

Service Manual - Tiger 1200 XCX

Introduction

Introduction

This manual is designed primarily for use by trained technicians in a properly equipped workshop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. The work can only be carried out if the owner has the necessary hand and special service tools to complete the job.

A basic knowledge of mechanics, including the proper use of tools and workshop procedures is necessary in order to carry out maintenance and repair work satisfactorily. Whenever the owner has insufficient experience or doubts regarding his ability to do the work, an authorised Triumph dealer must undertake all adjustments, maintenance, and repair work.

In order to perform the work efficiently and to avoid costly mistakes, read the text and thoroughly familiarise yourself with procedures before starting work.

All work should be performed with great care and in a clean working area with adequate lighting.

Always use the correct special service tools or equipment specified. Under no circumstances use makeshift tools or equipment since the use of substitutes may adversely affect safe operation.

Where accurate measurements are required, they can only be made using calibrated, precision instruments.

For the duration of the warranty period, an authorised Triumph dealer must perform all repairs and scheduled maintenance.

To maximise the life of your motorcycle:

- Accurately follow the maintenance requirements of the periodic maintenance chart in the Service Manual.
- Do not allow problems to develop. Investigate unusual noises and changes in the riding characteristics of the motorcycle. Rectify all problems as soon as possible (immediately if safety related).
- Use only genuine Triumph parts as listed in the electronic parts catalogue (EPC).
- Follow the procedures in this manual carefully and completely. Do not take short cuts.
- Keep complete records of all maintenance and repairs with dates and any new parts installed.
- Use only approved lubricants, as specified in the Owner's Handbook, in the maintenance of the motorcycle.

How to use this manual

To assist in the use of this manual, the section title is given at the top.

Each major section starts with a contents page, listing the information contained in the section.

The individual steps comprising repair operations are to be followed in the sequence in which they appear.

Adjustment and repair operations include reference to service tool numbers and the associated illustration depicts the tool.

Where usage is not obvious, the tool is shown in use.

Adjustment and repair operations also include reference to wear limits, relevant data, torque figures, specialist information and useful assembly details.

Warnings, Cautions and Notes

Particularly important information is presented in the following form:

WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

Note

- This note symbol indicates points of particular interest for more efficient and convenient operation.

Tampering with Noise Control System Prohibited

Owners are warned that the law may prohibit:

1.
 - The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use; and
 - the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

References

References to the left hand or right hand side given in this manual are made when viewing the motorcycle from the rear.

Operations covered in this manual do not always include reference to testing the motorcycle after repair. It is essential that work is inspected and tested after completion and, if necessary, a road test of the motorcycle is carried out particularly where safety related items are concerned.

Dimensions

The dimensions quoted are to design engineering specification with service limits where applicable.

During the period of running-in from new, certain adjustments may vary from the specification figures given in this manual. These will be reset by the dealer at the 500 mile/800 km service, and thereafter should be maintained at the figures specified in this manual.

Repairs and Replacements

Before removal and disassembly, thoroughly clean the motorcycle. Any dirt entering the engine or other parts will work as an abrasive and shorten the life of the motorcycle. Particular attention should be paid when installing a new part, that any dust or metal filings are cleared from the immediate area.

Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Never lever a component as this will cause damage both to the component itself and to the surface being levered against.

Whenever tapping to aid removal of an item is necessary, tap lightly using a hide or plastic faced mallet.

Edges

Watch for sharp edges, especially during engine disassembly and assembly. Protect the hands with industrial quality gloves.

When replacement parts are required, it is essential that only genuine Triumph parts are used.

Safety features and corrosion prevention treatments embodied in the motorcycle may be impaired if parts other than genuine Triumph parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the manufacturer's specification.

Tightening procedure

Generally, when installing a part with several bolts, nuts or screws, they should all be started in their holes and tightened to a snug fit, evenly and in a cross pattern. This is to avoid distortion of the part and/or gas or oil

leakage. Conversely, bolts, nuts, or screws, should all be loosened (in sequence if specified) by about a quarter of a turn and then removed.

Where there is a tightening sequence specified in this Service Manual, the bolts, nuts, or screws must be tightened in the order and by the method indicated.

Torque wrench setting figures given in this manual must be observed. The torque tools used must be of accurate calibration.

Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed. This applies particularly to micro-encapsulated fixings which must always be replaced if disturbed. Where necessary, the text in this manual will indicate where such a fixing is used.

Use of Crow Foot Spanner Adapters with Torque Wrenches

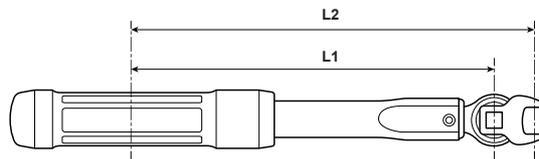
The use of a crow foot spanner adapter will effectively lengthen the lever arm of a torque wrench. The amount of torque applied to a fastener is increased as the torque wrench lever arm is extended, therefore the torque wrench setting must be adjusted in order to achieve the correct tightening torque.

Before tightening a fixing using a crow foot spanner adapter, measure the normal length of the torque wrench from the centre of the drive square to the centre of the handle (dimension L1). Fit the crow foot spanner adapter to the torque wrench as shown below. Measure the extended length of the torque wrench from the centre of the crow foot spanner head to the centre of the handle (dimension L2).

Use the following formula to calculate the correct torque wrench setting to achieve the required tightening torque.

Note

- The example shown below is calculated using a crow foot spanner measuring 25 mm from the centre of the spanner head to the centre of the drive square.



$M1 = M2 \times L1 / L2$	Example
M2 is the required tightening torque to be applied	90 Nm
L1 is the normal length of the torque wrench, measured from the centre of the drive square to the centre of the handle	300 mm
L2 is the extended length of the torque wrench, measured from the centre of the crow foot spanner head to the centre of the handle	325 mm
M1 is the calculated torque wrench setting	83 Nm

General Information

Ignition System Safety Precautions

WARNING

The ignition system produces extremely high voltages. Do not touch any part of the ignition system or any cables while the engine is running.

An electric shock caused by contact with the ignition system may lead to illness, injury or death.

 **WARNING**

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits and or diagnostic equipment.

The ignition system and any diagnostic equipment may interrupt the normal operation of such devices causing illness or death.

Dangerous Substances

 **WARNING**

Many liquids and other substances used in motor vehicles are poisonous and should under no circumstances be consumed and should, as far as possible, be kept from contact with the skin. These substances among others include acid, antifreeze, asbestos, brake fluid, fuel, lubricants, and various adhesives. Always pay close attention to the instructions printed on labels and obey the instructions contained within. These instructions are included for your safety and well-being.

NEVER DISREGARD THESE INSTRUCTIONS!

Third Party Products

 **WARNING**

Many proprietary products, such as chemicals, solvents and cleaning agents, will cause damage to components if used incorrectly or inappropriately. Always follow the manufacturer's instructions printed on the product container's labels and obey the instructions given. These instructions are included for your safety and well-being.

Damage to the motorcycle components caused by the incorrect or inappropriate use of chemicals, solvents and cleaning agents may reduce the components efficiency, resulting in loss of motorcycle control and an accident.

Fluoroelastomers

 **WARNING**

Fluoroelastomer material is used in the manufacture of various seals in Triumph motorcycles.

In fire conditions involving temperatures greater than 315°C this material will decompose and can then be potentially hazardous. Highly toxic and corrosive decomposition products, including hydrogen fluoride, carbonyl fluoride, fluorinated olefins and carbon monoxide can be generated and will be present in fumes from fires.

In the presence of any water or humidity, hydrogen fluoride may dissolve to form extremely corrosive liquid hydrofluoric acid.

If such conditions exist, do not touch the material and avoid all skin contact. Skin contact with liquid or decomposition residues can cause painful and penetrating burns leading to permanent, irreversible skin and tissue damage.

Oils

 **WARNING**

The engine oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.

 **WARNING**

 **WARNING**

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.

Health Protection Precautions

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets.
- Overalls must be cleaned regularly. Discard heavily soiled clothing and oil impregnated footwear.
- First aid treatment should be obtained immediately for open cuts and wounds. Always be aware of who your nearest First Aider is and where the medical facilities are kept.
- Use barrier creams, applying before each work period to protect the skin from the effects of oil and grease and to aid removal of the same after completing work.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use petrol, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practicable, degrease components prior to handling.

 **WARNING**

Any risk of eye injury must be avoided. Always wear eye protection when using a hammer, air line, cleaning agent or where there is ANY risk of flying debris or chemical splashing.

Environmental Protection Precautions

 **CAUTION**

Do not pour oil on the ground, down sewers or drains, or into water courses. To prevent pollution of water courses etc., dispose of used oil sensibly. If in doubt contact your local authority.

Burning of used engine oil in small space heaters or boilers can be recommended only for units of approved design. If in doubt, check with the appropriate local authority and/or manufacturer of the approved appliance. Dispose of used oil and used filters through authorised waste disposal contractors, to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact your local authority for advice on disposal facilities.

Brakes

 **WARNING**

 **WARNING**

Brake fluid is hygroscopic which means it will absorb moisture from the air. Any absorbed moisture will greatly reduce the boiling point of the brake fluid causing a reduction in braking efficiency.

Replace brake fluid in line with the routine maintenance schedule. A dangerous riding condition could result if this important maintenance item is neglected!

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake fluid from a sealed container and never use fluid from an unsealed container or from one that has been previously opened.

Do not mix different brands of fluid. Check for fluid leakage around brake fittings, seals and joints.

Check regularly for brake hose damage.

FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY REDUCE BRAKING EFFICIENCY LEADING TO AN ACCIDENT.

 **WARNING**

If there has been an appreciable drop in the level of the fluid in either brake fluid reservoir, consult your authorised Triumph dealer for advice before riding.

If the brake lever or pedal feels soft when it is applied, or if the lever/pedal travel becomes excessive, there may be air in the brake lines or the brake may be defective.

It is dangerous to operate the motorcycle under such conditions and remedial action must be taken by your authorised Triumph dealer before riding the motorcycle.

Failure to take remedial action may reduce braking efficiency leading to an accident.

 **WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident.

Failure to change the brake fluid at the interval specified in the routine maintenance schedule may reduce braking efficiency resulting in an accident.

 **WARNING**

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in an accident.

 **WARNING**

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

Safety Instructions

Jacking and Lifting

WARNING

Always ensure that any lifting apparatus has adequate load and safety capacity for the weight to be lifted. Ensure the motorcycle is well supported to prevent any possibility of the machine falling prior to lifting or jacking or while repairs and servicing are carried out.

Never rely on a single means of support when working with the motorcycle. Use additional safety supports and straps to prevent toppling.

Do not leave tools, lifting equipment, spilled oil, etc. in a place where they could become a hazard to health. Always work in a clean, tidy area and put all tools away when the work is finished.

Precautions Against Damage

Avoid spilling brake fluid or battery acid on any part of the bodywork. Wash spillages off with water immediately. Disconnect the battery earth lead before starting work, see **ELECTRICAL PRECAUTIONS**.

Always use the recommended service tool where specified.

Protect exposed bearing and sealing surfaces, and screw threads from damage.

Coolant

WARNING

Coolant mixture, which is blended with antifreeze and corrosion inhibitors contains toxic chemicals which are harmful to the human body. Never swallow antifreeze, corrosion inhibitors or any of the motorcycle coolant.

WARNING

Do not remove the radiator cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.

CAUTION

The coolant antifreeze contains a corrosion inhibitor which helps prevent damage to the metal surfaces inside the cooling system. Without this inhibitor, the coolant would 'attack' the metals and the resulting corrosion would cause blockages in the cooling system leading to engine overheating and damage. Always use the correct antifreeze as specified in the Owner's Handbook. Never use a methanol based antifreeze as this does not contain the required corrosion inhibition properties.

CAUTION

Distilled water must be used with the antifreeze (see specification for antifreeze) in the cooling system. If hard water is used in the system, it causes scale accumulation in the water passages, and considerably reduces the efficiency of the cooling system. Reduced cooling system efficiency may lead to the engine overheating and engine damage.

Cleaning Components

A high flashpoint solvent is recommended to reduce fire hazard.

Always follow container directions regarding the use of any solvent.

Always use the recommended cleaning agent or equivalent.

Do not use degreasing equipment for components containing items which could be damaged by the use of this process. Whenever possible, clean components and the area surrounding them before removal. Always observe scrupulous cleanliness when cleaning dismantled components.

Lubrication

The majority of engine wear occurs while the engine is warming up and before all the rubbing surfaces have an adequate lubrication film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface, which has lost its lubrication film. Old grease and dirty oil should be cleaned off. This is because used lubricants will have lost some lubrication qualities and may contain abrasive foreign particles.

Use recommended lubricants. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulphide grease in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

Joints and Joint Faces

Assemble joints dry unless otherwise specified in this manual.

If gaskets and/or jointing compound is recommended for use; remove all traces of old jointing material prior to reassembly. Do not use a tool which will damage the joint faces and smooth out any scratches or burrs on the joint faces using an oil stone. Do not allow dirt or jointing material to enter any tapped holes.

Gaskets, O-rings

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

Liquid Gasket, Non-permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly as excessive amounts of sealer may block engine oil passages and cause serious damage. Prior to reassembly, blow through any pipes, channels or crevices with compressed air.

WARNING

To prevent injury, always use eye, face and ear protection when using compressed air. Always wear protective gloves if the compressed air is to be directed in proximity to the skin.

Screw Threads

Metric threads to ISO standard are used.

Damaged nuts, bolts and screws must always be discarded.

Castellated nuts must not be loosened back to accept a split pin, except in those recommended cases when this forms part of an adjustment.

Do not allow oil or grease to enter blind threaded holes. The hydraulic action on screwing in the bolt or stud could split the housing.

Always tighten a nut or bolt to the recommended torque figure. Damaged or corroded threads can affect the torque reading.

Unless specified, threaded fixings must always be fitted dry (no lubrication).

WARNING

Never lubricate a thread unless instructed to do so.

When a thread of a fixing is lubricated, the thread friction is reduced. When the fixing is tightened, reduced friction will cause over tightening and possible fixing failure.

A fixing which fails in service could cause component detachment leading to loss of control and an accident.

Locking Devices

Always release locking tabs and fit new locking washers. Do not reuse locking tabs.

Fitting a Split Pin

Always fit new split pins of the correct size for the hole in the bolt or stud. Do not loosen back castle nuts when fitting a split pin, except in those recommended cases when this forms part of an adjustment.

Always fit new roll pins of an interference fit in the hole.

Circlips, Retaining Rings

Replace any circlips and retaining rings that are removed. Removal weakens and deforms circlips causing looseness in the circlip groove. When installing circlips and retaining rings, take care to compress or expand them only enough to install them.

Always use the correct replacement circlip as recommended in the Triumph parts catalogue.

Self-Locking Nuts

Self-locking nuts can be reused, provided resistance can be felt when the locking portion passes over the thread of the bolt or stud.

DO NOT reuse self-locking nuts in critical locations, e.g. suspension components. Always use the correct replacement self-locking nut.

Encapsulated Bolts

An encapsulated bolt can be identified by a coloured section of thread which is treated with a locking agent.

Unless a specified repair procedure states otherwise, encapsulated bolts cannot be reused and **MUST** be replaced if disturbed or removed.



Failure to replace an encapsulated bolt could lead to a dangerous riding condition. Always replace encapsulated bolts.

Oil and Grease Seals

Replace any oil or grease seals that are removed. Removal will cause damage to an oil seal which, if reused, would cause an oil leak.

Ensure the surface on which the new seal is to run is free of burrs or scratches. Renew the component if the original sealing surface cannot be completely restored.

Protect the seal from any surface which could cause damage over which it has to pass when being fitted. Use a protective sleeve or tape to cover the relevant surface and avoid touching the sealing lip.

Lubricate the sealing lips with a recommended lubricant. This will help to prevent damage in initial use. On dual lipped seals, smear the area between the lips with appropriate grease.

When pressing in a seal which has manufacturer's marks, press in with the marks facing out.

Seals must be pressed into place using a suitable driver. Use of improper tools will damage the seal.

Press

A part installed using a press or driver, such as a wheel bearing, should first be coated with oil or grease on its outer or inner circumference so that it will locate smoothly.

Ball Bearing

When installing a ball bearing, the bearing race which is an interference fit should be pushed by a suitable driver. This prevents severe stress or damage to the load carrying components. Press a ball bearing until it touches the shoulder in the bore or on the shaft.

With the sealing lip facing the lubricant, press or drift a seal to the depth of its housing, if the housing is shouldered, or flush with the face of the housing where no shoulder is provided.

Chassis Bearing Lubrication

Note

Note

- **This information relates only to bearing lubrication. For the procedures necessary to replace a bearing, always refer to the relevant section of this Service Manual.**
- **Bearings installed in engine and transmission applications are not covered by this information. Refer to the Lubrication chapter or the relevant engine chapter for additional information.**

General

For a bearing to be serviceable for its anticipated life span it must be checked, adjusted and lubricated at regular intervals, as specified in the service schedules given in the Owner's Handbook and this Service Manual.

A correctly lubricated bearing will have a film of lubrication that separates the moving parts, disperses heat and protects the bearing surfaces from corrosion.

Note

- **In all cases, use the lubricant recommended.**
- **Grease the bearing, not the cavity where it is located.**
- **A bearing that is not regularly checked and lubricated will have a reduced life span.**

New Bearings

New bearings are typically protected with an oil preservative to prevent corrosion etc. during storage. This is NOT the lubrication for the bearing but DOES NOT need to be washed off prior to assembly and in-service lubrication.

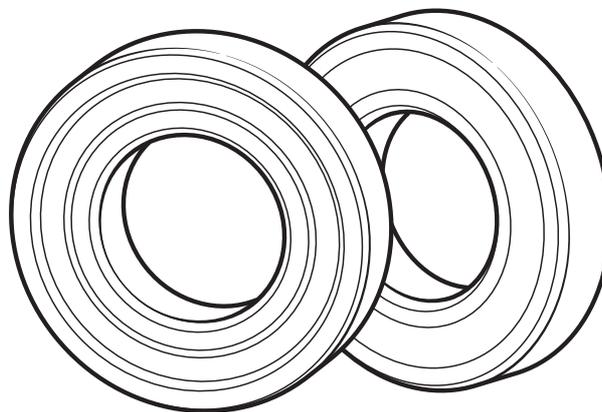
When lubricating a new bearing with grease the following steps should be taken:

1. Do not clean off the oil preservative.
2. Grease must be forced between the roller elements and the roller cage.
3. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.
4. Any excess grease should be smeared on the outside of the rollers.

Lubrication and Checks While Servicing a Bearing

1. Disassemble parts as necessary to access the bearing.
2. Inspect the old grease covering the bearing, looking for signs of bearing damage, i.e. flakes or specks of metal.
3. Remove the old grease.
4. Check the bearing for smooth operation and visually check for corrosion, dents and flaking in the bearing race, rollers or cage. Replace if necessary.

Below/overleaf several common bearing types and the lubrication procedures for each are identified:

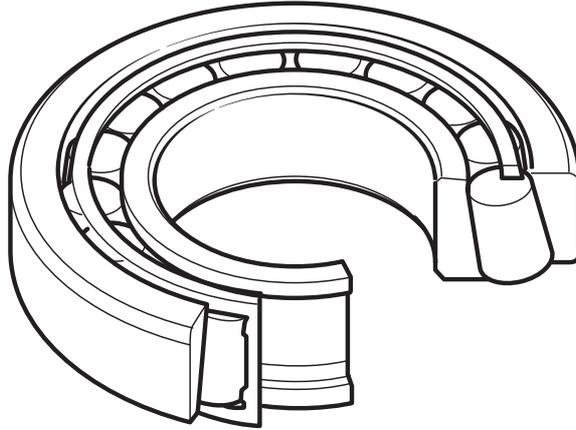


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Sealed Bearings

Note

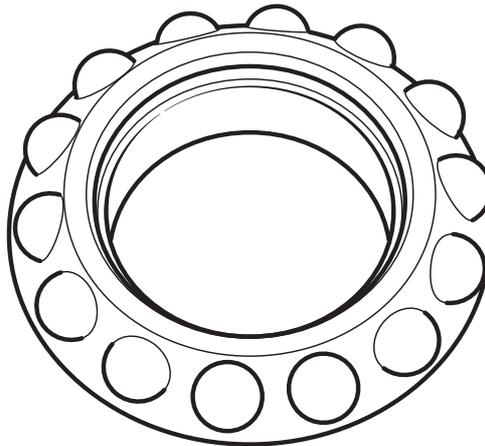
- Sealed bearings can be identified by their integrated seals.
- Sealed bearings are lubricated for life by the manufacturer.
- Any attempt to change the grease in a sealed bearing will damage the integrated seals. If the seals are damaged, dirt and water will ingress and the life of the bearing will be greatly reduced.



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Taper Bearings

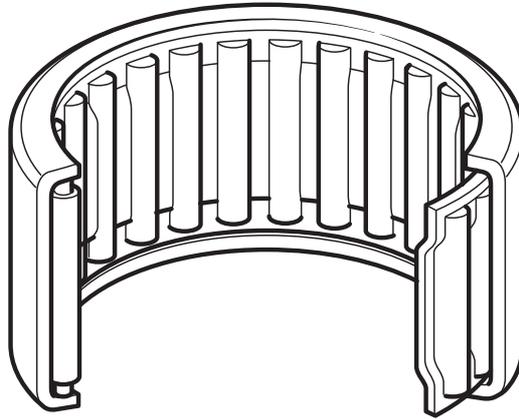
1. Grease must be forced between the inner race and the roller carrier.
2. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.
3. Any excess grease should be smeared on the outside of the rollers.



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Angular Contact and Ball Bearing

1. Grease the bearing races and the ball bearing carrier.
2. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.



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Needle Roller Bearings

1. Coat the needle rollers with grease.
2. Ensure the needle rollers turn so that the grease is distributed over the entire circumference of the internal parts.
3. Assemble the parts, adjust and check as necessary.

Metal Bushes

1. Disassemble the parts as necessary to access the bush.
2. Remove the old grease.
3. Apply fresh grease to the metal bush.

Fuel Handling Precautions

General

The following information provides basic precautions which must be observed if petrol (gasoline) is to be handled safely. It also outlines other areas of risk which must not be ignored. This information is issued for basic guidance only and, if in doubt, appropriate enquiries should be made to your local Fire Officer.

Petrol – Gasoline

When petrol (gasoline) evaporates it produces 150 times its own volume in vapour which when diluted with air becomes a readily ignitable mixture. The vapour is heavier than air and will always fall to the lowest level. It can readily be distributed throughout any indoor environment by air currents, consequently, even a small spillage of petrol (gasoline) is potentially very dangerous.



 **WARNING**

Petrol (gasoline) is highly flammable and can be explosive under certain conditions. When opening the fuel tank cap always observe all the following items:

Turn the motorcycle ignition switch OFF.

Do not smoke.

Always have a fire extinguisher containing FOAM, CO₂, HALON or POWDER close at hand when handling or draining fuel or fuel systems. Fire extinguishers must also be present in areas where fuel is stored.

Always disconnect the vehicle battery, negative (black) lead first, before carrying out, dismantling or draining work on a fuel system.

Whenever petrol (gasoline) is being handled, drained, stored or when fuel systems are being dismantled, make sure the area is well ventilated. All potential forms of ignition must be extinguished or removed (this includes any appliance with a pilot light). Any lead-lamps must be flame-proof and kept clear of any fuel spillage.

Warning notices must be posted at a safe distance from the site of the work to warn others that petrol (gasoline) is being openly handled. The notice must instruct the reader of the precautions which must be taken.

Failure to observe any of the above warnings may lead to a fire hazard which could result in personal injury.

 **WARNING**

No one should be permitted to repair components associated with petrol (gasoline) without first having specialist training on the fire hazards which may be created by incorrect installation and repair of items associated with petrol (gasoline).

Repairs carried out by untrained personnel could bring about a safety hazard leading to a risk of personal injury.

 **WARNING**

Draining or extraction of petrol (gasoline) from a vehicle fuel tank must be carried out in a well ventilated area.

The receptacle used to contain the petrol (gasoline) must be more than adequate for the full amount of fuel to be extracted or drained. The receptacle should be clearly marked with its contents, and placed in a safe storage area which meets the requirements of local authority regulations.

When petrol (gasoline) has been extracted or drained from a fuel tank, the precautions governing naked lights and ignition sources should be maintained.

Failure to observe any of the above warnings could bring about a safety hazard leading to a risk of personal injury.

Fuel Tank Removal

Fuel tanks should have a 'PETROL (GASOLINE) VAPOUR' warning label attached to them as soon as they are removed from the vehicle. In all cases, they must be stored in a secured, marked area.

Chassis Repairs

 **WARNING**

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for repair or inspection. Any accident can cause damage to the motorcycle, which if not correctly repaired, may cause a second accident which may result in injury or death.

The frame must not be modified as any modification to the frame such as welding or drilling may weaken the frame resulting in an accident.

Electrical Precautions

The following guidelines are intended to ensure the safety of the operator whilst preventing damage to the electrical and electronic components fitted to the motorcycle. Where necessary, specific precautions are detailed in the relevant sections of this manual which should be referred to prior to commencing repair operations.

Equipment - Prior to commencing any test procedure on the motorcycle ensure that the relevant test equipment is working correctly and any harness or connectors are in good condition, in particular mains leads and plugs.

 **WARNING**

The ignition system produces extremely high voltages. Do not touch any part of the ignition system or any cables while the engine is running.

An electric shock caused by contact with the ignition system may lead to illness, injury or death.

 **WARNING**

Wearers of surgically implanted heart pacemaker devices should not be in close proximity to ignition circuits and/or diagnostic equipment.

The ignition system and any diagnostic equipment may interrupt the normal operation of such devices causing illness or death.

 **WARNING**

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

Do not jump start the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gases causing a risk of personal injury.

High Voltage Circuits - Whenever disconnecting live H.T. circuits always use insulated pliers. Exercise caution when measuring the voltage on the coil terminals while the engine is running. High voltage spikes can occur on these terminals.

Connectors and Harness - The engine of a motorcycle is a particularly hostile environment for electrical components and connectors. Always ensure these items are dry and oil-free before disconnecting and connecting test equipment. Never force connectors apart either by using tools or by pulling on the wiring itself. Always ensure locking mechanisms are disengaged before removal and note the orientation to enable correct reconnection. Ensure that any protective covers and substances are replaced if disturbed.

Having confirmed a component to be faulty, switch off the ignition and disconnect the battery negative (black) lead first. Remove the component and support the disconnected harness. When replacing the component keep oily hands away from electrical connection areas and push connectors home until any locking mechanism becomes fully engaged.

Battery Disconnecting

Before disconnecting the battery, switch off all electrical equipment.

 **WARNING**

To prevent the risk of a battery exploding and to prevent damage to electrical components ALWAYS disconnect the battery negative (black) lead first. When reconnecting the battery, always connect the positive (red) lead first, then the negative (black) lead. Always disconnect the battery when working on any part of the electrical system.

Failure to observe the above warnings may lead to electrical damage and a fire hazard which could cause personal injury.

Always ensure that battery leads are routed correctly and are not close to any potential chafing points.

Disciplines

Switch off the ignition prior to making any connection or disconnection in the system. An electrical surge can be caused by disconnecting 'live' connections which can damage electronic components.

Ensure hands and work surfaces are clean and free of grease, swarf, etc. as grease collects dirt which can cause tracking or high-resistance contacts.

Prior to commencing any test, and periodically during any test, touch a good earth to discharge body static. This is because some electronic components are vulnerable to static electricity.

Electrical Wires

All the electrical wires are either single-colour or two-colour and, with only a few exceptions, must be connected to wires of the same colour. On any of the two-colour wires there is a greater amount of one colour and a lesser amount of a second colour. A two-colour wire is identified by first the primary colour and then the secondary colour. For example, a yellow wire with thin red stripes is referred to as a 'yellow/red' wire; it would be a 'red/yellow' wire if the colours were reversed to make red the main colour.

Glossary of Circuit Diagram Symbols

The following is a description of the symbols found in the circuit diagrams used in all Triumph Service Manuals.

Connector



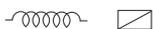
This illustration is used to show all multiplug type electrical connectors on Triumph circuit diagrams. The numbers in the box relate to the terminal numbers of the connector pins. On ECMs with two connectors, the number would be prefixed with the letters 'A' or 'B' to identify each connector. An additional number outside the box will identify the component.

Diode



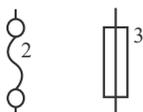
An electrical one-way valve. Diodes allow current to flow in one direction but will not allow it to return. The arrow, which forms part of the diode symbol, indicates the direction of current flow.

Electromagnetic Winding (solenoid)



An electromagnetic winding (or solenoid) is used to convert an electrical current into a lateral movement. This can then be used to operate switches (as used in relays) or other components such as fuel injectors or secondary air injection solenoids.

Fuse



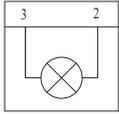
A fuse is a device which protects a circuit in the event of a fault. The fuse will 'blow' should a short circuit occur, protecting that circuit from further damage. The number next to the fuse on the circuit diagram indicates the position of the fuse in the fuse box.

Ground Point



This symbol is used to show ground points. This is the negative connection to either the frame or engine, and is a common cause of intermittent faults due to loose or corroded connections.

Lamp or Bulb



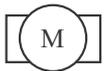
This symbol is used to show all types of light bulbs. The numbers in the box relate to the terminal numbers of the connector pins. An additional number outside the box will identify the component.

LED (Light Emitting Diode)



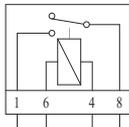
Triumph use LEDs for the alarm warning light, instrument illumination and warning lights, gear change lights and rear light/brake lights on various models.

Motor



An electric motor. This could be the starter motor or a motor within an actuator, for example within the ABS modulator.

Relay



A relay is effectively an electromagnetic switch. To close the relay contacts and complete the circuit, an electromagnet in the relay is energised which causes the relay contacts to close, making the circuit complete. Relays are used when the electrical current is too great for a mechanical switch, usually when the switching must be done quickly to prevent arcing across the switch contacts. If a mechanical switch were used, the mechanical switch contacts would quickly burn away.

Resistor



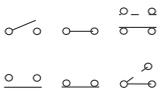
A device placed in a cable to reduce a voltage or restrict the maximum current a device can draw.

Splice



A hard cable joint where two or more cables are joined in the wiring harness. A potential source of both open and short circuits.

Switches



A mechanical device for completing or breaking a circuit. There are three common types of switch: normally open, normally closed and changeover.

Electrical Testing

For any electrical system to work, electricity must be able to flow in a complete circuit from the power source (the battery) via the components and back to the battery. No circuit means no electrical flow. Once the power has left the positive side of the battery and run through the component it must then return to the battery on its negative side (this is called earth or ground). To save on wiring, connections and space, the negative side of the battery is connected directly to the frame or engine. Around the frame and engine will be various other ground points to which the wiring coming from components will be connected. In the case of the starter motor it bolts directly to the engine, which is bolted to the frame. Therefore the frame and engine also form part of the earth return path.

Ohm's Law

The relationship between voltage, current and resistance is defined by Ohm's Law.

- The potential of a battery is measured in volts (V).
- The flow of current in a circuit (I) is measured in amperes.
- The power rating of a consumer is measured in watts (W).
- The resistance (R) of a circuit is measured in Ohms.

Ohm's law, for practical work can be described as -

$$\frac{\text{Voltage}}{\text{Current}} = \text{Resistance}$$

Power is calculated by multiplying Volts x Amps -

$$\text{Watts} = \text{Volts} \times \text{Amps}$$

By transposing either of these formulae, the value of any unit can be calculated if the other two values are known.

For example, if a battery of 12 V is connected to a bulb of 60 W:

- the current flowing in the circuit can be calculated by using -

$$\frac{W}{V} = I \quad \frac{60}{12} = 5$$

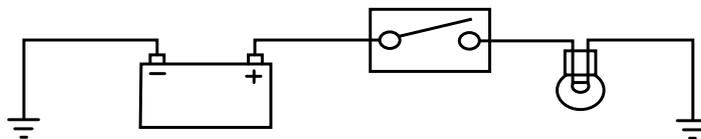
- the bulb resistance can be calculated by using -

$$\frac{V}{I} = R \quad \frac{12}{5} = 2.4$$

To use either of the following triangles, put your finger over the value you want to find. Multiply the remaining values if side by side, or divide if one is over the other.



Basic Electrical Circuits



Basic Circuit Diagram

In the above circuit an electrical reservoir (the battery) is connected via a cable to a terminal on the controlling device (the switch) whose contacts are either open or closed. The other terminal on the switch is connected via a cable to the consumer (the bulb), and the other side of the bulb filament is connected to ground (earth) by another cable. The ground point is usually a part of the frame or engine, to which the battery negative terminal is also connected.

When the switch contacts are open (as shown in the diagram), the circuit is broken and no current flows. When the switch contacts are closed, the circuit is made and current flows from the battery positive terminal through the switch contacts and bulb filament to ground. The frame completes the circuit to the battery negative terminal and the bulb illuminates.

Although some circuits on the circuit diagram may at first seem more complicated, it will generally be found that they can be broken down into sections which do not differ greatly from the basic circuit above.

Circuit Diagrams

Circuit diagrams are created to provide a 'picture' of the electrical system and to identify the route taken by each individual wire through the system, in order to identify which components it feeds and which connectors the wire runs through. Circuit diagrams are an essential tool for fault finding, as it is possible to locate start and finish points for a circuit without having to manually trace the wire through the motorcycle itself. Circuit diagrams may look confusing at first but when they are studied closely they soon become logical.

Due to the complex circuits and the number of individual wires, Triumph uses two types of circuit diagram in its Service Manuals.

- Within the manual, conventional circuit diagrams are used to show the layout of the main circuits of the motorcycle. These are: Engine management/ignition, Lighting, Starting and Charging and Auxiliary and Accessory. In these diagrams no attempt is made to show the components of the system in any particular order or position in relation to the motorcycle.
- At the back of the Service Manual a full colour layout circuit diagram is used to show the main electrical components in a position similar to the actual position on the motorcycle.

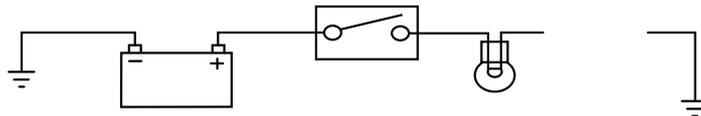
Both of these circuit diagrams use similar symbols to illustrate the various system components and will be accompanied by a key indicating circuit diagram components and wiring colour codes.

Circuit diagrams also depict the inner workings of a switch housing (i.e. which wire connects to which when a switch is turned from one position to another) so that a test of that switch can be made using the wire terminals in the connector instead of disassembling the switch itself.

Tracing Circuits

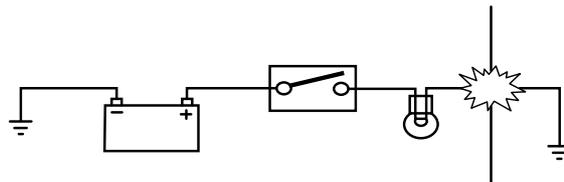
The following is a description of two types of common electrical failures, and some of the methods which may be used to find them.

Open Circuit



A break in an electrical circuit - current cannot flow. Usually caused by a break in a wire or cable or by a loose connection. Open circuits can often be intermittent, making diagnosis difficult.

Short Circuit



A 'short cut' in an electrical circuit - current bypasses the intended circuit, either to ground or to another, different circuit. Often caused by failure of the cable insulation due to chafing or trapping of the wire. There are two different types of short circuit - short to ground and short to battery Voltage.

A short to ground means that the current is going to ground before it reaches the component it is supposed to feed. These are often caused by chafing of the harness to the frame or wires trapped between a bolted component, and will often blow the fuse on that circuit.

A short to battery voltage (12 Volts) is caused by a live power supply wire contacting an adjacent cable. Note that it is also possible for a 5 Volt sensor reference voltage to short to an adjacent circuit, which can also cause electrical failures and DTCs (Diagnostic Trouble Code) to be stored.

When tracing a wire that is suspect, carefully check the circuit diagram before starting. Remember:

- a wire may diverge at a splice and go off to feed other circuits. If these circuits are working, check for wiring faults from the splice onwards.
- the circuit diagram is not an accurate guide to the actual location of the parts when fitted on the bike. It is a schematic diagram of the circuits.

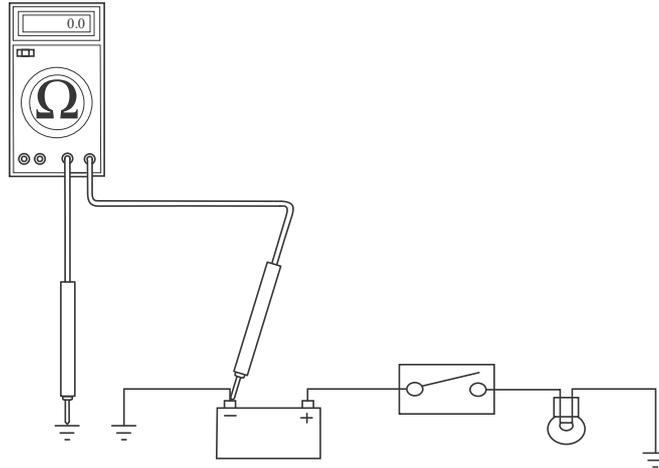
- particularly where engine management items are concerned, the circuit is only completed by the ECM. If the ECM is not connected, the circuit may register as open.

To Check Continuity:

! CAUTION

Ensure the circuit being tested is switched off before measuring continuity. Damage to the Digital Multi Meter (DMM) may result from testing a 'live' circuit with the meter set to resistance (Ω).

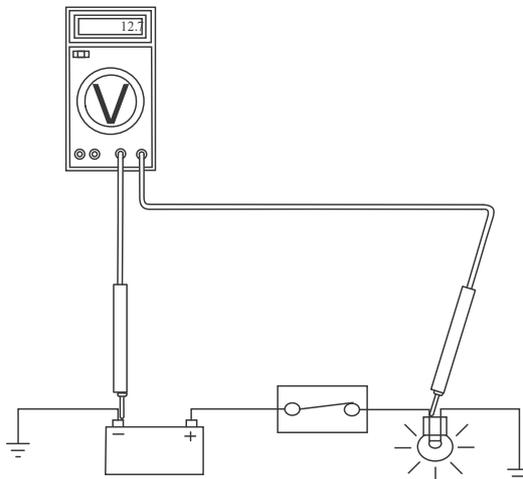
In the example below, the ground circuit continuity is being tested from the battery to the frame.



- Locate each end of the wire.
- Set the Digital Multi Meter (DMM) to resistance check Ohms.
- Probe each end of the wire.
- If there is continuity, the meter will usually beep or register the resistance of the cable.
- A high resistance figure could indicate a dirty or corroded connection.
- If there is a break in the wire, the meter will not beep or register a resistance.
- By probing the wire in various places, the position of a high resistance or break in the wire (open circuit) can be narrowed down until it is found.

To Measure Voltage:

In the example below, the circuit voltage is being measured at the bulb positive (+) terminal.



- Turn the circuit to be tested 'ON'.

- Set the Digital Multi Meter (DMM) to Voltage Check (V). Ensure the multi meter is set to DC Volts for direct current circuits (most circuits) or AC Volts for alternating current circuits (typically alternator output voltage tests).
- Set the range of the DMM to the range best suited to the voltage of the circuit being tested (typically 20 Volts for most DMMs). Refer to the DMM manufacturers instructions.
- Connect the black (ground) lead of the DMM to a reliable ground connection (usually the battery or frame ground).
- Locate the positive terminal of the wire or component to be tested.
- Connect the red (positive) lead of the DMM to the positive terminal.
- Read the voltage from meter.

Splices

Splices are probably the most common cause of wiring faults after connectors. Splices are made where two or more wires come together and diverge in different directions, usually to feed a different circuit.

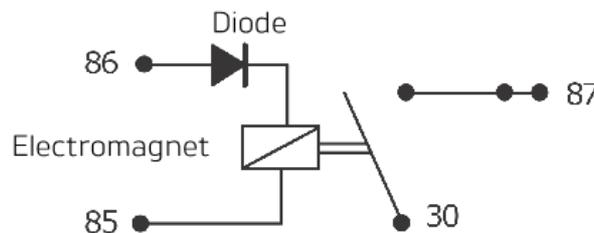
To locate a splice, it is necessary to peel back the insulation and examine the splice for its integrity. The most common fault is where one of the wires at the joint has come adrift usually causing the circuit it feeds or grounds to become 'dead'.

Switches

To check a switch, set the multimeter to resistance/continuity and probe the two pins that form a closed circuit when the switch is pushed. If the switch is working correctly, the resistance should register or the meter will beep.

Relays

All relay cases have a circuit path engraved on them showing the circuit path across the electromagnet and the switch. Before making any checks, first note the pin designations, current paths, and whether or not there is a diode in either circuit path.



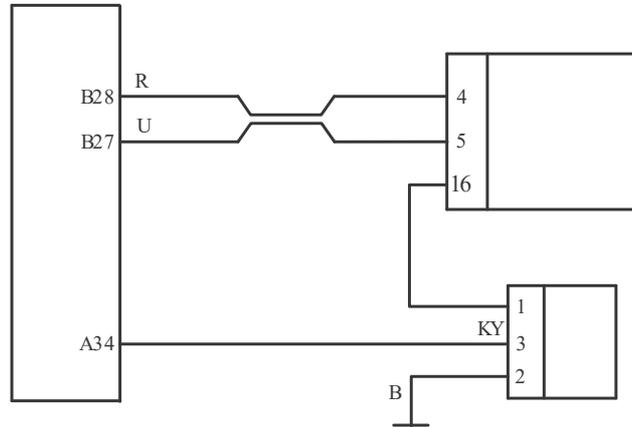
Make continuity checks across the electromagnet first, usually from pin 86 (positive) to pin 85 (negative). If a diode appears in the circuit use the diode check on the multimeter (Volts scale) in the direction of current flow. If there is no diode, use the resistance check facility. An open circuit or unusually high resistance value indicates a faulty relay.

To check the switch side, apply a 12 Volt supply between pins 86 and 85. With the supply connected, the relay should be heard to click and there should be continuity between pins 30 and 87. An open circuit indicates a faulty relay.

CAN (Controller Area Networking)

CAN (sometimes called CANbus) is a protocol for data communication between Electronic Control Modules (ECMs). Each ECM on the network is connected by a single pair of twisted wires (or bus) which are used for the transmission of vehicle sensor data. By using CAN, the overall number of system sensors, and the amount of cabling required to allow ECMs to communicate with each other is greatly reduced.

This saves cost, weight and space, and makes the system more reliable, as the physical number of wires and connections is reduced.



CAN works by each ECM sending out 'packets' of information (such as engine speed or fuel consumption information) on to the network bus (note that the network must be free of data before any ECM is allowed to transmit). This data is given a priority according to its importance (for example 'engine speed' may have a higher priority than 'low fuel level'), so that even if two ECMs send data at the same time, high priority information is always sent first. Lower priority data is then resent after the high priority data has been received by all ECMs on the network.

The receiving ECM confirms the data has been received correctly and that the data is valid, and this information is then used by the ECM as necessary. Specific data not required by an ECM will still be received and acknowledged as correct but then disregarded (for example if an ECM does not require 'clutch switch position' information, this data packet would be ignored).

This allows for a very high speed system of communication, which is also very reliable. Should one ECM fail or transmit corrupted or otherwise incorrect messages, none of the other ECMs on the network will be affected, and after a certain time that ECM will be prevented from transmitting further messages until the fault is rectified. This stops the ECM from clogging the network with incorrect data and preventing other messages from getting through. The fault would then be reported by a DTC (Diagnostic Trouble Code).

Triumph currently uses CAN for communication between the following ECMs:

- Engine ECM
- Instruments
- ABS ECM
- Immobiliser or Chassis ECM
- Diagnostic connector
- Inertial Measurement Unit (if fitted)
- Audio system (if fitted)
- Electronic steering lock (if fitted)
- LED Headlights (if fitted).

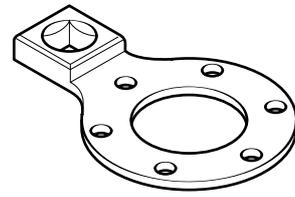
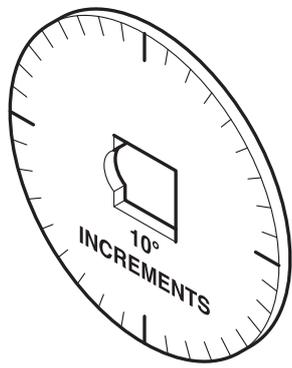
Service Tools

Service Tools

Service tools have been developed to facilitate removal, dismantling and assembly of certain mechanical components in a practical manner without causing damage. Some operations in this service manual cannot be carried out without the aid of the relevant service tools. Where this is the case, the tools required will be described during the procedure.

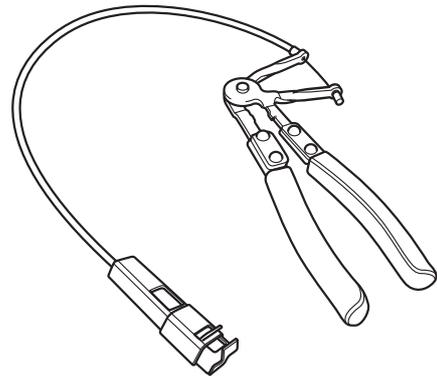
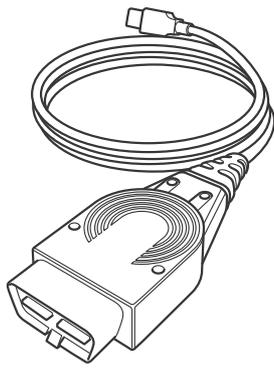
Service Tools

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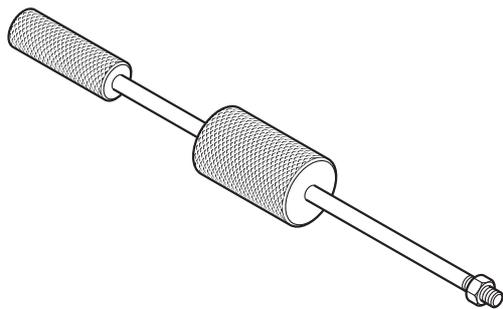
T3880105 - Torque Angle Gauge

T3880371 - Oil Pump Drive Gear Holder

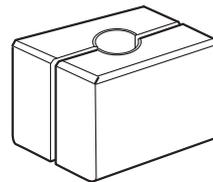


T3880057 - Triumph Diagnostic Interface

T3880207 - Hose Clip Pliers

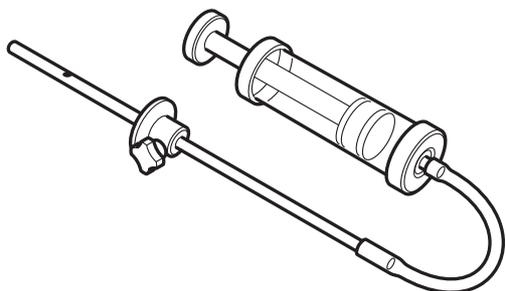


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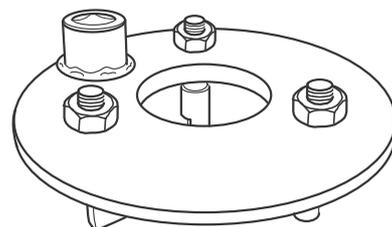


T3880208 - Slide Hammer

T3880317 - Damper Tube Clamp

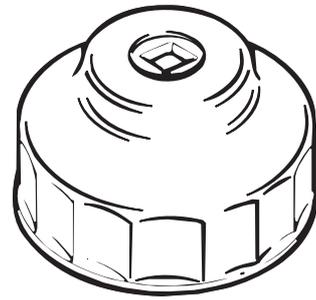
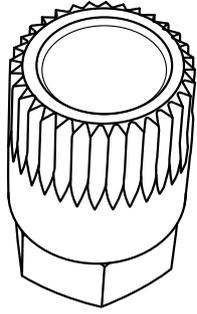


ccha



T3880160 - Fork Oil Filler/Evacuator

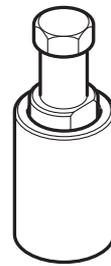
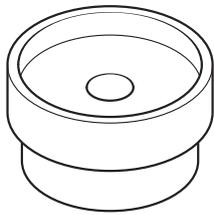
T3880660 - Clutch Restraint



gahc

T3880602 - Alternator Wrench

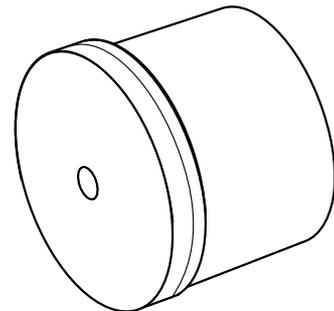
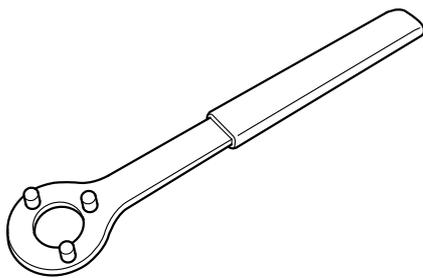
T3880313 - Oil Filter Wrench



cczh

T3880070 - Bearing Installer

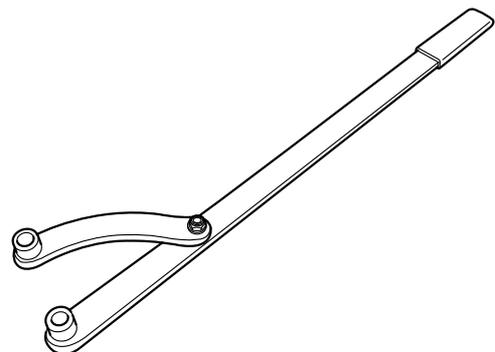
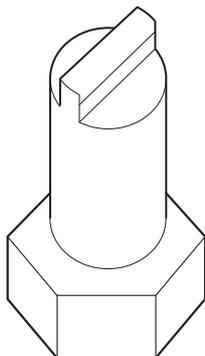
T3880365 - Alternator Housing Puller



cjhb

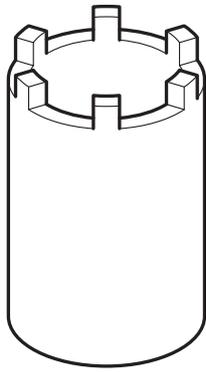
T3880603 - Oil Pump Restraint

T3880605 - Cylinder Liner Extractor (use with the frame from Cylinder Liner Extractor T3880315)

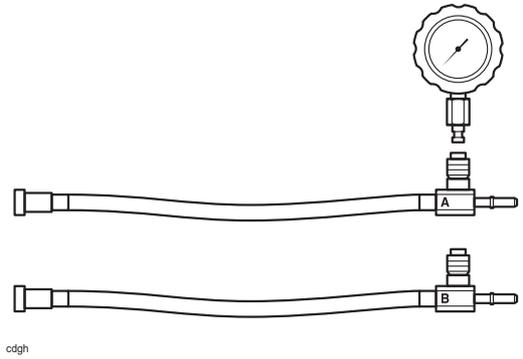


cdoa2

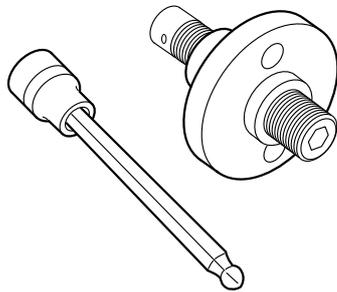
T3880377 - Engine Mounting Adjuster



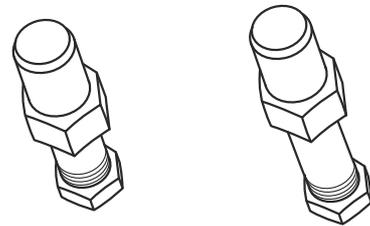
T3880606 - Flywheel Restraint Handle



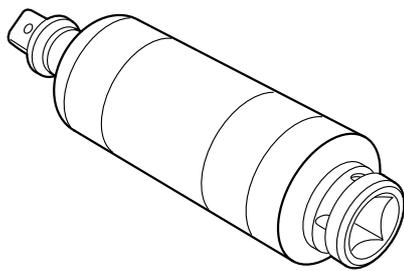
T3880023 - 50 mm Socket



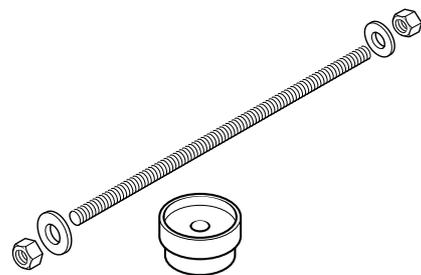
T3880001 - Fuel Pressure Gauge



T3880607 - Camshaft Timing Tensioner

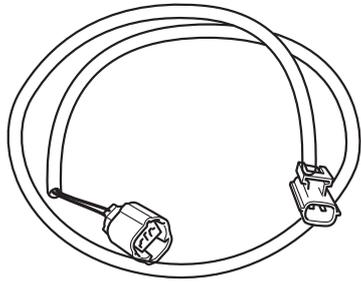


T3880608 - Flywheel Pin Set

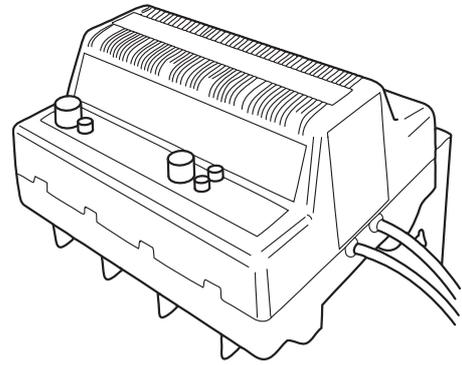


T3880609 - Timing Torque Limiter

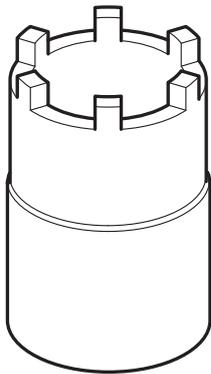
T3880053 - Wheel Bearing Extraction Kit



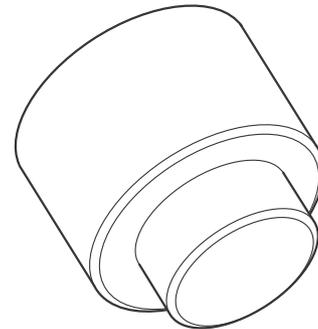
T3880123 - Extension Cable



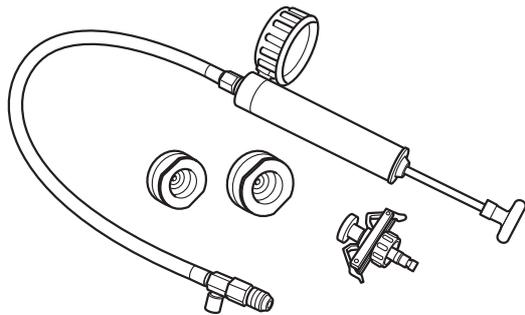
BatteryMate Battery Charger - See Latest Parts Catalogue for Part Number Information



T3880620 - Adjuster Socket, 48 mm

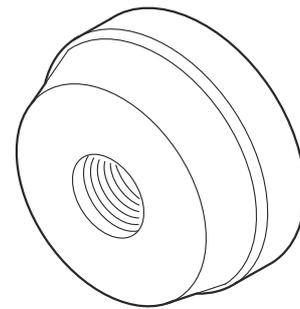


T3880624 - Housing Support

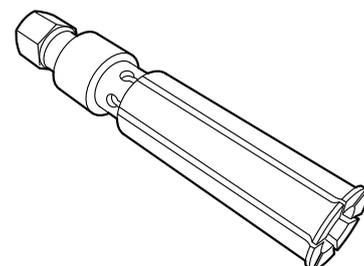
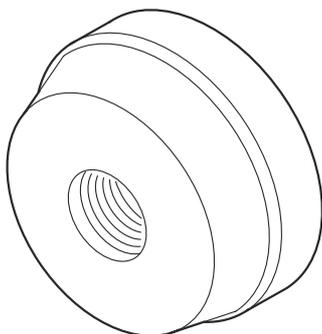


cgwp

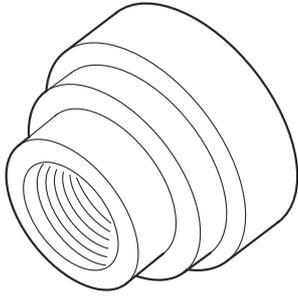
T3880147 - Radiator and Cap Tester Kit



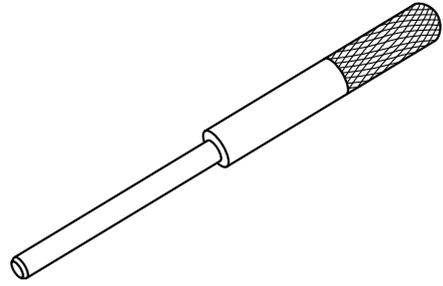
T3880625 - Bearing Installer, 39 mm



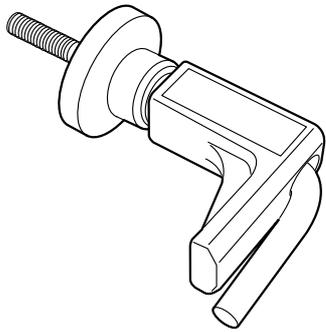
T3880626 - Bearing Installer, 46 mm



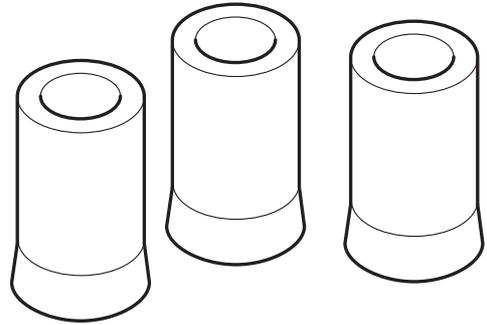
T3880627 - Bearing Puller, 32-42 mm



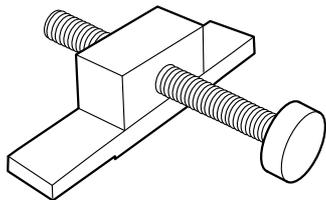
T3880628 - Bearing Installer, 26 mm



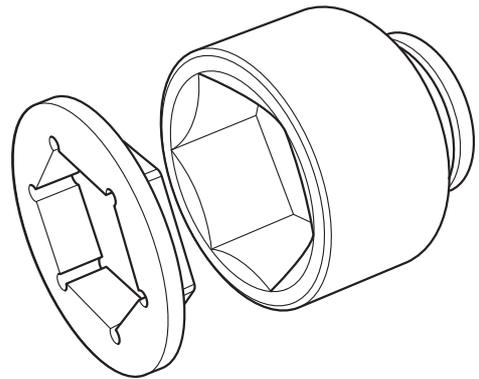
T3880601 - Camshaft Timing Pin



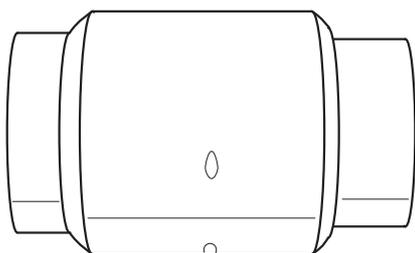
T3880630 - Fuel Hose Clamp



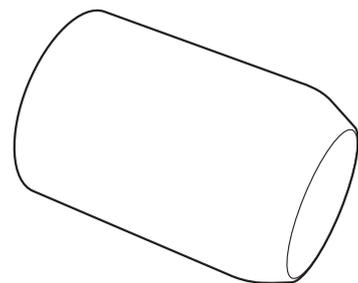
T3880631 - Blanking Cap



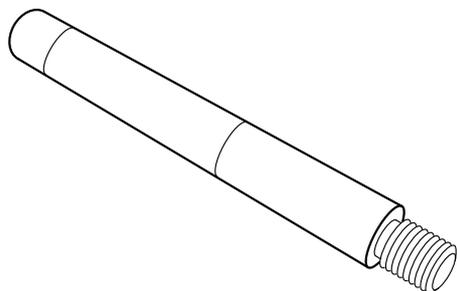
T3880640 - Camshaft Timing Plate



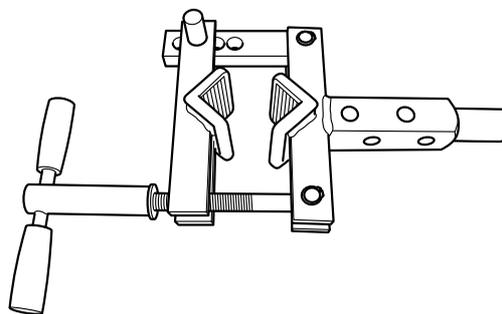
T3880643 - Fork Top Cap Socket



T3880661 - Fork Seal Installer

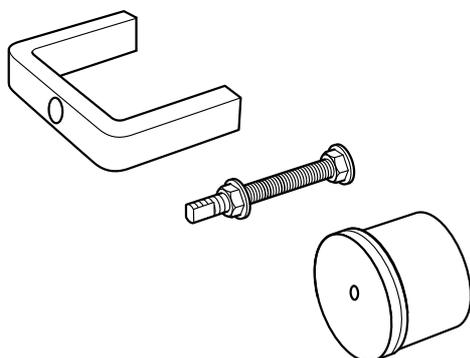


T3880662 - Fork Seal Guide



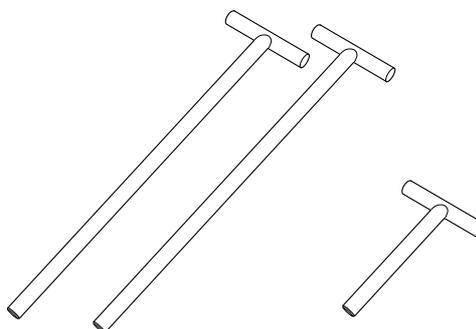
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T3880629 - Bearing Installer Handle

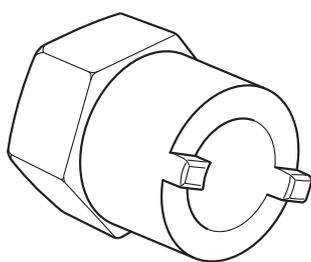


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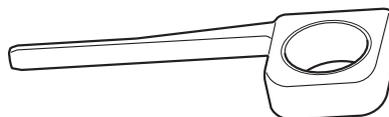
T3880171 - Fork Holding Tool



T3880315 - Extractor, Cylinder Liner (use with Cylinder Liner Extractor T3880605)

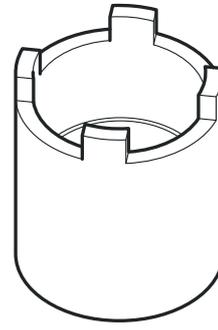
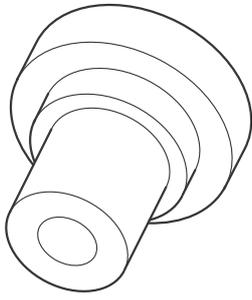


T3880637 - Kit, Engine to Frame Alignment Bars



T3880182 - Wrench, Frame Adjuster

T3880369 - Switch Housing Removal Tool



ccgu

T3880663 - Bearing Installer, 32 mm

T3880062 - Lock Ring Wrench, 38 mm

Specifications

Engine

Engine Configuration	3 cylinder 12 valve DOHC
Arrangement	Transverse in-line
Displacement	1215 cc
Bore x Stroke	85 x 71.4 mm
Compression Ratio	11:1
Cylinder Numbering	Left to right (no. 3 adjacent to camshaft drive chain)
Cylinder Sequence	Number 1 at left
Firing Order	1-2-3

Cylinder Head and Valves

Cylinder Head	Flatness Tolerance	0.030 mm
Valve Head Diameter	Inlet	35.600 mm
	Exhaust	28.600 mm
Valve Lift	Inlet	8.75 mm
	Exhaust	8.00 mm
Valve Stem Diameter	Inlet	4.975 - 4.990 mm (standard)
		4.965 mm (service limit)

	Exhaust	4.970 - 4.980 mm (standard)
		4.960 mm (service limit)
Valve Guide Bore Diameter	Inlet	5.000 - 5.012 mm (standard)
		5.040 mm (service limit)
	Exhaust	5.000 - 5.012 mm (standard)
		5.080 mm (service limit)
Valve Stem to Guide Clearance	Inlet	0.010 - 0.037 mm (standard)
		0.068 mm (service limit)
	Exhaust	0.020 - 0.042 mm (standard)
		0.128 mm (service limit)
Valve Seat Width (in head)	Inlet	1.0 mm (standard)
		1.5 mm (service limit)
	Exhaust	1.2 mm (standard)
		1.7 mm (service limit)
Valve Seat Width (valve)	Inlet	1.03 mm
	Exhaust	1.33 mm
Valve Seat Angle		45°
Inlet/Exhaust Valve Spring 'Load at Length '		580 N +/- 29 N at 26.8 mm
Valve Clearance	Inlet	0.10 - 0.15 mm
	Exhaust	0.275 - 0.325 mm
Valve Bucket Diameter	Inlet and Exhaust	28.476 - 28.490 mm (standard)
		28.468 mm (service limit)
Valve Bucket Bore Diameter	Inlet and Exhaust	28.507 - 28.527 mm
		28.541 mm (service limit)

Camshafts

Camshaft Timing	Inlet	Open 5.83° BTDC (@ 1.0 mm lift)
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		Close 35.83° ABDC (@ 1.0 mm lift)
	Duration	221.7°
	Exhaust	Open 45.3° BBDC (@ 1.0 mm lift)
		Close 4.7° BTDC (@ 1.0 mm lift)
	Duration	220.6°
Camshaft Journal Diameter		23.93 - 23.96 mm
Camshaft Journal Clearance		0.040 - 0.091 mm (standard)
		0.13 mm (service limit)
Camshaft Journal Bore Diameter		24.000 - 24.021 mm
Camshaft End Float		0.03 - 0.13 mm (standard)
		0.20 mm (service limit)
Camshaft Run-out		0.05 mm max.

Clutch/Primary Drive

Primary Drive	Type	Gear
Reduction Ratio		(98/61)
Clutch	Type	Wet multiplate
No. of Friction Plates		9
Steel Plate Flatness		Within 0.15 mm (standard)
		0.20 mm (service limit)
Friction Plate Thickness (2 x inner and 1 x outer)		3.80 mm (standard)
		3.60 mm (service limit)
Friction Plate Thickness (all others)		3.80 mm (standard)
		3.60 mm (service limit)
Clutch Pack Height		50.2 mm +0.50/-0.50 mm
Clutch Actuation Method		Hydraulic

Clutch Fluid	DOT 4 brake and clutch
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Pistons

Cylinder Bore Diameter (15 mm from top of bore)	Grade A	84.995 - 85.003 mm (standard)
	Grade B	84.985 - 94.994 mm (standard)
	Service Limit (all grades)	85.100 mm
Piston Diameter (at 90° to gudgeon pin, 12.5 from bottom of piston)	Grade A	84.981 - 84.984 mm (standard)
	Grade AB	84.972 - 84.980 mm (standard)
	Grade B	84.968 - 84.971 mm (standard)
	Service Limit (all grades)	84.928 mm
Piston Ring to Groove Clearance	Top	0.000 to 0.040 mm (standard)
		0.085 mm (service limit)
	Second	0.020 - 0.060 mm (standard)
		0.075 mm (service limit)
Piston Ring End Gap	Top	0.150 - 0.350 mm (standard)
		0.470 mm (service limit)
	Second	0.350 - 0.550 mm (standard)
		0.670 mm (service limit)
	Oil	0.200 - 0.700 mm (standard)
		0.84 mm (service limit)
Gudgeon Pin Bore Diameter in Piston	19.010 - 19.015 mm (standard)	
	19.043 mm (service limit)	
Gudgeon Pin Diameter	19.000 - 19.005 mm (standard)	
	18.985 mm (service limit)	

Connecting Rods

Connecting Rod Small End Diameter	19.035 - 19.048 mm (standard)
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	19.058 mm (service limit)
Connecting Rod Big End Side Clearance	0.150 - 0.300 mm (standard)
	0.500 mm (service limit)

Crankshaft

Crankshaft Big End Journal Diameter	38.020 - 38.036 mm (standard)
	37.996 mm (service limit)
Crankshaft Big End Bearing Clearance	0.030 - 0.056 mm (standard)
	0.061 mm (service limit)
Crankshaft Main Bearing Journal Clearance	0.029 mm (standard)
	0.061 mm (service limit)
Crankshaft Main Bearing Journal Diameter	37.960 - 37.976 mm (standard)
	37.936 mm (service limit)
Crankshaft End Float	0.05 - 0.20 mm (standard)
	0.375 mm (service limit)
Crankshaft Run-out	0.020 mm or less (standard)
	0.050 mm (service limit)

Transmission

Type	6 Speed, Constant Mesh	
Gear Ratios	1st	2.846:1 (13/37)
	2nd	2.056:1 (18/37)
	3rd	1.583:1 (24/38)
	4th	1.2916:1 (24/31)
	5th	1.138:1 (29/33)
	6th	1.037:1 (27/28)
Gear Selector Fork Thickness	Input shaft	5.8 - 5.9 mm (standard)

		5.7 mm (service limit)
	Output shaft	6.3 - 6.4 mm (standard)
		6.2 mm (service limit)
Gear Selector Groove Width	Input shaft	6.0 - 6.1 mm (standard)
		6.2 mm (service limit)
	Output shaft	6.5 - 6.6 mm (standard)
		6.7 mm (service limit)
Gear Selector Fork to Groove Clearance		0.500 mm max

Final Drive

Final Drive	Shaft drive
Front Bevel Box	Bevel geared crown wheel and pinion
Rear Bevel Box	Bevel geared crown wheel and pinion
Final Drive Ratio	2.557:1
Front Bevel Box Ratio	1.042:1
Rear Bevel Box Ratio	2.455:1
Drive System	Universal-jointed shaft with torsional damper
Final Drive Oil	Castrol SAF-XO Fully Synthetic Hypoid Oil
Final Drive Oil Capacity	0.17 litres

Lubrication

Type	Pressure Lubrication, Wet Sump
Oil Capacity (dry fill)	3.9 litres
Oil Capacity (wet fill including filter)	3.8 litres
Oil Capacity (wet fill excluding filter)	3.75 litres
Oil Pressure (in main gallery)	2.76 bar (40 lb/in ²) min. @ 80°C oil temperature @ 5,000 rpm

Oil Pump Rotor Tip Clearance	0.050 - 0.150 mm (standard)
	0.200 mm (service limit)
Oil Pump Body Clearance	0.050 - 0.139 mm (standard)
	0.35 mm (service limit)
Oil Pump Rotor End Float	0.040 - 0.090 mm (standard)
	0.170 mm (service limit)

Ignition System

Type	Digital Inductive
Electronic Rev Limiter	9,500 rpm
Primary Coil Resistance	0.56 Ohms +/- 10% @ 20°C
Ignition Coil Type	Plug-top
Spark Plug Type	NGK CR8EK
Spark Plug Gap	0.7 mm
Gap Tolerance	+0.05/-0.1 mm

Fuel System

Fuel Type	Unleaded, 91 RON (U.S. 87 CLC/AKI)
Fuel Tank Capacity	20.0 litres (motorcycle upright)
Low Level Warning Lamp	3.5 litres remaining
Fuel Pump Type	Submerged
Fuel Pressure (nominal)	3.5 bar
Purge Control System	Electronic, via fuel system ECM

Fuel Injection System

Type	Electronic, sequential
Idle Speed	1,000 rpm
Injector Type	Multi hole, solenoid operated plate valve

Throttle	Butterfly, electronically controlled
Control Sensors	Ambient air pressure, throttle position, accelerator position, coolant temperature, crankshaft position, oxygen sensor, intake air temperature, manifold absolute pressure (MAP), gear position, road speed (from ABS system)

Emissions Controls

Catalysts	1 in down pipe
Oxygen Sensor	Heated, in down pipe
Secondary Air Injection	Solenoid controlled, reed valve type
Evaporative Control	Activated carbon canister

Coolant System

Coolant Mixture	Pre-mixed
Anti-Freeze Type	Triumph HD4X Hybrid OAT coolantT
Cooling System Capacity	2.4 litres
Radiator Cap Opening Pressure	1.1 bar
Thermostat Opening Temperature	88°C (nominal)
Cooling Fan Switch On Temperature	103°C
Temperature Gauge Sensor Resistance	2.9 - 3.3 K/Ohms @ 15°C

Suspension

Front Fork Travel	190 mm
Recommended Fork Oil Grade	WP 4860-1166 SAE4
Oil Level (fork fully compressed with spring guide, upper spring preload spacers and spring removed)	105 mm
Oil Volume (dry fill)	700 cc
Front Fork Pull Through	42.5 mm
Rear Wheel Travel	193 mm

Brakes

Front Type	Two, four piston radial calipers acting on twin discs
Front Caliper Piston Diameter	32.0 mm
Front Disc Diameter	305.0 mm
Front Disc Thickness	4.5 mm (standard)
	4.0 mm (service limit)
Front Disc Run-out Max.	0.15 mm
Front Wheel Speed Sensor Air Gap	0.1 mm - 1.5 mm
Front Master Cylinder Diameter	15.87 mm
Recommended Fluid	DOT 4 brake and clutch
Rear Type	Twin piston sliding caliper acting on single disc
Rear Caliper Piston Diameter	27.0 mm
Rear Disc Diameter	255.0 mm
Rear Disc Thickness	6.0 mm (standard)
	5.0 mm (service limit)
Rear Disc Run-out Max.	0.5 mm
Rear Wheel Speed Sensor Air Gap	0.1 mm - 1.5 mm (Non adjustable)
Rear Master Cylinder Diameter	14.0 mm
Recommended Fluid	DOT 4 brake and clutch

Wheels and Tyres

Front Wheel Size	MT 3.0 x 19
Front Tyre Size	120/70 R19
Front Tyre Pressure	2.21 bar (32 lb/in ²)
Front Tyre TPMS Warning Light On Pressure	1.93 bar (28 lb/in ²)
Front Wheel Rim Axial Run-out	0.6 mm
Front Wheel Rim Radial Run-out	0.6 mm

Rear Wheel Size	MT 4.5 x 17	
Rear Tyre Size	170/60 R17	
Rear Tyre Pressure	2.69 bar (39 lb/in ²)	
Rear Tyre TPMS Warning Light On Pressure	2.27 bar (33 lb/in ²)	
Rear Wheel Rim Axial Run-out	0.6 mm	
Rear Wheel Rim Radial Run-out	0.6 mm	
Front Tyre Minimum Tread Depth	Under 80 mph (130km/h)	2mm (0.08in)
Rear Tyre Minimum Tread Depth	Under 80 mph (130km/h)	2mm (0.08in)
Front Tyre Minimum Tread Depth	Over 80 mph (130km/h)	2mm (0.08in)
Rear Tyre Minimum Tread Depth	Over 80 mph (130km/h)	3 mm (0.12 in)

Frame

Frame Type	Steel trellis
Rake	23.1°
Trail	99 mm
Max. Payload (rider, passenger, luggage & accessories)	228 kg (503 lb)

Electrical Equipment

Battery Type	YTZ14S
Battery Rating	12 Volt - 11.2 Amp. Hour
Alternator Rating	70 Amp
Headlight	LED
Front Position Light	LED
Fog Lights (if fitted)	-
Tail/Brake Light	LED

Direction Indicators - Standard (if fitted)	RY10W, 12 Volt, 10 Watt, amber
Direction Indicators - LED (if fitted)	LED
Fuses	See Fuse Identification

Torque Wrench Settings

Cylinder Head

Application	Torque (Nm)	Notes
Secondary air injection valve covers to camshaft cover	9 Nm	
Camshaft drive chain tensioner to crankcase	*	See Camshaft Drive Chain Tensioner - Installation
Camshaft bearing ladder to cylinder head	10 Nm	Apply clean engine oil to the thread(s)
Camshaft sprocket to camshaft	*	See Camshaft Drive Chain Tensioner - Installation
Camshaft drive chain top pad to cylinder head	10 Nm	Apply clean engine oil to the thread(s)
Cylinder head to crankcase (M6 screws)	10 Nm	Fit new fixing(s) if loosened or removed
Cylinder head to crankcase bolts	*	See Cylinder Head - Installation
Cylinder head dry seal plug	25 Nm	Fit new fixing(s) if loosened or removed
Spark plugs	12 Nm	
Cylinder head exhaust stud	10 Nm	Fit new fixing(s) if loosened or removed
Electrical connector bracket to fuel transfer pipe bracket	3 Nm	

Clutch

Application	Torque (Nm)	Notes
Clutch centre nut	160 Nm	Fit new fixing(s) if loosened or removed Fit new Belleville washer
Clutch release plate to pressure plate	10 Nm	
Clutch master cylinder clamp bolts	12 Nm	

Application	Torque (Nm)	Notes
Clutch lever nut	6 Nm	
Clutch lever pivot bolt	1 Nm	
Clutch slave cylinder to clutch cover	10 Nm	
Clutch slave cylinder bleed screw	5 Nm	
Clutch hose union bolts	25 Nm	Fit new sealing washer(s)
Clutch hose P-clip	5 Nm	
Clutch master cylinder cover	1.5 Nm	
Clutch slave cylinder cover	4 Nm	Fit new fixing(s) if loosened or removed
Clutch switch to clutch master cylinder	2 Nm	

Crankshaft and Crankcases

Application	Torque (Nm)	Notes
Crankcase lower M8 bolts	*	See Crankcases - Assembly
Crankcase lower M6 bolts	*	See Crankcases - Assembly
Crankcase upper bolts	*	See Crankcases - Assembly
Balancer gear to crankshaft	35 Nm	
Big end bearings	*	See Connecting Rods - Installation
Crankcase coolant drain plug	8 Nm	Fit new sealing washer(s)
Breather plate to crankcase	12 Nm	Fit new fixing(s) if loosened or removed
Trigger wheel to crankshaft	*	See Trigger Wheel, Starter Drive Gears and Sprag Clutch - Installation
Crankcase dry seal plug	25 Nm	Fit new fixing(s) if loosened or removed
Camshaft drive sprocket to crankshaft	27 Nm	Fit new fixing(s) if loosened or removed
Oil retainer plate	12 Nm	Fit new fixing(s) if loosened or removed

Application	Torque (Nm)	Notes
Face seal plug	8 Nm	
Crankcase cable tidy - right hand fixing	6 Nm	Fit new fixing(s) if loosened or removed

Engine Covers

Application	Torque (Nm)	Notes
Camshaft cover to cylinder head	12 Nm	Apply engine oil to seals See Camshaft Cover - Installation
Crankshaft cover to crankcase	11 Nm	See Crankshaft Cover - Installation
Trigger wheel cover	11 Nm	
Balancer cover to crankcase	11 Nm	See Balancer Shaft Cover - Installation
Clutch cover to crankcase	11 Nm	See Clutch Cover - Installation
Breather cover to crankcase	11 Nm	Fit new fixing(s) if loosened or removed See Breather Cover - Installation
Sump to crankcase	12 Nm	

Transmission

Application	Torque (Nm)	Notes
Transmission housing to crankcase	20 Nm	Fit new fixing(s) if loosened or removed
Input shaft bearing retainer (to crankcase)	12 Nm	Fit new fixing(s) if loosened or removed
Input shaft bearing retainer (to transmission)	9 Nm	Fit new fixing(s) if loosened or removed
Detent wheel to selector drum	11 Nm	Fit new fixing(s) if loosened or removed
Selector drum bearing retaining screw	9 Nm	Fit new fixing(s) if loosened or removed
Gear position sensor	5 Nm	Fit new fixing(s) if loosened or removed
Gear pedal crank pinch bolt	9 Nm	
Gear change rod lock nuts	6 Nm	

Application	Torque (Nm)	Notes
Gear change rod ball joints	8 Nm	Fit new fixing(s) if loosened or removed
Gear change pivot arm lock nut	11 Nm	
Gear pedal pinch bolt	9 Nm	Fit new fixing(s) if loosened or removed
Bevel box front cover bolts	25 Nm	Fit new fixing(s) if loosened or removed
Bevel box side cover bolts	9 Nm	Fit new fixing(s) if loosened or removed
Selector cover to crankcase - 28mm fixing	11 Nm	
Selector cover to crankcase - 90mm fixing	11 Nm	
Selector shaft retainer	12 Nm	Fit new fixing(s) if loosened or removed

Lubrication System

Application	Torque (Nm)	Notes
Sump plug	25 Nm	Fit new sealing washer(s)
Oil pressure relief valve	15 Nm	Apply ThreeBond 1305 to the threads
Low oil pressure warning light switch to crankcase	13 Nm	Fit new sealing washer(s)
Oil filter adapter to crankcase	16 Nm	Fit new fixing(s) if loosened or removed
Oil filter to adapter	10 Nm	Apply clean engine oil to the seal(s)
Oil pump to crankcase	9 Nm	Fit new fixing(s) if loosened or removed
Oil pump drive sprocket to pump shaft	12 Nm	Fit new fixing(s) if loosened or removed
Oil pump drive chain guide	4 Nm	Fit new fixing(s) if loosened or removed
Oil feed pipe casting	8 Nm	Fit new fixing(s) if loosened or removed
Heat exchanger to oil pump	10 Nm	Fit new fixing(s) if loosened or removed

Application	Torque (Nm)	Notes
Breather drain tube	9 Nm	Fit new fixing(s) if loosened or removed
Oil pump rotor housing fixings	10 Nm	
Sump blanking plug	9 Nm	

Cooling System

Application	Torque (Nm)	Notes
Radiator upper mountings to frame	9 Nm	
Radiator lower mountings to brackets	9 Nm	
Radiator lower brackets to engine	18 Nm	
Radiator drain plug	1.5 Nm	Fit new sealing washer(s)
Thermostat housing to cylinder head	9 Nm	Fit new sealing washer(s)
Crankcase coolant drain plug	8 Nm	
Water temperature sensor	18 Nm	Apply ThreeBond 1374 to the threads
Radiator fan cowl fixings	8 Nm	
Expansion tank fixings	3 Nm	
Expansion tank cover upper fixing	3 Nm	Fit new fixing(s) if loosened or removed
Expansion tank cover lower fixing	4 Nm	
Radiator shroud Torx fixings	1.2 Nm	
Radiator shroud M5 bolts	3 Nm	
Radiator stone guard fixings	7 Nm	
Radiator top hose bleed screw	1.5 Nm	

Fuel System, Exhaust System and Airbox

Application	Torque (Nm)	Notes
Fuel tank to frame	12 Nm	
Fuel cap to fuel tank	4 Nm	

Application	Torque (Nm)	Notes
Fuel pump mounting plate to fuel tank	9 Nm	
Throttle body transition piece to cylinder head	9 Nm	
Throttle body to transition piece clip	1.5 Nm	
Throttle balance blanking screw	5 Nm	
Fuel rail to throttle bodies	3.5 Nm	
Exhaust downpipe to cylinder head - Stage 1	6 Nm	See Exhaust Header Pipes - Installation
Exhaust downpipe to cylinder head - Stage 2	12 Nm	See Exhaust Header Pipes - Installation
Exhaust downpipe to cylinder head - Stage 3	15 Nm	See Exhaust Header Pipes - Installation
Exhaust downpipe to frame	15 Nm	
Exhaust downpipe clamp to exhaust silencer	10 Nm	
Exhaust silencer to frame	30 Nm	
Exhaust silencer front and rear end cap fixings	5 Nm	Fit new fixing(s) if loosened or removed
Exhaust downpipe heatshield fixings	5 Nm	Fit new fixing(s) if loosened or removed
Exhaust silencer strap fixings	5 Nm	Fit new fixing(s) if loosened or removed
Oxygen sensor	25 Nm	
Secondary air injection solenoid fixings	2 Nm	
Secondary air injection reed valve cover	9 Nm	
Air filter housing	1.5 Nm	
Airbox mounting bracket to throttle bodies	5 Nm	
Airbox to mounting bracket	5 Nm	
Intake air temperature sensor	2 Nm	
Ambient air temperature sensor	1.5 Nm	

Application	Torque (Nm)	Notes
Manifold absolute pressure sensor	1.5 Nm	
Ambient air pressure sensor	1.5 Nm	
Fall detection switch to mounting bracket	3 Nm	Fit new fixing(s) if loosened or removed
Crankshaft position sensor	6 Nm	Fit new fixing(s) if loosened or removed
Seat bridge to frame	5 Nm	
Evaporative cannister	8 Nm	
Purge valve	3 Nm	
Gear position sensor	5 Nm	
Sump cable tidy	3 Nm	Fit new fixing(s) if loosened or removed

Front Suspension

Application	Torque (Nm)	Notes
Upper yoke pinch bolt	25 Nm	
Lower yoke pinch bolt	25 Nm	
Fork top cap to fork outer tube	40 Nm	
Fork top cap to damping rod	2.5 Nm	
Fork top cap lock nut	25 Nm	
Fork damping rod bolt	22 Nm	Fit new sealing washer(s)
Headstock upper nut	90 Nm	
Handlebar clamp base to upper yoke (M10 bolt)	35 Nm	
Handlebar upper clamp to lower clamp (M8 bolt)	26 Nm	
Handlebar grip, left hand side	3 Nm	
Handlebar end weights	5 Nm	Fit new fixing(s) if loosened or removed
Headstock adjuster nut - stage 1	40 Nm	See Headstock Bearing Check/Adjustment

Application	Torque (Nm)	Notes
Headstock adjuster nut - stage 2	10 Nm	See Headstock Bearing Check/Adjustment
Headstock lock nut	40 Nm	See Headstock Bearing Check/Adjustment
Clutch switch	2 Nm	
Handguard to bracket fixing	6 Nm	Fit new fixing(s) if loosened or removed

Rear Suspension

Application	Torque (Nm)	Notes
Swinging arm spindle lock nut	110 Nm	See Swinging Arm - Installation
Swinging arm spindle right hand frame adjuster	6 Nm	See Swinging Arm - Installation
Swinging arm spindle left hand frame adjuster	170 Nm	See Swinging Arm - Installation
Rear suspension unit upper mounting lock nut	75 Nm	See Rear Suspension Unit - Installation Fit new fixing(s) if loosened or removed
Rear suspension unit lower mounting bolt to drop link	85 Nm	See Rear Suspension Unit - Installation Fit new fixing(s) if loosened or removed
Drag link to frame	85 Nm	See Drag and Drop Links - Installation Fit new fixing(s) if loosened or removed
Drop links to swinging arm	85 Nm	See Drag and Drop Links - Installation Fit new fixing(s) if loosened or removed
Torque arms to rear bevel box	48 Nm	
Torque arms to frame	48 Nm	
Hose guide on torque arm	3 Nm	
Torque arm spacers	12 Nm	
Rear suspension unit stone guard fixings	5 Nm	
Rear suspension unit damping connector fixing	1 Nm	

Wheels

Application	Torque (Nm)	Notes
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Application	Torque (Nm)	Notes
Front wheel spindle/axle bolt	65 Nm	
Fork to wheel spindle pinch bolts	22 Nm	
Rear wheel to final drive unit	70 Nm	
Tyre valve - models without tyre pressure monitoring system	6 Nm	Apply ThreeBond 1305 to the threads
Tyre valve - models with tyre pressure monitoring system	4.5 Nm	

Final Drive

Application	Torque (Nm)	Notes
Filler/level plug	25 Nm	Fit new sealing washer(s)
Drain plug	25 Nm	Fit new sealing washer(s)
Left hand pivot pin	100 Nm	See Rear Bevel Box - Installation
Right hand pivot pin	48 Nm	See Rear Bevel Box - Installation
Locking ring - right hand pivot pin	110 Nm	Apply a thin smear of proprietary high temperature copper based grease to the threads See Rear Bevel Box - Installation
Back plate to bevel box housing	30 Nm	
Rubber boot clip	1.5 Nm	

Front Brakes

Application	Torque (Nm)	Notes
Front brake caliper to fork	50 Nm	
Front brake pad retaining pin	6 Nm	
Front brake caliper bleed screw	6 Nm	
Front brake hose to caliper union	25 Nm	Fit new sealing washer(s)
Front brake master cylinder to handlebar	12 Nm	
Front brake hose to master cylinder union	25 Nm	Fit new sealing washer(s)
Front brake hose clamp on front fork	3 Nm	

Application	Torque (Nm)	Notes
Front brake master cylinder reservoir cover	1.5 Nm	
Front brake disc to wheel	22 Nm	Fit new fixing(s) if loosened or removed
Brake lever pivot bolt	1 Nm	
Brake lever pivot bolt lock nut	6 Nm	

Rear Brakes

Application	Torque (Nm)	Notes
Rear brake caliper	40 Nm	
Rear brake pad retaining pin	17 Nm	
Rear brake caliper bleed screw	6 Nm	
Rear brake hose to caliper union	25 Nm	Fit new sealing washer(s)
Rear brake master cylinder	18 Nm	
Rear brake master cylinder reservoir	6 Nm	
Rear brake hose to master cylinder union	25 Nm	Fit new sealing washer(s)
Brake pedal pivot bolt	22 Nm	Fit new fixing(s) if loosened or removed
Brake hose P-clip bolt	7 Nm	Fit new fixing(s) if loosened or removed
Rear brake disc	22 Nm	Fit new fixing(s) if loosened or removed
Lock nut, master cylinder push rod	18 Nm	

ABS

Application	Torque (Nm)	Notes
ABS modulator to sub bracket fixings	9 Nm	Fit new fixing(s) if loosened or removed
ABS modulator sub bracket to main bracket	9 Nm	Fit new fixing(s) if loosened or removed
ABS modulator to main bracket	9 Nm	Fit new fixing(s) if loosened or removed

Application	Torque (Nm)	Notes
ABS modulator bracket to frame lower fixing	9 Nm	
ABS rear pulser ring	5 Nm	Fit new fixing(s) if loosened or removed
ABS front and rear wheel speed sensors	9 Nm	
ABS lines to modulator	25 Nm	Fit new sealing washer(s)
Rear brake line to crankcase tidy	8 Nm	Fit new fixing(s) if loosened or removed
Rear brake master cylinder reservoir cover	1.5 Nm	
ABS modulator hose guide fixings	3 Nm	

Frame and Bodywork

Application	Torque (Nm)	Notes
Upper crankcase to frame	100 Nm	See Engine - Installation
Lower crankcase to frame	100 Nm	See Engine - Installation
Cylinder head rear mountings to frame	85 Nm	See Engine - Installation
Cylinder head front left hand mounting to frame - initial torque	24 Nm	See Engine - Installation
Cylinder head front left hand mounting to frame - final torque	115 Nm	See Engine - Installation
Cylinder head front right hand mounting to frame	100 Nm	See Engine - Installation
Upper and lower crankcase to frame adjusters	5 Nm	See Engine - Installation
Cylinder head front right hand mounting to frame adjuster	3 Nm	See Engine - Installation
Headstock brace to frame - M6 lock nut	12 Nm	Fit new fixing(s) if loosened or removed
Headstock brace to frame - M6 x 20 bolt	12 Nm	
Fork protector and side reflector bracket to fork leg fixing	3 Nm	
Fork protector to front mudguard	3 Nm	
Front mudguard to fork leg	7 Nm	Fit new fixing(s) if loosened or removed

Application	Torque (Nm)	Notes
Front sub frame fixings	30 Nm	
Windscreen fixings	4 Nm	
Windscreen support to adjuster pivot bar fixings	4 Nm	
Windscreen motor fixings	12 Nm	
Windscreen support to motor fixing	5 Nm	
Windscreen motor infill fixings	3 Nm	
Wind deflector clear panel fixings	3 Nm	
Cockpit panel fixings	3 Nm	
High level mudguard to inner fixings	1.2 Nm	
Finisher to high level mudguard fixing	1.2 Nm	
Clear panel to high level mudguard finisher fixings	3 Nm	
Infill panel to high mudguard, finisher and clear panel assembly	3 Nm	
High level mudguard assembly to sub frame	5 Nm	
Fuel tank panels to radiator covers	1.2 Nm	
Radiator duct to radiator covers	1.2 Nm	
Fuel tank infill lower brackets to radiator covers	1.2 Nm	
Fuel tank upper infill brackets to radiator covers	3 Nm	
Side fairings to fuel tank fixings	3 Nm	
Side fuel tank infills	3 Nm	
Centre fuel tank infill	3 Nm	
Fuel tank panel badge fixings	2 Nm	
Fuel tank/seat infill locating slot fixing	9 Nm	
Seat Infill fixing	3 Nm	
Sump guard to engine fixings	6 Nm	Fit new fixing(s) if loosened or removed

Application	Torque (Nm)	Notes
Sump guard to bracket fixings (aluminium sump guard)	6 Nm	Fit new fixing(s) if loosened or removed
Engine bar to radiator mounting bracket	18 Nm	
Engine bar centre mounting	18 Nm	
Rear panel to frame fixings	7 Nm	
Luggage rack fixings	27 Nm	
Luggage rack cover fixings	7 Nm	
Pannier rail fixings	27 Nm	
Rear mudguard upper fixings	7 Nm	
Rear mudguard lower fixings	3 Nm	
Under seat tray fixings	7 Nm	
Chassis electronic control module cover bolt and lock nut to under seat tray	2 Nm	
Centre stand mounting bolts	50 Nm	Fit new fixing(s) if loosened or removed
Centre stand spring upper mounting pin	18 Nm	
Centre stand spring lower mounting bracket	20 Nm	
Side stand mounting bolts	70 Nm	
Side stand spring peg	7 Nm	Fit new fixing(s) if loosened or removed
Mirror boss	25 Nm	
Mirror lock nut	25 Nm	
Control plate fixings	18 Nm	
Right hand front heel guard fixings	7 Nm	
Rear footrest hangers	27 Nm	
Rear footrest heel guard fixings	3 Nm	
Seat bridge moulding to frame	5 Nm	

Application	Torque (Nm)	Notes
Seat lock to frame	4 Nm	Fit new fixing(s) if loosened or removed
Seat latch to frame	9 Nm	
Side panel brackets to radiator	7 Nm	

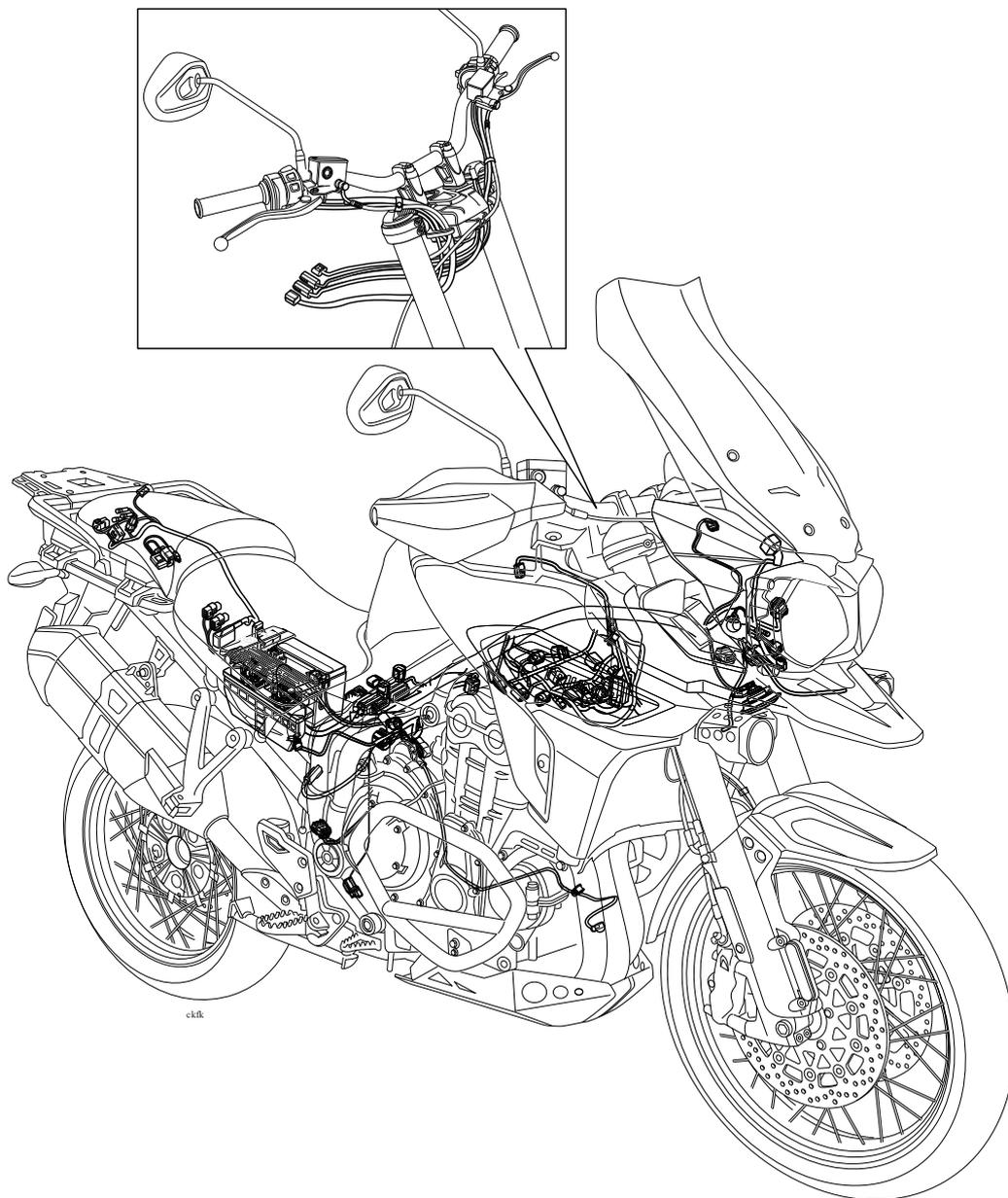
Electrical

Application	Torque (Nm)	Notes
Battery terminals	4.5 Nm	See Linked procedure not present at the moment.
Battery bracket	3 Nm	
Alternator to crankcase	28 Nm	
Alternator drive gear	54 Nm	Fit new fixing(s) if loosened or removed
Alternator decoupler to drive gear	3 Nm	
Alternator power lead connector	12 Nm	See Linked procedure not present at the moment.
Starter motor to crankcase	9 Nm	
Starter motor power lead connection	5 Nm	See Linked procedure not present at the moment.
Starter motor cover	4 Nm	Fit new fixing(s) if loosened or removed
Starter motor solenoid lead connector	5 Nm	See Linked procedure not present at the moment.
Horn	18 Nm	
Electronic steering lock	16 Nm	Fit new fixing(s) if loosened or removed
Instruments	3.5 Nm	
Instrument bracket to hinge	3 Nm	
Instrument bracket hinge to front subframe	3 Nm	Fit new fixing(s) if loosened or removed
Headlight	4 Nm	

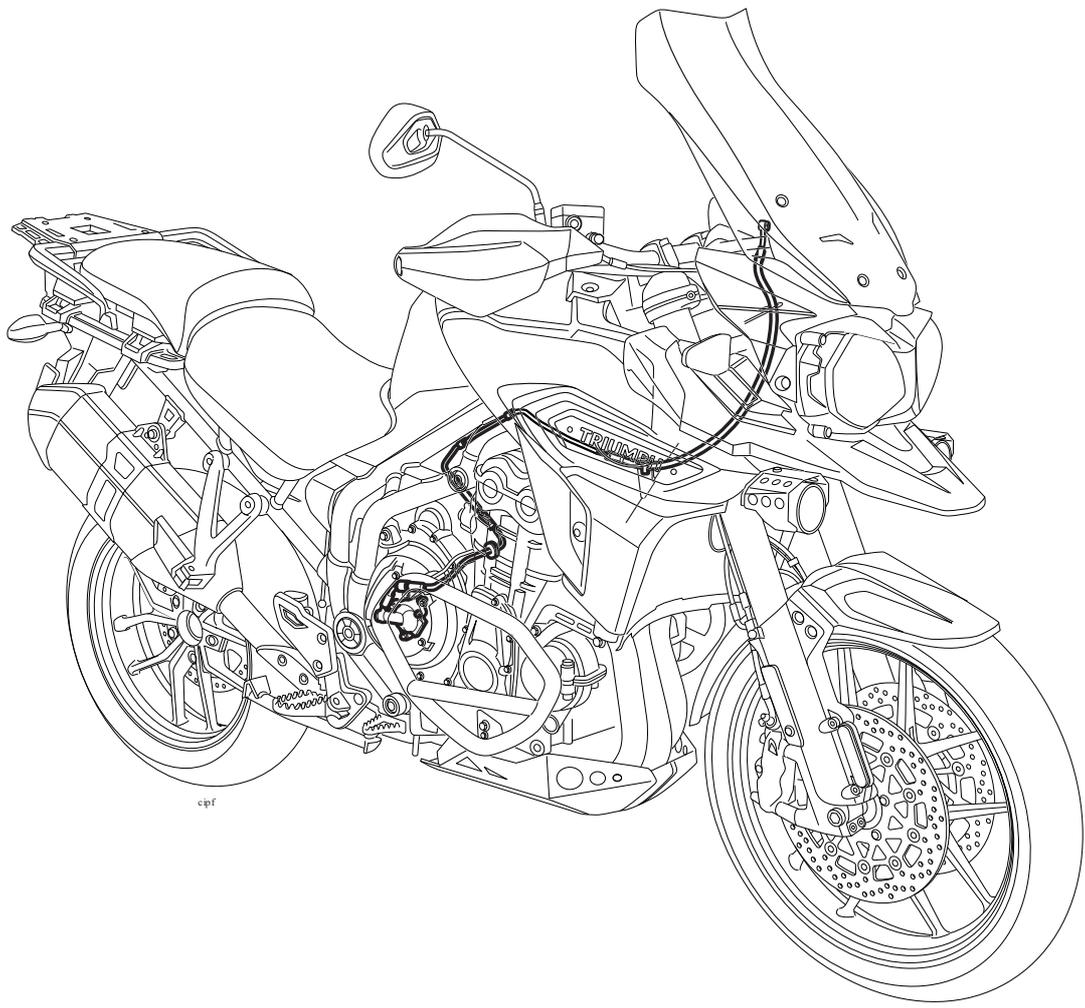
Application	Torque (Nm)	Notes
Headlight surround	2 Nm	
Rear light	4 Nm	
Direction indicator lens	0.3 Nm	
Front and rear direction indicators	5 Nm	
Fog light bracket fixings	5 Nm	
Fog light and shroud to bracket	3 Nm	
Electrical accessory socket(s)	2 Nm	
Inertial measurement unit to bracket	8 Nm	See Inertial Measurement Unit (IMU) - Installation
Inertial measurement unit and bracket to front seat support	1.5 Nm	See Inertial Measurement Unit (IMU) - Installation
Chassis electronic control module cover wing nut	1.25 Nm	
Ambient air temperature sensor	1.5 Nm	
Swinging arm position sensor	4 Nm	
Position sensor drop link ball stud	9 Nm	Apply a smear of proprietary general purpose grease to NLGI 2 standard to the ball stud. Fit new fixing(s) if loosened or removed
Starter Motor cable P clip to sump	6 Nm	Fit new fixing(s) if loosened or removed
Side stand switch	7 Nm	Fit new fixing(s) if loosened or removed
Sump cable guide	3 Nm	Fit new fixing(s) if loosened or removed

Routings

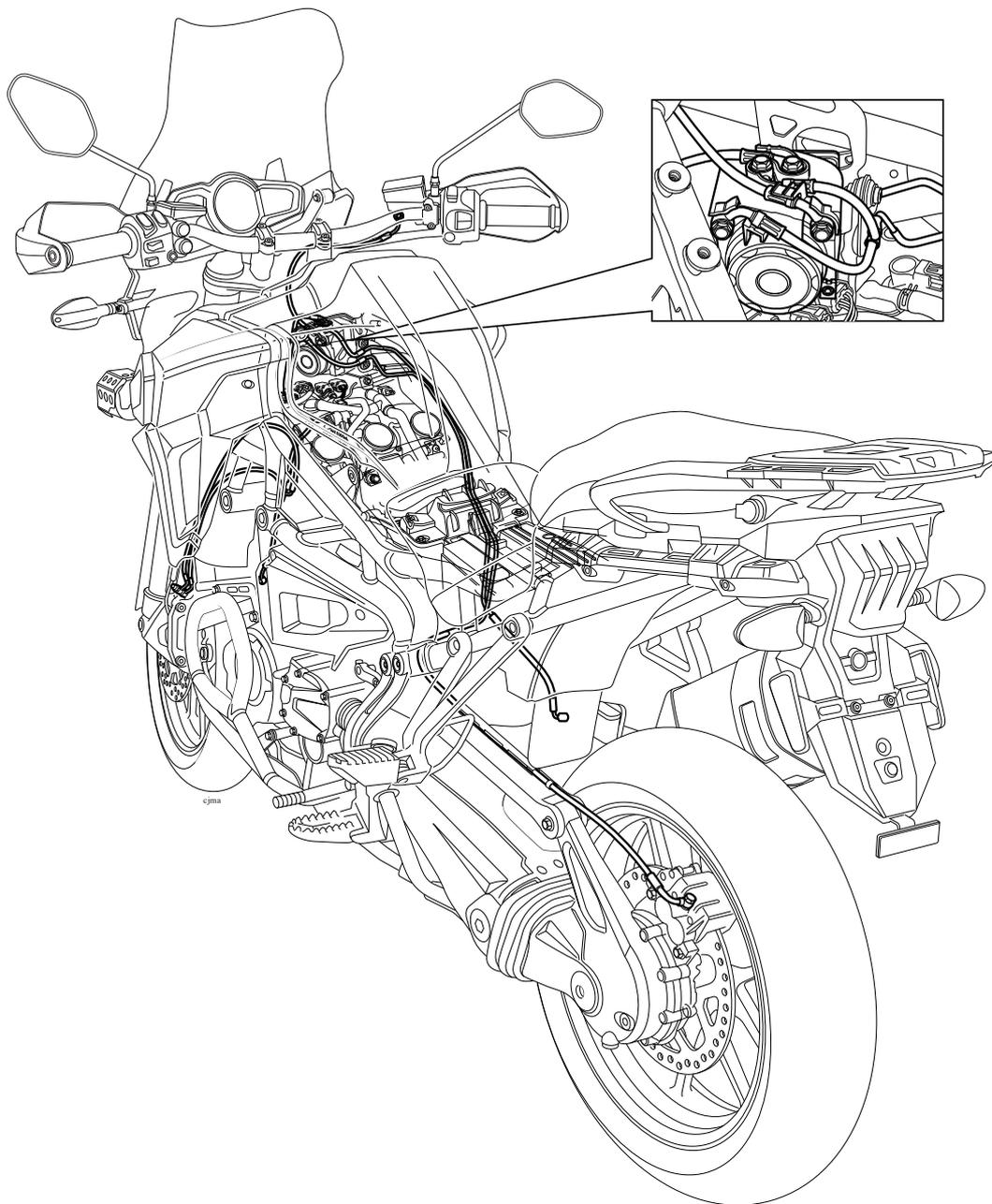
Main Wiring Harness Routing



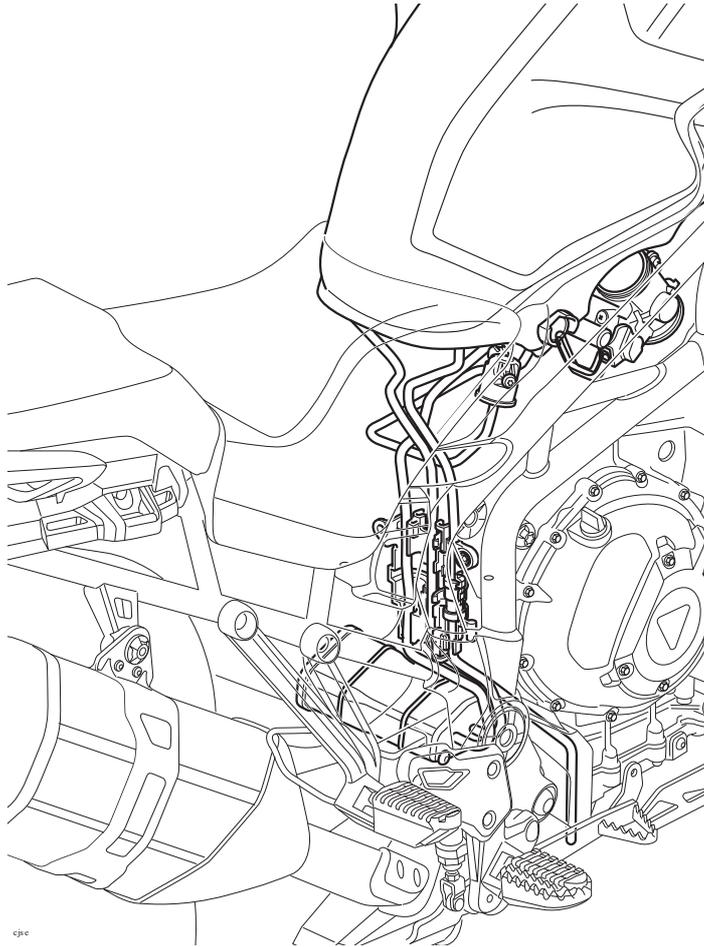
Clutch Hose Routing



ABS and Brake Hose Routing



Fuel Tank Breather Hose Routing



Routine Maintenance

Routine Maintenance Introduction

To maintain the motorcycle in a safe and reliable condition, the maintenance and adjustments outlined in this section must be carried out as specified in the schedule of daily checks, and also in line with the Scheduled Maintenance chart.

Weather, terrain and geographical location affects maintenance. The maintenance schedule should be adjusted to match the particular environment in which the vehicle is used and the demands of the individual owner. For advice on adjusting the service schedule, consult your authorised Triumph dealer.

 **WARNING**

! WARNING

In order to correctly carry out the maintenance items listed in the Scheduled Maintenance chart, special tools and specialist knowledge will be required. As only an authorised Triumph dealer will have this knowledge and equipment, Triumph strongly recommends that your authorised Triumph dealer carries out all scheduled maintenance.

A dangerous riding condition could result from incorrect maintenance leading to loss of motorcycle control and an accident.

! WARNING

All maintenance is vitally important and must not be neglected. Incorrect maintenance or adjustment may cause one or more parts of the motorcycle to malfunction. A malfunctioning motorcycle is dangerous and may lead to an accident.

Scheduled maintenance may be carried out by your dealer in three ways; annual maintenance, mileage based maintenance or a combination of both, depending on the mileage the motorcycle travels each year.

- Motorcycles travelling less than 10,000 miles/ 16,000 km per year must be maintained annually. In addition to this, mileage based items require maintenance at their specified intervals, as the motorcycle reaches this mileage.
- Motorcycles travelling approximately 10,000 miles/ 16,000 km per year must have the annual maintenance and the specified mileage based items carried out together.
- Motorcycles travelling more than 10,000 miles/ 16,000 km per year must have the mileage based items maintained as the motorcycle reaches the specified mileage. In addition to this, annual based items will require maintenance at their specified annual intervals.

In all cases maintenance must be carried out at or before the specified maintenance intervals shown. Consult an authorised Triumph dealer for advice on which maintenance schedule is most suitable for your motorcycle.

! WARNING

Triumph Motorcycles cannot accept any responsibility for damage or injury resulting from incorrect maintenance or improper adjustment carried out by the owner.

Since incorrect or neglected maintenance can lead to a dangerous riding condition, always have an authorised Triumph dealer carry out the scheduled maintenance of this motorcycle.

Scheduled Maintenance Chart

Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first					
		First Service	Annual Service	Mileage Based Service		
	Every	500 (800) 1 month	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Lubrication						
Engine and oil cooler - check for leaks	Day	•	•	•	•	•
Engine oil - renew	-	•	•	•	•	•
Engine oil filter - renew	-	•	•	•	•	•
Fuel System and Engine Management						

Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first					
		First Service	Annual Service	Mileage Based Service		
	Every	500 (800) 1 month	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Autoscan - Carry out a full Autoscan using the Triumph Diagnostic Tool (print a customer copy)	-	•	•	•	•	•
Fuel system - check for leaks	Day	•	•	•	•	•
Fuel system - check fuel hoses for chafing, cracks or damage. Replace if necessary	-			•	•	•
Air cleaner - renew	-			•	•	•
Throttle body plate (butterfly) - check/clean	-			•	•	•
Throttle bodies - balance	-			•	•	•
Fuel hoses - renew	Every four years, regardless of mileage					
Evaporative loss hoses - renew	Every four years, regardless of mileage					
Ignition System						
Spark plugs - check	-			•		
Spark plugs - renew	-				•	•
Cooling System						
Cooling system - check for leaks	Day	•	•	•	•	•
Cooling system - check coolant hoses for chafing, cracks or damage. Replace if necessary	-			•	•	•
Coolant level - check/adjust	Day	•	•	•	•	•
Coolant - renew	Every 3 years regardless of mileage					
Engine						
Clutch master cylinder - check for leaks	-	•	•	•	•	•
Clutch fluid levels - check	Day	•	•	•	•	•
Clutch fluid - renew	Every 2 years, regardless of mileage					
Valve clearances - check	-				•	•

Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first					
		First Service	Annual Service	Mileage Based Service		
	Every	500 (800) 1 month	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Camshaft timing - check/adjust	-				.	.
Wheels and Tyres						
Wheels - inspect for damage	Day	.	.	.	.	.
Wheel bearings - check for wear/smooth operation	-	.	.	.	.	.
Wheels - check wheels for broken or damaged spokes and check spoke tightness (models with spoked wheels only)	-	.	.	.	.	.
Tyre wear/tyre damage - check	Day	.	.	.	.	.
Tyre pressures - check/adjust	Day	.	.	.	.	.
Steering and Suspension						
Steering - check for free operation	Day	.	.	.	.	.
Front and rear suspension - check for damage/leaks/smooth operation	Day	.	.	.	.	.
Fork oil - renew	-					.
Headstock bearings - check/adjust	-		.	.	.	.
Headstock bearings - lubricate	-				.	.
Rear suspension linkage - check/lubricate	-				.	.
Brakes						
Brake pads - check wear levels	Day	.	.	.	.	.
Brake master cylinders - check for fluid leaks	Day	.	.	.	.	.
Brake calipers - check for fluid leaks and seized pistons	Day	.	.	.	.	.
Brake fluid levels - check	Day	.	.	.	.	.
Brake fluid - renew	Every 2 years regardless of mileage					
Final Drive						

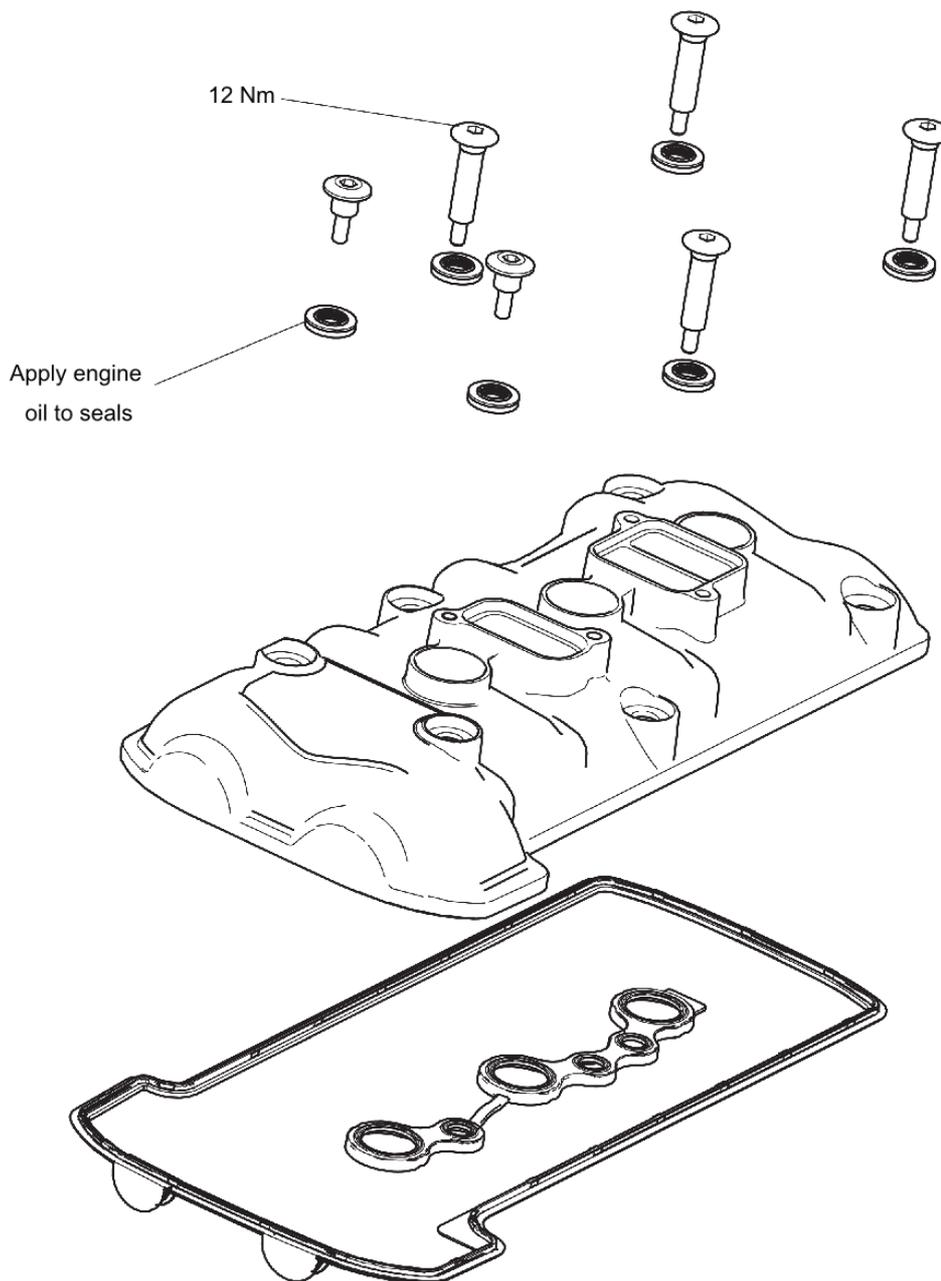
Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first					
		First Service	Annual Service	Mileage Based Service		
	Every	500 (800) 1 month	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Final drive - check for oil leaks	Day	.	.	.	.	.
Final drive oil level - check	-		.	.	.	.
Final drive oil - renew - only first service	-	.				
Electrical						
All lights, instruments and electrical systems - check	Day	.	.	.	.	.
General						
Instruments, chassis ECM and engine ECM - check for latest calibration download using the Triumph diagnostic tool	-	.	.	.	.	.
Bank angle indicators - check for wear	Day	.	.	.	.	.
Fasteners - inspect visually for security	Day	.	.	.	.	.
Accessory rack sliding carriage - check for correct operation†	-		.	.	.	.
Accessory pannier link bar - check for correct operation and adjustment†	-		.	.	.	.
Side stand - check operation	Day	.	.	.	.	.
Side stand pivot - clean/grease	-			.	.	.
Centre stand - check operation	Day	.	.	.	.	.
Centre stand flanged sleeves - check/clean/grease	-		.	.	.	.
Gear change pedal - clean bushes	-		.	.	.	.
Carry out all outstanding Service Bulletin and warranty work	-	.	.	.	.	.
Carry out road test	-	.	.	.	.	.
Complete the service record book and reset the service indicator	-	.	.	.	.	.

Operation Description	Odometer Reading in Miles (Km) or Time Period, whichever comes first				
		First Service	Annual Service	Mileage Based Service	
	Every	500 (800) 1 month	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)

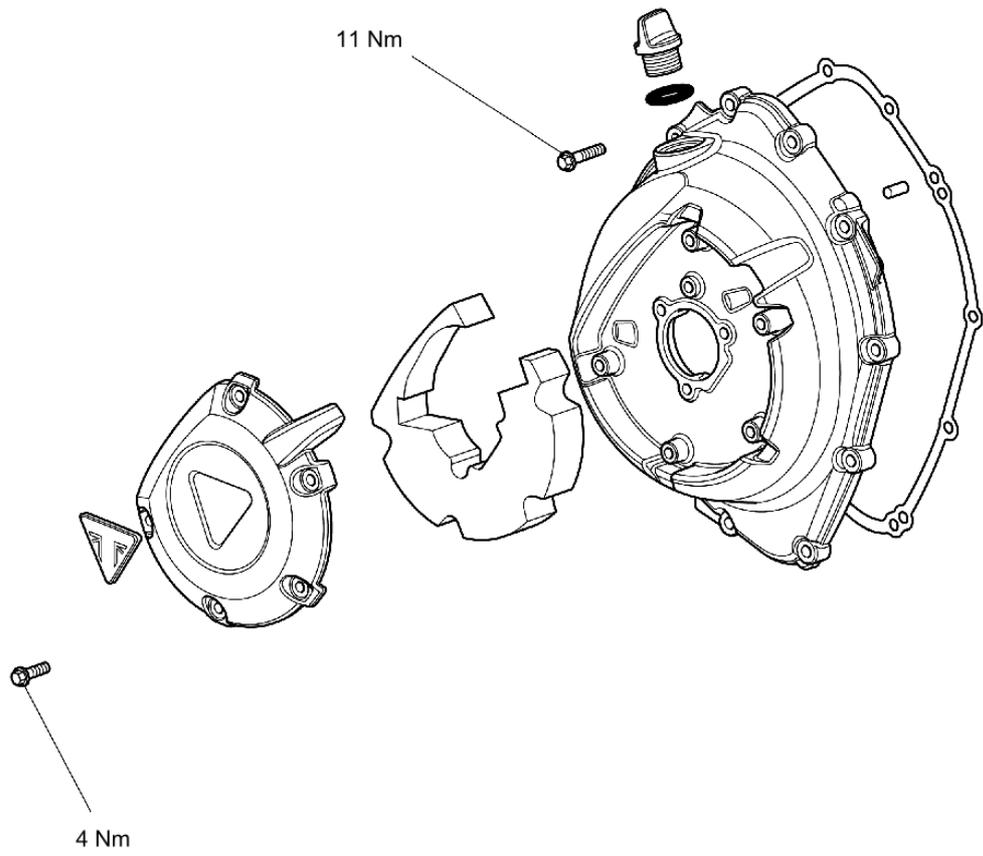
‡ Only if fitted

Engine Covers

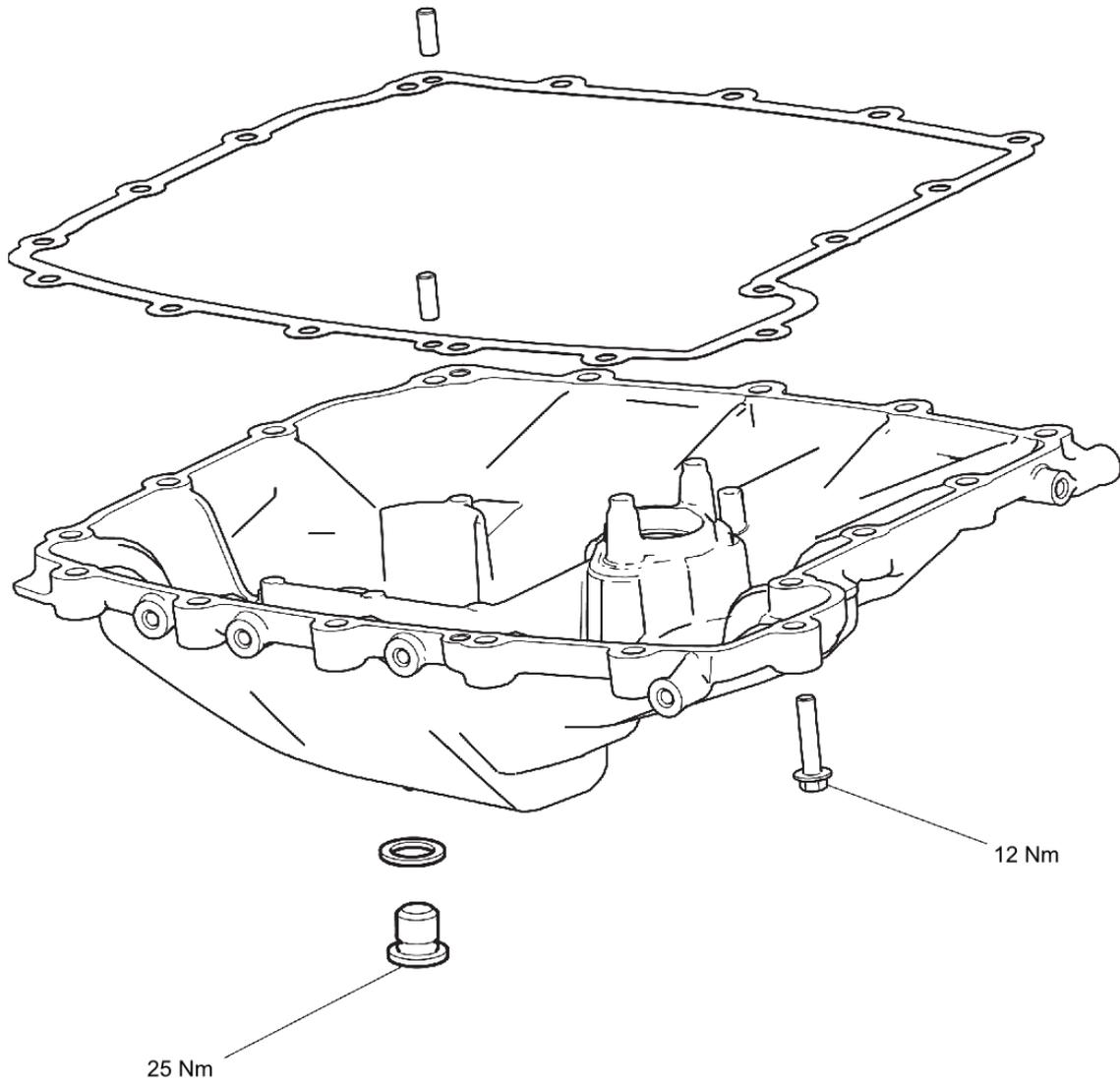
Exploded View - Camshaft Cover



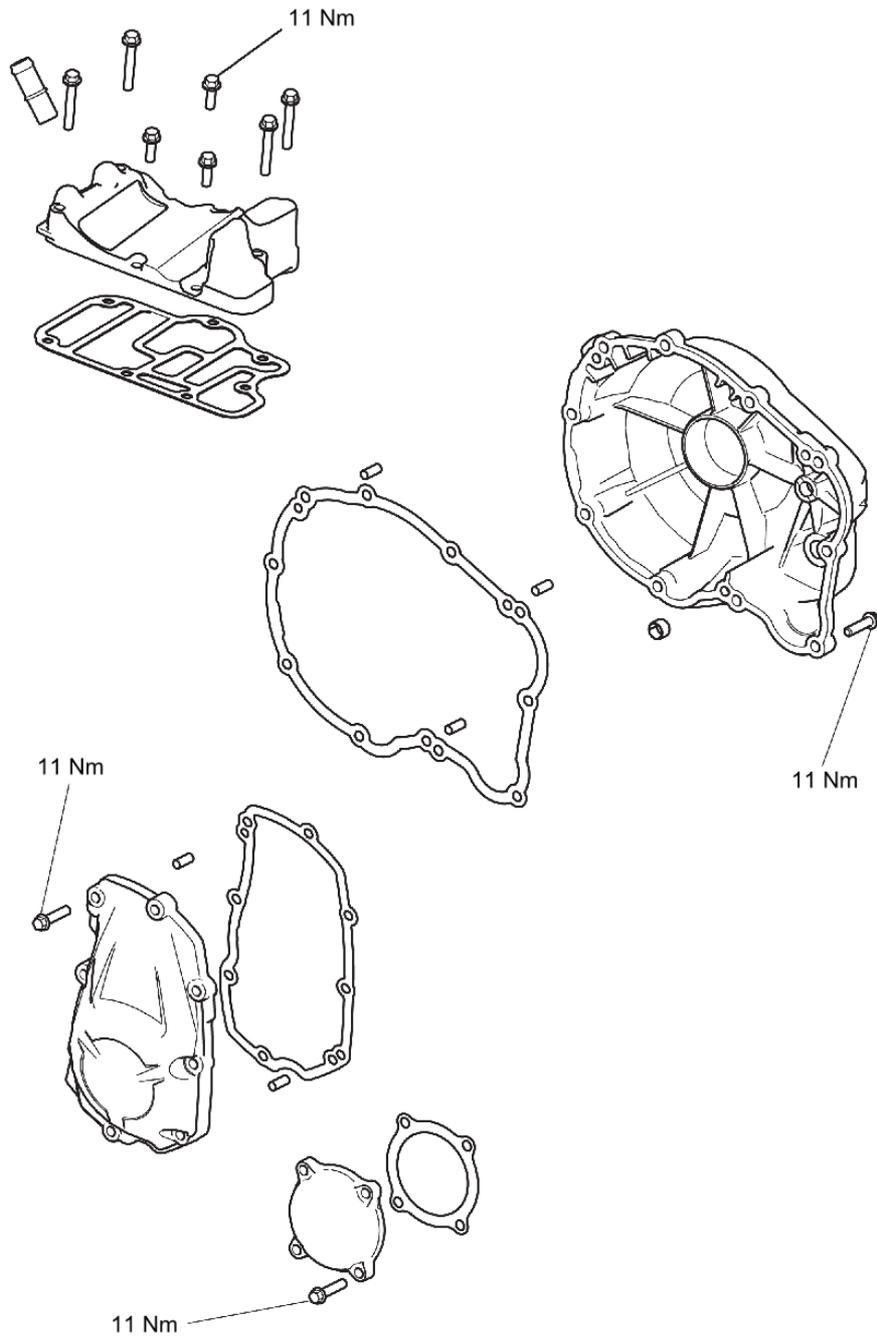
Exploded View – Clutch Cover



Exploded View – Sump



Exploded View – Engine Covers



Camshaft Cover - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

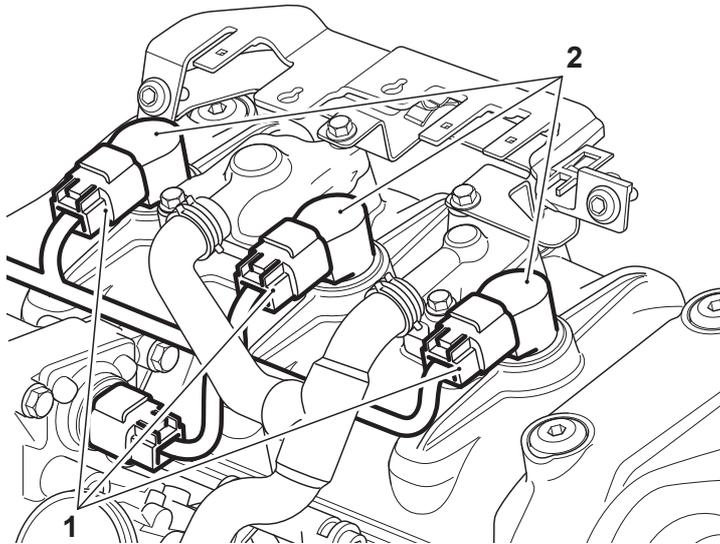
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal.
- Airbox - Removal
- Throttle Bodies/Injectors - Removal
- Coolant Replacement - Drainage

Note

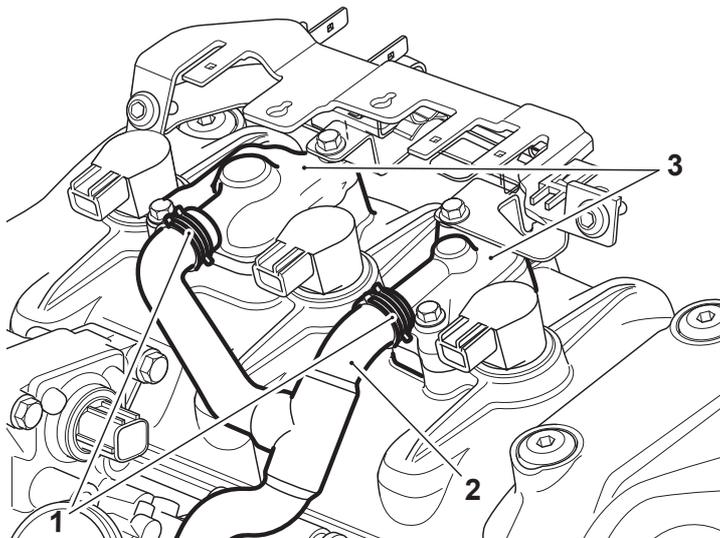
- **Note the position and routing of all hoses and electrical connections prior to removal.**

1. Disconnect the right hand coolant hose at the radiator and position aside.
2. Disconnect the electrical connections to the ignition coils and remove the coils.



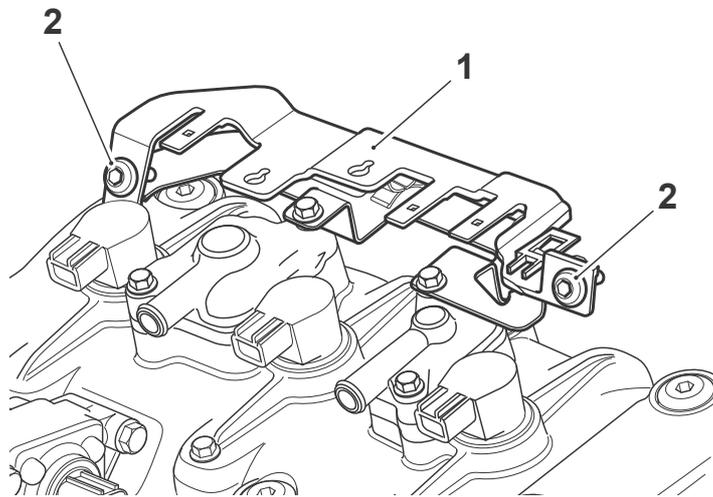
1. **Electrical connectors**
2. **Ignition coils**

3. Detach the secondary air injection hose from the reed valves on top of the camshaft cover.



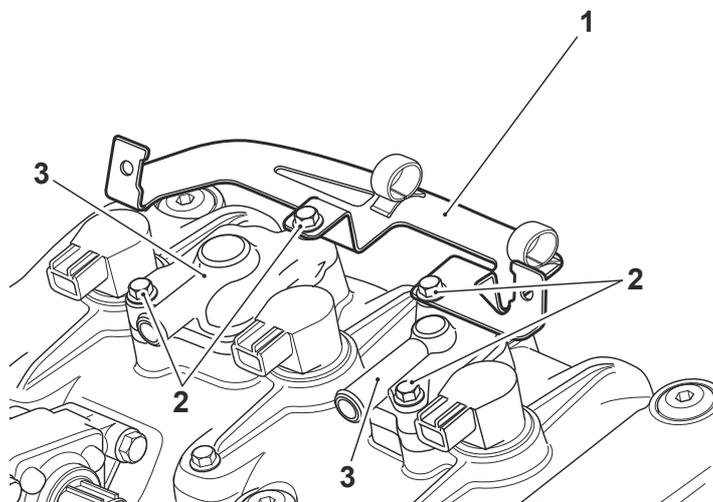
1. **Spring-close clip**
2. **Secondary air injection hose**
3. **Reed valve assemblies**

4. Detach the connectors from the connector bracket and position aside, then release the fixings and remove the connector bracket.



1. Connector bracket
2. Fixings

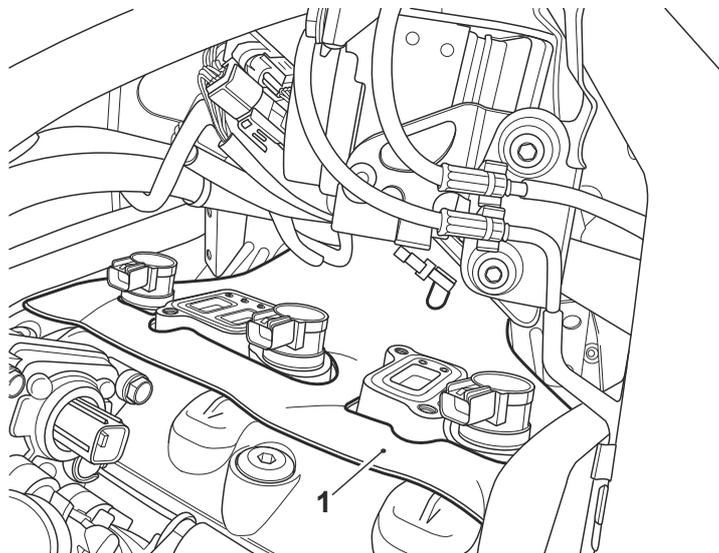
5. Noting the position of the fuel transfer pipe bracket, release the fixings securing the reed valve covers to the camshaft cover. Position the fuel transfer pipe bracket aside.



1. Fuel transfer pipe bracket
2. Fixings
3. Reed valve covers

6. Ease the reed valve covers from the valves.

7. Noting its position, move the air deflector towards the front of the motorcycle to allow access to the camshaft cover.

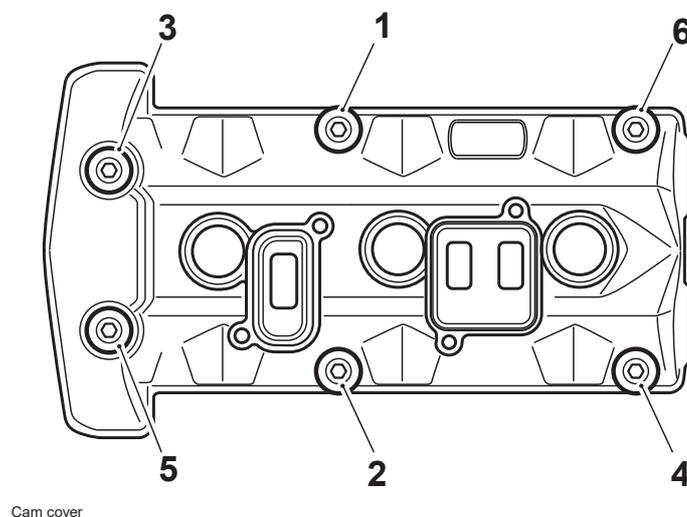


1. Air deflector

8. Progressively release the camshaft cover bolts in the sequence shown below.

Note

- Two shorter bolts are fitted at the end adjacent to the camshaft drive chain.



Camshaft Cover Bolt Release Sequence

9. Carefully manoeuvre the camshaft cover towards the front of the motorcycle. Then manoeuvre the cover to the right to remove it from the motorcycle.

! CAUTION

Never use a lever to remove the camshaft cover from the cylinder head.
Using a lever will cause damage to the head and camshaft cover which could lead to an oil leak.

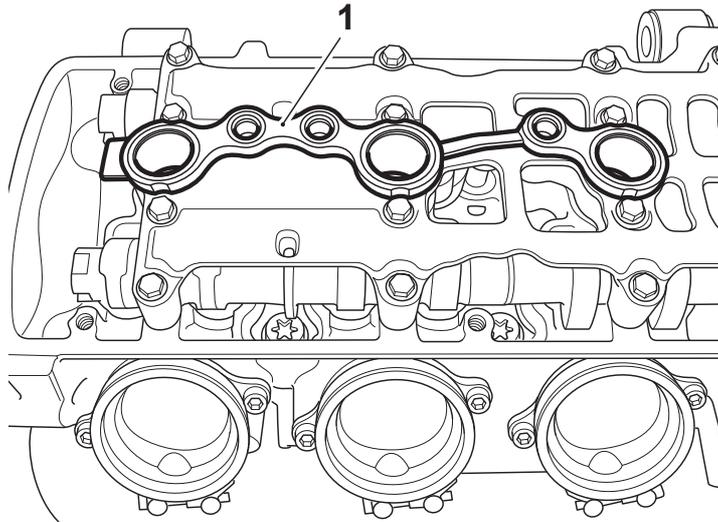
10. Remove the camshaft cover gasket and plug tower seals. If necessary, recover the dowels from the secondary air injection holes in the head (these may come away in the cover or gasket).
11. Discard the camshaft cover seal, bolt seals and the spark plug tower seals.
12. Remove any residual oil from the front of the cylinder head using a syringe or lint free cloth.

Camshaft Cover - Installation

WARNING

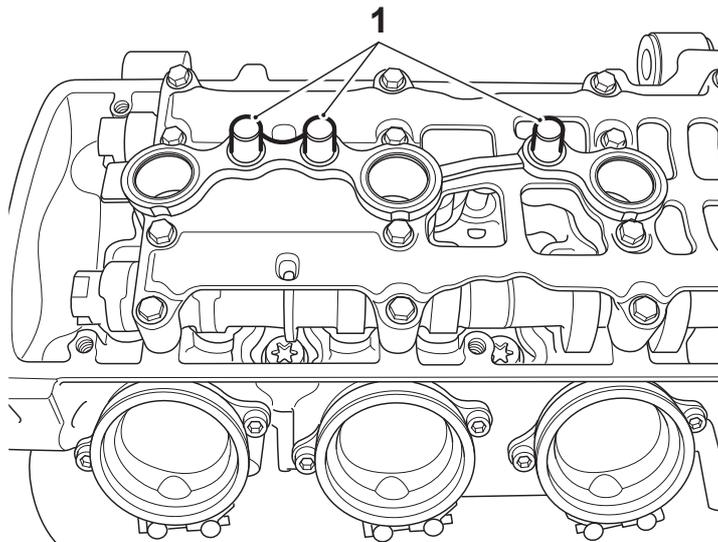
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit new plug tower seals to the camshaft cap ladder.



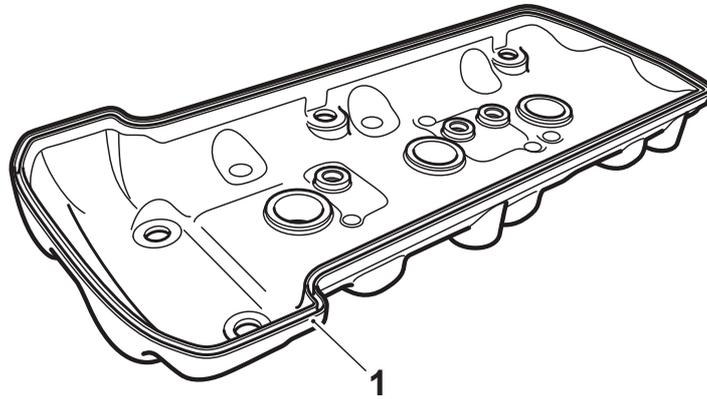
1. Plug tower seals

2. Refit the dowels to the cylinder head.



1. Dowels

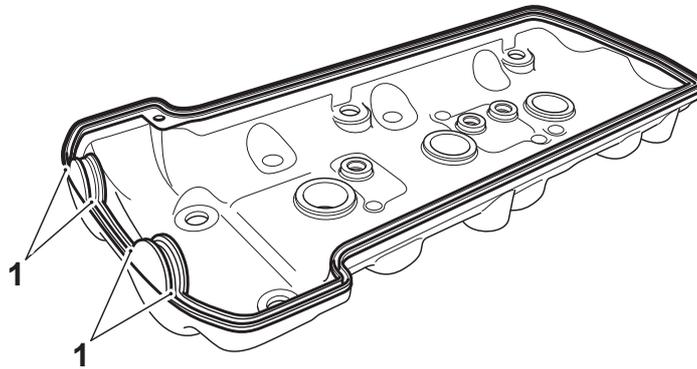
3. Fit a new camshaft cover seal to the groove in the camshaft cover.



chdk

1. Camshaft cover seal groove

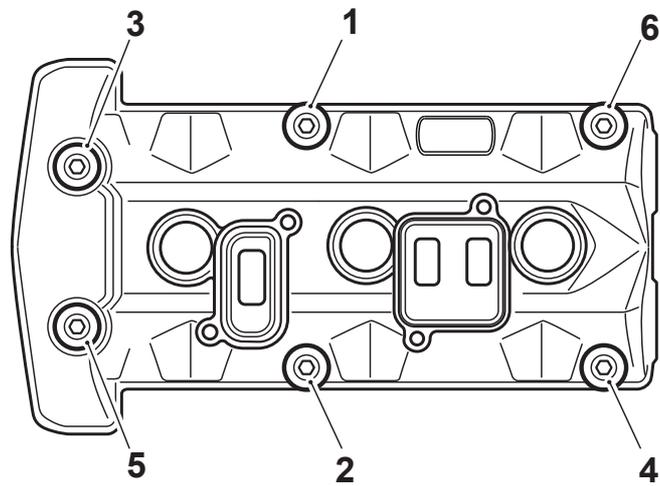
4. Apply silicone sealer to the areas shown in the diagram below (at the factory, ThreeBond 1215E is used).



chdk

1. Silicone sealer areas

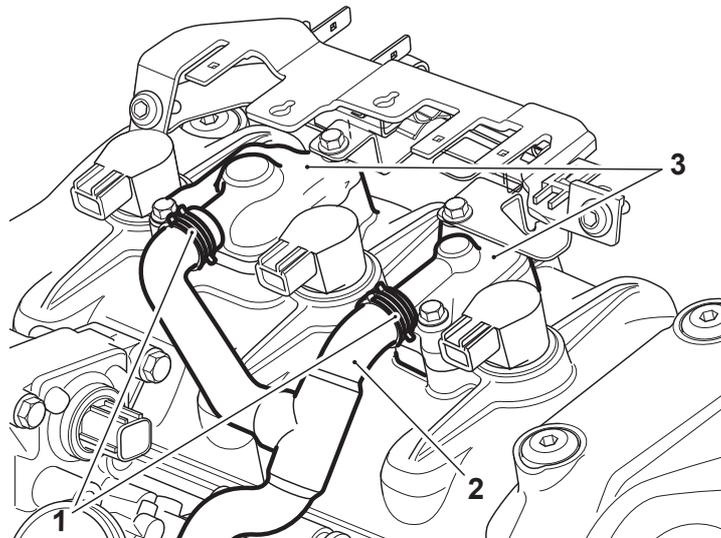
5. Fit the camshaft cover, ensuring that the dowels, gasket and seals remain in the correct positions.
6. Apply a thin film of engine oil to both sides of the new seals for the camshaft cover bolts.
7. Fit the camshaft cover screws and screw seals, then tighten until finger tight.
8. Finally, tighten the camshaft cover bolts to **12 Nm** in the sequence shown below.



Cam cover

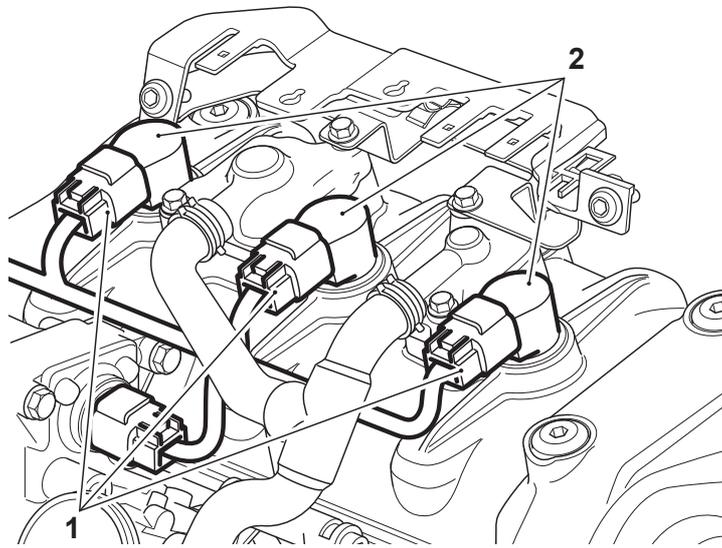
Camshaft Cover Bolts Tightening Sequence

9. Reposition the air deflector onto the camshaft cover as noted during removal.
10. Refit the reed valve covers and fuel transfer pipe bracket to the camshaft cover as noted during removal. Tighten the fixings to **9 Nm**.
11. Refit the connector bracket to the fuel transfer pipe bracket. Tighten the fixings to **3 Nm**.
12. Reattach the electrical connectors to the connector bracket as noted during removal.
13. Refit the secondary air injection hose to the reed valves.



1. **Spring-close hose clip**
2. **Secondary air injection hose**
3. **Reed valve assembly**

14. Fit the ignition coils and reconnect.



1. **Electrical connectors**
2. **Ignition coils**

15. Reconnect the right hand coolant hose, refit the constant tension hose clamp.

Perform the following operations:

- Refill the cooling system (see Coolant Replacement - Filling).
- Throttle Bodies/Injectors - Installation
- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Clutch Cover - Removal

WARNING

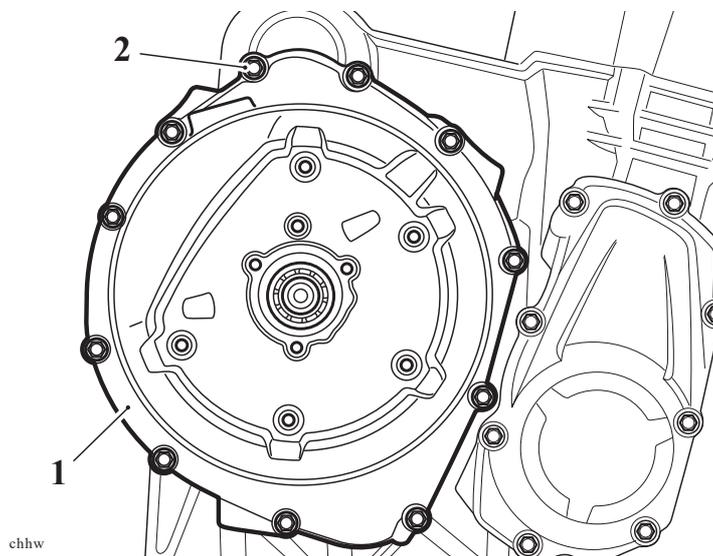
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the clutch slave cylinder (see Clutch Slave Cylinder - Removal). It is not necessary to drain the clutch cylinder fluid. Retain the piston to the slave cylinder using a rubber band or cable tie.

WARNING

Do not allow the clutch slave cylinder to hang on the clutch hose as this may damage the hose and could impair clutch operation leading to loss of motorcycle control and an accident.

2. Tie the clutch slave cylinder aside.
3. Noting the position of the encapsulated fixing, remove the fixings and remove the clutch cover. Discard the encapsulated fixing.



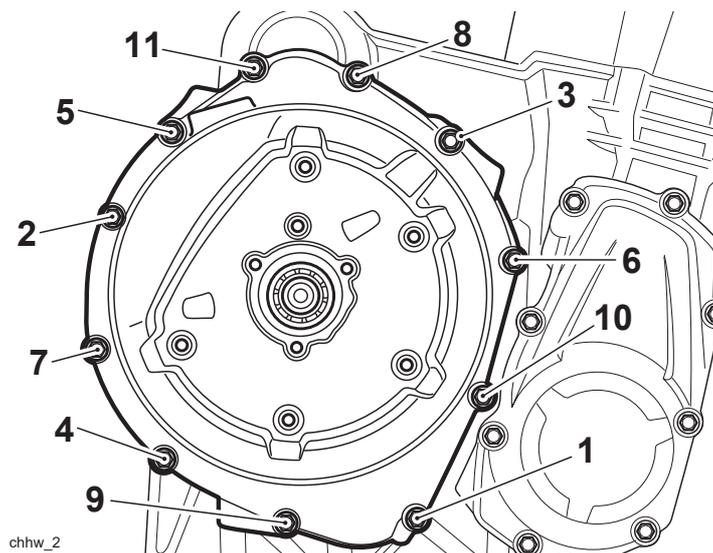
1. Clutch cover
2. Encapsulated fixing position

Clutch Cover - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Clean and refit the clutch cover incorporating a new gasket.
2. Install a new encapsulated fixing at the position noted during removal.
3. Install the remaining fixings and tighten as described below:
 - o Tighten fixings 1 to 10 only, in the sequence shown below to **11 Nm**.
 - o Tighten fixings one and two again to **11 Nm**.
 - o Tighten fixing 11 to **11 Nm**.



Clutch Cover Tightening Sequence

4. Remove the cable tie or rubber band from the clutch slave cylinder.
 - Clean and refit the clutch slave cylinder incorporating a new gasket (see Clutch Slave Cylinder - Installation).
 - Check and top up the engine oil level (see Oil Level Inspection).

- Check the clutch operation. Rectify as necessary.

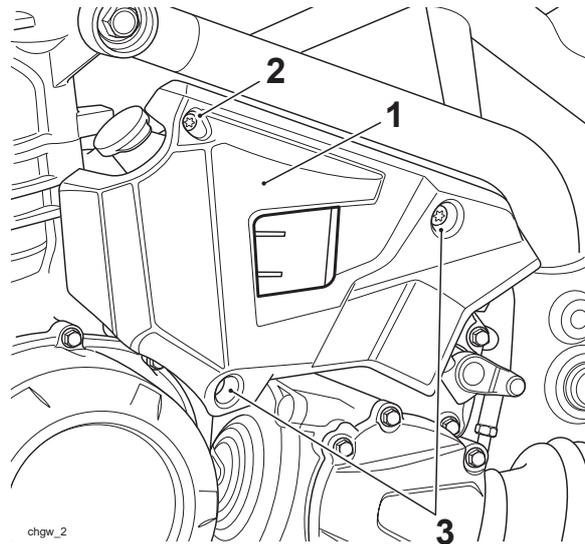
Trigger Wheel Cover - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

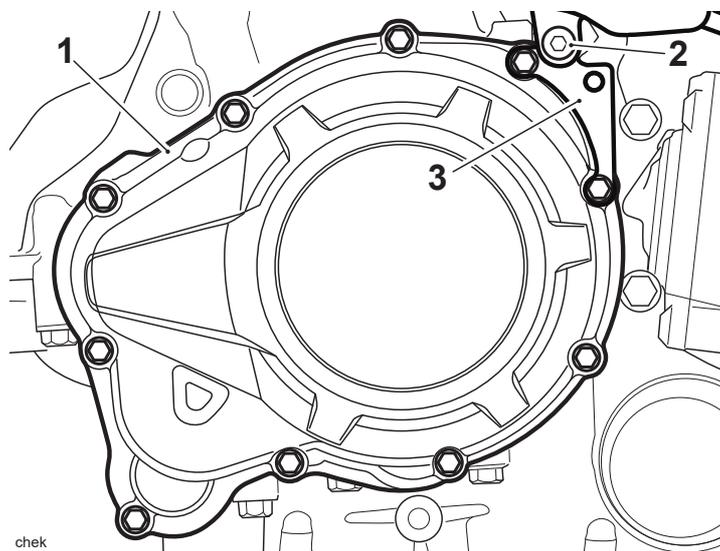
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Remove the three fixings and remove the expansion tank cover. Discard the upper M5 fixing. Retain the lower M6 fixings for reuse.



1. **Expansion tank cover**
2. **Upper fixing (M5)**
3. **Lower fixings (M6)**

2. Remove the lower expansion tank fixing. It is not necessary to remove or drain the expansion tank.
3. Remove the fixings and remove the trigger wheel cover. Collect the expansion tank bracket. Discard the gasket.



1. **Trigger wheel cover**
2. **Expansion tank fixing**

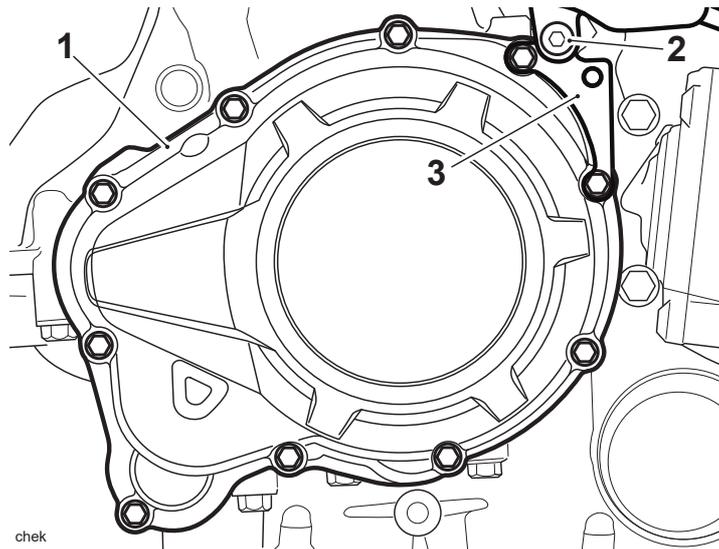
3. Expansion tank bracket

Trigger Wheel Cover - Installation

WARNING

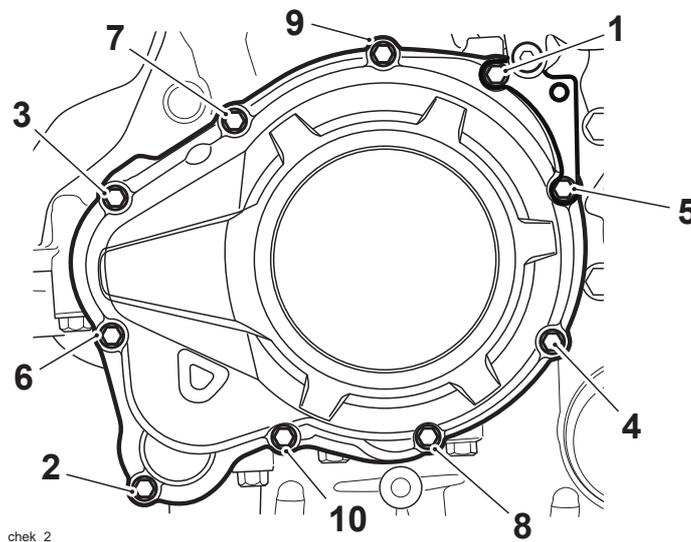
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the trigger wheel cover.
2. Position a new gasket to the crankcase dowels then refit the trigger wheel cover.
3. Refit the expansion tank bracket and secure the cover and bracket with the fixings.



1. Trigger wheel cover
2. Expansion tank fixing
3. Expansion tank bracket

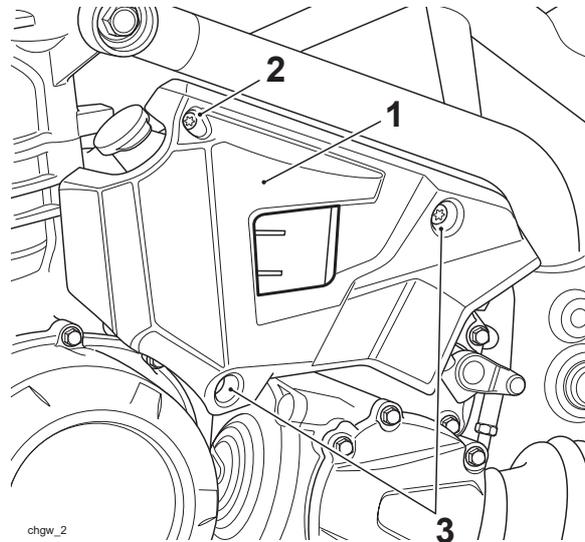
4. Tighten the cover fixings in the following sequence:
 - o Tighten the fixings in the sequence shown below to **11 Nm**.
 - o Tighten fixings one and two again to **11 Nm**.



Trigger Wheel Cover Tightening Sequence

5. Refit the expansion tank lower fixing, tightening to **3 Nm**.

6. Refit the expansion tank cover. Secure the upper mounting with a new M5 encapsulated fixing. Secure the lower mountings with the two original fixings. Tighten the upper fixing to **3 Nm** and the lower fixings to **4 Nm**.



1. Expansion tank cover
2. Upper fixing (M5)
3. Lower fixings (M6)

Perform the following operations:

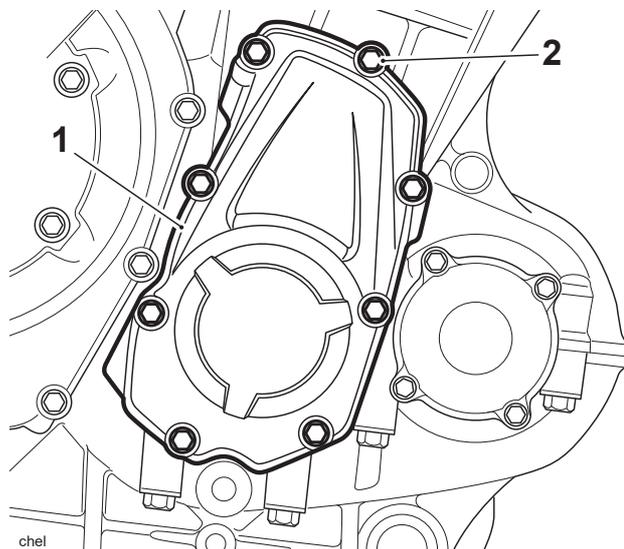
- Battery - Installation
- Rider's Seat - Installation

Crankshaft Cover - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the seven fixings, noting the position of the encapsulated fixing.
2. Remove the crank cover. Discard the encapsulated fixing and gasket.



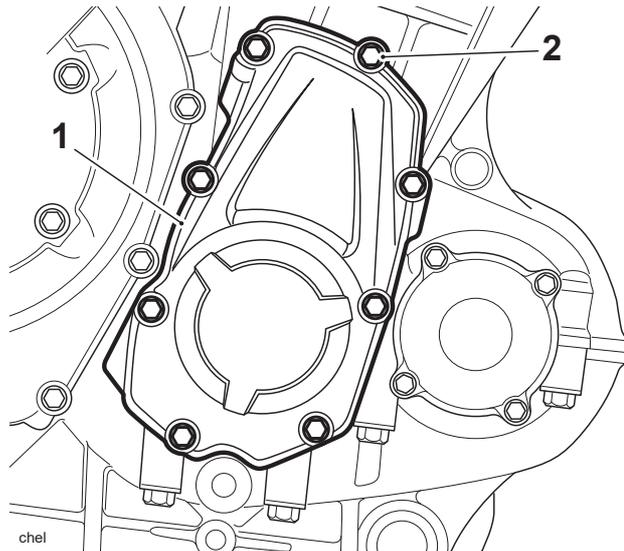
1. Crankshaft cover
2. Encapsulated fixing

Crankshaft Cover - Installation

WARNING

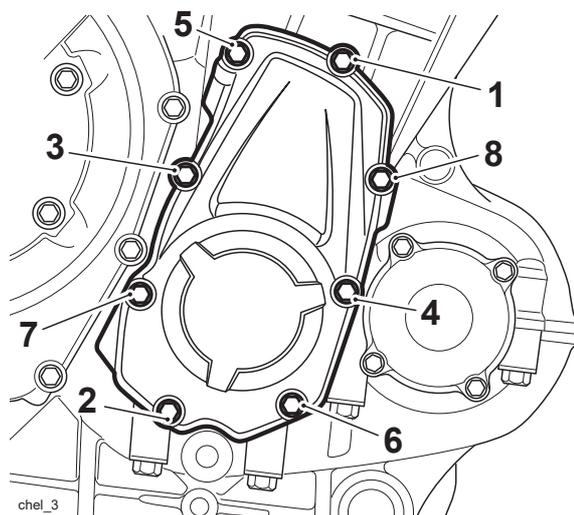
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the crankshaft cover.
2. Position a new gasket to the crankcase dowels.
3. Refit the crankshaft cover, installing a new encapsulated fixing to the position shown below.



1. Crankshaft cover
2. Encapsulated fixing

4. Tighten the cover fixings in the following sequence:
 - o Tighten the fixings in the sequence shown below to **11 Nm**
 - o Tighten fixings one and two again to **11 Nm**.



Crankshaft Cover Tightening Sequence

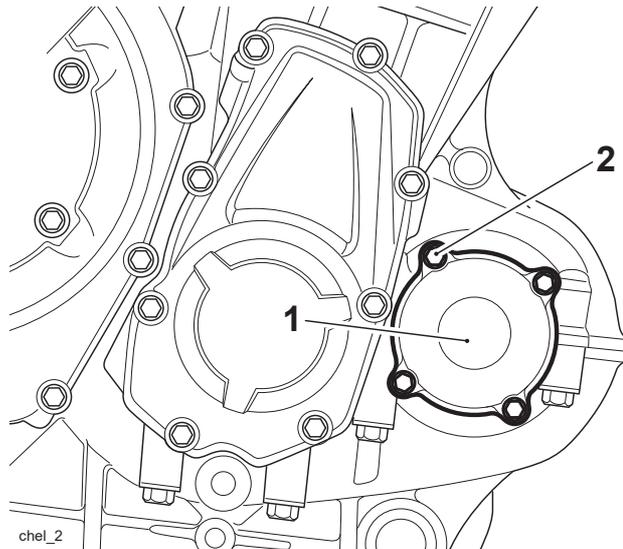
Balancer Shaft Cover - Removal

WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the four fixings.
2. Remove the balancer shaft cover. Discard the gasket.



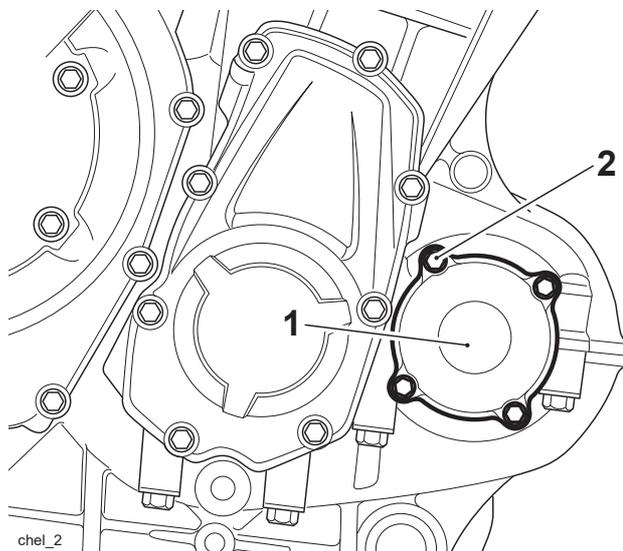
1. Balancer cover
2. Fixings

Balancer Shaft Cover - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the balancer shaft cover.
2. Position a new gasket to the crankcase dowels.
3. Refit the balancer shaft cover.

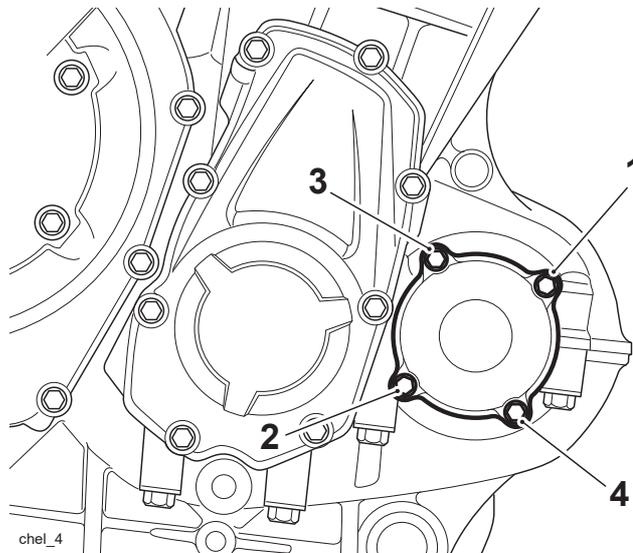


1. Balancer cover

2. Fixings

4. Tighten the cover fixings in the following sequence:

- Tighten the fixings in the sequence shown below to **11 Nm**.
- Tighten fixings one and two again to **11 Nm**.



Balancer Cover Tightening Sequence

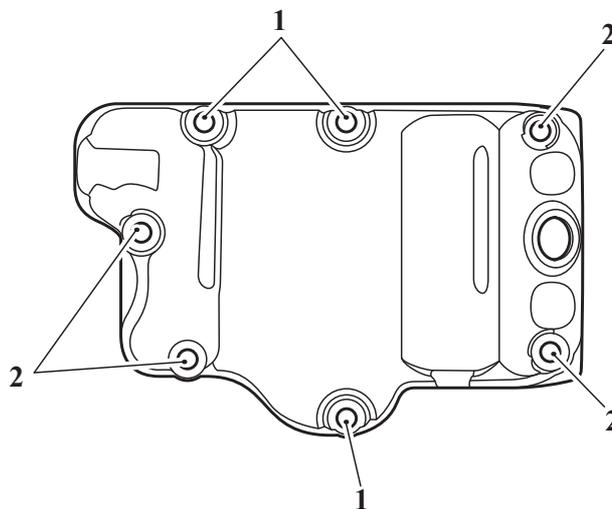
Breather Cover - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Alternator - Removal
1. Remove the seven fixings, noting the position of the three M6 x 16 mm and four M6 x 35 mm fixings.



1. **M6 x 16 mm fixings**
2. **M6 x 35 mm fixings**

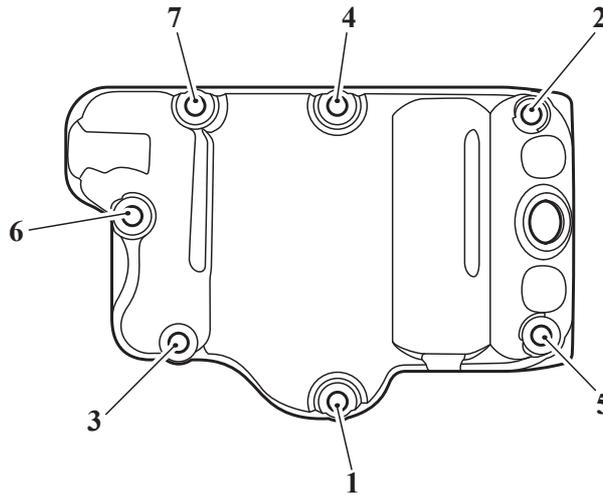
2. Remove the breather cover. Discard the fixings and gasket.

Breather Cover - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the breather cover.
2. Position a new gasket to the crankcase.
3. Refit the breather cover, installing new M6 x 16 mm and M6 x 35 mm encapsulated fixings as noted during removal.
4. Tighten the new fixings in the sequence shown below to **11 Nm**.



Breather Cover Tightening Sequence

Perform the following operations:

- Alternator - Installation

Sump - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contamination which can cause cancer. Wear suitable clothing and avoid skin contact.

The engine oil and filter must be replaced in accordance with scheduled maintenance requirements.

WARNING

If the engine has recently been running, the engine oil will be hot to the touch. Contact with the hot oils may cause damage to exposed skin. To avoid skin damage, do not touch hot oil.

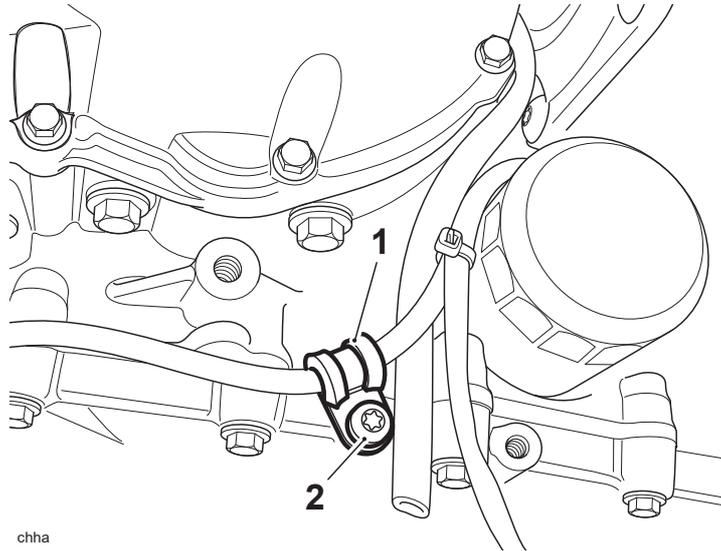
WARNING

WARNING

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Perform the following operations:

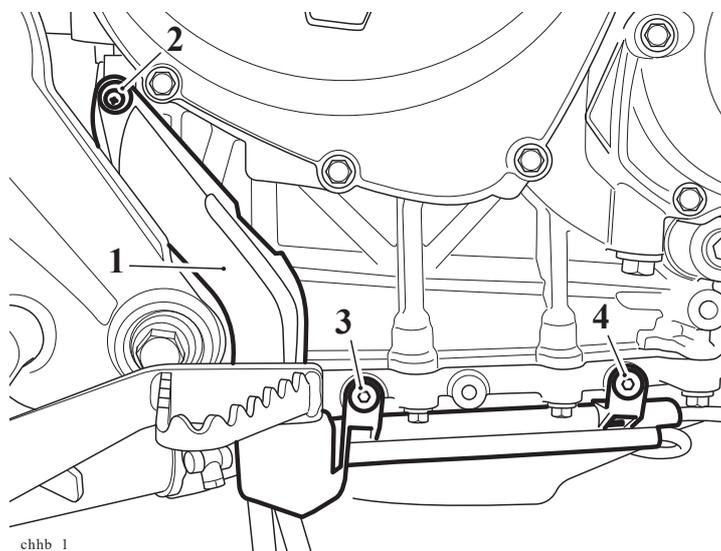
- Rider's Seat - Removal
 - Battery - Removal
 - Drain the engine oil, see Oil and Oil Filter Change
 - Sump Guard - Removal
 - Exhaust Header Pipes - Removal
1. Remove the fixing and detach the starter motor cable P-clip from the sump.



1. **Starter motor cable P-clip**
2. **Fixing**

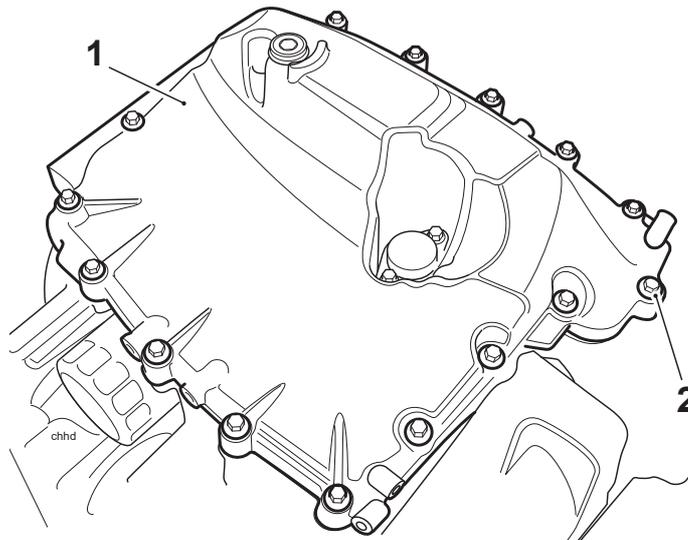
Note

- For models fitted with engine bars as standard, the lower front mounting point of the harness guide is secured with a fir tree clip instead of a bolt.
2. Remove the scrivet, bolt(s) and fir tree clip (if fitted) and remove the harness guide from the right hand side of the engine. Discard the bolt(s) and fir tree clip.



1. **Harness guide**
2. **Scrivet**
3. **Bolt**
4. **Bolt/fir tree clip**

3. Release the fixings securing the sump to the lower crankcase.

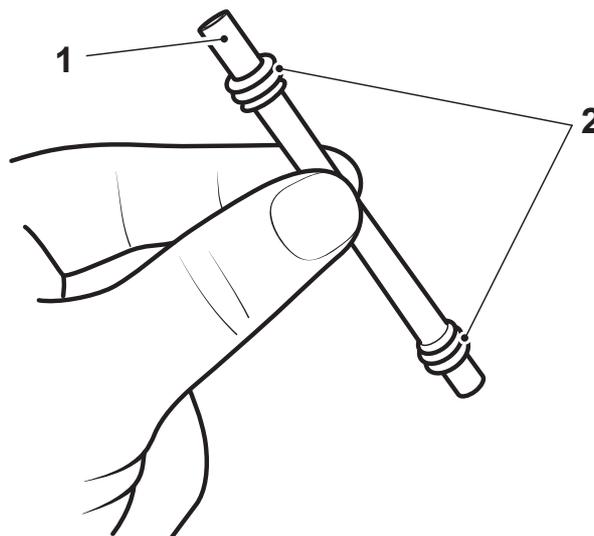


1. **Sump**
2. **Fixings**

4. Detach the sump and collect the water pump drain tube. Remove and discard the four drain tube O-rings.

Note

- The water pump drain tube may remain attached to the water pump or become detached with the sump.



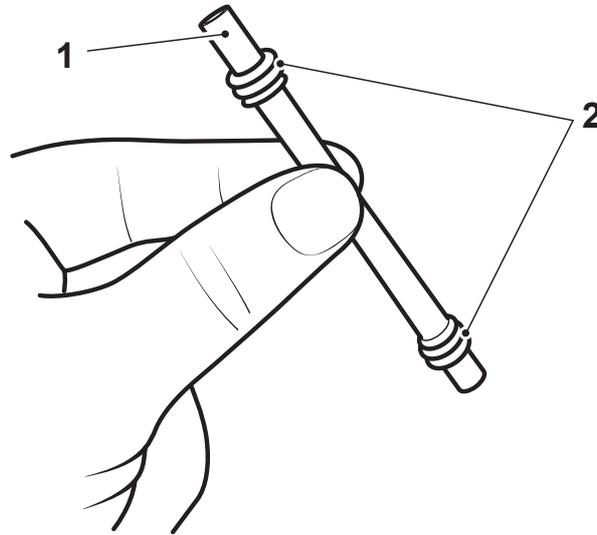
1. **Water pump drain tube**
2. **O-rings**

Sump - Inspection

1. Inspect the oil pick-up for correct fitment in the lower crankcase.

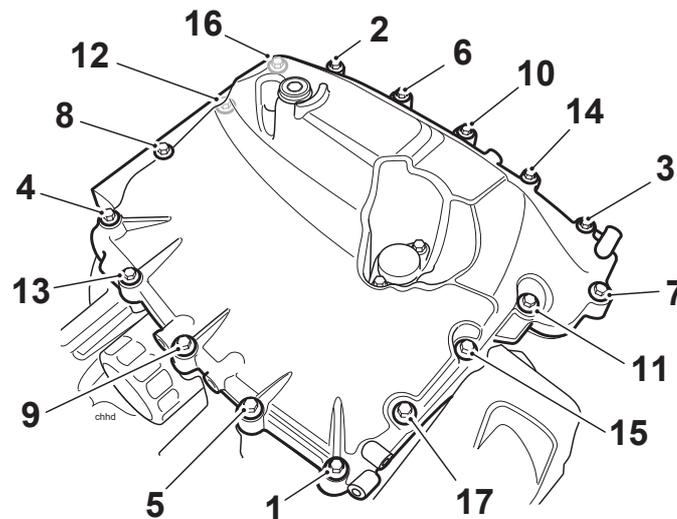
Sump - Installation

1. Incorporating new O-rings (two at each end of the tube), position the water pump drain tube to the oil pump.



1. **Water pump drain tube**
2. **O-rings**

2. Thoroughly clean the sump.
3. Incorporating a new sump gasket, position the sump to the lower crankcase.
4. Tighten the sump fixings in the following sequence:
 - o Tighten the fixings in the sequence shown below to **12 Nm**.
 - o Tighten fixings one, two, three and four again to **12 Nm**.



Sump Tightening Sequence

Note

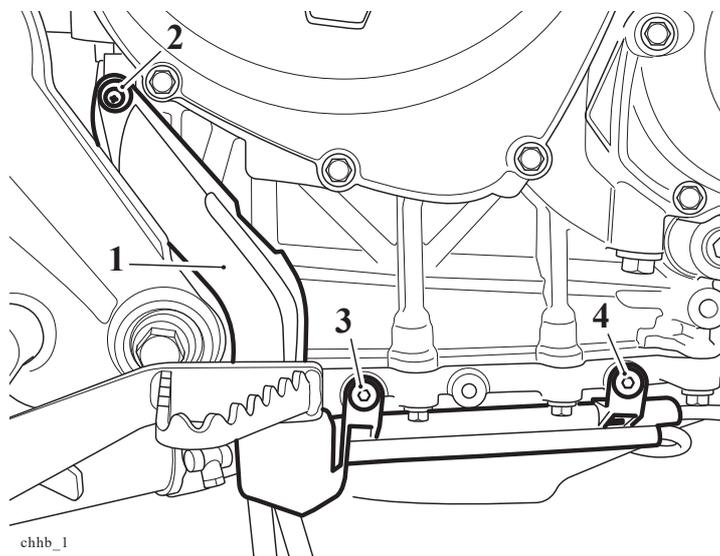
- **Use new exhaust gaskets at the downpipe connections with the cylinder head.**

5. Refit the exhaust system (see Exhaust Header Pipes - Installation).

Note

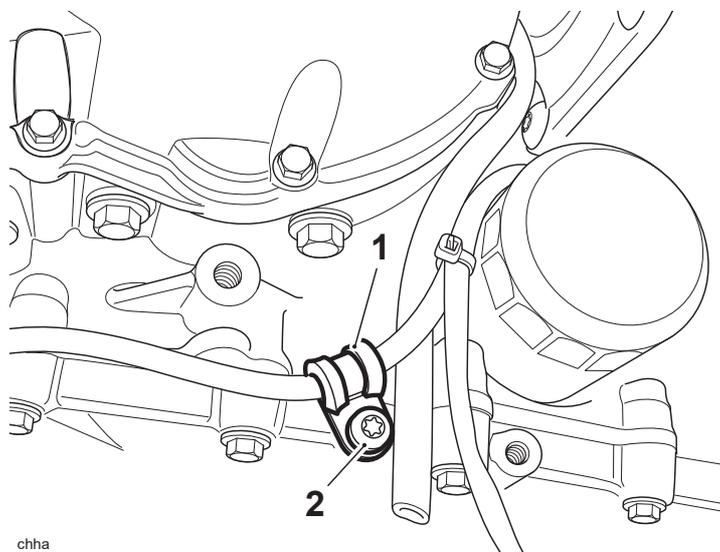
- **For models fitted with engine bars as standard, the lower front mounting point of the harness guide is secured with a fir tree clip instead of a bolt.**

6. Refit the harness guide and secure with the scrivet, new bolt(s) and new fir tree clip (if fitted). Tighten the bolt(s) to **3 Nm**.



1. **Harness guide**
2. **Scrivet**
3. **Bolt**
4. **Bolt/fir tree clip**

7. Reposition the starter motor cable P-clip to the sump and secure with a new fixing. Tighten to **6 Nm**.

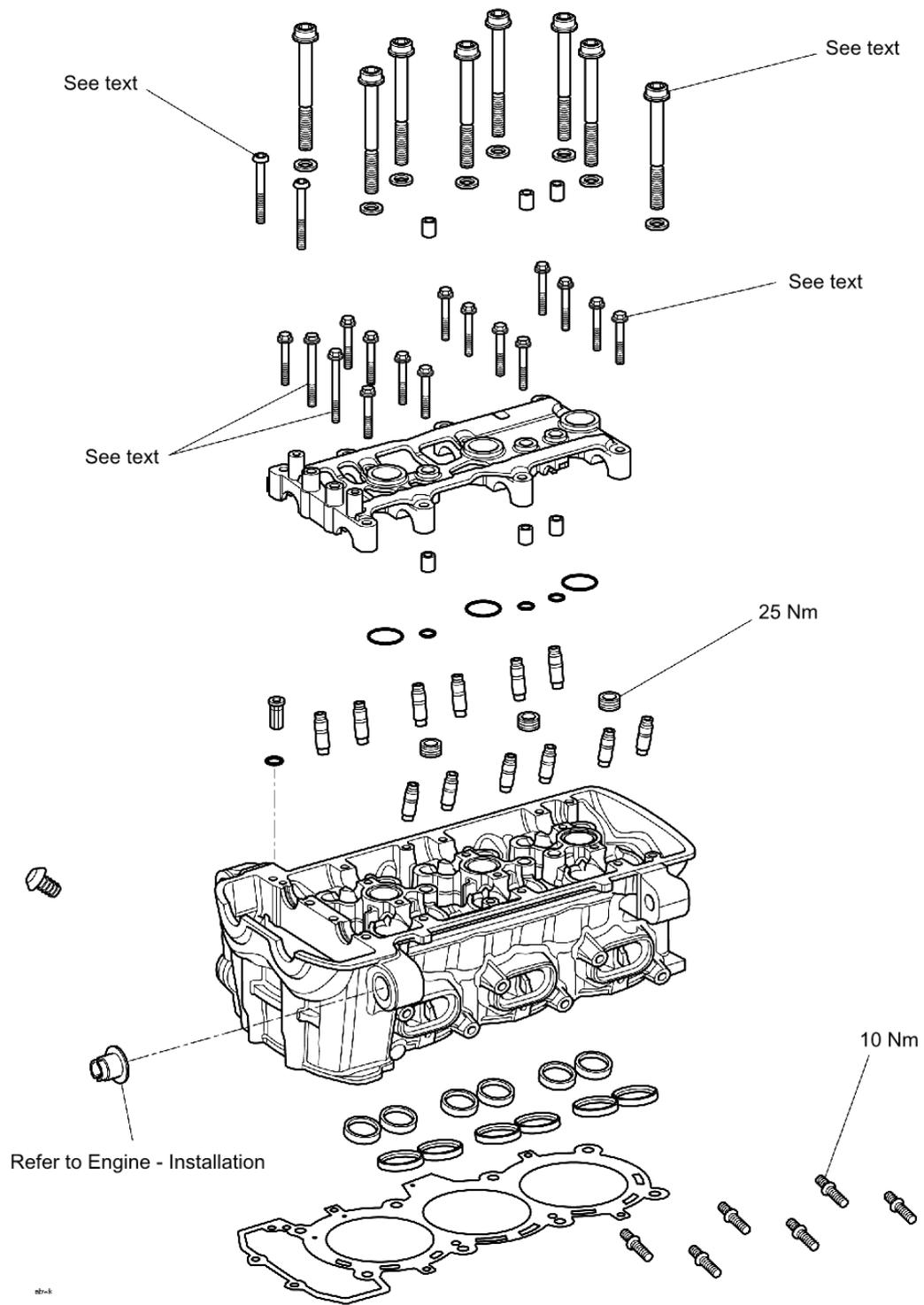


1. **P-clip**
2. **Fixing**

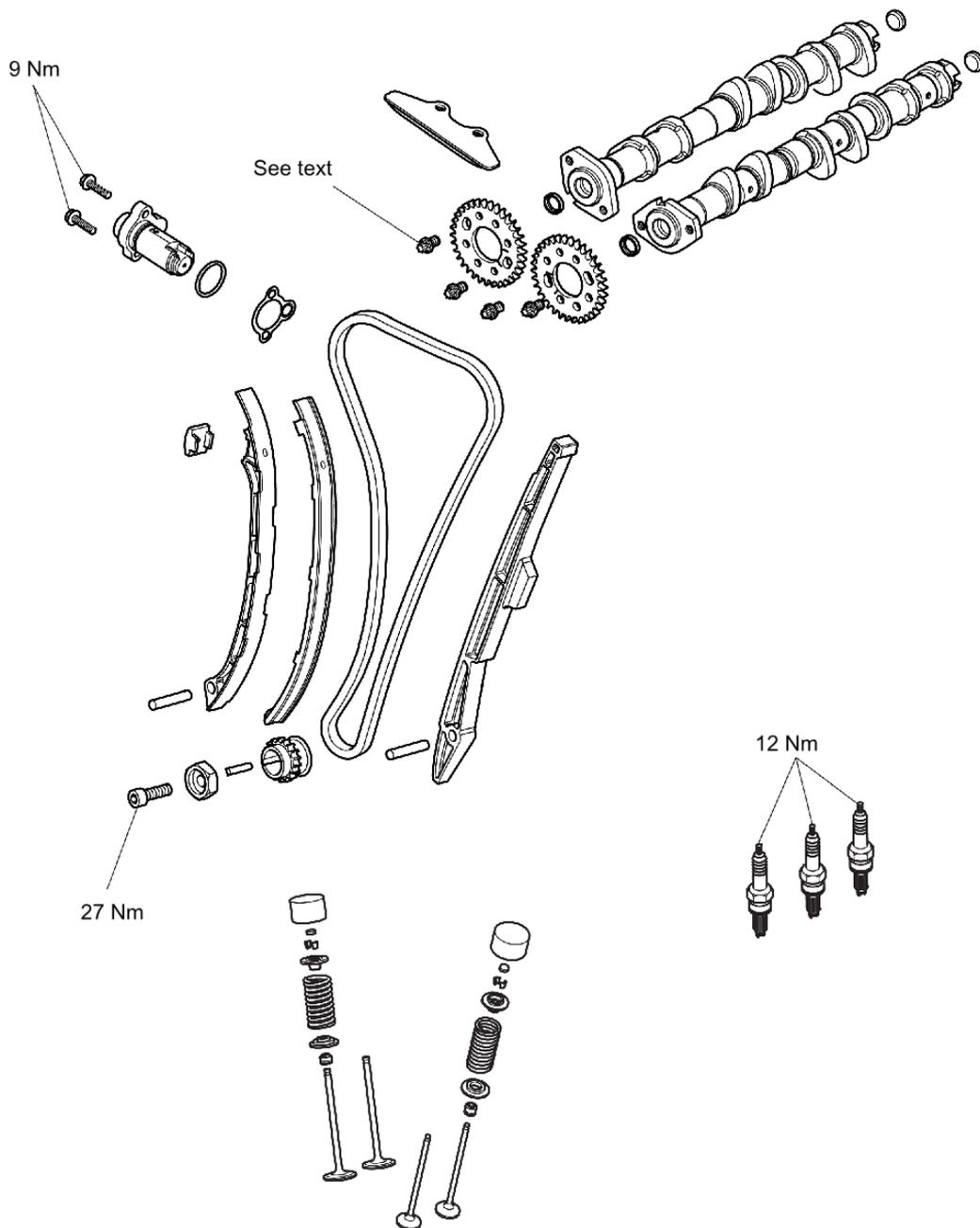
8. Refit the sump guard (see Sump Guard - Installation).
9. Fill the engine with the correct grade of engine oil (see Oil and Oil Filter Change).
10. Reconnect the battery, positive (red) lead first.
11. Start the engine and ensure that the low oil pressure warning light goes out shortly after starting.
12. Stop the engine and adjust the engine oil level (see Oil Level Inspection).
13. Refit the rider's seat (see Rider's Seat - Installation).

Cylinder Head

Exploded View - Cylinder Head



Exploded View - Camshaft, Camshaft Drive and Valves



Cylinder Head Description

The engine is fitted with an aluminium alloy cylinder head, which carries the camshafts, valves and spark plugs. The cylinder head is cast as a single entity and various components are permanently added after machining.

The camshafts run directly in the cylinder head without separate bearings. Valve clearances are adjusted by changing variable thickness shims which sit between the valve tappet bucket and the valves.

The camshafts are driven by a silent-type drive chain, via a sprocket bolted to each of the camshafts, using slotted holes. The use of slotted holes allows the camshaft timing to be adjusted very accurately, to compensate for manufacturing tolerances in the camshaft drive system.

The chain is guided by two blades and is tensioned by a hydraulic tensioner.

The hydraulic tensioner is fed oil via a gallery in the cylinder head. The combination of oil pressure and spring pressure pushes the plunger against the tensioner blade which tensions the camshaft drive chain. The hydraulic tensioner has an oil pressure relief valve located in the plunger that is set to open between 12-16 bar and when open sprays oil through a drilling in the tensioner blade onto the camshaft drive chain.

Oil is supplied to the cylinder head by a gallery in the crankcase. Once supplied to the head, the oil is distributed along internal drillings within the cylinder head casting and camshaft.

Single valve springs are used to close both the inlet valves and exhaust valves. These valve springs have close wound coils at one end to assist in the prevention of valve bounce at high engine speed and to give a smooth valve actuation. When assembling the cylinder head it is important that the close wound, colour coded ends of the springs are fitted downwards (towards the piston). Both the tip and seating face of the valves are hardened to give a long service life.

Due to the methods used to assemble the valve seat and valve guides to the head, these parts cannot be replaced.

CAUTION

In any of the following operations which necessitate the removal or disconnection of the camshaft drive chain, NEVER turn the engine without the camshaft drive chain and tensioner correctly fitted and adjusted. In the disassembled condition, the pistons will contact the valves if the crankshaft is turned, causing severe engine damage.

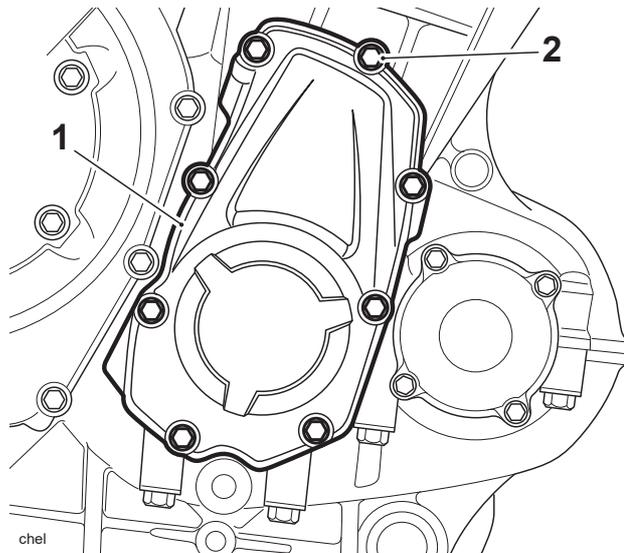
Camshaft Drive Chain Tensioner - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

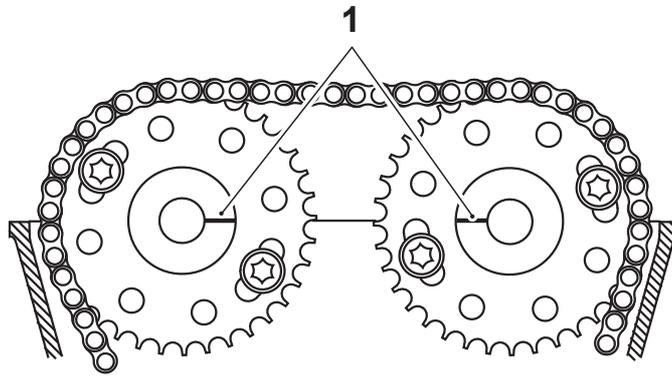
Perform the following operations:

- Camshaft Cover - Removal
1. Remove the right hand crankshaft cover, noting the position of the encapsulated bolt. Discard the encapsulated bolt.



1. Right hand crankshaft cover
2. Encapsulated bolt

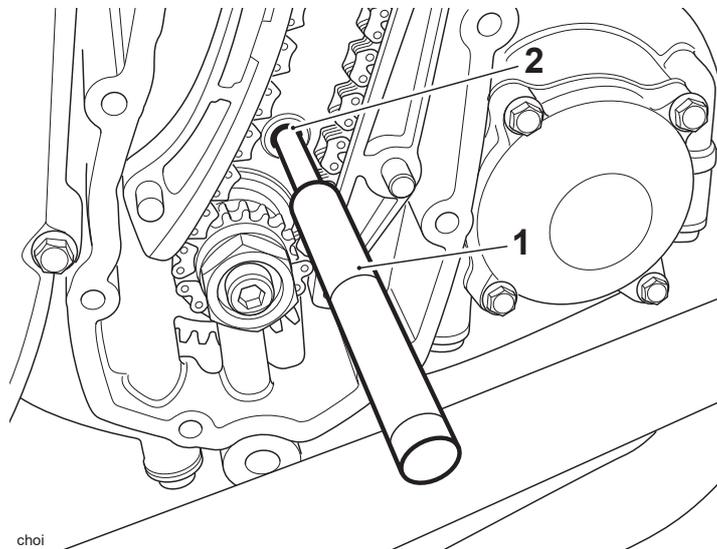
2. Rotate the crankshaft clockwise (the normal direction of rotation) using the bolt fitted to the end of the crankshaft. Stop rotation **just before** the marks on the camshaft bosses point inwards at a point level with the joint face.



gaaa_2

1. Alignment marks

3. Insert T3880601 - Camshaft Timing Pin into the timing hole in the crankcase.
4. Turn the engine clockwise until the pin can be inserted fully into the crankshaft.

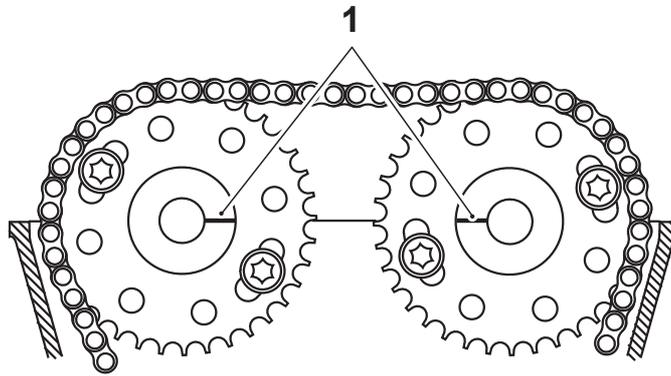


choi

1. T3880601 - Camshaft Timing Pin
2. Timing hole in crankcase

Note

- In addition to T3880601 - Camshaft Timing Pin being installed in to the crankshaft at TDC, the alignment marks on the camshaft bosses will point inwards at a point level with the joint face.



gaaa_2

1. Alignment marks

5. Place a suitable wedge between the camshaft drive chain tensioner blade and crankcase, to hold the camshaft drive chain taut during removal of the tensioner.

WARNING

The hydraulic tensioner is under spring tension. Always wear hand, eye, and face protection when withdrawing the tensioner mounting bolts and take great care to minimise the risk of injury and loss of components.

Note

- **Note the orientation of the tensioner before removal.**
6. Evenly release the camshaft drive chain tensioner mounting bolts until the plunger spring tension has been released.
 7. Remove the camshaft drive chain tensioner and discard the O-ring and gasket.

Camshaft Drive Chain Tensioner - Inspection

1. Inspect the camshaft drive chain tensioner spring for damage and deformation. Renew as necessary.
2. Inspect the tip of the camshaft drive chain tensioner plunger for wear and damage. Renew as necessary.

Camshaft Drive Chain Tensioner - Installation

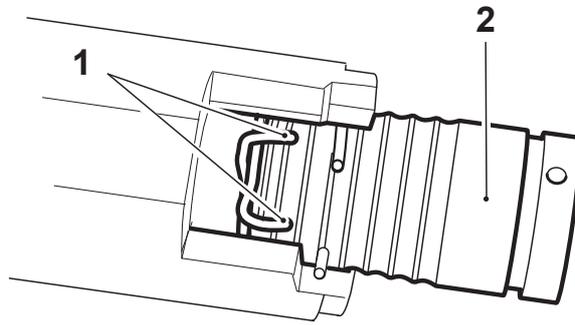
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

To set the camshaft drive chain tensioner onto the first tooth of the ratchet (i.e. minimum extension) carry out the following:

Note

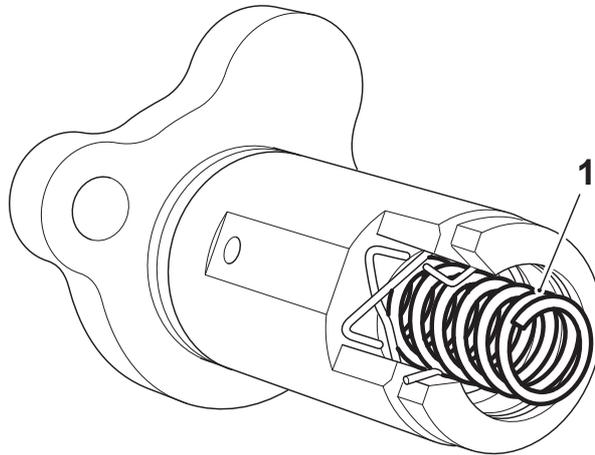
- **If installing a new camshaft drive chain tensioner, do not release the plunger before fitting.**
 - **If installing the original camshaft drive chain tensioner, the engine oil must be drained out of the tensioner to enable the plunger to be set onto the first tooth of the ratchet.**
1. Hold the resistor ring ends together and pull out the plunger.



cfei_2

1. Resister ring ends
2. Plunger

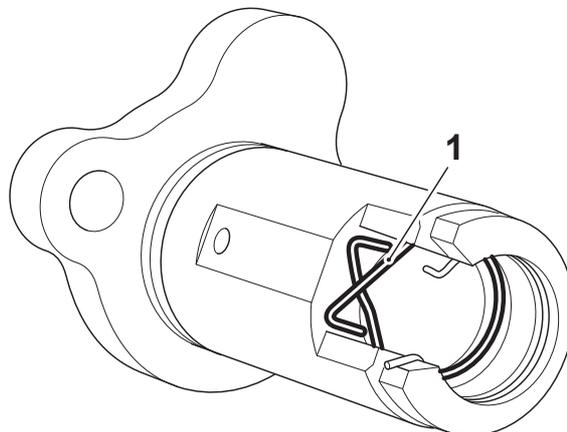
2. Remove the spring.



cfhp

1. Spring

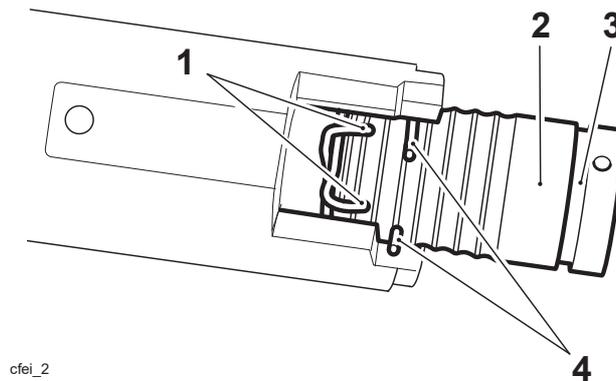
3. While holding the resister ring in place, pour out the engine oil into a suitable container.
4. Ensure the resister ring is correctly located as shown in the illustration below.



cfho

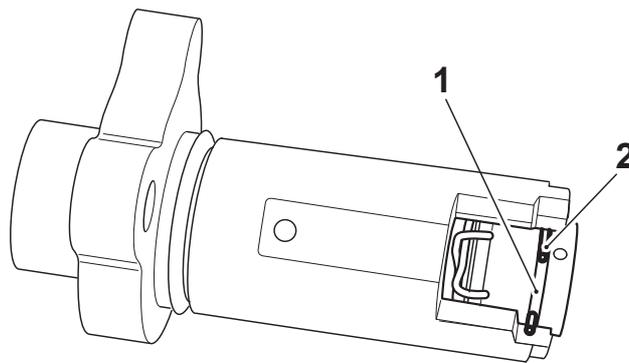
1. Resister ring

5. Refit the spring.
6. Hold the resister ends together and insert the plunger into the tensioner housing.
7. Place the tensioner in a soft jawed vice.
8. While holding the resister ends together, use the vice to push the plunger through the resister ring until the groove for the snap ring aligns with the snap ring.



1. Resister ring
2. Plunger
3. Groove for snap ring
4. Snap ring

9. When the groove aligns with the snap ring, release the resister ring and move one end of the snap ring into the groove. Slowly release the vice to ensure that the plunger is held in place.



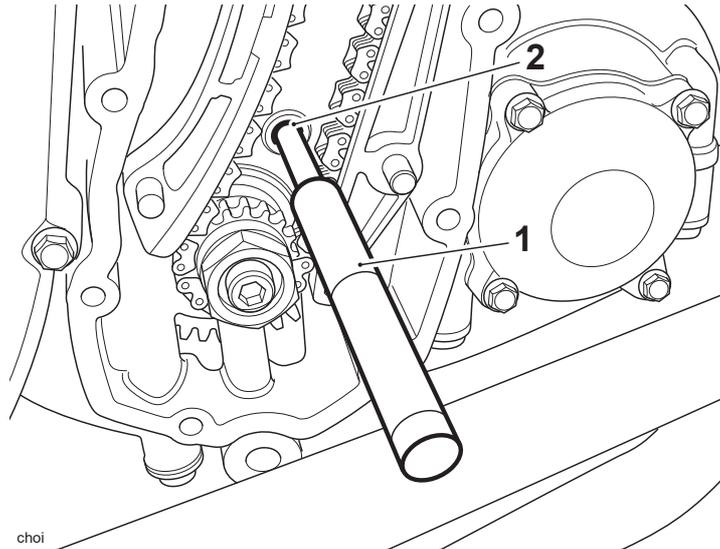
1. Groove for snap ring
2. Snap ring

10. Fit a new O-ring and gasket to the camshaft drive chain tensioner.
11. Fit the camshaft drive chain tensioner to the cylinder head as noted for removal. Tighten the bolts to **9 Nm**.
12. Remove the wedge, taking care not to move or damage the tensioner blade.
13. Remove T3880601 - Camshaft Timing Pin.
14. To release the hydraulic tensioner, rotate the crankshaft 90° (¼ turn) anti-clockwise using the bolt fitted to the end of the crankshaft. Then rotate the crankshaft clockwise until T3880601 - Camshaft Timing Pin can be inserted into the crankshaft.
15. Check that there is tension in the camshaft drive chain and the timing marks on the camshaft bosses are correctly aligned.

Note

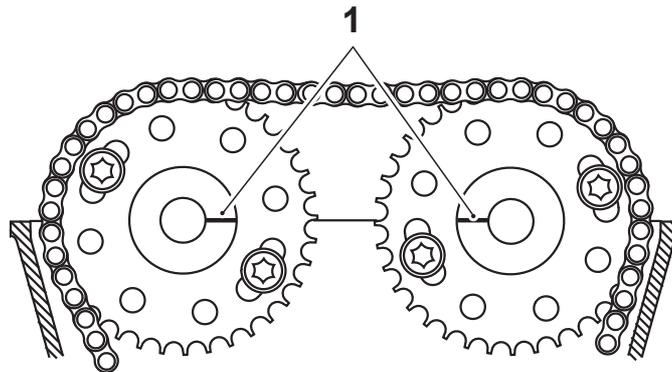
- After fitting to the engine, the hydraulic tensioner will be empty of engine oil. After starting the engine, the camshaft drive chain and tensioner blade will be noisy until full oil pressure is felt at the tensioner plunger. This could take up to five seconds.

16. Check that the tensioner plunger is correctly located in the middle of the tensioner blade when viewed from above.
17. Rotate the engine through four full revolutions, and reset number 1 cylinder to TDC. Ensure that T3880601 - Camshaft Timing Pin can be inserted fully into the timing hole in the crankcase and crankshaft.



1. T3880601 - Camshaft Timing Pin
2. Timing hole in crankcase

18. Check that the camshaft boss timing marks align as illustrated below.



gaaa_2

1. Camshaft Boss to Cylinder Head Alignment Marks

19. Re-check the tensioner plunger location against the tensioner blade.
20. Remove T3880601 - Camshaft Timing Pin.

Perform the following operations:

- Camshaft Cover - Installation
- Crankshaft Cover - Installation

Camshafts - Removal

WARNING

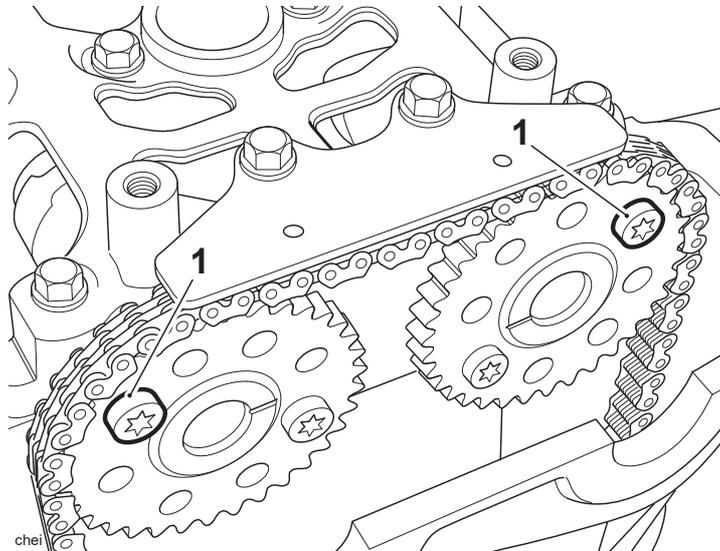
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Camshaft Cover - Removal
 - Crankshaft Cover - Removal
1. Remove the spark plugs to reduce compression resistance when turning the engine.
 2. Rotate the engine using the 24 mm hexagon on the end of the crankshaft so any two camshaft sprocket fixings are accessible.

Note

- **The camshaft sprocket fixings need only be loosened sufficiently to allow the sprockets to rotate on the camshafts.**
 - **The camshaft sprocket fixings are encapsulated and must never be reused if loosened or removed; however new fixings should only be installed during final tightening after the timing procedure has been completed.**
 - **If the sprockets are to be removed from the camshafts, temporarily refit the sprockets for timing adjustment using the old fixings, and only install new fixings during final tightening.**
3. Loosen the two camshaft sprocket fixings. Do not remove the fixings at this stage.



1. Fixings

4. Rotate engine until the remaining two fixings are accessible.

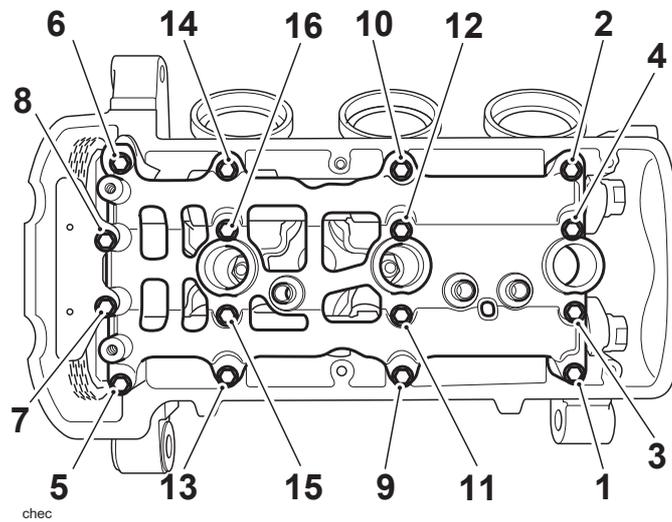
CAUTION

Do not rotate the engine further once the four camshaft sprocket bolts have been loosened. Rotation of the engine with the four sprocket bolts loose will result in valve to piston contact and serious engine damage.

5. Loosen the two remaining camshaft sprocket fixings. Do not remove the fixings at this stage.

Note

- **Note the orientation of the tensioner before removal.**
6. Evenly release the camshaft drive chain tensioner mounting bolts until the plunger spring tension has been released.
 7. Remove the tensioner and discard the O-ring and gasket.
 8. Note the orientation of the camshaft ladder in relation to the head.
 9. Progressively release the bolts securing the camshaft ladder to the head in the sequence shown below.



Camshaft Ladder Bolt Release Sequence

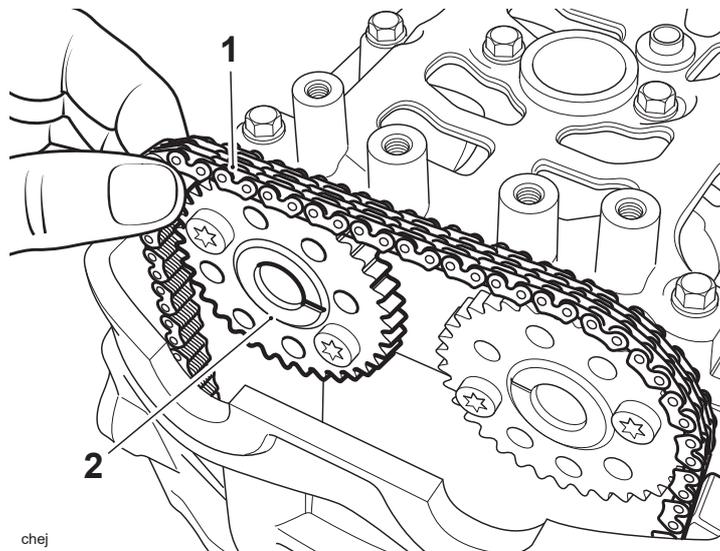
10. Remove the camshaft ladder and top pad, and collect the dowels (if loose) and spark plug tower O-rings.

Note

- Each camshaft and sprocket is removed as an assembly.

11. Lift the camshaft drive chain from the inlet camshaft sprocket and remove the inlet camshaft.

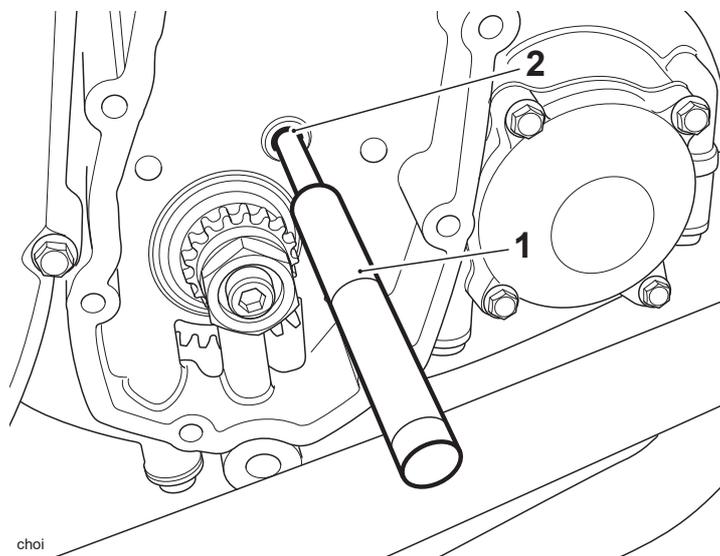
12. Lift the camshaft drive chain from the exhaust camshaft sprocket and remove the exhaust camshaft.



1. Camshaft drive chain
2. Inlet camshaft

13. Remove the camshaft drive chain and if necessary the tensioner blade and rubbing strip (see Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Removal).

14. Rotate the crankshaft and insert T3880601 - Camshaft Timing Pin. Ensure the crankshaft can no longer rotate.



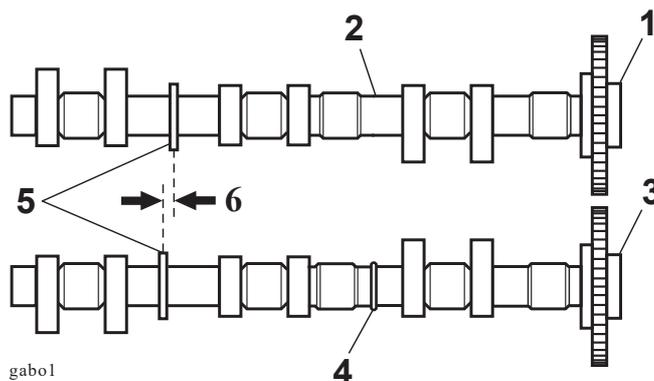
1. T3880601 - Camshaft Timing Pin
2. Timing hole in crankcase

15. At this stage the camshafts and sprockets can be separated if required.

Camshaft and Sprocket Identification

Note

- The inlet and exhaust camshafts are different. They can be identified by a raised section in the centre of the exhaust camshaft and a plain section in the same place on the inlet camshaft. In addition, the thrust faces on each camshaft are offset from each other, which prevents the camshafts being fitted incorrectly.



1. Inlet camshaft
2. Plain section
3. Exhaust camshaft
4. Raised section
5. Thrust faces
6. Offset

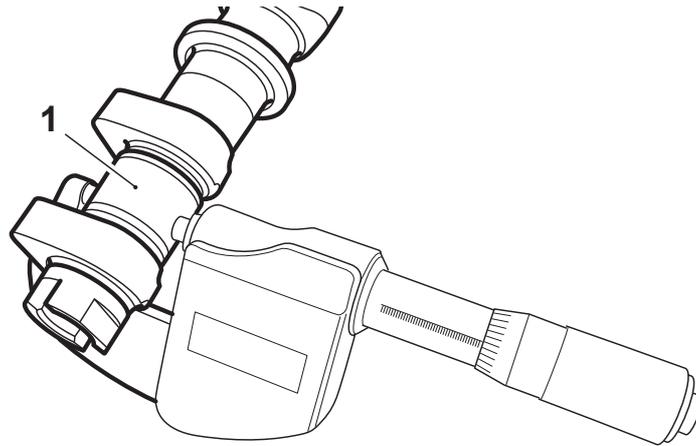
The same sprocket is used for both inlet and exhaust camshafts, and is attached to the camshaft using slotted bolt holes. The same holes are used when fitting the sprocket to either camshaft.

Note that the mark on the camshaft boss is not a timing mark, it is used as a visual aid during the timing adjustment procedure.

Accurate camshaft timing can only be obtained using the correct timing method and service tools (see Camshafts - Installation).

Camshaft and Bearing Cap Inspection

1. Inspect the camshaft sprockets for damaged and worn teeth. Replace as necessary.
2. Measure the camshaft journals with a micrometer. If any journal is outside the specified tolerance, replace the camshaft.
3. For specifications refer to Camshafts.



cheg

1. Camshaft journal

4. Examine all camshaft and camshaft bearing caps for excessive wear and damage.
5. Check the journal-to-head clearances, using 'Plastigauge' (Triumph part number 3880150-T0301) as follows:
 - o Wipe the exposed areas of both the camshaft journal and a single cap or cap area of the ladder.
 - o Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the cap.
 - o Size a length of the Plastigauge to fit across the camshaft journal. Fit the Plastigauge to the camshaft journal using the grease to hold the strip in place.
 - o Ensuring that the camshaft sprocket alignment marking is located as for removal, refit the camshaft cap ladder then evenly and progressively tighten the ladder bolts to **10 Nm** in the correct sequence (see Camshafts - Installation).
 - o Release the bolts and remove the ladder. Using the gauge provided with the Plastigauge kit, measure the width of the now compressed Plastigauge.



cbpg

Measuring the Compressed Plastigauge

Note

- **The camshaft ladder is unique to each cylinder head and is, therefore, not available separately. If the camshaft ladder is worn or damaged, the complete cylinder head must be replaced.**
6. Calculate the journal clearance using the Plastigauge chart supplied with the Plastigauge kit.
 7. For specifications refer to Camshafts
 8. If the clearance measured is within the specified tolerance, remove the cap/ladder and clean off all traces of Plastigauge. Assemble the camshafts (see Camshafts - Installation).

CAUTION

Although Plastigauge is oil soluble, all traces of the material must be removed to prevent blockage of the oil drillings and resultant engine damage.

Camshafts - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

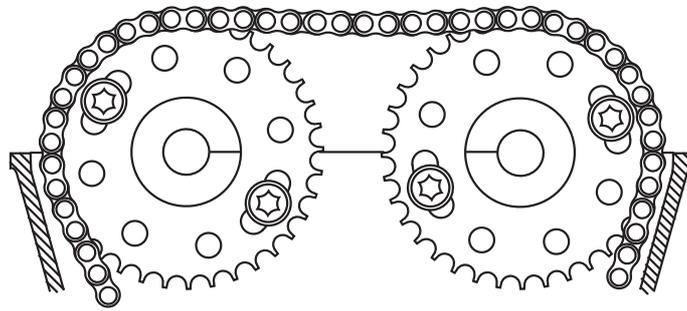
The camshaft sprockets are attached to the camshafts using slotted bolt holes. This allows for very accurate valve timing and therefore improved performance and fuel economy.

Never fit the camshaft sprockets without correctly setting the camshaft timing using the service tools and timing procedure described below. Severe engine damage will result from incorrect valve timing adjustment.

1. Check that T3880601 - Camshaft Timing Pin is installed. Ensure the crankshaft cannot rotate.
2. Thoroughly clean the camshafts and journals. Inspect the ends of the camshafts for correct fitment of the sealing plugs. Lubricate the camshafts with clean engine oil before fitting to the cylinder head.
3. If removed, refit the camshaft sprockets noting their orientation, and secure using the original bolts. **DO NOT** tighten the fixings at this stage, the sprockets must be free to rotate.
4. Refit the camshaft drive chain and if removed the tensioner blade and rubbing strip (see Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Installation).

Note

- **Locate each camshaft to the head ensuring the camshafts are correctly identified (inlet and exhaust) and are also correctly located over their respective valve banks.**
5. Refit the exhaust camshaft to the cylinder head, hooking the camshaft drive chain over the sprocket as you do so.
 6. Ensure there is no slack between the crankshaft and exhaust sprocket when the sprocket fixings are centrally located within the slotted holes.
 7. Refit the inlet camshaft to the cylinder head, hooking the chain over the sprocket as you do so.
 8. Ensure the fixings on the inlet sprocket are also centrally located within the slotted holes when there is no slack between the exhaust and inlet sprockets.
 9. Check that the chain is correctly located around the crankshaft, and both camshaft sprockets.
 10. Rotate the camshafts until the alignment marks on the end of the camshaft journals are pointing towards one another.



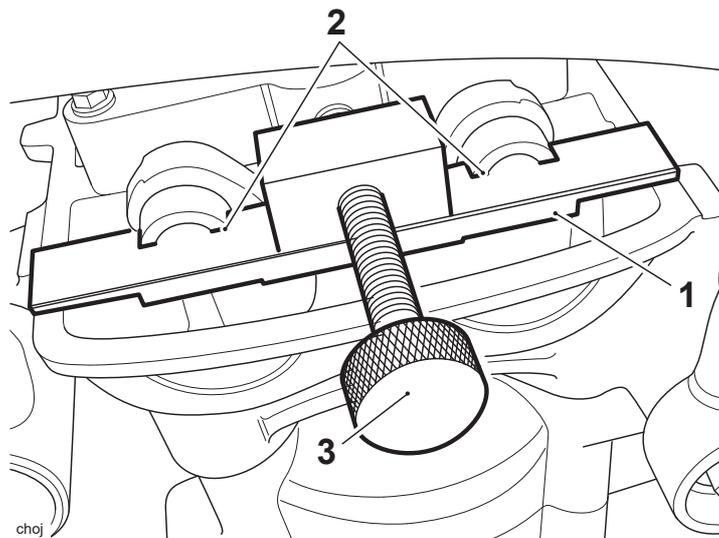
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Camshaft Boss to Cylinder Head Alignment Marks

CAUTION

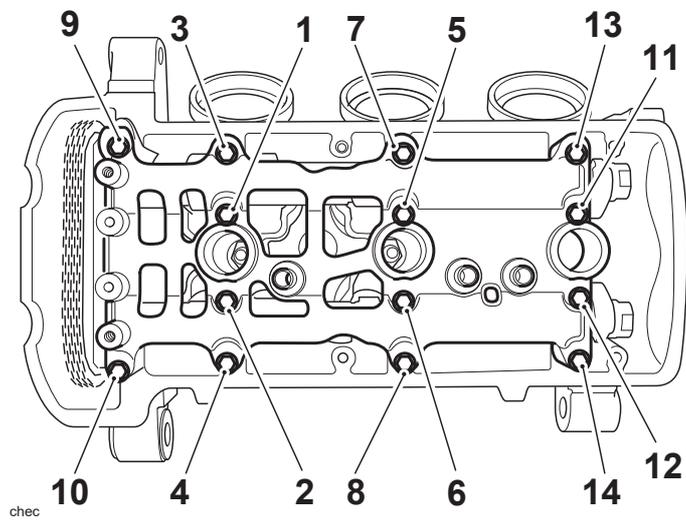
The T3880640 - Camshaft Timing Plate must be located centrally between the camshafts. Incorrect positioning of the tool may prevent the camshaft ladder locating correctly to the cylinder head during fixing tightening, resulting in incorrect valve timing being set. Severe engine damage will result from incorrect valve timing adjustment.

11. Insert T3880640 - Camshaft Timing Plate into the camshaft slots, ensuring the removal screw is unscrewed fully, as shown below. Ensure that the tool is centrally located between the camshafts.



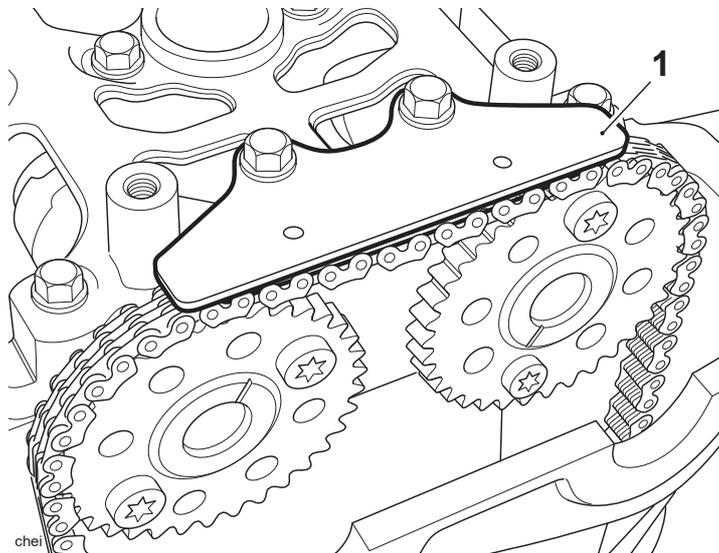
1. T3880640 - Camshaft Timing Plate
2. Camshaft slots
3. Removal screw

12. Assemble the camshaft ladder in the same location and orientation as prior to removal. Do not fit the top pad at this stage.
13. Fit and evenly tighten the camshaft ladder fixings to **10 Nm**, in the sequence shown below, ensuring that T3880640 - Camshaft Timing Plate remains centrally located between the camshafts.



Camshaft Ladder Fixing Tightening Sequence

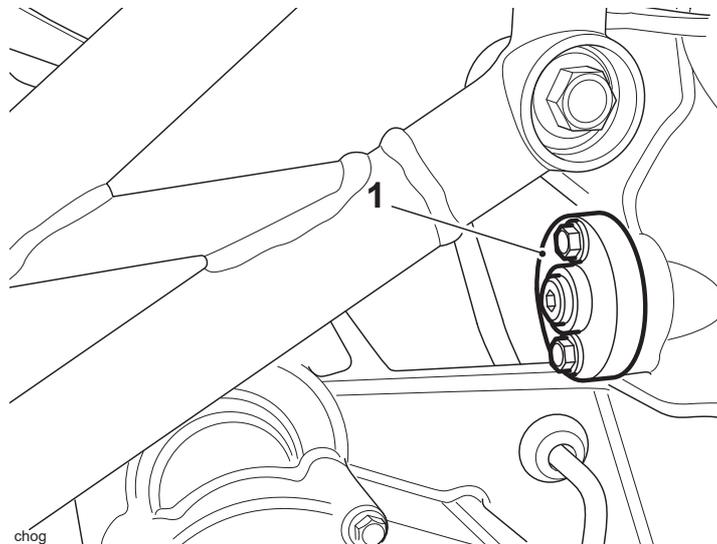
14. Refit the top pad and tighten the fixings to **10 Nm**.



1. Camshaft drive chain top pad

15. Remove and discard the fir tree clip, located on the cylinder head, on the camshaft drive chain tensioner mounting face.

16. Fit T3880607 - Camshaft Timing Tensioner using the original fixings and tighten to **9 Nm**.

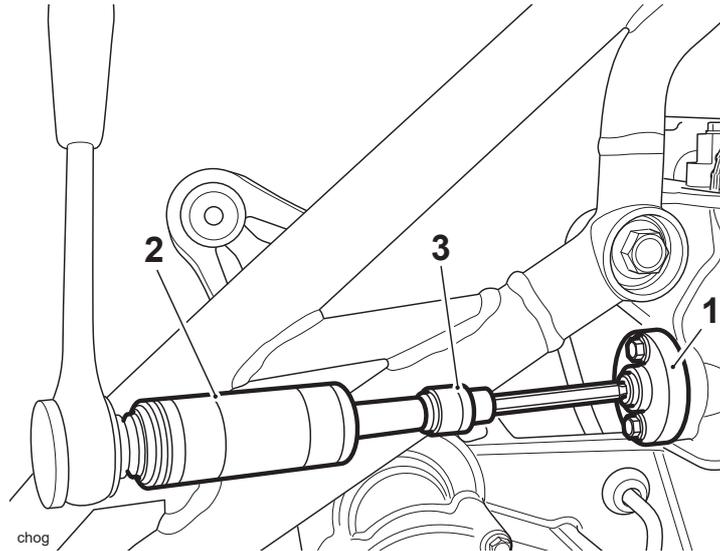


1. T3880607 - Camshaft Timing Tensioner

CAUTION

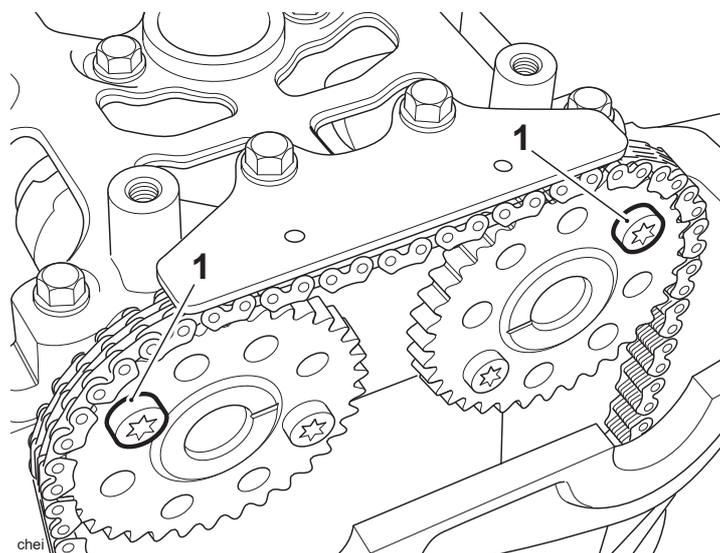
The torque value stated is very important to accurate timing. Always use the correct value of **0.6 Nm**, as set using the Torque Limiter T3880609. Using an incorrect torque value will result in incorrect valve timing being set, or damage to the tensioner blade or other valve train components. Either condition may result in serious damage to the engine, reduced engine performance, or reduced fuel economy.

17. Using T3880609 - Timing Torque Limiter, and the 6 mm Ball Ended Allen Key supplied, tighten the Camshaft Timing Tensioner T3880607 to **0.6 Nm** preset by T3880609 - Timing Torque Limiter.



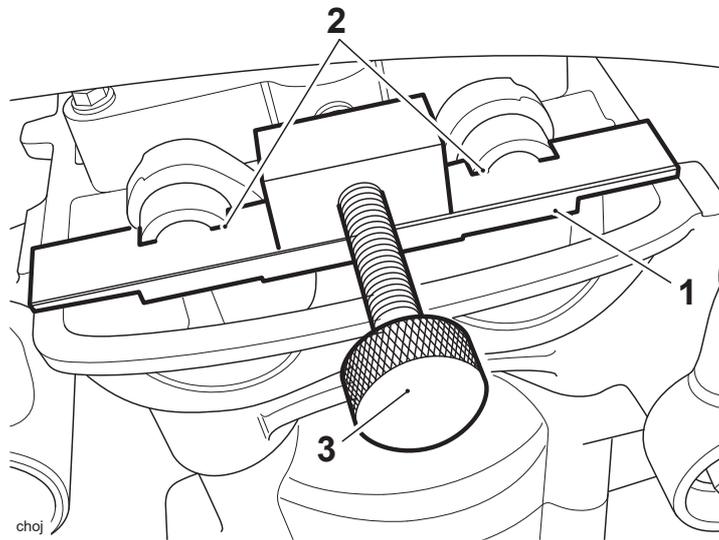
1. T3880607 - Camshaft Timing Tensioner
2. T3880609 - Timing Torque Limiter
3. 6 mm Ball Ended Allen Key

18. Remove and discard the two accessible (uppermost) camshaft sprocket fixings, and replace with new fixings. Tighten to **22 Nm**.



1. Uppermost fixings

19. Remove T3880640 - Camshaft Timing Plate by rotating the removal screw clockwise as shown below.



1. **T3880640 - Camshaft Timing Plate**
2. **Removal screw**

20. Remove T3880601 - Camshaft Timing Pin.

! CAUTION

Always check that T3880640 - Camshaft Timing Plate has been removed before rotating the engine. Severe damage will result to the camshafts or T3880640 - Camshaft Timing Plate if engine rotation is attempted with the tool installed.

21. Rotate the engine until the remaining two sprocket fixings are accessible.
22. Remove and discard the two remaining camshaft sprocket fixings, and replace with new fixings. Tighten to **22 Nm**.
23. Place a suitable wedge between the camshaft drive chain tensioner blade and crankcase, to hold the camshaft drive chain taut during removal of T3880607 - Camshaft Timing Tensioner.
24. Release the tension on T3880607 - Camshaft Timing Tensioner and remove it.
25. Refit the camshaft drive chain tensioner, incorporating a new gasket and O-ring (see Camshaft Drive Chain Tensioner - Installation).
26. Fit a new fir tree clip into the hole on the camshaft drive chain tensioner mounting face.
27. Rotate the engine until T3880601 - Camshaft Timing Pin can be refitted.
28. Recheck that the timing marks are still approximately aligned (to check that the camshaft timing has not moved during the removal of T3880607 - Camshaft Timing Tensioner).
29. Remove T3880601 - Camshaft Timing Pin.
30. Check the valve clearances (see Valve Clearance Measurement). Adjust as necessary (see Valve Clearance Adjustment).

Valve Clearances

Camshaft, valve, valve shim and valve seat wear affects the valve clearances. The effect of this wear is to change the gap between the camshaft and tappet bucket, causing engine noise and improper running. If the valve clearances become too small, permanent damage to the valve and valve seat will take place. If the valve clearance becomes too great, the engine will become noisy and will not run correctly.

Valve Clearance Measurement

Note

- **Valve clearance measurement must be carried out with the engine cold.**

Perform the following operations:

- Camshaft Cover - Removal
- Crankshaft Cover - Removal

1. Remove the spark plugs to reduce compression resistance when turning the engine.
2. Rotate the engine using the 24 mm hexagon on the end of the crankshaft until a pair of camshaft lobes are positioned pointing away from the valves.
3. Using feeler gauges, measure and record the clearances for this pair of valves only.
4. Repeat the process until the valve clearances for all valves have been checked.

Note

- **If the measurement does not fall within the specified range, adjustment must be made.**

5. For the inlet and exhaust valve clearances (see Cylinder Head and Valves).


CAUTION

If the valve clearances are not checked and corrected, wear could cause the valves to remain partly open, which lowers performance, burns the valves and valve seats and may cause serious engine damage.

6. Record the measured valve clearances on a chart similar to the example shown.

Typical Valve Clearance Chart

Inlet Valve No.	Gap Measured
1	as measured (mm)
2	as measured (mm)
3	as measured (mm)
4	as measured (mm)
5	as measured (mm)
6	as measured (mm)
Exhaust Valve No.	Gap Measured
1	as measured (mm)
2	as measured (mm)
3	as measured (mm)
4	as measured (mm)
5	as measured (mm)
6	as measured (mm)

Valve Clearance Adjustment

Note

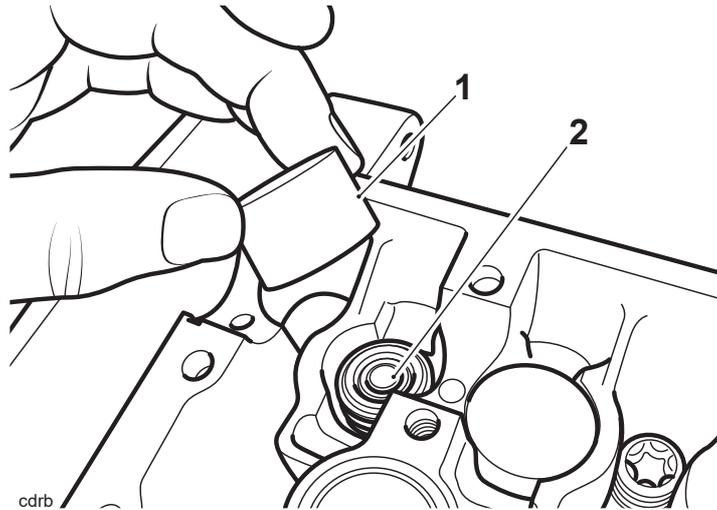
- **To adjust the valve clearances the camshafts must be removed.**

Perform the following operations:

- Camshafts - Removal
1. Remove the tappet bucket from the cylinder head.

Note

- **The shim may withdraw with the tappet bucket.**
2. Remove the shim from the valve head.



1. **Tappet bucket**
2. **Shim**

3. Measure the original shim using a micrometer and select the appropriate new shim as required.
 - **Clearance too small** - Fit a thinner shim.
 - **Clearance too large** - Fit a thicker shim.

Note

- **Shims are available ranging from 1.70 mm to 3.00 mm in increments of 0.025 mm.**
4. Fit the new shim to the valve head.
 5. Lubricate the tappet bucket(s) with a 50/50 solution of engine oil and molybdenum disulphide grease.
 6. Refit the tappet bucket.
 7. Refit the camshafts (see Camshafts - Installation).
 8. Recheck all valve clearances.
 9. Repeat the procedure if the valves require further adjustment.

Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

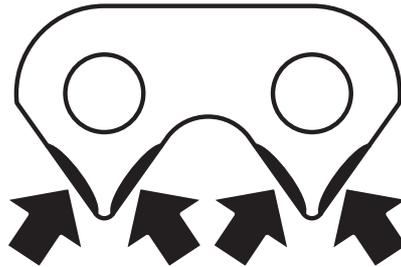
Perform the following operations:

- Camshafts - Removal
1. Remove the tensioner blade pin and remove the tensioner blade through the right hand crankshaft cover opening in the crankcase.
 2. Remove the rubbing strip pin and allow the rubbing strip to drop. This will allow the camshaft drive chain to be unhooked from the crankshaft sprocket.
 3. Unhook the camshaft drive chain from the crankshaft sprocket and remove it through the right hand crankshaft cover opening in the crankcase.
 4. Remove the rubbing strip through the right hand crankshaft cover opening in the crankcase.

Camshaft Chain - Inspection

Visual in situ checks can also be made as follows:

1. Check for significant blue discolouration of the drive chain plates indicating excessive heat build-up.
2. Examine all of the pins for signs of rotation.
3. Check for cracking or deep scratching of the drive chain plates.
4. Check for severe wear of the inner plates as indicated in the diagram below.



ccrv

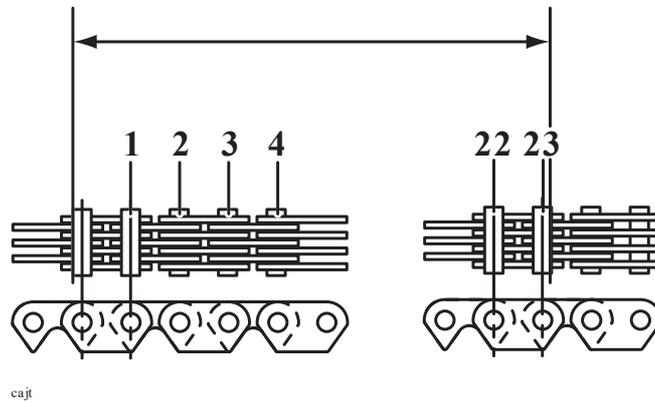
For a more thorough check, proceed as follows:

1. Remove the drive chain from the engine.
2. Suspend the drive chain from a pin or hook with a 13 kg weight attached at the lower end.



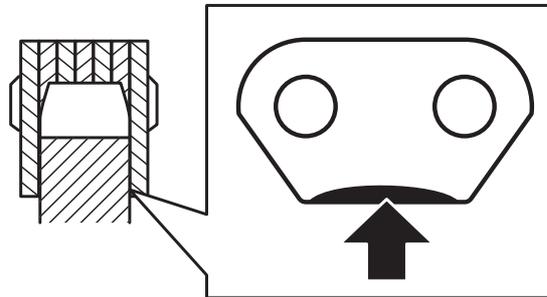
cajs

3. Measure across 23 links as shown in the diagram below. If the drive chain is within limits, the measurement should be no longer than 150.14 mm. Measurements beyond 150.14 mm indicate that the drive chain must be replaced.



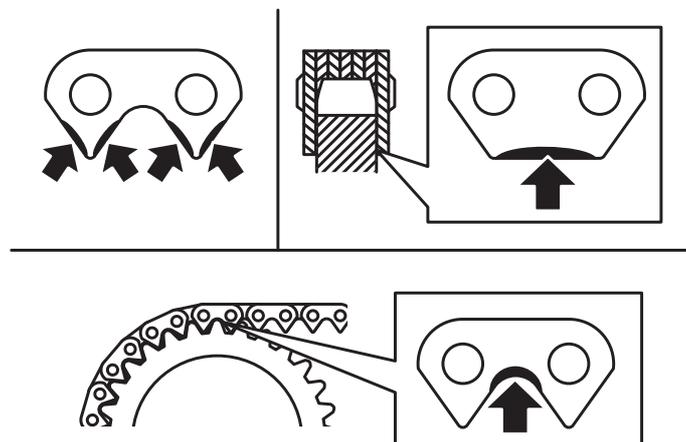
cajt

4. Check for severe wear of the inner surface of the outer plates at the side-contact points with the sprocket teeth.



ccru

5. Check for signs of stiffness or kinking.
6. Check for severe wear of the plates in the area shown below.



caju

7. If any of these symptoms are evident, the camshaft drive chain must be replaced.

Camshaft Drive Chain Tensioner Blade and Rubbing Strip - Inspection

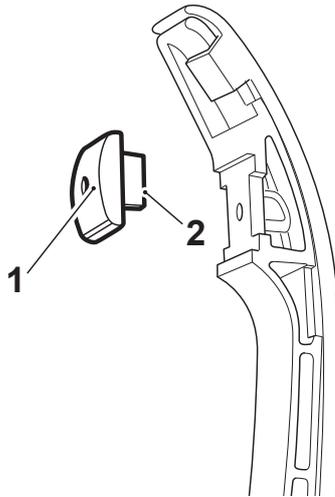
1. Check the camshaft drive chain tensioner blade and rubbing strip for wear or damage. Renew if worn or damaged.

Camshaft Drive Chain Tensioner Blade - Disassembly

Note

- For the purpose of this instruction, the top of the tensioner blade is where the pad is located.

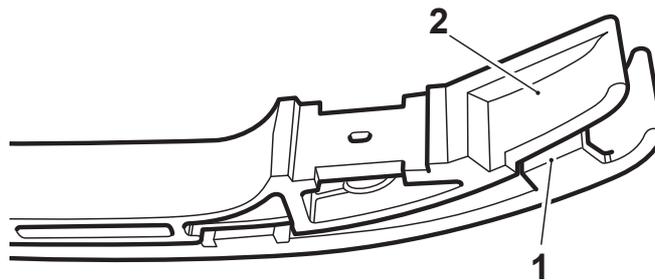
1. Release the clips and remove the pad.



cfee

1. Pad
2. Clip (one side shown)

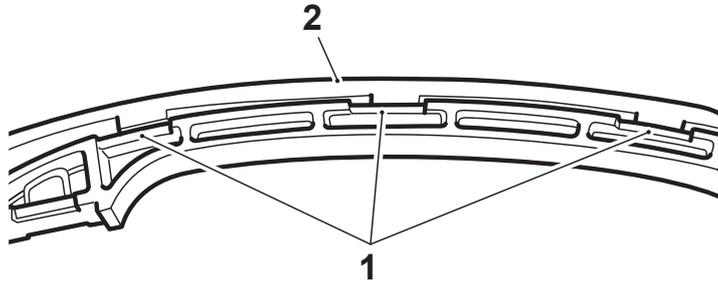
2. Detach the top hook from the tensioner blade.



cfef

1. Top hook
2. Tensioner blade

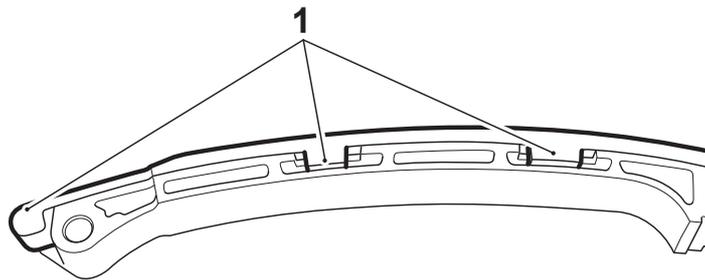
3. Release the three side locating devices.



cfeg

1. Locating devices
2. Facing blade

4. Release the three hooks and remove the facing blade.



cfeh

1. Hooks

Camshaft Drive Chain Tensioner Blade - Assembly

1. Assembly is the reverse of disassembly (see Camshaft Drive Chain Tensioner Blade - Disassembly).

Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Loosely refit the rubbing blade. Do not fit the pin at this stage.
2. Lower the chain through the cylinder head opening and hook over the crankshaft sprocket. Support the chain at its upper end until the camshafts are refitted.
3. Refit the tensioner blade, ensuring that the camshaft drive chain is correctly seated on the facing blade and secure with the pin.
4. Reposition the rubbing blade, ensuring that the camshaft drive chain is correctly seated on the rubbing blade and secure with the pin.

Perform the following operations:

- Camshafts - Installation

Cylinder Head - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

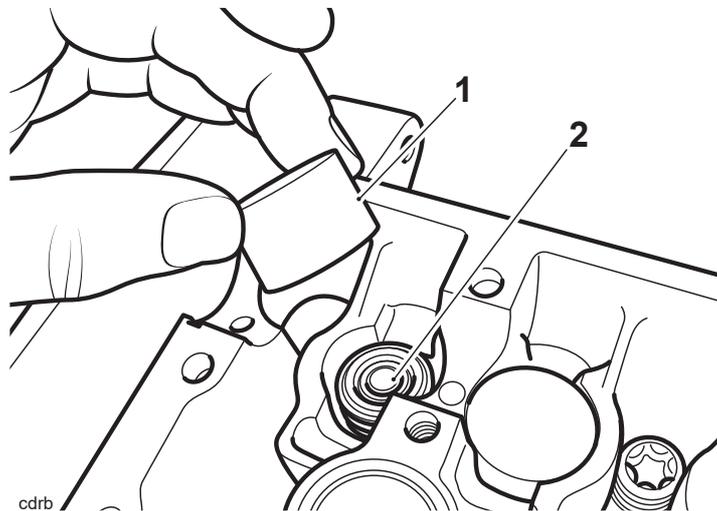
Note

- **The cylinder liners must be resealed once the cylinder head has been removed.**

Perform the following operations:

- Engine - Removal
- Camshafts - Removal
- Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Removal

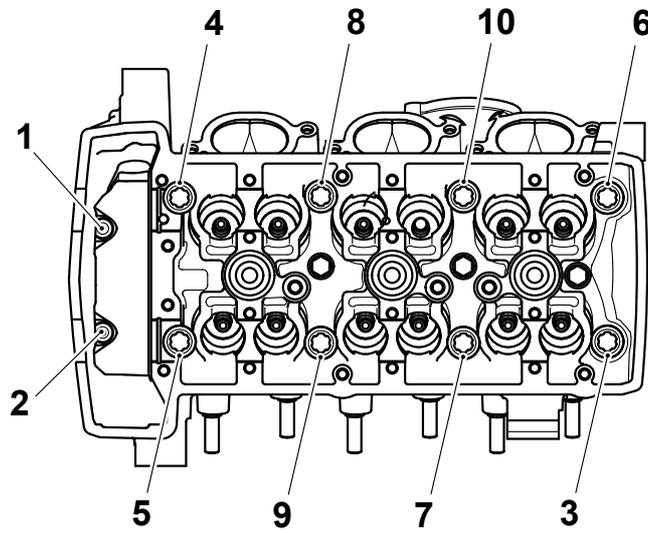
1. Note the position of all tappet buckets and shims so that they can be refitted in the same positions. Remove all the tappet buckets and shims.



1. Tappet bucket
2. Shim

Note

- **To prevent the tappet buckets and shims from becoming mixed, place the shim and tappet together in a marked container. The components must be refitted in their original positions.**
2. Progressively release the cylinder head bolts in the order shown below.

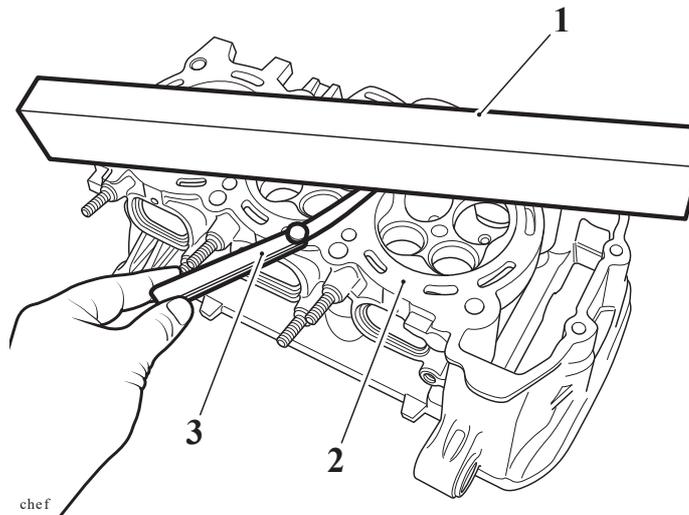


Cylinder Head Bolt Release Sequence

3. Lightly tap the cylinder head with a rubber mallet to break the seal of the gasket.
4. Lift the head directly upwards until clear of the camshaft drive chain rubbing blades.

Cylinder Head - Inspection

1. Thoroughly clean the surface of the head and check for damage and pitting of the combustion chambers.
2. Using a straight edge, check the cylinder head gasket face for warp which could lead to gasket failure. Replace the head if warped.



1. Straight edge
2. Cylinder head gasket face
3. Feeler gauge

3. For specifications refer to Cylinder Head and Valves.

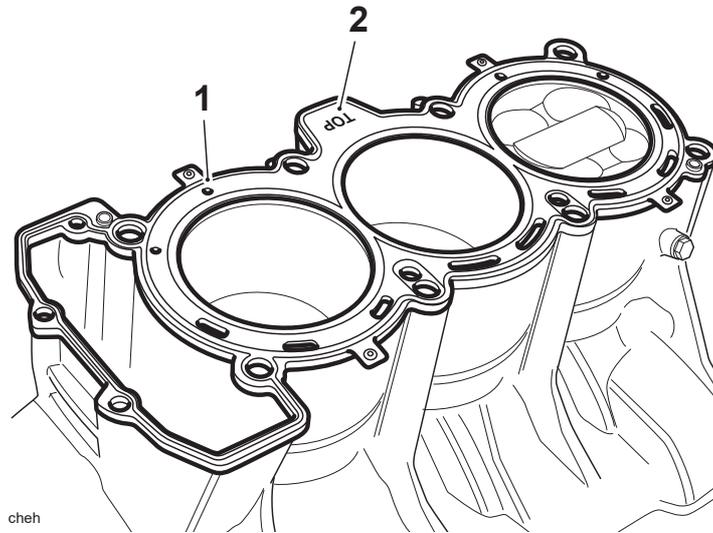
Cylinder Head - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Remove and re-seal the cylinder liners (see Cylinder Liners - Removal, Cylinder Liners - Installation).
1. Thoroughly clean the upper faces of the crankcase taking care not to damage the mating surfaces.
 2. Fit a new cylinder head gasket (TOP marking uppermost) ensuring that the head to crankcase location dowels are correctly in place.



1. **Cylinder head gasket**
2. **TOP marking**

3. Ensure that the cylinder head face is completely clean.
4. Carefully lower the cylinder head over the cylinder head gasket and locate it onto the dowels.

! CAUTION

Using the correct procedure to fit and tighten the cylinder head bolts will ensure the long term reliability of the cylinder head gasket.

Clean each bolt, paying particular attention to the threads and under-bolt-head areas. If any of the threads or bolt-head areas are damaged, replace the bolt(s).

Lubricate the threads with engine oil, and then wipe clean with a lint-free cloth leaving minimal oil on the threads (that is, almost dry to touch).

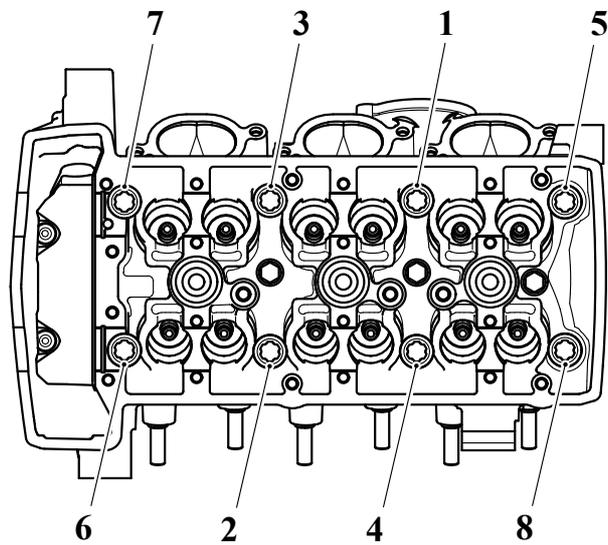
Tighten the bolts using the three-stage procedure given below.

Failure to observe these important items may damage the head gasket and lead to severe engine damage.

5. Fit the bolts and washers (if fitted) to the head and tighten until finger tight. The head bolts are finally tightened in three stages. This is to ensure that the cylinder head gasket seals correctly to the head and crankcase. The three stages are as follows:

Note

- For stages A and B of the head bolt tightening operation, a torque wrench of known, accurate calibration must be used.



Cylinder Head Bolt Tightening Sequence

6. Stage A

- Tighten the head bolts in the sequence shown above to **20 Nm**.

7. Stage B

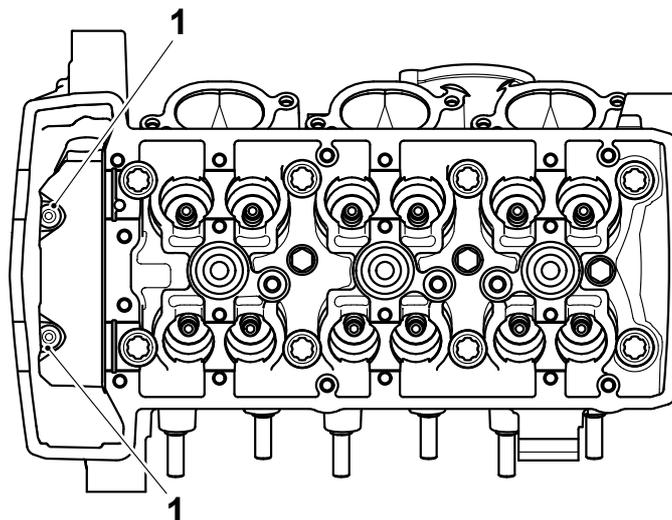
- Tighten the head bolts in the sequence shown above to **40 Nm**.

Note

- For the final torque operation, which again is carried out in the sequence shown above, a 'torque turn' method is used. The bolts must be turned by **90°** to reach the final setting. To accurately gauge the 90° turn, use T3880105 - Torque Angle Gauge as follows:

8. Stage C

- Fit the torque turn gauge between the Torx socket and the drive handle and locate the Torx drive to the head bolt. Pick an increment point on the torque turn gauge which aligns with a suitable reference point on the head. Tighten the bolts until nine of the 10° gauge increments have rotated past the chosen point on the head.
- 9. Fit the screws securing the side of the cylinder head to the crankcase and tighten to **10 Nm**.



1. Cylinder head to upper crankcase screws

- 10. Clean and lubricate the tappet buckets with clean engine oil and refit the buckets and shims in the same locations from which they were removed.

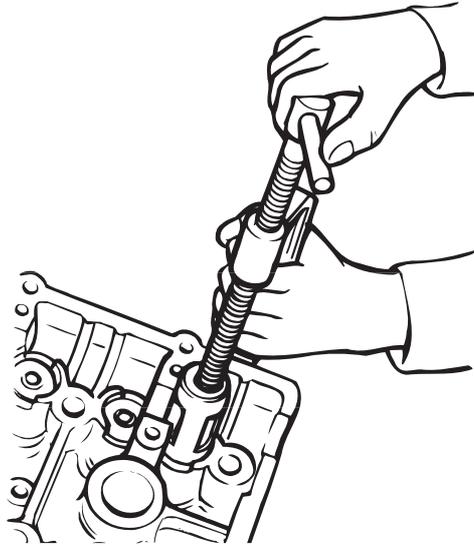
Perform the following operations:

- Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Installation
- Camshafts - Installation

- Engine - Installation

Valves and Valve Stem Seals - Removal from the Cylinder Head

1. Remove each valve from the head using a valve spring compressor. The compressor must act on the top cup to allow removal of the valve collets.

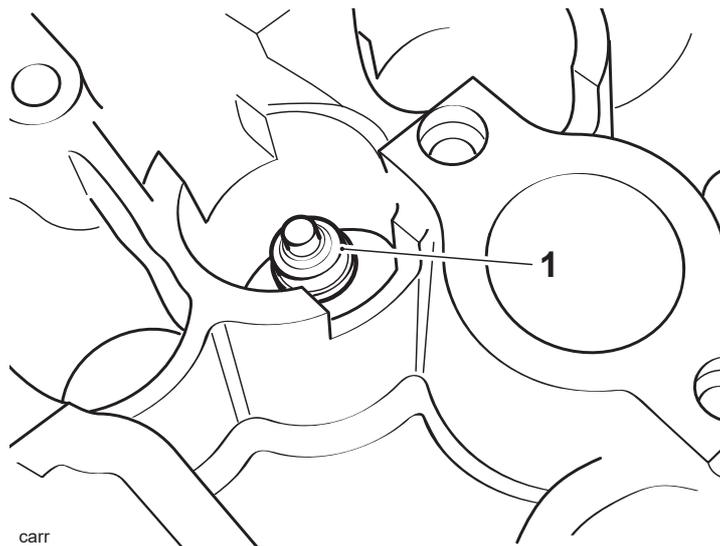


gadh

Valve Removal

2. Once the collets are released, remove the following items:

- Collets
- Valve spring retainer
- Valve spring
- Valve stem seal
- Spring platform
- Valve (de-burr before removal).

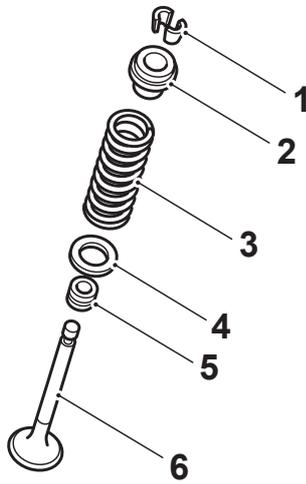


carr

1. Valve stem seal

Note

- Ensure inlet and exhaust valve components do not become mixed.



ccrx

1. Collets
2. Valve spring retainer
3. Valve spring
4. Valve spring platform
5. Stem oil seal
6. Valve

Cylinder Head Valve Guide Wear Check

Perform the following operations:

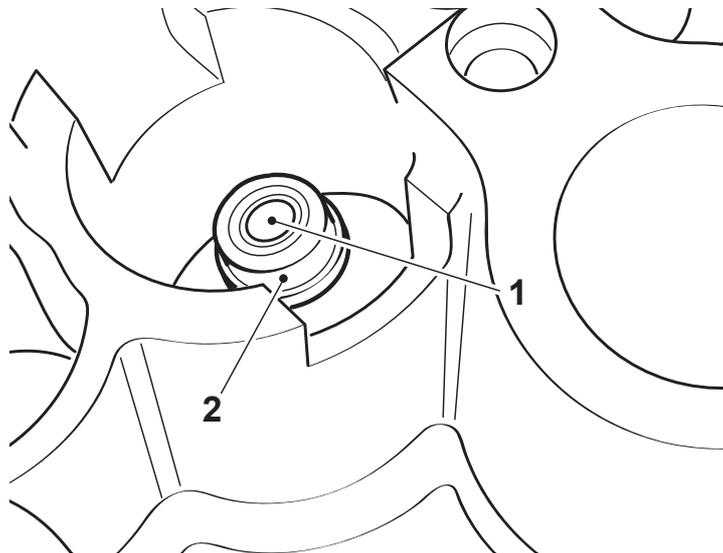
Perform the following operations:

- Cylinder Head - Removal
- Valves and Valve Stem Seals - Removal from the Cylinder Head

Note

- **Do not remove the valve or valve stem seal.**

1. Position the valve so that the valve stem end is level with the valve stem seal (the valve must remain in this position for the duration of the test).



1. Valve stem end
2. Valve stem seal

Note

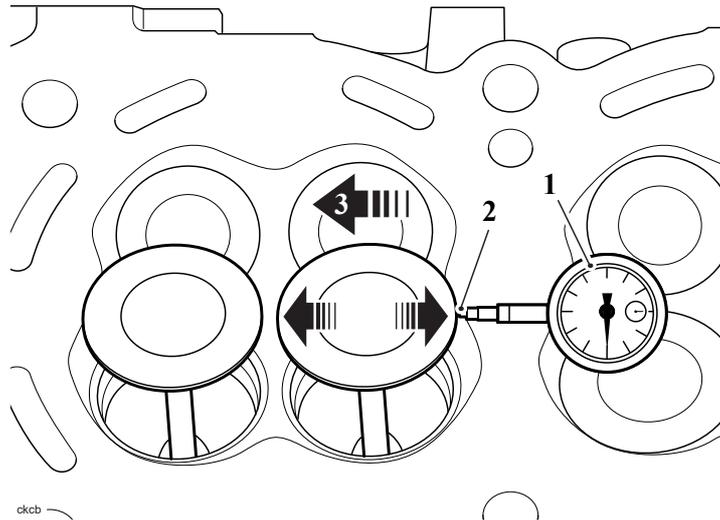
Note

- **Excessive force must not be used when measuring the valve guide wear. Excessive force will bend the valve stem and give a false reading.**

2. The valve should be gently rocked to one side of the valve guide in line with the camshaft.

Note

- **A flat ended contact point must be fitted to the dial gauge.**
 - **Ensure the dial gauge is level and is in line with the directional movement of the valve being checked.**
3. Secure a dial gauge to the cylinder head such that the clamping device will not damage any of the cylinder head surfaces.
4. Position the dial gauge to the valve head on the opposite side to where the valve has made contact to the valve guide, as shown in the illustration below.

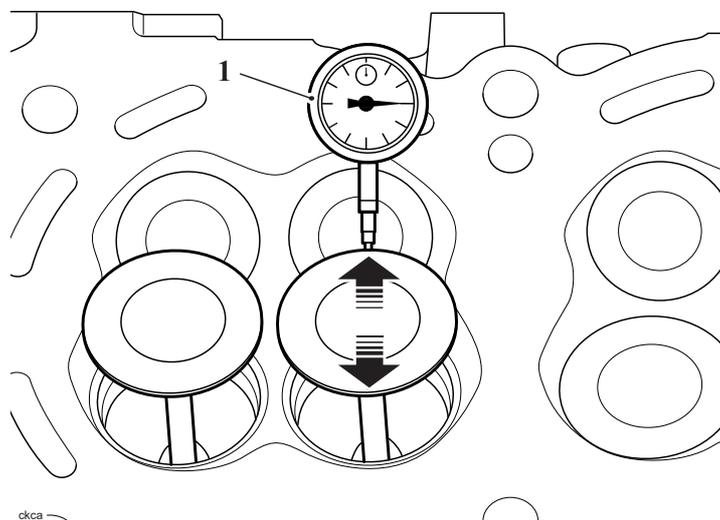


1. **Dial gauge**
2. **Flat ended contact point**
3. **Direction valve rocked to valve guide**

5. Zero the dial gauge.

6. Gently rock the valve to the opposite side of the valve guide in line with the camshaft and note the reading on the dial gauge.

7. Repeat steps two to six but with the rocking of the valve head at 90° to the original measurement, as shown in image below. Note the reading on the dial.



1. **Dial gauge**

8. The maximum movement of the valve in either direction must be less than 0.5 mm.

Note

- **Due to the methods used to assemble the valve guides, these parts cannot be replaced. If the maximum movement of the valve exceeds 0.5 mm in either direction, the cylinder head must be replaced.**

Perform the following operations:

- Valves and Valve Stem Seals - Installation
- Cylinder Head - Installation

Valve Face Inspection

1. Remove any carbon build-up from the valve head area. Examine the valve seat face, checking in particular for signs of cracking or pitting.

Valves and Valve Stem Seals - Installation

1. Apply a thin coat of molybdenum disulphide grease to the valve stem.
2. Install the valve into the valve guide and refit the spring platform to the valve spring recess in the head.
3. Fit the valve stem seal over the valve stem and, using a suitable tool, press down fully until the seal is correctly seated over the valve guide.

Note

- **During fitment of the valve stem seal, two distinctly different degrees of resistance will be noted when the seal is correctly fitted.**
- **Firstly, press the seal down the valve stem until the lower side of the seal comes into contact with the valve guide. Greater resistance is felt at this contact point and further gentle pressure is then required to locate the seal over the top end of the valve guide.**
- **On application of this pressure, the seal can be felt to positively locate over the top face of the valve guide. Once correctly positioned, the seal cannot be pushed down any further.**

CAUTION

Incorrect fitment of the valve stem oil seals could lead to high oil consumption and blue smoke emissions from the exhaust system. Do not use excessive force in fitting the seal as this may break the seal ring.

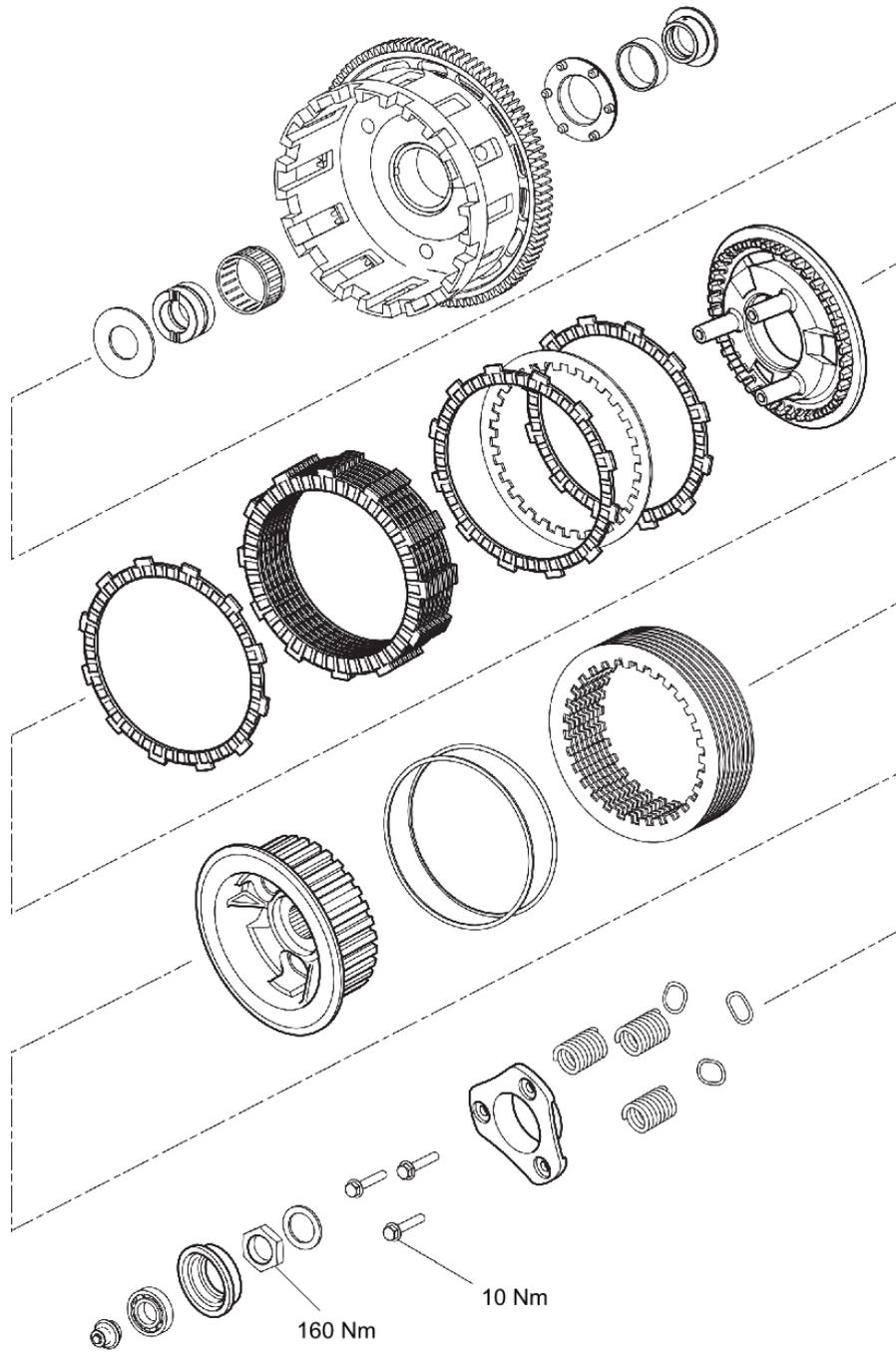
4. Install the valve spring over the valve stem.
5. Compress the valve spring ensuring that the spring is compressed squarely to prevent damage to the valve stem and cylinder head.
6. Fit the valve collets ensuring correct collet location in the spring retainer and valve as the spring compressor is released.

CAUTION

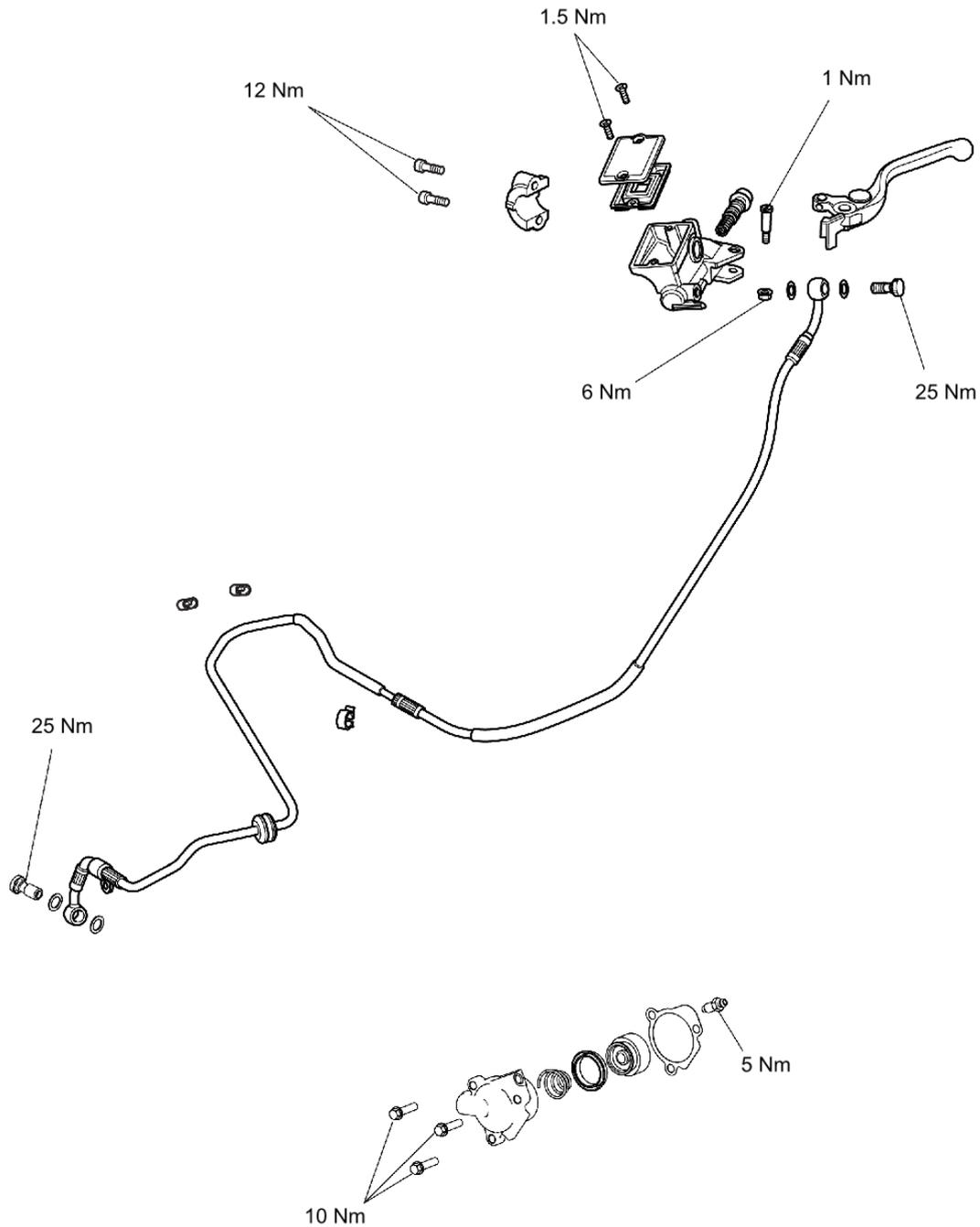
Always check for correct location of the valve collets during and after assembly. If not fitted correctly, the collets may become dislodged when the engine is running allowing the valves to contact the pistons. Any such valve to piston contact will cause severe engine damage.

Clutch

Exploded View – Clutch Assembly



Exploded View – Clutch Controls



Clutch Description

This model is fitted with a hydraulically operated, wet plate, torque assist clutch. The clutch is operated by a hydraulic master cylinder, which in turn operates a slave cylinder mounted on the clutch cover.

The clutch has nine friction plates located between the inner and outer drums. An auxiliary gear train also drives the alternator, and a chain connected to the rear of the clutch drives the combined oil and water pump.

Clutch System Maintenance Safety Precautions

! WARNING

WARNING

Brake and clutch fluid is hygroscopic which means it will absorb moisture from the air. The absorbed moisture will greatly reduce the boiling point of the brake and clutch fluid causing a reduction in clutch efficiency.

Replace brake and clutch fluid in line with the scheduled maintenance chart. A dangerous riding condition could result if this important maintenance item is neglected.

Do not spill brake and clutch fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake and clutch fluid from a sealed container and never use fluid from an unsealed container or from one which has been previously opened.

Do not mix different brands of brake and clutch fluid. Check for fluid leakage around clutch fittings, seals and joints.

Check regularly for clutch hose damage.

FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY IMPAIR CLUTCH OPERATION LEADING TO LOSS OF MOTORCYCLE CONTROL AND AN ACCIDENT.

WARNING

If there has been an appreciable drop in the level of the fluid in the clutch fluid reservoir, consult your authorised Triumph dealer for advice before riding.

If the clutch lever feels soft when it is applied, there may be air in the clutch line or the clutch may be defective.

It is dangerous to operate the motorcycle under such conditions and remedial action must be taken by your authorised Triumph dealer before riding the motorcycle. Failure to take remedial action may impair clutch operation leading to loss of motorcycle control and an accident.

WARNING

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of brake and clutch fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the clutch operation.

Failure to change the brake and clutch fluid at the interval specified in the scheduled maintenance chart may affect clutch operation resulting in an accident.

WARNING

Never use mineral based grease (such as lithium or copper based grease) in any area where contact with the clutch system hydraulic seals and dust seals is possible. Mineral based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders. Damage caused by contact with mineral based grease may affect clutch operation resulting in an accident.

Clutch Switch

WARNING

The clutch switch is an integral part of the cruise control system. To ensure the clutch switch functions correctly after a replacement, the cruise control switch test must be carried out (see Cruise Control Switch Check).

Failure to carry out the cruise control switch check may result in loss of motorcycle control and an accident.

The clutch switch is an integral part of the left hand handlebar switch housing. If the clutch switch requires replacement, the left hand handlebar switch housing and clutch switch assembly must be replaced.

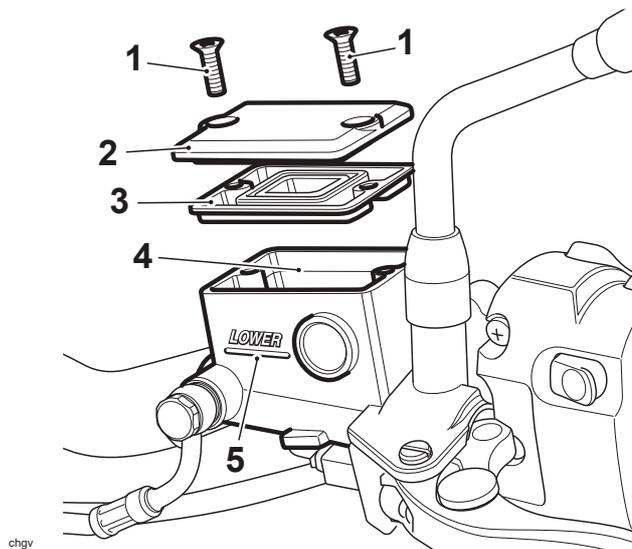
Clutch Fluid Level Inspection

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

In accordance with the scheduled maintenance chart, inspect the clutch fluid level in the master cylinder reservoir.

1. Ensure that the clutch fluid level in the clutch fluid reservoir is between the upper and lower level lines (reservoir held horizontal).

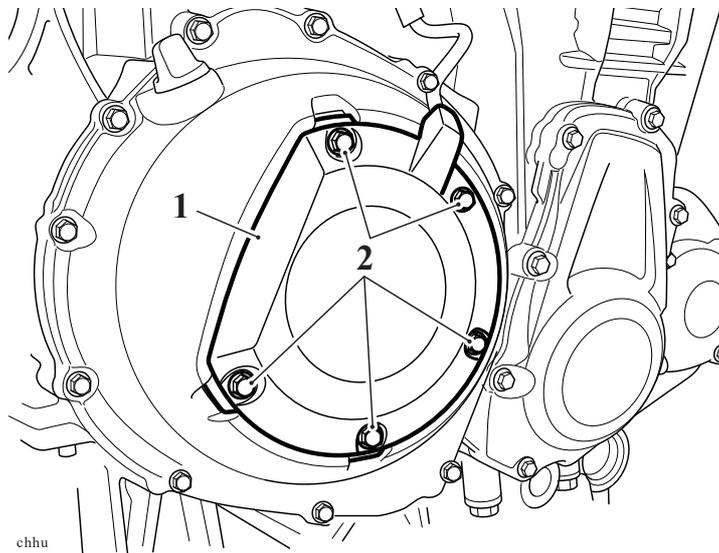


1. **Fixings**
2. **Cover**
3. **Diaphragm seal**
4. **Upper level line**
5. **Lower level line**

2. To inspect the fluid level, check the level of fluid visible in the window at the front of the reservoir body.
3. To adjust the fluid level:
 - o Release the fixings and detach the cover noting the position of the sealing diaphragm.
 - o Fill the reservoir to the upper level line using new DOT 4 brake and clutch fluid from a sealed container.
 - o Refit the cover, ensuring that the diaphragm seal is correctly positioned between the cover and reservoir body. Secure with the fixings and tighten to **1.5 Nm**.

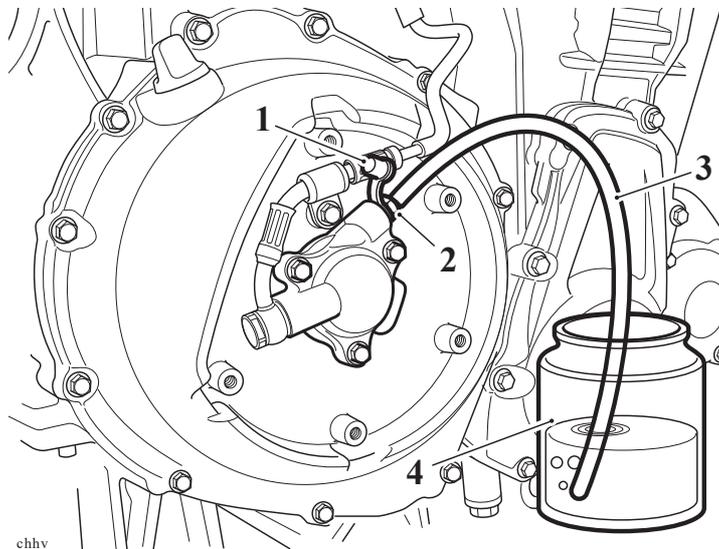
Bleeding the Clutch

1. Note the original setting of the clutch lever adjuster in order that it can be returned to the same position when the bleeding operation is complete. Set the clutch lever adjuster to position No. 1.
2. Turn the handlebars to bring the fluid reservoir to a level position.
3. Remove the five fixings and remove the slave cylinder cover. Discard the fixings.



- 1. Slave cylinder cover
- 2. Fixings

- 4. Remove the dust cap from the bleed nipple on the slave cylinder.
- 5. Attach a transparent plastic tube to the bleed nipple.



- 1. Bleed nipple dust cap
- 2. Bleed nipple
- 3. Bleed tube
- 4. Container

- 6. Place the other end of the tube into a suitable receptacle containing new clutch fluid.
- 7. Loosen and remove the two fixings securing the clutch reservoir cover.

! WARNING

Ensure absolute cleanliness when adding clutch fluid to the clutch fluid reservoir.
Do not allow moisture or debris to enter the cylinder as this will adversely affect the fluid properties.
Always use fluid from a sealed container and do not use fluid from a container which has been opened for any period of time.
Always check for fluid leakage around hydraulic fittings and for damage to hoses.
A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

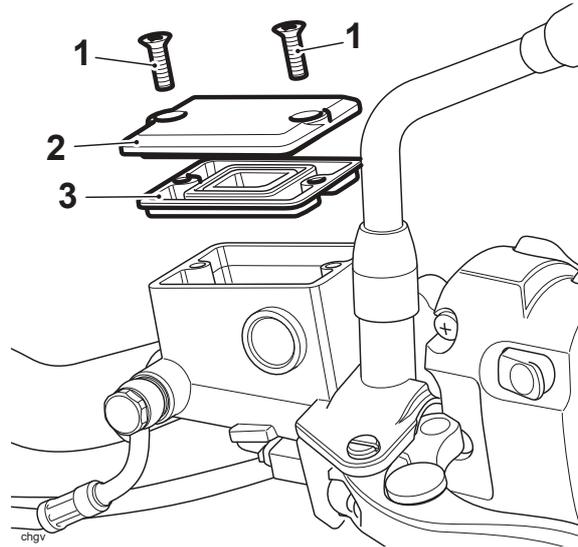
! WARNING

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of brake and clutch fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the clutch system leading to an accident.

! CAUTION

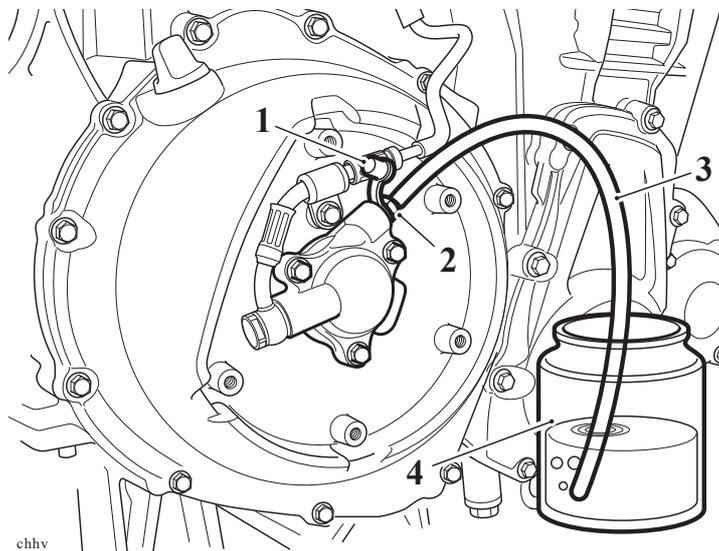
To prevent body damage, do not spill clutch fluid onto any area of the bodywork.

8. Carefully remove the cover taking care not to spill fluid.
9. Check the condition of the sealing diaphragm fitted beneath the cover. Replace the diaphragm if necessary.



1. **Fixings**
2. **Cover**
3. **Diaphragm seal**

10. Release the bleed nipple.
11. Slowly pull in and release the clutch lever several times until no more bubbles appear in the pipe.



1. **Bleed nipple dust cap**
2. **Bleed nipple**
3. **Bleed tube**

4. Container

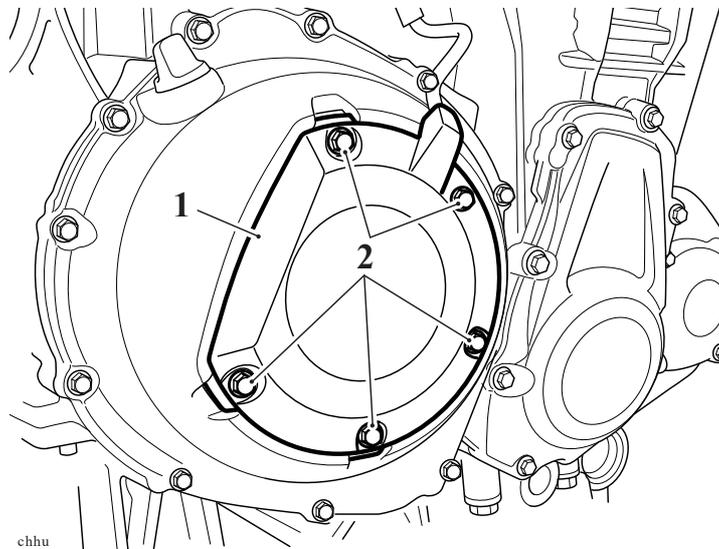
Note

- During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.
12. Maintain the clutch fluid level between the upper and lower levels whilst bleeding is being carried out.
 13. When all the air has been expelled from the system, hold in the clutch lever and close the bleed nipple. Tighten to **5 Nm**.
 14. Fill the reservoir to the upper level.

WARNING

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of clutch fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the clutch system leading to an accident.

15. Replace the reservoir cover and diaphragm ensuring correct fitment of the diaphragm. Tighten the screws to **1.5 Nm**.
16. Remove the transparent bleed pipe.
17. Replace the bleed nipple dust cap.
18. Refit the slave cylinder cover. Tighten the new fixings to **4 Nm**.



1. Slave cylinder cover
2. Fixings

19. Reset the adjuster wheel on the clutch lever to the original setting.

WARNING

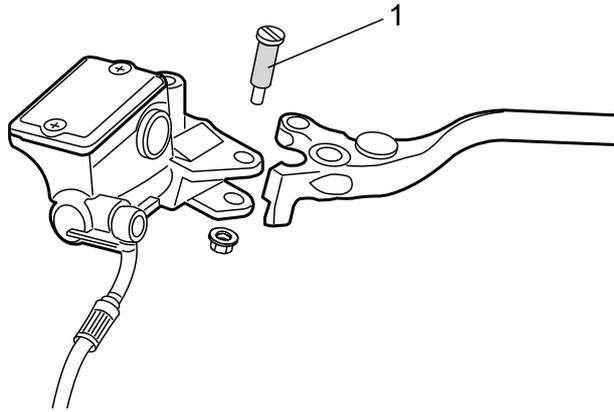
Always return the lever adjuster to the original setting as noted in step 1. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of control or an accident.

Clutch Lever - Pivot Bolt Lubrication

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the nut and pivot bolt securing the clutch lever to the master cylinder.
2. Using Castrol Metal Parts Cleaner or an equivalent, clean the clutch lever pivot and the shank of the clutch lever pivot bolt.
3. Apply a smear of silicone grease to the shank of the clutch lever pivot bolt.



1. Lubrication area

4. Position the clutch lever to the clutch master cylinder. Ensure that the pivot boss is correctly aligned and fitted to the push rod, and that the clutch switch actuation plate is correctly positioned to the clutch switch.
5. Secure with the pivot bolt and tighten to **1 Nm**.
6. Counter hold the pivot bolt, fit and tighten the lock nut to **6 Nm**.

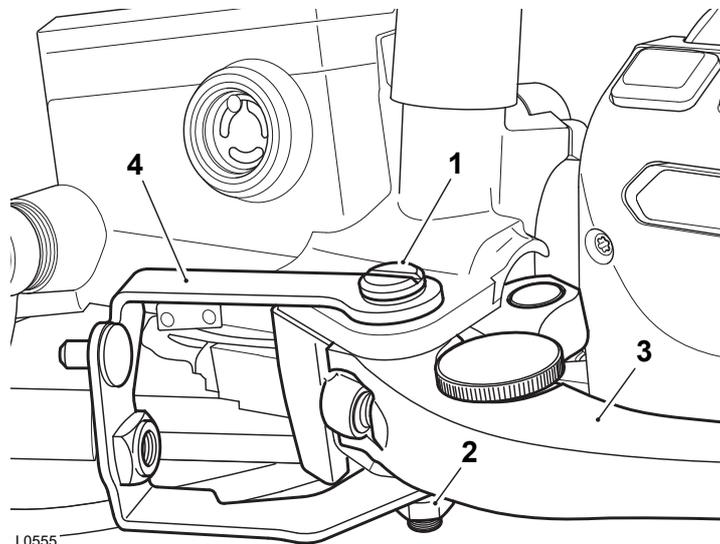
Clutch Master Cylinder - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Remove the reservoir cover. Drain the fluid from the master cylinder using the bleed process (see Bleeding the Clutch).
 - Handguards - Removal
1. Remove the nut and pivot bolt securing the clutch lever to the master cylinder.
 2. Remove the clutch lever and hand guard mounting bracket from the master cylinder.



1. Pivot Bolt
2. Lock nut
3. Clutch lever
4. Hand guard bracket

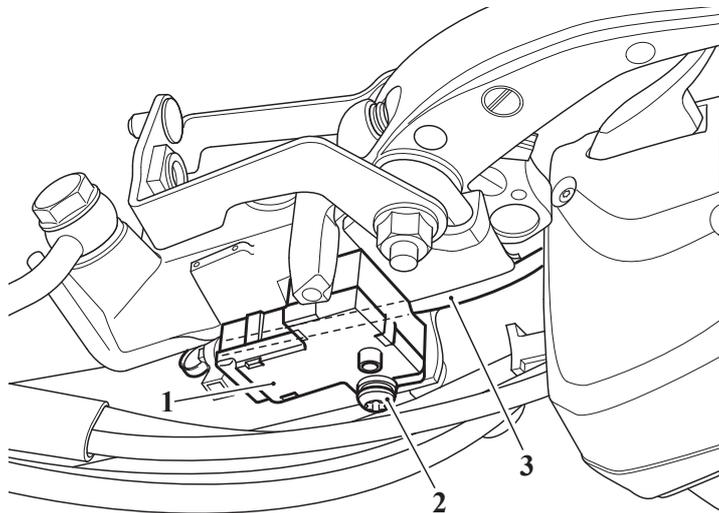
! CAUTION

To prevent body damage, do not spill clutch fluid onto any area of the bodywork.

3. Release the union bolt securing the clutch hose to the master cylinder. Disconnect the clutch hose. Discard the sealing washers.

Note

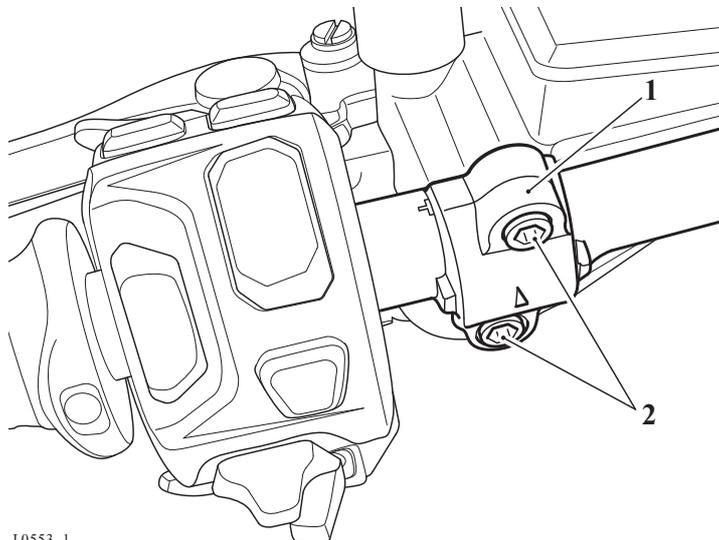
- Note the routing of the clutch switch harness for installation.
4. Release the fixing and detach the clutch switch from the master cylinder.



L0546

1. Clutch switch
2. Fixing
3. Harness

5. Release the clamp fixings and remove the clamp and master cylinder.



L0553_1

1. Clamp

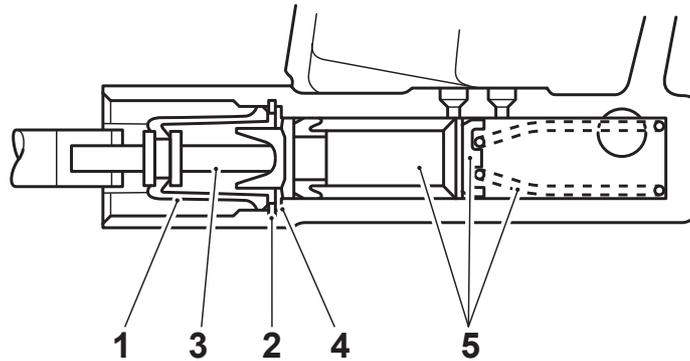
2. Fixings

Clutch Master Cylinder - Disassembly

Note

- **Note the order and orientation of each component as it is removed. It is essential for correct clutch operation that each component is installed in the correct order and orientation during reassembly.**

1. Remove dust cover/boot (1) from the rear of the master cylinder body.
2. Remove the cylinder pushrod (3).
3. Remove the circlip (2) from the end of the master cylinder bore.
4. Remove the washer (4) from part way down the bore.
5. Remove the piston, seal and spring (5) noting the position of the seal lip in relation to the piston.



chhr

1. **Dust cover/boot**
2. **Circlip**
3. **Pushrod**
4. **Washer**
5. **Piston, seal and spring**

Clutch Master Cylinder - Inspection

1. Check the following for wear, damage, cracks or signs of deterioration and replace as necessary:
 - o Cylinder bore and piston
 - o Seals
 - o Dust cover
 - o Spring.
2. Ensure that the fluid return and supply ports on cylinder are not blocked.

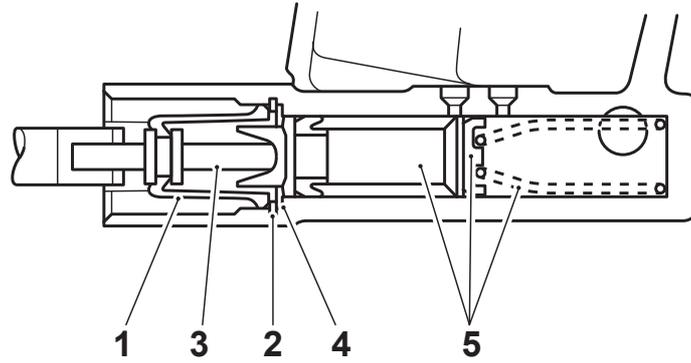
Clutch Master Cylinder - Assembly

1. Clean all disassembled parts with new DOT 4 brake and clutch fluid. Apply brake and clutch fluid to the bore of the cylinder.
2. Fit a new seal and piston set ensuring that the seal is fitted in the same position as noted during removal.

Note

- **It is essential for correct clutch operation that all components are installed in the correct order and orientation as noted during removal.**
3. Assemble all components to the master cylinder. When fitting the pushrod, ensure the rounded end of the pushrod is inserted into the master cylinder. Ensure that the dust cover is correctly located over both the

pushrod and cylinder body.



chhr

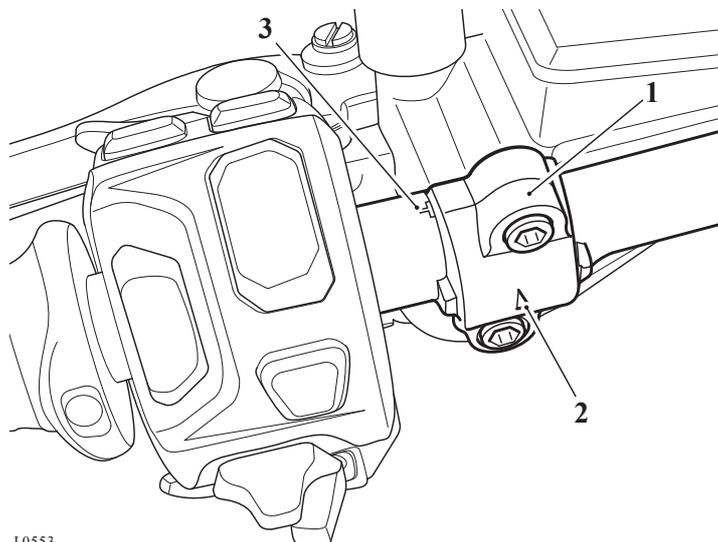
1. Dust cover/boot
2. Circlip
3. Pushrod
4. Washer
5. Piston, seal and spring

Clutch Master Cylinder - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

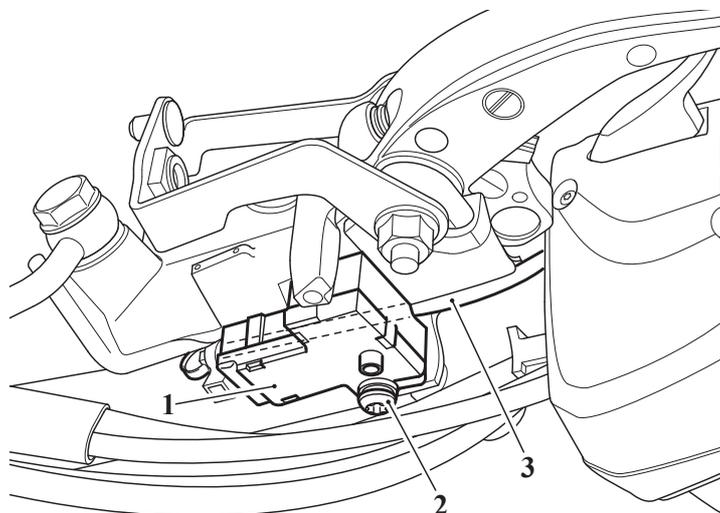
1. Locate the master cylinder to the handlebars and position the clamp with the 'UP' arrow pointing upwards. Align the master cylinder/clamp split line with the alignment mark on the handlebar.
2. Tighten the clamp bolts, upper first and then lower, to **12 Nm**.



L0553

1. Clamp
2. 'UP' arrow
3. Alignment mark

3. Position the clutch switch to the master cylinder, routing the harness as noted during removal. Secure with the fixing and tighten to **2 Nm**.



L0546

1. **Clutch switch**
2. **Fixing**
3. **Harness**

4. Using Castrol Metal Parts Cleaner or an equivalent, clean the clutch lever pivot and the shank of the clutch lever pivot bolt.
5. Apply a smear of silicone grease to the shank of the clutch lever pivot bolt.
6. Position the clutch lever to the clutch master cylinder. Ensure that the pivot boss is correctly aligned and fitted to the push rod, and that the clutch switch actuation plate is correctly positioned to the clutch switch.
7. Position the handguard bracket to the clutch master cylinder.
8. Secure clutch lever and handguard bracket with the pivot bolt and tighten to **1 Nm**.
9. Counter hold the pivot bolt, fit and tighten the lock nut to **6 Nm**.
10. Align and fit the union bolt to the clutch hose incorporating new sealing washers. Connect the hose to the master cylinder.
11. Tighten the union bolt to **25 Nm**.

Perform the following operations:

- Handguards - Installation
- Bleed the clutch (see Bleeding the Clutch) and then examine the system for correct clutch operation and for any fluid leakage.

Clutch Slave Cylinder - Removal

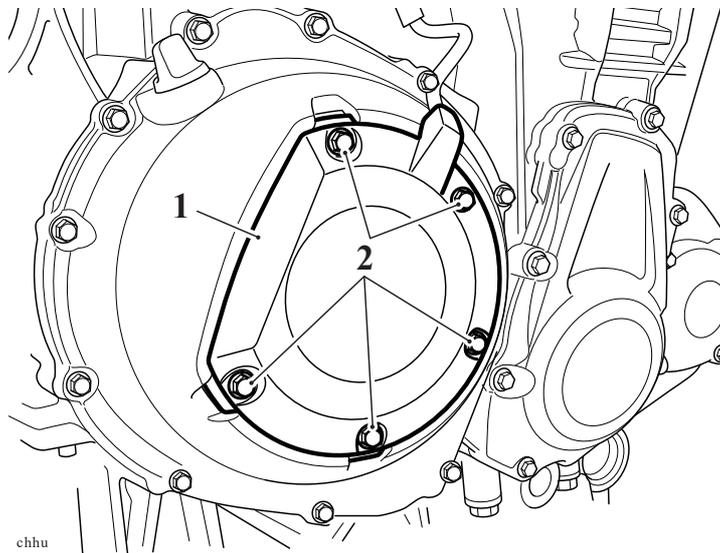
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

If the clutch slave cylinder is found to be leaking, the engine oil must be replaced after repairs to the clutch slave cylinder have been carried out. Contamination of the engine oil with brake and clutch fluid may result in damage to engine and clutch components.

1. Remove the five fixings and remove the slave cylinder cover. Discard the fixings.



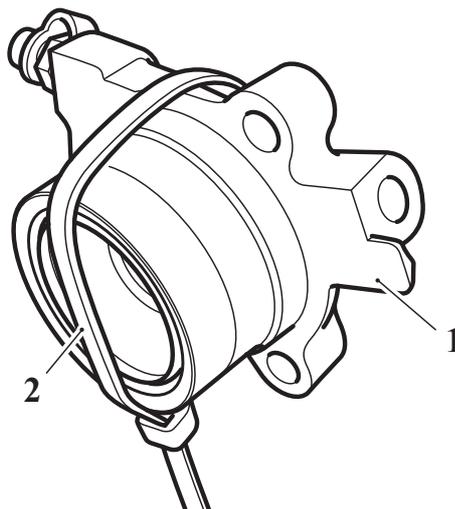
1. Slave cylinder cover
2. Fixings

2. Position a suitable container for the collection of brake and clutch fluid.

! CAUTION

To prevent body damage, do not spill clutch fluid onto any area of the bodywork.

3. Release the union bolt from the clutch slave cylinder. Place the hose fitting into the container to collect the fluid.
4. Release the three bolts securing the clutch slave cylinder to the clutch cover.
5. Detach the cylinder taking care to ensure that the piston remains in the cylinder.
6. Retain the piston to the slave cylinder using a retaining tie such as a rubber band or cable tie.



1. Clutch slave cylinder
2. Retaining tie

Clutch Slave Cylinder - Inspection

! WARNING

WARNING

The clutch slave cylinder contains no user serviceable parts and replacement piston and dust seals are not available.

If disassembled, never attempt to reassemble the clutch slave cylinder using the original seals as this could cause a fluid leak.

The clutch slave cylinder must be replaced if disassembled for any reason.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Inspect the clutch slave cylinder carefully for fluid leaks, wear, damage, cracks or deterioration.
2. Replace the clutch slave cylinder if any of the above are evident.

Clutch Slave Cylinder - Installation

1. Remove the cable tie or rubber band from the slave cylinder.
2. Align and fit the union bolt to the clutch hose incorporating new sealing washers. Connect the hose to the slave cylinder.
3. Fit the slave cylinder to the clutch cover ensuring that the lifter piece locates correctly in the cylinder. Tighten the cylinder to clutch cover bolts to **10 Nm**.
4. Tighten the clutch hose union bolt to **25 Nm**.
5. Bleed the clutch (see Bleeding the Clutch) and then examine the system for:
 - o Correct clutch operation
 - o Fluid leakage.
6. Refit the slave cylinder cover. Tighten the new fixings to **4 Nm**.

Clutch - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

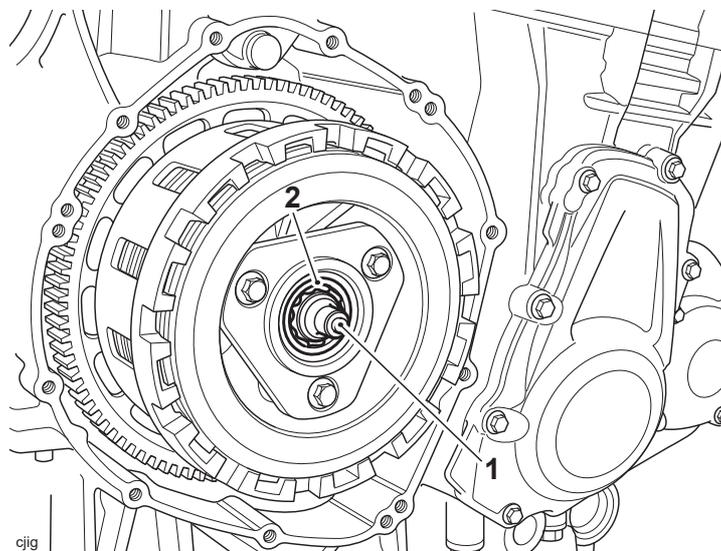
Perform the following operations:

- Clutch Cover - Removal

Note

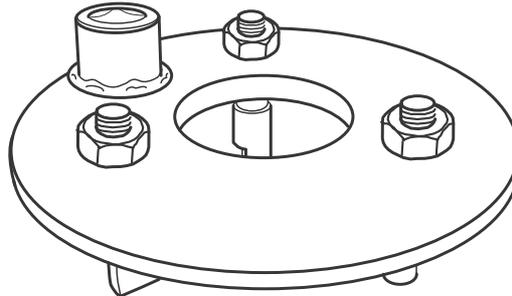
- **The lifter piece and bearing carrier can be removed by hand.**

1. Remove the lifter piece and bearing carrier.



1. **Lifter piece**
2. **Bearing carrier**

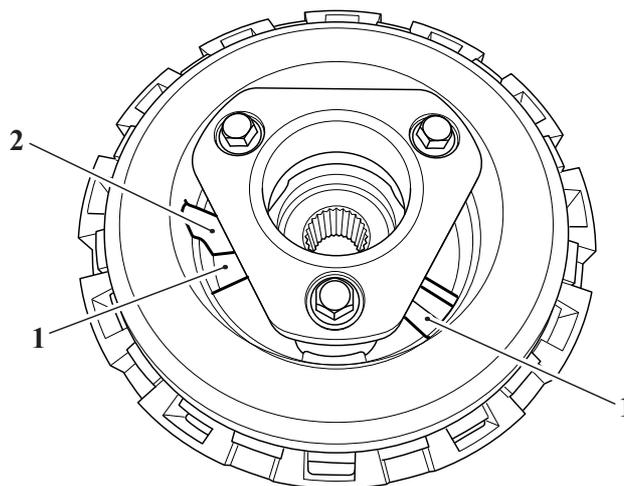
2. Carefully de-stake the clutch centre nut.
3. Loosen the locating pins of T3880660 - Clutch Restraint sufficiently to allow them to adjust on the tool's mounting plate.



T3880660 - Clutch Restraint

Note

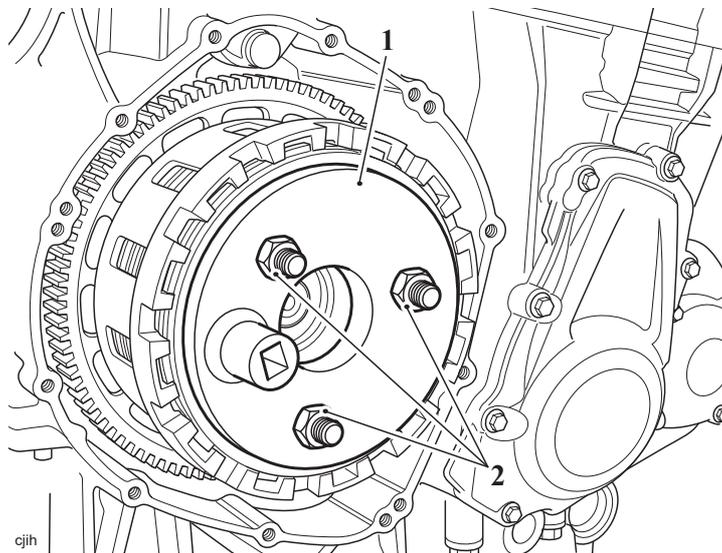
- When positioning T3880660 - Clutch Restraint to the clutch centre, ensure that the tool's locating pins are positioned into the openings for the clutch centre ramps. When correctly located, the tool's mounting plate will sit flush against the clutch centre.
- For clutch removal, the tool should be rotated clockwise until the rounded sides of the locating pins engage with the webbed side of the openings for the clutch centre ramps.



cjht_1

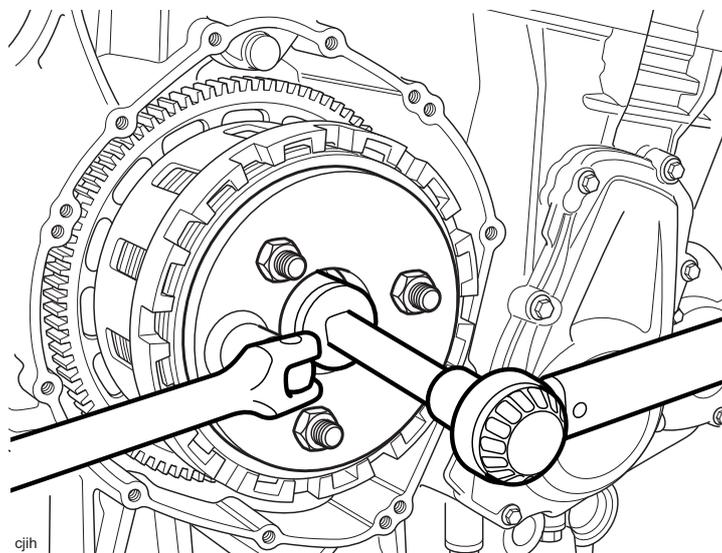
1. **Clutch centre ramp openings**
2. **Webbed side**

4. Position T3880660 - Clutch Restraint to the clutch centre. Rotate the tool clockwise until the locating pins engage with the webbed side of the openings for the clutch centre ramps.
5. Hand tighten the locating pin nuts.



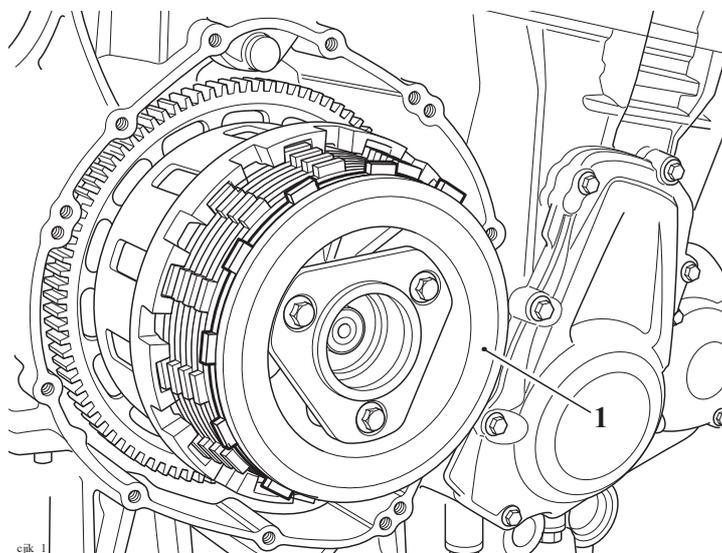
1. **T3880660 - Clutch Restraint**
2. **Locating pin nuts**

6. Hold the service tool to prevent clutch rotation then loosen and remove the centre nut and Belleville washer from the input shaft. Discard the nut and washer.



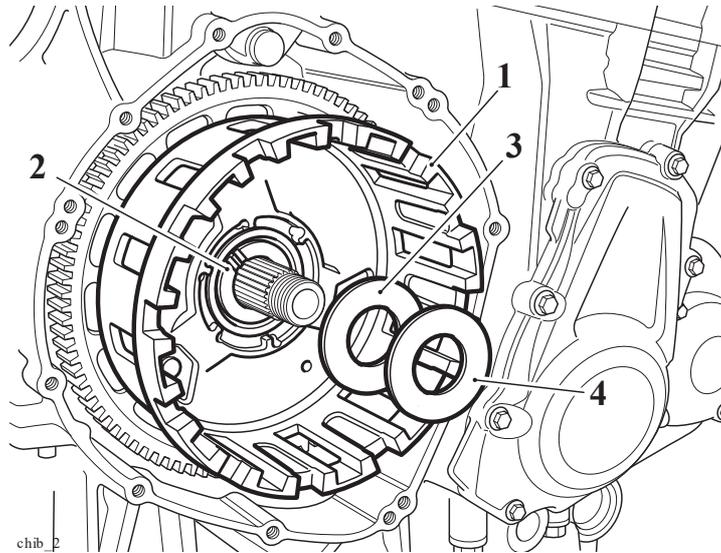
Hold the Service Tool and Loosen the Centre Nut

7. Remove T3880660 - Clutch Restraint.
8. Withdraw the clutch centre and pressure plate assembly.



1. Clutch centre and pressure plate assembly

9. Remove the thrust washer (and shim(s) if fitted) from the input shaft.
10. Slide the clutch outer drum assembly gently backwards and forwards to dislodge the inner bearing sleeve. Carefully remove the bearing sleeve while supporting the clutch drum.

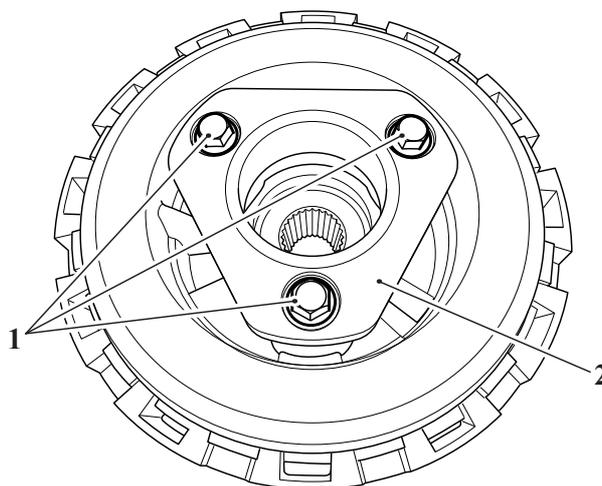


1. Outer drum
2. Bearing sleeve
3. Shim (if fitted)
4. Thrust washer

11. Remove the clutch outer drum leaving the oil pump drive sprocket, bearing and sleeve in place on the input shaft.

Clutch - Disassembly

1. Evenly and progressively loosen the three fixings securing the release plate to the clutch centre and pressure plate assembly.



1. Fixings
2. Release plate

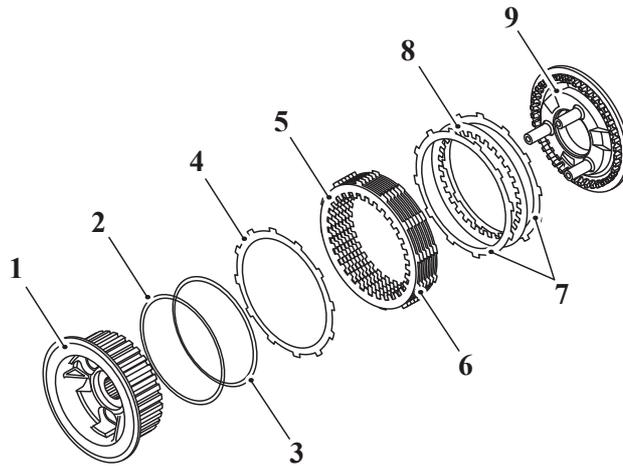
2. Remove the fixings and lift off the release plate. Collect the springs.
3. Remove the clutch centre.

Note

- The one outermost and two innermost friction plates differ from the six centre plates and must not be fitted in any other positions.
 - The innermost steel plate differs from the seven other steel plates and cannot be fitted in any other position.
4. Noting their orientation, remove all the clutch friction plates and steel plates together with the anti-judder spring and anti-judder seat washer.

Note

- Record the orientation of all components as they are removed. The plates must be assembled in the same order.

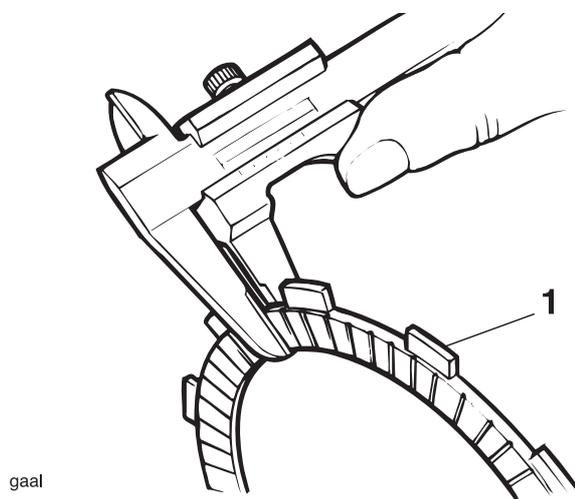


1. Clutch Centre
2. Anti-judder seat washer
3. Anti-judder spring
4. Outer friction plate
5. 7 x centre steel plates
6. 6 x centre friction plates
7. Inner friction plates
8. Inner steel plate
9. Pressure plate

Friction Plate Inspection

Thickness

1. If any friction plate thickness is outside the service limit, replace the friction plates as a set.

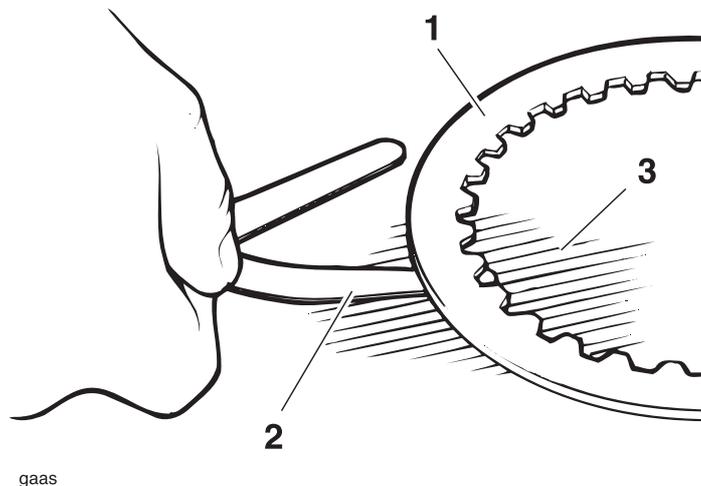


1. Clutch friction plate

Steel Plate Bend/Warp

Check all plates for bend and warp as follows:

1. Place the plate being checked on a clean surface plate and attempt to pass a feeler gauge of the maximum specified thickness between the steel plate and surface plate at several points around the plate. If the feeler gauge can be passed beneath the steel plate at any point, renew the plates as a set.



1. Steel plate
2. Feeler gauge
3. Surface plate

- For specifications refer to Clutch/Primary Drive.

Clutch Pack Height

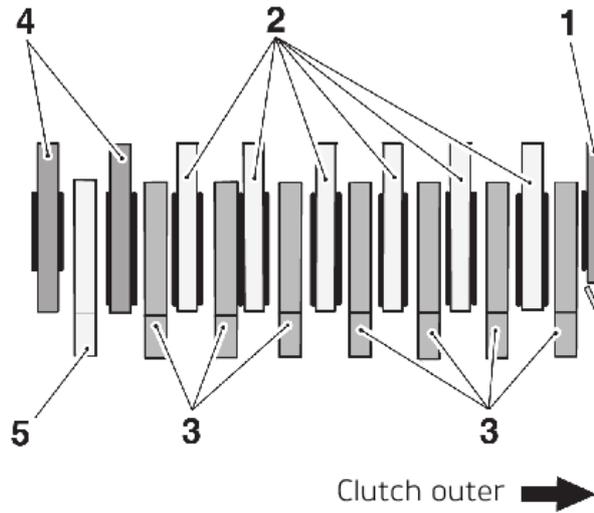
The clutch pack height should only be measured if the friction plates and the steel plates have been replaced. The clutch pack height is critical for a smooth operation of the transmission and must be measured prior to installation of new clutch plates.

If used clutch plates are being refitted, the clutch pack height measurement is not necessary, as the plates may not be worn to the service limit (and are therefore still serviceable), but could fall outside of the clutch pack height tolerance when measured.

If building a new clutch pack its height must be correct. To achieve this, build the new clutch pack with the following:

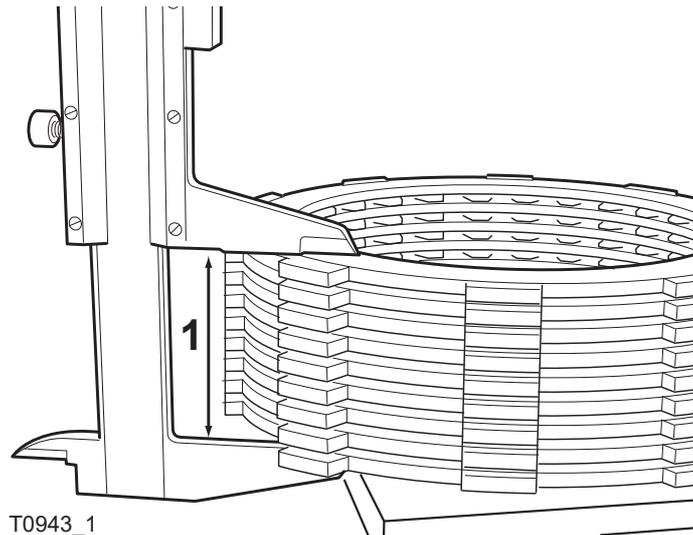
- 1 x new outer friction plate
- 6 x new friction plates
- 7 x steel plates, 2.0 mm thick
- 2 x new inner friction plates
- 1 x new inner steel plate, 2.0 mm thick.

1. Arrange the new friction and new steel plates in a stack as shown below.



1. Outer friction plate
2. Friction plates
3. Steel plates, 2.0 mm thickness
4. Inner friction plates
5. Inner steel plate, 2.0 mm thickness

2. Place the assembled clutch pack on a flat surface and measure its height as shown below.



1. Clutch pack height

3. The correct clutch pack height for this clutch assembly is shown in the specification table see Clutch/Primary Drive.

4. If the clutch pack height measurement is incorrect, proceed as described below:

Clutch Pack Height Too High

Note

Note

- **No more than one 1.6 mm thick steel plate may be used in the clutch pack.**
 - **The 1.6 mm steel plate cannot be used to replace the inner most steel plate.**
1. Replace one 2.0 mm steel plate with a 1.6 mm steel plate. The thinner plate can be installed in any position except the innermost position.
 2. Recheck the clutch pack height as described earlier.

Clutch Pack Height Too Low

Note

- **No more than one 2.3 mm thick steel plate may be used in the clutch pack.**
 - **The 2.3 mm steel plate cannot be used to replace the inner most steel plate.**
1. Replace one 2.0 mm steel plate with a 2.3 mm steel plate. The thicker plate can be installed in any position except the innermost position.
 2. Recheck the clutch pack height as described earlier.

Clutch - Assembly

The outermost and two innermost friction plates differ from the six centre friction plates. Identification is as follows:

- The outermost and two innermost friction plates have a larger internal diameter to accommodate the anti-judder spring and pressure plate splines respectively.
- The outermost and two innermost friction plates also have more friction pads (60 pads) than the other plates (50 pads).
- The outermost and two innermost friction plates can also be identified by pink paint markings on the outer tabs.

The innermost steel plate differs from the other seven steel plates and can be identified by a larger internal diameter.

CAUTION

Do not use brake cleaner or any other similar cleaning fluids to clean the clutch plates. The use of brake cleaner or other similar cleaning fluids may adversely affect the operation of the clutch.

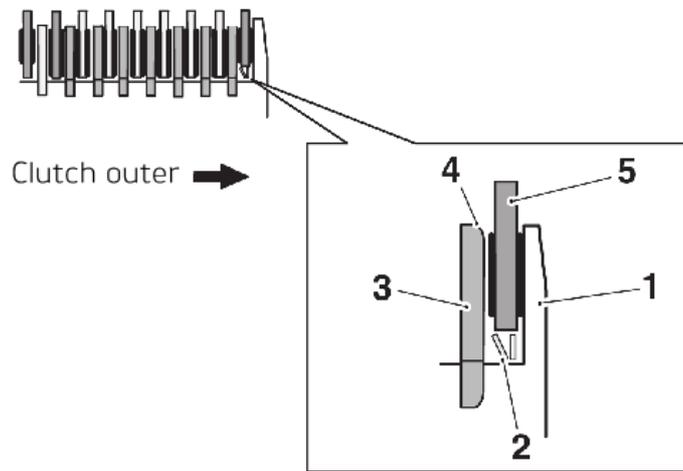
1. Remove any contamination or debris from the clutch plates using a soft dry cloth.
2. Coat all friction and steel plates in clean engine oil.

CAUTION

Ensure the clutch plates are all installed in the correct locations. Failure to do so will adversely affect the operation of the clutch.

Note

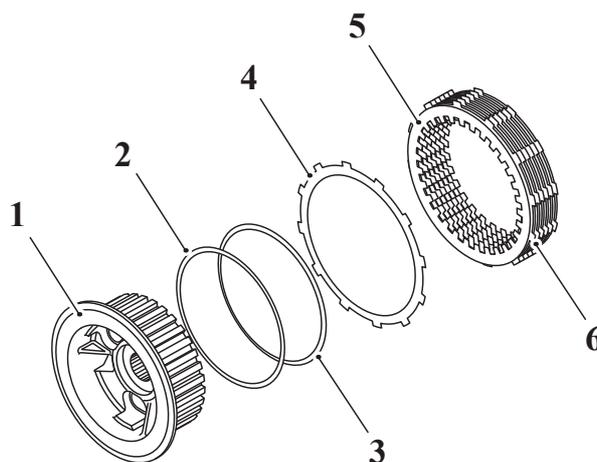
- **During installation, ensure that the anti-judder spring is installed with its smaller (internal) diameter facing outwards towards the clutch centre.**
- **Also ensure that the steel plates are installed so that the face with the curved edges is facing outwards towards the clutch centre.**



1. Clutch centre
2. Anti-judder spring
3. Steel plate
4. Curved edge
5. Outer friction plate

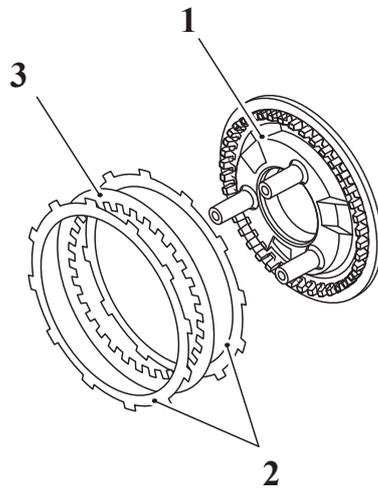
3. Assemble the following to the clutch centre in the same order and orientation as noted for removal:

- o Anti-judder washer
- o Anti-judder spring
- o Outer friction plate
- o 7 x steel plates
- o 6 x friction plates.



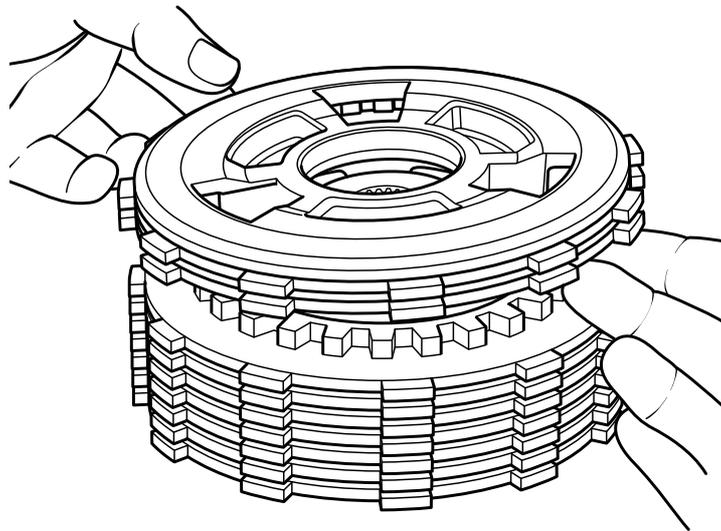
1. Clutch centre
2. Anti-judder seat washer
3. Anti-judder spring
4. Outer friction plate
5. 7 x steel plates
6. 6 x friction plates

4. Assemble the innermost friction and steel plates to the pressure plate in the same order and orientation as noted for removal.



1. Pressure plate
2. Inner friction plates
3. Inner steel plate

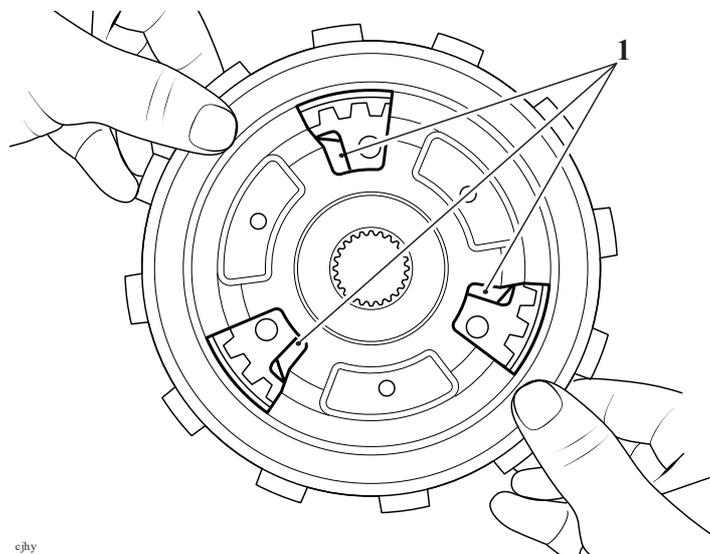
5. While holding the innermost friction and steel plates in position, invert the pressure plate and locate it onto the clutch centre.



cjhx

Locating the Pressure Plate

6. Ensure the pressure plate ramps engage correctly with the clutch centre.

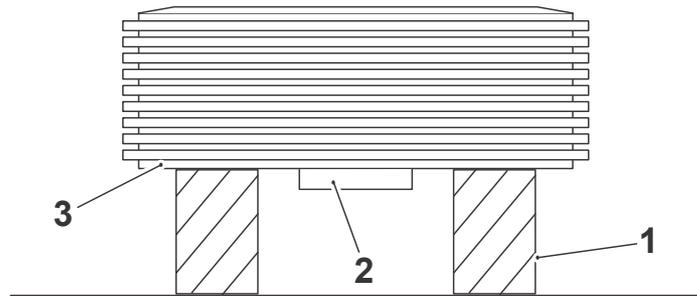


cjhy

1. Pressure plate ramps

Note

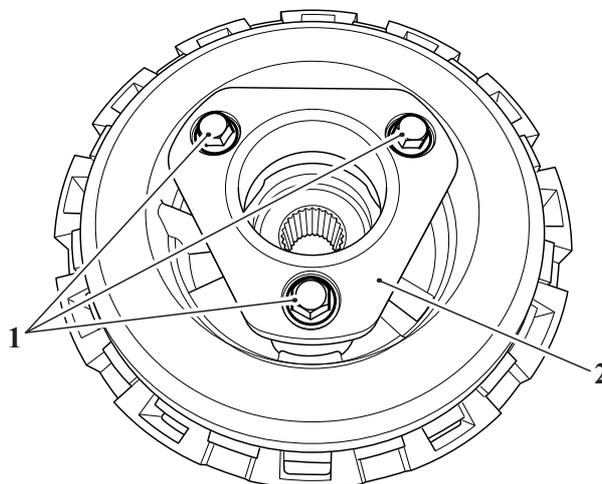
- Do not allow the clutch centre and pressure plate to separate at this point as this may cause the innermost steel plate to disengage from the pressure plate splines.
7. Holding the clutch centre and pressure plate assembly together, invert the assembly and place on a suitable support. Ensure the assembly rests on the pressure plate and not on the under side of the clutch centre.



1. Support
2. Clutch centre (underside)
3. Pressure plate

Note

- During the next instruction step, the release plate fixings should be tightened until a small amount of preload is applied to the springs. The amount of preload applied should be sufficient to prevent the clutch centre and pressure plate from separating, while allowing movement/rotation of the friction plates.
8. Fit the springs and release plate to the clutch centre and pressure plate assembly and secure with the three fixings. Evenly and progressively tighten the release plate fixings until a small amount of spring preload is applied. Do not fully tighten the fixings.



cjht

1. Fixings

2. Release plate

Clutch - Installation

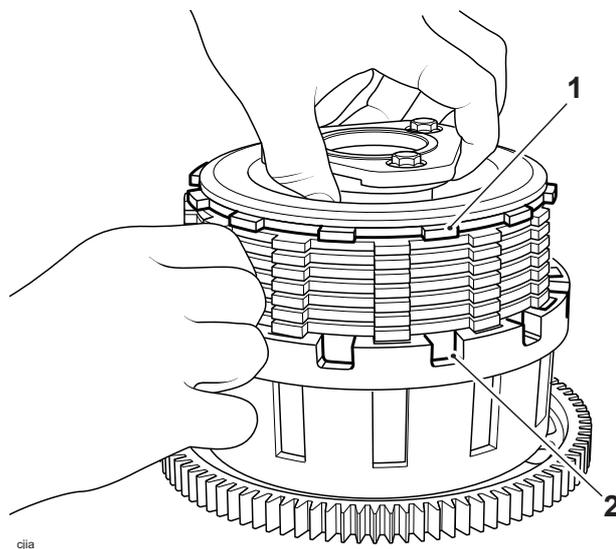
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

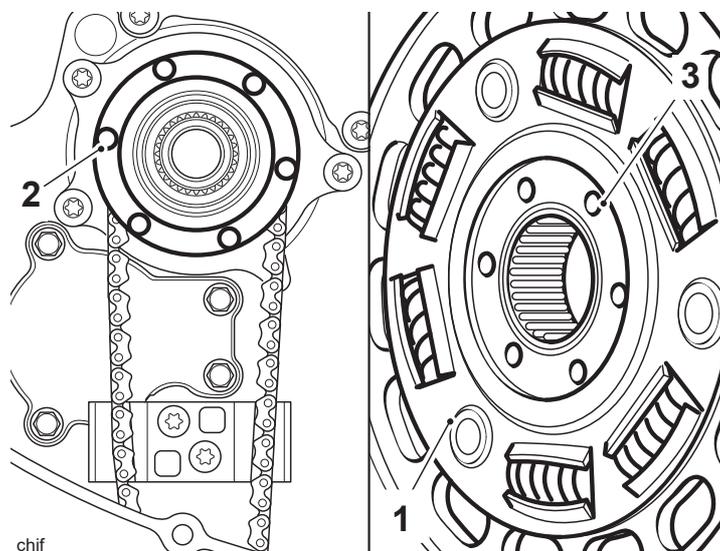
- To aid installation, the clutch centre and pressure plate assembly should be temporarily fitted to the clutch outer drum while it is removed from the motorcycle. This allows alignment of the friction plate outer tabs prior to installation to the motorcycle.

1. With the clutch outer drum assembly removed from the motorcycle, fit the clutch centre and pressure plate assembly to the outer drum assembly. Align the friction plate tabs noting that the outermost friction plate engages in its own (shallow) slot.



1. Outer most friction plate
2. Shallow slot

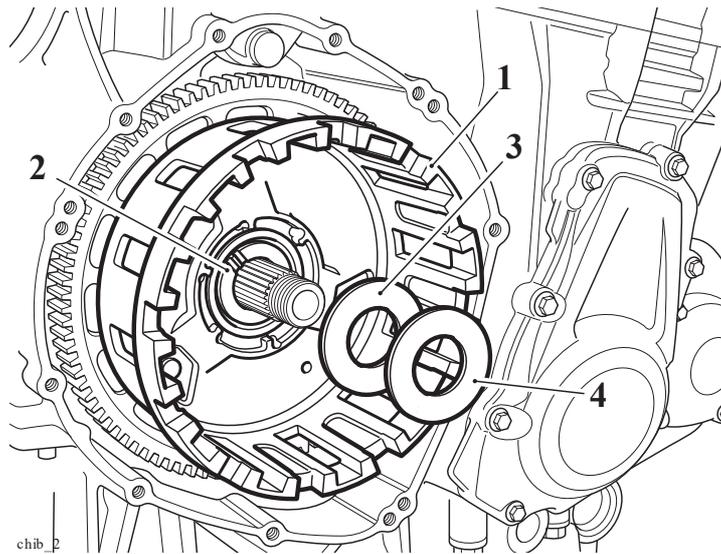
2. Remove the clutch centre and pressure plate assembly from the outer drum assembly. Take care not to disturb the friction plate tabs.
3. Position the clutch outer drum assembly to the input shaft and align the oil pump drive pegs with the corresponding holes in the rear of the clutch outer drum.



1. Clutch outer drum
2. Oil pump sprocket drive pegs
3. Oil pump drive holes

Note

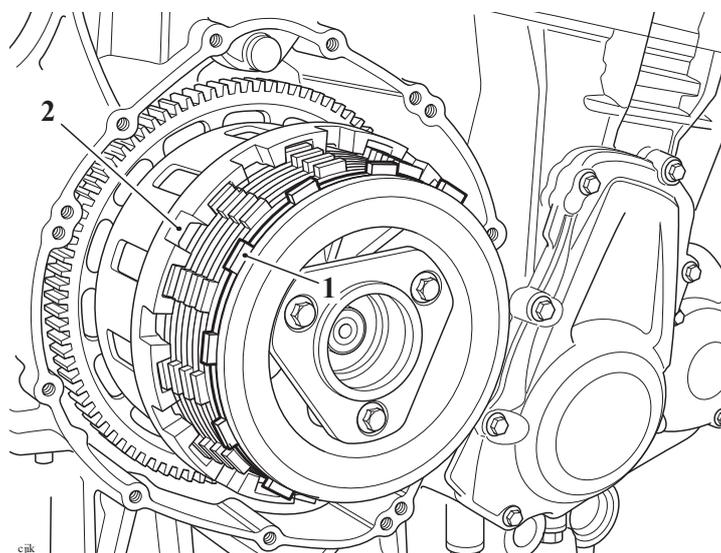
- When the bearing sleeve is correctly fitted, it will be a flush fit with the clutch drum face.
4. While holding the clutch outer drum in position and ensuring correct engagement with the oil pump drive, refit the bearing sleeve, shim(s) (if fitted) and thrust washer.



1. Outer drum
2. Bearing sleeve
3. Shim (if fitted)
4. Thrust washer

Note

- To align the clutch centre splines with the input shaft splines, it may be necessary to rotate the input shaft.
5. Fit the clutch centre and pressure plate assembly, aligning the friction plate tabs with the clutch drum slots, noting that the outermost friction plate engages in its own (shallow) slot. Align the clutch centre splines with those of the input shaft and slide the assembly fully into position.



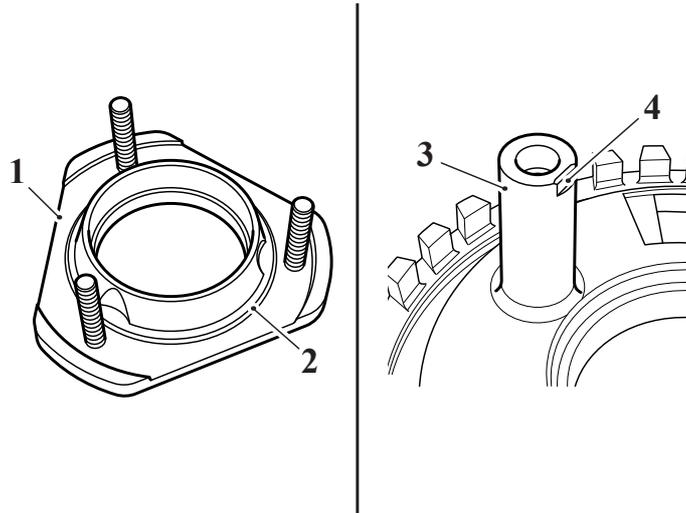
1. Outer friction plate
2. Outer friction plate slot

CAUTION

Ensure the clutch springs are all installed correctly under the release plate. Failure to do so will adversely affect the operation of the clutch.

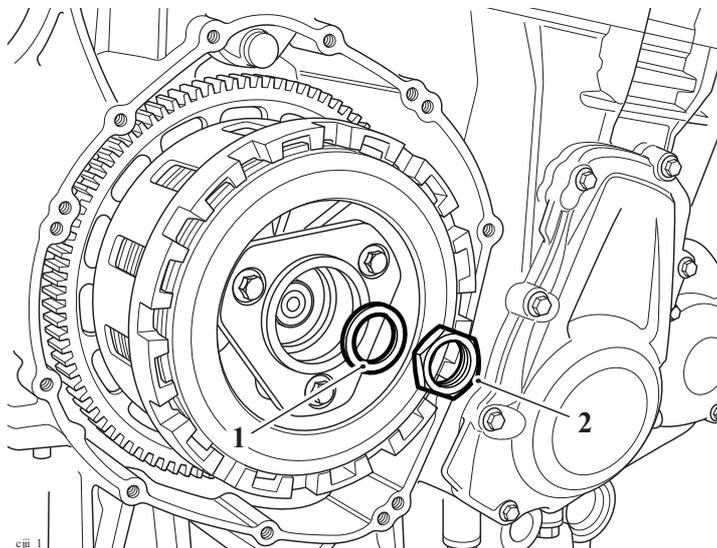
Note

- When tightening the three release plate fixings, care must be taken to tighten the fixings evenly and progressively. This is to ensure that the chamfered edge on the underside of the release plate is correctly seated into the machined face on the inside edge of the pressure plate fixing towers.
- Failure to ensure that the release plate is correctly seated will cause the clutch friction plates to release and re-engage at an angle, resulting in severe clutch judder.



1. Release plate
2. Chamfered edge
3. Fixing tower
4. Machined face

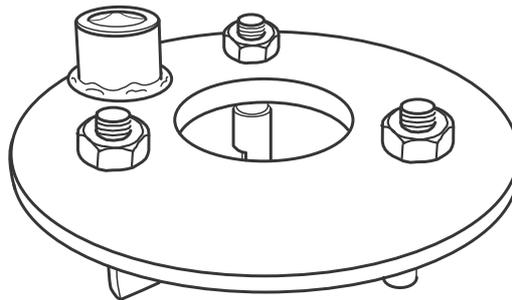
6. Evenly and progressively tighten the release plate bolts to **10 Nm**, ensuring that the springs remain correctly located and that the release plate is correctly seated to the pressure plate fixing towers.
7. Fit a new Belleville washer with its OUT marking facing outwards.
8. Fit a new centre nut.



1. Belleville washer

2. Centre nut

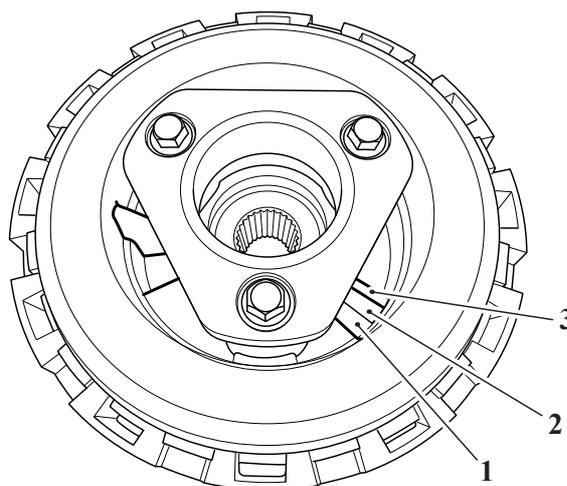
9. Loosen the locating pins of T3880660 - Clutch Restraint sufficiently to allow them to adjust on the tool's mounting plate.



T3880660 - Clutch Restraint

Note

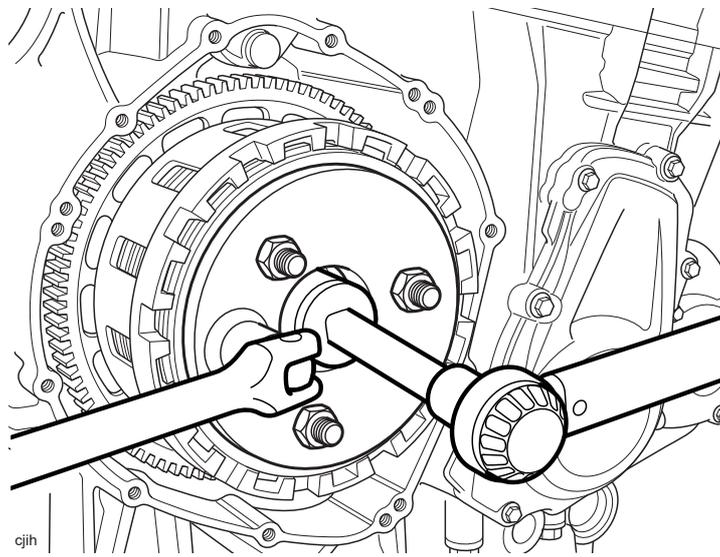
- When positioning T3880660 - Clutch Restraint to the clutch centre, ensure that the tool's locating pins are positioned into the openings for the clutch centre ramps. When correctly located, the tool's mounting plate will sit flush against the clutch centre.
- For clutch installation, the tool should be rotated anticlockwise until the machined face of the locating pins engages with the flat face of the clutch centre ramps.



cjht_2

1. Clutch centre ramp opening
2. Ramp
3. Flat face

10. Position T3880660 - Clutch Restraint to the clutch centre and pressure plate assembly. Rotate the tool anticlockwise until the tool's locating pins engage with the flat face of clutch centre ramps.
11. Hand tighten the locating pin nuts.
12. Tighten the centre nut to **160 Nm** whilst holding the service tool to prevent rotation.

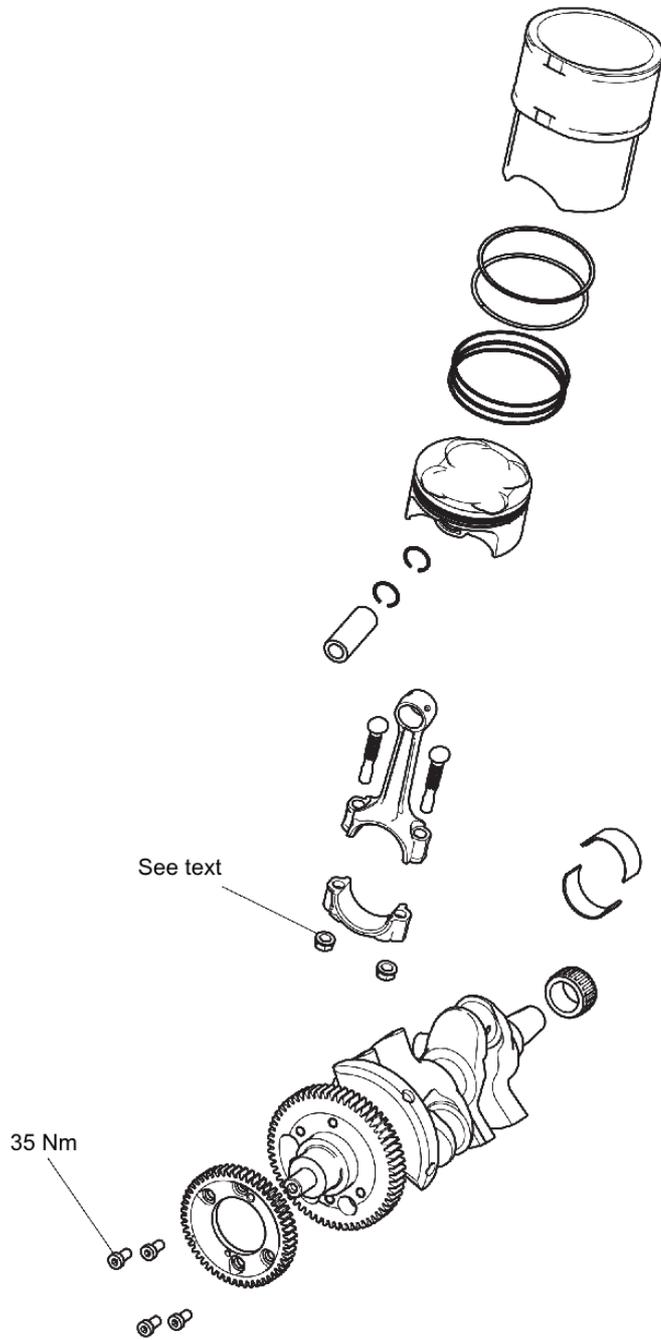


Retain the Service Tool and Tighten the Centre Nut

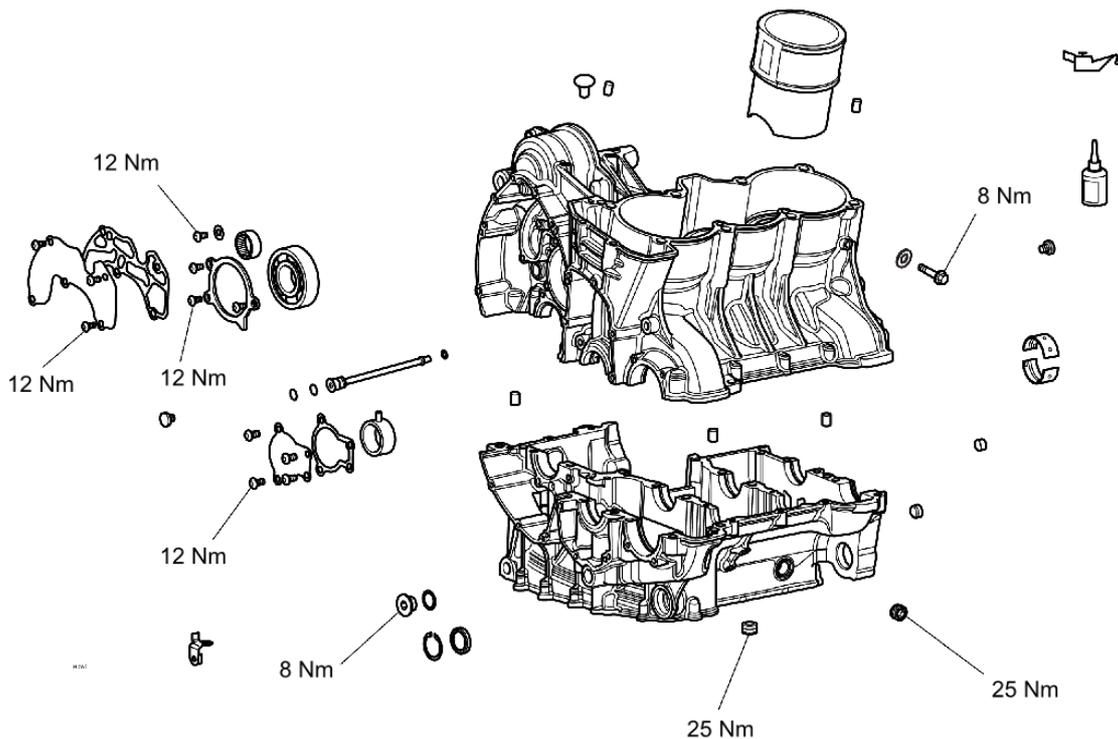
13. Remove T3880660 - Clutch Restraint from the pressure plate.
 14. Stake the clutch centre nut to the shaft.
 15. Fit the lifter piece and bearing carrier, ensuring they are correctly installed in the release plate.
- Perform the following operations:
- Clutch Cover - Installation

Crankcase, Crankshaft, Connecting Rods and Pistons

Exploded View – Crankshaft, Connecting Rod, Piston and Liner



Exploded View – Crankcases



Crankcases - Disassembly

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

The upper and lower crankcases are machined as a matched set and must never be assembled to non-matching halves. Doing so may cause seizure of the engine.

Perform the following operations:

- Engine - Removal
- Sump - Removal

- Trigger Wheel Cover - Removal
- Crankshaft Cover - Removal
- Balancer Shaft Cover - Removal
- Clutch - Removal
- Transmission - Removal
- Oil Pump - Removal
- Trigger Wheel, Starter Drive Gears and Sprag Clutch - Removal

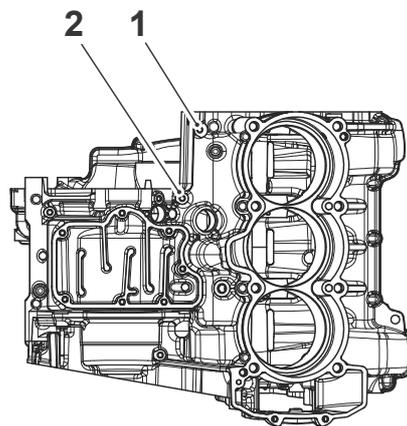
Note

- If the crankshaft or connecting rods are to be removed, the cylinder head must also be removed.

! CAUTION

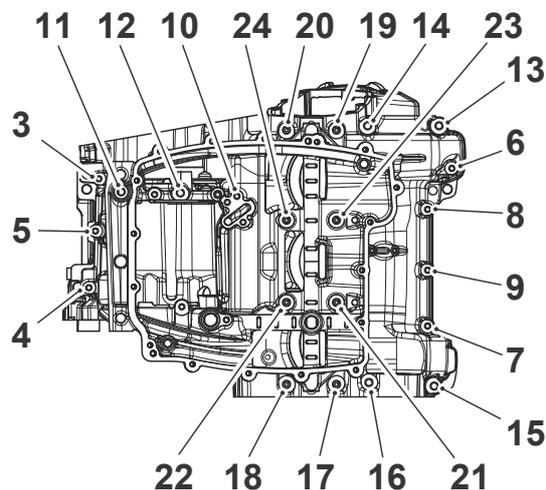
Failure to follow the correct screw release sequence may result in permanent crankcase damage.

1. Working on the upper crankcase bolts first, release the bolts in the sequence shown below.



Upper Crankcase Bolt Release Sequence

2. Invert the engine to give access to the lower crankcase bolts.
3. Release the lower crankcase bolts in the sequence shown in the diagram below.



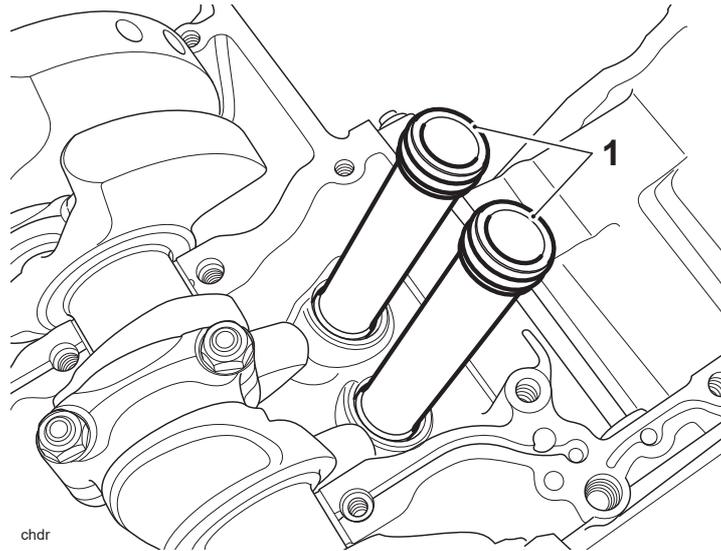
Lower Crankcase Bolt Release Sequence

4. Separate the lower and upper crankcases ensuring that the three locating dowels remain in the upper crankcase.

! CAUTION

Do not use levers to separate the upper and lower sections of the crankcase or damage to the crankcases could result.

5. Note the positions of the two coolant tubes in the upper crankcase.



1. Coolant tubes

Note

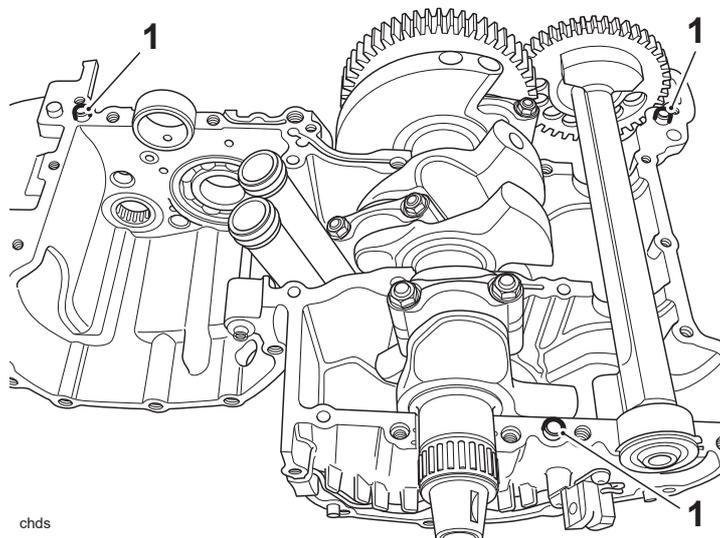
- At this point the balancer shaft, crankshaft, bearings etc. can be removed.

Crankcases - Assembly

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

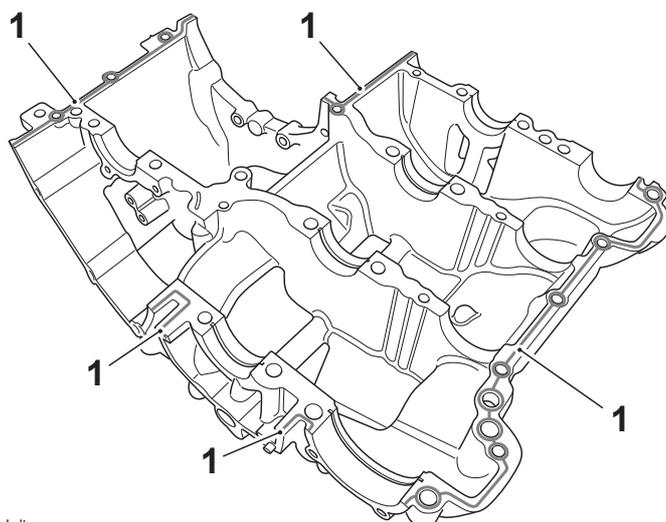
1. Use high flash-point solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.
2. Fit the gearbox shafts (if removed), ensuring the locating ring on the input shaft is in position in the circlip groove on the crankcase.
3. Ensure that the three locating dowels are in position in the upper crankcase.



chds

1. Locating dowels

4. Apply a thin bead of silicone sealant to the lower crankcase mating faces (at the factory, ThreeBond 1215E is used).



chdt

1. Sealer areas

! CAUTION

Do not use excessive amounts of sealer. The extra sealer may become dislodged and could block the oil passages in the crankcases causing severe engine damage.

5. Install and lubricate the crankshaft bearing shells with clean engine oil (see bearing selection before proceeding).
6. Lubricate the crankshaft journals with clean engine oil.
7. Position the lower crankcase to the upper crankcase.
8. Fit the screws into the lower crankcase and hand tighten until the bolt heads are near contact with the crankcase.
9. Invert the engine.
10. Fit the screws into the upper crankcase and hand tighten until the bolt heads are near contact with the crankcase.

Note

- The crankcase screws are tightened in stages.

! CAUTION

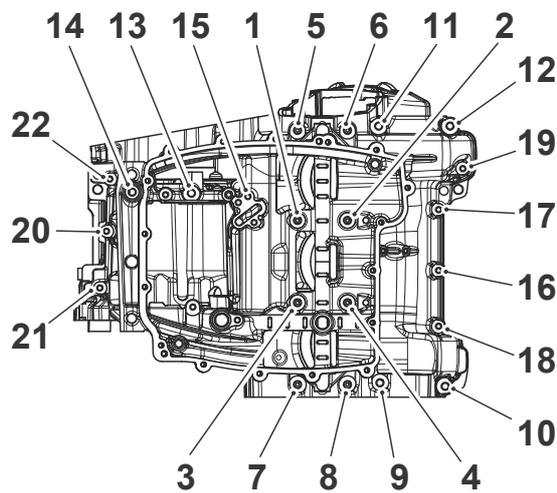
Failure to follow the correct screw tightening sequence may result in permanent crankcase damage.

Stage 1 - M8 screws only

11. Invert the engine.
12. In the correct sequence, tighten the M8 size lower crankcase screws (numbers 1 to 14) to **14 Nm**.

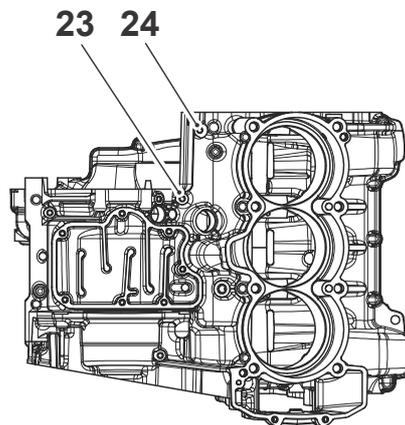
Stage 2 - M6 screws only

13. In the correct sequence, tighten the M6 size lower crankcase screws (numbers 15 to 22) to **12 Nm**.



Lower Crankcase Bolt Tightening Sequence

14. Invert the engine.
15. In the correct sequence, tighten the upper crankcase bolts (number 23 and 24) to **12 Nm**.



Upper Crankcase Bolt Tightening Sequence

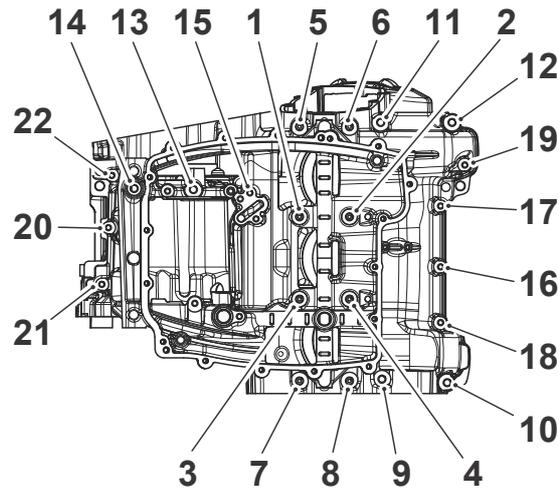
Stage 3 - M8 screws only

16. Invert the engine.

17. In the correct sequence, tighten the M8 size lower crankcase screws (numbers 1 to 14) to **36 Nm**.

Stage 4 - M6 screws only

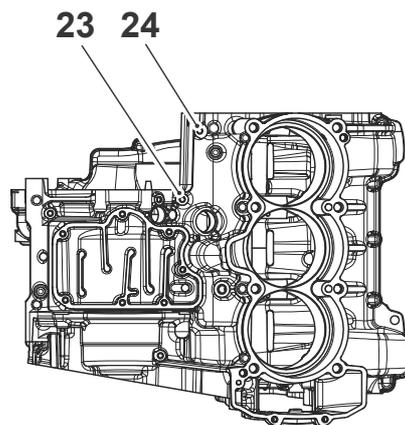
18. In the correct sequence, tighten the M6 size lower crankcase screws (number 15 to 22) to **12 Nm**.



Lower Crankcase Bolt Tightening Sequence

19. Invert the engine.

20. In the correct sequence, tighten the upper crankcase bolts (number 23 and 24) to **12 Nm**.



Upper Crankcase Bolt Tightening Sequence

21. Rotate the crankshaft clockwise. Check for tight spots and rectify as necessary.

Perform the following operations:

- Transmission - Installation
- Trigger Wheel, Starter Drive Gears and Sprag Clutch - Installation
- Oil Pump - Installation
- Clutch - Installation
- Trigger Wheel Cover - Installation

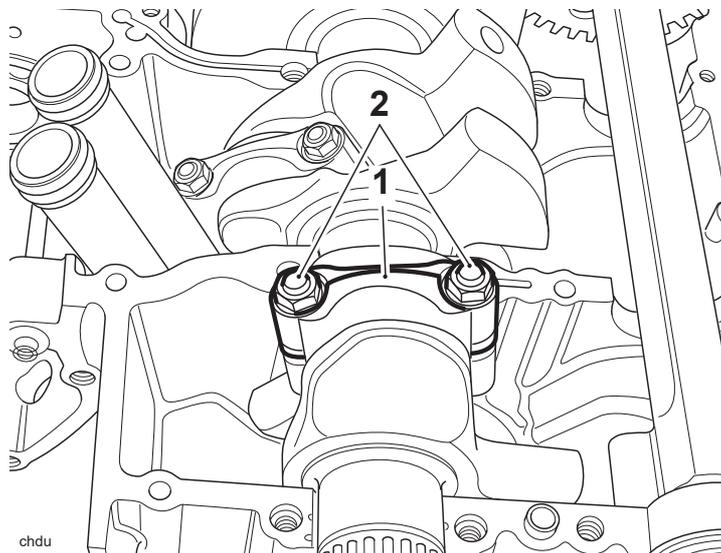
- Crankshaft Cover - Installation
- Balancer Shaft Cover - Installation
- Sump - Installation
- Engine - Installation

Connecting Rods - Removal

Perform the following operations:

- Engine - Removal
- Cylinder Head - Removal
- Cylinder Liners - Removal
- Pistons - Disassembly
- Crankcases - Disassembly

1. Mark each big end cap and connecting rod to identify both items as a matched pair and to identify the correct orientation of the bearing cap to the connecting rod.
2. Release and discard the connecting rod nuts and remove the big end cap. Ensure that the bearing shell remains in place in the cap.



1. **Big end cap**
2. **Connecting rod nuts**

Note

- **It may be necessary to gently tap the big end cap with a rubber mallet to release the cap from the bolts.**
3. Push the connecting rod up through the crankcase and collect the connecting rod from the top.
 4. Label the assembly to identify the cylinder from which it was removed.
 5. Remove and discard the connecting rod bolts.

CAUTION

Never reuse connecting rod bolts or nuts. If the connecting rod cap is disturbed, always renew the bolts and nuts. Using the original bolts and nuts may lead to severe engine damage.

Connecting Rods - Installation

Note

Note

- **Connecting rod bolts and nuts are treated with an anti-rust solution which must not be removed.**
- **Clean the connecting rod with high flash-point solvent.**
- **Remove all bearings and inspect for damage, wear and any signs of deterioration and replace as necessary.**

WARNING

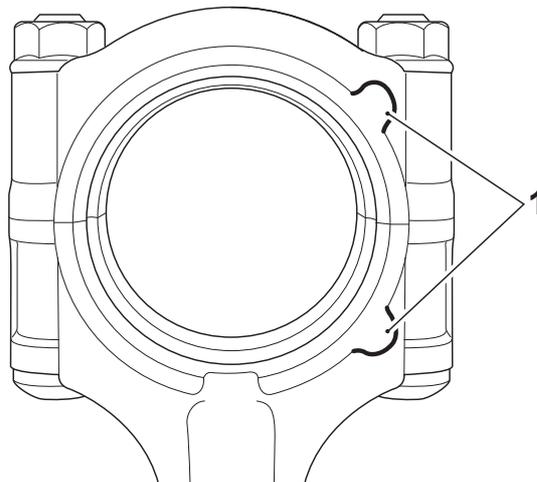
Connecting rod bolts and nuts **MUST** only be used once. If the bolts or nuts are removed or undone for any reason, new bolts and nuts **MUST** always be used.

Reusing bolts can cause connecting rods and their caps to detach from the crankshaft causing severe engine damage, loss of motorcycle control and an accident.

1. Fit new connecting rod bolts to the big end.

Note

- **Ensure the piston is fitted correctly to the connecting rod.**
 - **If a previously run engine is being rebuilt, always ensure that the piston and connecting rod are assembled in the same orientation as prior to strip-down.**
 - **Connecting rods may be fitted to the pistons either way around. However, ensure all three are fitted facing the same way in relation to the piston. To aid correct assembly, the connecting rods have assembly markers cast in to them, as shown overleaf.**
2. Fit the pistons to the connecting rods (see Piston Assembly), ensuring the assembly markers will all be assembled on the same side, when the piston arrows face the front of the engine.

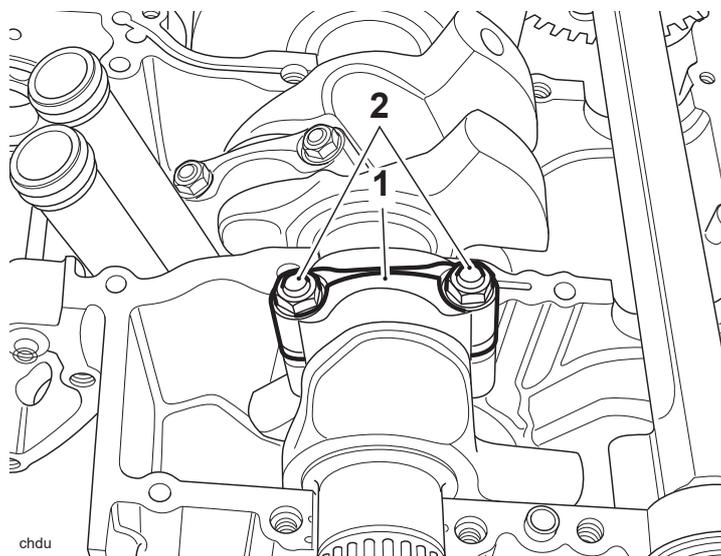


1. Assembly markers

WARNING

Avoid contact with the bearing surfaces of the bearing shells with engine components, tools, hands or fingers. Damage to the soft bearing surfaces may result, leading to reduced engine life or severe engine damage.

3. Select the correct big end bearing shells (see Connecting Rod Bearing Selection/ Crankshaft Journal Wear Check).
4. Fit the bearing shells as selected at step 3 to the connecting rod and big end cap and lubricate with a 50/50 solution of engine oil and molybdenum disulphide grease.
5. Align the connecting rod to the crankshaft and fit the big end cap. Ensure the assembly marker on the connecting rod and cap face the same direction.

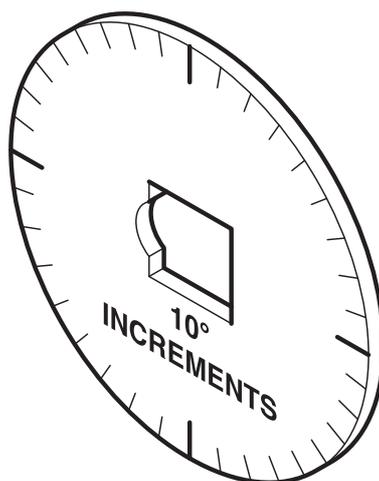


1. Big end
2. Connecting rod nuts

! CAUTION

The torque characteristics of the connecting rod nuts and bolts are sensitive to the rate at which they are tightened. If all the torque is applied in one action, the bolt may be stretched and the nut may become loose when in service resulting in an expensive engine failure.

6. Lubricate the threads of the bolt and the face of the nut with molybdenum disulphide grease. Tighten the nuts progressively in two stages as follows:
 - o Tighten to **14 Nm**.
 - o Tighten through 180° of nut rotation as measured using T3880105 - Torque Angle Gauge.



T3880105 - Torque Angle Gauge

Perform the following operations:

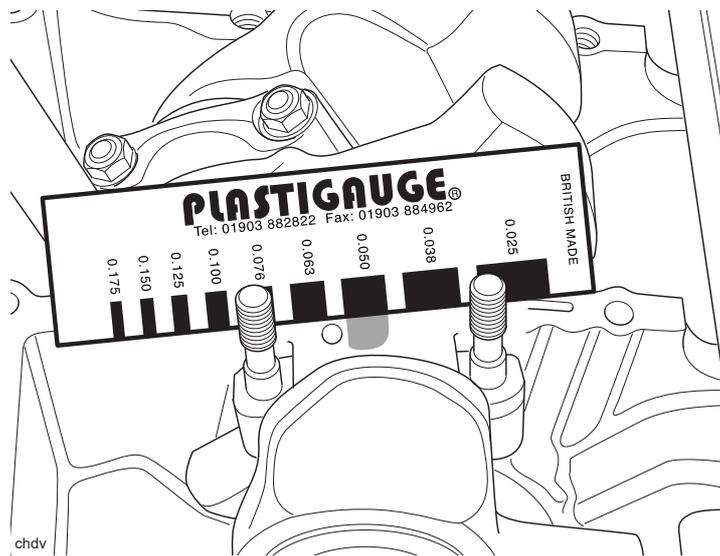
- Crankcases - Assembly
- Cylinder Liners - Installation
- Cylinder Head - Installation
- Engine - Installation

Connecting Rod Bearing Selection/ Crankshaft Journal Wear Check

1. Measure the bearing and crankshaft journal clearance as follows:

Note

- **Do not turn the connecting rod and crankshaft during the clearance measurement as this will damage the Plastigauge. The crankshaft journal clearances are measured using Plastigauge (Triumph part number 3880150-T0301).**
2. Remove the big end cap from the journal to be checked.
 3. Wipe the exposed areas of the crankshaft journal, and the bearing face inside the cap.
 4. Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the bearing.
 5. Trim a length of the Plastigauge to fit across the journal. Fit the strip to the journal using the grease to hold the Plastigauge in place.
 6. Lubricate the threads of the bolt and the face of the nut with molybdenum disulphide grease. Refit the bearing end cap and tighten the big end nuts (see Connecting Rods - Installation).
 7. Release the nuts and remove the cap being measured. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Checking the Measured Clearance

8. For specifications refer to Crankshaft.

Note

- **If the measured clearance exceeds the service limit, measure the crankshaft journal diameter.**
- **If any crankshaft journal has worn beyond the service limit, the crankshaft must be replaced. Due to the advanced techniques used during manufacture, the crankshaft cannot be reground and no oversize bearings are available.**

Connecting Rod Bearing Selection

Minor differences in connecting rod dimensions are compensated for by using selective bearings. For further information on bearing part number to colour cross-references, see the latest parts information.

1. Select the correct big end bearing shell as follows:
 - o Measure each crankshaft journal diameter
 - o Note the connecting rod marking.
2. Select the correct bearings by matching the information found with the chart below.

Connecting Rod Bearing Selection Chart (all dimensions in mm)				
Shell Colour	White	Red	Red	Blue
Connecting Rod Marking	5	5	4	4

Connecting Rod Bore Dia.	41.000 41.008	41.000 41.008	41.009 41.018	41.009 41.018
Crankshaft Journal Dia.	38.029 38.036	38.020 38.028	38.029 38.036	38.020 38.028
Running Clearance	0.030 0.053	0.030 0.054	0.031 0.055	0.031 0.056

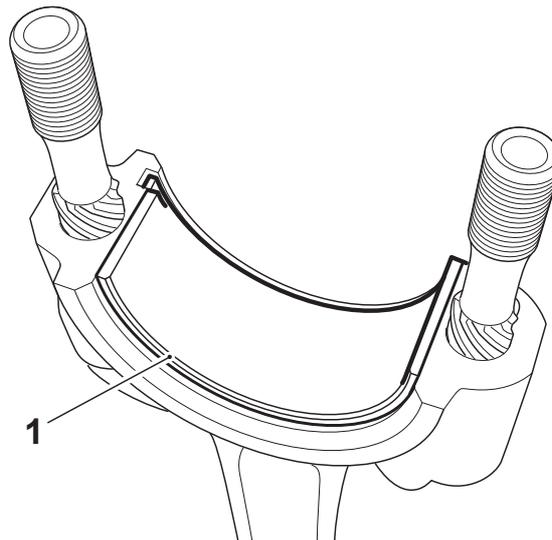
Connecting Rod Bearing Selection Example

Connecting Rod Mark	5
Connecting Rod Bore Diameter	41.008
Crankshaft Journal Diameter	38.020
Required Bearing	Red

Note

- Repeat the measurements for all connecting rods and their respective crankshaft journals.
- It is normal for the bearings selected to differ from one connecting rod to another.

3. Install the new bearings in the connecting rod.



1. Connecting rod bearing

CAUTION

Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance.

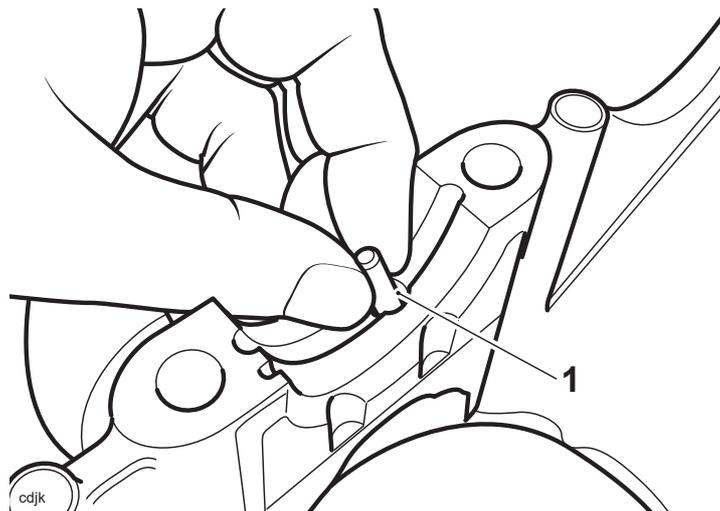
Crankshaft - Removal

Perform the following operations:

- Engine - Removal
 - Crankcases - Disassembly
 - Connecting Rods - Removal
 - Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Removal
1. Release and remove the crankshaft from the upper crankcase.

Note

- **Identify the location of each bearing shell.**
 - **Remove all bearings and inspect for damage, wear, overheating (blueing) and any other signs of deterioration. Replace the bearings as a set if necessary.**
2. Collect the piston cooling jets from the crankcase oil ways beneath the crankshaft bearings.



1. Piston cooling jet (one of three)

CAUTION

During crankcase assembly, ensure all three piston cooling jets are re-installed. If the jets are omitted, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

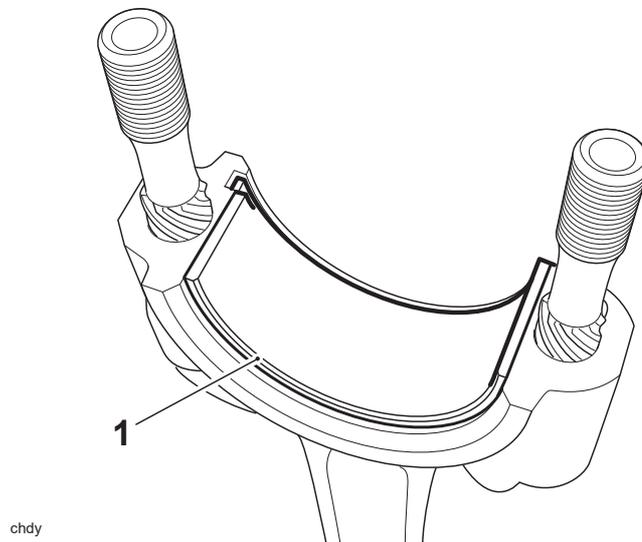
3. Remove the balancer (see Balancer - Removal).

Crankshaft - Installation

CAUTION

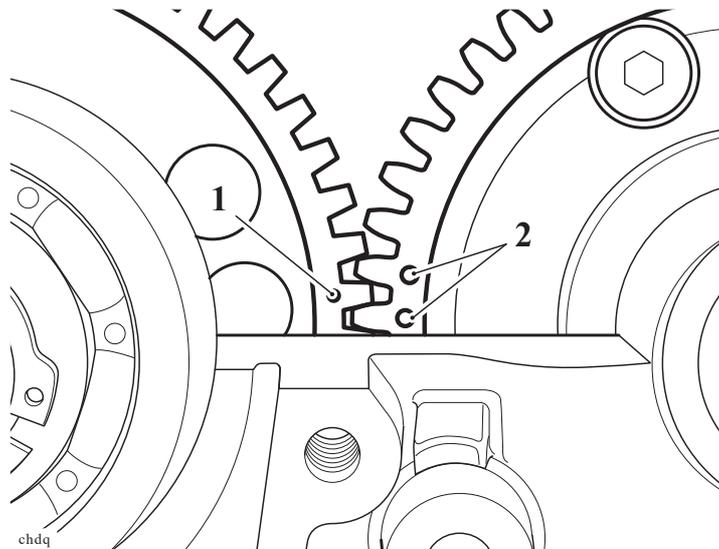
Always check the bearing journal clearance (see Crankshaft Main Bearing/Journal Wear), before final assembly of the crankshaft. Failure to correctly select crankshaft bearings will result in severe engine damage.

1. If removed, insert the three piston cooling jets into the main bearing housings in the upper crankcase.
2. Select and fit new main and big end shell bearings using the selection processes detailed in Connecting Rod Bearing Selection/ Crankshaft Journal Wear Check and Crankshaft Main Bearing/Journal Wear.



1. Big end bearing

3. Lubricate all bearings with clean engine oil.
4. Ensure that the crankshaft is clean, and that the oil ways within the crankshaft are clean and free from blockages and debris.
5. Refit the balancer (see Balancer - Installation).
6. Install the crankshaft ensuring that the crankshaft journals align with the big ends and that the crankshaft and balancer gear markings align as shown in the next illustration.



1. Balancer drive gear marking
2. Crankshaft markings

Perform the following operations:

- Connecting Rods - Installation
- Crankcases - Assembly
- Camshaft Drive Chain, Tensioner Blade and Rubbing Strip - Installation
- Engine - Installation

Crankshaft Main Bearing/Journal Wear

Minor differences in crankshaft dimensions are compensated for by using selective bearings. For further information on bearing part number to colour cross-references, refer to the EPC.

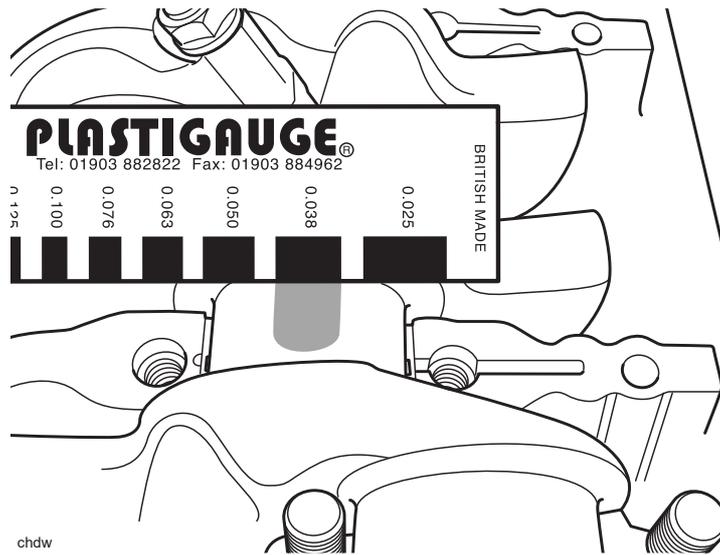
Note

- All four crankshaft main bearing/journal clearances must be measured at the same time.

1. Separate the crankcase halves (see Crankcases - Disassembly).
2. Wipe the exposed areas of the crankshaft journals, and the bearing faces inside the lower crankcase half.
3. Apply a thin smear of grease to each journal and a small quantity of silicone release agent to each bearing.
4. Trim a length of the Plastigauge to fit across each journal. Fit the strips to each journal using the grease to hold the Plastigauge in place.

Note

- **Do not turn the crankshaft during crankcase assembly and disassembly as this will cause damage to the Plastigauge.**
5. Assemble the crankcase halves and tighten the fixings as described in Crankcases - Assembly.
 6. Separate the crankcase halves (see Crankcases - Disassembly).
 7. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Checking Crankshaft Journal Clearance using Plastigauge

8. Record the clearance measurements for each crankshaft main bearing/journal.
9. For specifications refer to Crankshaft.

If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.

Note

- **If any journal has worn beyond the service limit, the crankshaft must be replaced. Due to the techniques used during manufacture, the crankshaft cannot be reground and no oversize bearings are available.**

Select bearings as follows:

1. Measure and record the diameter of each crankshaft main bearing journal.
2. Measure and record each main bearing bore diameter in the crankcase (bearings removed).

Main Bearing Selection Chart (all dimensions in mm)			
Shell Colour	Crankcase Bore	Journal Diameter	Running Clearance
Red	41.125 to 41.116	37.976 to 37.969	0.046 to 0.020
Blue	41.125 to 41.116	37.968 to 37.960	0.045 to 0.020
Blue	41.134 to 41.126	37.976 to 37.969	0.045 to 0.022
Green	41.134 to 41.126	37.968 to 37.960	0.046 to 0.022

Compare the data found with the chart above to select bearings individually by journal.

For example:

Crankshaft Journal diameter 37.962 mm

Crankcase Bore 41.125 mm

Bearing Required Blue

Note

- It is normal for the bearings selected to differ from one journal to another.
- It is also normal for there to be two options of bearing shell colour. In such cases, pick the shell size which gives the greater running clearance.

CAUTION

Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance.

Crankshaft End Float

For specifications refer to Crankshaft.

Note

- Crankshaft end float is controlled by the tolerances in crankshaft and crankcase machining. No thrust washers are used. If crankshaft end float is outside the specified limit, the crankshaft and/or the crankcases must be replaced.

Pistons - Disassembly

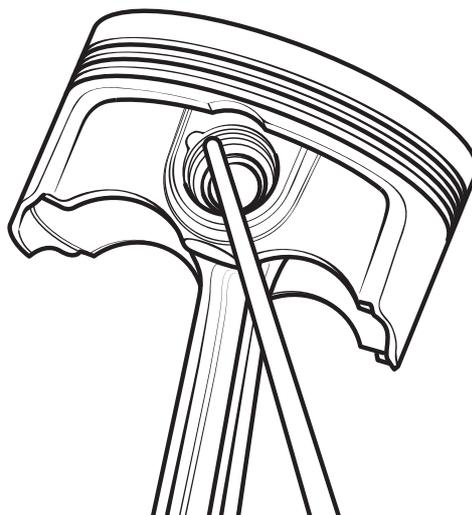
Perform the following operations:

- Cylinder Head - Removal
- Cylinder Liners - Removal

Note

- It is not necessary to remove the connecting rods from the crankshaft.

1. Remove the gudgeon pin circlip from one side of the piston.



cape

Removing the Gudgeon Pin Circlip

CAUTION

Never force the gudgeon pin through the piston. This may cause damage to the piston which may also damage the liner when assembled.

Note

- If the gudgeon pin is found to be tight in the piston, check the piston for a witness mark caused by the circlip. Carefully remove the mark to allow the pin to be removed.
2. Remove the gudgeon pin by pushing the pin through the piston and rod toward the side from which the circlip was removed.

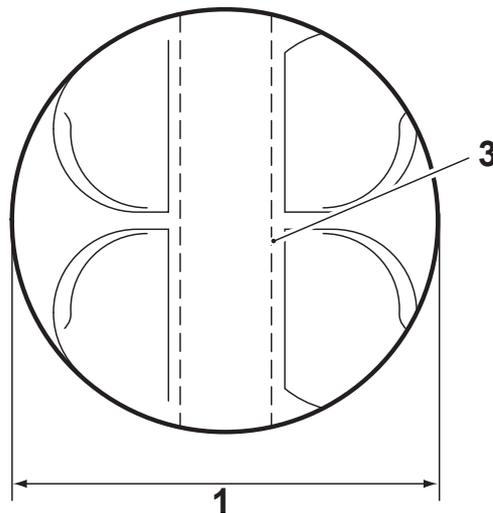
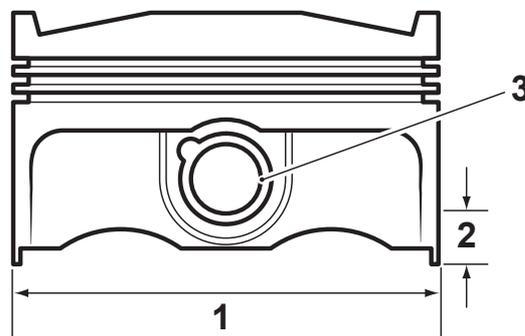
Note

- The rings may be removed using a proprietary piston ring expander tool or, if a tool is not available, carefully spread the ring opening using thumb pressure then push up on the opposite side of the ring to remove it from the piston.
3. Remove the piston rings.

Piston Wear Check

Note

- There are three grades of piston used during manufacture, these are grades A, AB and B. For spare parts use, only a grade AB piston will be supplied, which will fit all grades of cylinder liner.
 - The piston is slightly oval in shape, therefore it is important to measure the diameter in the centre of the piston thrust faces, and at 90° to the direction of the gudgeon pin.
1. Measure the piston outside diameter, 12.5 mm up from the bottom of the piston and at 90° to the direction of the gudgeon pin bore.



capf

1. Piston outside diameter
2. Measurement point
3. Gudgeon pin bore

2. Always refer to the specifications table (see Pistons).
3. Replace the piston if the measured diameter falls outside the specified limit.

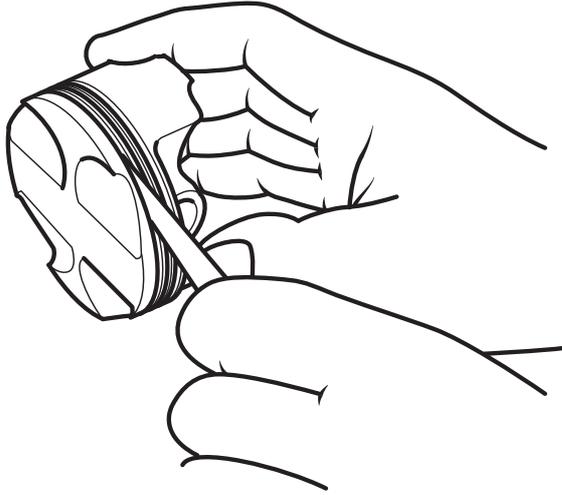
Piston Ring to Groove Clearance

Check the pistons for uneven groove wear by visually inspecting the ring grooves.

If all the rings do not fit parallel to the groove upper and lower surfaces, the piston must be replaced.

Clean the piston ring grooves.

Fit the piston rings to the pistons. Check, using feeler gauges, for the correct clearance between the ring grooves and the rings. Replace the piston and rings if outside the specified limit.



capg

Piston Ring to Ring Groove Clearance Check

When checking the piston ring to groove clearance, always refer to the specifications table (see Pistons).

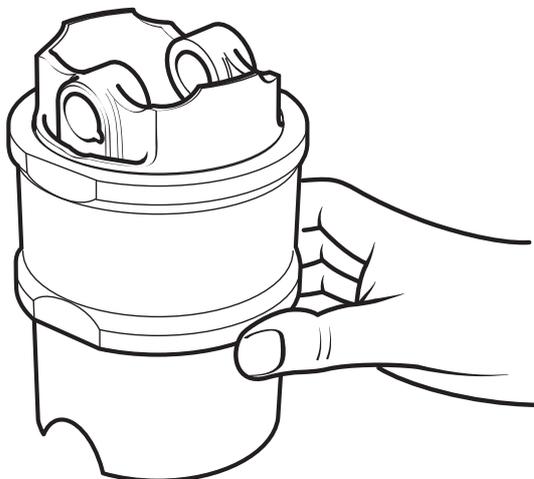
Note

- If the ring-to-groove clearance is too large, replace the piston rings with a new set.
- If the gap remains too large with new piston rings, the piston must also be replaced.
- If the gap is too small, check the piston ring grooves closely for distortion, replacing the piston as necessary. **DO NOT FILE THE RING GROOVES.**

Piston Ring Gap

Note

- **Before final assembly the piston ring gap, when fitted in the liner, must first be checked.**
1. Place the piston ring inside the liner.
 2. Push the ring into the top of the cylinder, using the piston to hold the ring square with the inside of the bore. Continue to push the ring into the bore until the third groove of the piston is level with the cylinder top, around the full circumference of the cylinder.



ccvj

Aligning Piston Rings using the Piston

3. Remove the piston and measure the gap between the ends of the piston ring using feeler gauges.
4. When checking the piston ring end gap, always refer to the specification table (see Pistons).

Note

- If the end gap is too large, replace the piston rings with a new set.
- If the gap remains too large with new piston rings, both the pistons and liners must be replaced.
- If the gap is too small, check the cylinder bore for distortion, replacing as necessary. **DO NOT FILE PISTON RINGS.**

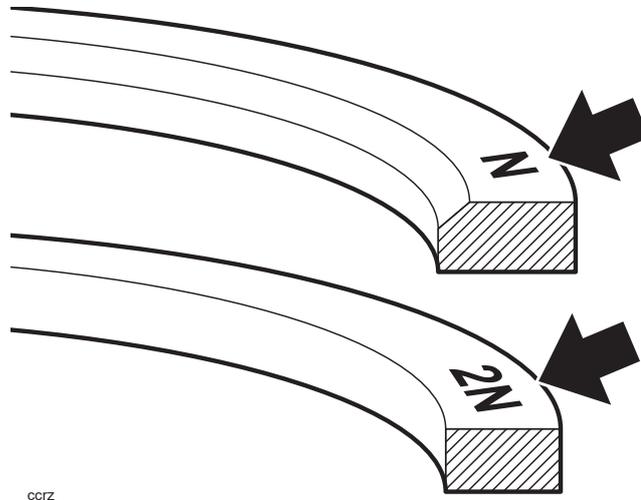
5. Repeat the procedure for the remaining piston rings.

Piston Assembly

1. Clean the piston ring grooves and fit the piston rings to the piston.

Note

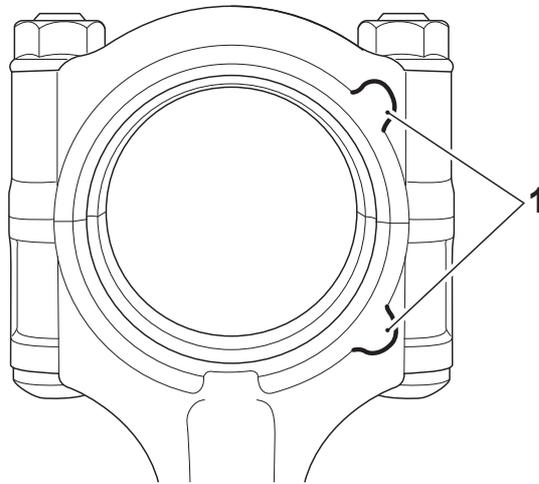
- The top ring upper surface is marked 'N' and can be identified by a chamfer on the inside edge.
- The second ring upper surface is marked '2N' but is plain on the inside edge and has a bronze appearance.
- The oil control rings can be fitted with either face upward.



Piston Ring Identification

Note

- Connecting rods may be fitted either way around. However, ensure all three are fitted the same way in relation to the piston.
2. Fit the piston to the connecting rod, ensuring the assembly markers in the cap and rod will all be assembled on the same side, when the piston arrows face the front of the engine.



chdx

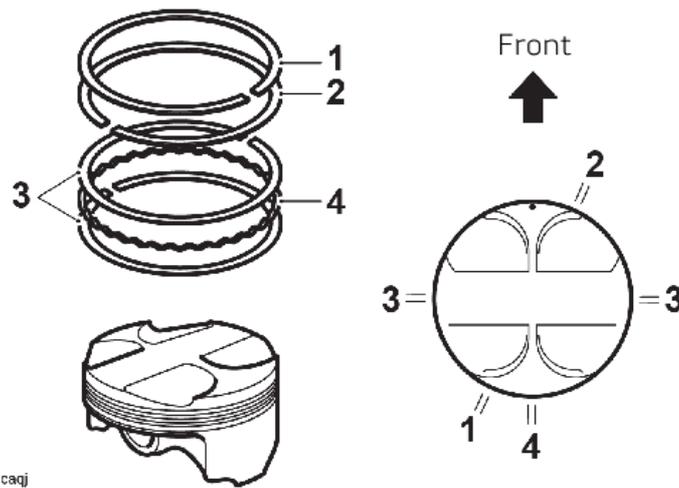
1. Assembly markers

3. Align the small end in the connecting rod with the gudgeon pin hole in the piston.
4. Lubricate the piston, small end and gudgeon pin with clean engine oil and fit the gudgeon pin.
5. Fit new circlips on both sides of the gudgeon pin ensuring the circlips are correctly fitted in the grooves.

WARNING

Failure to use new gudgeon pin circlips could allow the pin to detach from the piston. This could seize the engine and lead to an accident.

6. The piston ring gaps must be arranged as shown in the diagram below.



caqj

1. Top ring
2. Second ring
3. Steel oil control rings
4. Oil control ring expander

Note

- The top ring gap should be positioned in the 7 o'clock position, the second ring gap in the 1 o'clock position and the steel oil control ring gaps in the 9 and 3 o'clock positions (one in each position).

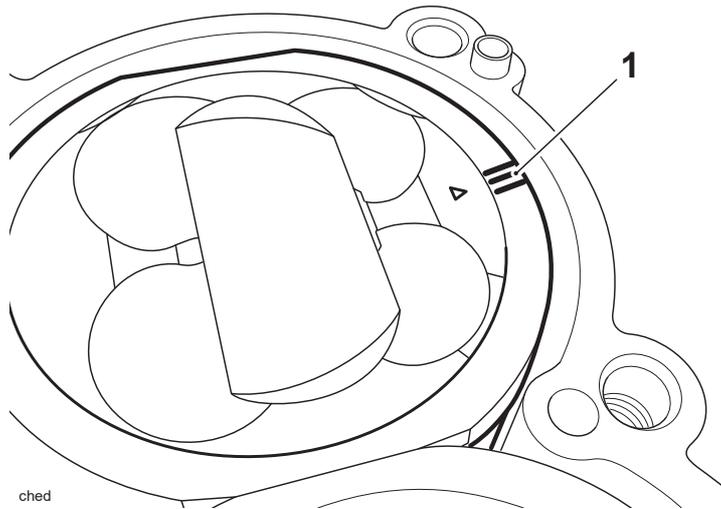
Perform the following operations:

- Cylinder Liners - Installation
- Cylinder Head - Installation

Cylinder Liners - Removal

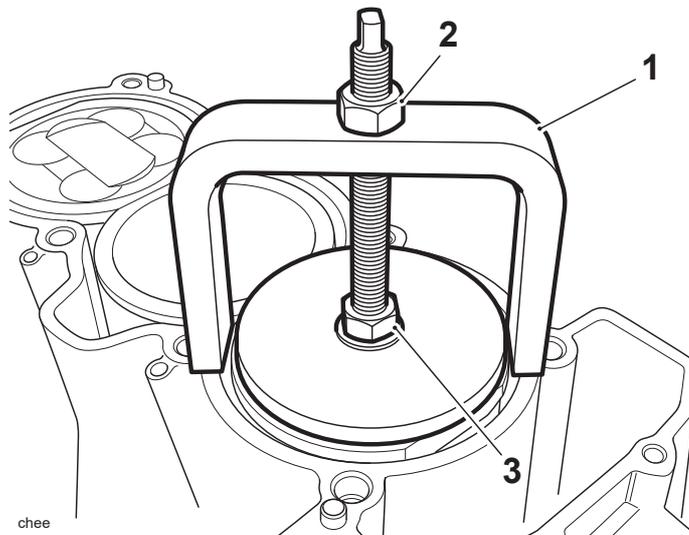
Perform the following operations:

- Cylinder Head - Removal
1. Mark each liner to identify correct orientation and the cylinder number from which it has been removed.



1. **Paint mark**

2. Turn the crankshaft until the piston in the liner to be removed is at the bottom of its stroke.



1. **T3880315 - Extractor, Cylinder Liner**
2. **Extraction nut**
3. **Locking nut**

3. Check that the locking nut on T3880315 - Extractor, Cylinder Liner is loose, then fully unscrew the extraction nut.
4. Carefully fit the tool fully into the cylinder bore, positioning the tool legs on the crankcase. Turn the locking nut clockwise until the rubber sleeve on the tool tightly grips the bore of the liner.
5. Check that the tool legs are positioned to allow withdrawal of the liner, then turn the extraction nut clockwise to extract the liner. Take care to ensure that the piston/connecting rod is not allowed to fall against the inside of the crankcase.
6. Turn the locking nut anticlockwise to release the liner.

Note

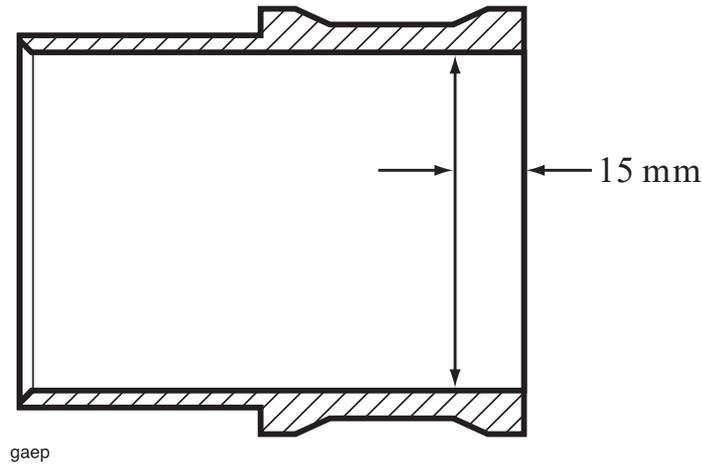
Note

- The tool must be used to release the seal between the liner and the crankcase.
- It is not intended that the tool is used to fully extract the liner. Once the seal is released, the tool must be removed and the liner extracted by hand.

Cylinder Liner Wear

Note

- There are two grades of liner used during manufacture, these are grades A and B. For spare parts use, only a grade A liner will be supplied, which will fit all grades of piston.
1. Measure the inside diameter of each cylinder liner, 15 mm from the top, using an internal micrometer or similar accurate measuring equipment.

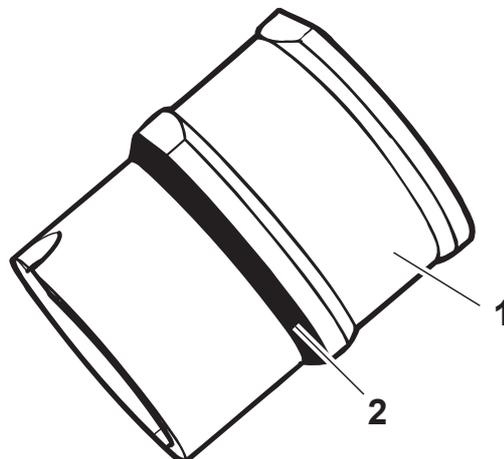


Test Positions for Bore Wear Check (bore shown in section)

2. When measuring the cylinder liner internal diameter, always refer to the specifications table (see Pistons).
3. If any reading is outside the specified limits, replace the liner and piston as an assembly.

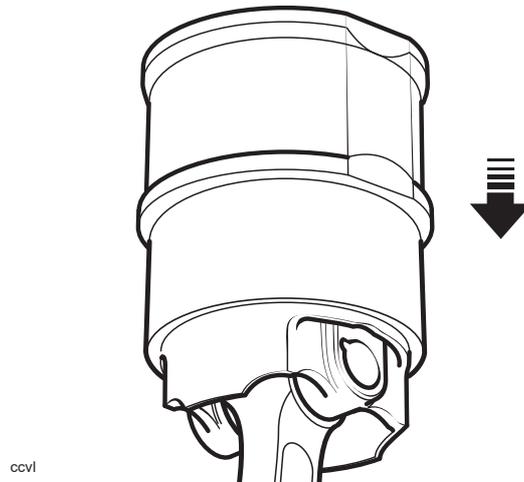
Cylinder Liners - Installation

1. Thoroughly clean the liner removing all traces of old silicone sealer.
2. Remove all traces of sealer from the crankcase bores.
3. Apply silicone sealer to the liner to crankcase mating face.



1. Liner
2. Sealer area

4. Fit each liner over the piston using a gentle rocking motion to allow compression of the piston rings.



Arrowed: Liner-Piston Fitment

Note

- The liners have a large chamfer at the bottom of the bore enabling fitting of the piston without need for a piston ring compressor.

! CAUTION

Fit each liner over whichever piston is at TDC. When turning the engine, do not allow the pistons to contact the inside of the crankcase and also do not allow fitted liners to lift off the crankcase base.

5. Continue fitting each liner in turn until all are fitted and sealed.

Note

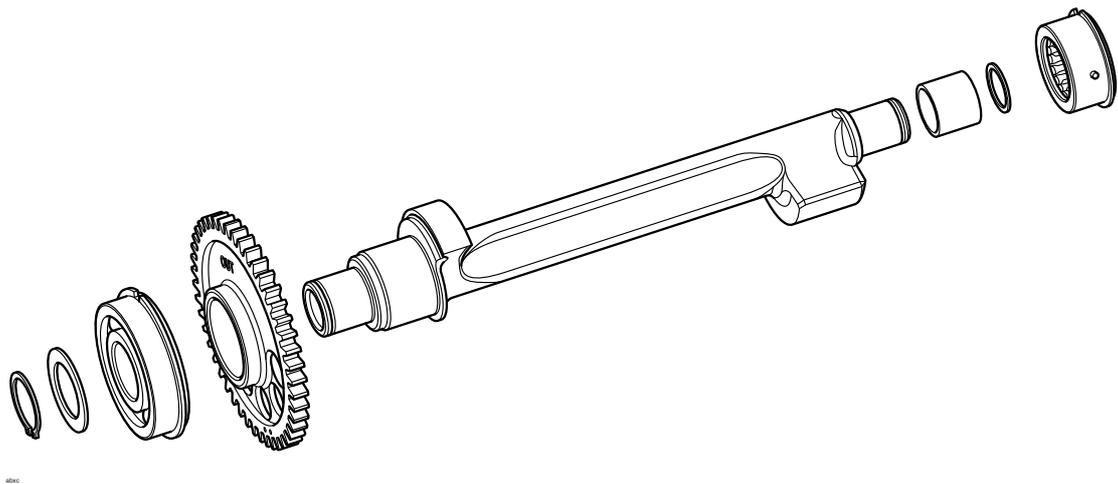
- When the liners have been fitted, they should not be disturbed. If it is necessary to remove the liner after fitting, the sealer must be reapplied.

Perform the following operations:

- Cylinder Head - Installation

Balancer

Exploded View – Balancer Shaft



Balancer

The balancer is fitted to control 'pulsing' within the engine. Without any form of balancer, the engine would 'pulse' each time the crankshaft rotated. This 'pulsing' would be felt as a vibration which would amplify as the engine speed was increased.

The balancer has the effect of a pair of counterbalance weights which create an equal amount of energy in the opposite direction, and at the same time as that produced by the crankshaft, pistons and connecting rods. Because the opposing pulses occur at the same point of crankshaft rotation, and are of an equal magnitude, a state of equilibrium or balance is reached.

Balancer - Removal

Perform the following operations:

- Crankcases - Disassembly
1. With the crankcase halves separated, lift out the balancer shaft complete with the shaft bearings/circlips.
 2. To remove the left hand bearing, slide the bearing, circlip and bearing sleeve from the balancer shaft.

3. To remove the right hand bearing, remove the circlip and slide the bearing race and thrust washer from the shaft.

Balancer - Inspection

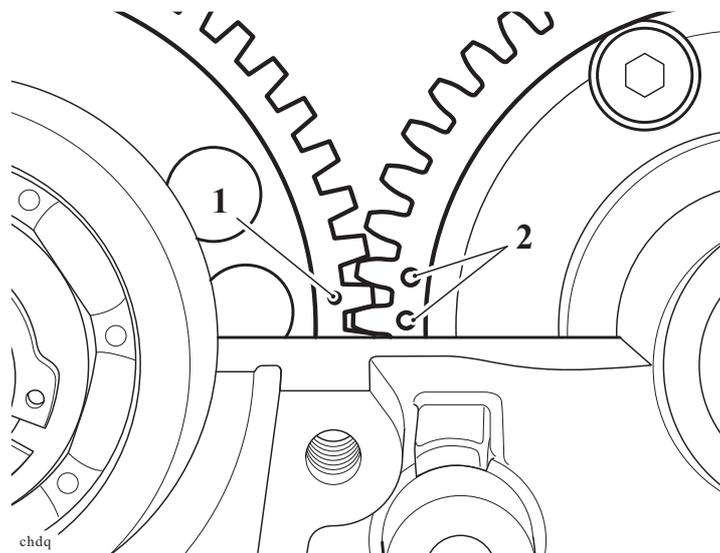
1. Inspect all gears for chipped or missing teeth.
2. Inspect all bearings for signs of overheating (blue discolouration), seized or damaged rollers, and any other damage.
3. Inspect the gear teeth for overheating (blue discolouration).

Note

- **Signs of blue discolouration on the gear centre are due to the manufacturing process and must be disregarded.**

Balancer - Installation

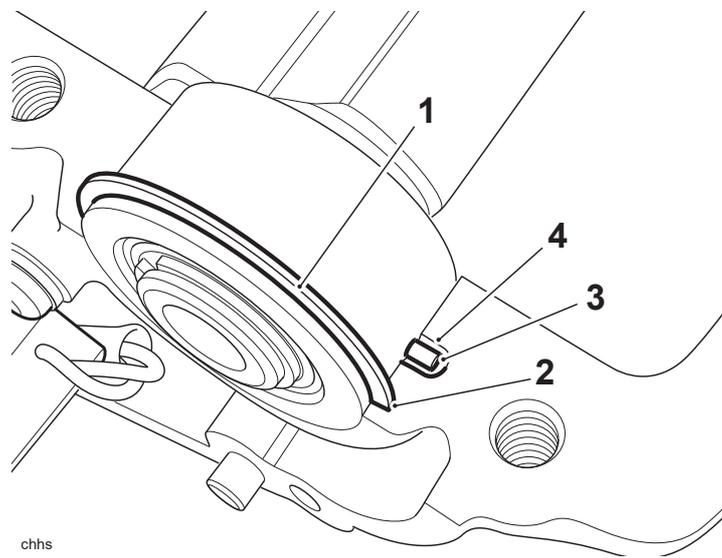
1. Lubricate and fit the right hand bearing and circlip to the shaft.
2. Lubricate and fit the left hand bearing and circlip.
3. Locate the balancer to the crankcase aligning the balancer gears and crankshaft as shown in the illustration below, while ensuring that the bearing circlips and pins locate correctly in their corresponding grooves in the crankcase.



1. Balancer drive gear markings
2. Crankshaft markings

CAUTION

If the balancer and crankshaft are not correctly aligned, severe engine vibration will occur leading to damage to components.



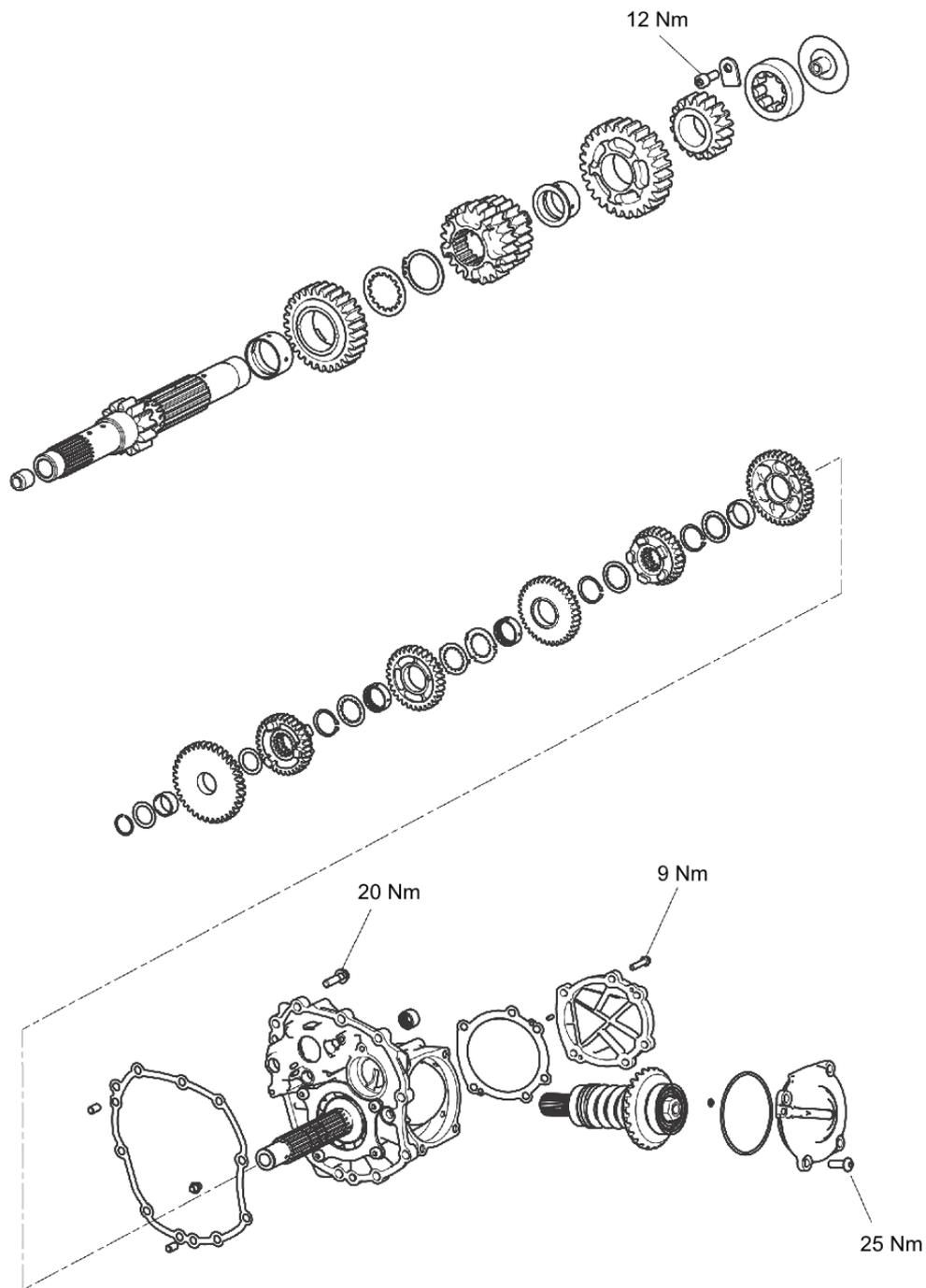
1. Circlip (left hand shown)
2. Crankcase circlip groove
3. Pin
4. Pin groove

4. Check that the balancer and crankshaft are correctly aligned before continuing.
Perform the following operations:

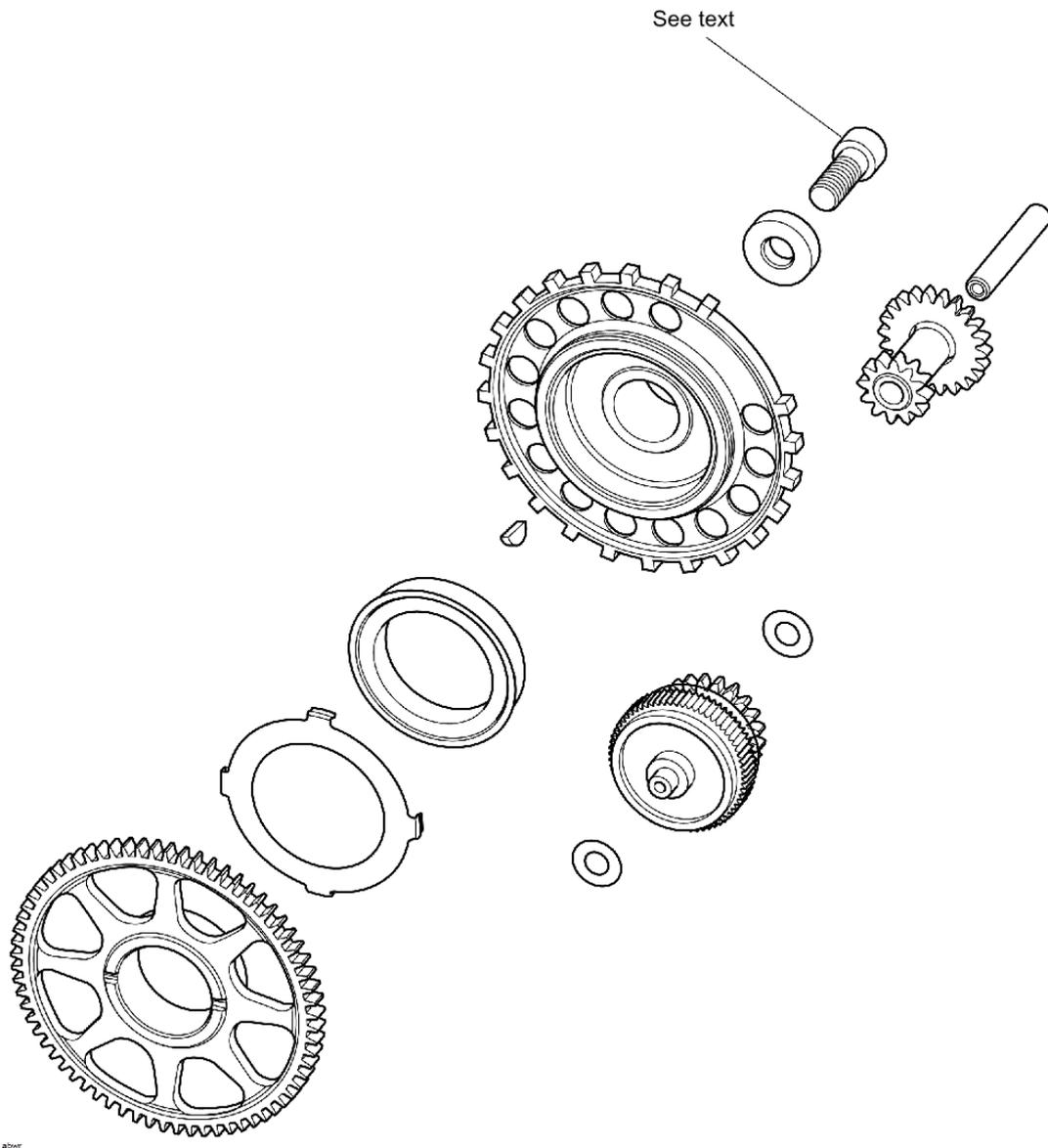
- Crankcases - Assembly

Transmission

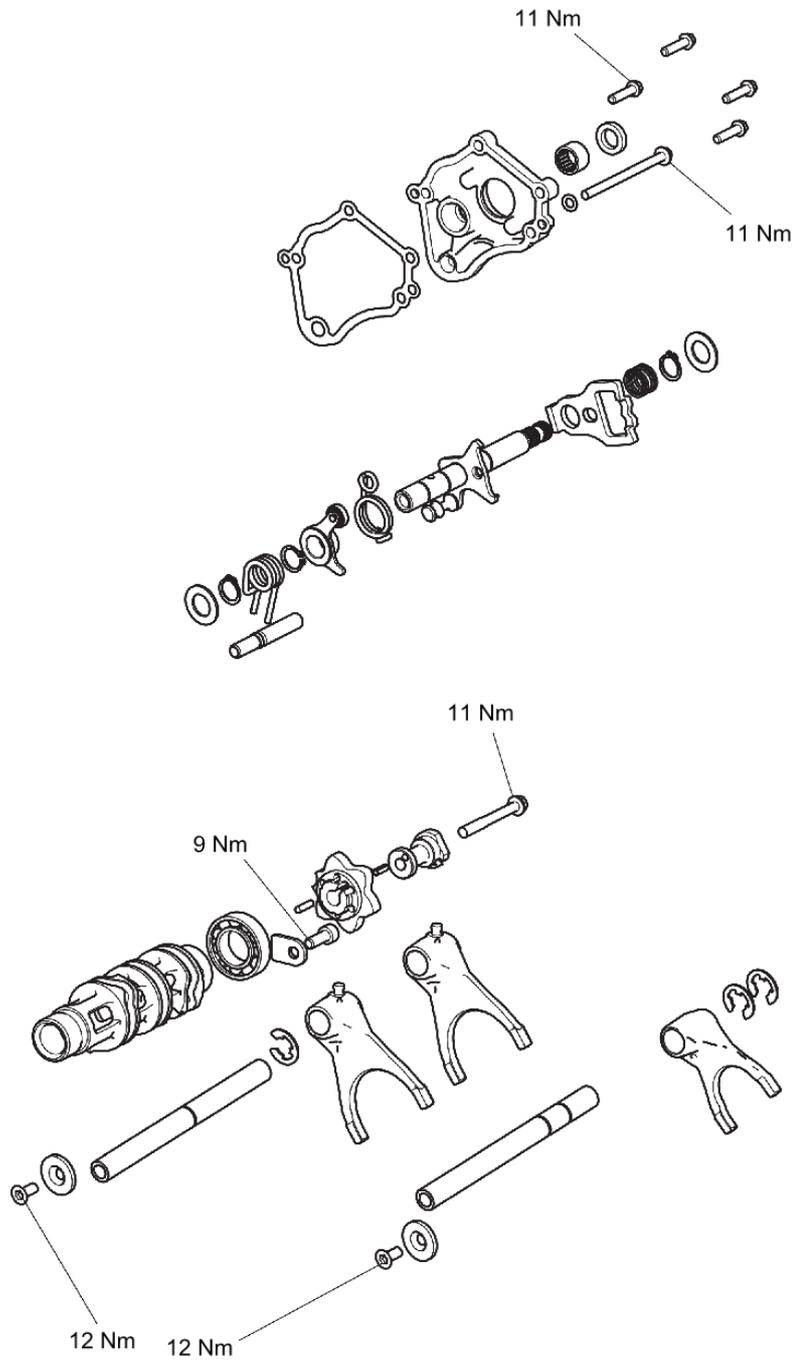
Exploded View – Input and Output Shafts



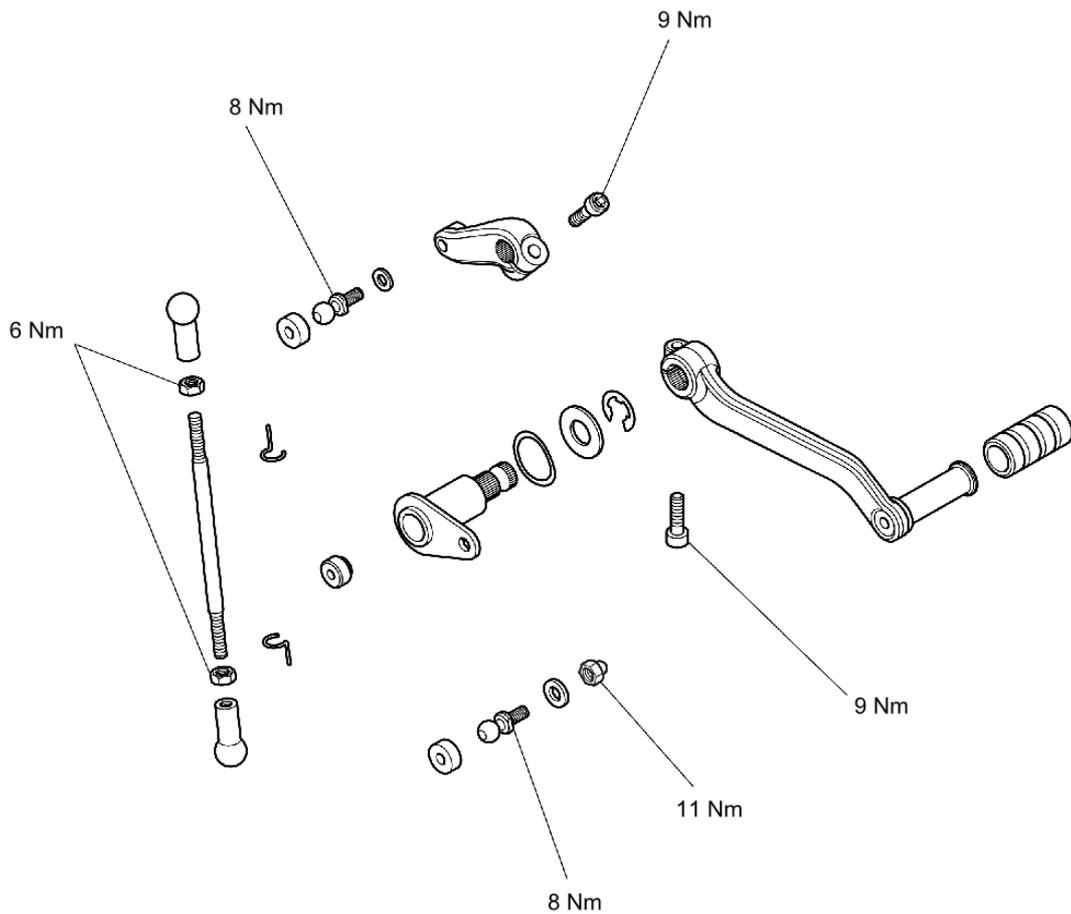
Exploded View – Flywheel, Sprag Clutch and Starter Gears



Exploded View – Gear Selectors and Drum



Exploded View – Gear Change Mechanism



Description

The transmission is of a cassette type design, which allows removal of the complete transmission as an assembly with the front bevel box, without separating the crankcase halves. Removal of the input shaft can be achieved after first removing the output shaft first gear and its bearing. The output shaft is an integral part of the front bevel box assembly and cannot be removed.

The front bevel box assembly contains no user serviceable parts, and must be replaced if any wear or damage are found. It is permitted however to replace the damper shaft oil seal and the bevel box casing O-rings and gaskets.

The gear selector shaft can be removed and installed without removal of the transmission, after first removing the selector cover and gear position sensor.

Gear Change Linkage - Removal



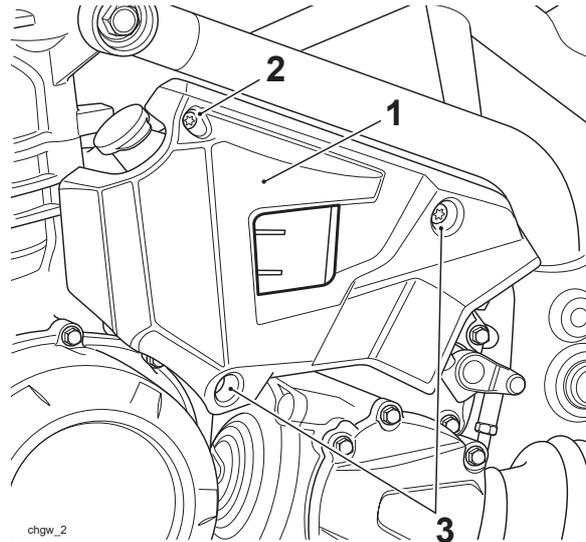
WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Models Fitted with Conventional Gear Change Linkage

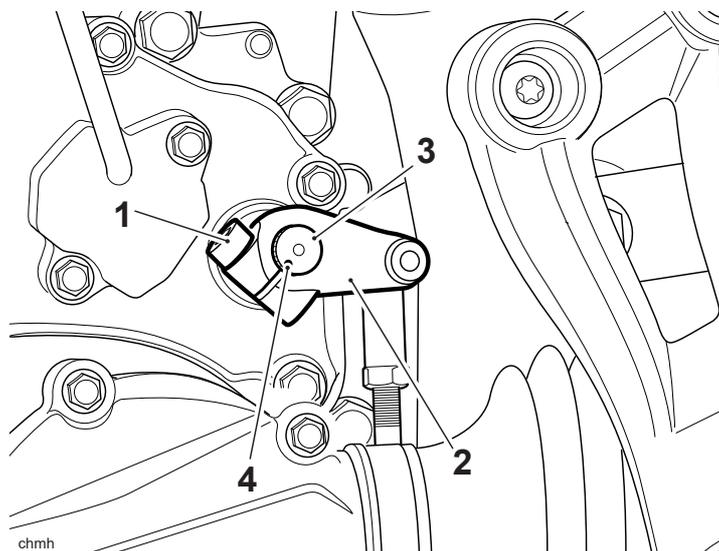
1. Remove the three fixings and remove the expansion tank cover. Discard the upper M5 fixing. Retain the lower M6 fixings for reuse.



1. **Expansion tank cover**
2. **Upper fixings (M5)**
3. **Lower fixings (M6)**

Note

- **Note the position of the pivot arm in relation to the punch mark on the gear change mechanism.**
2. Select neutral, remove the pinch bolt and disconnect the gear change mechanism pivot arm.

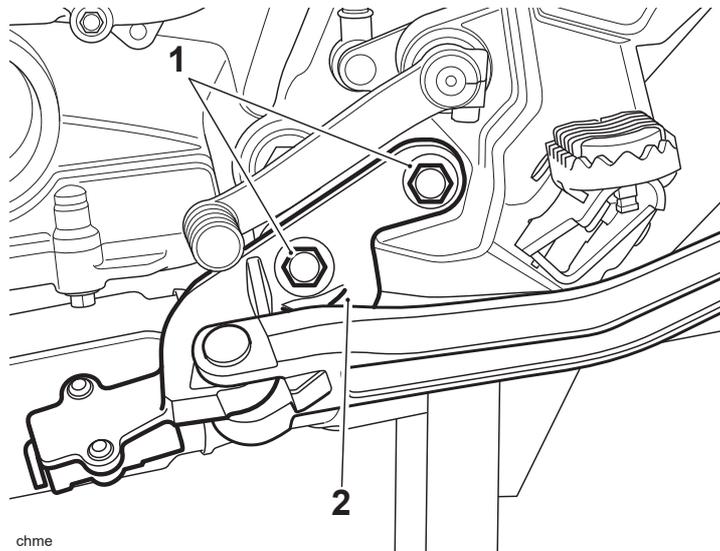


1. **Pinch bolt**
2. **Pivot arm**
3. **Gear change mechanism**
4. **Punch mark**

Note

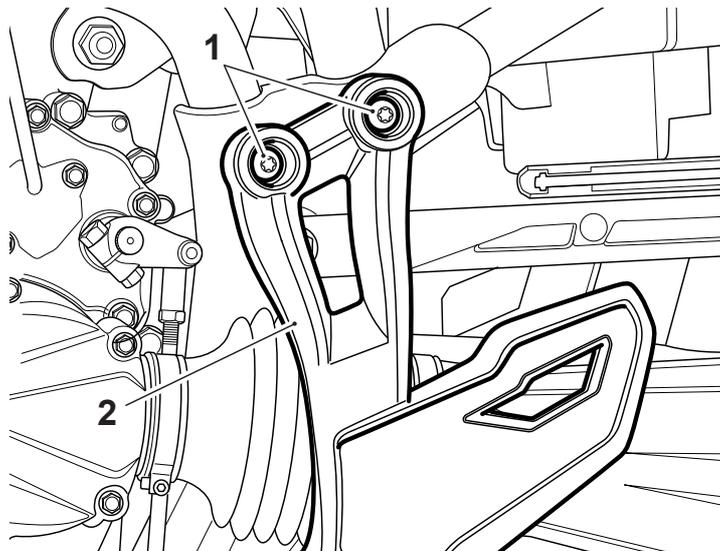
- Do not allow the side stand to hang on the harness for the side stand switch.
- Note the routing of the harness for the side stand switch for installation.

3. Release the fixings, detach the side stand and position aside.



1. Fixings
2. Side stand

4. Release the fixings and remove the left hand control plate and gear change linkage assembly.



1. Fixings
2. Control plate

Models Fitted with a Shift Force Sensor

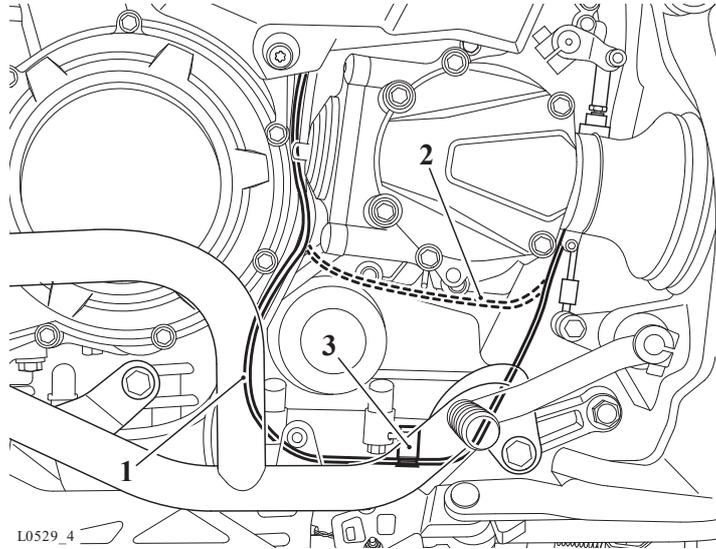
Perform the following operations:

Note

- The expansion tank must be detached to allow access to the shift force sensor electrical connector. It is not necessary to drain the expansion tank or disconnect the hoses.
- Rider's Seat - Removal
- Battery - Removal
- Expansion Tank - Removal

Note

- The shift force sensor is available with two different wiring harness lengths. The routing of the shift force sensor wiring harness differs depending on which length of harness is fitted.
- Refer to the illustration below for the two routing conditions.

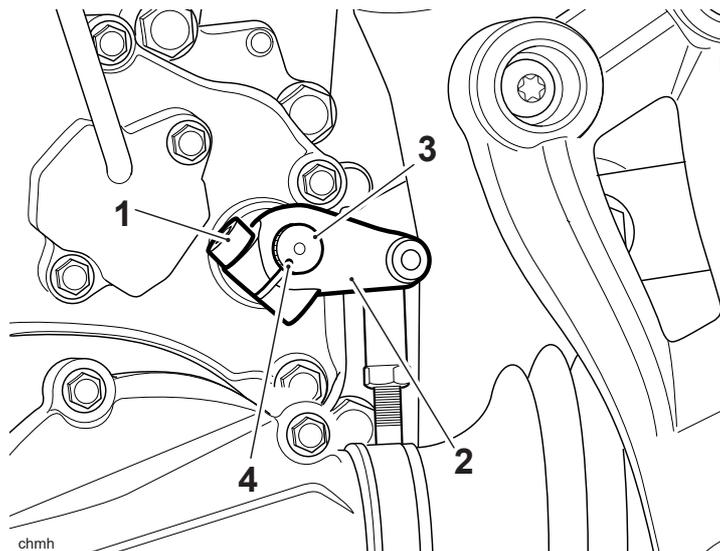


1. Long harness routing
2. Short harness routing
3. Clip

1. Noting the harness routing, disconnect the shift force sensor electrical connector from the main harness and feed it down to the gear change linkage. If necessary, detach the harness from the clip on the sump.

Note

- Note the position of the pivot arm in relation to the punch mark on the gear change mechanism.
2. Select neutral, remove the pinch bolt and disconnect the gear change mechanism pivot arm.

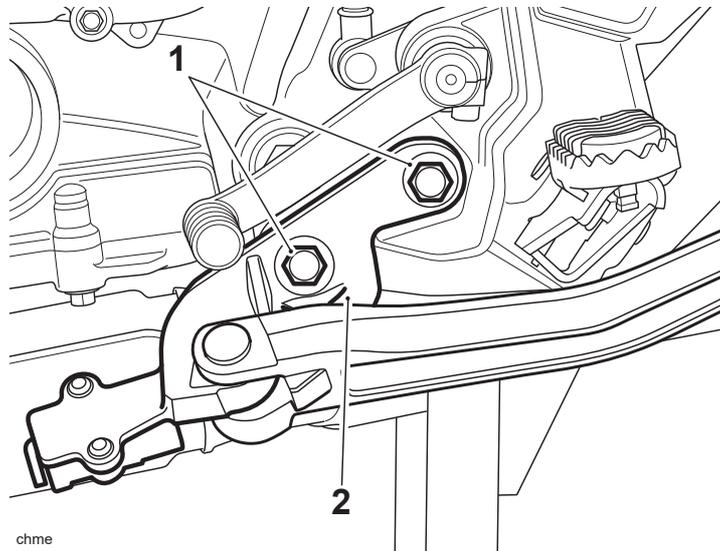


1. Pinch bolt
2. Pivot arm
3. Gear change mechanism
4. Punch mark

Note

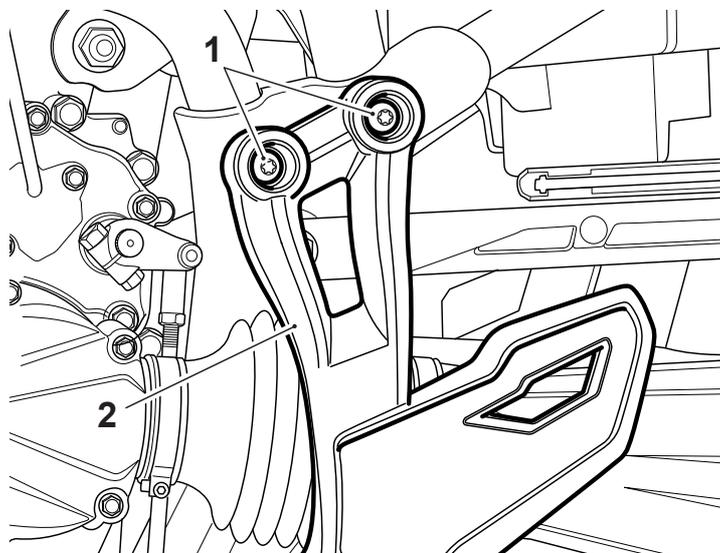
- Do not allow the side stand to hang on the harness for the side stand switch.
- Note the routing of the harness for the side stand switch for installation.

3. Release the fixings, detach the side stand and position aside.



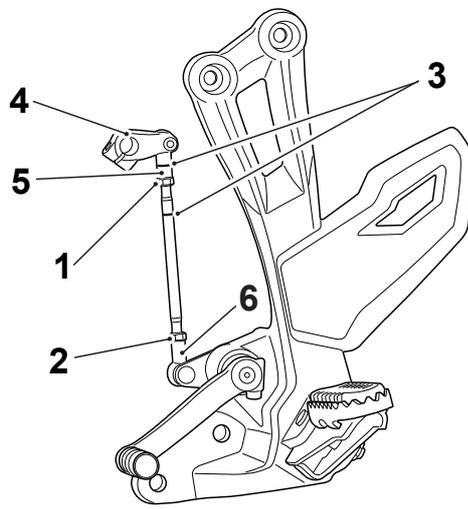
- 1. Fixings
- 2. Side stand

4. Release the fixings and remove the left hand control plate and gear change linkage assembly.



- 1. Fixings
- 2. Control plate

Gear Change Linkage - Disassembly



1. Lock nut - left hand thread
2. Lock nut - right hand thread)
3. Machined Rings
4. Gear change mechanism pivot arm
5. Upper ball joint
6. Lower ball joint

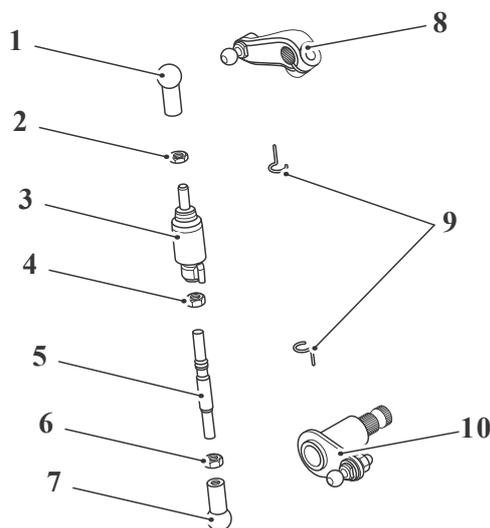
1. Remove the retaining clips and detach the ball joints from the pivots for the gear change pedal and gear change mechanism.

Note

- The upper ball joint and lock nut on the gear change linkage has a left hand thread. This is identified by a machined ring on the linkage and on the ball joint.

2. Loosen the gear change rod lock nuts.
3. Remove the ball joints from the gear change rod.
4. If required, remove the lock nuts from the gear change rod.

Gear Change Linkage - Disassembly (models fitted with a shift force sensor)



1. Upper ball joint
2. Thin lock nut
3. Shift force sensor
4. Lock nut - left hand thread
5. Gear change rod

6. Lock nut - right hand thread
7. Lower ball joint
8. Gear change mechanism pivot arm
9. Retaining clips
10. Gear change pedal pivot arm

Note

- The shift forcesensor harness may be attached to the gear change rod by either a cable tie or a rubber band.
 - Note the position of the cable tie or rubber band for installation.
1. If fitted, remove the cable tie securing the shift force sensor harness to the gear change rod.
 2. Remove the retaining clips and detach the ball joints from the pivots for the gear change pedal and gear change mechanism.

Note

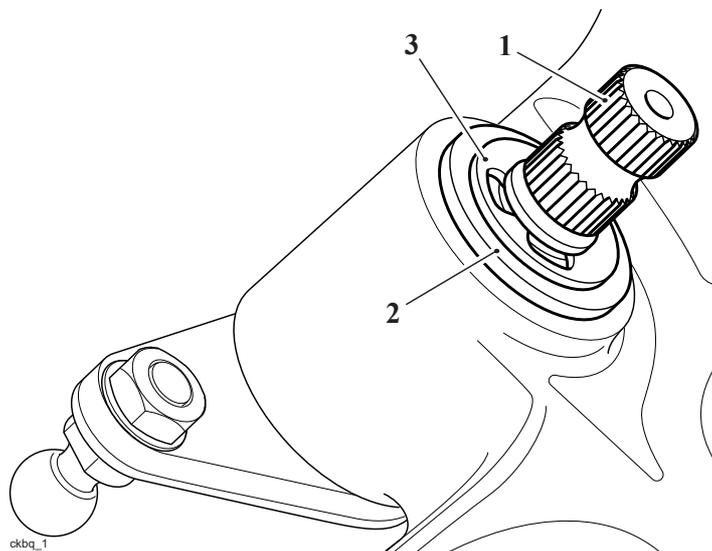
- The upper gear change rod lock nut has a left hand thread.
3. Holding the shift force sensor, loosen the three lock nuts.
 4. Remove the ball joints and gear change rod from the shift force sensor.
 5. If the shift force sensor harness is fitted with a rubber band, detach the gear change rod from the rubber band leaving the band in place on the sensor harness.
 6. If required, remove the lock nuts from the gear change rod.

Gear Change Pedal - Cleaning and Inspection

1. Remove the pinch bolt and remove the gear pedal from the gear change pivot arm shaft.

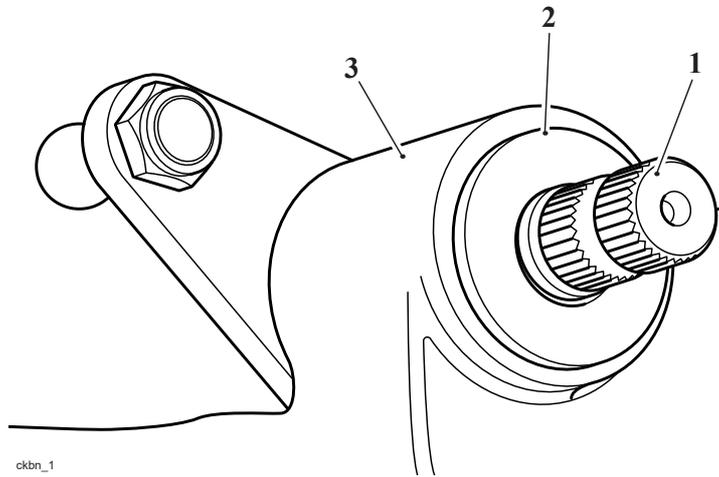
Note

- The gear change bushes are made of a metal backed, composite bearing material needing no additional lubrication.
 - The bearings, shaft and washers are assembled dry (without lubrication) at the factory and must not be lubricated during service or repair.
2. Remove the circlip.



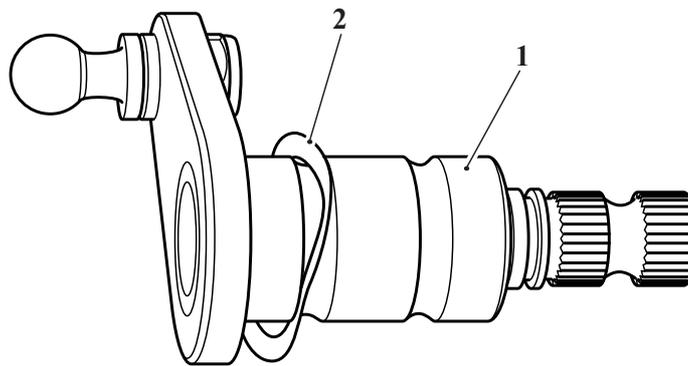
1. Gear change pivot arm shaft
2. Circlip
3. Flat washer

3. Remove the flat washer.



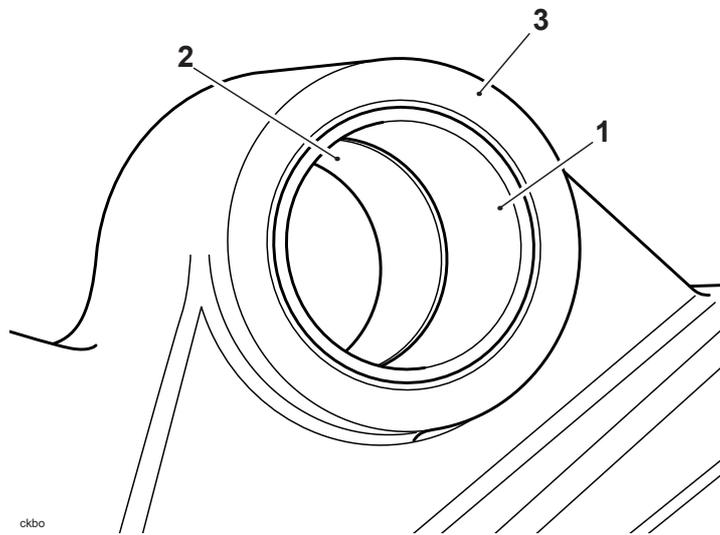
1. Gear change pivot arm shaft
2. Flat washer
3. Housing

4. Remove the gear change pivot arm from the housing and remove the wavy washer.



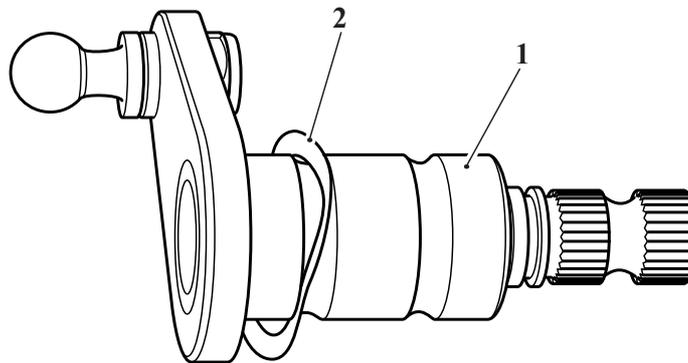
1. Gear change pivot arm
2. Wavy washer

5. Using Castrol Metal Parts Cleaner or an equivalent, thoroughly clean the gear change bushes, shaft and washers and dry using a lint free cloth.



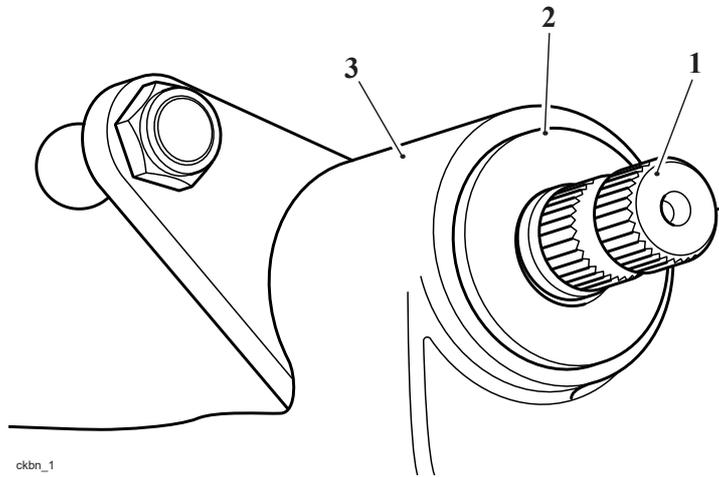
1. Outer bush
2. Inner bush
3. Housing

6. Inspect all parts for wear and replace as necessary.
7. Refit the wavy washer.



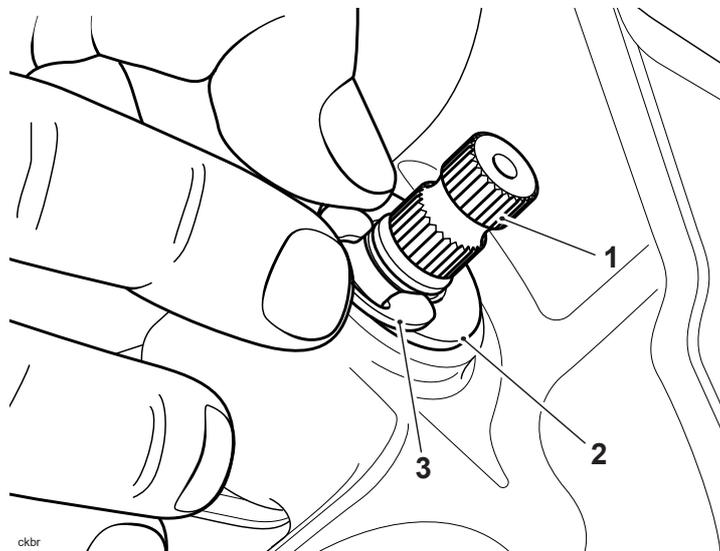
1. Gear change pivot arm
2. Wavy washer

8. Fit the gear change pivot arm shaft into the housing and refit the flat washer as noted during removal.



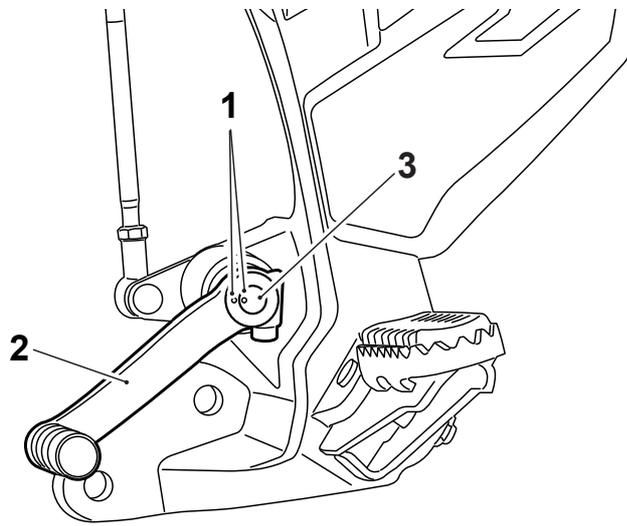
1. Gear change pivot arm shaft
2. Flat washer
3. Housing

9. Compress the components until the circlip groove is visible and then fit the circlip.



1. Gear change pivot arm shaft
2. Flat washer
3. Circlip

10. Refit the gear change pedal ensuring the punch mark on the pedal is aligned with the punch mark on the gear change pivot arm shaft. Fit the pinch bolt and tighten to **9 Nm**.



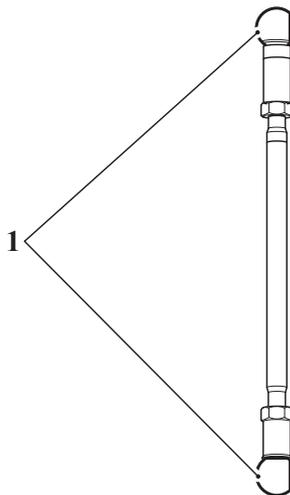
1. Punch marks
2. Gear change pedal
3. Gear change pivot arm shaft

Gear Change Linkage - Assembly

Note

- The upper ball joint and lock nut on the gear change linkage has a left hand thread. This is identified by a machined ring on the linkage and on the ball joint.

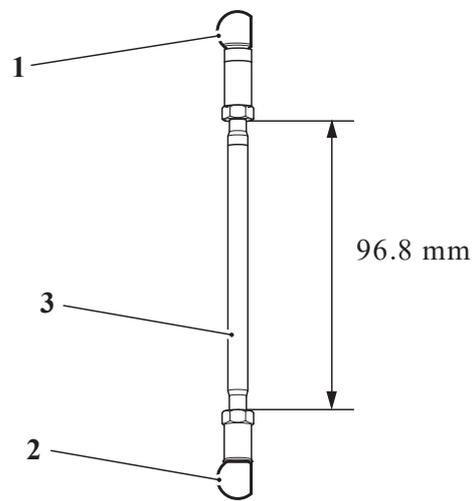
1. If removed, fit the lock nuts to the gear change linkage.
2. Screw the right hand threaded end of the gear change linkage into the lower ball joint by three complete turns.
3. Screw the upper ball joint onto the left hand threaded end by three complete turns.
4. If necessary, turn the lower ball joint to align it with the upper ball joint.



L0543_3

1. Upper and lower ball joints aligned

5. While holding the ball joints stationary, turn the gear change rod to adjust the distance between the two ball joints to 96.8 mm.



L0543_2

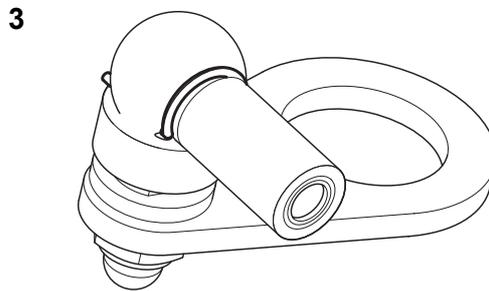
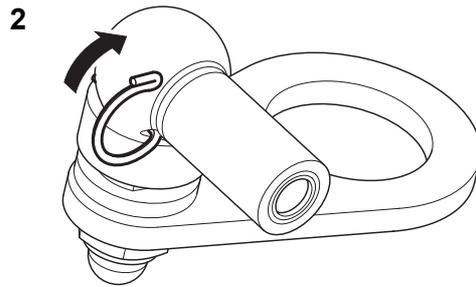
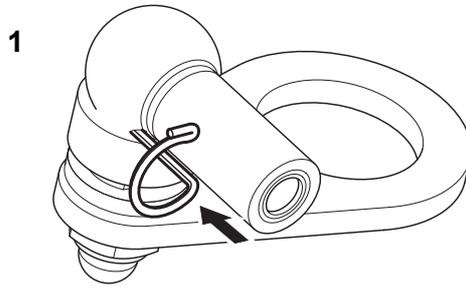
1. **Upper ball joint**
2. **Lower ball joint**
3. **Gear change rod**

6. Tighten the gear change rod lock nuts against the ball joints to **6 Nm**.

 **WARNING**

When fitting the ball joints to the ball studs, ensure that the ball joint retaining clips are correctly fitted and that the ball joint is securely retained.

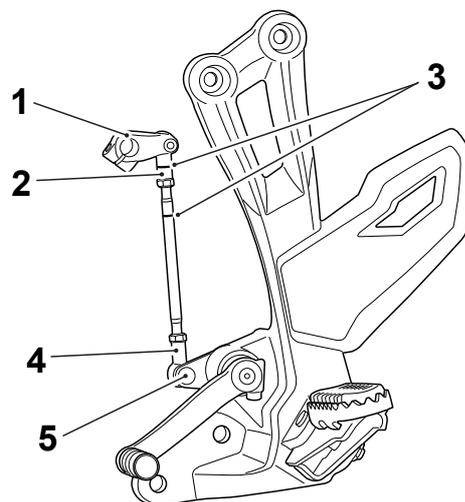
A poorly fitted ball joint may cause the gear change linkage to detach, leading to loss of motorcycle control and an accident.



L0545

Ball joint retaining clip installation

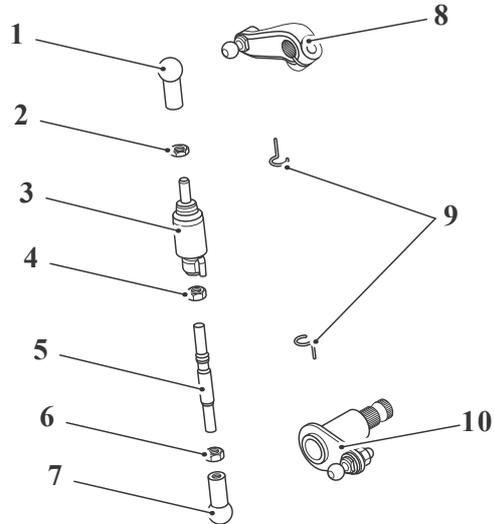
7. Fit the gear change mechanism pivot arm to the upper ball joint and secure with the retaining clip.
8. Fit the lower ball joint to the gear change pedal pivot arm on the left hand control plate assembly. Secure with the retaining clip.



1. Gear change mechanism pivot arm
2. Upper ball joint
3. Machined rings
4. Lower ball joint

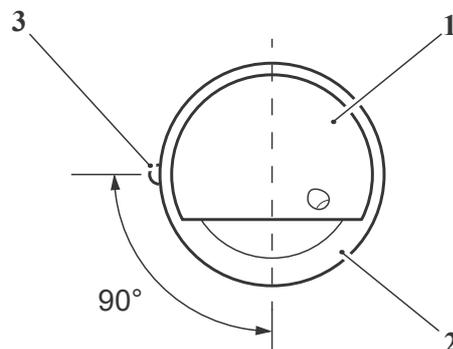
5. Gear change pedal pivot arm

Gear Change Linkage - Assembly (models fitted with a shift force sensor)



1. Upper ball joint
2. Thin lock nut
3. Shift force sensor
4. Lock nut - left hand thread
5. Gear change rod
6. Lock nut - right hand thread
7. Lower ball joint
8. Gear change mechanism pivot arm
9. Clips
10. Gear change pedal pivot arm

1. Screw the thin lock nut and upper ball joint fully onto the upper end of the shift force sensor.
2. Loosen the ball joint until it is positioned at 90° to the shift force sensor harness outlet, as shown below.

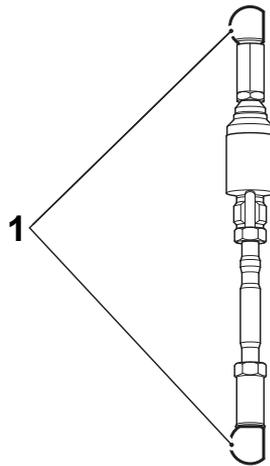


1. Upper ball joint
2. Shift force sensor
3. Harness outlet

3. Tighten the lock nut against the ball joint to **6 Nm**.

Note

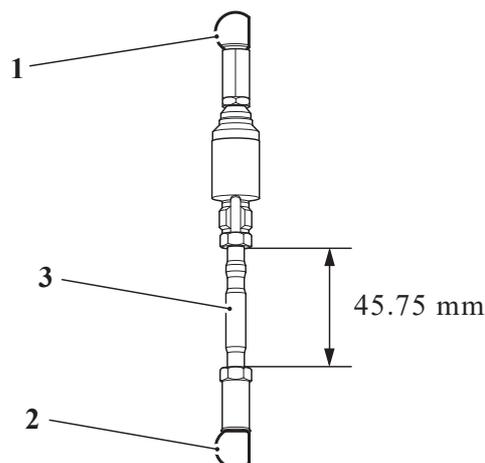
- The shift force sensor harness may be attached to the gear change rod by either a cable tie or a rubber band.
4. If fitted, attach the shift force sensor harness rubber band to the gear change rod and position as noted during removal.
 5. If removed, fit the lock nuts to the gear change rod.
 6. Screw the left hand threaded end of the gear change rod into the shift force sensor and upper ball joint assembly by three complete turns.
 7. Screw the lower ball joint onto the right hand threaded end of the gear change rod by three complete turns.
 8. Turn the lower ball joint to align it with the upper ball joint.



L0543

1. Upper and lower ball joints aligned

9. While holding the ball joints and shift force sensor stationary, turn the gear change rod to adjust its length to 45.75 mm as shown below.



L0543_1

1. Upper ball joint
2. Gear change rod
3. Lower ball joint

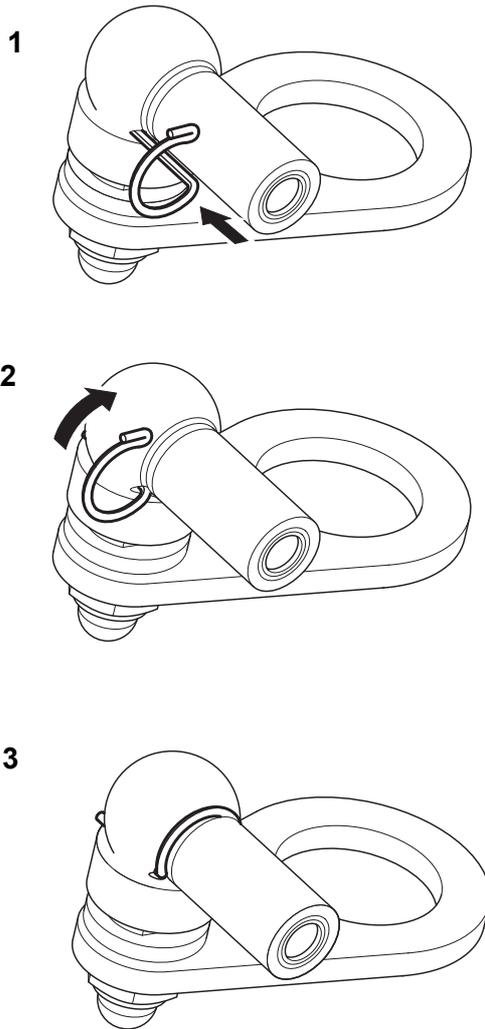
10. Tighten the gear change rod lock nuts to **6 Nm**.
11. If required, secure the shift force sensor harness to the gear change rod with a new cable tie.

 **WARNING**

WARNING

When fitting the ball joints to the ball studs, ensure that the ball joint retaining clips are correctly fitted and that the ball joint is securely retained.

A poorly fitted ball joint may cause the gear change linkage to detach, leading to loss of motorcycle control and an accident.



L0545

Ball joint retaining clip installation

12. Fit the gear change mechanism pivot arm to the upper ball joint and secure with the retaining clip.
13. Fit the lower ball joint to the gear change pedal pivot arm on the left hand control plate assembly. Secure with the retaining clip.

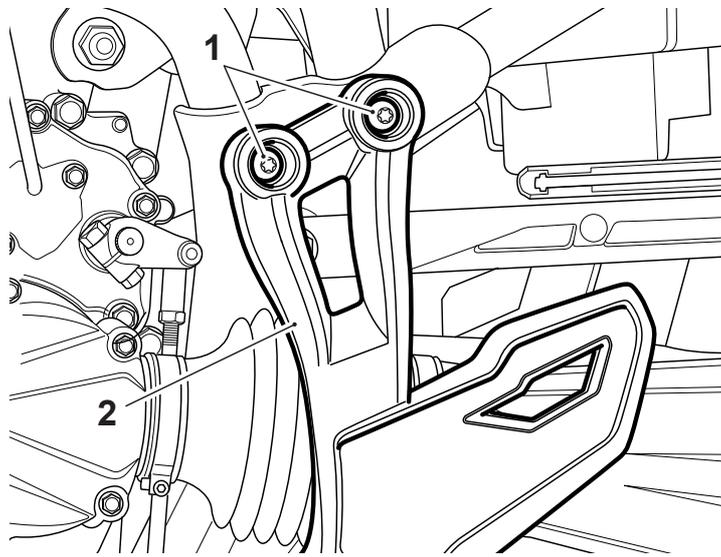
Gear Change Linkage - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

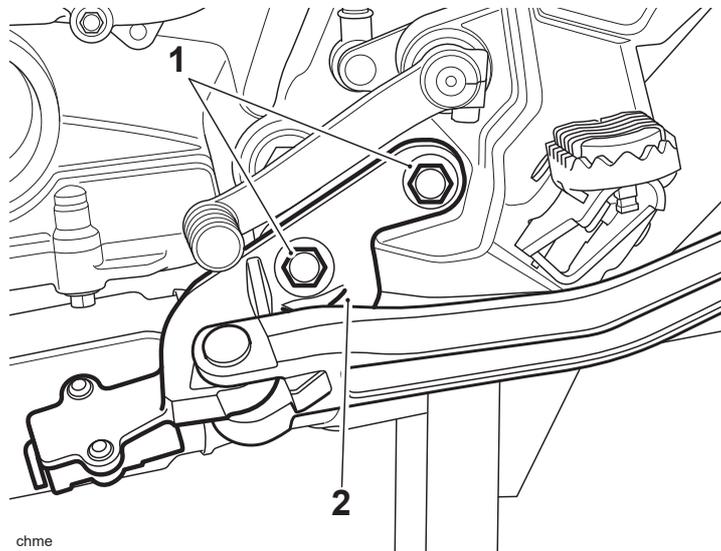
Models Fitted with Conventional Gear Change Linkage

1. Align the left hand control plate and gear change linkage assembly to the frame and fit the two upper fixings. Do not fully tighten at this stage.



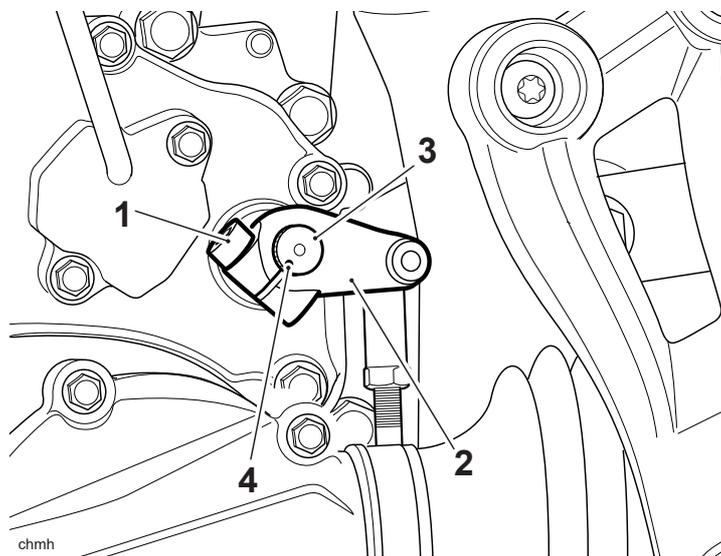
1. **Fixings**
2. **Control plate**

2. Route the harness for the side stand switch as noted for removal.
3. Fit the side stand and tighten its fixings to **70 Nm**.



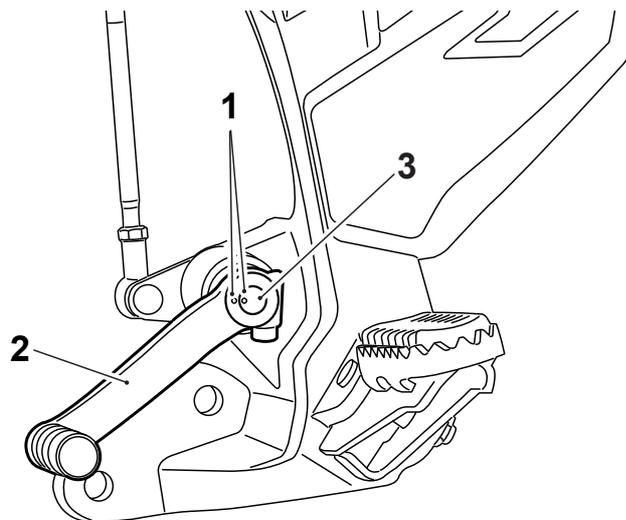
1. **Fixings**
2. **Side stand**

4. Tighten the upper fixings for the left hand control plate to **18 Nm**.
5. Fit the gear change mechanism pivot arm as noted for removal.
6. Fit the pinch bolt and tighten it to **9 Nm**.



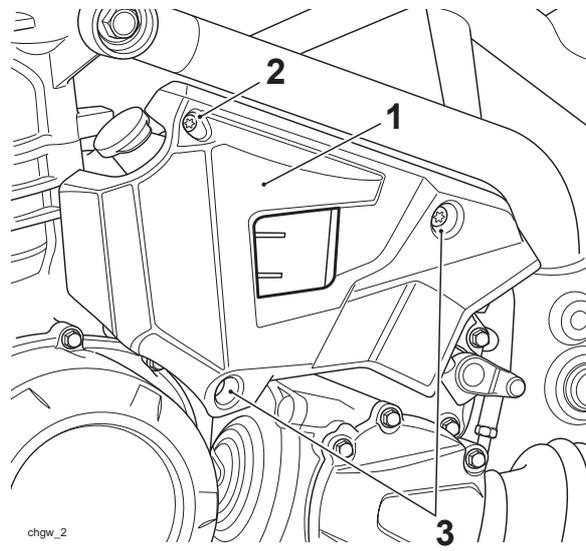
1. Pinch bolt
2. Pivot arm
3. Gear change mechanism
4. Punch mark

7. Check that the upper and lower ball joints are correctly located onto their pivots and are not twisted to one side. Rectify if necessary.
8. If the gear change pedal has been removed, align the punch mark on the pedal to the punch mark on the pivot for the gear change pedal.
9. Push the gear change pedal fully on, fit the pinch bolt and tighten to **9 Nm**.



1. Punch marks
2. Gear change pedal
3. Pivot

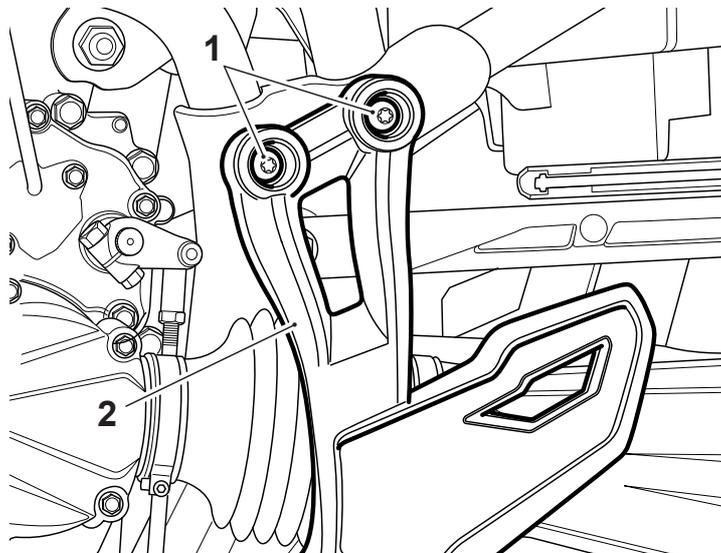
10. Refit the expansion tank cover. Secure the upper mounting with a new M5 encapsulated fixing. Secure the lower mounting with the two original fixings. Tighten the upper fixing to **3 Nm** and the lower fixings to **4 Nm**.



1. Expansion tank cover
2. Upper fixing (M5)
3. Lower fixings (M6)

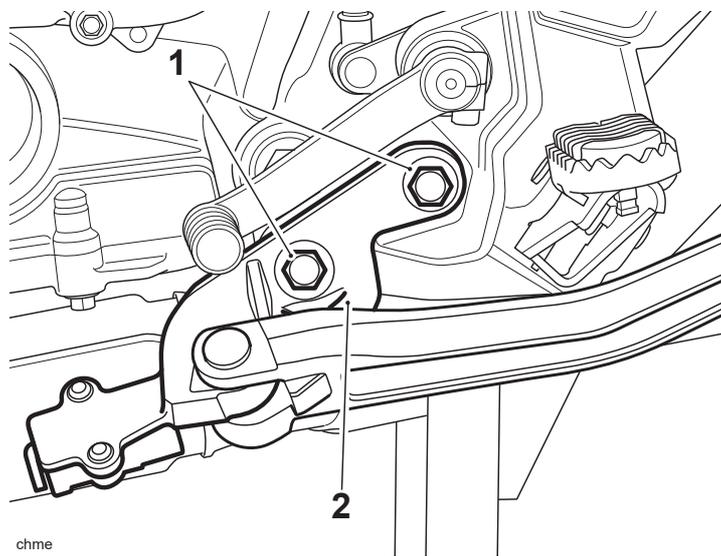
Models Fitted with a Shift Force Sensor

1. Align the left hand control plate and gear change linkage assembly to the frame and fit the two upper fixings. Do not fully tighten at this stage.



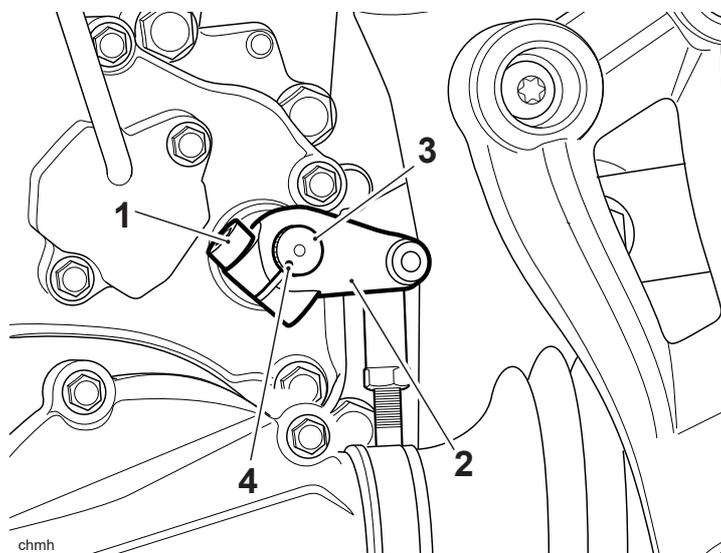
1. Fixings
2. Control plate

2. Route the harness for the side stand switch as noted for removal.
3. Fit the side stand and tighten its fixings to **70 Nm**.



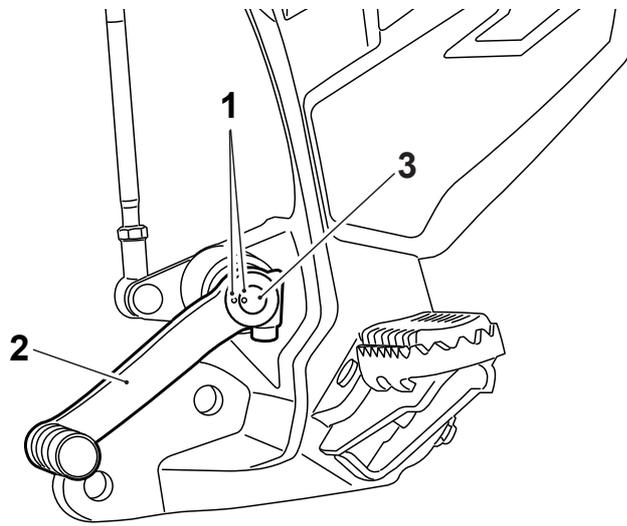
- 1. Fixings
- 2. Side stand

- 4. Tighten the upper fixings for the left hand control plate to **18 Nm**.
- 5. Fit the gear change mechanism pivot arm as noted for removal.
- 6. Fit the pinch bolt and tighten it to **9 Nm**.



- 1. Pinch bolt
- 2. Pivot arm
- 3. Gear change mechanism
- 4. Punch mark

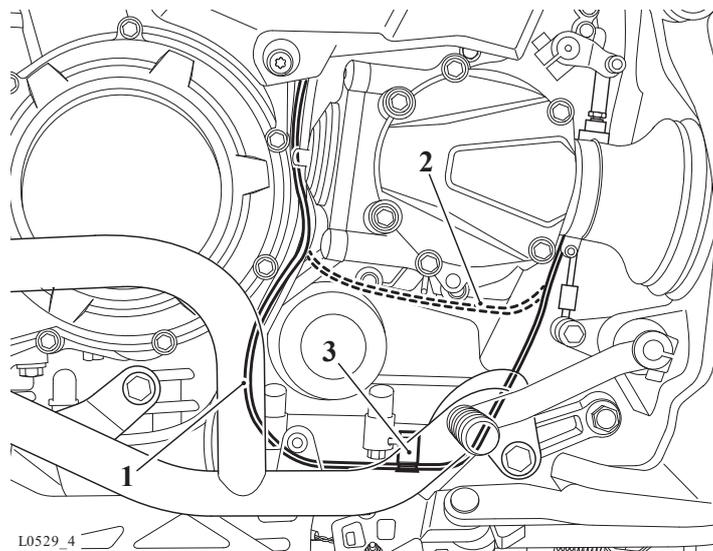
- 7. Check that the upper and lower ball joints are correctly located onto their pivots and are not twisted to one side. Rectify if necessary.
- 8. If the gear change pedal has been removed, align the punch mark on the pedal to the punch mark on the pivot for the gear change pedal.
- 9. Push the gear change pedal fully on, fit the pinch bolt and tighten to **9 Nm**.



1. Punch marks
2. Gear change pedal
3. Pivot

Note

- The shift force sensor is available with two different wiring harness lengths. The routing of the shift force sensor wiring harness differs depending on which length of harness is fitted.
- Refer to the illustration below for the two routing conditions.



1. Long harness routing
2. Short harness routing
3. Clip

10. Route the shift force sensor harness as noted during removal and connect to the main wiring harness. If necessary, attach the shift force sensor harness to its clip on the sump.

Perform the following operations:

- Expansion Tank - Installation
- Battery - Installation
- Rider's Seat - Installation
- Shift Force Sensor Adaption

Selector Shaft - Removal

WARNING

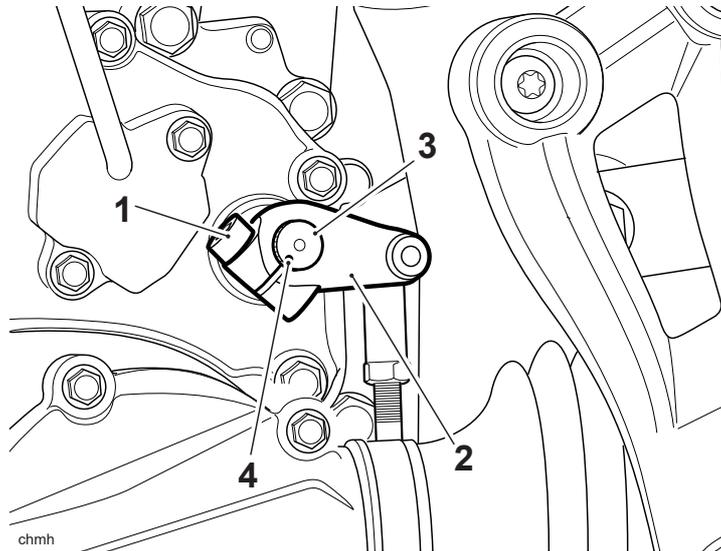
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Expansion Tank - Removal

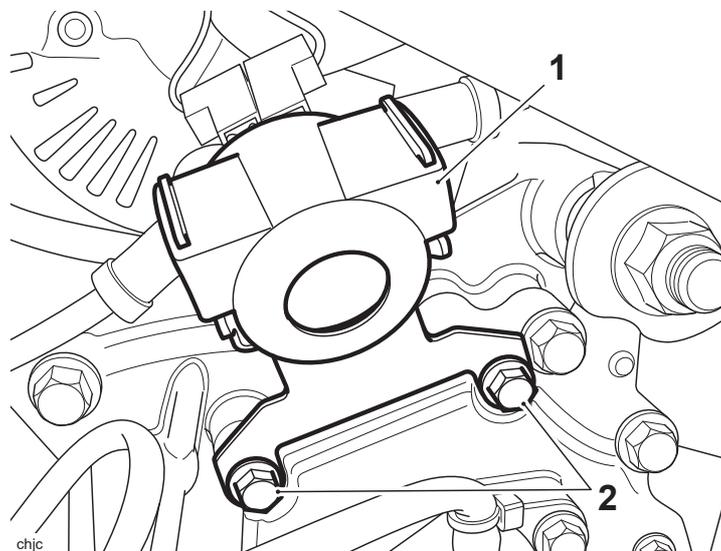
Note

- **Note the position of the transmission linkage in relation to the punch mark on the gear change mechanism.**
1. Select neutral, remove the pinch bolt and disconnect the transmission linkage from the gear change mechanism.



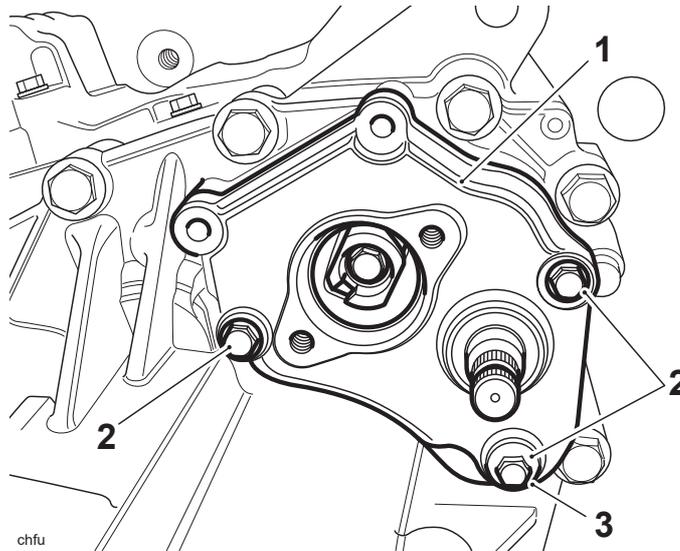
1. Pinch bolt
2. Transmission linkage
3. Gear change mechanism
4. Punch mark

2. Remove the gear position sensor (see Gear Position Sensor - Removal).
3. Remove the two upper selector cover fixings and detach the starter solenoid and bracket. Position the starter solenoid aside.



1. Starter solenoid
2. Fixings

4. Remove the three remaining fixings and remove the selector shaft cover and gasket. Note the position of the two dowels.
5. Note that the 90 mm fixing is fitted with a copper washer.



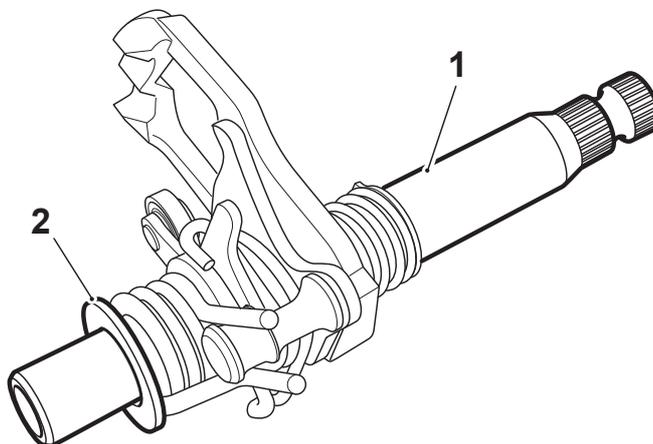
1. Selector shaft cover
2. Fixings
3. Copper washer position

6. Collect the washer from the outer end of the selector shaft.

! CAUTION

Take care to ensure that the washer fitted to the inner end of the selector shaft remains in position during removal of the shaft. Should the washer become dislodged during removal, it is possible for it to drop in to the transmission housing. Should this happen, it will be necessary to remove the transmission and/or sump to recover the washer.

7. Remove the spring abutment sleeve.
8. Remove the selector shaft, along with the inner washer.



1. Selector shaft

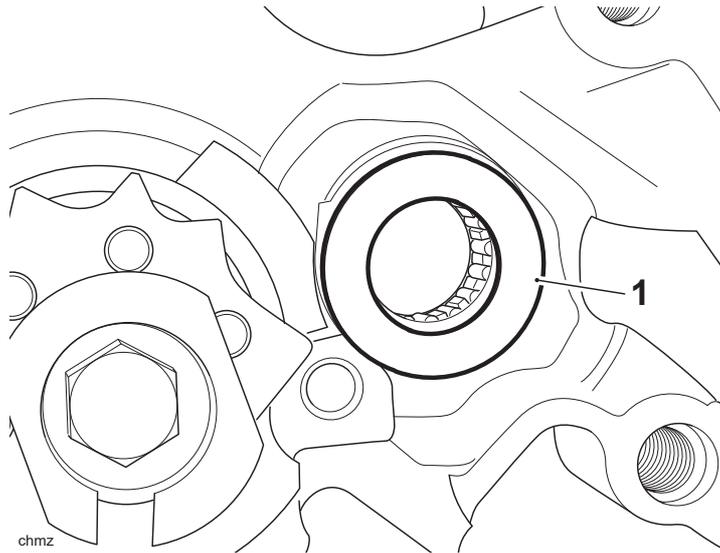
2. Inner washer

Selector Shaft - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the washer to the transmission housing, securing in position with a smear of multi-purpose grease.



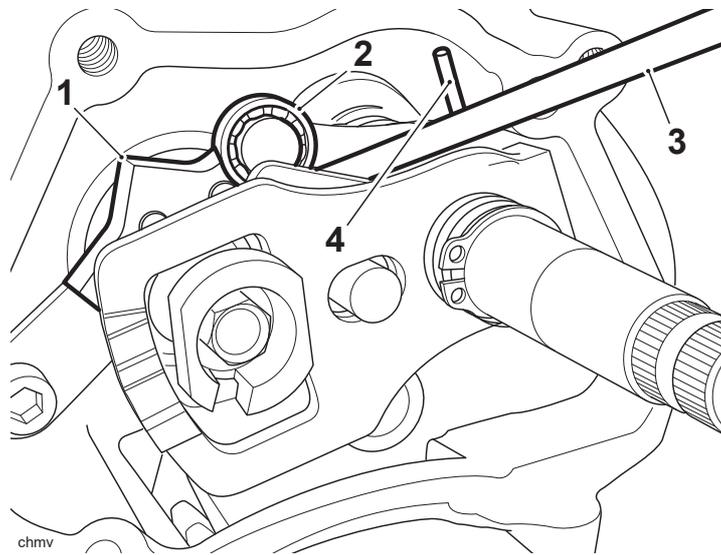
1. Washer

CAUTION

Take care to ensure that the washer remains in position during installation of the shaft. Should the washer become dislodged during installation, it is possible for it to drop in to the transmission housing. Should this happen, it will be necessary to remove the transmission and/or sump to recover the washer.

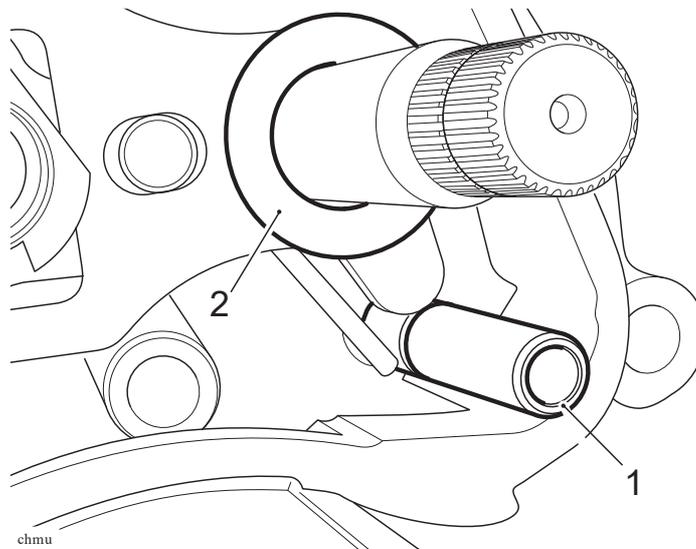
Note

- **Prior to fitting the selector shaft, ensure that the long straight part of the detent spring is pointing up.**
2. Position the selector shaft to the transmission housing, aligning the shaft to the inner bearing. Ensure the inner washer remains in position as the shaft is installed.
 3. Install the selector shaft until the detent arm lightly contacts the detent wheel.
 4. Using a suitable tool, lift the detent arm roller onto the detent wheel, against the detent spring pressure, and install the selector shaft fully.



1. **Detent wheel**
2. **Detent arm roller**
3. **Lever**
4. **Detent spring**

5. Fit the abutment sleeve between the ends of the abutment spring and install fully in to the transmission casing.
6. Refit the washer to the outer end of the selector shaft.



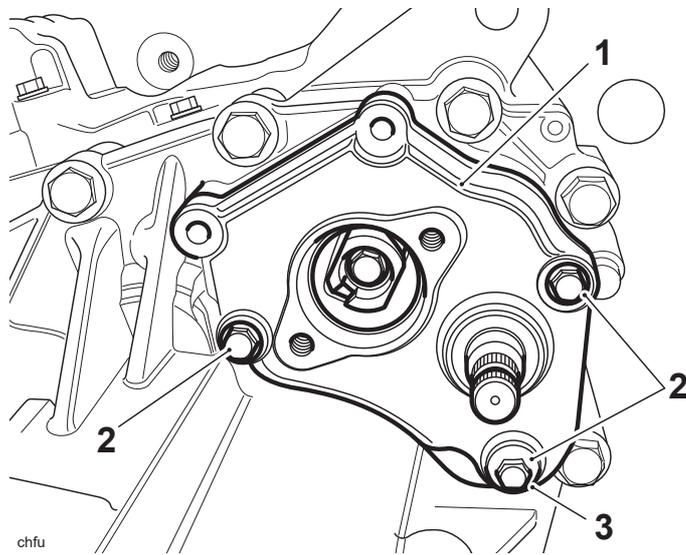
1. **Abutment sleeve**
2. **Washer**

7. Ensure that the two dowels are in position in the selector shaft cover.
8. Check the condition of the selector shaft seal; if necessary fit a new seal.

! CAUTION

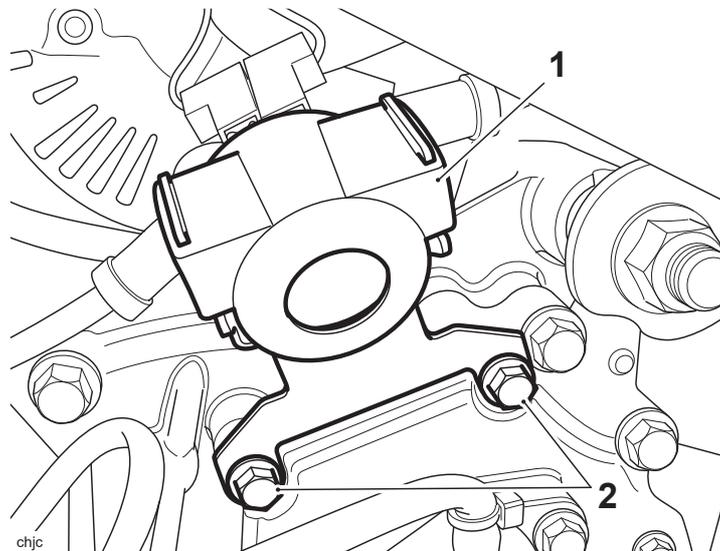
Take care to avoid damaging the lip of the seal when installing the selector shaft cover over the selector shaft. A damaged seal will lead to oil loss and could result in engine damage.

9. Fit a new gasket to the selector shaft cover, and refit the cover.
10. Fit a new copper washer to the 90 mm selector shaft cover fixing.
11. Secure the cover with the three fixings, noting that the 90 mm fixing passes through the abutment sleeve.



1. Selector shaft cover
2. Fixings
3. Copper washer position

12. Refit the starter solenoid and secure with the two remaining fixings.



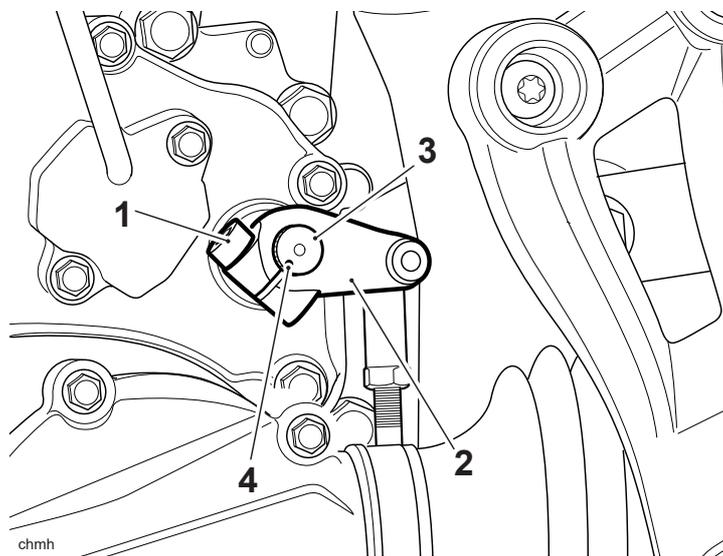
1. Starter solenoid
2. Fixings

13. Tighten the four 28 mm fixings to **11 Nm**, and the 90 mm fixing to **11 Nm**.

14. Refit the gear position sensor (see Gear Position Sensor - Installation).

15. Fit the transmission linkage to the gear change mechanism as noted for removal.

16. Fit the pinch bolt and tighten it to **9 Nm**.



1. Pinch bolt
2. Transmission linkage
3. Gear change mechanism
4. Punch mark

Perform the following operations:

- Expansion Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Transmission - Removal

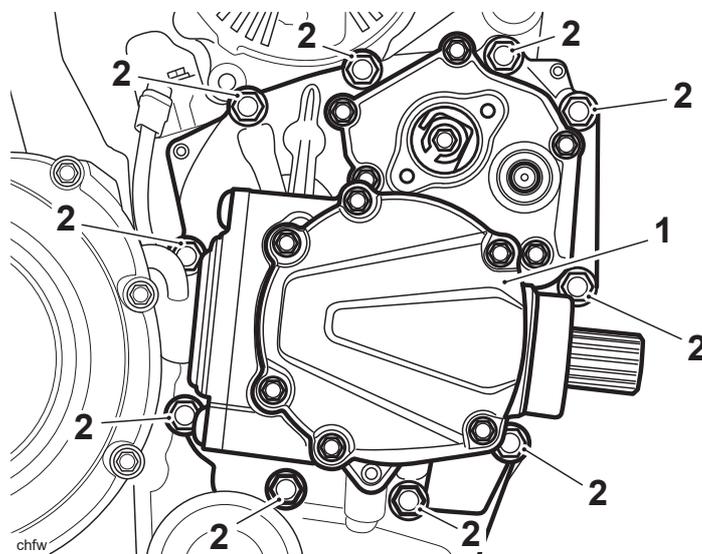
! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Expansion Tank - Removal
- Clutch - Removal
- Rear Bevel Box - Removal

1. Remove and discard the 10 transmission fixings.



1. **Transmission assembly**
2. **Fixings**

2. Withdraw the transmission assembly from the crankcases, collecting the two dowels as you do so. Remove and discard the gasket.

Transmission - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Ensure the two dowels are in position in the transmission casing.
2. Position a new gasket to the transmission casing, aligning it to the dowels.
3. Carefully position the transmission to the crankcases, and align to the bolt holes. Take care not to damage or dislodge the gasket as you do so.
4. Install 10 new fixings, then evenly tighten to **20 Nm**.

Perform the following operations:

- Rear Bevel Box - Inspection
- Clutch - Installation
- Expansion Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Selector Drum and Selector Forks - Removal

WARNING

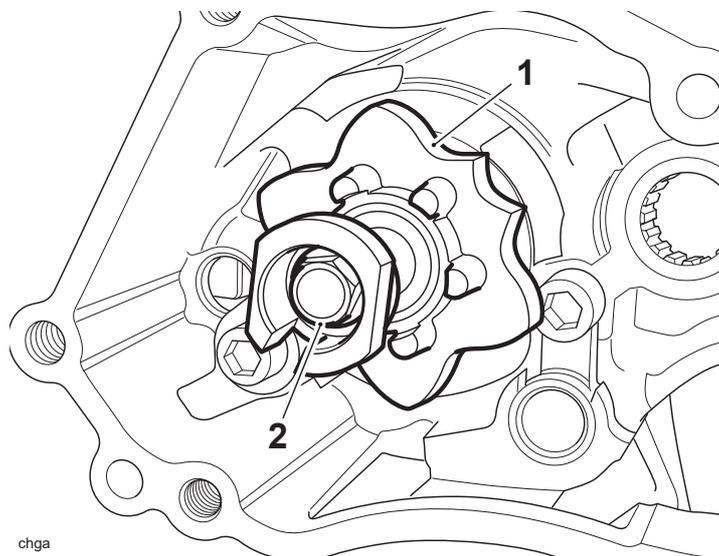
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Transmission - Removal
- Selector Shaft - Removal

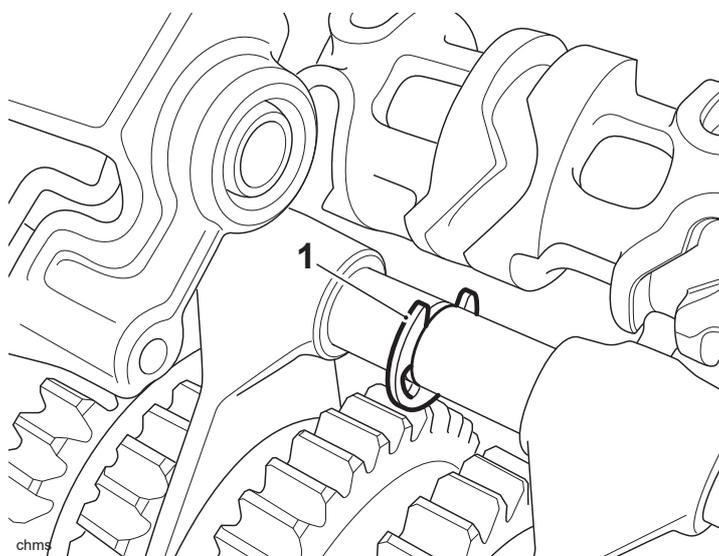
Note

- **To prevent drum rotation, use a stout rod through one of the through-holes in the drum.**
1. Remove the fixing and remove the detent wheel from the selector drum. Discard the fixing. The detent wheel is a tight fit in the selector drum, and can be removed using a rocking motion.



1. **Detent wheel**
2. **Fixing**

2. Remove the selector drum from the transmission housing, lifting it to allow removal from the selector forks.
3. If necessary, remove the fixing (discard the fixing) and keeper plate, and remove the selector drum bearing from the transmission housing.
4. Remove the E-clip from the output shaft selector shaft. Discard the E-clip.



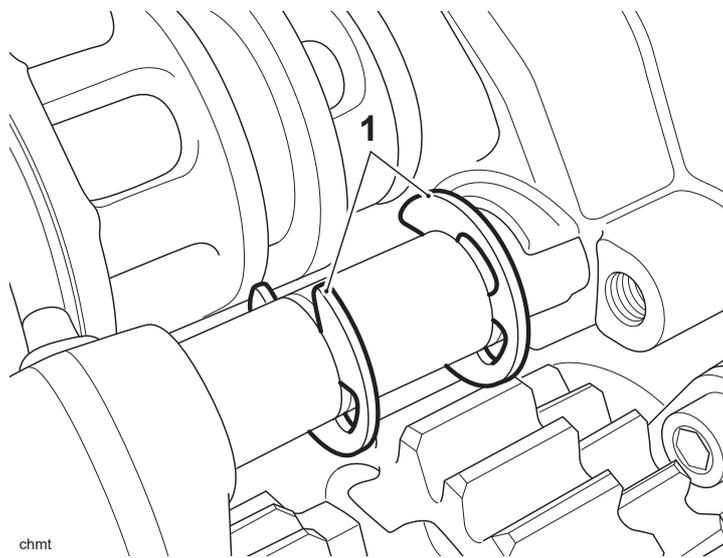
1. **E-clip**

⚠ CAUTION

The selector forks and shafts can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks or shafts will cause gearbox damage or incorrect operation.

Note

- **The two output shaft selector forks are identical. If the selector forks are to be reused, note their respective positions prior to removal in order that the selector forks can be fitted in their original locations.**
5. Push the output shaft selector shaft out from the transmission housing in the direction of the output shaft. Collect each selector fork as they are released by the selector shaft, noting their orientation.
 6. Remove the two E-clips from the input shaft selector shaft. Discard the E-clips.



1. E-clips

CAUTION

The selector forks and shafts can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks or shafts will cause gearbox damage or incorrect operation.

7. Push the input shaft selector shaft out from the transmission in the direction of the input shaft. Collect the selector fork as it is released by the selector shaft, noting its orientation.

Selector Drum and Selector Forks - Inspection

Inspect all bearings for damage or wear. Renew as necessary.

Inspect the selector forks and selector grooves for wear beyond the service limits. Renew the components as necessary.

1. Refer to the specifications table (see Transmission).

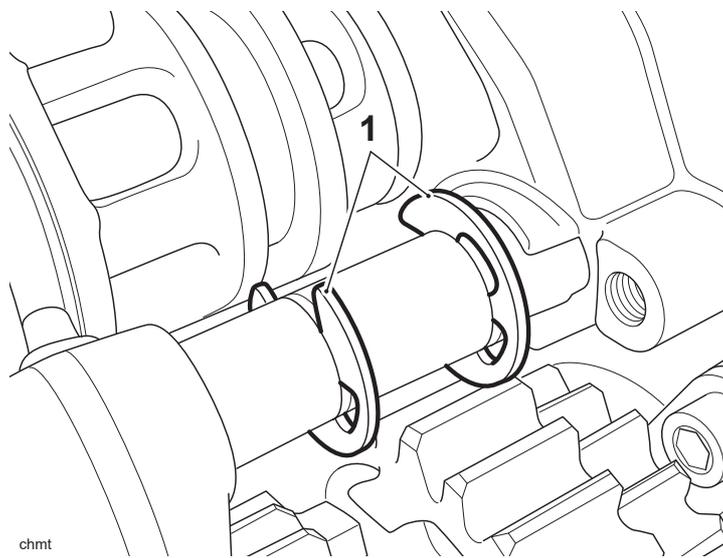
Selector Drum and Selector Forks - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **Prior to installation, lubricate both ends of each selector shaft, and their locating holes in the transmission housing, with a 50/50 solution of engine oil and molybdenum disulphide grease.**
1. Push the input shaft selector shaft into the transmission housing, with the two grooves facing towards the housing, from the input shaft side. As the shaft is inserted locate the selector fork. Ensure the fork is fitted in the position noted during removal.
 2. Fit new E-clips to the grooves in the shaft between the selector fork and the transmission housing.

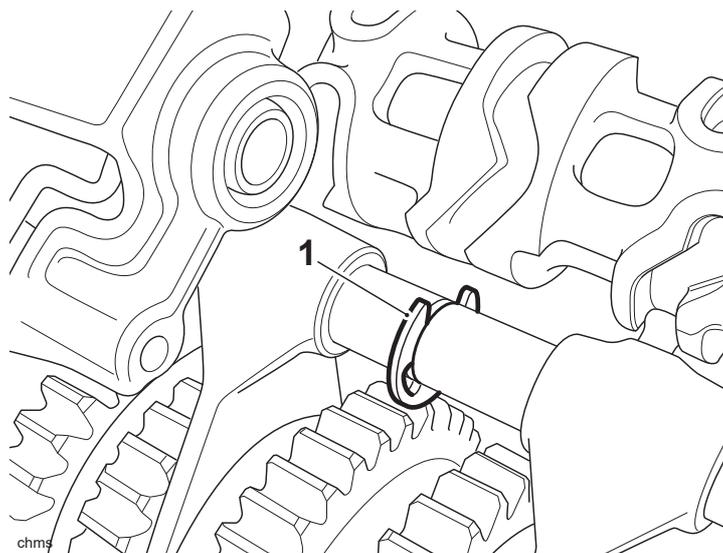


1. E-clips

CAUTION

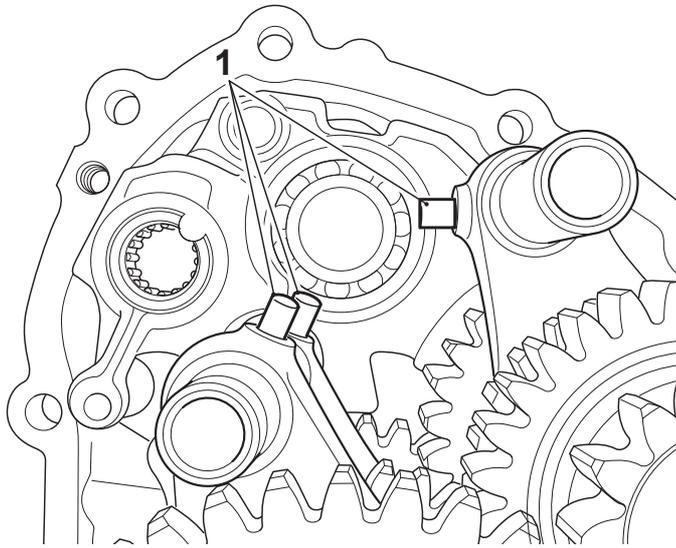
The selector forks can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks will cause gearbox damage or incorrect operation.

3. Push the output shaft selector shaft into the transmission housing, with the single groove facing away from the housing, from the output shaft side. As the shaft is inserted locate the selector forks. Ensure the forks are fitted in the position noted during removal.
4. Fit a new E-clip to the groove in the shaft between the two selector forks.



1. E-clip

5. Check that the pins on each selector fork face inwards towards each other, as shown below.



1. Selector fork pins

6. If removed, refit the selector drum bearing to the transmission housing. Install the keeper plate and secure with a new fixing. Tighten to **9 Nm**.
7. Using clean engine oil, lubricate the selector drum bearing.
8. Set the transmission in neutral.
9. Engage the selector drum into the bearing and lower until the grooves on the drum engage with the three selector fork pins.
10. Check that the three selector fork pins are correctly engaged in the selector fork grooves. Rectify as necessary.

Note

- **To prevent drum rotation, use a stout rod through one of the through-holes in the drum.**

11. Fit the detent wheel, engaging the slot in the wheel with the locator pin in the selector drum. Install a new fixing and tighten to **11 Nm**.

Perform the following operations:

- Selector Shaft - Installation
- Transmission - Installation

Input Shaft - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

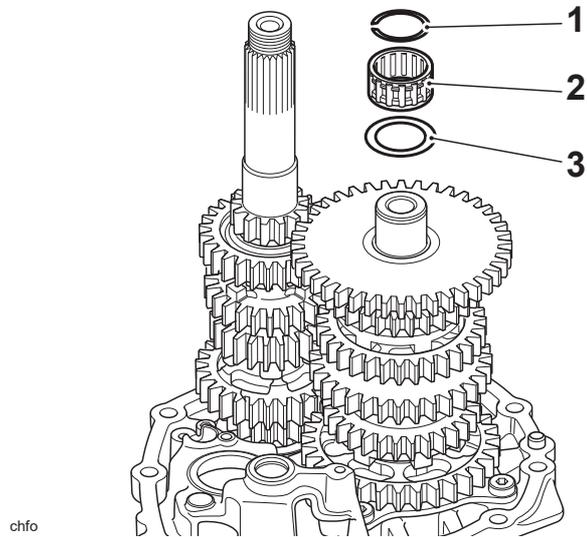
Note

- **Removal of the input shaft can be achieved after first removing the output shaft first gear and its bearing. The output shaft is an integral part of the front bevel box assembly and cannot be removed.**
- **If the transmission housing input shaft bearing is to be removed, the output shaft must first be disassembled. Remove the input shaft as described below, then see Output Shaft - Disassembly.**
- **The input shaft cannot be disassembled or assembled in service. If necessary, the complete input shaft assembly must be replaced.**

Perform the following operations:

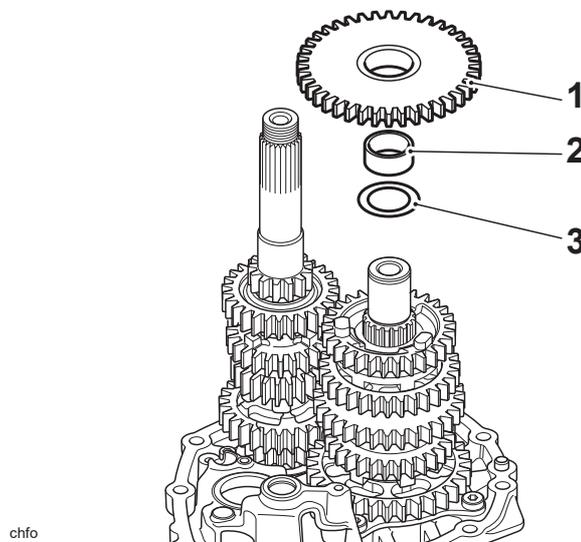
- Transmission - Removal
 - Selector Drum and Selector Forks - Removal
1. Place the transmission assembly on a clean surface, taking care to protect the transmission casing from damage.
 2. Remove and discard the output shaft needle bearing snap ring.

3. Remove the output shaft needle bearing and thrust washer.



1. Snap ring
2. Needle bearing
3. Thrust washer

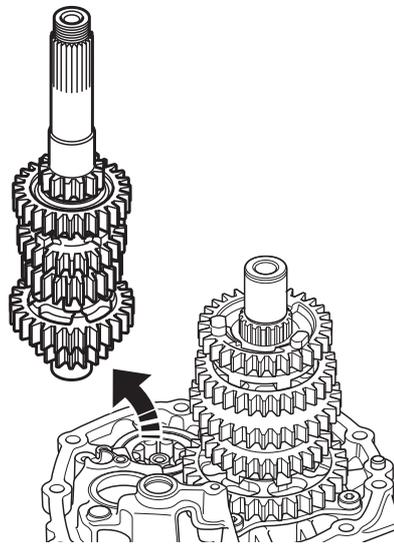
4. Remove the output shaft first gear, needle bearing and thrust washer.



1. First gear
2. Needle bearing
3. Thrust washer

5. Withdraw the input shaft assembly from its bearing and remove from the transmission housing.

chfn



Input Shaft Removal

Input Shaft - Installation

WARNING

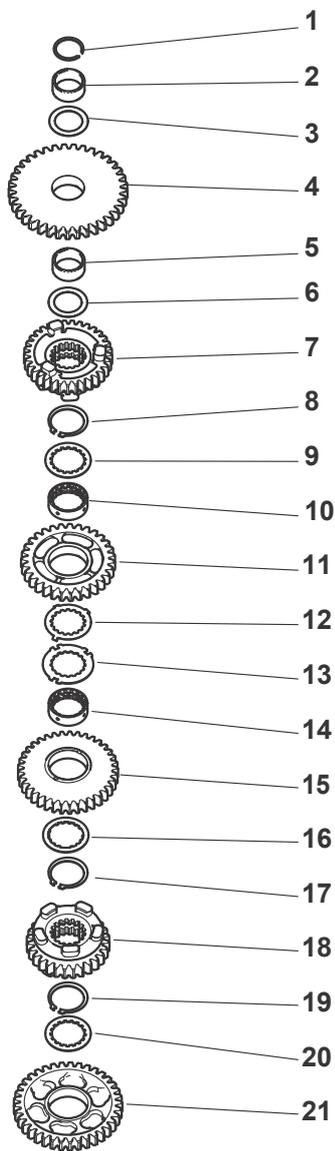
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Place the input shaft in position in the transmission housing, and insert the shaft fully in to the bearing.
2. Refit the output shaft thrust washer, needle bearing and first gear.
3. Refit the output shaft thrust washer and needle bearing.
4. Secure the output shaft needle bearing with a new snap ring.

Perform the following operations:

- Selector Drum and Selector Forks - Installation
- Transmission - Installation

Exploded View – Output Shaft



1. Circlip
2. Needle roller bearing
3. Thrust washer
4. First gear
5. Needle roller bearing
6. Thrust washer
7. Fifth gear
8. Circlip
9. Thrust washer
10. Splined bush
11. Fourth gear
12. Lock washer
13. Splined washer
14. Splined bush

15. Third gear
16. Thrust washer
17. Circlip
18. Sixth gear
19. Circlip
20. Thrust washer
21. Second gear

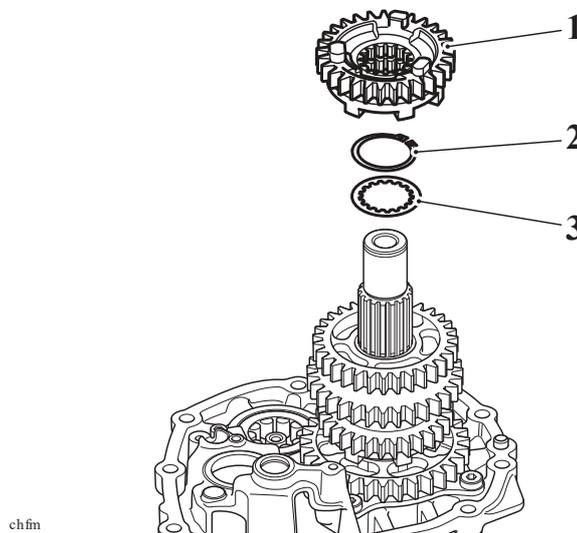
Output Shaft - Disassembly

Note

- The output shaft is an integral part of the front bevel box assembly and cannot be removed.

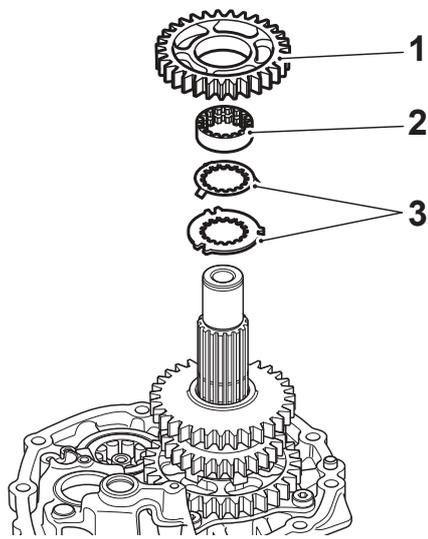
Perform the following operations:

- Input Shaft - Removal
1. Slide fifth gear from the shaft.
 2. Remove the circlip from in front of fourth gear.
 3. Remove the splined thrust washer from the shaft.



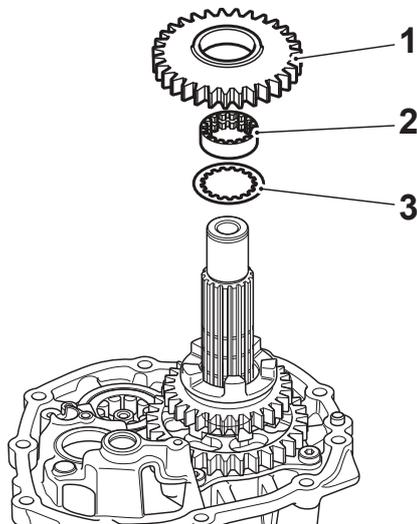
1. Fifth gear
2. Circlip
3. Splined thrust washer

4. Remove fourth gear.
5. Remove the splined bush.
6. Note their orientation and remove the splined lock washers. Note the 'UP' mark on the lower splined lock washer.



1. Fourth gear
2. Splined bush
3. Splined lock washer

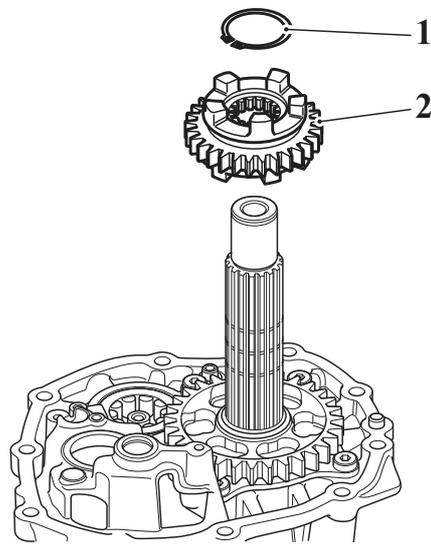
7. Slide third gear off the shaft and also remove the splined bush and thrust washer.



1. Third gear
2. Splined bush
3. Splined thrust washer

8. Remove the circlip from in front of sixth gear.

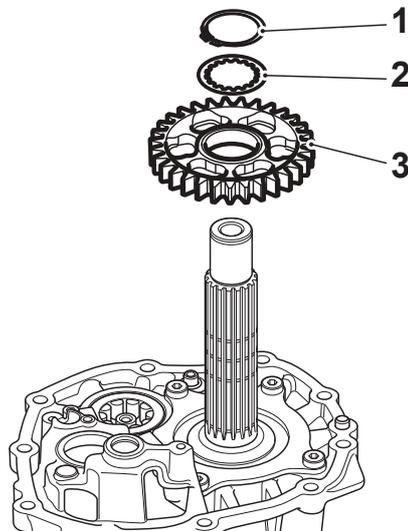
9. Remove sixth gear.



chfj

1. Circlip
2. Sixth gear

10. Remove the circlip from in front of second gear.
11. Remove the thrust washer and slide off second gear.



chfg

1. Circlip
2. Thrust washer
3. Second gear

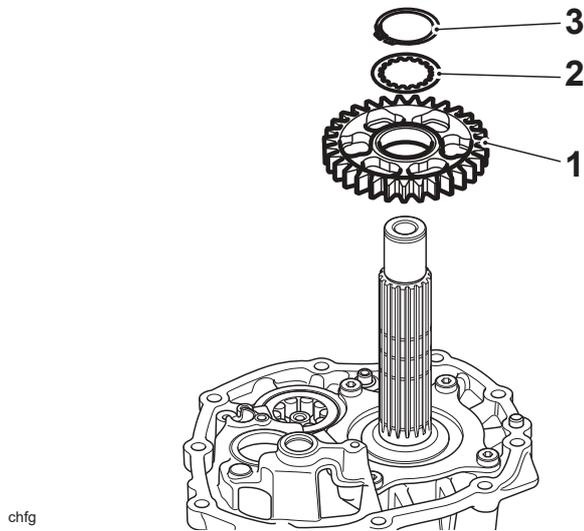
12. At this stage, the input shaft bearing can be removed from the transmission housing as follows:
 - o Remove the fixing and collect the bearing keeper plate. Discard the fixing
 - o Using a proprietary bearing puller, remove the bearing from the housing
 - o Collect the oil restrictor plate.

Output Shaft - Assembly

Note

- Lubricate each gear and bush with clean engine oil during assembly.
- Examine all gears, bearings and sleeves for damage, chipped teeth and wear beyond the service limits. Replace all suspect components and always use new circlips to assemble the shaft.
- The splined thrust washer fitted next to second gear is different to the two other splined thrust washers fitted elsewhere on the output shaft. It can be identified by three sets of missing splines, equally spaced around the inner circumference.

1. Locate second gear to the shaft with the dog slots facing away from the bevel box. Fit the splined thrust washer (see note above for thrust washer identification) and retain with a new circlip.



1. **Second gear**
2. **Thrust washer**
3. **Circlip**

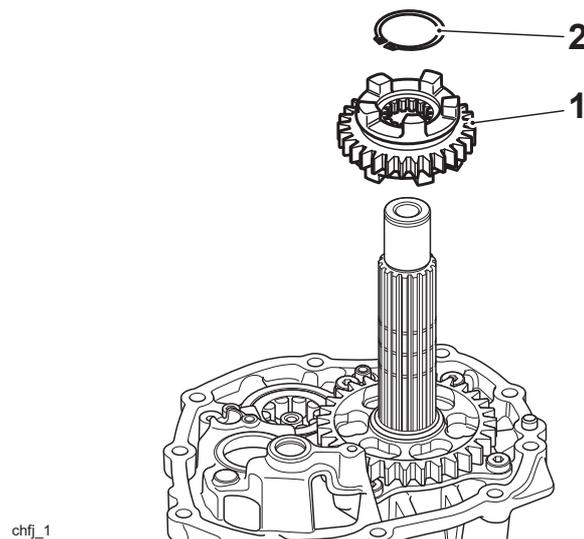
2. Fit sixth gear with the selector fork groove facing away from the bevel box. Ensure that the oil holes in the gear DO NOT align with the corresponding oil hole in the output shaft.

! WARNING

If the oil holes in the sixth gear are aligned with the corresponding hole in the output shaft, engine oil pressure and gear lubrication will be reduced.

Reduced oil pressure and gear lubrication will cause engine damage and could also lead to engine seizure resulting in loss of motorcycle control and an accident.

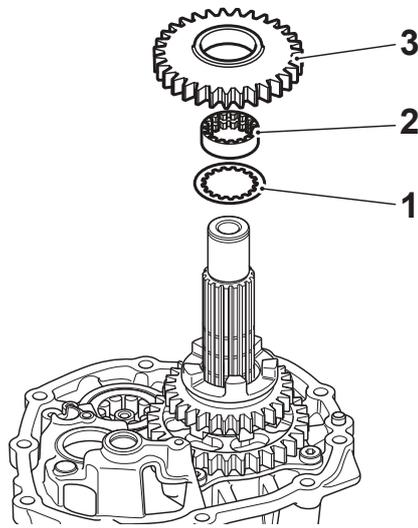
3. Fit a new circlip.



1. **Sixth gear**
2. **Circlip**

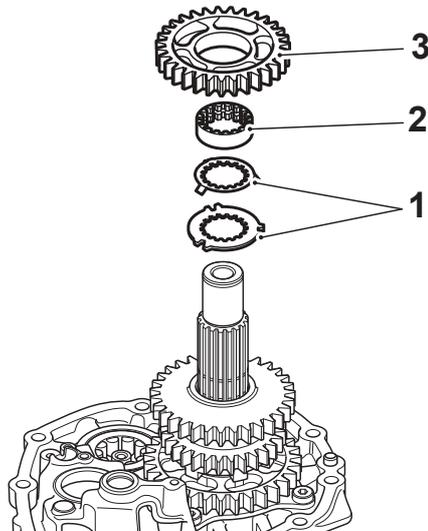
4. Fit the splined thrust washer.
5. Fit the splined bush for third gear, ensuring that the oil hole in the shaft DOES NOT align with the hole in the bush. Fit third gear to the shaft with the dog slots facing towards the bevel box.

chfk_1



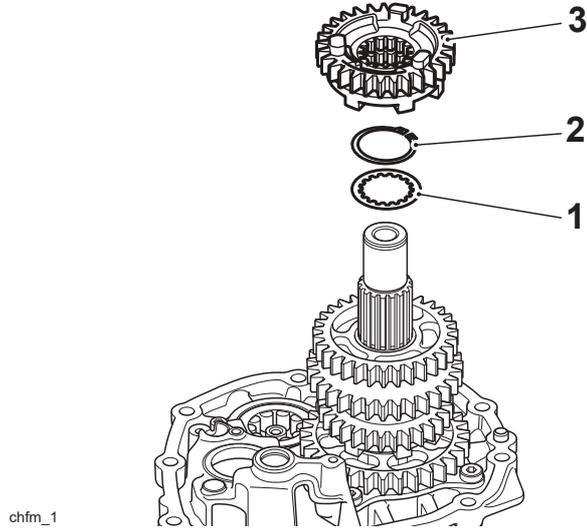
1. Thrust washer
2. Splined bush
3. Third gear

6. Fit the splined lock washer with the 'UP' mark visible. Fit the lock washer, ensuring the three tabs in the smaller washer locate in the three slots in the larger washer. Note the lock washer will only fit the splined lock washer in one position.
7. Fit the splined bush for fourth gear, ensuring that the oil hole in the shaft DOES NOT align with the hole in the bush. Fit fourth gear to the shaft with the dog slots facing away from the bevel box.



1. Splined lock washer
2. Splined bush
3. Fourth gear

8. Fit the thrust washer and retain with a new circlip.
9. Fit fifth gear.



1. Thrust washer
2. Circlip
3. Fifth gear

Perform the following operations:

- Input Shaft - Installation

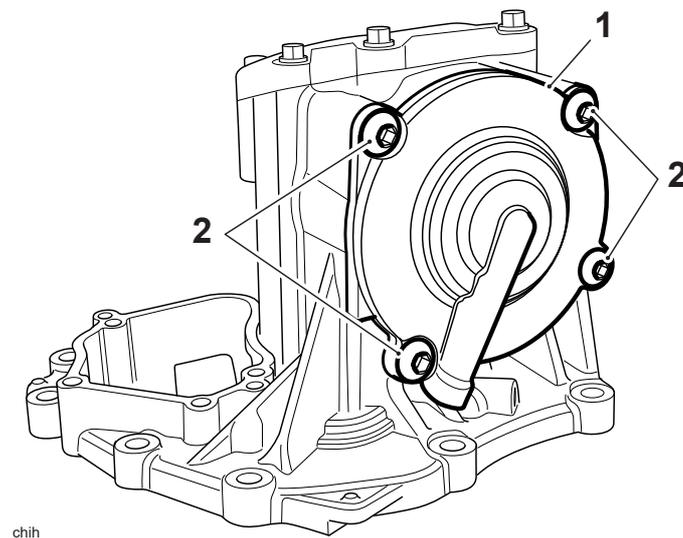
Bevel Box Damper Shaft Oil Seal - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

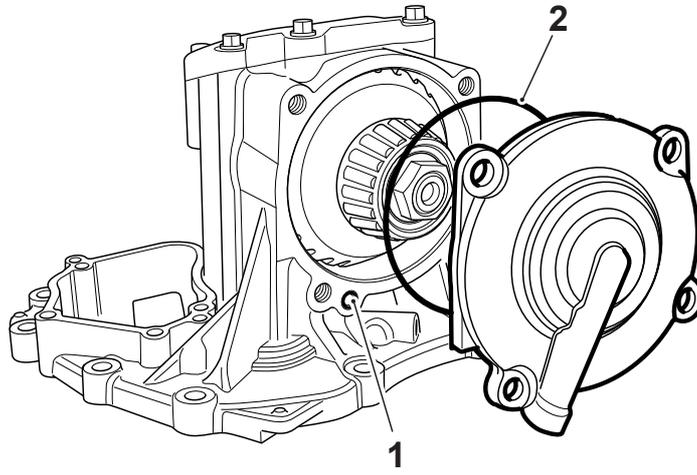
Perform the following operations:

- Transmission - Removal
1. Release the four fixings and remove the bevel box front cover.



1. Bevel box front cover
2. Fixings

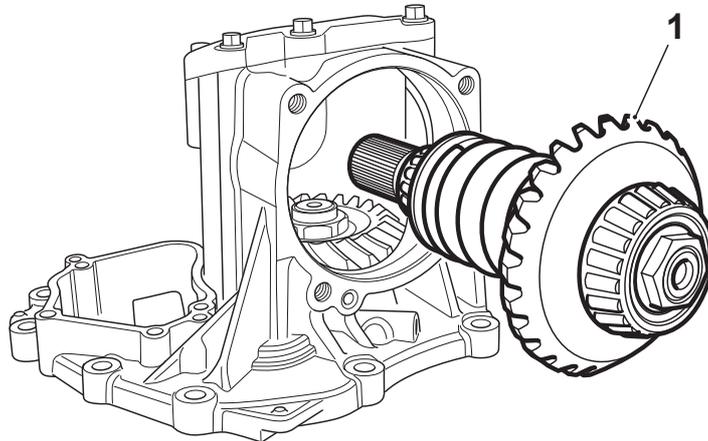
2. Remove and discard the front cover outer O-ring and oil feed O-ring.



chii

1. Oil feed O-ring
2. Front cover O-ring

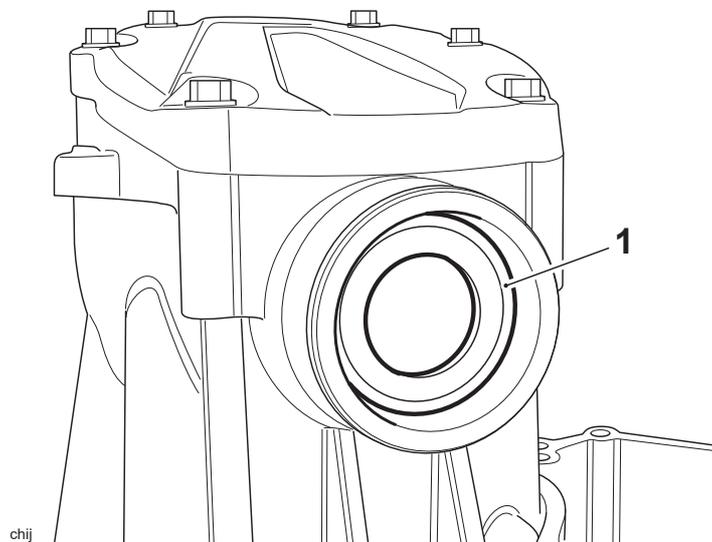
3. Withdraw the damper shaft from the bevel box.



chig

1. Damper shaft

4. Drift out the oil seal.



chij

1. Oil seal

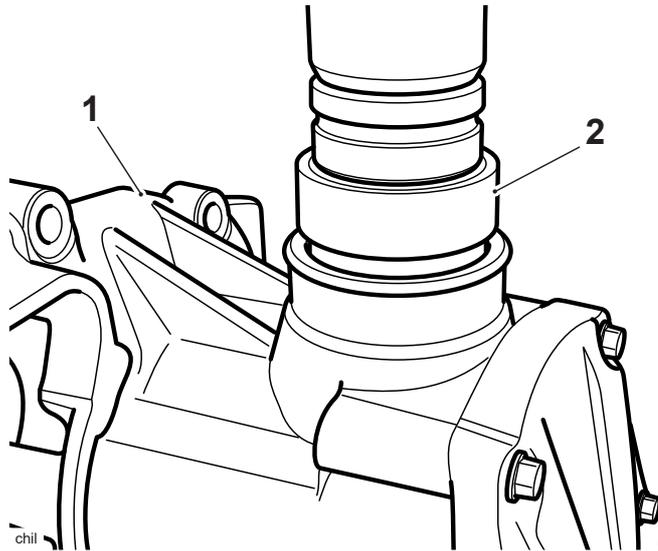
5. Thoroughly clean the seal housing.

Bevel Box Damper Shaft Oil Seal - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Protect the front cover mating face of the bevel box against damage and place it in a press.
2. Using the collar from T3880053 - Wheel Bearing Extraction Kit (smaller diameter positioned on the outer edge of the seal), carefully press in a new oil seal.

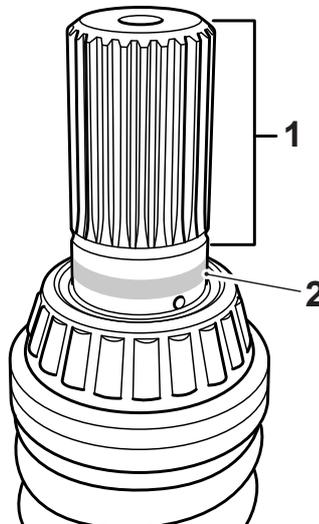


1. Bevel box
2. Collar (part of T3880053 - Wheel Bearing Extraction Kit)

CAUTION

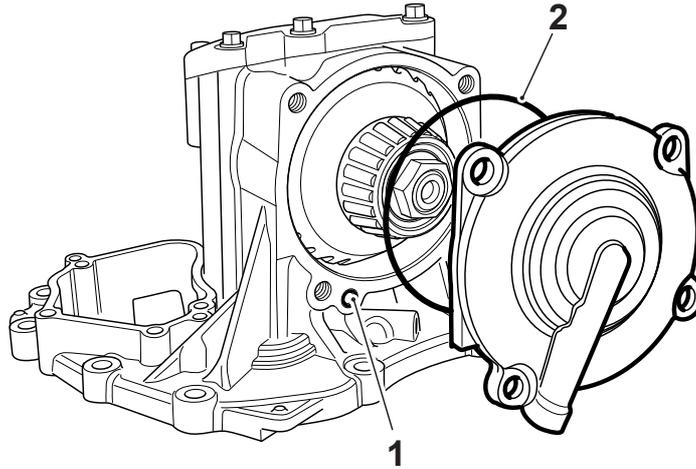
Failure to protect the splines of the damper shaft will result in damage to the new oil seal.

3. Protect the splines and the groove (as shown below) of the damper shaft with a suitable tape, such as electrical insulation tape. Do not apply tape to the seal running area, shown grey below.



1. Damper shaft splines and groove
2. Seal running area

4. Refit the damper shaft to the bevel box, taking care not to damage the oil seal.
5. Remove the protective tape from the damper shaft splines.
6. Fit a new O-ring to the oil feed.
7. Fit a new O-ring to the front cover.



1. Oil feed O-ring
2. Front cover O-ring

8. Refit the front cover, ensuring the oil feed O-ring is not dislodged as you do so.
9. Secure the cover with four new fixings and tighten to **25 Nm**.

Perform the following operations:

- Transmission - Installation

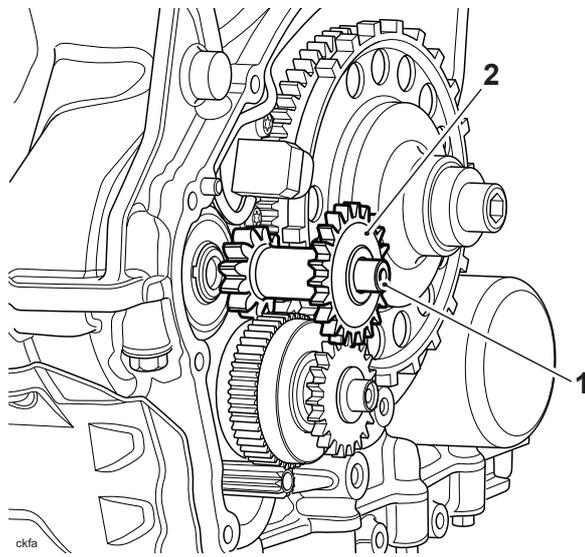
Trigger Wheel, Starter Drive Gears and Sprag Clutch - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

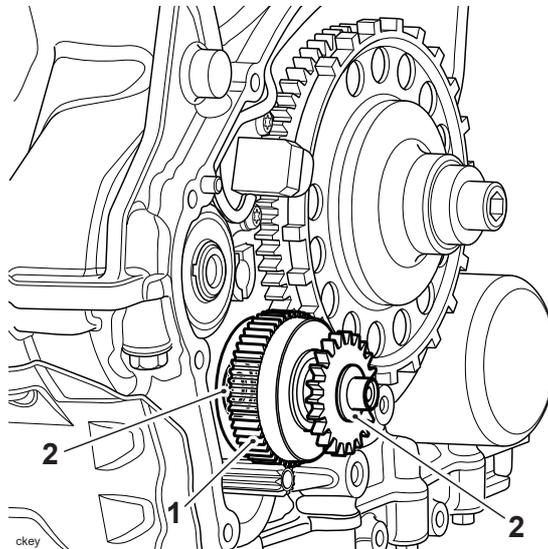
Perform the following operations:

- Trigger Wheel Cover - Removal
1. Withdraw the pin and remove the starter idler gear noting the orientation of the gear.



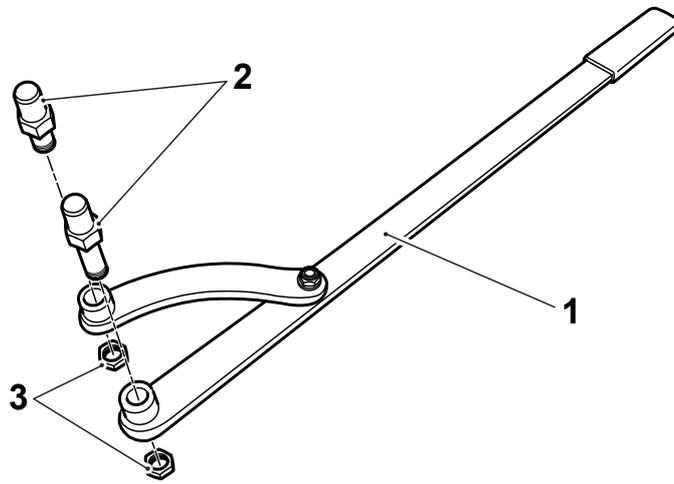
1. Idler shaft
2. Idler gear

2. Withdraw the starter motor torque limiter from the crankcase, collecting the washers from each end of the shaft as you do so.



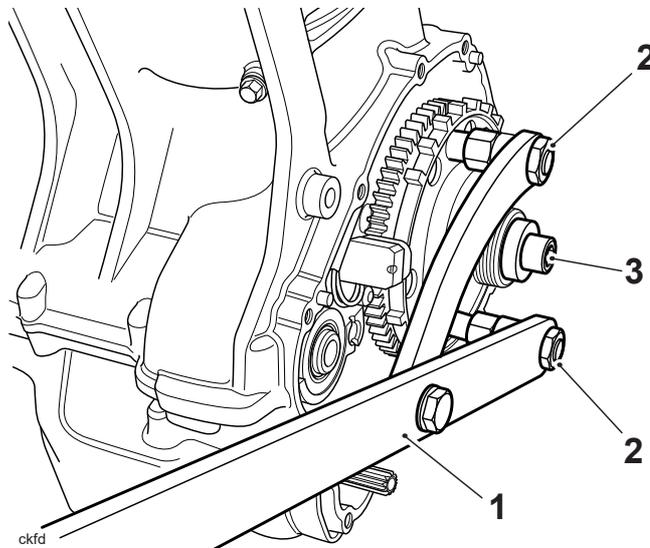
1. Starter motor torque limiter
2. Flat washers (outer shown)

3. Assemble T3880608 - Flywheel Pin Set (flywheel pin set) to T3880606 - Flywheel Restraint Handle (flywheel restraint), ensuring the shorter pin is fitted to the short arm of T3880606 - Flywheel Restraint Handle. Fit the nuts and tighten to **10 Nm**.



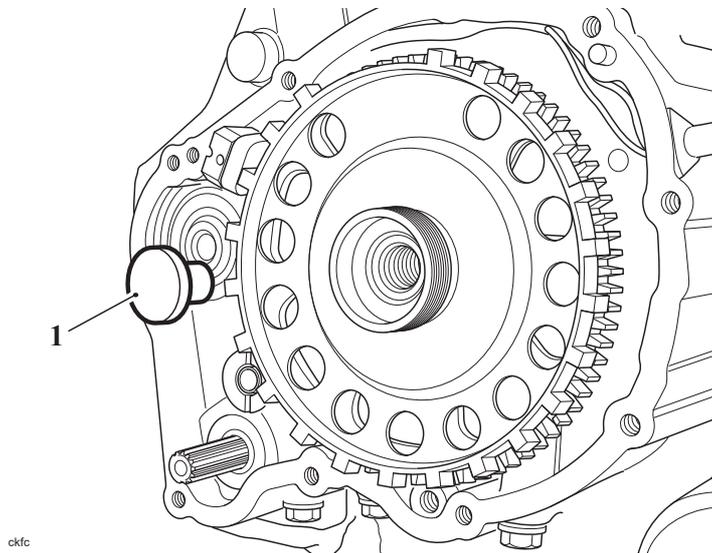
1. T3880606 - Flywheel Restraint Handle
2. Pins (part of T3880608 - Flywheel Pin Set)
3. Nuts (part of T3880608 - Flywheel Pin Set)

4. Using T3880606 - Flywheel Restraint Handle and T3880608 - Flywheel Pin Set, prevent the trigger wheel from turning and remove the trigger wheel fixing and washer from the end of the crankshaft.



1. T3880606 - Flywheel Restraint Handle
2. T3880608 - Flywheel Pin Set
3. Trigger Wheel fixing

5. Locate the spigot from the larger of the two thrust pads supplied with T3880365 - Alternator Housing Puller to the crankshaft.



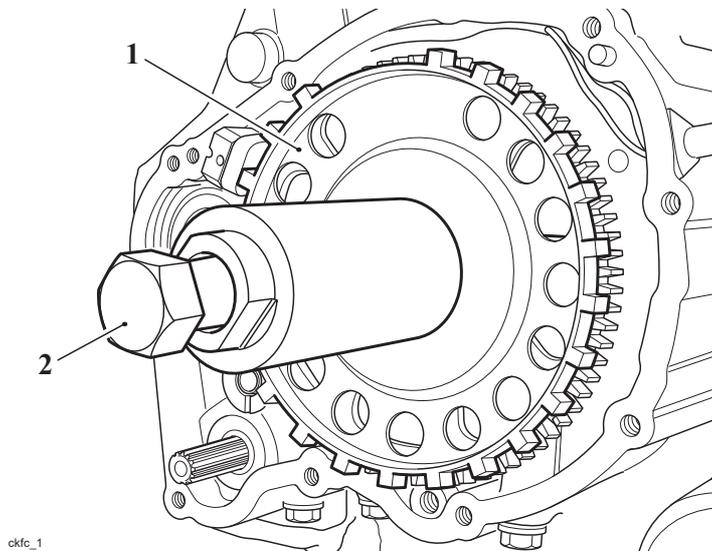
1. Thrust pad

6. Assemble T3880365 - Alternator Housing Puller to the threaded centre section of the trigger wheel.

Note

- Ensure that the thrust pad does not fall out during assembly of the tool.

7. Hold the outer of the tool to prevent rotation then tighten the draw-bolt in the centre of the tool to release the taper seating of the trigger wheel from the crankshaft.

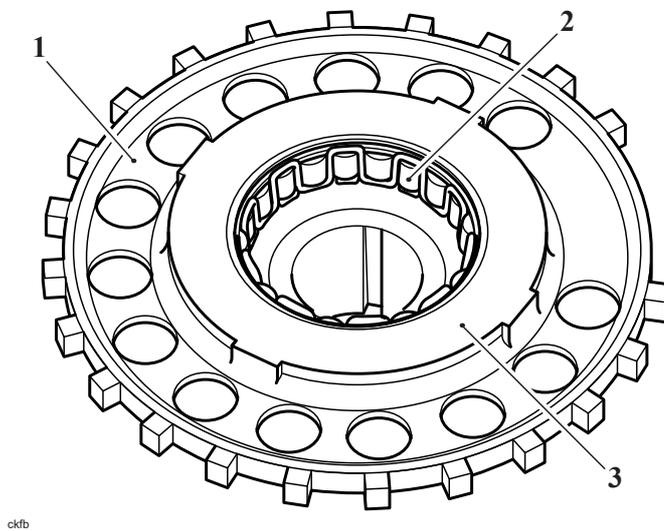


- 1. Trigger Wheel**
- 2. T3880365 - Alternator Housing Puller**

8. Withdraw the trigger wheel and tool as an assembly and then separate the tool from the trigger wheel. Collect the Woodruff Key and the tool thrust pad from the crankshaft.

9. Remove the starter gear from the trigger wheel.

10. Remove the sprag retaining clip and remove the sprag clutch. Discard the sprag retaining clip.



ckfb

1. **Trigger Wheel**
2. **Sprag clutch**
3. **Sprag retaining clip**

Trigger Wheel, Starter Drive Gears and Sprag Clutch - Inspection

1. Examine the sprag clutch for signs of slipping, overheating and for any other damage.
2. Examine all gears for chipped teeth, overheating and for any other damage.
3. Examine all bearings for chipped, broken or seized rollers, overheating and for any other damage.
4. Examine the end of the crankshaft for damage.

Trigger Wheel, Starter Drive Gears and Sprag Clutch - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

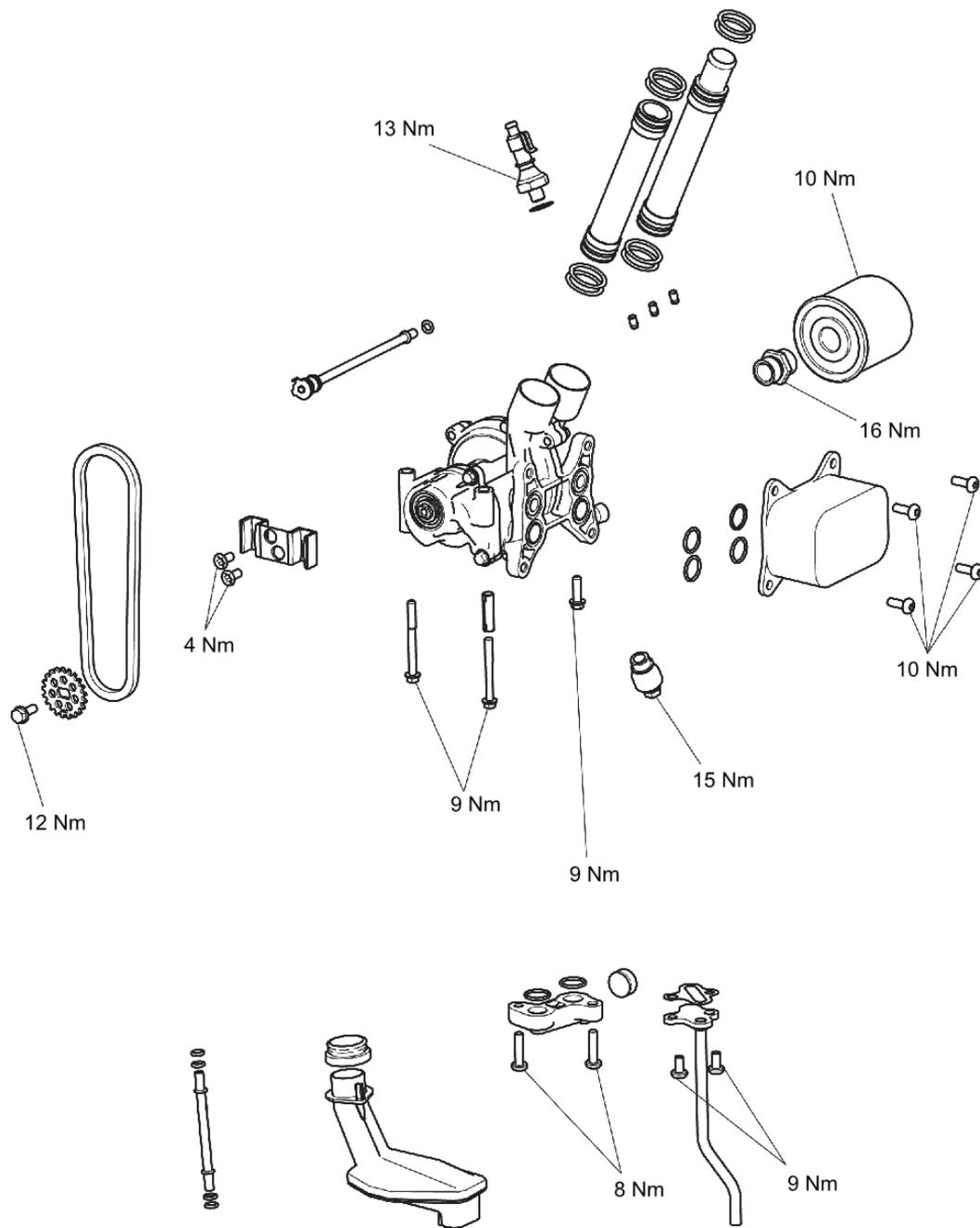
1. Assemble the needle roller bearing and starter gear to the trigger wheel.
2. Refit the Woodruff Key to the crankshaft slot.
3. Locate the trigger wheel to the crankshaft, ensuring the Woodruff Key remains in position on the crankshaft.
4. Prevent the trigger wheel from turning using T3880606 - Flywheel Restraint Handle and T3880608 - Flywheel Pin Set then fit and tighten a new trigger wheel fixing and washer, first to **85 Nm**, then to **120 Nm**.
5. Check that the two flat washers are fitted to the starter motor torque limiter, one at each end.
6. Refit the starter motor torque limiter, engaging the gear teeth to the starter motor shaft.
7. Lubricate the idler gear shaft.
8. Fit the small idler gear and shaft to the crankcase.

Perform the following operations:

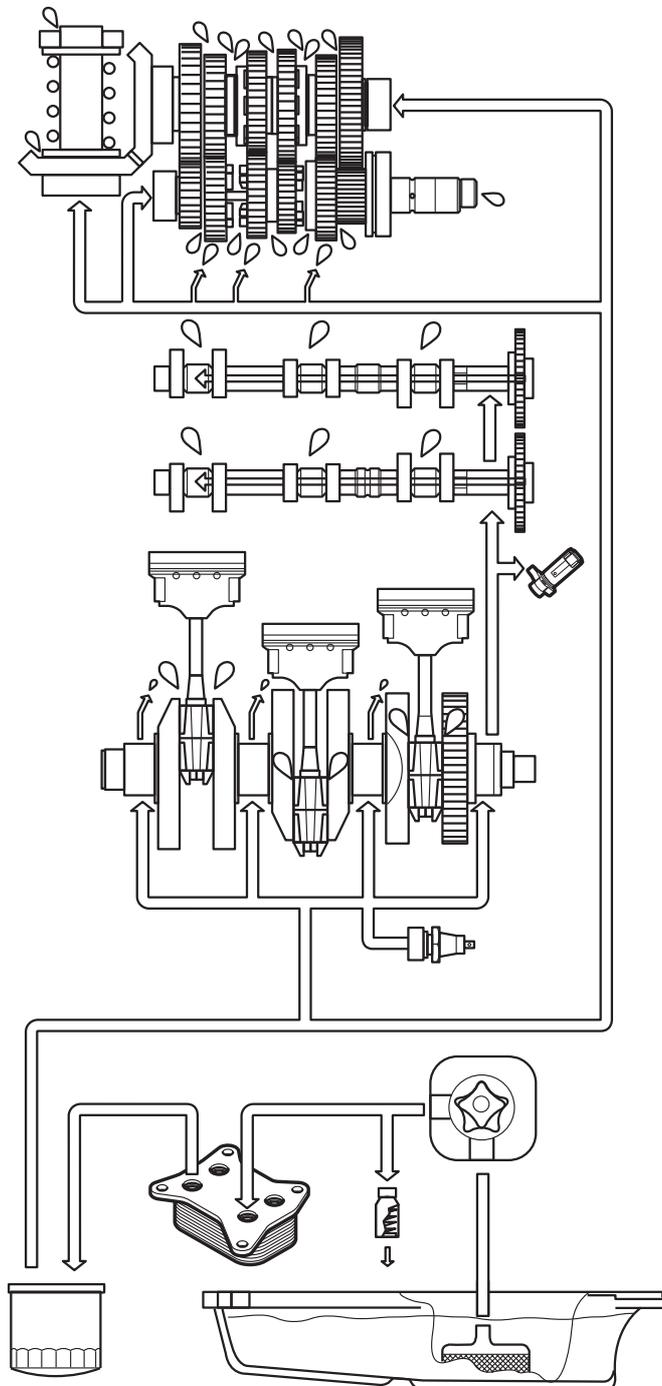
- Trigger Wheel Cover - Installation

Lubrication

Exploded View – Lubrication System



Engine Oil Circuit Diagram



Engine Oil Circuit Description

Oil is collected from the sump and is drawn through a mesh strainer into the oil pump rotor. The oil pump is fitted with a single pumping rotor which supplies pressurised oil to the lubrication circuit and the heat exchanger.

- Pressurised oil is delivered to the heat exchanger near to where the oil pressure relief valve is fitted. The relief valve is set to open at 5.2 bar (75 lb/in²) and when open, returns high pressure oil direct to the sump.
- Oil arrives at the heat exchanger (mounted on the oil pump) where it is cooled, and then it passes to the oil filter.
- Filtered oil is fed to the main gallery located under the crankshaft. Here it is delivered to the crankshaft main bearings and, via drillings in the crankshaft, to the big end bearings. Spray jets located in the upper crankcase, behind the main bearing shells, lubricate the pistons and connecting rod small ends. These jets are fed oil from the crankshaft oil feed.
- A low oil pressure warning light switch is connected to the main gallery.
- Some oil is sent directly to the timing chain tensioner and cylinder head via a drilling in the upper crankcase. Oil that arrives at the cylinder head is fed to both camshafts via a gallery in the cylinder head

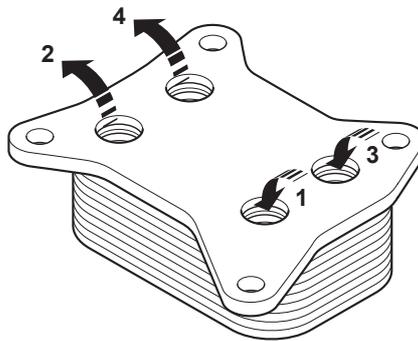
casting that delivers oil directly to the sprocket end camshaft bearings. Oil is then fed through the hollow camshafts to the other camshaft bearings, the tappet buckets and the valves.

- Oil is fed to the gearbox via a spray bar and drillings that supply oil directly to the end of the transmission shafts. The spray bar also directs oil to the bevel box bearings and gears.
- Oil is circulated along the gearbox shafts to exit holes that feed directly to the bearings and gears.

Heat Exchanger

The heat exchanger is used to transfer heat from the engine oil into the coolant. Oil is delivered to the heat exchanger via an opening (1) after which it flows through the heat exchanger core, where it is circulated. Coolant is pumped through a similar opening (3) in to the heat exchanger core to cool the oil. The cooled oil then exits the heat exchanger (2) and flows to the oil filter. The coolant then flows out of the heat exchanger (4) and through the rest of system.

An additional benefit of the heat exchanger is that, as the engine coolant reaches its operating temperature more quickly than the engine oil, the oil is heated by the engine coolant at lower engine temperatures; this allows the engine oil to reach its optimum operating temperature more quickly, thereby helping to improve engine oil life, reduce exhaust emissions and reduce engine wear.

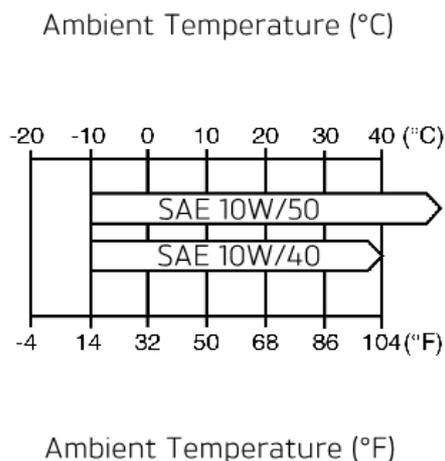


Engine Oil - Specification

Use semi or fully synthetic 10W/40 or 10W/50 motorcycle engine oil which meets specification API SH (or higher) **and** JASO MA, such as Castrol Power 1 Racing 4T, sold as Castrol Power RS Racing 4T in some countries.

Triumph recommends the fully synthetic 10W/40 motorcycle engine oil for most conditions. The oil viscosity may need to be changed to accommodate the ambient temperatures in your riding area.

Refer to the chart below for the correct oil viscosity (10W/40 or 10W/50) to be used in your riding area.



Oil Viscosity Temperature Range



 **CAUTION**

Triumph high performance fuel injected engines are designed to use semi or fully synthetic motorcycle engine oil which meets specification API SH (or higher) **and** JASO MA.

Do not add any chemical additives to the engine oil. The engine oil also lubricates the clutch and any additives could cause the clutch to slip.

Do not use mineral, vegetable, non-detergent oil, castor based oils or any oil not conforming to the required specification. The use of these oils may cause instant, severe engine damage.

Ensure no foreign matter enters the crankcase during an oil change or top up.

Triumph Engine Oil

Your Triumph motorcycle is a quality engineered product which has been carefully built and tested to exacting standards. Triumph Motorcycles are keen to ensure that you enjoy optimum performance from your motorcycle and with this objective in mind have tested many of the engine lubricants currently available to the limits of their performance.

Disposal of Used Engine Oil and Oil Filters

To protect the environment, do not pour oil on the ground, down sewers or drains, or into watercourses. Do not place used oil filters in with general waste. If in doubt contact your local authority.

Oil Level Inspection

In order for the engine, transmission, and clutch to function correctly, maintain the engine oil at the correct level, and change the oil and oil filter in accordance with scheduled maintenance requirements.

 **WARNING**

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated engine wear and may result in engine or transmission seizure. Seizure of the engine or transmission may lead to loss of motorcycle control and an accident.

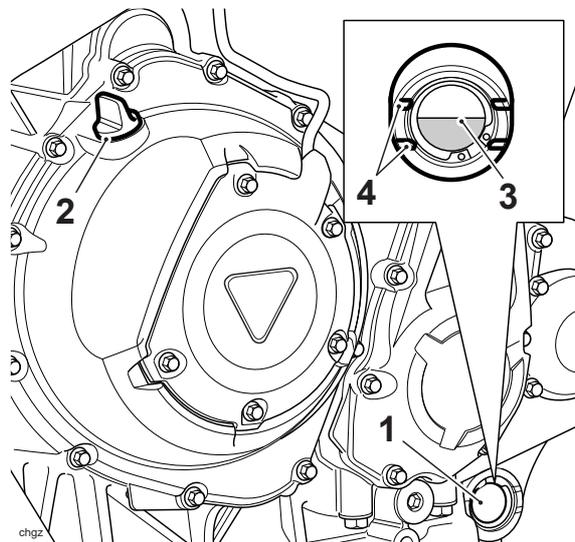
 **WARNING**

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open air or in an area with adequate ventilation.

 **CAUTION**

Running the engine with insufficient oil will cause engine damage. If the low oil pressure indicator remains on, stop the engine immediately and investigate the cause.

1. With the motorcycle upright and off the side stand, check to see if oil is visible in the sight glass at a point mid-way between the upper (maximum) and lower (minimum) horizontal lines marked on the crankcase.
2. If it is necessary to top up the oil level, remove the filler plug and add oil, a little at a time, until the level registered in the sight glass is correct. Refit and tighten the filler plug.



1. **Sight glass**
2. **Filler plug**
3. **Oil level (correct level shown)**
4. **Crankcase oil level lines**

Note

- **An accurate indication of the level of oil in the engine is only shown when the engine is at normal operating temperature and the motorcycle is upright (not on the side stand).**
3. Start the engine and run at idle for approximately five minutes.
 4. Stop the engine, then wait for at least three minutes for the oil to settle.
 5. Note the oil level visible in the sight glass.
 6. When correct, oil should be visible in the sight glass at a point mid-way between the upper (maximum) and lower (minimum) horizontal lines marked on the crankcase.
 7. If necessary, top up the oil level as described earlier.
 8. Once the correct level is reached, fit and tighten the filler plug.

Oil and Oil Filter Change

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

! WARNING

Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contamination which can cause cancer. Wear suitable clothing and avoid skin contact.

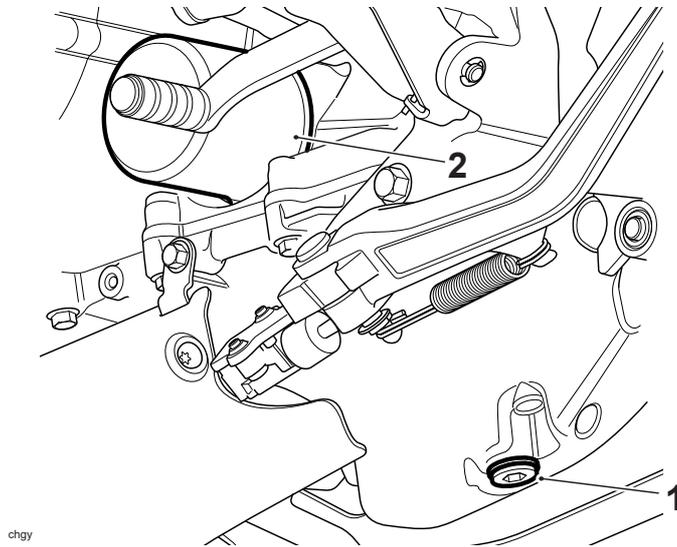
The engine oil and filter must be replaced in accordance with scheduled maintenance requirements.

1. Warm up the engine thoroughly, and then stop the engine and secure the motorcycle in an upright position on level ground.
2. Place an oil pan beneath the engine.

! WARNING

The oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.

3. Remove the oil drain plug.



1. Oil drain plug
2. Oil filter

Note

- **Note the routing of any wiring harnesses in close proximity to the oil filter.**

4. Unscrew and remove the oil filter using T3880313 - Oil Filter Wrench.
5. Dispose of the old oil filter in an environmentally friendly way.
6. Pre-fill a new oil filter with clean engine oil.
7. Apply a smear of clean engine oil to the sealing ring of the new oil filter.

Note

- **Ensure all wiring harnesses in close proximity to the oil filter are routed as noted during removal. Take care not to trap any wiring harnesses when fitting the new oil filter.**

8. Fit the oil filter and tighten to **10 Nm**.
9. After the oil has completely drained out, fit a new sealing washer to the drain plug. Fit and tighten the plug to **25 Nm**.
10. Fill the engine with new oil of the type and grade listed previously and in the specification section.
11. Start the engine and allow to idle.

CAUTION

Racing the engine before the oil reaches every part can cause engine damage or seizure.

12. Ensure that the oil pressure warning light extinguishes shortly after starting and the message WARNING - OIL PRESSURE LOW is not shown in the instrument display screen.

CAUTION

If the engine oil pressure is too low, the low oil pressure warning light will illuminate. If this light stays on when the engine is running, stop the engine immediately and investigate the cause. Running the engine with low oil pressure will cause engine damage.

13. Stop the engine and check the oil level. Adjust if necessary.

Low Oil Pressure Warning Light Switch - Removal

WARNING

WARNING

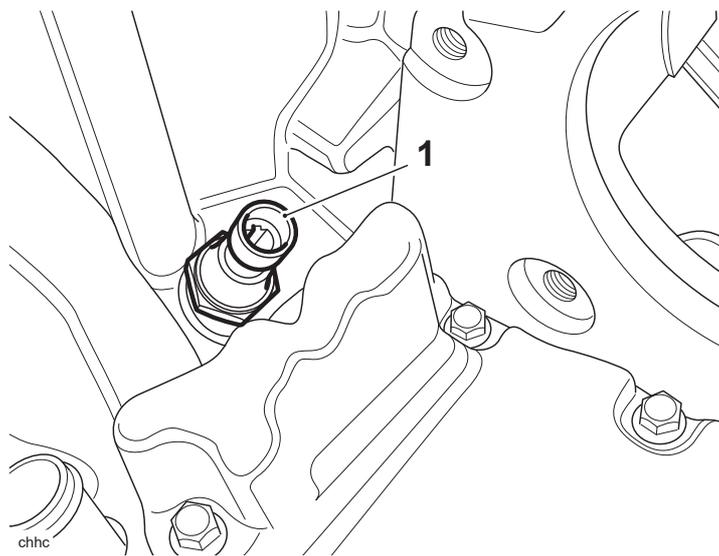
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- The low oil pressure warning light switch is located in the upper crankcase, behind the cylinder head.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Throttle Bodies/Injectors - Removal
 - Alternator - Removal
1. Disconnect the electrical connection to the switch.
 2. Remove the switch and collect the copper washer.



1. Low oil pressure warning light switch

Low Oil Pressure Warning Light Switch - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Incorporating a new copper washer, fit the switch and tighten to **13 Nm**.
2. Refit the electrical connection.

Perform the following operations:

- Alternator - Installation
- Throttle Bodies/Injectors - Installation
- Battery - Installation
- Rider's Seat - Installation
- Start the engine and ensure that the low oil pressure warning light goes out shortly after starting.

Oil Pump - Removal

WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

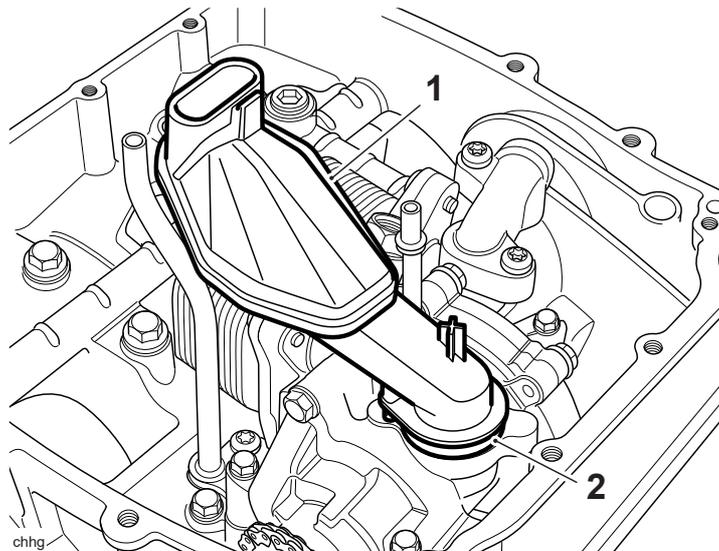
Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants which can cause cancer. When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.

CAUTION

Do not pour engine oil on the ground, down sewers or drains, or into watercourses. To prevent pollution of watercourses etc., dispose of used oil sensibly. If in doubt contact your local authority.

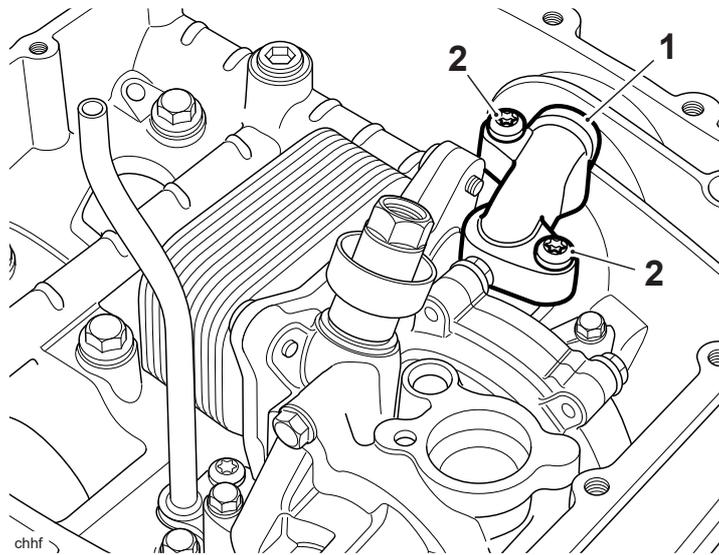
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Coolant Replacement - Drainage
 - Clutch - Removal
 - Sump - Removal
1. Remove the oil pick-up and seal.



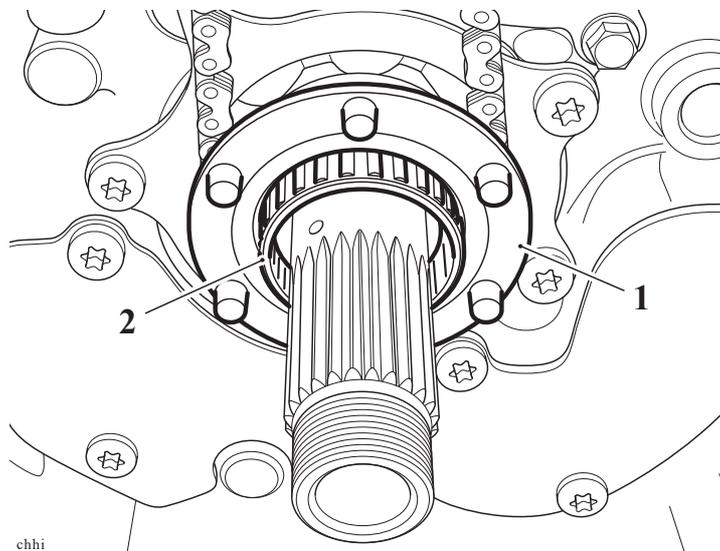
1. Oil pick-up
2. Seal

2. Release and discard the two fixings and remove the oil feed pipe. Remove and discard the two O-ring seals.



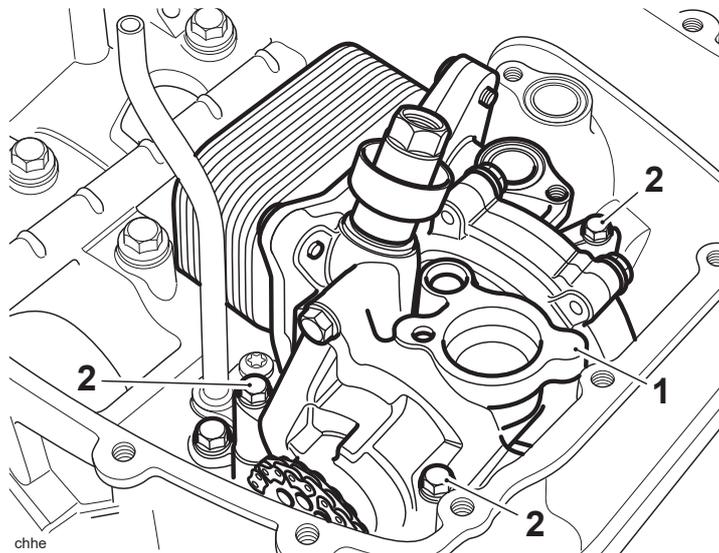
1. Oil feed pipe
2. Fixings

3. Slide the oil pump drive sprocket gently backwards and forwards to dislodge the inner needle roller bearing.
4. Carefully remove the bearing while supporting the oil pump drive sprocket.



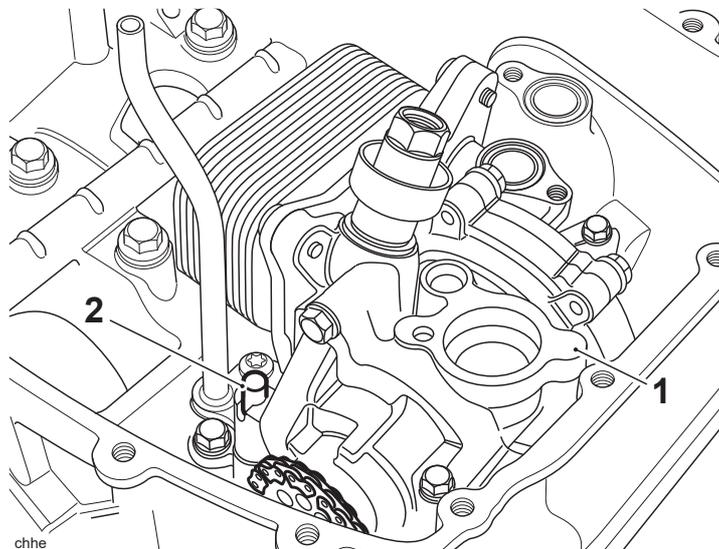
1. Oil pump drive sprocket
2. Needle roller bearing

5. Detach the drive chain from the oil pump.
6. Release the three oil pump fixings.



1. Oil pump
2. Fixings

7. Using a suitable tool, slide the dowel upwards to release the oil pump from the crankcase. It is not necessary to remove the dowel completely from the oil pump.

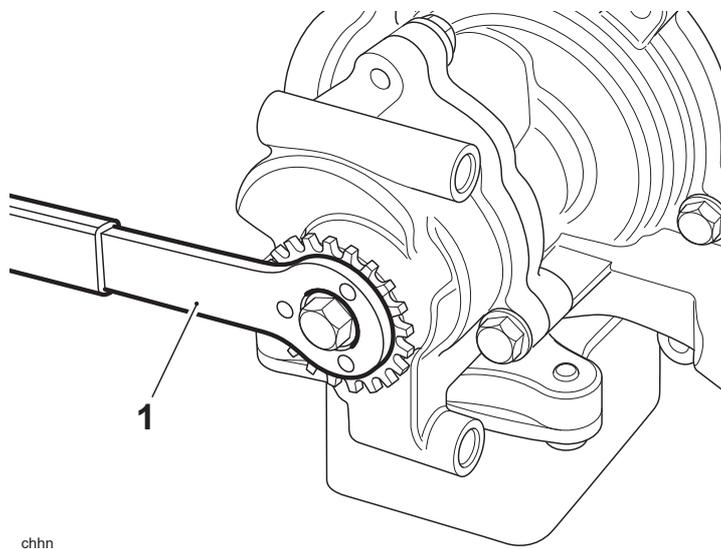


1. Oil pump
2. Dowel

8. Detach the oil pump from the coolant inlet and outlet tubes.
9. Carefully withdraw the oil pump from the crankcase.

Oil Pump - Inspection

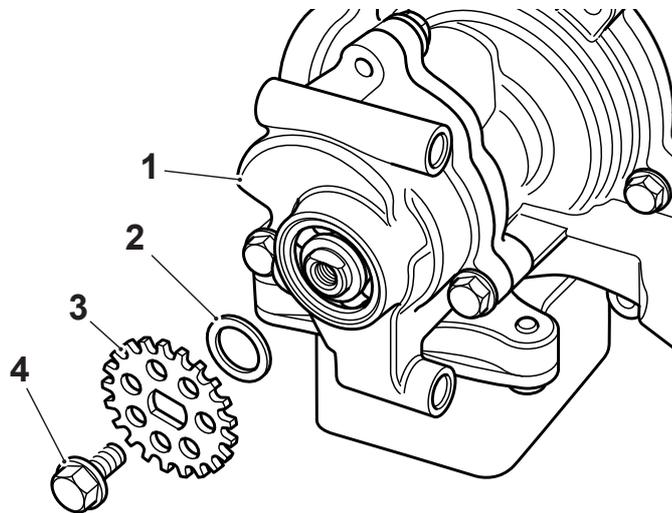
1. Prevent the oil pump sprocket from turning using T3880603 - Oil Pump Restraint and remove the centre fixing. Discard the fixing.



chhn

1. T3880603 - Oil Pump Restraint

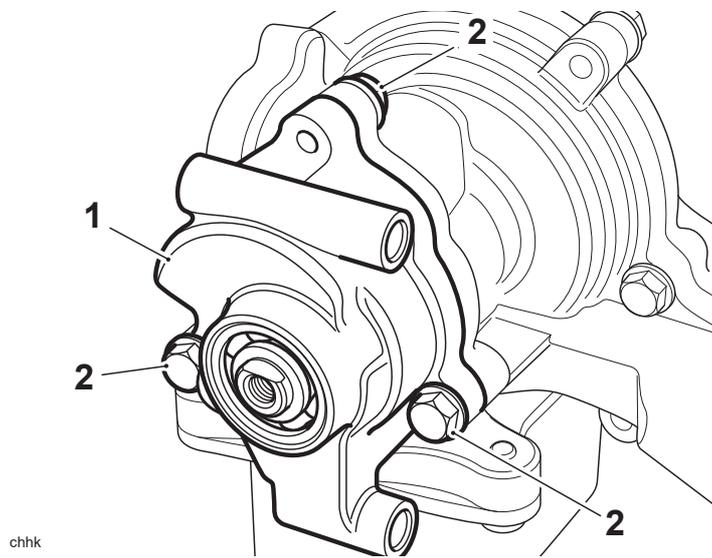
2. Remove the drive sprocket and spacer washer.



chhm

1. Oil pump
2. Spacer washer
3. Drive sprocket
4. Fixing

3. Release the three fixings and withdraw the oil pump rotor housing. Discard the fixings.

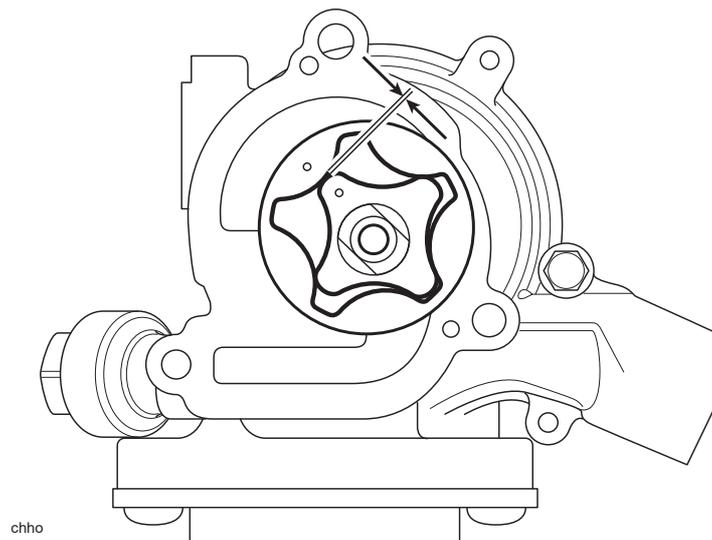


1. Oil pump rotor housing
2. Fixings

! CAUTION

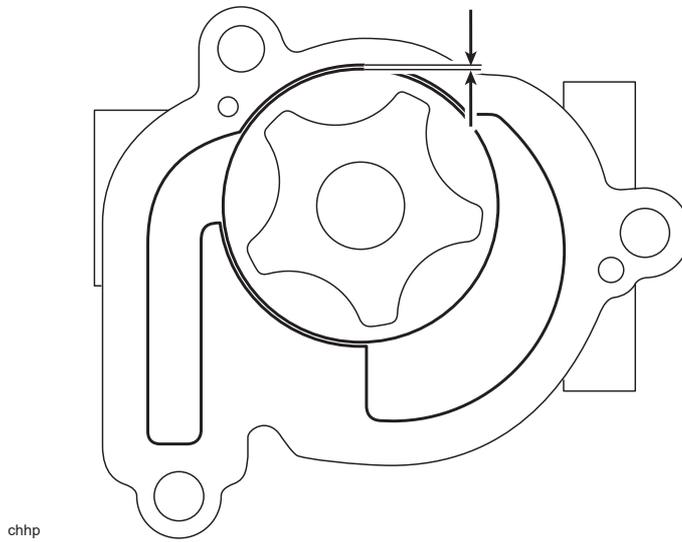
If any part of the oil pump is found to be outside the service limit, the complete pump must be replaced. Severe engine damage may result from the continued use of a faulty oil pump.

4. Measure the rotor tip clearance using feeler gauges.
5. For specifications refer to Lubrication.



Rotor Tip Clearance

6. Measure the pump body clearance using feeler gauges.



Pump Body Clearance

7. For specifications refer to Lubrication.
8. Measure the pump end clearance.
9. If any clearance measured is outside the service limits, renew the complete pump.
10. For specifications refer to Lubrication.
11. If all clearances are within service limits, liberally apply clean engine oil to all internal components. Refit the oil pump rotor housing to the oil pump body and secure with new fixings. Tighten the fixings to **10 Nm**.
12. Inspect the sprocket and chain for wear and/or damage. Replace the sprocket and chain if wear and/or damage is found.
13. Refit the spacer washer and oil pump sprocket and secure with a new fixing. Using T3880603 - Oil Pump Restraint to prevent rotation, tighten the fixing to **12 Nm**.

Oil Pump - Installation

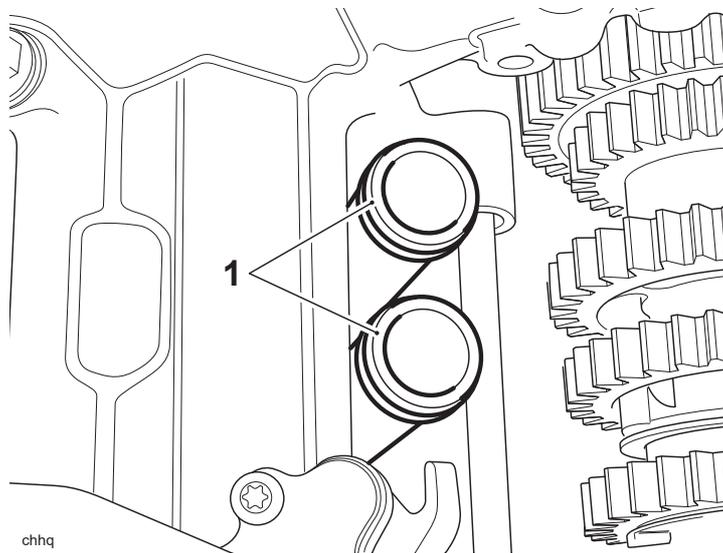
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

Before fitting the oil pump to the crankcase ensure the pump internal surfaces have been 'wetted' with clean engine oil. The pump may fail to pick-up oil from the sump if the surfaces have not been 'wetted'. This will cause the engine to run without engine oil pressure and will lead to severe engine damage.

1. Install new O-rings to the coolant inlet and outlet tubes.



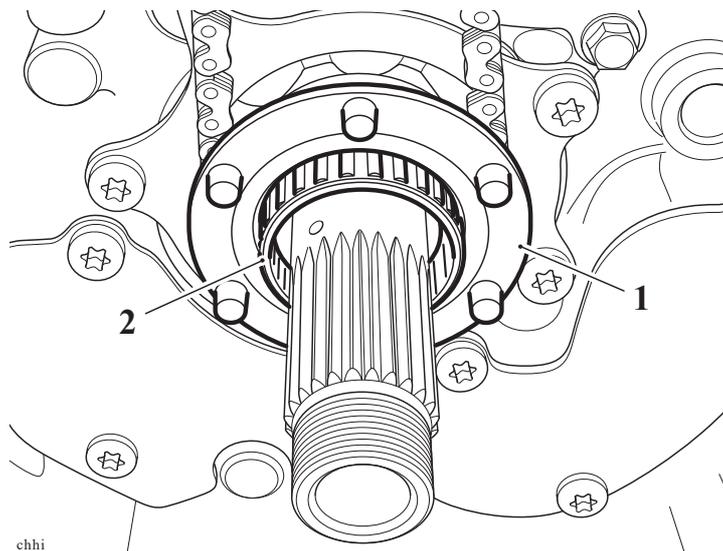
1. Coolant tubes

2. Fill the oil pump with new engine oil, turning the pump rotor as the oil is poured in to ensure all surfaces are coated with oil.
3. Position the oil pump to the crankcase and push the openings in the water pump over the coolant inlet and outlet tubes.
4. Align the oil pump to the crankcase, and ensure the oil pump dowel correctly locates over the bolt hole.

CAUTION

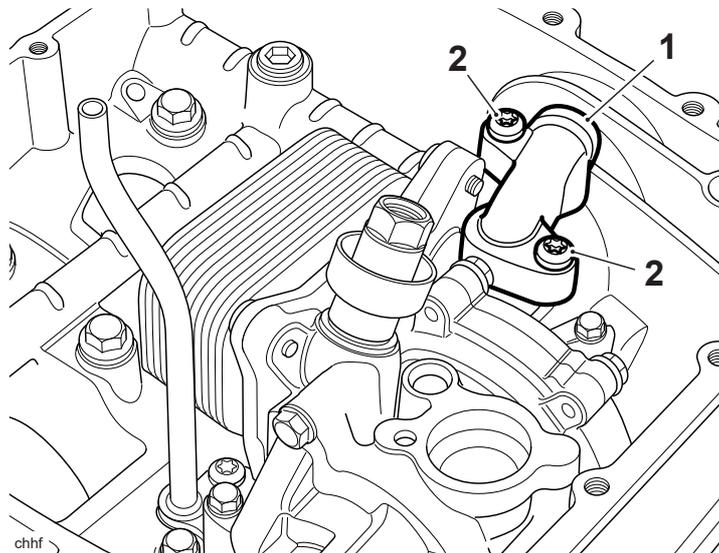
Do not use excessive force to insert the dowel into the crankcase. Severe dowel or crankcase damage may result from the use of excessive force.

5. Using a suitable pin punch, gently tap the dowel downwards into the crankcase until it seats.
6. Secure the oil pump with new bolts. Tighten the bolts to **9 Nm**.
7. Feed the drive chain over the transmission input shaft and fit to the sprocket.
8. Fit the drive chain to the oil pump sprocket.
9. Support the oil pump drive sprocket and carefully refit the needle roller bearing.



1. Oil pump drive sprocket
2. Needle roller bearing

10. Install two new oil feed pipe O-rings to the crankcase.
11. Refit the oil feed pipe. Fit new bolts and tighten to **8 Nm**.



1. Oil feed pipe
2. Fixings

12. Install a new O-ring to the oil pick-up and refit the oil pick-up.

Perform the following operations:

- Clutch - Installation
- Refit the sump, ensuring the water pump drain tube is correctly installed (see Sump - Installation)
- Refill the engine with oil (see Oil and Oil Filter Change)
- Refill the cooling system (see Coolant Replacement - Filling)
- Battery - Installation
- Rider's Seat - Installation

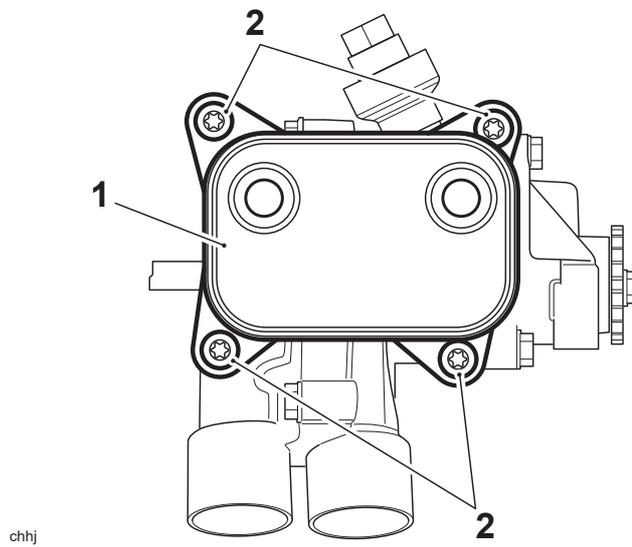
Heat Exchanger - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Sump - Removal
 - Oil Pump - Removal
1. Release the heat exchanger fixings.



1. Heat exchanger
2. Fixings

2. Detach the heat exchanger.
3. Collect the four O-rings from the oil pump.

Heat Exchanger - Inspection

1. Inspect the heat exchanger for fractures and signs of oil leakage or coolant leakage.

Heat Exchanger - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit new O-rings to the oil pump.
2. Position the heat exchanger to the oil pump, noting that it will only fit one way.
3. Secure with new fixings and tighten to **10 Nm**.
4. Refit the oil pump (see Oil Pump - Installation).
5. Refit the sump, ensuring the water pump drain tube is correctly installed (see Sump - Installation).
6. Refill the engine with oil (see Oil and Oil Filter Change).
7. Reconnect the battery, positive (red) lead first.
8. Start the engine and check for oil leaks. Once a leak check has been made, stop the engine and allow to stand for 10 minutes.
9. Adjust the engine oil level (see Oil Level Inspection).
10. Refit the rider's seat (see Rider's Seat - Installation).

Engine Remove and Install

Engine - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

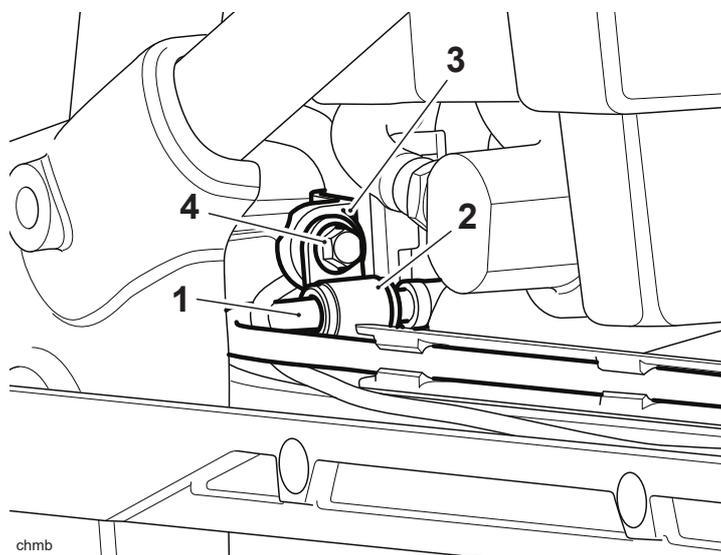
Perform the following operations:

- Raise and securely support the motorcycle

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Airbox - Removal
- Expansion Tank - Removal
- Throttle Bodies/Injectors - Removal
- Radiator - Removal
- Engine Bars - Removal
- Exhaust Header Pipes - Removal
- Drain the engine oil (see Oil and Oil Filter Change)
- Rear Bevel Box - Removal.

Note

- **Secure the coolant hoses to prevent damage as the engine is removed.**
1. Drain the clutch fluid and detach the clutch hose from the master cylinder (see Clutch Master Cylinder - Removal).
 2. Detach the rear brake line and its bracket from the crankcase tidy moulding.



1. **Rear brake line**
2. **Bracket**
3. **Crankcase tidy**
4. **Fixing**

3. Disconnect all electrical connections to the engine, noting the connection locations and the position of cable ties securing the harnesses in position.
4. Place a support beneath the engine and ensure that the frame is still adequately and securely supported.

Note

- **The washers and a spacer are only fitted to the right hand side of the frame.**
 - **Note the position for each of the mounting bolts, washers and the spacer for installation.**
5. Remove the engine mounting bolts, lock nuts and washer from the front of the cylinder head. Discard the lock nuts.

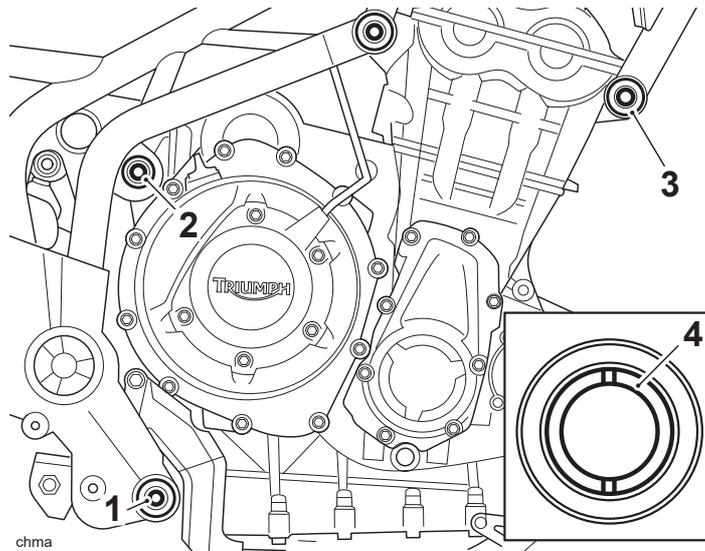
Note

- **The cylinder head rear mounting on the right hand side has a spacer between it and the frame. Note the spacer's position for installation.**
6. Remove the engine mounting bolts and a spacer from the rear of the cylinder head. Discard the mounting bolts.
 7. Remove the engine mounting bolts, washers and lock nuts from the crankcase mountings. Discard the lock nuts.

Note

- There are three frame adjuster sleeves for this model. They are located as follows:
- Two of the frame adjuster sleeves are located on the right hand side of the frame.
- The third frame adjuster sleeve is located in the front right hand mounting of the cylinder head.

8. Using T3880377 - Engine Mounting Adjuster, loosen the frame adjuster sleeves.



1. Lower crankcase adjuster
2. Upper crankcase adjuster
3. Cylinder head front right hand adjuster
4. Adjuster

CAUTION

To prevent body damage, do not allow clutch and brake fluid to contact any area of the bodywork.

CAUTION

To prevent damage to components, lower the engine very carefully.

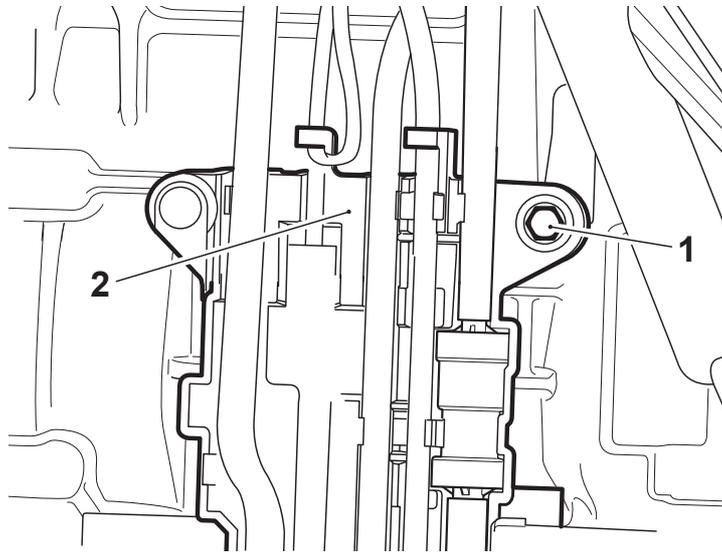
9. Temporarily refit the mounting bolts to the front mountings of the cylinder head and frame.

Note

- If fitted, note the routing of the evaporative canister hoses for installation.

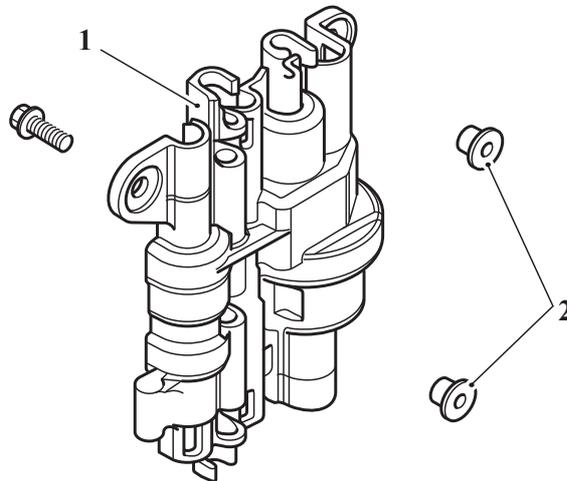
10. Carefully partially lower the rear of the engine to gain access to the rear cable tidy on the crankcase.

11. Release the fixing and detach the cable tidy from the crankcase. Discard the fixing.



1. Fixing
2. Cable tidy

12. Collect the two flanged sleeves from the cable tidy.

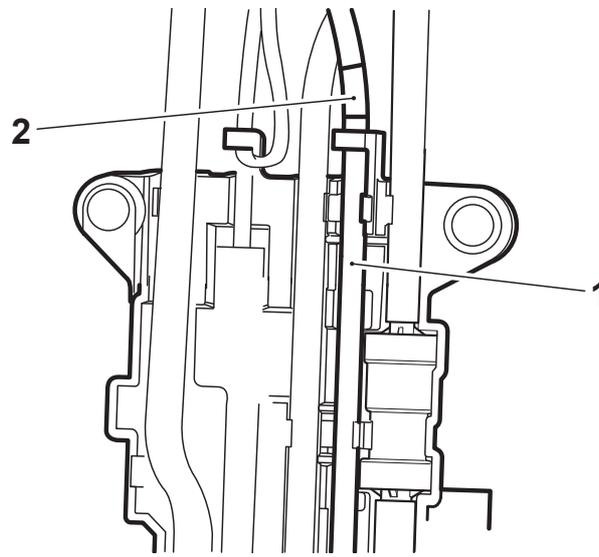


1. Cable tidy
2. Flanged sleeves

Note

- Note the position of the blue tape on the oxygen sensor in relation to the cable tidy for installation.

13. Detach the oxygen sensor harness from the cable tidy.



1. Oxygen sensor harness
2. Blue tape

14. Support the engine and remove the front mounting bolts for the cylinder head. Discard the mounting bolts.

Note

- Note the routing of the clutch hose for installation.

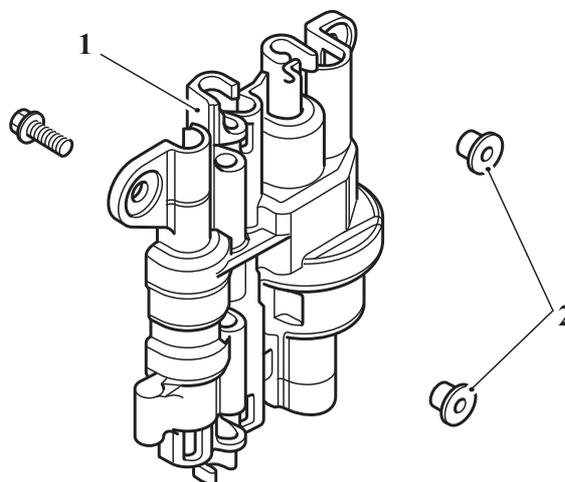
15. Lower the engine while feeding the clutch hose around the frame and remove the engine.

Engine - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the engine beneath the frame.
2. Raise the engine, while routing the clutch hose as noted for removal.
3. Temporarily fit the mounting bolts to the front mountings of the cylinder head and frame.
4. Lower the rear of the engine to gain access to the rear cable tidy on the crankcase.
5. Fit the flanged sleeves to the cable tidy.



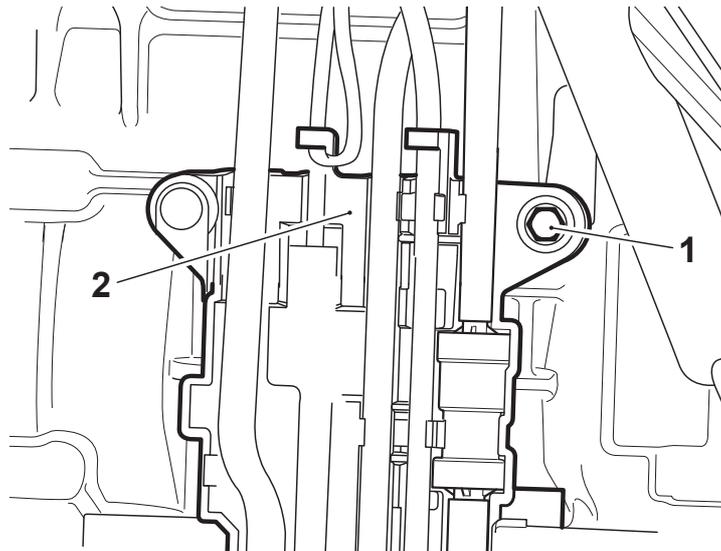
1. Cable tidy
2. Flanged sleeves

6. Fit the oxygen sensor harness to the cable tidy. Ensure that the blue tape on the oxygen sensor harness is positioned as noted for removal.

Note

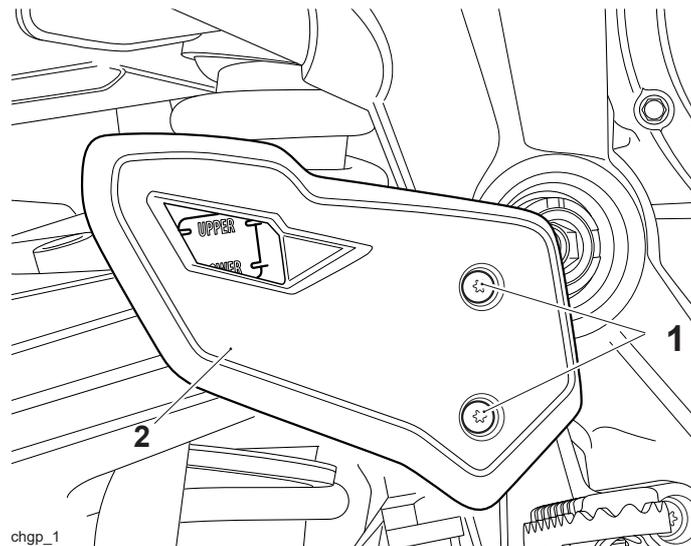
- When fitting the cable tidy, ensure its left hand mounting is aligned correctly to its threaded hole for the brake line clip.

7. Attach the cable tidy to the crankcase and tighten its new fixing to **6 Nm**.



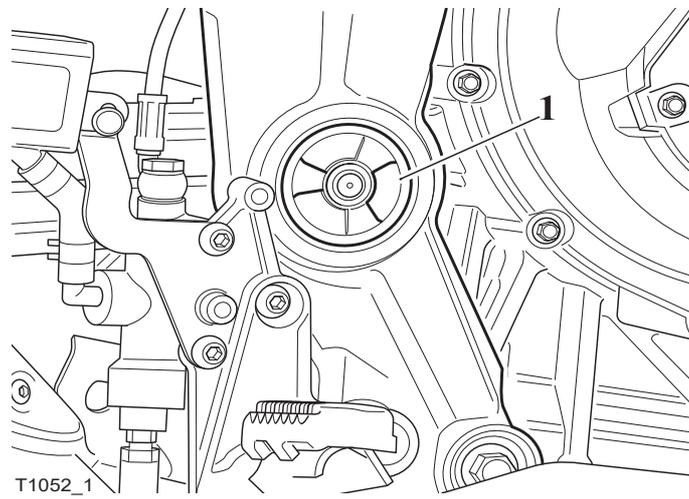
1. Fixing
2. Cable tidy

8. Release the fixings and remove the right hand heel guard.



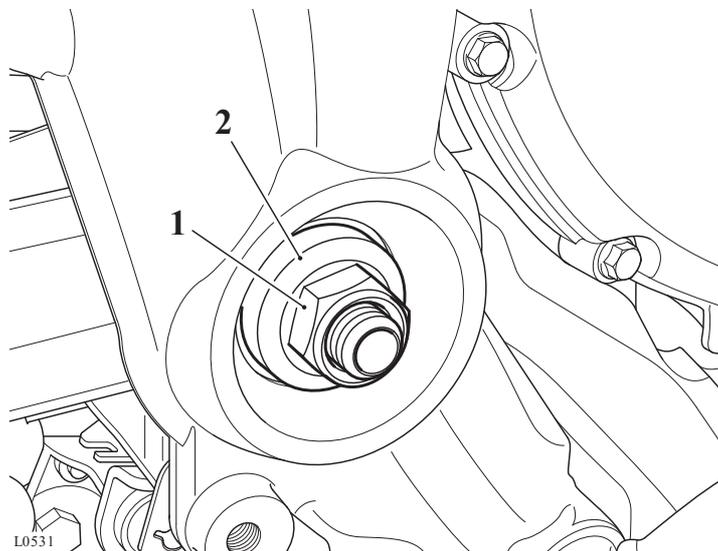
1. Fixings
2. Heel guard

9. Carefully remove the cover from the right hand swinging arm pivot pin.



1. Cover

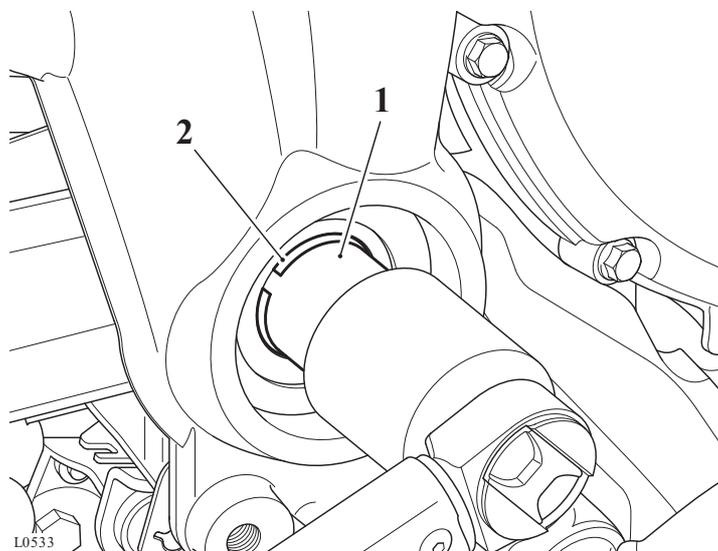
10. Remove the lock nut and adapter from the swinging arm spindle. Discard the lock nut.



1. Lock nut

2. Adapter

11. Using T3880182 - Wrench, Frame Adjuster, loosen the swinging arm frame adjuster but do not fully remove. Do not remove the swinging arm spindle.



1. T3880182 - Wrench, Frame Adjuster
2. Swinging arm frame adjuster

Note

- If fitted, ensure that the evaporative canister hoses are routed as noted for removal while raising the rear of the engine.

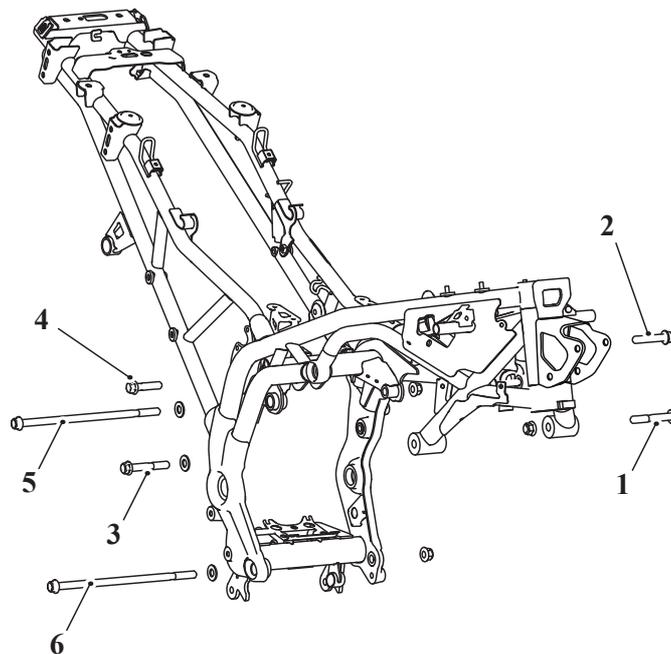
12. Raise the rear of the engine and align the engine to the frame.

! CAUTION

Unless the following engine mounting bolt tightening sequence is precisely followed, severe frame damage can occur.

The engine MUST be cold prior to starting the frame bolt tightening sequence.

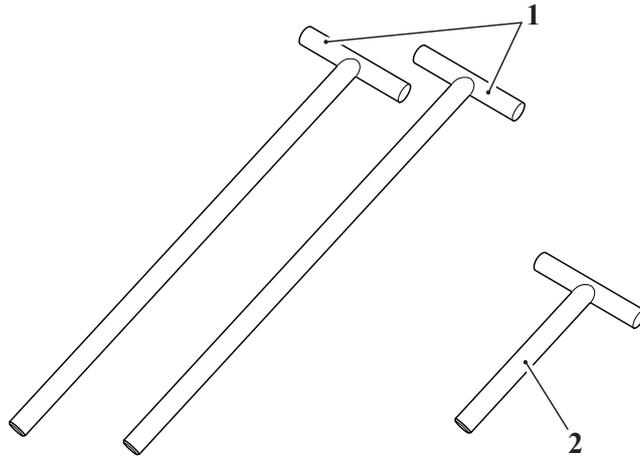
Frame Bolts Exploded View



1. Left hand front cylinder head bolt
2. Left hand rear cylinder head bolt
3. Right hand front cylinder head bolt
4. Right hand rear cylinder head bolt
5. Upper crankcase bolt
6. Lower crankcase bolt

Note

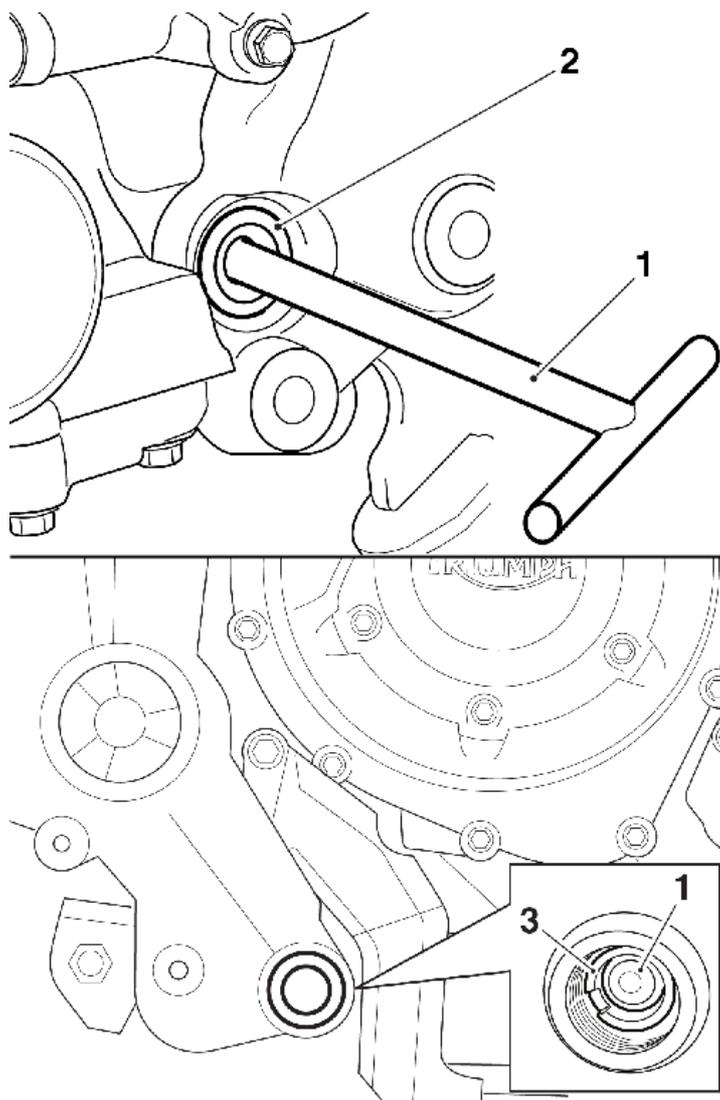
- The T3880637 - Kit, Engine to Frame Alignment Bars is required to correctly align the engine to the frame for the following tightening sequence.
- Adjust the engine position as necessary to allow the engine to frame alignment bars to be inserted and removed freely.



T3880637 - Kit, Engine to Frame Alignment Bars

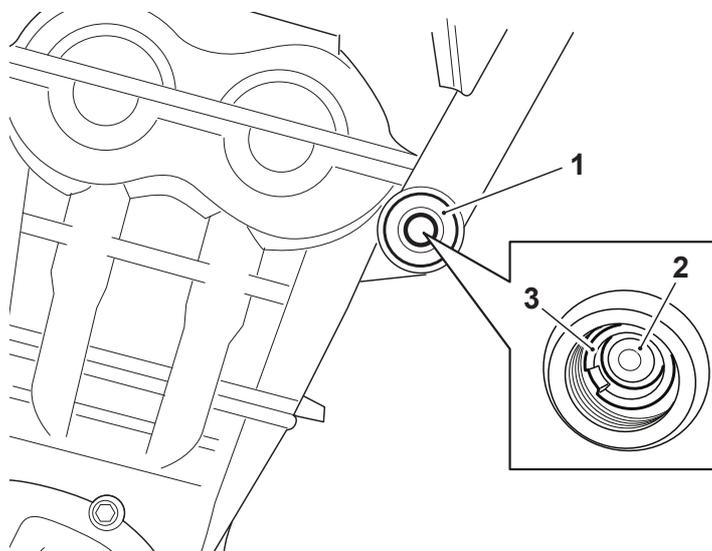
1. Crankcase alignment bars
2. Cylinder head alignment bar

13. Insert the crankcase alignment bars into the upper and lower crankcase mountings from the left hand side of the frame. Ensure the alignment bars are located through the engine and into the crankcase adjusters on the right hand side of the frame. Allow enough clearance on the right hand side of the frame to enable the threaded adjusters to be adjusted.



1. Crankcase alignment bar
2. Frame to crankcase mounting (lower mounting shown - left hand side of frame)
3. Crankcase adjuster (lower mounting shown - right hand side of frame)

14. Remove the right hand front cylinder head bolt that was temporarily fitted earlier in this procedure.
15. Insert the cylinder head alignment bar into the left hand side of the right hand front cylinder head mounting point. Allow enough clearance on the right hand side of the frame to enable the threaded adjuster to be adjusted.

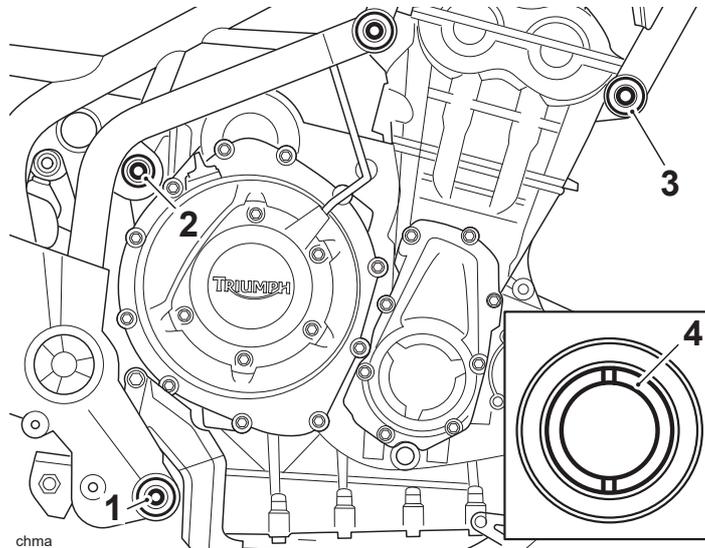


1. **Right hand front cylinder head mounting point**
2. **Cylinder head alignment bar (end of bar shown)**
3. **Cylinder head adjuster**

16. Lubricate the threads of the rear cylinder head bolts only with a smear of proprietary high temperature copper-based grease.
17. Fit the right hand rear cylinder head bolt ensuring that the spacer is fitted between the cylinder head and frame. Do not fully tighten at this stage.
18. Fit the left hand rear cylinder head bolt. Do not fully tighten at this stage.
19. Fit a new lock nut to the left hand front cylinder head bolt and tighten to **24 Nm**.
20. Tighten the left hand rear cylinder head bolt to **85 Nm**.

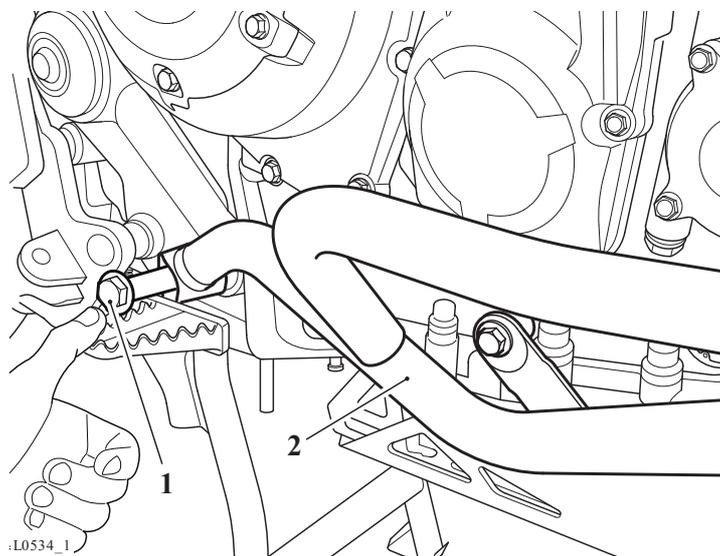
Note

- **If, after tightening each adjuster and frame fixing, any of the engine to frame alignment bars and frame fixings cannot be removed and inserted freely, check that the engine is still adequately supported, loosen all tightened adjusters and frame fixings and restart the tightening sequence from step 18.**
21. Using T3880377 - Engine Mounting Adjuster, tighten the three adjusters in the following sequence.
 - Tighten the lower crankcase adjuster to **5 Nm**.
 - Tighten the upper crankcase adjuster to **5 Nm**.
 - Tighten the cylinder head front right hand adjuster to **3 Nm**.



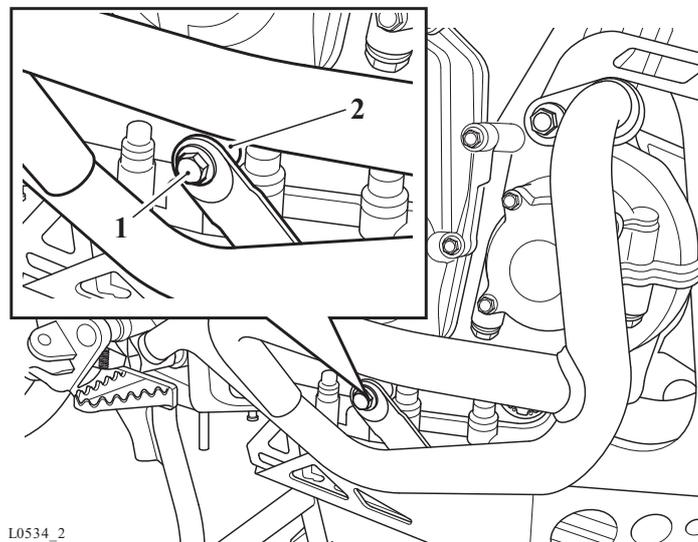
1. **Lower crankcase adjuster**
2. **Upper crankcase adjuster**
3. **Cylinder head right hand front adjuster**
4. **Adjuster**

22. Remove the upper crankcase alignment bar and fit the upper crankcase bolt and washer from the right hand side. Holding the bolt to prevent rotation, fit a new lock nut and tighten to **100 Nm**.
23. Align the right hand engine bar to the engine.
24. Remove the lower crankcase alignment bar and fit the lower crankcase mounting bolt through the rear mounting of the right hand engine bar, frame and lower crankcase. Loosely fit a new lock nut.



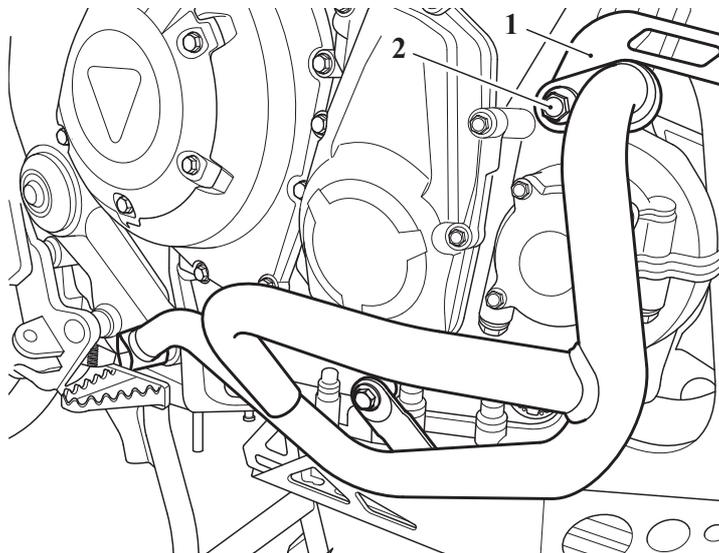
1. Lower crankcase mounting bolt
2. Right hand engine bar

25. Position the 13 mm spacer between the centre mounting and the engine as noted for removal. Fit the M8 x 33 mm bolt, do not fully tighten at this stage.



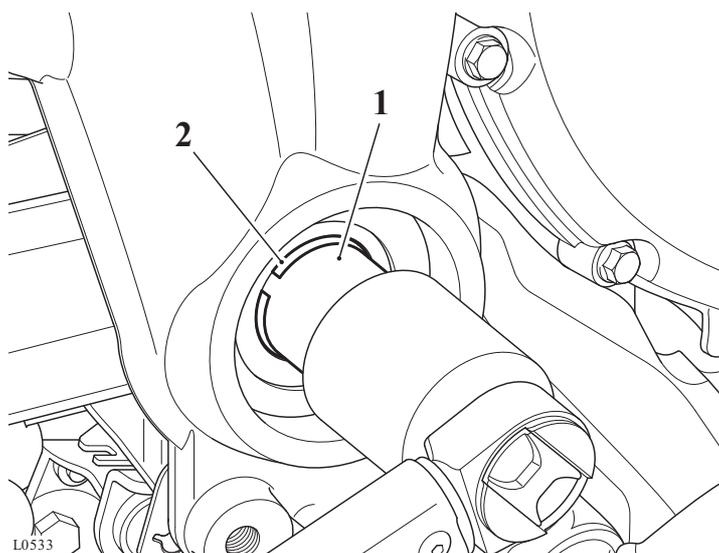
1. Lower crankcase mounting bolt
2. Bolt, M8 x 33 mm
3. Spacer, 13 mm

26. Position the right hand lower radiator bracket between the upper mounting for the engine bar and the engine as noted for removal. Fit the M8 x 25 mm bolt, do not fully tighten at this stage.



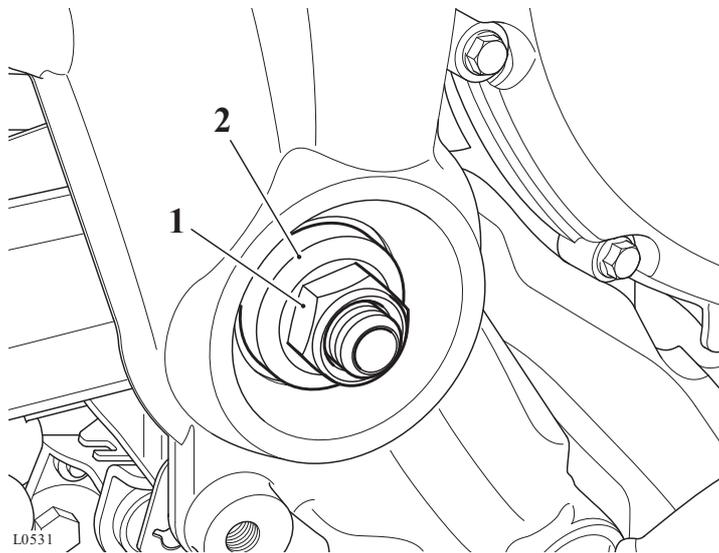
1. Radiator bracket
2. Bolt, M8 x 25 mm

27. Hold the lower crankcase mounting bolt to prevent rotation and tighten its lock nut to **100 Nm**.
28. Tighten the remaining frame bolts in the following sequence:
 - Tighten the right hand rear cylinder head bolt to **85 Nm**.
 - Tighten the left hand front cylinder head bolt to **115 Nm**.
 - Using T3880377 - Engine Mounting Adjuster, re-tighten the right hand front cylinder head adjuster to **3 Nm**.
 - Remove the cylinder head alignment bar from the right hand front cylinder head mounting and fit the bolt and washer. Fit a new lock nut and tighten to **100 Nm**.
29. Tighten the right hand engine bar centre mounting bolt to **18 Nm**.
30. Tighten the right hand engine bar upper mounting bolt to **18 Nm**.
31. Using T3880182 - Wrench, Frame Adjuster, tighten the right hand swinging arm frame adjuster to **6 Nm**.



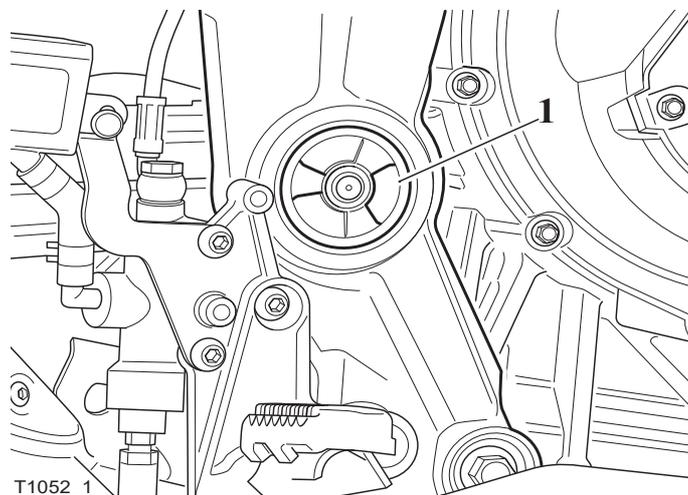
1. T3880182 - Wrench, Frame Adjuster
2. Swinging arm spindle frame adjuster

32. Fit the adapter to the swinging arm spindle as noted during removal and fit a new lock nut.



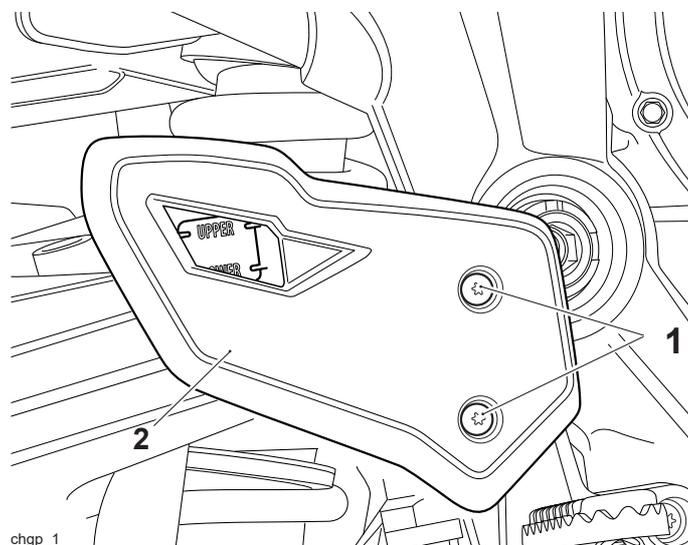
1. Adapter
2. Lock nut

33. Holding the swinging arm spindle to prevent rotation, tighten the lock nut to **110 Nm**.
34. Refit the cover to the swinging arm right hand pivot pin.



1. Cover

35. Refit the right hand heel guard and tighten its fixings to **7 Nm**.



1. **Fixings**
2. **Heel guard**

36. Remove the support from beneath the engine.
37. Refit the throttle bodies to the cylinder head (see Throttle Bodies/Injectors - Installation).
38. Reconnect all electrical connections to the engine and ensure they are secured as noted for removal.
39. Attach the brake line and its bracket to the crankcase and tighten the new fixing to **8 Nm**.

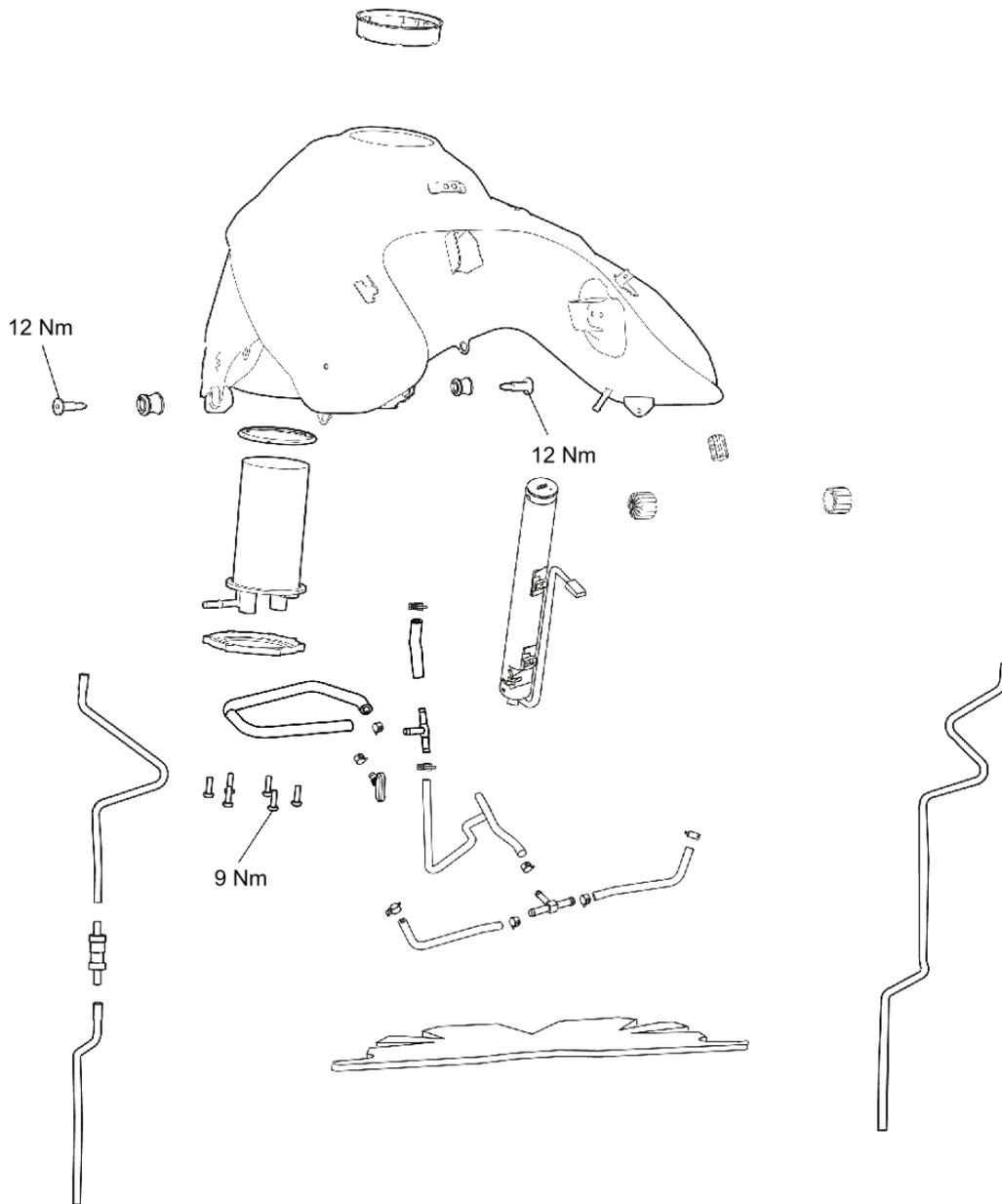
Perform the following operations:

- Rear Bevel Box - Installation
- Refit the clutch hose to the clutch master cylinder (see Clutch Master Cylinder - Installation)
- Fill and bleed the clutch system (see Bleeding the Clutch)
- Expansion Tank - Installation
- Exhaust Header Pipes - Installation
- Refit the left hand engine bar (see Engine Bars - Installation)
- Radiator - Installation
- Refill the cooling system (see Coolant Replacement - Filling)
- Fill the engine with oil of the correct grade and viscosity (see Oil and Oil Filter Change)
- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation
- Remove the motorcycle from its support and place on the side stand.

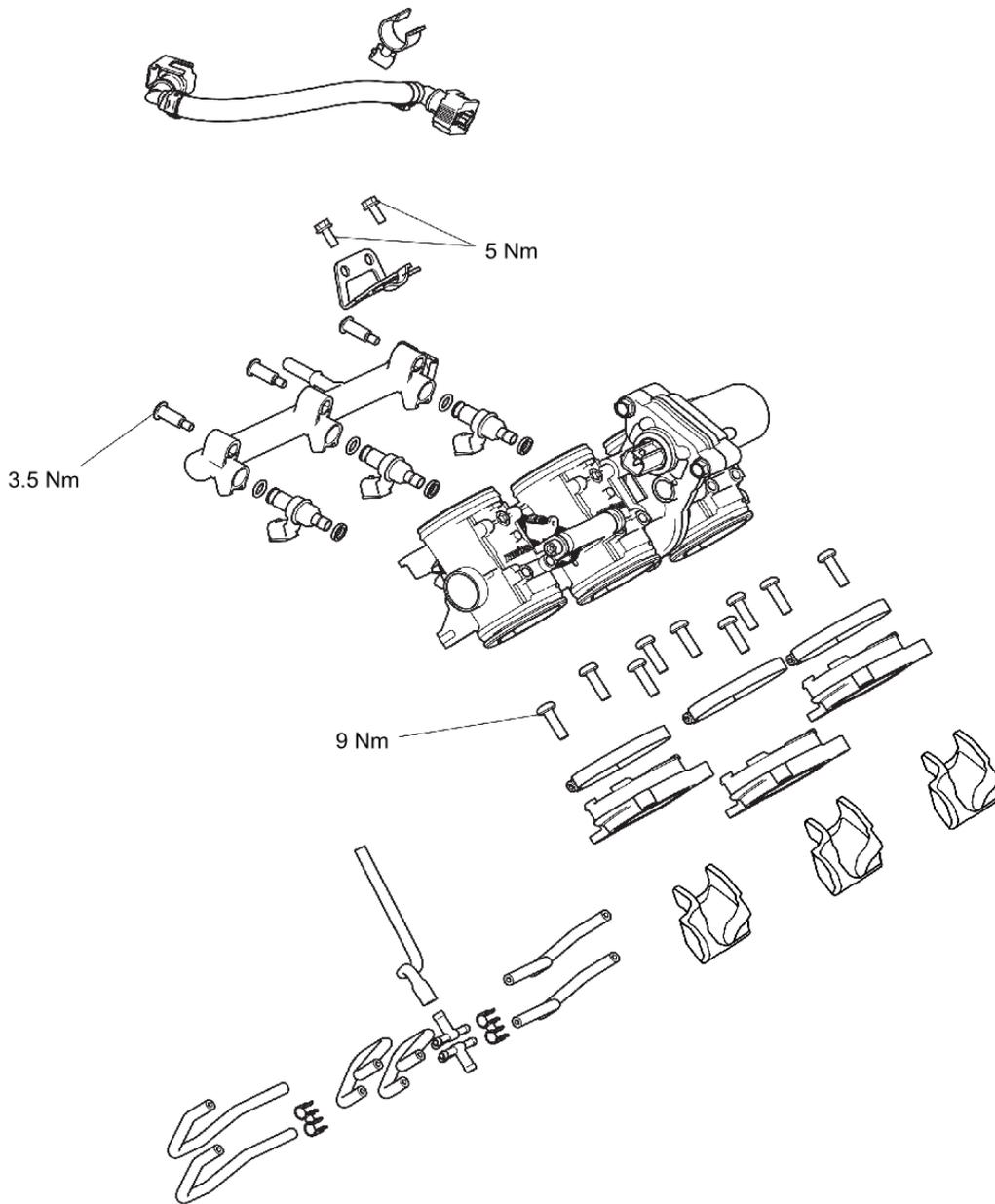
Fuel System and Engine Management

Exploded Views

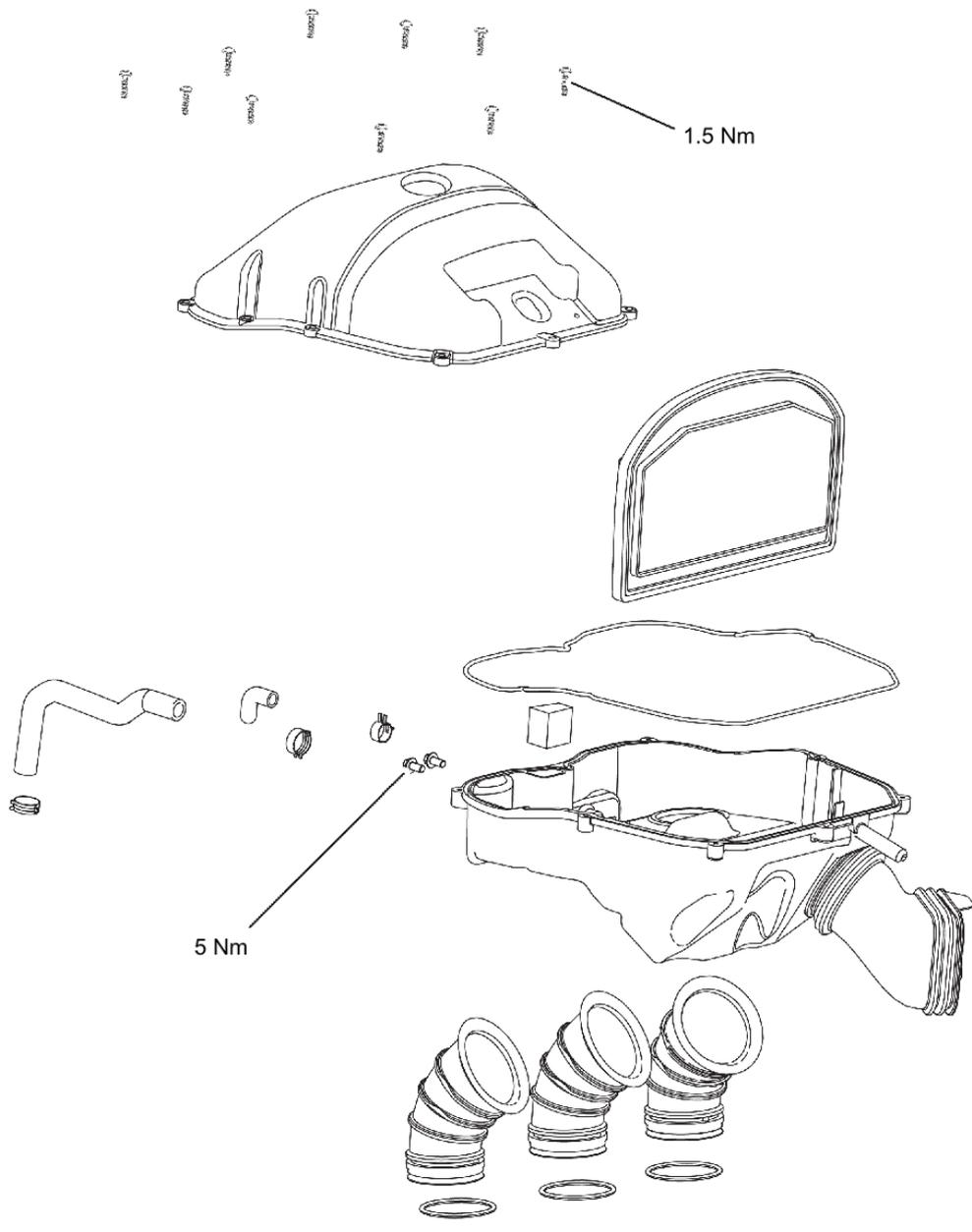
Exploded View – Fuel Tank and Fuel Pump



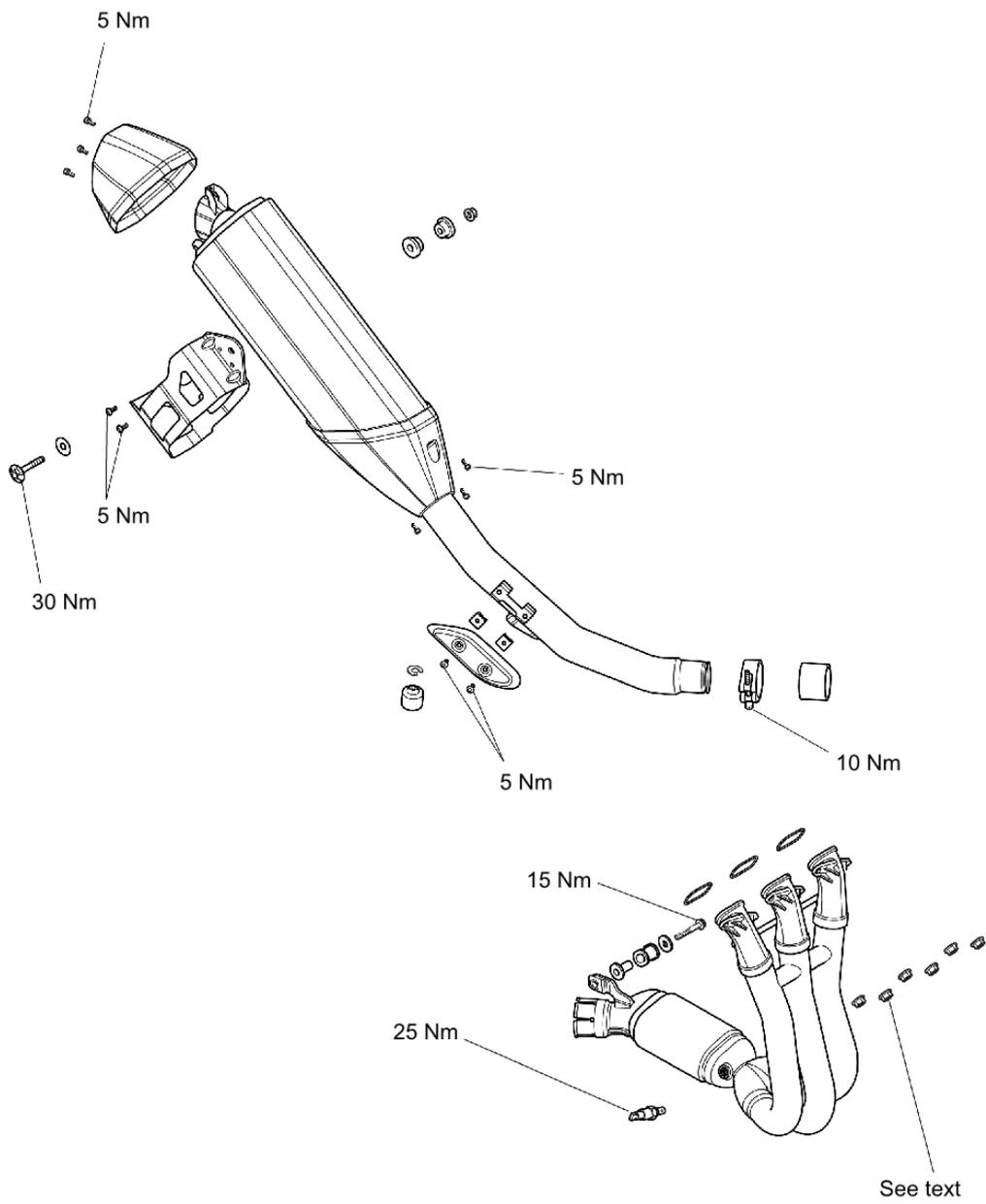
Exploded View – Fuel Rail, Throttles and Injectors



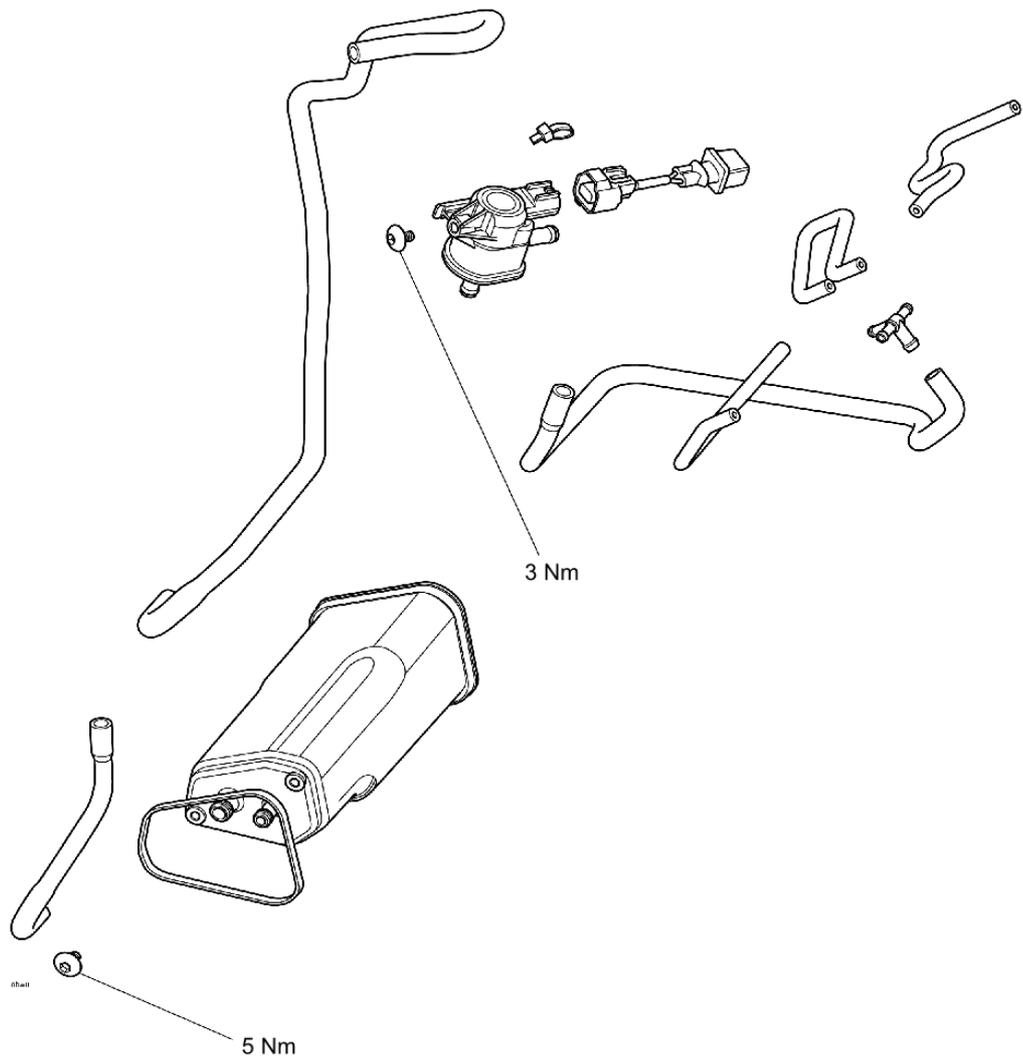
Exploded View – Airbox



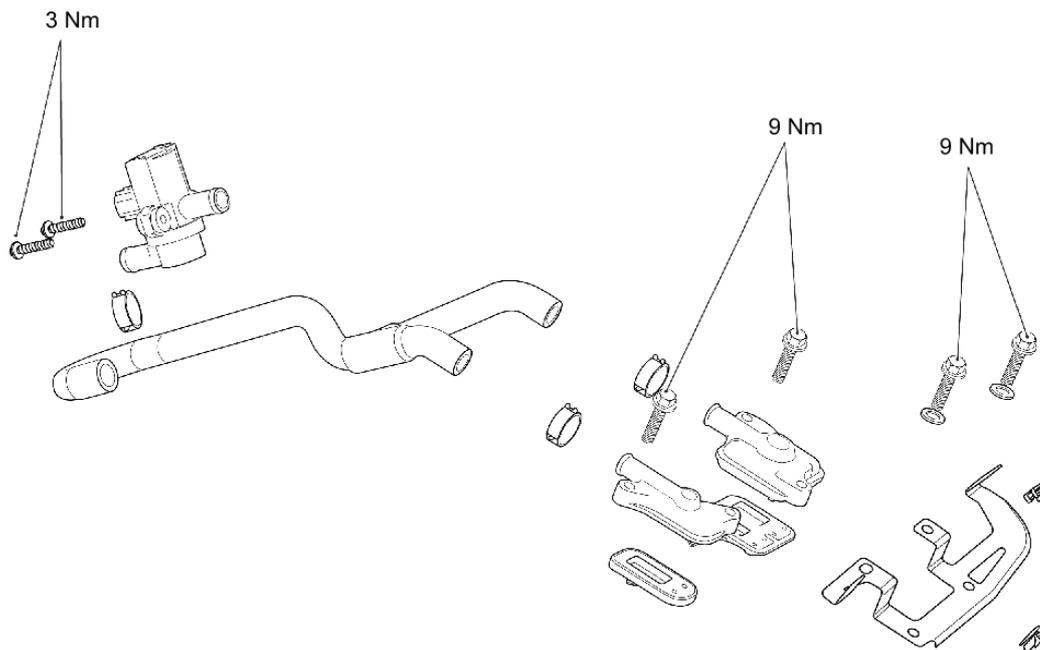
Exploded View – Exhaust System



Exploded View – Evaporative System



Exploded View – Secondary Air Injection



Engine Management

Fuel Requirements

Fuel Requirements - all countries except USA

This model must be run on 91 RON or higher unleaded fuel.

Fuel Requirements - USA

In the United States of America where the octane rating of fuel is measured in a different way, the following information may be applied:

This model is designed to run on unleaded gasoline with a CLC or AKI octane rating $(R+M)/2$ of 87 or higher.

Note

- If 'Knocking' or 'Pinking' occurs at a steady engine speed under normal load, use a different brand of gasoline or a higher octane rating.

 **CAUTION**

The use of leaded gasoline is illegal in some countries, states or territories and will invalidate the vehicle and emissions control warranties. Additionally, leaded gasoline will cause damage to emissions control components.

Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. This model will give best performance when using unleaded gasoline. However, the following should be used as a guide to the use of oxygenated fuels.

 **CAUTION**

Because of the generally higher volatility of oxygenated fuels, starting, engine response and fuel consumption may be adversely affected by their use. Should any of these difficulties be experienced, run the motorcycle on normal unleaded gasoline.

Ethanol

Ethanol fuel is a mixture of 10% ethanol and 90% gasoline and is often described under the names 'gasohol', 'ethanol enhanced', or 'contains ethanol'. This fuel may be used in Triumph motorcycles.

Methanol

 **CAUTION**

Fuels containing methanol should not be used in Triumph motorcycles as damage to components in the fuel system can be caused by contact with methanol.

MTBE (Methyl Tertiary Butyl Ether)

The use of gasolines containing up to 15% MTBE (Methyl Tertiary Butyl Ether) is permitted in Triumph motorcycles.

Glossary of Terms

The following terms and abbreviations will be found in this section. A brief explanation is given below of what some of the more common terms and abbreviations mean.

Air temperature sensors

A sensor located in the airbox to detect the temperature of the incoming air.

Another sensor is located on the underside of the high level mudguard to detect the ambient air temperature.

Ambient air pressure

Pressure of the air in the atmosphere.

Ambient air temperature

Temperature of the air in the atmosphere.

ATDC

After Top Dead Centre (TDC).

BTDC

Before Top Dead Centre (TDC).

Catalyst

Device placed in the exhaust system which reduces exhaust emissions by stimulating secondary combustion of the exhaust gases.

Chassis ECM

Chassis Electronic Control Module.

Closed throttle position

Throttle position at idle (i.e. against end stop), measured as a Voltage and expressed as a percentage.

Coolant temperature

The coolant temperature in the cylinder head.

Coolant temperature sensor

Sensor which detects coolant temperature.

Cooling fan status

The 'on' or 'off' condition of the cooling fan.

Cruise control cancel switch

A switch located in the twist grip housing, used to cancel the cruise control. The switch is operated by 'over-closing' of the twist grip.

DTC

Diagnostic Trouble Code.

Electronic steering lock

Located on the upper yoke. The electronic is operated by a button located on the right hand switch housing. For the electronic steering lock to engage, the vehicle must be stationary and the steering must be positioned at left hand full lock.

Engine ECM

Engine Electronic Control Module.

Engine speed

The crankshaft revolutions per minute.

Freeze frame

A data set captured at the time a Diagnostic Trouble Code (DTC) is set.

Gear position sensor

Gearbox mounted sensor which delivers information to the ECM. This is converted to the gear position value that is displayed on the instrument's gear position indicator and neutral light.

Ignition advance

The timing of ignition at the spark plug relative to top dead centre.

Ignition switch position

The 'ON' or 'OFF' position of either or both the ignition switch and the engine stop switch.

Ignition timing

Same as 'ignition advance'.

IMU

Inertial Measurement Unit.

Injector pulse time

The time during which an injector remains open (i.e. delivering fuel).

Intake air temperature

The air temperature in the airbox and intake system.

MAP sensor

Manifold absolute pressure (the air pressure in the intake system).

MIL

Malfunction Indicator Light.

Illuminates when most Diagnostic Trouble Codes (DTCs) are set.

Neutral switch status

The 'neutral' or 'in gear' status of the gear change.

Open circuit

A break in an electrical circuit - current cannot flow.

Over temp

High temperature within the Engine Control Module (ECM) caused by an internal or external failure.

Oxygen sensor

The oxygen sensor measures the oxygen levels in the exhaust gases and feeds this information to the ECM. Based on this information, adjustments to air/fuel ratio are made.

Purge valve duty cycle

The time the purge valve is open in an open/close cycle, expressed as a percentage of the cycle time.

Secondary air injection

A small amount of air injected into the exhaust port to reduce the levels of pollutants in the exhaust gases.

Sensor reference Voltage

Supply Voltage to the system sensors (nominally 5 Volts).

Shift Force Sensor

Models fitted with Triumph Shift Assist only. Located on the gear change pedal linkage, the shift force sensor enables gear changes without the use of the clutch. Signals from the sensor are interpreted by the engine ECM. Engine torque is then adjusted to enable a smooth clutch-free gear change.

Short circuit

A 'short cut' in an electrical circuit - current by-passes the intended circuit (either to earth (ground), 5 Volt sensor reference Voltage or Vbatt).

Side stand status

The 'up' or 'down' position of the side stand.

Target dwell time

The actual time from coil 'on' to coil 'off'.

TDC

Top Dead Centre.

Throttle actuator motor

Motor used to open/close the throttle.

Throttle position

The position of the throttle butterfly given as a percentage of the movement range. When the data is displayed on the tool, fully open need not be 100% nor fully closed 0%.

Throttle position sensor

Sensor for the primary throttle position.

Throttle Voltage

Voltage at the throttle potentiometer.

TPMS

Tyre Pressure Monitoring System.

Transponder

A transmitter-responder chip located in the ignition key. The transponder is activated by a radio signal sent out by the immobiliser and TPMS control module, via an antenna located around the ignition switch. If the immobiliser and TPMS control module does not receive the correct code signal from the transponder, the immobiliser will remain active and the engine will not start.

Twist grip position sensor

The twist grip position sensor is used to relay twist grip position information to the ECM. The ECM uses this information to drive the throttle actuator motor to the correct position.

Vbatt

Battery Voltage.

Engine Management System Description

This model is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The engine ECM is electronically paired to the immobiliser system within the chassis ECM to help prevent theft of the motorcycle. The engine ECM also draws information from sensors positioned around the engine, cooling and air intake systems and precisely calculates ignition advance and fuelling requirements for all engine speeds and loads.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the engine management system, the malfunction type, and engine data at the time the malfunction occurred,

are stored in the engine ECM memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

Engine Management System Sensors

Intake air temperature sensor - situated in the top of the airbox. As the density of the air (and therefore the amount of oxygen available to ignite the fuel) changes with temperature, an intake air temperature sensor is fitted. Changes in air temperature (and therefore air density) are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.

Ambient air pressure sensor - situated on the right hand side of the rear mudguard, beneath the seat. The ambient air pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.

Manifold Absolute Pressure (MAP) sensor - situated to the left side of the airbox, connected to each of the three throttle bodies by equal length tubes. The MAP sensor provides information to the engine ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the engine ECM. This degree of engine load accuracy allows the engine ECM to make very small adjustments to fuel and ignition which would otherwise not be possible from throttle angle data alone.

Clutch switch - situated on the clutch lever. The clutch must be pulled in for the starter motor to operate. With the cruise control on and active, the operation of the clutch will cancel cruise control.

Crankshaft position sensor - situated in the crankcase, near the trigger wheel cover. The crankshaft position sensor detects movement of a toothed trigger wheel. The toothed wheel gives a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the engine ECM to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the fuel occurs.

Engine coolant temperature sensor - situated at the rear of the cylinder head, on the left hand side. Coolant temperature information, received by the engine ECM, is used to optimise fuelling at all engine temperatures and to calculate hot and cold start fueling requirements.

Throttle position sensors 1 and 2 - the two sensors are located in the same housing which is situated at the left end of the throttle body. Used to relay throttle position information back to the engine ECM.

Oxygen sensor - situated in the exhaust header system upstream of the catalyst. The oxygen sensor constantly feeds information to the engine ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.

Side stand switch - situated at the top of the side stand leg. If the side stand is in the down position, the engine will not run unless the transmission is in neutral.

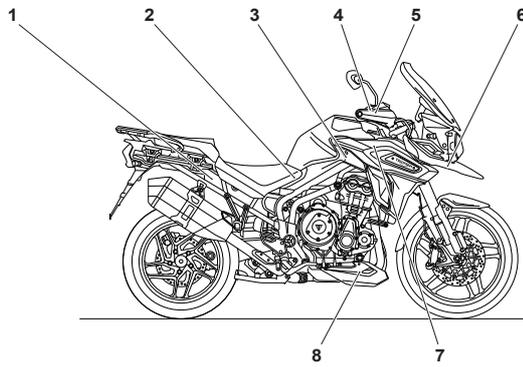
Inertial Measurement Unit (IMU) - situated beneath the front seat support, the IMU consists of a 3-axis gyroscope and a 3-axis accelerometer, and is used to calculate the motorcycle's lean angle. Data provided by the IMU is constantly monitored by the optimised cornering traction control system, optimised cornering ABS and Triumph Semi Active Suspension (TSAS). The IMU also provides fall detection. Power to the ignition and fuel delivery systems is cut if the IMU detects that the motorcycle is on its side. This prevents the engine from running and the fuel pump from delivering fuel. In the event of a fall, the fall detection system is reset by returning the motorcycle to an upright position and switching the ignition off then back on again.

Twist grip position sensors 1 and 2 - the two sensors are located in the same housing which is situated in the right hand switch cube. The twist grip position sensor is used to relay twist grip position information to the engine ECM. The engine ECM uses this information to drive the throttle actuator motor to the correct position.

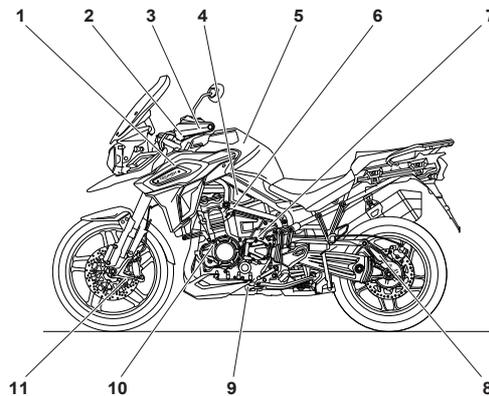
Gear position sensor - situated in the transmission cover, behind the coolant expansion tank. The gear position sensor provides the engine ECM with selected gear information. This is used to prevent the engine from starting if the transmission is in gear. The sensor also provides information to the gear position indicator and the neutral light in the instruments.

Brake switches - incorporated in the ABS hydraulic modulator/ECM. With the cruise control on and active, the operation of the front or rear brakes will cancel cruise control.

Engine Management System Sensor Locations



1. **Ambient air pressure sensor**
2. **Inertial Measurement Unit (IMU)**
3. **Manifold Absolute Pressure (MAP) sensor**
4. **Cruise control cancel switch**
5. **Twist grip position sensor**
6. **Ambient air temperature sensor**
7. **Intake air temperature sensor**
8. **Oxygen sensor**



1. **ABS hydraulic modulator/ECM**
2. **Clutch switch**
3. **Cruise control set/adjust switch**
4. **Throttle position sensor**
5. **Fuel level sensor**
6. **Coolant temperature sensor**
7. **Gear position sensor**
8. **ABS rear wheel sensor**
9. **Side stand switch**
10. **Crankshaft position sensor**
11. **ABS front wheel sensor**

Engine Management System Actuators

In response to signals received from the sensors, the engine ECM controls and directs messages to a series of electronic and electro-mechanical actuators. The function and location of the actuators is given below.

Throttle actuator motor - situated at the left end of the throttle bodies. The throttle actuator motor opens and closes the throttle plates in the throttle bodies, in response to commands from the engine ECM. The throttle actuator motor is an integral part of the throttle bodies.

Canister purge valve - situated in the vapour return line between the carbon canister and the throttle bodies. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is 'pulsed' by the engine ECM to give control over the rate at which the canister is purged.

Injectors - located in the cylinder head. The engine is fitted with three injectors. The spray pattern of the injectors is fixed but the length of time each injector can remain open is variable according to operating conditions. The duration of each injection is calculated by the engine ECM using data received from the various sensors in the system.

Ignition coils - plug-top coils are located in the camshaft cover. There are three coils fitted, one for each spark plug. The engine ECM controls the point at which the coils are switched on and off. In calculating the switch-on time, the engine ECM allows sufficient time for the coils to charge to a level where a spark can be produced. The coils are switched off at the point of ignition, the timing of which is optimised for good engine performance.

Main power relay - situated under the seat. When the ignition is switched on, the main power relay is powered up to provide a stable Voltage supply for the engine ECM.

Fuel pump - located inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant 3.5 bar pressure. The pump is run continuously when the engine is operating and is also run briefly when the ignition is first switched on to ensure that 3.5 bar is available to the system as soon as the engine is cranked. Fuel pressure is controlled by a regulator also situated inside the fuel tank.

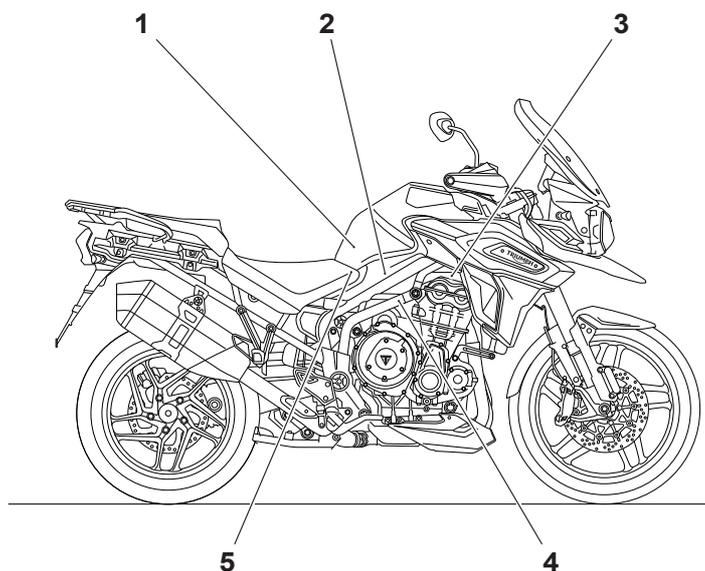
Cooling fan - located behind the radiator. The cooling fan is turned on or off by the chassis ECM, in response to a request sent by the engine ECM. The request from the engine ECM to turn the cooling fan on or off is sent to the chassis ECM in response to a signal received from the coolant temperature sensor. When the coolant temperature rises to a level where the cooling effect of natural airflow is insufficient, the engine ECM sends a request to the chassis ECM to turn the cooling fan on. When the coolant temperature falls sufficiently, the engine ECM sends a request to the chassis ECM to turn the cooling fan off. The fan only becomes operational when the engine is running. It will not operate at any other time.

Secondary air injection solenoid - located on the rear of the airbox. The secondary air injection solenoid controls airflow through the secondary air injection system.

Note

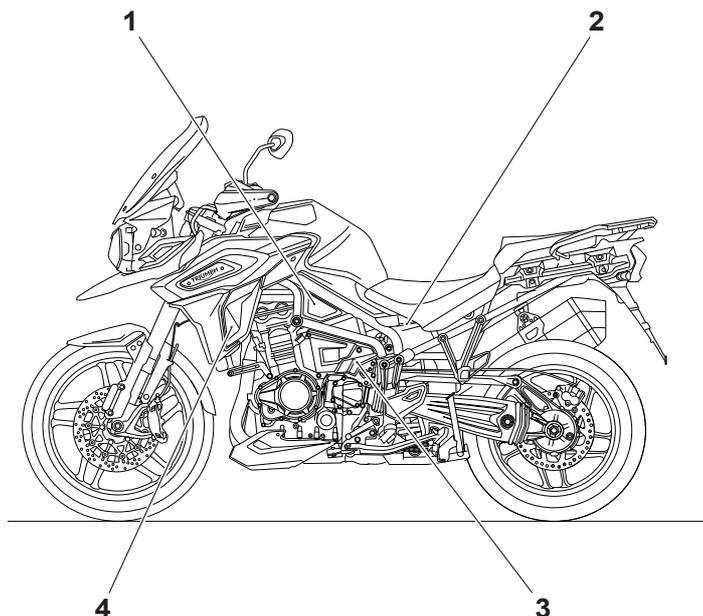
- In this system, the starter lockout system (clutch switch, neutral switch, side stand switch) all operate through the engine ECM.

Engine Management System Actuator Locations



1. Fuel pump

2. Secondary air injection solenoid
3. Ignition coils
4. Injectors
5. Cannister purge valve



1. Throttle actuator motor
2. Main power relay
3. Starter solenoid
4. Cooling fan

Immobiliser and Keyless Ignition System

System Description

This model is fitted with an electronic immobiliser and keyless ignition system to help protect it against theft. The immobiliser and keyless ignition system is incorporated in the chassis ECM. The chassis ECM has to be paired with the engine ECM, Electronic Steering Lock (ESL) and the ignition keys which each contain a transponder chip. If all the components are correctly paired, the immobiliser will allow the engine to start. The Triumph diagnostic tool is the only way these components can be paired.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the immobiliser system, a malfunction code is stored in the chassis ECM memory. This stored data can then be recovered using the Triumph diagnostic tool (see Triumph Diagnostic Software).

System Components and Operation

- **Transponder chip** - situated inside the ignition key. The chip is activated when requested by the chassis ECM, providing the key is in range of the LF antenna (within one meter/three feet for smart keys, within 50 mm for passive keys).
- **Low Frequency (LF) Antenna** - situated on the left hand side of the motorcycle under the passenger seat. The transponder chip in the ignition key is activated when it is in range of the LF antenna. The signal from the chip is interpreted by the chassis ECM.
- **Chassis ECM** - situated beneath the rider's seat. This control module communicates with the transponder chip in the key via the LF antenna, and with the engine ECM. The chassis ECM will only allow the motorcycle's electronic systems to turn on and the engine to start if a matching signal is received.
- **Alarm/immobiliser warning indicator light** - situated in the instrument pack. The light will flash on and off for 24 hours to show that the engine immobiliser is on. When the ignition switch is turned to the ON position

the immobiliser and the indicator light will be off. If the indicator light remains on it indicates that the immobiliser has a malfunction that requires investigation. If an accessory alarm is fitted, the immobiliser indicator light will only illuminate when the conditions described in the accessory alarm instructions are met.

- **Electronic Steering Lock (ESL)** - Situated on the upper yoke. The ESL will activate to lock the steering when requested, provided that the motorcycle is stationary and the steering is positioned correctly to enable locking.

Keys

When the motorcycle is delivered from the factory it is supplied with two passive keys and one smart key.

Note

- **An additional smart key can be purchased from your Triumph dealer. However, only three keys can be programmed to the motorcycle. This can be any combination of smart keys and standard keys.**

Keys can be deleted or added to the immobiliser system using the Triumph diagnostic tool.

To ensure the immobiliser system functions correctly note the following:

- Do not put any magnetic materials on the same key ring as the motorcycle key.
- Do not put any other ignition key with a transponder chip fitted near the motorcycle key when in use.
- Do not modify the immobiliser system.
- Do not submerge the key in water or any other fluid.
- Do not drop or strike the key against hard material.

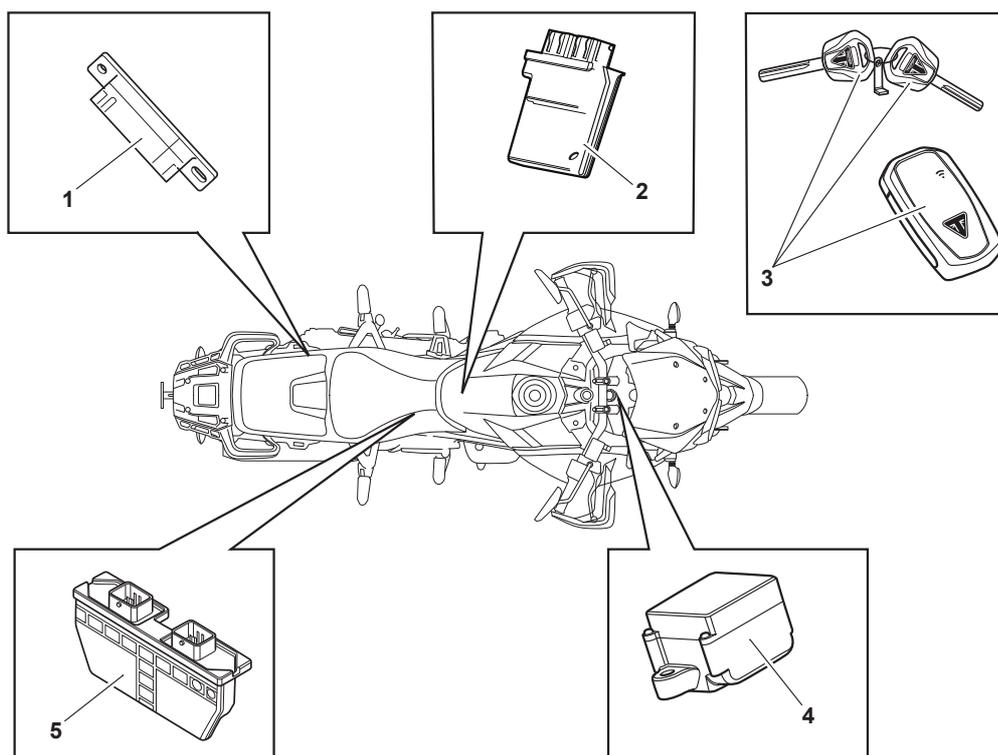
Diagnostics

To fully diagnose the immobiliser system it is necessary to check for fault codes in the chassis ECM using the Triumph diagnostic tool (see System Diagnosis).

Further Diagnosis

The diagnostic trouble code tables, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored (see Chassis ECM Diagnostic Trouble Codes).

Immobiliser and Keyless Ignition System Components Location



1. LF Antenna
2. Engine ECM

3. Transponder chip
4. Electronic steering lock
5. Chassis ECM

Key to Engine Management Circuit Diagram

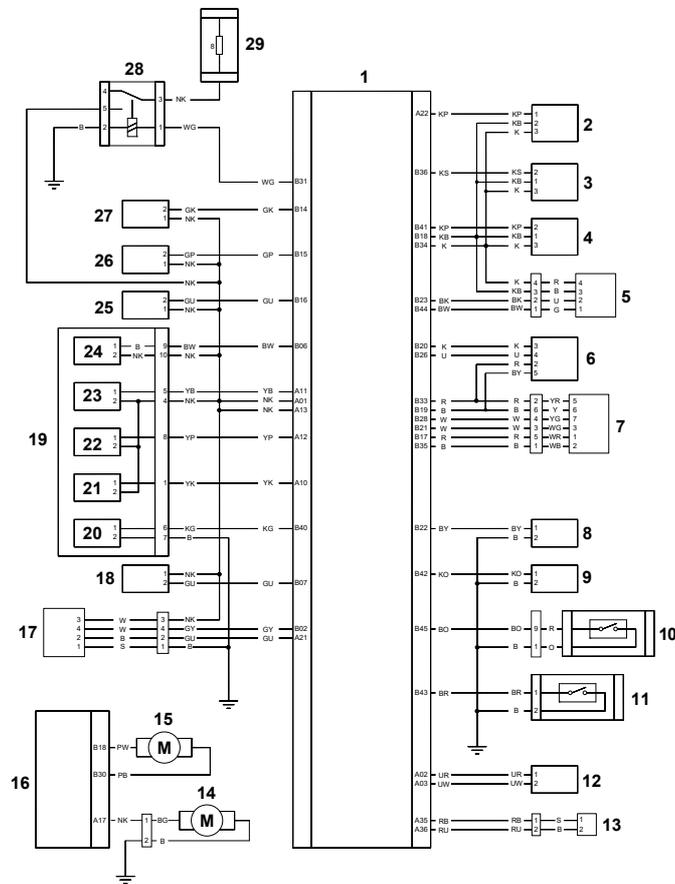
Key	Item Description
1	Engine Control Module
2	Shift Force Sensor
3	Manifold Absolute Pressure Sensor
4	Ambient Air Pressure Sensor
5	Gear Position Sensor
6	Throttle Position Sensor
7	Accelerator Position Sensor
8	Fuel Level Sender
9	Intake Air Temperature Sensor
10	Clutch Switch
11	Side Stand Switch
12	Throttle Actuator Motor
13	Crankshaft Position Sensor
14	Cooling Fan
15	Fuel Pump
16	Chassis ECM
17	Oxygen Sensor
18	Secondary Air Injection Solenoid
19	Engine Sub Harness
20	Coolant Temperature Sensor
21	Injector 1
22	Injector 3

Key	Item Description
23	Injector 2
24	Purge Valve
25	Coil 3
26	Coil 2
27	Coil 1
28	Engine Management Relay
29	Main Fuse Box

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Engine Management Circuit Diagram



Engine Management Adaption

General Information

The engine management system fitted to this model is adaptive. This means that the system is able to learn about new or changing operating conditions and continuously adapt itself without needing to constantly make major adjustments from a fixed baseline setting.

Adaptive changes can become necessary because of changing rider behaviour, changes in the region in which the bike is operated (i.e. operation at high altitude where it was previously used at sea level) or because a new part may have been fitted which has slightly different characteristics to the old part. All adaptive changes are automatic and require no intervention by rider or dealer.

Adaption Status

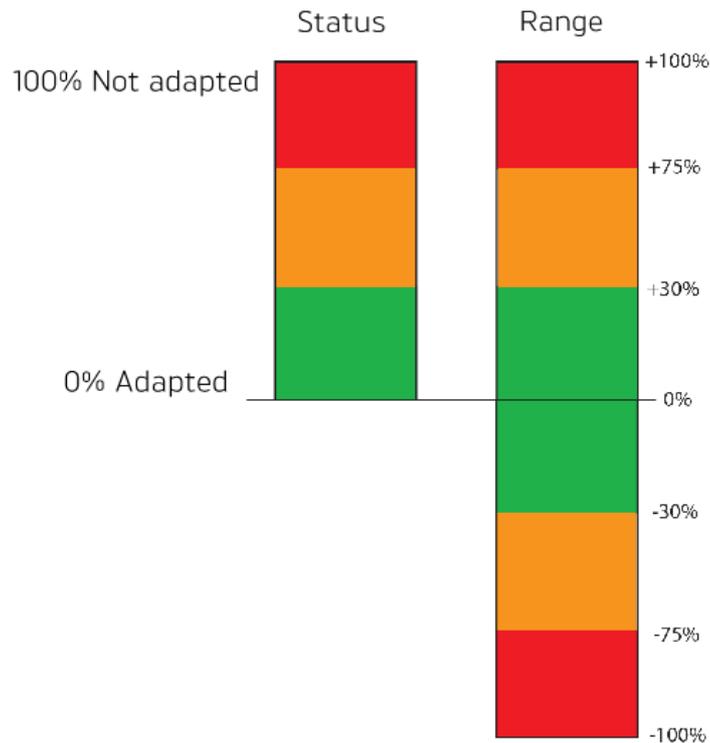
To see if a motorcycle has fully adapted, a facility named 'ADAPTION STATUS' is provided on the diagnostic tool. The following adaption details can be examined:

Function Examined	Report Method
Closed throttle position reference status	Adapted/not adapted
Idle speed control adaption status	%
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption status (idle)	%
Oxygen sensor adaption range (idle)	%

Terminology

Where the term 'status' is used, this indicates how far the present operating parameter is from the stored (baseline) value. The nearer these figures are to zero the better as it indicates the motorcycle has adapted to its current operating conditions.

The term 'range' indicates how much (in percentage terms) of the adjustment range has been used to reach the current operating status.



Typical Values

In a correctly adapted motorcycle, the following will be typical:

Function Examined	Read Out
Closed throttle position reference status	Adapted
Idle speed control adaption status	Between +100 and -100%
Oxygen sensor adaption status (off idle)	0% +/- 10%
Oxygen sensor adaption range (off idle)	Between +100 and -100%
Oxygen sensor adaption status (idle)	0% +/- 10%
Oxygen sensor adaption range (idle)	Between +100 and -100%

Forcing Adaption to Take Place

If the read out indicates that the motorcycle is not adapted, the following will force the system to make adaptations:



WARNING

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

Note

- **Resetting adaptations with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, causing poor engine running. Always reset the adaptations with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well ventilated area.**
1. Ensure the engine is cold.
 2. WITHOUT TOUCHING THE THROTTLE, start the engine and allow it to warm up until the cooling fan comes on.
 3. Leave the engine to idle for a further 12 minutes.

Note

- **As an alternative to the above process, connect the diagnostic tool, select ADJUST TUNE (see the Triumph Diagnostic Tool User Guide) and select RESET ADAPTIONS. This will force a fast adaption routine to take place in around five seconds. For this to happen, the engine MUST be running, it must be at normal operating temperature and in closed loop control mode. Under any other conditions fast adaption will not take place and may cause default values to be loaded, which may then require a normal 12 minute adaption routine to be run.**

Fault Indications

If 'range' figures at 100% are seen, then the adjustment has reached maximum indicating a mechanical fault exists on the motorcycle. This can be due to a number of faults but the most likely causes will be low/high fuel pressure, faulty injectors or air leaks at the throttle bodies or airbox.

In these circumstances, locate and rectify the fault, and reset the adaptations as described above.

Diagnostics and Testing

Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

Note

-
- **A major cause of hidden electrical faults can be traced to faulty electrical connectors. For example:**
- **Dirty/corroded terminals**
- **Damp terminals**
-

For example, the chassis Electronic Control Module (chassis ECM) relies on the supply of accurate information to enable it to monitor and control its various systems. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the chassis ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

When Disconnecting a Connector:

CAUTION

When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

- Check for a security device that must be released before the connector can be separated, e.g. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

When Connecting a Connector:

- Ensure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

Disconnection of the Engine ECM Connectors

! CAUTION

Never disconnect an ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.
Always disconnect an ECM after disconnecting the battery negative (black) lead first.

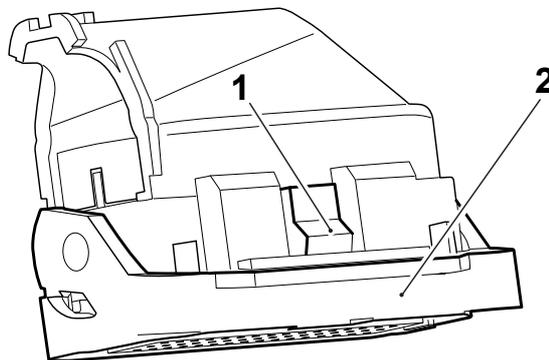
! CAUTION

When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

1. Turn the ignition to the OFF position and wait at least 1 minute for the engine ECM to complete its power down sequence.
2. Detach the engine ECM from it's location under the front seat support (see Engine Electronic Control Module (ECM) - Removal).

Note

- **Two different sized connectors are used in the engine ECM, which ensures correct connection is always made. The connectors are coloured black and correspond with identical connectors on the main harness.**
3. Press down on the locking device and gently pull back on the connector to release it from the engine ECM.

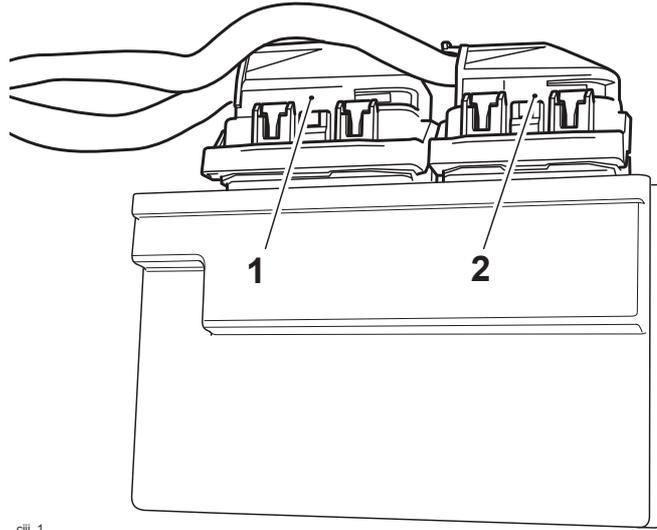


1. Locking device
2. Locking lever

CAUTION

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

1. Fit the connector into its socket. When the locking lever starts to move, stop pushing the connector and use the locking lever to fully insert the connector home and lock it.



1. Connector B (large)
2. Connector A (small)

2. Refit the engine ECM (see Engine Electronic Control Module (ECM) - Installation).

System Diagnostics

The engine management system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

On-board Fault Detection System

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted. For example, if there is a fault in the crankshaft position sensor, the counter will increment its count each time the crankshaft turns through 360°, provided the fault is still present.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a predetermined threshold, the fault becomes confirmed. If the fault is an emissions related fault or a serious malfunction affecting engine performance, a DTC (Diagnostic Trouble Code) and freeze-frame data will be logged in the ECM's memory and the MIL (Malfunction Indicator Lamp) on the motorcycle instrument panel is illuminated. Once a fault is confirmed, the number of warm-up cycles made by the engine is counted. If the fault clears, the warm-up cycle counter will extinguish the MIL (Malfunction Indicator Lamp) at a predetermined count, and erase the DTC and freeze-frame data from the ECM memory at another (higher) count.

A single warm-up cycle is deemed to have taken place when the following criteria have been met:

- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.

- A controlled power down sequence must take place.

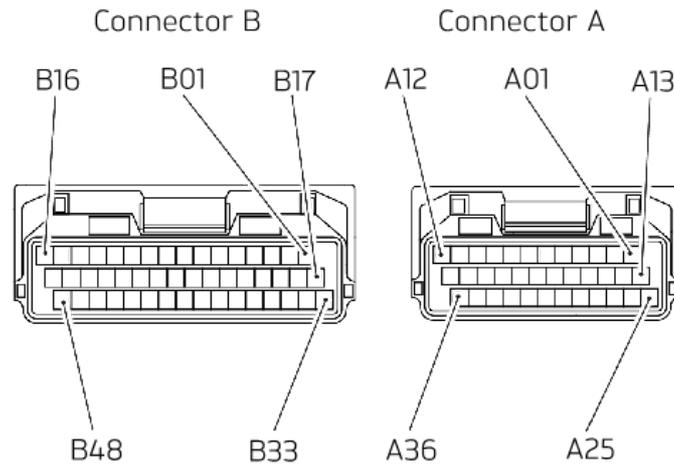
Note

- When a fault has been rectified, the MIL will remain illuminated until sufficient non-fault warm-up cycles have taken place to turn it off. The MIL will be immediately extinguished if, after first rectifying the fault, the DTC (diagnostic trouble code) that caused the MIL illumination is erased from the ECM memory using the Triumph diagnostic software.

Note

- In some cases, when a fault is detected, the engine management system will revert to a limp-home mode. In this mode, the engine will still function though the performance and fuel economy may be marginally affected. In some cases, the rider may not notice any appreciable difference from normal operation.

ECM Connector Pin Numbering

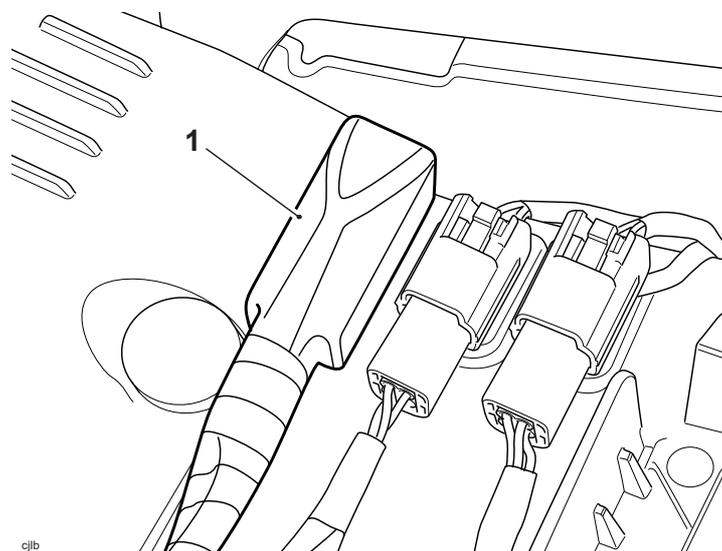


The above illustration shows the pin numbering system used in the engine management circuit diagram.

The smaller connector's pins are prefixed A and the larger connector pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

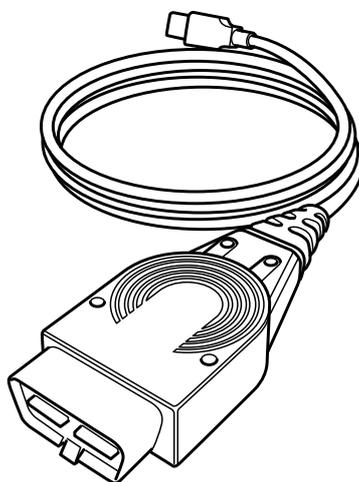
Triumph Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see Rider's Seat - Removal) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

2. Plug the Triumph diagnostic interface directly into the diagnostic connector.



T3880057 - Triumph Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see Rider's Seat - Installation).

Triumph Diagnostic Software - Engine ECM

Described on the following pages is the range of information which can be retrieved from the engine ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

Note

- Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.

Build Data

The Build Data screen will display the following information:

- Motorcycle model
- Vehicle Identification Number (VIN)
- ECM type
- ECM ID
- ECM serial number
- Calibration number
- Date of last calibration download
- Total calibration downloads since manufacture
- The lock status of the Engine ECM (ECM Locked, Unlocked or Not Applicable).

Current Data

The data available under Current Data is:

Function Examined	Result Reported (Scale)
Fuel system status	open or closed loop operation
Calculated load value	%
Engine coolant temperature	°C

Short term fuel trim	%
Intake manifold absolute pressure	mmHg
Engine speed	rpm
Vehicle speed	km/h
Ignition timing advance	degrees
Intake air temperature	°C
Absolute throttle position	%
Oxygen sensor	Volts

Sensor Data

When using this function it is possible to check the status of various sensors and actuators.

The data sets are divided into seven groups - Sensor Voltages, Sensor Readings, Injector Data, Ignition Data, Idle Speed, Throttle Data and Inputs and Adaption Status. Each of these screens is described on the following pages.

Sensor Voltages

The data available under Sensor Voltages is:

Item Checked	Result Unit
Battery Voltage	Volts
Voltage from ignition switch to engine ECM	Volts
Air temperature sensor Voltage	Volts
Coolant temperature sensor Voltage	Volts
Atmospheric pressure sensor Voltage	Volts
Manifold absolute pressure sensor Voltage	Volts
Throttle position sensor Voltage	Volts
Fuel level sensor Voltage	Volts
Oxygen sensor output Voltage	Volts
Throttle position sensor 1 Voltage	Volts
Throttle position sensor 2 Voltage	Volts
Twist grip position sensor 1 Voltage	Volts

Twist grip position sensor 2 Voltage	Volts
--------------------------------------	-------

Sensor Readings

The data available under Sensor Readings is:

Item Checked	Result Unit
Air temperature	°C
Coolant temperature	°C
Atmospheric (barometric) pressure	mmHg
Manifold absolute pressure (one reading per cylinder)	mmHg
Low fuel light	on/off
Oxygen sensor 1 short term fuel trim	%
Oxygen sensor heater status	on/off

Injector Data

The data available under Injector Data is:

Item Checked	Result Unit
Injector 1 pulse time	milliseconds
Injector 2 pulse time	milliseconds
Injector 3 pulse time	milliseconds

Ignition Data

The data available under Ignition Data is:

Item Checked	Result Unit
Ignition timing cyl 1	degrees BTDC
Ignition timing cyl 2	degrees BTDC
Ignition timing cyl 3	degrees BTDC
Coil 1 dwell time	milliseconds
Coil 2 dwell time	milliseconds
Coil 3 dwell time	milliseconds

Idle Speed and Throttle Data

The data available under Idle Speed and Throttle Data is:

Item Checked	Result Unit
Engine speed	RPM
Idle reference speed	RPM
Idle speed control current steps	numeric
Idle speed control target steps	numeric
Throttle position 1	% open
Throttle position 2	% open
Secondary air injection status	SAI on/off
Twist grip position	%

Inputs

The data available under Inputs is:

Function Examined	Result Unit
Starter switch status	switch on/off
Side stand status	up/down
Fall detection status	normal/over
Clutch switch status	release/grip
Neutral switch	gear/neutral
Vehicle speed	km/h
Calculated load	%
Brake switch 1 status	on/off
Brake switch 2 status	on/off
Cruise control accelerate switch status	on/off
Cruise control decelerate switch status	on/off
Cruise control ON/OFF switch status	on/off

Twist grip cruise control cancel switch status	on/off
Cruise control status	on/off

Outputs

The data available under Outputs is:

Function Examined	Result Unit
EMS Main relay status	relay on/off
Fuel pump relay status	on/off
Starter relay status	starter on/off
Malfunction indicator light status	MIL on/off
Cooling fan status	fan on/off
Purge valve duty cycle	%
Throttle actuator motor internal relay	on/off

Engine Adaption Status

Because the fuel system is adaptive, the engine management system is able to automatically adjust to new working conditions, such as changes in fuel quality, component wear, air leaks etc. This screen displays information on the adaption status of the vehicle which will show if it has adapted or not.

Function Examined	Report Method
Closed throttle position adapted	adapted/not adapted
Twist grip adapted	yes/no
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption range (idle)	%
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption status (idle)	%

Gear Position Adaption Status

The data available under Gear Position Adaption Status is:

Function Examined	Report Method
Neutral position adapted	yes/no
Gear position adapted (Models fitted with Triumph Shift Assist only)	yes/no

Triumph Shift Assist Adaption Status

The data available under Triumph Shift Assist Adaption Status is:

Function Examined	Report Method
Shift force sensor adapted	yes/no

Function Tests

The system allows the diagnostic software to perform a series of function tests on various actuators in the engine management system. In some cases it is necessary to make a visual observation of a component and in others, if faults are present, DTCs will be logged.

The Function Tests available are:

Function Examined	Report Method
Instrument panel	Observe instrument panel, refer to Service Manual
Idle air control stepper motor	Observe throttle position/Stored fault code*
Purge valve	Listen for valve operation/Stored fault code*
Secondary air injection	Listen for valve operation/Stored fault code*
Ride by wire motor open/closed	Observe throttle position/Stored fault code*
Cruise control switch check	Operate the cruise control switches as instructed. Observe the relevant switch response and rectify as necessary (see Cruise Control Switch Check)

* If a fault is detected.

Adjust Tune

Using the Triumph diagnostic software, it is possible to:

- Reset the adaptions (see Engine Management Adaption).
- Reset the neutral position adaption (see Neutral Position Adaption).
- Reset the gear position adaption (see Gear Position Adaption).
- Reset the shift force sensor adaption (see Shift Force Sensor Adaption).
- Balance the throttle bodies (see Throttle Body Balancing).

Freeze Frame Data

Freeze frame data is stored at the time a DTC is recorded (confirmed) by the ECM. If multiple DTCs are recorded, the freeze frame data which is stored will relate to the first recorded DTC only.

By calling up freeze frame data associated with the first recorded DTC, the technician can check the engine condition at the time the fault occurred. The data available is:

Function Examined	Report Method
DTC	Diagnostic Trouble Code (DTC) number

Fuel system status	open or closed loop operation
Calculated load	%
Coolant temperature	°C
Short term fuel trim	%
Intake manifold absolute pressure	mmHg
Engine speed	RPM
Vehicle speed	km/h
Ignition advance	degrees
Intake air temperature	°C
Throttle position	%
Oxygen sensor output Voltage	Volts
Oxygen sensor short term fuel trim	%

Cruise Control Switch Check

The cruise control switch check is required after certain DTCs or defects have been repaired which relate to the ride by wire system or cruise control system, or after the adaptations have been reset. The switch check requires the user to operate the switches in order, following the instructions on screen.

The following switches will be checked:

- Front brake switch
- Rear brake switch
- Clutch switch
- Twist grip cruise cancel switch (operated by holding the twistgrip in the fully closed position)
- Cruise control accelerate switch
- Cruise control decelerate switch.

A malfunction of any switch will not necessarily cause a DTC to be stored and may prevent the cruise control from operating correctly.

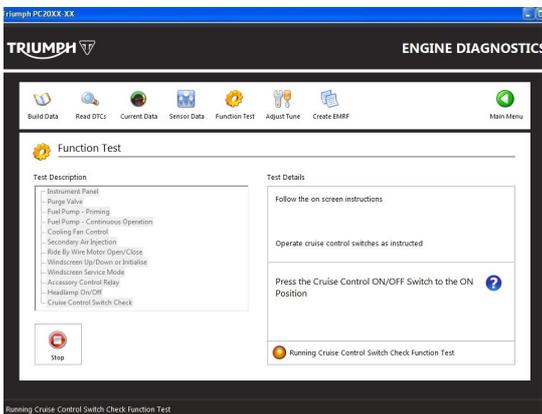
Note

- **If the cruise control switch check is not carried out, the green cruise control warning light will illuminate when the ignition is turned to the ON position but the cruise function will be disabled.**

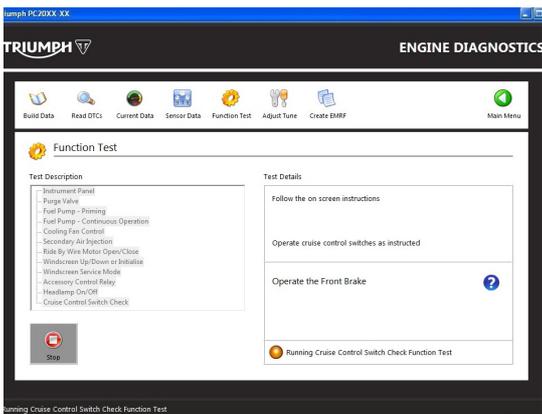
Cruise Control Switch Check Function

If the engine is running you will be prompted to turn it off before the test will start.

If the cruise control is turned on you will be prompted to turn it off before the test will start.



Follow the on-screen instructions to operate and then release each switch in turn.



Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the ECM memory when there is a confirmed fault in the system. The codes are reported to the Triumph diagnostic software as a four digit code.

As mentioned earlier, when the system detects a fault, it begins to count the number of times the fault occurs before illuminating the MIL and storing a fault code.

Similarly, if a fault clears, the ECM also records this fact and will turn off the MIL when sufficient no fault warm-up cycles have taken place. Any fault codes will remain in the ECM memory until the required number of no fault warm-up cycles have taken place. The number of warm-up cycles required to extinguish the MIL will always be less than the number required to remove a DTC from the ECM memory. DTCs can be removed at any time using the Triumph diagnostic software.

The system will log the diagnostic trouble codes listed below/over:

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0030	Oxygen sensor 1 heater open circuit or short to ground	3	40	Yes	Oxygen Sensor
P0032	Oxygen sensor 1 heater short circuit to vBatt	3	40	Yes	Oxygen Sensor

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0105	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	Manifold Absolute Pressure (MAP) Sensor
P0107	Manifold absolute pressure sensor 1 short circuit to ground	3	40	Yes	Manifold Absolute Pressure (MAP) Sensor
P0110	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	Intake Air Temperature Sensor
P0112	Intake air temperature sensor short circuit to ground	3	40	Yes	Intake Air Temperature Sensor
P0115	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	Coolant Temperature Sensor
P0117	Engine coolant temperature sensor short circuit to ground	3	40	Yes	Coolant Temperature Sensor
P0120	Throttle position sensor 1 short circuit or open circuit	3	40	Yes	Throttle Position Sensors 1 and 2
P0122	Throttle position sensor 1 short circuit to ground or open circuit	3	40	Yes	Throttle Position Sensors 1 and 2
P0130	Oxygen sensor 1 open circuit or short circuit to vBatt	3	40	Yes	Oxygen Sensor

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0131	Oxygen sensor 1 short circuit to ground	3	40	Yes	Oxygen Sensor
P0201	Injector 1 circuit malfunction	3	40	Yes	Fuel Injectors
P0202	Injector 2 circuit malfunction	3	40	Yes	Fuel Injectors
P0203	Injector 3 circuit malfunction	3	40	Yes	Fuel Injectors
P0220	Throttle position sensor 2 short circuit to vBatt or open circuit	3	40	Yes	Throttle Position Sensors 1 and 2
P0222	Throttle position sensor 2 short circuit to ground	3	40	Yes	Throttle Position Sensors 1 and 2
P0335	Crankshaft sensor circuit malfunction	3	40	Yes	Crankshaft Sensor
P0351	Ignition coil 1 malfunction	3	40	Yes	Ignition Coils
P0352	Ignition coil 2 malfunction	3	40	Yes	Ignition Coils
P0353	Ignition coil 3 malfunction	3	40	Yes	Ignition Coils
P0412	Secondary air injection short circuit to ground or open circuit	3	40	Yes	Secondary Air Injection Solenoid
P044F	Secondary air injection short circuit to vBatt	3	40	Yes	Secondary Air Injection Solenoid
P0443	Purge valve short circuit to ground or open circuit	3	40	Yes	Purge Valve

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0459	Purge valve short circuit to vBatt	3	40	Yes	Purge Valve
P0460	Fuel level sensor circuit malfunction	0	40	No	Fuel Level Sensor Circuit Malfunction
P0500	Vehicle speed sensor malfunction	3	40	Yes	Vehicle Speed Sensor
P0560	System voltage - battery circuit malfunction	3	40	Yes	System Voltage
P056C	Twist grip cruise cancel switch malfunction	3	40	Yes	Twist Grip – Cruise Cancel Switch Circuit Malfunction
P0603	EEPROM Error	0	0	Yes	EEPROM Error
P0606	ECM internal error	3	40	Yes	Engine ECM Internal Error
P0914	Gear position sensor short circuit to ground or open circuit	3	40	Yes	Gear Position Sensor Circuit
P0917	Gear position sensor short circuit to 5 Volt sensor supply	3	40	Yes	Gear Position Sensor Circuit
P1105	Manifold absolute pressure sensor 1 pipe malfunction	3	40	Yes	Manifold Absolute Pressure (MAP) Sensor
P1135	Traction Control prevented due to malfunction	0	0	No	Traction Control Prevented Due to Malfunction

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1136	Cornering Traction Control disabled due to Inertial Measurement Unit (IMU) malfunction	0	0	No	Cornering Traction Control and Roll-over Detection Disabled
P1520	Unmatched ABS module	0	0	Flashing	ABS Modulator ID Incompatible
P1521	CAN fault - lost communication with ABS module or ABS system status error	3	40	Yes	ABS Modulator Communication
P1574	Cruise control prevented due to other malfunction condition	3	40	Yes	Cruise Control Prevented Due to Other Malfunction
P1604	ECM tamper detected - return to Triumph	0	0	No	Engine ECM Tamper Detected
P1605	ECM locked by the tune lock function	Only if tune lock is unlocked		Flashing	Tune Lock
P1607	ECM ride by wire internal error	3	40	Yes	Engine ECM Internal Error
P1608	ECM ride by wire internal error	3	40	Yes	Engine ECM Internal Error
P1614	Instrument ID incompatible	Only if Instrument ID Matching		Flashing	Instrument ID Incompatible
P1640	Roll-over detection disabled due to Inertial Measurement Unit (IMU) malfunction	0	0	Yes	Cornering Traction Control and Roll-over Detection Disabled

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1659	Ignition power supply malfunction	3	40	Yes	EMS Ignition Voltage Input Circuit
P1685	Main relay circuit malfunction	3	40	Yes	EMS Main Relay Circuit
P1690	CAN Fault	3	40	Yes	CAN Communication
P1695	CAN fault - lost communication with instrument panel	3	40	Yes	Instrument Communication (CAN)
P1698	5 Volt sensor supply malfunction	3	40	Yes	5 Volt Sensor Supply Circuit
P16A0	Engine ECM detects Inertial Measurement Unit (IMU) present but ID incompatible	0	0	No	Inertial Measurement Unit (IMU) Incompatible
P16A1	Engine ECM detects Inertial Measurement Unit (IMU) circuit malfunction	0	40	No	Inertial Measurement Unit (IMU) Circuit Malfunction
P16A2	Engine ECM detects Inertial Measurement Unit (IMU) present but with signal error	0	40	No	Cornering Traction Control and Roll-over Detection Disabled
P16A3	Chassis ECM communication error	3	40	Yes	Chassis ECM Communication Error/Malfunction
P16A4	Chassis ECM malfunction - check Chassis ECM diagnostics	3	40	Yes	Chassis ECM Communication Error/Malfunction
P1702	Shift force sensor circuit low voltage	3	40	Yes	Shift Force Sensor Circuit

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1703	Shift force sensor circuit high voltage	3	40	Yes	Shift Force Sensor Circuit
P2100	Throttle actuator control motor open circuit	3	40	Yes	Throttle Actuator Motor Circuit
P2102	Throttle actuator control internal motor relay does not operate	3	40	Yes	Throttle Valve Drive Error
P2103	Throttle actuator control internal motor relay operates continually	3	40	Yes	Throttle Valve Drive Error
P2111	Throttle valve drive error (stuck open)	3	40	Yes	Throttle Valve Drive Error
P2119	Throttle valve drive error	3	40	Yes	Throttle Valve Drive Error
P2120	Twist grip position sensor 1 short circuit to ground or open circuit	3	40	Yes	Twist Grip Position Sensor 1
P2123	Twist grip position sensor 1 short circuit to vBatt	3	40	Yes	Twist Grip Position Sensor 1
P2125	Twist grip position sensor 2 short circuit to ground or open circuit	3	40	Yes	Twist Grip Position Sensor 2
P2128	Twist grip position sensor 2 short circuit to vBatt	3	40	Yes	Twist Grip Position Sensor 2

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P2135	Throttle position sensor 1 correlation error with throttle position sensor 2	3	40	Yes	Throttle Position Sensors 1 and 2
P2138	Twist grip position sensor 1 correlation error with twist grip position 2	3	40	Yes	Twist Grip Position Sensor 1 Correlation Error with Twist Grip Position 2
P2226	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	Ambient Air Pressure Sensor
P2228	Ambient air pressure sensor circuit short circuit to ground	3	40	Yes	Ambient Air Pressure Sensor

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Pinpoint Tests - Fuel

Crankshaft Sensor

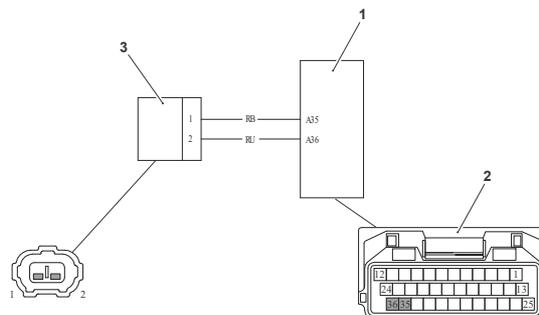
Fault Code	Possible Cause	Action
P0335	Crankshaft sensor circuit malfunction	View and note diagnostic tool 'freeze frame' data if available Ensure sensor is fitted correctly and connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - Engine ECM pin A35 - Engine ECM pin A36	OK	Disconnect crankshaft sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6

Test	Result	Action	
2	Check cable for short circuit:	OK	Proceed to test 3
	- Engine ECM pin A35 to ground - Engine ECM pin A36 to ground	Short circuit	Locate and rectify wiring fault, proceed to test 6
3	Check cable continuity:	OK	Proceed to test 4
	- Engine ECM pin A35 to sensor pin 1 - Engine ECM pin A36 to sensor pin 2	Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short circuit:	OK	Renew crankshaft sensor, proceed to test 5
	- Engine ECM pin A35 to Engine ECM pin A36	Short circuit	Locate and rectify wiring fault, proceed to test 6
5	Check crank toothed wheel:	OK	Proceed to test 6
	- Damage to teeth - magnetic debris contamination	Faulty	Clean/renew toothed wheel, proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Crankshaft Position Sensor

Fuel Injectors

Fault Code	Possible Cause	Action
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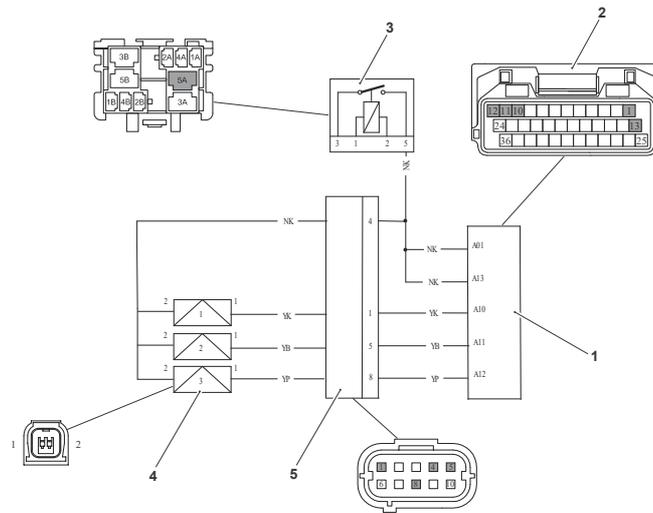
Fault Code	Possible Cause	Action
P0201/02/03	Injector 1/2/3 circuit malfunction - Misfire indicates open circuit - Flooding indicates short circuit	View and note diagnostic tool 'freeze frame' data if available Ensure relevant injector connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check cable and terminal integrity: - Engine ECM pin A12 - Engine ECM pin A11 - Engine ECM pin A10 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - Engine ECM pin A01 to Engine ECM pin A10 (injector 1) - Engine ECM pin A01 to Engine ECM pin A11 (injector 2) - Engine ECM pin A01 to Engine ECM pin A12 (injector 3)	9 to 12 Ohms	Proceed to test 3
		Open circuit	Disconnect relevant injector and proceed to test 4
		Short circuit	Disconnect relevant injector and proceed to test 5
3	Check cable for short circuit to ground: - Engine ECM pin A10 to ground - Engine ECM pin A11 to ground - Engine ECM pin A12 to ground	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to relevant injector pin 2 - Engine ECM pin A10 to injector 1 pin 1 - Engine ECM pin A11 to injector 2 pin 1 - Engine ECM pin A12 to injector 3 pin 1	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - Engine ECM pin A01 to Engine ECM pin A10 (injector 1) - Engine ECM pin A01 to Engine ECM pin A11 (injector 2) - Engine ECM pin A01 to Engine ECM pin A12 (injector 3)	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check relevant injector resistance: - Injector pin 1 to injector pin 2	9 to 12 Ohms	Proceed to test 7
		Faulty	Renew relevant injector, proceed to test 7
7	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test

Test	Result	Action
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Management System Relay
4. Fuel Injectors
5. Engine Sub - Harness

Throttle Position Sensors 1 and 2

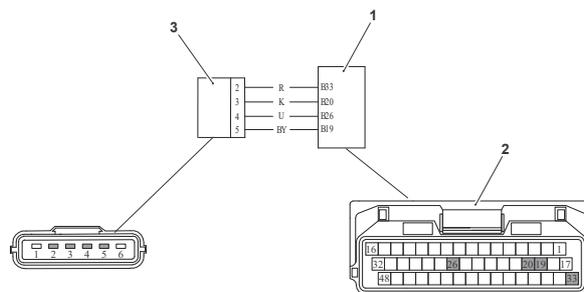
Fault Code	Possible Cause	Action
P0120	Throttle position sensor 1 short circuit or open circuit	View and note diagnostic tool 'freeze frame' data if available View and note diagnostic tool 'sensor' data Ensure sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:
P0122	Throttle position sensor 1 short circuit to ground or open circuit	
P0220	Throttle position sensor 2 short circuit to vBatt or open circuit	
P0222	Throttle position sensor 2 short circuit to ground	
P2135	Throttle position sensor 1 correlation error with throttle position sensor 2	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B19 - Engine ECM pin B33	OK	Disconnect sensor and proceed to test 2

Test	Result	Action
- Engine ECM pin B20 - Engine ECM pin B26	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin B20 to ground - Engine ECM pin B26 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin B20 to sensor pin 3 - Engine ECM pin B26 to sensor pin 4 - Engine ECM pin B19 to sensor pin 5 - Engine ECM pin B33 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin B33 to Engine ECM pin B20 - Engine ECM pin B33 to Engine ECM pin B26	OK	Contact Triumph service
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Throttle Position Sensor

Twist Grip Position Sensor 1

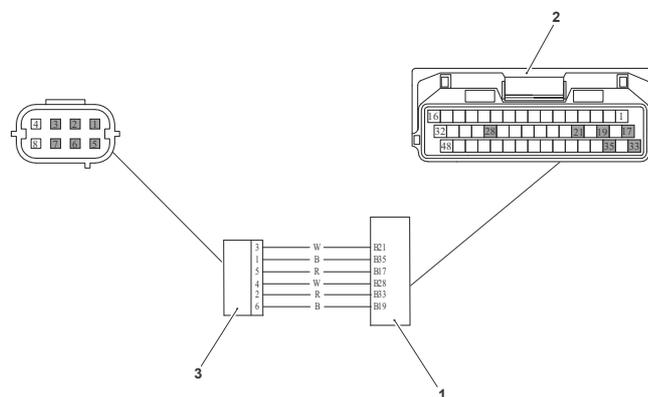
Fault Code	Possible Cause	Action
P2120	Twist grip position sensor 1 short circuit to ground or open circuit	View and note diagnostic tool 'freeze frame' data if available View and note diagnostic tool 'sensor' data

Fault Code	Possible Cause	Action
P2123	Twist grip position sensor 1 short circuit to battery voltage	Ensure accelerator position sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B17 - Engine ECM pin B21 - Engine ECM pin B35	OK	Disconnect accelerator position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin B21 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin B17 to sensor pin 5 - Engine ECM pin B21 to sensor pin 3 - Engine ECM pin B35 to sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin B21 to Engine ECM pin B17 - Engine ECM pin B21 to Engine ECM pin B35	OK	Renew twist grip position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B

3. Twist Grip Position Sensor

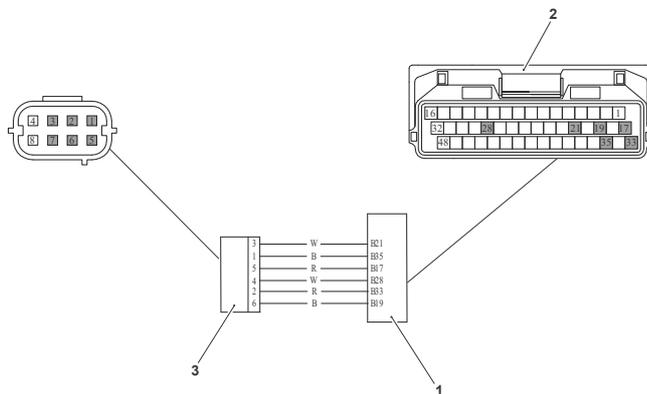
Twist Grip Position Sensor 2

Fault Code	Possible Cause	Action
P2125	Twist grip position sensor 2 short circuit to ground or open circuit	View and note diagnostic tool 'freeze frame' data if available View and note diagnostic tool 'sensor' data
P2128	Twist grip position sensor 2 short circuit to battery voltage	Ensure twist grip position sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B19 - Engine ECM pin B28 - Engine ECM pin B33	OK Disconnect twist grip position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B28 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B19 to sensor pin 6 - Engine ECM pin B28 to sensor pin 4 - Engine ECM pin B33 to sensor pin 2	OK Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B28 to Engine ECM pin B19 - Engine ECM pin B28 to Engine ECM pin B33	OK Renew twist grip position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Twist Grip Position Sensor

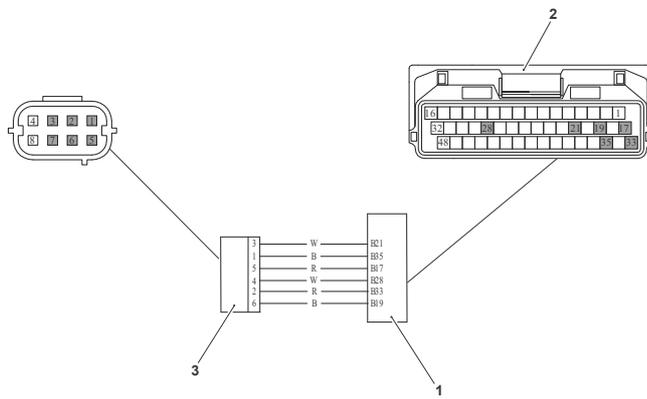
Twist Grip Position Sensor 1 Correlation Error with Twist Grip Position 2

Fault Code	Possible Cause	Action
P2138	Twist grip position sensor 1 correlation error with twist grip position sensor 2	View and note diagnostic tool 'freeze frame' data if available View and note diagnostic tool 'sensor' data Disconnect twist grip position sensor and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Turn the ignition on and measure the Voltage between: - Engine ECM pin B33 and Engine ECM pin B19 - Engine ECM pin B17 and Engine ECM pin B35	5 V DC	Proceed to test 2
		Faulty	Rectify fault, proceed to test 2
2	Check cable continuity: Engine ECM pin B21 to sensor pin 3 Engine ECM pin B28 to sensor pin 4	OK	Replace twist grip position sensor and proceed to test 2
		Open circuit	Rectify fault, proceed to test 3
3	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Twist Grip Position Sensor

Throttle Actuator Motor Circuit

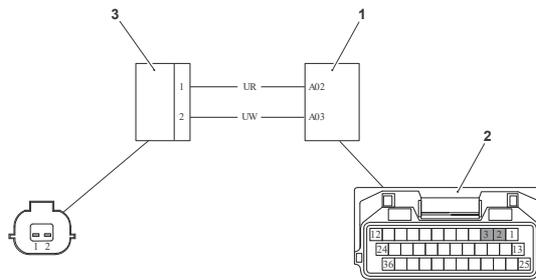
Fault Code	Possible Cause	Action
P2100	Throttle actuator control motor open circuit	View and note diagnostic tool 'freeze frame' data if available Ensure throttle actuator connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin A02 - Engine ECM pin A03 - Throttle actuator connector pin 1 - Throttle actuator connector pin 2	OK	Disconnect throttle actuator and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin A02 to ground - Engine ECM pin A03 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin A02 to throttle actuator pin 1 - Engine ECM pin A03 to throttle actuator pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin A02 to Engine ECM pin A01	OK	Renew twist grip position sensor, proceed to test 5

Test	Engine ECM pin A03 to Engine ECM pin A01	Result	Action
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Throttle Actuator Motor

Throttle Valve Drive Error

Fault Code	Possible cause	Action
P2111	Throttle valve drive error (stuck open)	View and note 'freeze-frame' data if available. View and note 'sensor' data. Check throttle body for mechanical malfunctions. Clear fault code and contact Triumph service if fault is still present.
P2119	Throttle valve drive error	
P2102	Throttle actuator control internal motor relay does not operate	
P2103	Throttle actuator control internal motor relay operates continually	

Purge Valve

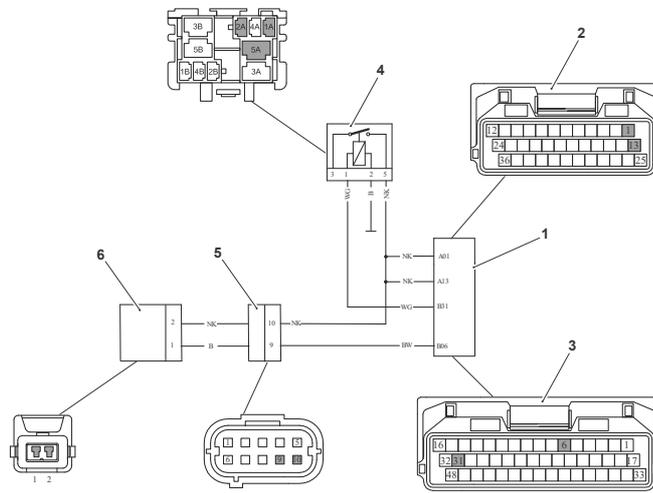
Fault Code	Possible Cause	Action
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Fault Code	Possible Cause	Action
P0443	Purge valve short circuit to ground or open circuit	View and note diagnostic tool 'sensor' data Ensure purge valve connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0459	Purge valve short circuit to Vbatt	Disconnect purge valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action	
1	Check cable and terminal integrity: - ECM pin B06 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - ECM pin A01 to ECM pin B06	22 to 30 Ohms	Proceed to test 3
		Open circuit	Disconnect purge valve and proceed to test 4
		Short circuit	Disconnect purge valve and proceed to test 5
3	Check cable for short circuit: - ECM pin B06 to ground	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to valve pin 2 - ECM pin B06 to valve pin 1	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - ECM pin A01 to ECM pin B06	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check purge valve resistance: - Valve pin 1 to valve pin 2	22 to 30 Ohms	Proceed to test 7
		Faulty	Renew purge valve, proceed to test 7
7	Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of purge valve	OK	Action complete - quit test
		Fault	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Engine Management System Relay
5. Engine Sub - Harness
6. Purge Valve

Gear Position Sensor Circuit

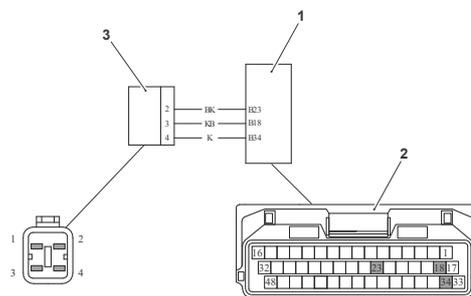
Fault Code	Possible Cause	Action
P0914	Gear position sensor short circuit to ground or open circuit	View and note 'freeze frame' data if available View and note 'sensor' data Ensure gear position sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:
P0917	Gear position sensor short circuit to 5 Volt sensor supply	Disconnect sensor and proceed to pinpoint test 4.

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B23	OK	Disconnect gear position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin B23 to ground - Engine ECM pin B34 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin B23 to gear position sensor pin 2	OK	Proceed to test 4

Test	Result	Action
- Engine ECM pin B18 to gear position sensor pin 3 - Engine ECM pin B34 to gear position sensor 4	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin B23 to Engine ECM pin B34	OK	Renew gear position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Gear Position Sensor

Ignition Coils

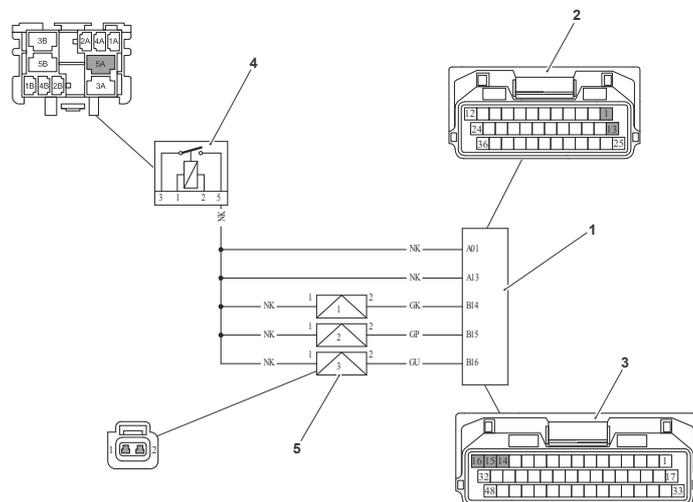
Fault Code	Possible Cause	Action
P0351	Ignition coil 1 malfunction	View and note diagnostic tool 'freeze frame' data if available Ensure relevant ignition coil connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:
P0352	Ignition coil 2 malfunction	
P0353	Ignition coil 3 malfunction	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B14	OK	Proceed to test 2

Test	Result	Action
- Engine ECM pin B15 - Engine ECM pin B16 - EMS relay pin 5	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - Engine ECM pin A01 to Engine ECM pin B14 (coil 1) - Engine ECM pin A01 to Engine ECM pin B15 (coil 2) - Engine ECM pin A01 to Engine ECM pin B16 (coil 3)	1.5 to 1.6 Ohms	Proceed to test 3
	Open circuit	Disconnect relevant ignition coil and proceed to test 4
	Short circuit	Disconnect relevant ignition coil and proceed to test 5
3 Check cable for short circuit: - Engine ECM pin B14 to ground - Engine ECM pin B15 to ground - Engine ECM pin B16 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - EMS relay pin 5 to relevant ign coil pin 1 - Engine ECM pin B14 to ignition coil 1 pin 2 - Engine ECM pin B15 to ignition coil 2 pin 2 - Engine ECM pin B16 to ignition coil 3 pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - Engine ECM pin A01 to Engine ECM pin B14 (coil 1) - Engine ECM pin A01 to Engine ECM pin B15 (coil 2) - Engine ECM pin A01 to Engine ECM pin B16 (coil 3)	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant ignition coil resistance: - Ignition coil pin 1 to ignition coil pin 2	1.2 to 1.6 Ohms	Proceed to test 7
	Faulty	Renew relevant ignition coil, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Engine Management System Relay
5. Ignition Coils

Coolant Temperature Sensor

Fault Code	Possible Cause	Action
P0115	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	View and note diagnostic tool 'freeze frame' data if available View and note diagnostic tool 'sensor' data Ensure sensor connector is secure. Disconnect Engine ECM and proceed to pinpoint test 1:
P0117	Engine coolant temperature sensor short circuit to ground	Disconnect sensor and proceed to test 6:

Pinpoint Tests

Test	Result	Action	
1	Check cable and terminal integrity: - Engine ECM pin B40 - Coolant temperature sensor pin 1 - Coolant temperature sensor pin 2	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7	
2	Check resistance value: - Engine ECM pin B40 to ground (temperature dependant - see circuit diagram resistance data)	OK	Proceed to test 6
		Open circuit	Disconnect coolant temperature sensor and proceed to test 3
		Short circuit	Disconnect coolant temperature sensor and proceed to test 4
3	Check cable continuity: - Engine ECM pin B40 to sensor pin 1	OK	Proceed to test 5

Test	Result	Action
- Ground to sensor pin 2	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - Engine ECM pin B40 to Engine ECM pin A01	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (temperature dependent - see circuit diagram resistance data)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: - Engine ECM pin B40 to ground	OK	Proceed to test 7
	Short Circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

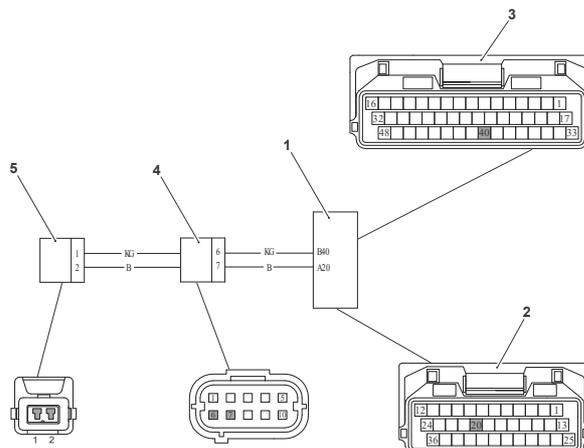
Resistance data under typical conditions:

Warm engine: 200 to 400Ω

Cold engine:

20°C ambient 2.22 to 2.71 KΩ

-10°C ambient 8.50 to 10.25 KΩ



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Engine Sub - Harness
5. Coolant Temperature Sensor

Intake Air Temperature Sensor

Fault Code	Possible Cause	Action
P0110	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	View and note diagnostic tool 'freeze frame' data if available View and note diagnostic tool 'sensor' data Ensure sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:
P0112	Intake air temperature sensor short circuit to ground	Disconnect sensor and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action	
1	Check cable and terminal integrity: - Engine ECM pin B42	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check resistance value: - Engine ECM pin B42 to ground (temperature dependent - see circuit diagram resistance data)	OK	Proceed to test 6
		Open circuit	Disconnect air temperature sensor and proceed to test 3
		Short circuit	Disconnect air temperature sensor and proceed to test 4
3	Check cable continuity: - Engine ECM pin B42 to sensor pin 1 - Ground to sensor pin 2	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short circuit: - Engine ECM pin B42 to ground	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 6
5	Check sensor resistance: - sensor pin 1 to sensor pin 2 (temperature dependent - see circuit diagram resistance data)	OK	Proceed to test 6
		Faulty	Renew air temperature sensor and proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

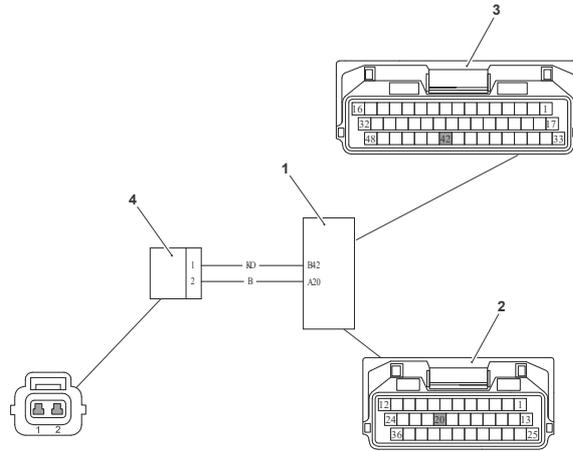
Circuit Diagram

If engine is warm, remove sensor and allow time to cool to ambient prior to test.

Resistance data:

Ambient temp Resistance value

80°C 200 to 400 Ohms
 20°C 2.35 to 2.65 K Ohms
 -10°C 8.50 to 10.25 K Ohms



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Intake Air Temperature Sensor

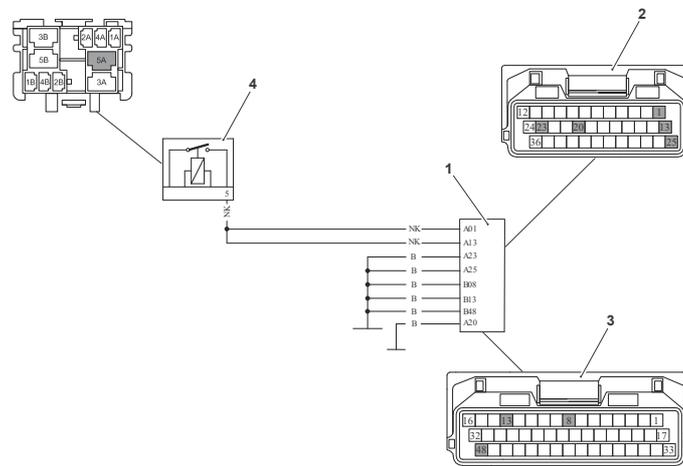
System Voltage

Fault Code	Possible Cause	Action
P0560	System Voltage - battery circuit malfunction	View and note diagnostic tool 'sensor' data Ensure Voltage across battery is acceptable, note Voltage Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin A01 - Engine ECM pin A13 - EMS relay pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 3
2 With Ignition 'ON', check Voltage at: - Engine ECM pin A01 - Engine ECM pin A13	Same as 'across battery' Voltage	Proceed to test 3
	Less than 'across battery' Voltage	Locate and rectify wiring fault, proceed to test 3
3 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Engine Management System Relay

Oxygen Sensor

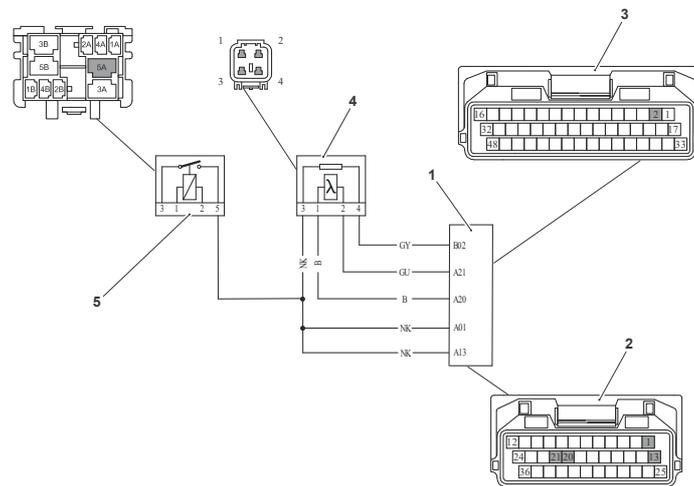
Fault Code	Possible Cause	Action
P0030	Oxygen sensor heater open circuit or short to ground	View and note 'freeze frame' data if available View and note 'sensor' data Ensure oxygen sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:
P0032	Oxygen sensor heater short circuit to Vbatt	
P0130	Oxygen sensor open circuit or short circuit to vBatt	
P0131	Oxygen sensor short circuit to ground	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin A21 - Engine ECM pin B02	OK	Disconnect oxygen sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin A21 to ground - Engine ECM pin B02 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin B02 to oxygen sensor pin 4	OK	Proceed to test 5

Test	Engine ECM pin A21 to oxygen sensor pin 2	Result	Action
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A01 to Engine ECM pin A21 - Engine ECM pin A01 to Engine ECM pin B02	OK	Renew oxygen sensor and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine. Check adaption status	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Oxygen Sensor
5. Engine Management System Relay

Cornering Traction Control and Roll-over Detection Disabled

Fault Code	Possible Cause	Action
P1136	Cornering Traction Control disabled due to Inertial Measurement Unit (IMU) malfunction	View and note 'freeze frame' data if available Ensure IMU connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:
P1640	Roll-over detection disabled due to Inertial Measurement Unit (IMU) malfunction	
P16A2	Engine ECM detects Inertial Measurement Unit (IMU) present but with signal error	

5. Chassis Electronic Control Module - Connector A

Vehicle Speed Sensor

Fault Code	Possible Cause	Action
P0500	Vehicle speed sensor malfunction	Refer to the following ABS diagnostic trouble codes C1611 (see Front Wheel Sensor Open Circuit/Short Circuit) C1612 (see Front Wheel Sensor Incorrect or Missing Signal) C1613 (see Rear Wheel Sensor Open Circuit/Short Circuit) C1614 (see Rear Wheel Sensor Incorrect or Missing Signal)

CAN Communication

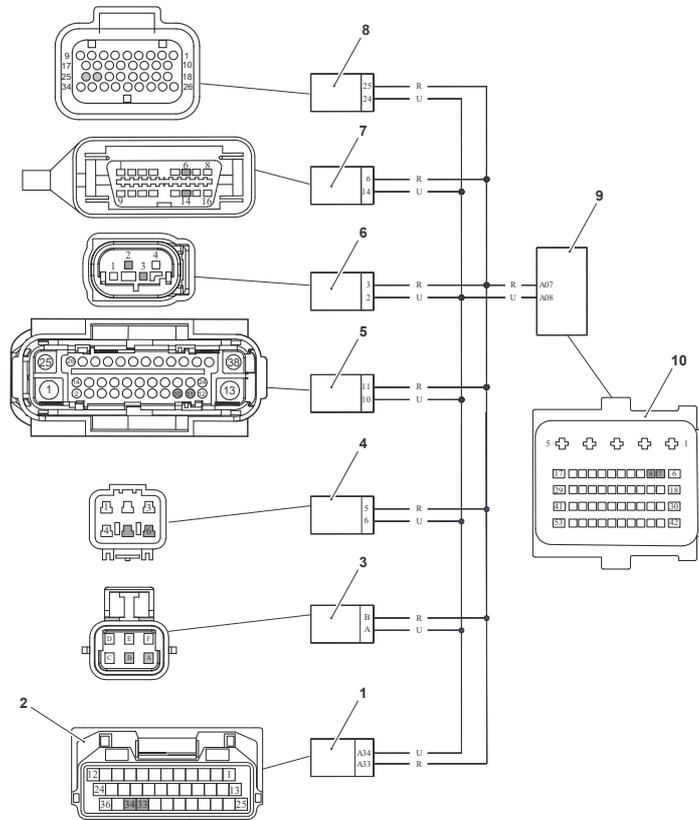
Fault Code	Possible Cause	Action
P1690	CAN Fault	View and note 'freeze frame' data if available Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM pin 11 - ABS ECM pin 10 - Chassis ECM pin A07 - Chassis ECM pin A08 - Instruments pin 24 - Instruments pin 25 - IMU pin 3 - IMU pin 2 - Diagnostic connector pin 6 - Diagnostic connector pin 14 - Engine ECM pin A33 - Engine ECM pin A34 - Electronic steering lock pin 5 - Electronic steering lock pin 6 - Headlights pin A - Headlights pin B	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin A33 to ground - Engine ECM pin A34 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity:	OK	Proceed to test 4

Test	Result	Action	
<ul style="list-style-type: none"> - Engine ECM pin A33 to instruments pin 25 - Engine ECM pin A34 to instruments pin 24 - Engine ECM pin A33 to Chassis ECM pin A07 - Engine ECM pin A34 to Chassis ECM pin A08 - Engine ECM pin A33 to IMU pin 3 - Engine ECM pin A34 to IMU pin 2 - Engine ECM pin A33 to diagnostic connector pin 6 - Engine ECM pin A34 to diagnostic pin 14 - Engine ECM pin A33 to ABS ECM pin 11 - Engine ECM pin A34 to ABS ECM pin 10 - Engine ECM pin A33 to electronic steering lock pin 5 - Engine ECM pin A34 to electronic steering lock pin 6 - Engine ECM pin A33 to electronic steering lock pin 5 - Engine ECM pin A34 to electronic steering lock pin 6 	Open circuit	Locate and rectify wiring fault, proceed to test 5	
4	Check cable for short circuit: - ECM pin A33 to ECM pin A34	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5	
5	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Electronic Steering Lock
4. ABS Control Module
5. Inertial Measurement Unit
6. Diagnostic Connector
7. Instruments
8. Chassis Electronic Control Module
9. Chassis Electronic Control Module - Connector A

Instrument Communication (CAN)

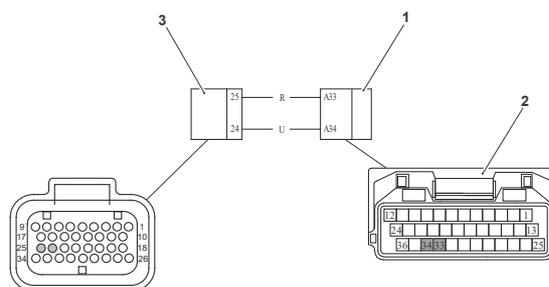
Fault Code	Possible Cause	Action
P1695	CAN fault - lost communication with Instrument panel	View and note 'freeze frame' data if available Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Verify instrument pack is operating. Turn on Ignition.	OK	Proceed to test 2
	Faulty	Check main fuse box, Fuse 9. Replace if blown. Proceed to test 2

Test	Result	Action	
2	Check cable and terminal integrity: - Engine ECM pin A33 - Engine ECM pin A34 - Instruments pin 25 - Instruments pin 24	OK	Disconnect instruments and proceed to test 3
	Faulty	Rectify fault, proceed to test 6	
3	Check cable for short circuit: - Engine ECM pin A33 to ground - Engine ECM pin A34 to ground	OK	Proceed to test 4
		Faulty	Locate and rectify wiring fault, proceed to test 6
4	Check cable continuity: - Engine ECM pin A33 to instruments pin 25 - Engine ECM pin A34 to instruments pin 24	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
5	Check cable for short circuit: - Engine ECM pin A33 to Engine ECM pin A34	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Instruments

Fuel Level Sensor Circuit Malfunction

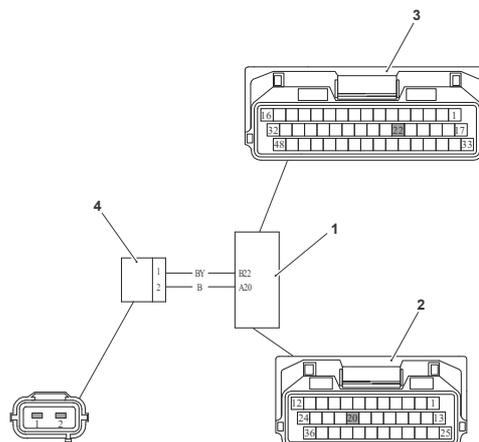
Fault Code	Possible Cause	Action
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Fault Code	Possible Cause	Action
P0460	Fuel level sensor circuit malfunction	View and note 'freeze frame' data if available View and note 'sensor' data Ensure fuel level sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B22 - Fuel level sensor pin 1 - Fuel level sensor pin 2	OK	Disconnect fuel level sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for short circuit: - Engine ECM pin B22 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable continuity: - Engine ECM pin B22 to sensor pin 1 - Ground to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Reconnect harness, clear fault code	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Fuel Level Sensor

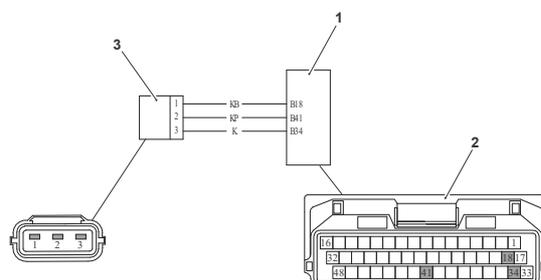
Ambient Air Pressure Sensor

Fault Code	Possible Cause	Action
P2228	Ambient air pressure sensor circuit short circuit to ground	View and note 'freeze frame' data if available View and note 'sensor' data
P2226	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	Ensure ambient pressure sensor connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B18 - Engine ECM pin B34 - Engine ECM pin B41 - Sensor pin 1, 2, 3	OK	Disconnect ambient air pressure sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for short circuit: - Engine ECM pin B41 to Engine ECM pin B18 - Engine ECM pin B41 to Engine ECM pin B34	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable for continuity: - Engine ECM pin B34 to sensor pin 3 - Engine ECM pin B18 to sensor pin 1 - Engine ECM pin B41 to sensor pin 2	OK	Renew ambient air pressure sensor and proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Ambient Air Pressure Sensor

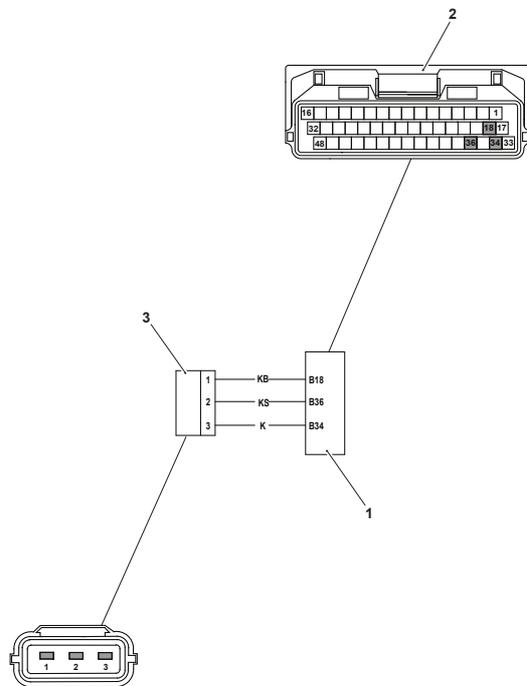
Manifold Absolute Pressure (MAP) Sensor

Fault Code	Possible cause	Action
P0107	Manifold absolute pressure sensor 1 short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P0105	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	Ensure sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:
P1105	Manifold absolute pressure sensor 1 pipe malfunction	Check connection/condition of pipes from MAP sensors to throttle body.

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B18 - ECM pin B34 - ECM pin B36 - Sensor pin 1, 2, 3	OK	Disconnect MAP sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for short circuit: - ECM pin B36 to ECM pin B18 - ECM pin B36 to ECM pin B34	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable for continuity: - ECM pin B34 to MAP sensor pin 3 - ECM pin B18 to MAP sensor pin 1 - ECM pin B36 to MAP sensor pin 2	OK	Renew relevant MAP pressure sensor, proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Manifold Absolute Pressure (MAP) Sensor

Secondary Air Injection Solenoid

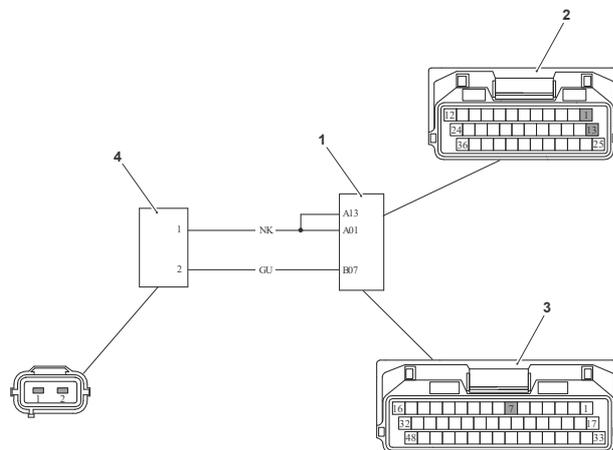
Fault Code	Possible Cause	Action
P044F	Secondary air injection short circuit to Vbatt	View and note diagnostic software 'freeze- frame' data if available.
P0412	Secondary air injection short circuit to ground or open circuit	Ensure secondary air solenoid connector is secure Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B07 - Engine ECM pin A01 - Engine ECM pin A13 - Secondary air injection solenoid pin 1	OK	Disconnect the secondary air injection solenoid and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 - Secondary air injection solenoid pin 2	OK	Proceed to test 3

Test	Check cable for short circuit:	OK Result	Proceed to test 5
	- Engine ECM pin B07 to ground - Engine ECM pin A01 to ground	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B07 to secondary air injection solenoid pin 1 - Engine ECM pin A01 to secondary air injection solenoid pin 2	OK	Proceed to test 4
		Open Circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin B07 to ECM pin A01	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of SAI valve	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Secondary Air Injection Solenoid

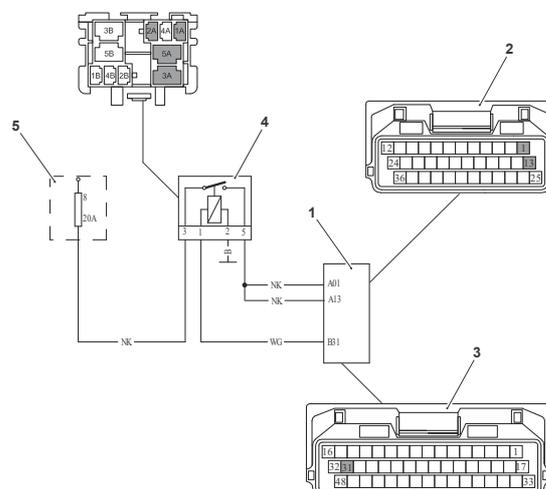
EMS Main Relay Circuit

Fault Code	Possible Cause	Action
P1685	Main relay circuit malfunction	Note that the Starter Motor cannot be powered if a Main Relay fault exists Ensure the EMS Main Relay connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Ensure ignition has been switched off for longer than 90 seconds. Identify EMS Main Relay on the harness Check that relay operates when the ignition is switched on	OK	Proceed to test 4
	Faulty	Disconnect main relay and Engine ECM and proceed to test 2
2 Check cable for short circuit: - Engine ECM pin B31 to ground - Engine ECM pin A01 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable and terminal integrity: - Engine ECM pin B31 - EMS main relay pin 1 - EMS main relay pin 2 - EMS main relay pin 3 - EMS main relay pin 5	OK	Proceed to test 4
	Faulty	Rectify fault, proceed to test 5
4 Check main fuse box, Fuse 8 integrity	OK	Proceed to test 5
	Faulty	Replace fuse and proceed to test 5
5 Check cable continuity: - Engine ECM pin A01 to EMS main relay pin 5 - Engine ECM pin B31 to EMS relay pin 1 - EMS main relay pin 2 to ground - EMS main relay pin 3 to main fuse box, fuse 8	OK	Replace EMS main relay and proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code. Switch ignition off for longer than 90 seconds. Switch ignition on and check that the EMS Main Relay operates. Start engine as final check	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Engine Management System Relay
5. Fuse Box

EEPROM Error

Fault Code	Possible cause	Action
P0603	EEPROM error	View and note 'freeze frame' data if available. No tests available - contact Triumph service.

EMS Ignition Voltage Input Circuit

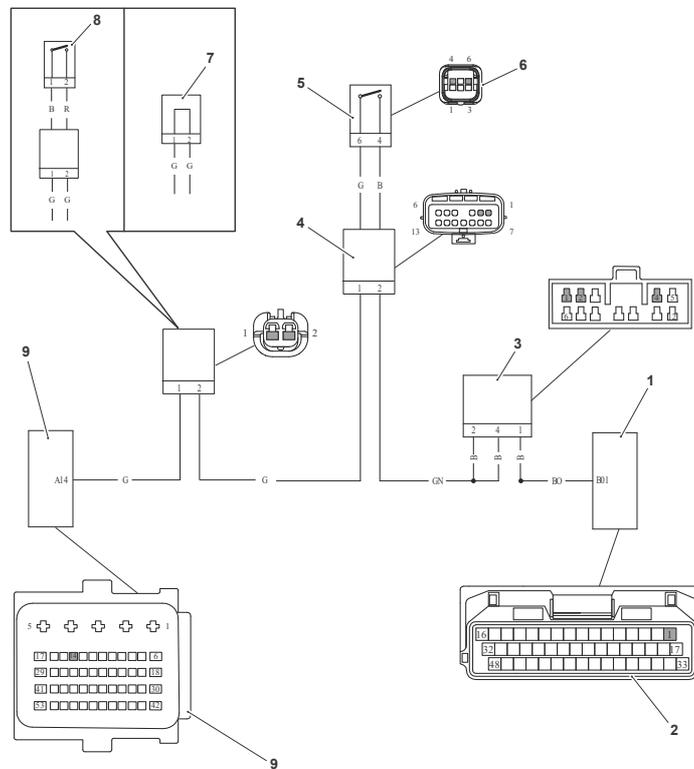
Fault Code	Possible Cause	Action
P1659	Ignition power supply malfunction	Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check main fuse box fuse 6 integrity	OK	Proceed to test 3
		Faulty	Proceed to test 2
2	Check cable for short circuit: - ECM pin B01 to ground	OK	Replace fuse 6 and proceed to test 5
		Short circuit	Locate and rectify wiring fault, replace fuse 6 and proceed to test 5
3	Check cable and terminal integrity: - ECM pin B01 - Alarm connector pin 1 - Alarm connector pin 2 - Alarm connector pin 4 - Switch housing subharness (main harness connector) pin 1 - Switch housing subharness (main harness connector) pin 2 - Right hand switch housing (6-way black connector) pin 4 - Right hand switch housing (6-way black connector) pin 6 - Ignition master switch link connector pin 1 - Ignition master switch link connector pin 2 - Chassis ECM pin A14	OK	Proceed to test 4
		Faulty	Rectify fault, proceed to test 5
	Check cable continuity:		

Test	Result	Action
<p>4 Engine ECM pin B01 to Chassis</p> <p>ECM pin A14</p> <p>Note:</p> <p>The engine stop switch must be in the 'RUN' position and any alarm fitted must be disarmed</p> <p>For all markets except US, the ignition master switch link connector must be fitted</p> <p>For US markets only, the ignition master switch must be in the ON position</p>	<p>Open circuit</p>	<p>Locate and rectify wiring, alarm or engine stop switch fault, proceed to test 5</p>
<p>5 Reconnect harness, clear fault code and run engine to verify fault cleared</p>	<p>OK</p>	<p>Action complete - quit test</p>
	<p>Fault still present</p>	<p>Contact Triumph service</p>

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector B
3. Alarm
4. Switch Housing Subharness
5. Engine Stop/Run Switch
6. Right Hand Switch Housing Black Connector
7. Ignition Master Switch Link Connector (all markets except US)
8. Ignition Master Switch (US Markets Only)
9. Chassis Electronic Control Module
10. Chassis Electronic Control Module - Connector A

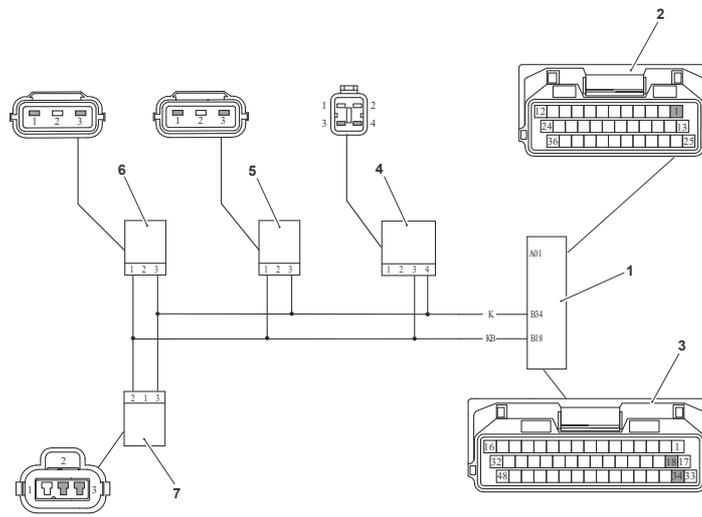
5 Volt Sensor Supply Circuit

Fault Code	Possible Cause	Action
P1698	5 V sensor supply malfunction	View and note 'sensor' data Note Engine ECM sensors requiring a power supply will not be active Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin B18 - Engine ECM pin B34	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit - Engine ECM pin B18 to Engine ECM pin B34	OK	Proceed to test 4
	Faulty	Proceed to test 3
3 Disconnect the following sensors in turn: - Shift force sensor (if fitted) - MAP sensor - Ambient pressure sensor - Gear position sensor And retest for short circuit: - Engine ECM pin B18 to Engine ECM pin B34	OK	Replace sensor last removed and proceed to test 5
	Faulty	Proceed to test 4
4 Check cable for short circuit: - Engine ECM pin B18 to ground - Engine ECM pin B34 to ground - Engine ECM pin B18 to Engine ECM pin A01 - Engine ECM pin B34 to Engine ECM pin A01 - Engine ECM pin B18 to battery positive - Engine ECM pin B34 to battery positive	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and use service tool to check for correct sensor outputs and 5 V sensor supply Voltage level	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Gear Position Sensor
5. Ambient Air Pressure Sensor
6. Manifold Absolute Pressure (MAP) Sensor
7. Shift Force Sensor

Inertial Measurement Unit (IMU) Incompatible

Fault Code	Possible Cause	Action
P16A0	Engine ECM detects Inertial Measurement Unit (IMU) present but ID incompatible	Proceed to pinpoint test 1:

Pinpoint Tests

Inertial Measurement Unit (IMU) Circuit Malfunction

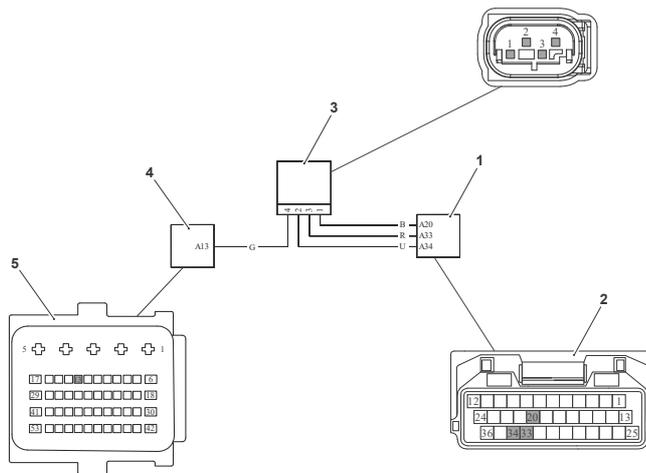
Fault Code	Possible Cause	Action
P16A1	Engine ECM detects Inertial Measurement Unit (IMU) circuit malfunction	View and note 'freeze-frame' data if available. View and note 'sensor' data. Ensure sensor connector is secure. Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A33 - Engine ECM pin A34	OK Disconnect IMU and proceed to test 2
		Faulty Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin A33 to ground	OK Proceed to test 3

Test	Engine ECM pin A34 to ground	Result	Action
3	- IMU pin 4 to ground	Short circuit	Locate and rectify wiring fault, proceed to test 5
	Check cable continuity: - Engine ECM pin A33 to IMU pin 3 - Engine ECM pin A34 to IMU pin 2 - IMU pin 4 to chassis ECM pin A13 (with the engine stop switch in the RUN position) - IMU pin 1 to ground	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A33 to Engine ECM pin A34	OK	Renew IMU and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Inertial Measurement Unit
4. Chassis Electronic Control Module
5. Chassis Electronic Control Module - Connector A

Chassis ECM Communication Error/Malfunction

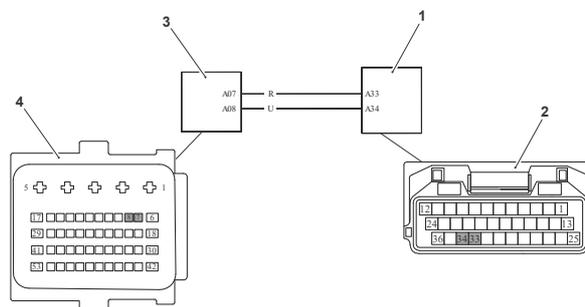
Fault Code	Possible Cause	Action
P16A3	Chassis ECM communication error	View and note 'freeze-frame' data if available. Ensure Chassis ECM connectors are secure.

Fault Code	Possible Cause	Action
P16A4	Chassis ECM malfunction - check Chassis ECM diagnostics	Check Chassis ECM diagnostic trouble codes. Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin A33 - Engine ECM pin A34 - Chassis ECM pin A07 - Chassis ECM pin A08	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin A33 to ground - Engine ECM pin A34 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin A33 to Chassis ECM pin A07 - Engine ECM pin A34 to Chassis ECM pin A08	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin A33 to Engine ECM pin A34	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module

2. Engine Electronic Control Module - Connector A
3. Chassis Electronic Control Module
4. Chassis Electronic Control Module - Connector A

Tune Lock

Fault Code	Possible cause	Action
P1605	Engine ECM locked by the tune lock function	This is also identified by a fast flashing MIL indication, and a disabled engine management system. Unlock the engine ECM using the diagnostic software and supplied unlock code from Triumph service.

Instrument ID Incompatible

Fault Code	Possible cause	Action
P1614	Instrument ID incompatible	This is also identified by a fast flashing MIL indication, and a disabled engine management system.

Pinpoint Tests

Test	Result	Action
1 Check engine ECM part number is correct for the motorcycle.	OK	Proceed to test 2
	Incorrect	Replace engine ECM with correct part and proceed to test 3
2 Check that the calibration is correct for the motorcycle, using the diagnostic software.	OK	Proceed to test 3
	Incorrect	Update calibration using diagnostic software, proceed to test 3
3 Clear fault code, check for normal operation.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

ABS Modulator ID Incompatible

Fault Code	Possible cause	Action
P1520	Unmatched ABS module	This is also identified by ABS warning light indication. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check ABS modulator part number is	OK	Proceed to test 2

	Test	Result	Action
	correct for the motorcycle.	Incorrect	Replace ABS modulator with correct part and proceed to test 3
2	Check that the engine ECM calibration is correct for the motorcycle, using the diagnostic tool.	OK	Proceed to test 3
		Incorrect	Update calibration using service tool, proceed to test 3
3	Clear fault code, check for normal operation.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

ABS Modulator Communication

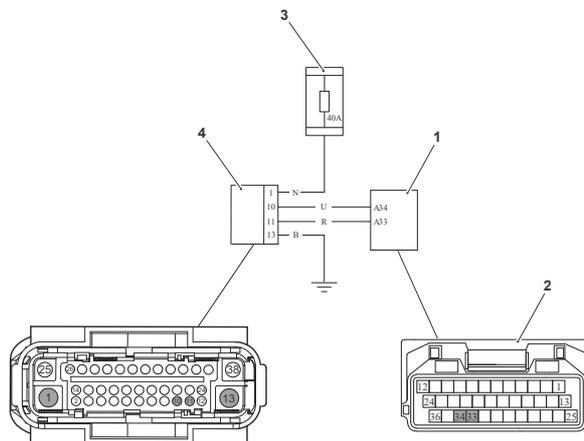
Fault Code	Possible Cause	Action
P1521	CAN fault - lost communication with ABS module or ABS system status error	View and note 'freeze frame' data if available Ensure ABS modulator connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check cable and terminal integrity: - Engine ECM pin A33 - Engine ECM pin A34 - ABS modulator pin 10 - ABS modulator pin 11 - ABS modulator pin 1 - ABS modulator pin 13 - ABS modulator pin 6	OK	Disconnect Engine ECM and proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - Engine ECM pin A33 to ground - Engine ECM pin A34 to ground	OK	Disconnect ABS modulator and proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 6
3	Check main fuse box Fuse 6 and ABS fuse box fuse integrity.	OK	Proceed to test 5
		Faulty	Proceed to test 4
4	Check cable for short circuit: - ABS modulator pin 10 to ground - ABS modulator pin 11 to ground	OK	Proceed to test 5
		Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5	Check cable continuity:	OK	Proceed to test 6

Test	Result	Action	
<ul style="list-style-type: none"> - Engine ECM pin A33 to ABS modulator pin 11 - Engine ECM pin A34 to ABS modulator pin 10 Turn the engine stop switch to the RUN position and check cable continuity: <ul style="list-style-type: none"> - ABS fuse box to ABS modulator pin 1 - Main fuse box to ABS modulator pin 6 	Fault still present	Locate and rectify wiring fault, proceed to test 6	
6	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. ABS Fuse
4. ABS Control Module

Twist Grip – Cruise Cancel Switch Circuit Malfunction

Fault Code	Possible Cause	Action
P056C	Twist grip cruise cancel switch malfunction	Connect Triumph Diagnostic Tool and turn the ignition ON Check and investigate any other stored DTCs Select Sensor Data - Sensor Voltages on the diagnostic tool and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
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Test	Result	Action	
1	Roll the twist grip forward to its fully closed (cruise cancel) position and note the following voltages: - Twist Grip Position Sensor 1 - Twist Grip Position Sensor 2	OK Position sensor 1 voltage lower than 0.8 V Position sensor 2 voltage higher than 0.4 V	Proceed to test 2
	Faulty Position sensor 1 voltage 0.8 V or higher and/or Position sensor 2 voltage 0.4 V or lower	Renew twist grip position sensor and proceed to test 2	
2	Clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Cruise Control Prevented Due to Other Malfunction

Fault Code	Possible Cause	Action
P1574	Cruise control prevented due to other malfunction condition	Check that there is no other DTC linked to the engine management system stored Check front and rear brake switches, cruise control cancel switch and the rear wheel speed sensor

Cruise Control Disabled Until Button Press Sequence Completed

Fault Code	Possible Cause	Action
P1575	Cruise control disabled until button press sequence completed After certain DTCs have been stored and subsequently repaired, the cruise control will be disabled until a test of the systems various switches has been performed	Carry out the button press sequence (see Cruise Control Switch Check).

Traction Control Prevented Due to Malfunction

Fault Code	Possible cause	Action
P1135	Traction Control prevented due to malfunction	Check that there is no other DTC linked to the ABS system or CAN communication stored. Contact Triumph service.

Engine ECM Internal Error

Fault Code	Possible cause	Action
P0606	Engine ECM internal error	Contact Triumph service.
P1607	Engine ECM ride by wire internal error	
P1608		

Engine ECM Tamper Detected

Fault Code	Possible cause	Action
P1604	Engine ECM tamper detected - return to Triumph	Contact Triumph service

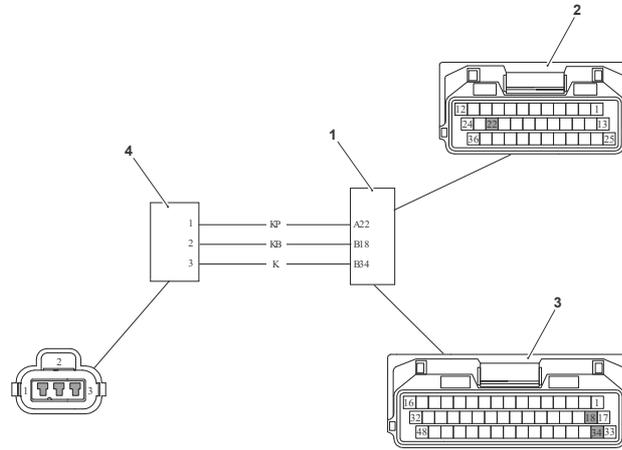
Shift Force Sensor Circuit

Fault Code	Possible Cause	Action
P1702	Shift force sensor voltage too high	View and note diagnostic tool 'sensor' data Disconnect engine ECM and proceed to pinpoint test 1:
P1703	Shift force sensor voltage too low	Disconnect engine ECM and proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin A22 - Engine ECM pin B18 - Engine ECM pin B34	OK	Disconnect shift force sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin A22 to pin B18 - Engine ECM pin B34 to pin B18	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin A22 to sensor pin 1 - Engine ECM pin B18 to sensor pin 2 - Engine ECM pin B34 to sensor pin 3	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin A22 to pin B34 - Engine ECM pin B18 to pin B34	OK	Renew shift force sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Engine Electronic Control Module - Connector B
4. Shift Force Sensor

Fault Finding – Non Electrical

Symptom	Possible Cause(s)
Poor throttle response at low RPM	Low fuel pressure caused by filter blockage/leaks
Cutting out at idle	Throttle bodies out of balance
	Low fuel pressure
	Weak mixture caused by air leak at the throttle body/transition piece to cylinder head face
Idle speed too low/high	Incorrect closed throttle position setting
	Mechanical fault with the throttle linkage
Diagnostic software malfunctions during tune download procedure	Low battery Voltage
Throttle hang-up	Incorrect closed throttle position setting
Motorcycle will start but cuts out immediately	Low fuel pressure caused by filter blockage/leaks
Abnormally high fuel pressure	Fuel pressure regulator inoperative
Temperature gauge reads cooler than normal	Cooling system air-locked resulting in coolant temperature sensor operating in air instead of coolant
Motorcycle will not start	Check the immobiliser system for faults

Symptom	Possible Cause(s)
	Ensure that the keys, Engine ECM and Chassis ECM are all correctly paired

Removal and Installation - Fuel and Air Components

Fuel Tank - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

WARNING

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

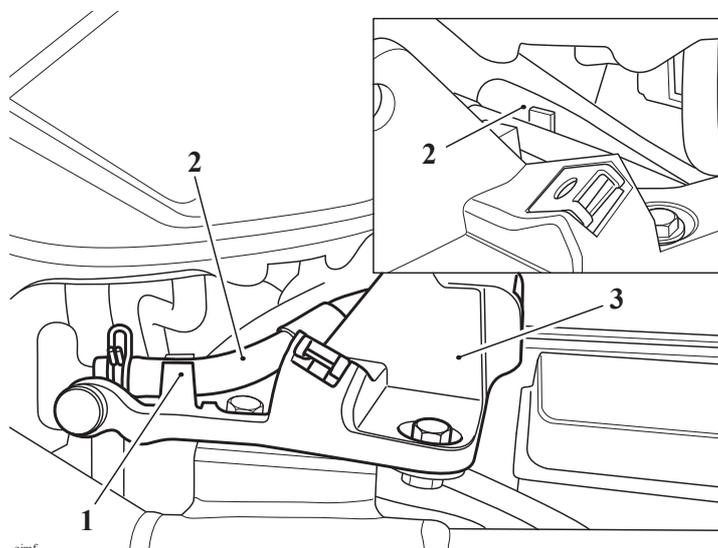
Perform the following operations:

- Rider's Seat - Removal
- Fuel Tank Infill Panels - Removal
- Side Fairings - Removal
- Seat Infill Panel - Removal

Note

- **Due to the shape of the fuel tank, a small amount of fuel may remain in the fuel tank after draining.**
- **Note the routing of the fuel tank's drain hose for installation.**

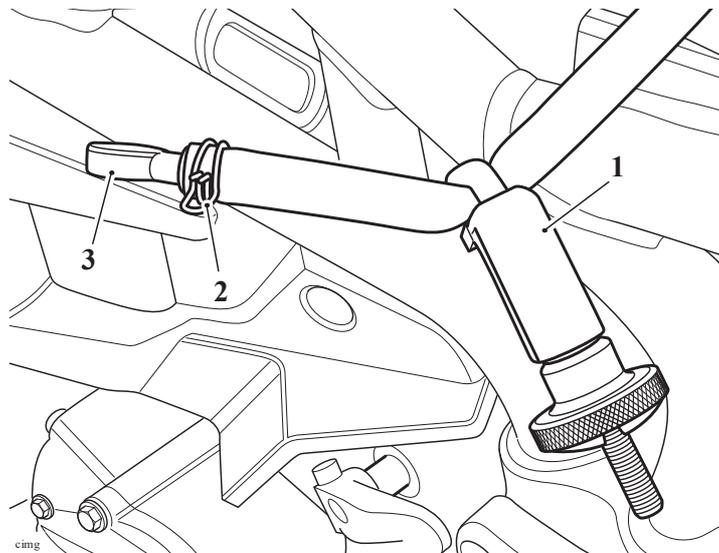
1. Detach the fuel drain hose from its retaining clips on the seat bridge and gently pull out the drain hose.



1. Retaining clip

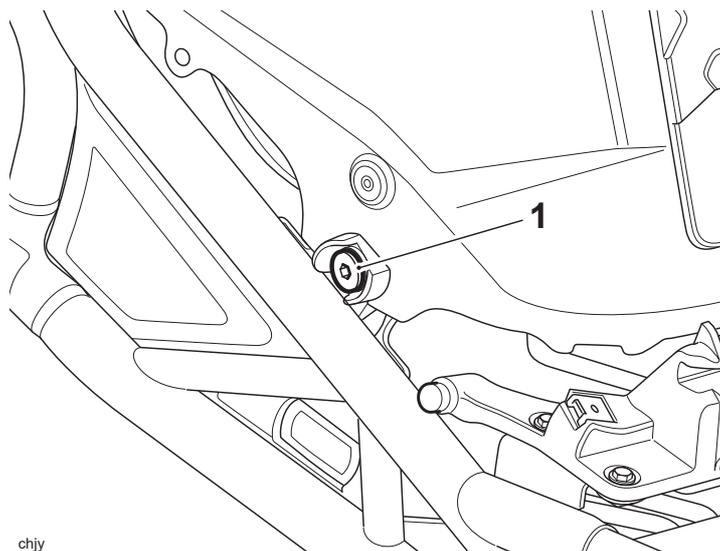
2. Fuel drain hose
3. Seat bridge

2. Using one of the fuel clamps from T3880630 - Fuel Hose Clamp, clamp the fuel drain hose. Ensure there is enough space to move the clip securing the plug to the hose.



1. T3880630 - Fuel Hose Clamp
2. Clip
3. Plug

3. Remove the plug from the drain hose and attach the hose to proprietary professional automotive workshop equipment approved for fuel handling.
4. Release the fuel hose clamp and drain the fuel from the fuel tank.
5. When all of the fuel has drained from the fuel tank, refit the plug to the drain hose and secure with its clip.
6. Remove the fixings securing the rear of the fuel tank to the frame.



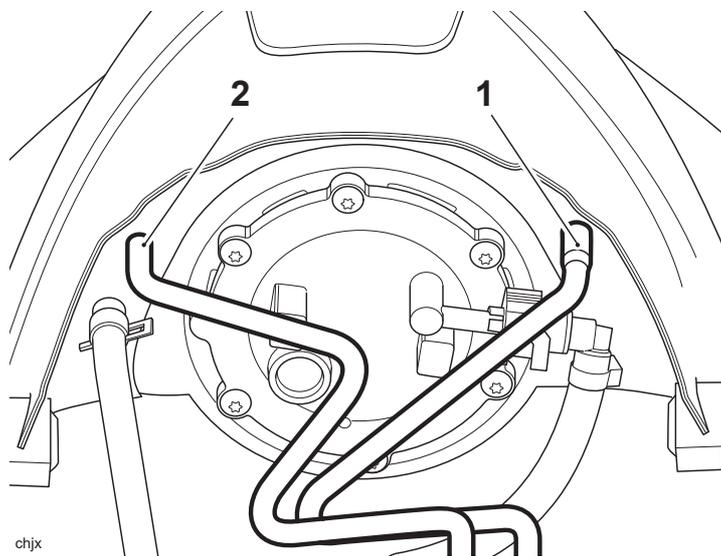
1. Fixing, left hand shown

7. Raise the rear of the fuel tank to access the fuel lines and electrical connectors to the fuel pump.

Note

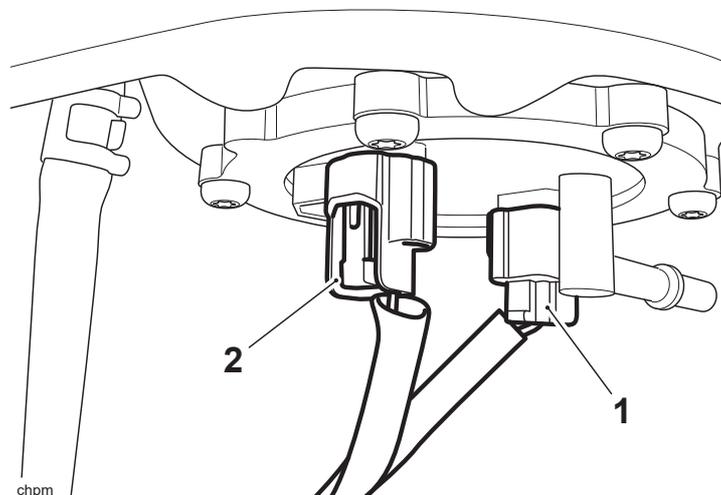
- Before disconnection, note that the right hand breather hose has a larger diameter than the left hand hose. Ensure they are returned to the same locations when refitting the tank.

8. Disconnect the two breather hoses.



1. Right hand breather hose
2. Left hand breather hose

9. Disconnect the electrical connections to the fuel level sender and the fuel pump.



1. Fuel pump connection
2. Fuel level sender connection

! WARNING

If the fuel rail is dismantled without first reducing pressure, fuel may escape causing clothing and components to be coated with fuel.

This would represent a serious fire hazard which could lead to burn injuries and damage to property.

Note

- Because fuel stored in the fuel rail will be at 3.5 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the fuel rail takes place. To reduce pressure, briefly crank the engine with the fuel pump disconnected.

10. Briefly crank the engine to reduce the fuel pressure in the fuel rail.

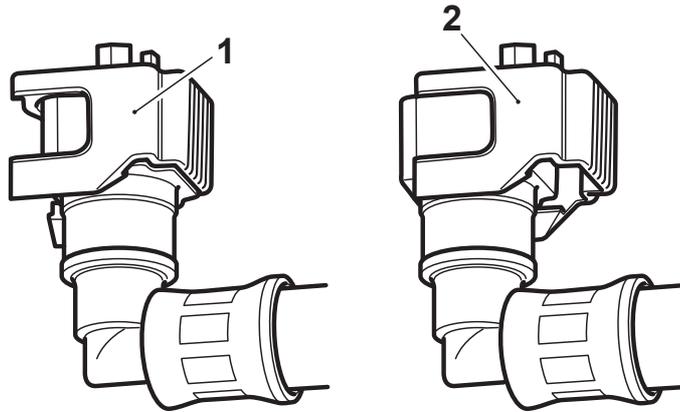
11. Remove the battery (see Battery - Removal).

Note

Note

- When disconnected, the fuel tank is self-sealing but a small amount of fuel may dribble from the hose.
- To protect the components under the fuel tank, place suitable material over the components to absorb the small amount of fuel that may come from the fuel tank and its fuel lines.

12. Ease the latch away from the fuel connector until the release buttons are exposed.



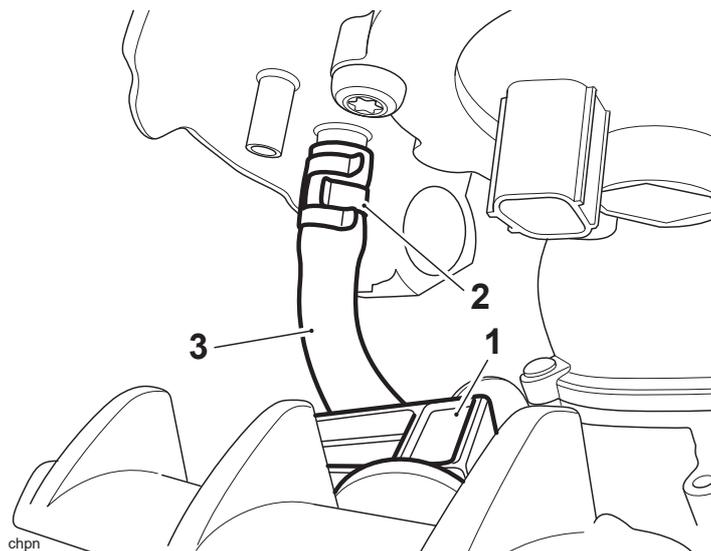
1. Locked position
2. Unlocked position

13. Disconnect the fuel hose by squeezing the sides of the connector and pulling the hose free from the spigot.

Note

- Use a suitable wooden block to support the rear of the fuel tank when fitting a fuel clamp to the rear transfer pipe and removing/fitting the transfer pipe to the fuel tank.

14. Raise the rear of the fuel tank and using one of the fuel clamps from T3880630 - Fuel Hose Clamp, clamp the fuel transfer pipe. Ensure there is enough space to move the clip off the spigot.



1. T3880630 - Fuel Hose Clamp
2. Clip
3. Fuel transfer pipe

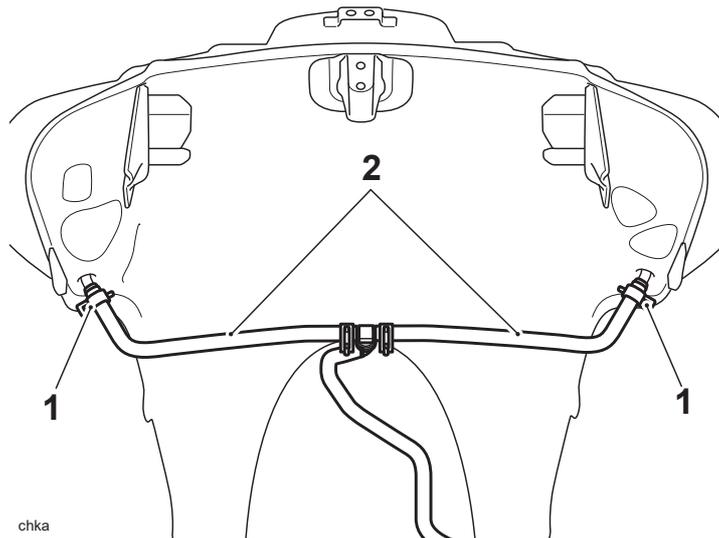
15. Release the clip and detach the transfer pipe from the spigot. At the same time fit a cap, from T3880631 - Blanking Cap, to the fuel tank spigot.

CAUTION

To prevent damage to the radiator fins, ensure that the fuel line clamp is positioned such that it will not contact the radiator while fitting/removing the clamp or removing/fitting the fuel transfer pipes.

Damaged radiator fins may impair the radiator's cooling efficiency.

16. Using the clamps from T3880630 - Fuel Hose Clamp, clamp the transfer pipe at the two front spigots. Ensure there is enough space to move the clip off the spigot.
17. Release the clip and detach one of the transfer pipes from the front spigot. At the same time fit a cap, from T3880631 - Blanking Cap, to the fuel tank spigot.
18. Repeat step 17 for the other front spigot.



1. Clips
2. Fuel transfer pipe

19. Raise the rear of the fuel tank and carefully slide the fuel tank rearwards to release its front mountings. Place the fuel tank onto a clean flat surface ensuring that the spigots and their caps do not make contact with the flat surface.

CAUTION

When the fuel tank has been removed from the motorcycle, the fuel clamps must be removed from the transfer pipe and the fuel drained into a suitable fuel container.

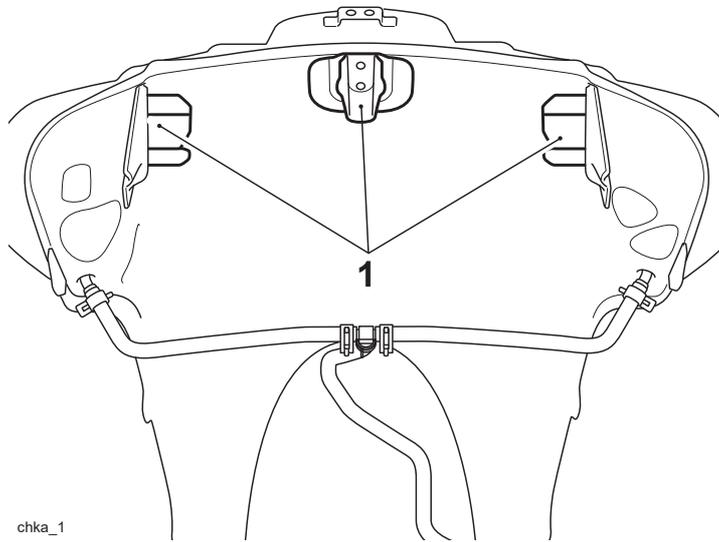
Keeping the fuel clamps on the transfer pipe for long periods of time may deform the fuel transfer pipe.

20. Remove the fuel line clamps from the transfer pipe and drain any fuel into an approved fuel container.

Fuel Tank - Installation

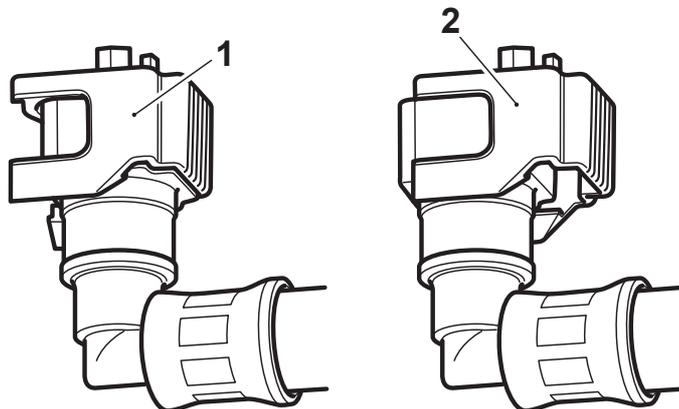
Note

- **Due to the shape of the fuel tank, a small amount of fuel may remain in the fuel tank after draining.**
1. Prior to fitting the fuel tank, drain any remaining fuel that may be in the fuel tank using proprietary professional automotive workshop equipment approved for fuel handling.
 2. Refit the fuel line clamps to the three ends of the fuel transfer pipe.
 3. Align the three front mountings on the fuel tank to their rubber mountings on the frame and push forward until fully engaged.



1. Front mountings

4. Remove the blanking cap from one of the front spigots. At the same time, refit the front fuel transfer pipe to the spigot and secure with its clip.
5. Repeat step 4 for the other front fuel transfer pipe.
6. Remove the fuel line clamps from the two front transfer pipes.
7. Pivot the fuel tank upwards at the rear and carry out the following:
 - o Remove the blanking cap from the rear spigot. At the same time, refit the rear fuel transfer pipe to the spigot and secure with its clip.
 - o Remove the fuel line clamp from the rear fuel transfer pipe.
 - o Route the drain hose as noted for removal and secure it to its retaining clips on the rider's seat front mounting.
 - o Fit the two breather pipes as noted for removal.
 - o Fit the fuel pump and fuel level sensor electrical connectors.
 - o Reconnect the fuel feed hose by gently pushing inwards until the hose engages with a click.
8. Slide the double check-latch down (i.e. towards the spigot) until the release buttons of the fuel connector are covered. If the latch will not slide into position, then the fuel hose is not fully home on its spigot and must therefore be refitted correctly.
9. Remove the covering used to cover the components under the rear of the fuel tank.
10. Lower the rear of the fuel tank onto the frame, fit the two fixings and tighten to **12 Nm**.
11. Check to ensure that the latch on the connector to the fuel pump is in the locked position.



1. Locked position
2. Unlocked position

12. Using proprietary professional automotive workshop equipment approved for fuel handling, refill the fuel tank.

Perform the following operations:

- Check carefully for fuel leaks around the fuel transfer pipes.
- Battery - Installation
- Start the engine and check carefully for fuel leaks. Rectify as necessary.
- Seat Infill Panel - Installation
- Side Fairings - Installation
- Fuel Tank Infill Panels - Installation
- Rider's Seat - Installation

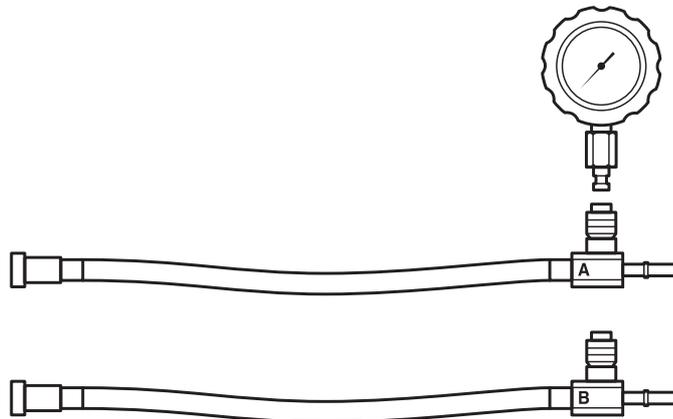
Fuel Pressure Checking

WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

Fuel pressure is checked using T3880001 - Fuel Pressure Gauge.



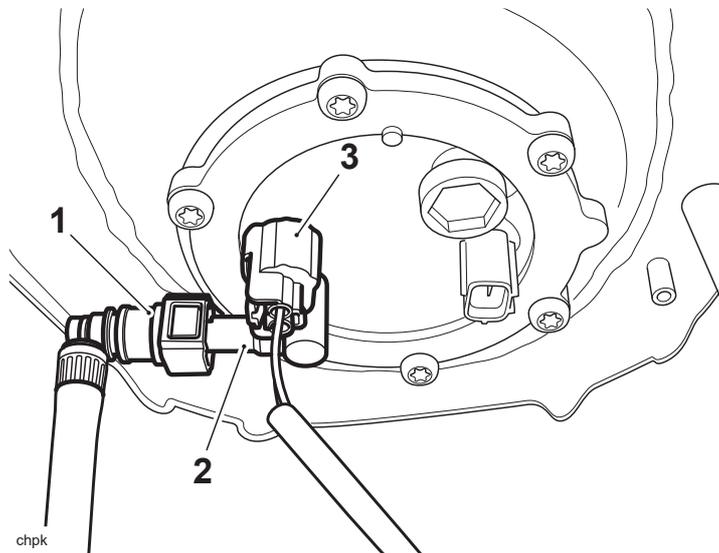
T3880001 - Fuel Pressure Gauge

1. Remove the fuel tank (see Fuel Tank - Removal) and place on a suitable support, close to the motorcycle.
2. Using T3880123 - Extension Cable, carefully connect the fuel pump connection on the main harness to the fuel tank. Connect the other end of the extension cable to the motorcycle main harness.
3. Select the fuel pressure gauge adapter marked 'B' from T3880001 - Fuel Pressure Gauge.

WARNING

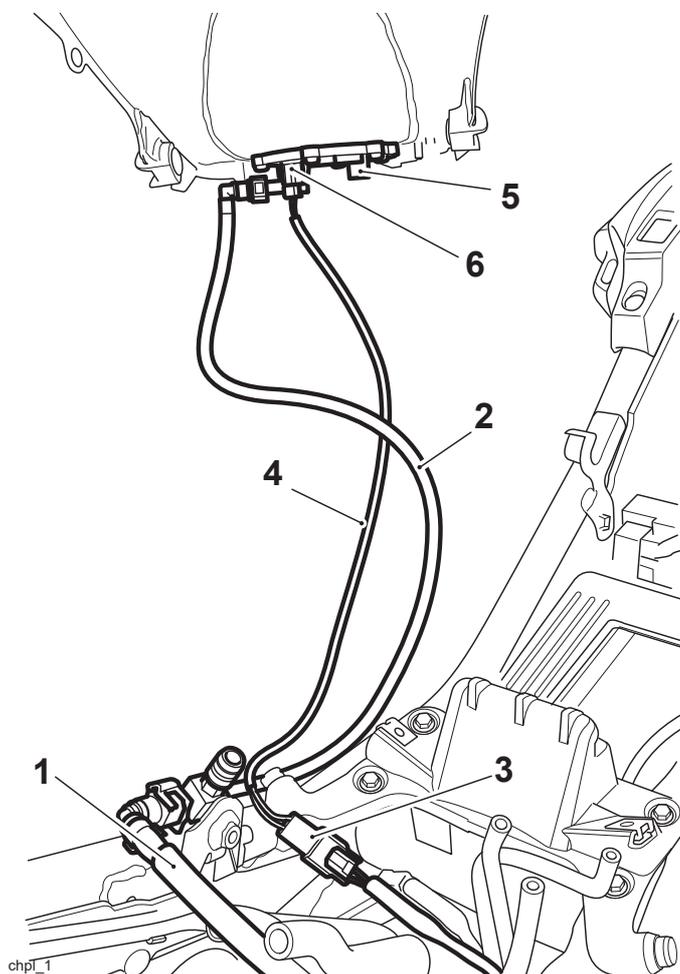
Always use the correct fuel pressure gauge adapter (**adapter 'B' for this model**). Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

4. Connect the adapter hose to the fuel pump plate outlet as shown in the illustration below.



1. Adaptor hose 'B'
2. Fuel pump plate outlet
3. T3880123 - Extension Cable

5. Connect the adapter between the fuel pump plate outlet and fuel hose as shown in the illustration below. Insert the gauge to the adapter also as shown in the illustration.



1. Motorcycle fuel hose
2. Adaptor hose 'B'
3. Fuel pump connection
4. T3880123 - Extension Cable
5. Fuel pump connection
6. Fuel pump plate outlet

Note

- To release the fuel pressure gauge from the adapter, slide the outer ferrule downwards. This will allow the gauge to spring upwards from the adapter.
 - To insert the gauge to the adapter, push the gauge spigot into the adapter until a click can be heard.
6. Ensure the gauge is visible to the side of the motorcycle.
 7. Using proprietary professional automotive workshop equipment approved for fuel handling, partially refill the fuel tank with the fuel removed earlier.
 8. Reconnect the battery, positive (red) lead first.
 9. Start the engine and observe the fuel pressure reading on the gauge.

Note

- The fuel pressure should be 3.5 bar nominally.
10. When fuel pressure checking is complete, turn the ignition to the OFF position, disconnect the fuel pressure gauge adapter and wiring extension.
 11. Using proprietary professional automotive workshop equipment approved for fuel handling, drain any remaining fuel from the fuel tank.
 12. Disconnect the battery, negative (black) lead first.
 13. Refit the fuel tank (see Fuel Tank - Installation).

Fuel Pump and Filter Assembly - Removal

Note

- The fuel pump and filter assembly is a sealed for life unit and must be replaced as a complete assembly.
- The fuel tank must be drained of fuel prior to its removal from the motorcycle.

Perform the following operations:

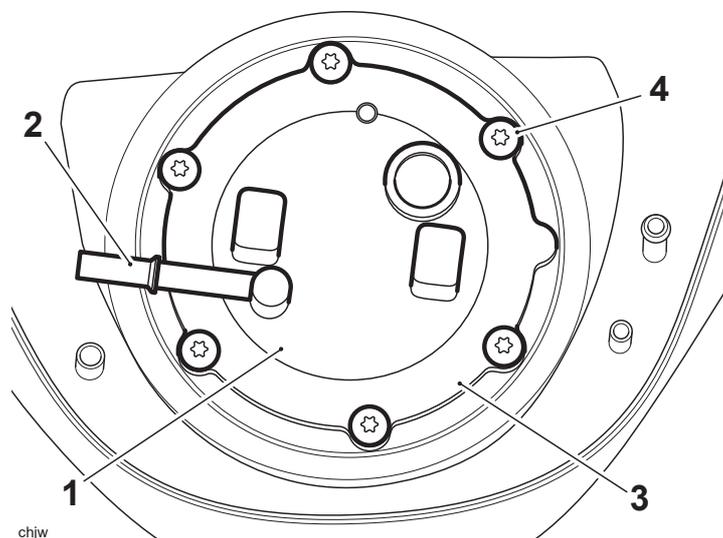
- Fuel Tank - Removal

WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

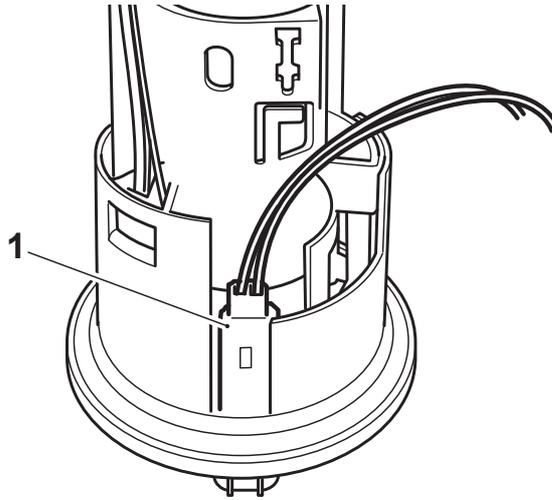
1. Invert the fuel tank and place on a protective surface to prevent paint damage.
2. Remove the fixings securing the fuel pump mounting plate to the tank. Remove the plate.



1. Fuel pump
2. Fuel pump spigot

3. **Mounting plate**
4. **Mounting plate fixings**

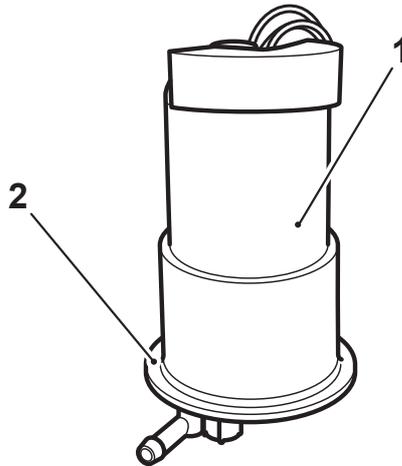
3. Lift the fuel pump and filter assembly and manoeuvre it from the fuel tank aperture.
4. Disconnect the fuel level sensor electrical connector and remove the fuel pump and filter assembly.



cegZ

1. **Fuel level sensor electrical connector**

5. Noting its orientation, remove and discard the sealing ring from the fuel pump assembly.

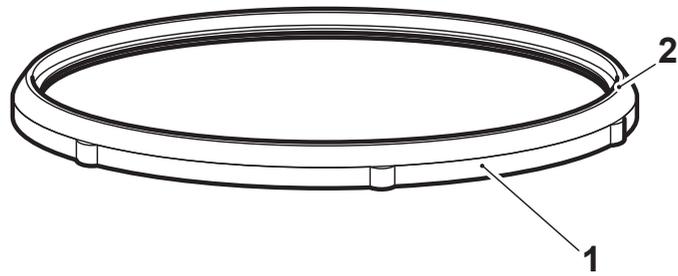


ccxh

1. **Fuel pump and filter assembly**
2. **Sealing ring location**

Fuel Pump and Filter Assembly - Installation

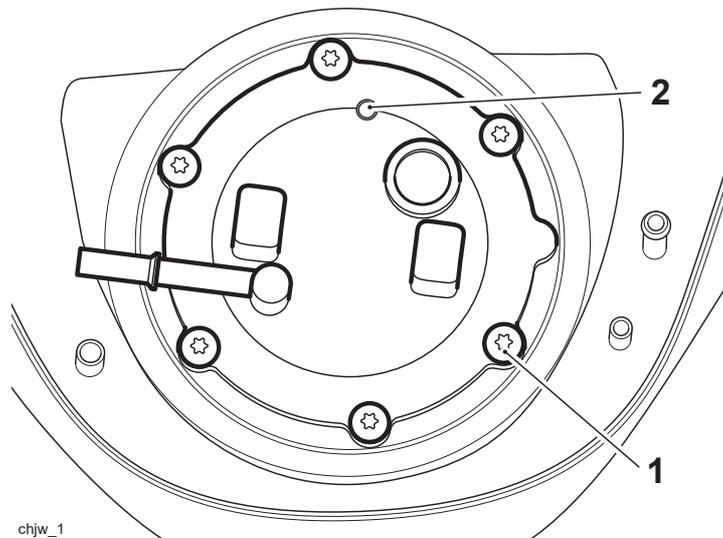
1. Install a new sealing ring into the fuel pump assembly, with the seal lip facing uppermost, and ensure that it is correctly seated.



cdva

1. Sealing ring
2. Seal lip

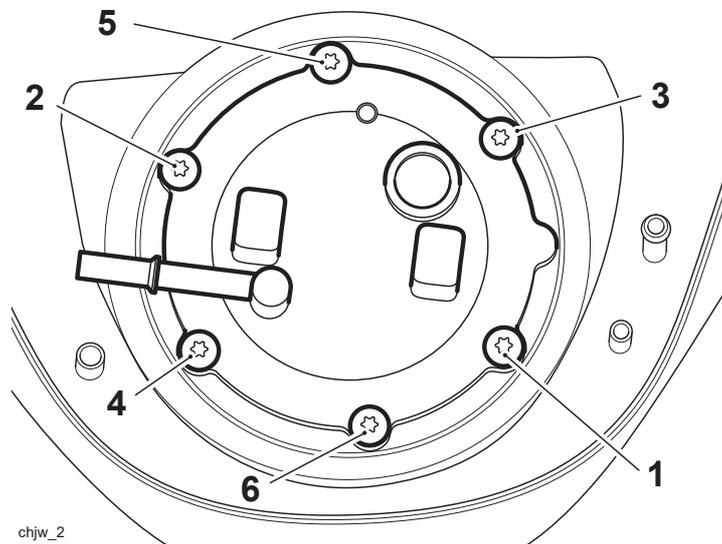
2. Taking care to ensure the sealing ring is not damaged or dislodged, manoeuvre the fuel pump assembly into the tank aperture.
3. Reconnect the fuel level sensor electrical connector and locate the fuel pump and filter assembly.
4. Ensure the locating peg on the fuel pump assembly is located in the cut out on the mounting plate and the offset hole is positioned as shown below.



chjw_1

1. Offset hole position
2. Locating peg

5. Tighten the fixings in the sequence shown below to **9 Nm**.



Pump Mounting Plate Tightening Sequence

Perform the following operations:

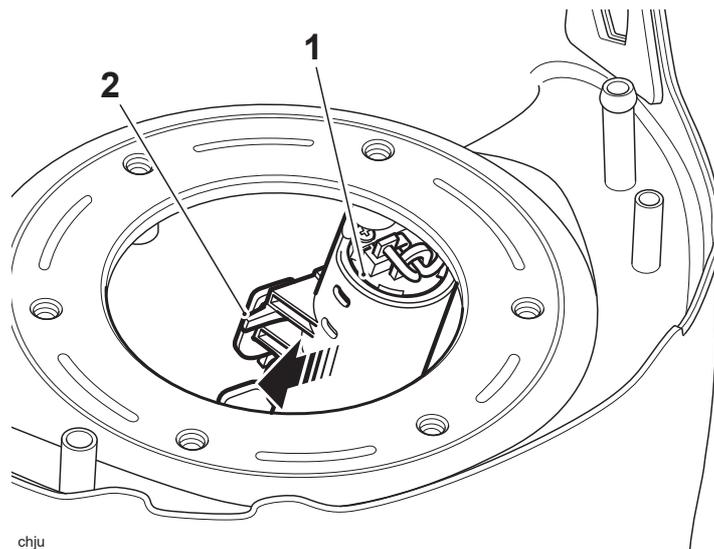
- Fuel Tank - Installation
- Start the engine and check carefully for fuel leaks. Rectify as necessary.

Fuel Level Sender Assembly - Removal

Perform the following operations:

- Fuel Tank - Removal
- Fuel Pump and Filter Assembly - Removal

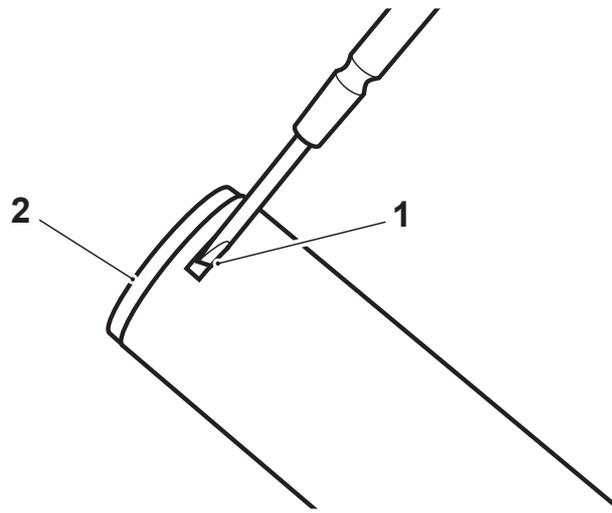
1. Release the locking device and slide the bottom of the level sender to the fuel tank opening. Withdraw from the tank and allow any remaining fuel to drain into a suitable container.



1. Fuel level sensor
2. Locking device

Fuel Level Sender Assembly - Float Replacement

1. Insert a small screwdriver into one of the tabs at the top of the float assembly and gently prise the lid free.



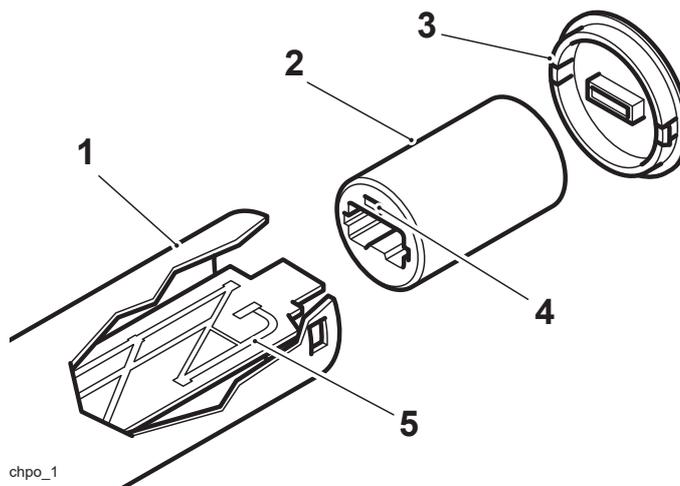
CCSW

1. Tab
2. Lid

2. Invert the assembly and allow the float unit to slide free.
3. Discard the old float unit.
4. Insert the new float unit in the orientation shown below ensuring the magnet cover on the face of the unit faces towards the bottom of the support tube.

Note

- It is possible to fit the float unit upside down. An incorrect fuel level reading will be indicated during motorcycle operation if the float unit is fitted upside down.



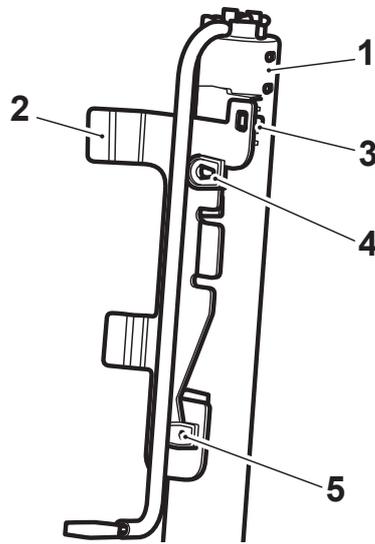
chpo_1

1. Support tube
2. Float unit
3. Lid
4. Magnet cover
5. Slider

5. Refit the lid ensuring the tabs on the lid locate correctly with the cut-outs in the top of the support tube.

Fuel Level Sender Assembly - Installation

1. Align the lower lug first to the bracket then the upper lug. Ensure that the locking device is fully engaged to the bracket and is secure.



chjv

1. Level sender
2. Bracket, inside fuel tank
3. Locking device
4. Upper lug
5. Lower lugs

Perform the following operations:

- Fuel Pump and Filter Assembly - Installation
- Fuel Tank - Installation
- Start the engine and check carefully for fuel leaks. Rectify as necessary.

Roll Over Valve - Removal

Roll Over Valve - Installation

WARNING

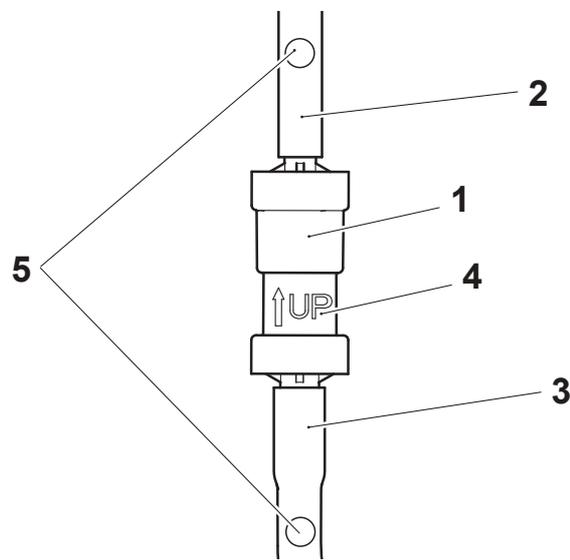
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

The roll over valve must be fitted in the correct orientation. An inverted roll over valve will prevent the fuel tank from breathing causing engine running problems and possible fuel tank damage.

Note

- To ensure that the roll over valve is correctly orientated when fitted, ensure that the arrow and 'UP' embossed on it is pointing upwards.
1. Reconnect the hoses to the roll over valve as noted for removal. Ensure the arrow is pointing upwards.



1. Roll over valve
2. Hose, from fuel tank
3. Hose, to evaporative cannister
4. Arrow and 'UP'
5. White spots

2. Carefully attach the roll over valve to the crankcase tidy. Ensure that the hoses are also secured by the crankcase tidy and the white spots are facing the rear of the motorcycle.
3. Refit the heel guard and tighten its fixings to **7 Nm**.

Perform the following operations:

- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

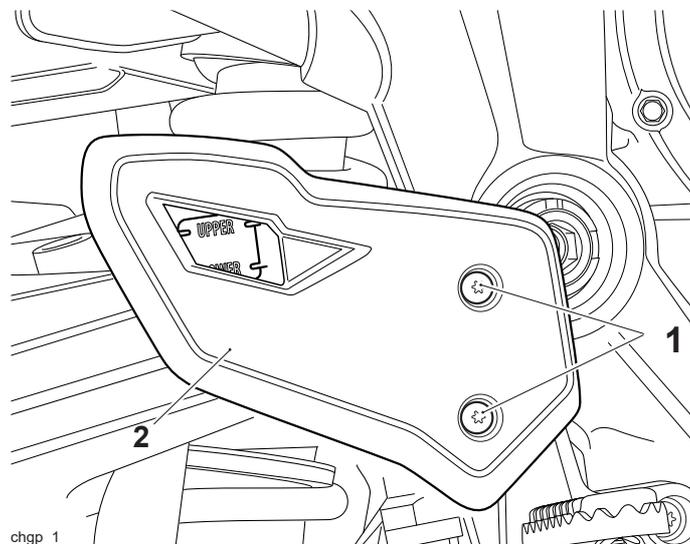
! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

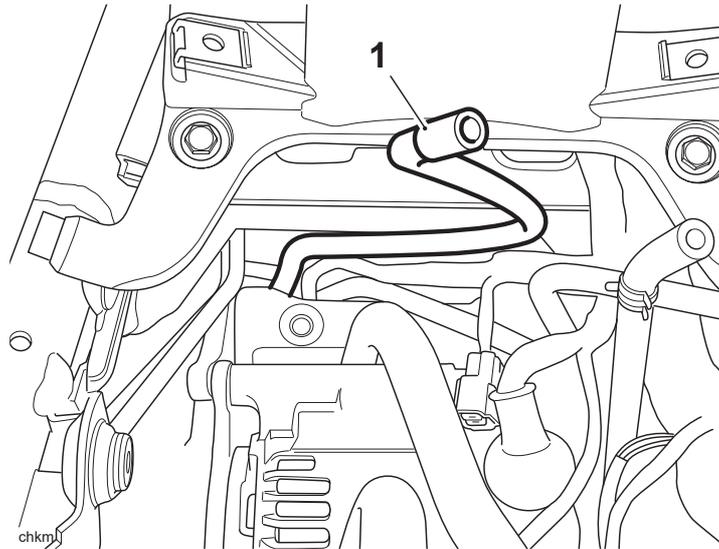
- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal

1. Release the fixings and remove the right hand heel guard.



1. Fixings
2. Heel guard

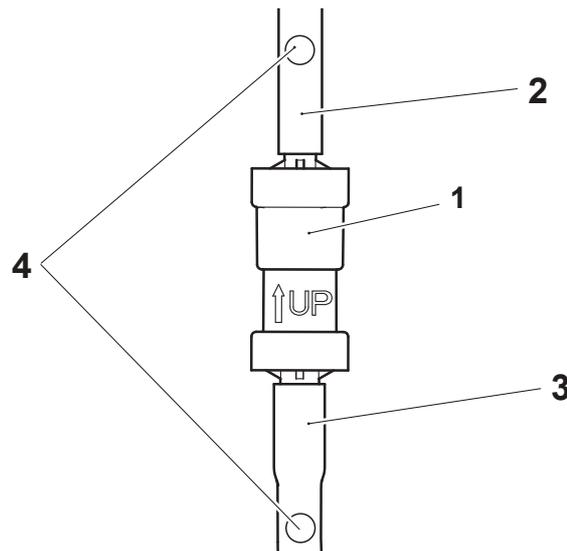
2. From the top of the motorcycle, follow the route of the hose to the roll over until near the top of the crankcase tidy. Then gently push the hose towards the rear of the motorcycle to release the roll over valve from the crankcase tidy.



1. Hose to roll over valve

Note

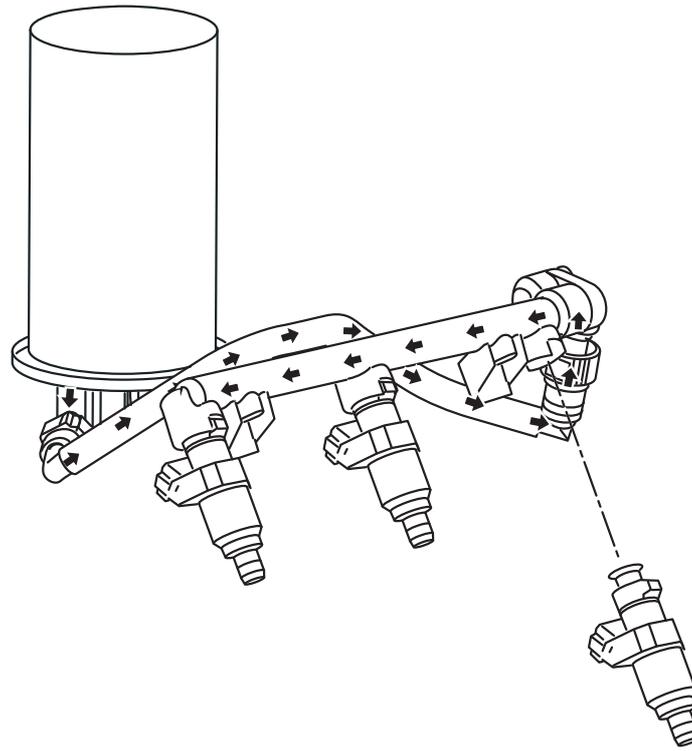
- The hoses connected to the roll over valve are marked with a white spot. When correctly fitted and in the crankcase tidy, these spots will face the rear of the motorcycle.
3. From the right hand side of the motorcycle, manoeuvre the roll over valve out, disconnect the two hoses and remove the roll over valve.



1. Roll over valve
2. Hose, from fuel tank
3. Hose, to evaporative cannister
4. White spots

Fuel is delivered to the injectors by a pump located inside the fuel tank. Fuel flows in the direction of the arrows shown in the diagram below.

Incorporated in the fuel pump assembly is a filter, a pressure regulator and a pick-up strainer.



Direction of Fuel Flow

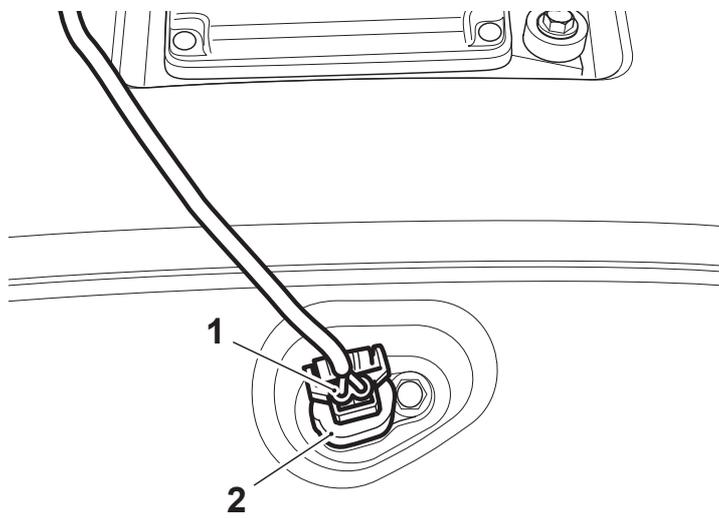
Air Filter Element - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

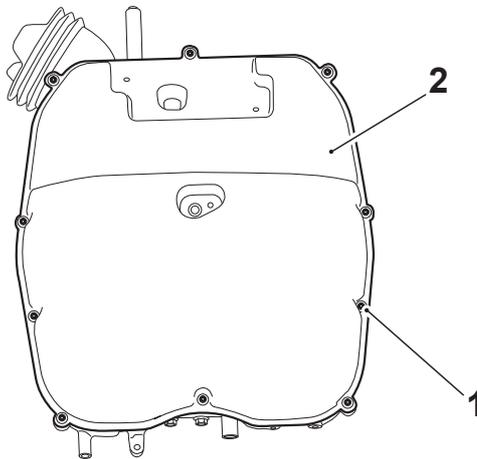
- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
1. Disconnect the multiplug from the air temperature sensor.



chkb_1

1. **Multiplug**
2. **Air temperature sensor**

2. Release the ten fixings and remove the airbox upper section.

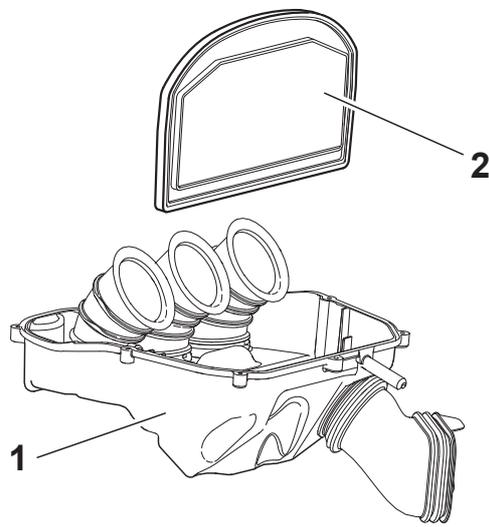


1. **Fixings**
2. **Airbox upper section**

Note

- Note the orientation of the air filter for installation.

3. Lift the air filter out of the airbox lower section.



1. **Airbox lower section**
2. **Air filter element**

Air Filter Element - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean the inside and outside of the airbox.

Note

- **The air filter will only fit one way, do not force fit the air filter element.**
2. Fit the air filter element into the airbox lower section as noted for removal.
 3. Refit the airbox upper section and tighten the fixings to **1.5 Nm**.
 4. Reconnect the multiplug to the air temperature sensor.

Perform the following operations:

- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Airbox - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

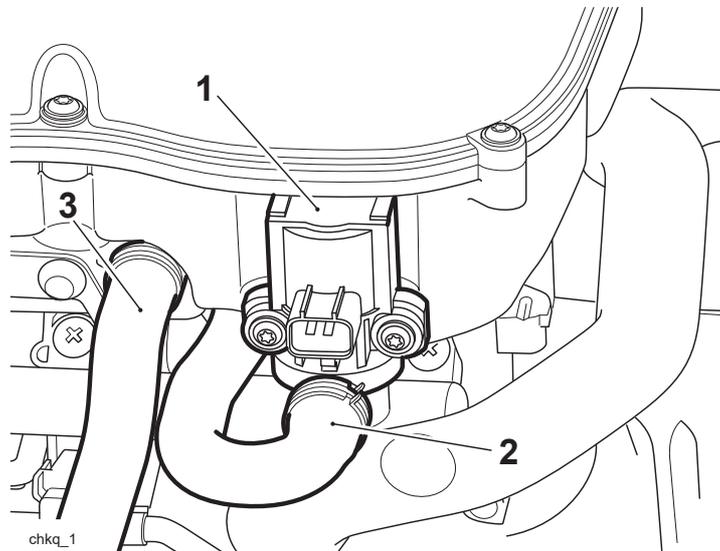
- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Manifold Absolute Pressure (MAP) Sensor - Removal

1. Disconnect the multiplugs from the following:

- Air temperature sensor
- Secondary air injection control valve.

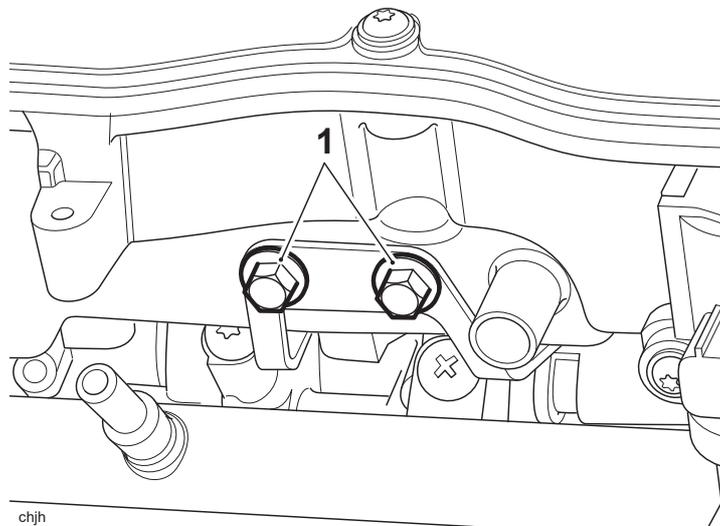
2. Disconnect the hose from the secondary air injection control valve.

3. Disconnect the breather drain hose from the rear of the airbox.



1. Secondary air injection control valve
2. Hose
3. Breather drain hose

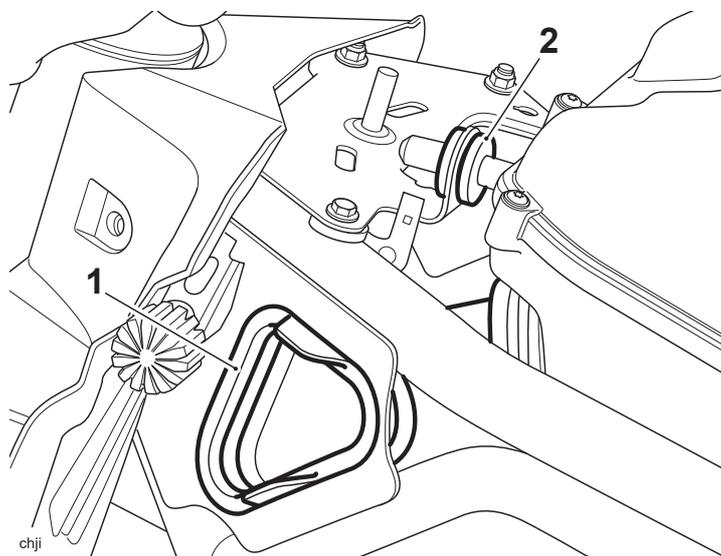
4. Remove the rear fixings of the airbox.



1. Fixings

5. Gently lift the rear of the airbox to release it from the throttle bodies.

6. Detach the air intake duct from the frame and slide the airbox rearwards to release it from its front mounting for complete removal.



1. **Air intake duct**
2. **Front mounting**

Airbox - Inspection

1. Inspect the intake rubbers for splits, damage and distortion.
2. Inspect the intake rubber retaining rings for loss of elasticity.
3. Check the airbox itself for damage.

Airbox - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the airbox to its forward mounting and push home.
2. Refit the air intake duct to the frame.
3. Press down on the rear of the airbox to locate the intake rubbers to the throttle bodies.

CAUTION

Always ensure that all 3 intake rubbers seal to the throttles through 360° as poor performance and lack of power can result from incorrect sealing.

4. Fit and tighten the airbox rear fixings to **5 Nm**.
5. Fit the breather drain hose to the rear of the airbox.
6. Reconnect the hose to the secondary air injection control valve.
7. Connect the multiplugs to the following:
 - Air temperature sensor
 - Secondary air injection control valve.

Perform the following operations:

- Manifold Absolute Pressure (MAP) Sensor - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Throttle Bodies/Injectors - Removal

WARNING

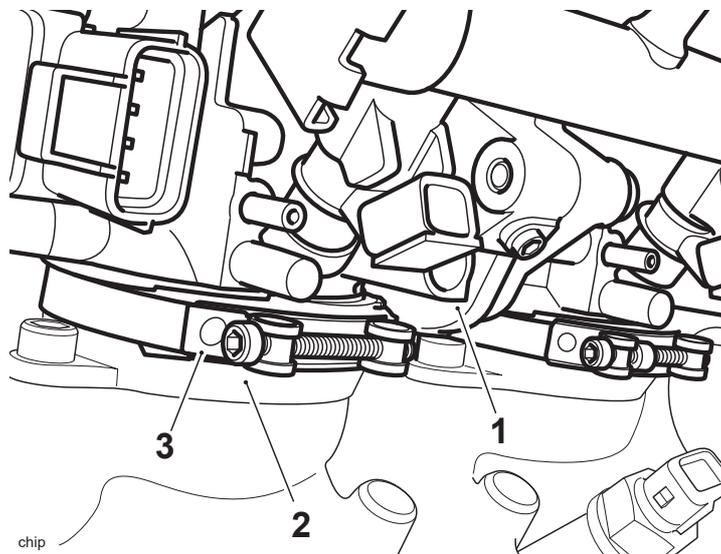
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Fuel Tank - Removal
 - Airbox - Removal
 - Expansion Tank - Removal
1. Disconnect the throttle position sensor electrical connector.
 2. Disconnect the throttle actuator motor electrical connector.
 3. Disconnect the electrical connector from each injector.

Note

- **Before disconnection, note the position of the MAP sensor and evaporative emissions control system hoses. Ensure they are returned to the same locations when refitting the throttle bodies.**
4. Detach the MAP sensor and evaporative emissions control system hoses from the throttle bodies.
 5. Release the clips securing the throttle bodies to the transition pieces.

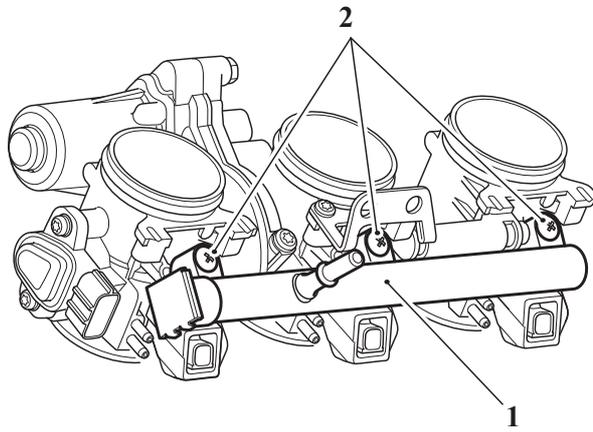


1. **Throttle body**
2. **Transition piece (one per cylinder)**
3. **Clip (one per cylinder)**

6. Remove the throttle bodies.
7. Collect the rubber covers from the fuel injectors.

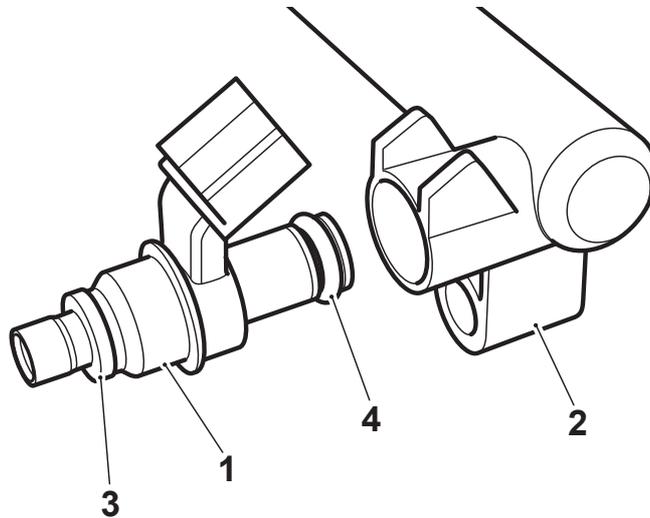
Throttle Bodies/Injectors - Disassembly

1. Release the fixings securing the fuel rail to the throttle bodies.



1. Fuel rail
2. Fixings

2. Ease the fuel rail and injectors from the throttle bodies.
3. To detach the injectors from the fuel rail, gently pull the injector out of the fuel rail using a twisting action.



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1. Injector
2. Fuel rail
3. Injector front seal
4. Injector rear seal

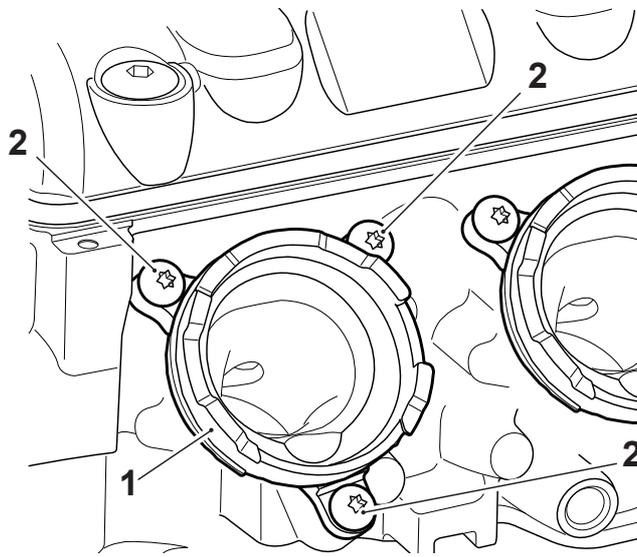
4. Discard the injector seals.
5. Release the fixings and remove the transition pieces.

Throttle Bodies/Injectors - Inspection

1. Check all joints and seals for splits, cuts and damage.
2. Check the throttles for sticking, loose or damaged throttle plates.

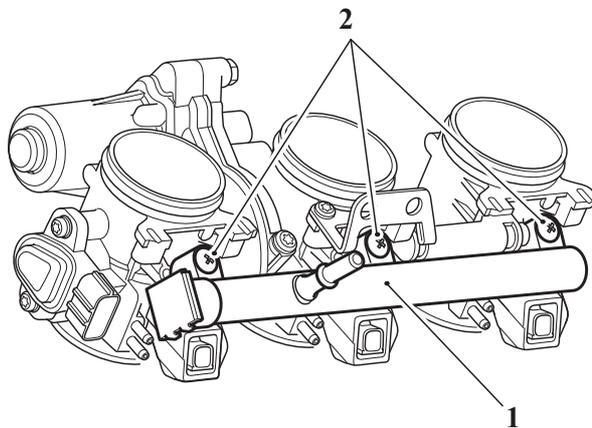
Throttle Bodies/Injectors - Assembly

1. Thoroughly clean the transition piece to cylinder head mating faces.
2. Refit the transition pieces to the head and tighten the fixings to **9 Nm**.



1. Transition piece
2. Fixings

3. Fit a new injector O-ring and seal to each injector.
4. Refit the injectors to the fuel rail using a twisting action.
5. Refit the injectors and fuel rail to the throttle bodies. Tighten the fuel rail fixings to **3.5 Nm**.



1. Fuel rail
2. Fixings

Throttle Bodies/Injectors - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Refit the rubber covers to the fuel injectors.
2. Refit the throttle bodies to the transition pieces and secure with clips. Tighten the clips to **1.5 Nm**.
3. Reconnect the electrical connector to each injector.
4. Reconnect the throttle control stepper motor.
5. Reconnect the throttle position sensor multiplug.
6. Reconnect the MAP sensor and evaporative emissions control hoses as noted during removal.

Perform the following operations:

- Expansion Tank - Installation
- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open air or in an area with adequate ventilation.

Note

- **Resetting adaptations with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, leading to poor engine running. Always reset the adaptations with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well-ventilated area.**

Start the engine and allow to idle until the motorcycle has adapted (see Engine Management Adaption).

Throttle Position Sensor

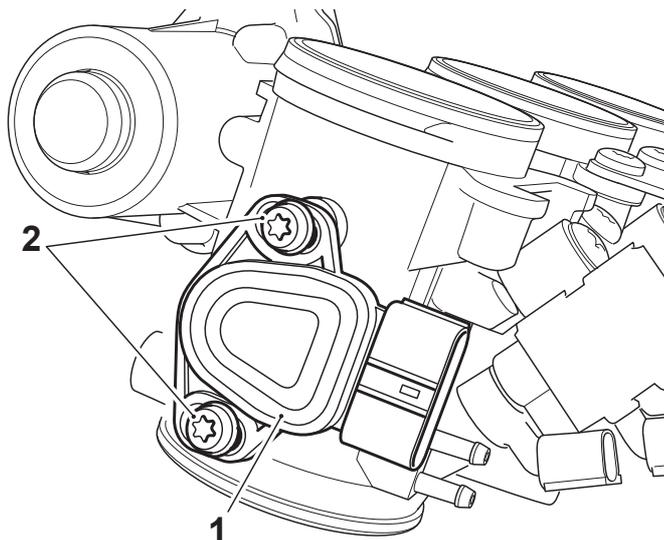
CAUTION

The fixings for the throttle position sensor must not be loosened or removed.

If the throttle position sensor fixings have been loosened or removed, the throttle body assembly must be replaced as there are no means to reset throttle position sensor to its correct position.

Note

- **If the throttle position sensor fixings have been loosened or removed, any warranty claims for the throttle bodies will be rejected.**



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1. Throttle position sensor
2. Fixings

The throttle position sensor can not be removed, replaced or adjusted in service. If necessary, the throttle bodies and throttle position sensor must be replaced as an assembly.

Throttle Body Balancing

Note

- The throttles cannot be balanced using equipment to measure vacuum in each throttle. Instead, the Triumph diagnostic tool must be used.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Airbox - Removal

WARNING

If the engine has recently been running, the components beneath the fuel tank may be hot to the touch.

1. Temporarily refit the fuel tank and reconnect the fuel supply and fuel pump connection using T3880001 - Fuel Pressure Gauge (minus the fuel pressure gauge) and T3880123 - Extension Cable (see Fuel Pressure Checking).
2. Using proprietary professional automotive workshop equipment approved for fuel handling, partially refill the fuel tank with the fuel removed earlier.
3. Temporarily refit the battery (see Battery - Installation).
4. Attach exhaust extraction hoses to the silencer.
5. Attach the Triumph diagnostic tool, start the engine and navigate to ADJUST TUNE (see Triumph Diagnostic Software - Engine ECM).
6. Select BALANCE THROTTLES.

Adjust Tune Procedure

Adjust the throttle balance as described in the Service Manual until balanced Press cancel to cancel the adjustment process Press OK to finish	
Throttle Status:	Throttles Balanced
Cylinder 1 MAP Pressure:	480 mmHg
Cylinder 2 MAP Pressure:	481 mmHg
Cylinder 3 MAP Pressure:	480 mmHg
 Adjusting parameter - Balance Throttles	

Balance Throttles Screen

Note

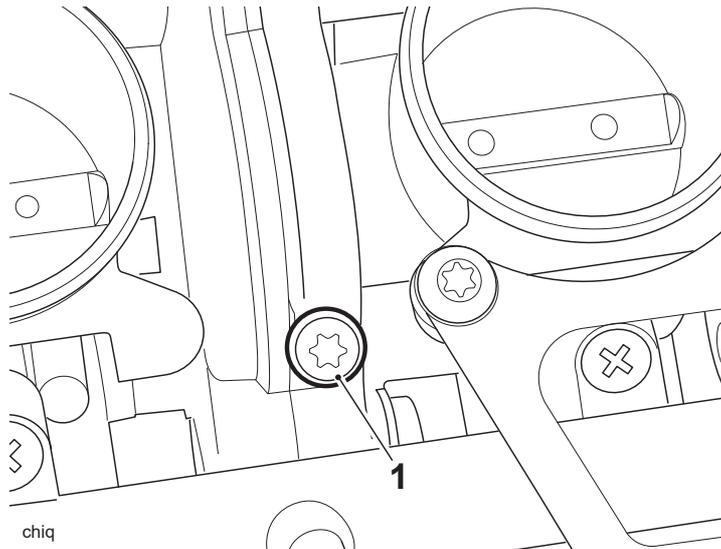
- The balance throttles screen shows the vacuum value of each throttle in mmHg. In addition, when the throttles are balanced to an acceptable range of each other the words 'THROTTLES BALANCED' in green text will appear on the right of the screen. At this point, no further adjustment is necessary or productive.
- If the throttles are not balanced to each other the words 'THROTTLES UNBALANCED' in red text will appear on the right of the screen. At this point adjustment will be necessary.
- The adjusters operate on the outer cylinders only (cylinders 1 and 3). The centre throttle (cylinder 2) adjustment is fixed, this being controlled by the throttle control motor. Note that the centre reading may alter slightly as the two outer cylinders are adjusted.
- DO NOT attempt to adjust the throttle stop screws, located below the fuel rail. The stop screws are set at the factory during manufacture, and must not be adjusted.

WARNING

WARNING

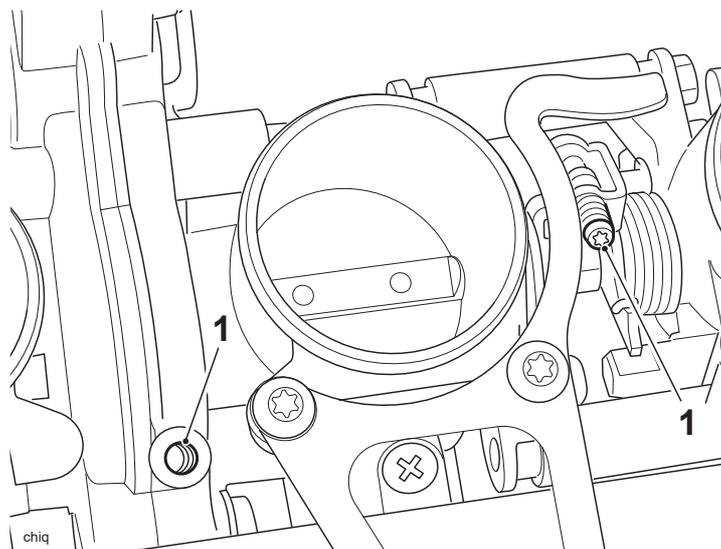
Total cleanliness must be observed at all times whilst the throttle balance blanking screw is removed, and adjustment must take place in a dirt/dust-free environment. Dirt or dust ingress to the throttle motor housing will cause the throttles to stick, leading to loss of motorcycle control and an accident.

7. Remove the Torx T30 blanking screw from the throttle control motor housing, located between cylinders one and two.



1. Throttle balance blanking screw

8. Using a suitable Torx T20 screwdriver adjust the throttle adjusters until the words 'THROTTLES BALANCED' appear on the diagnostic tool.



1. Adjusters

9. When balanced, stop the engine and disconnect the diagnostic tool.
10. Refit the Torx T30 blanking screw to the throttle control motor housing and tighten to **5 Nm**.
11. Remove the battery (see Battery - Removal).
12. Using proprietary professional automotive workshop equipment approved for fuel handling, drain any remaining fuel from the fuel tank.

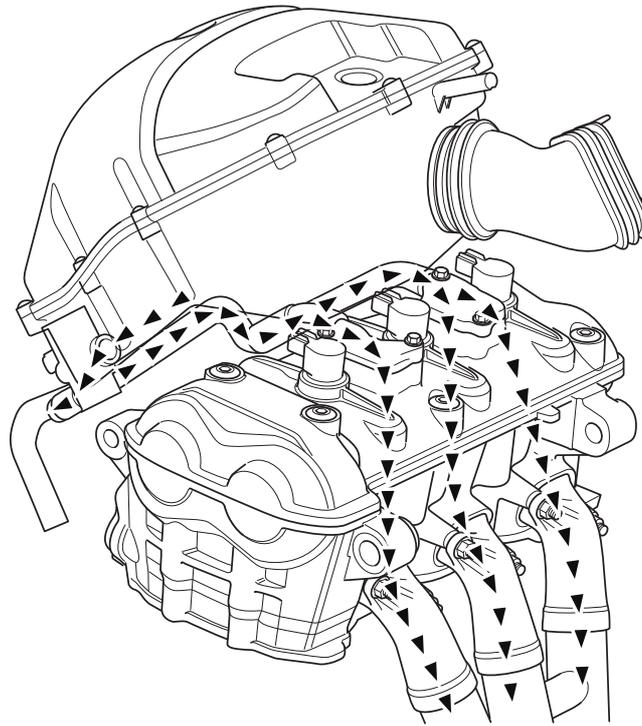
Perform the following operations:

- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation

- Rider's Seat - Installation

Secondary Air Injection

System Purpose and Operation



The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber.

At certain specific engine speeds above idle (determined by the factory programming of the engine management system), the secondary air injection control valve is opened by the engine ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the control valve, through the open reed valves, into the exhaust port. This air promotes secondary combustion of the exhaust gases in the ports and the header system.

At other engine speeds, the system is disabled by closing the control valve in the system. This allows an oxygen sensor to control air to fuel ratios. If air was fed to the exhaust system when the oxygen sensor was operational, the incoming air would cause inaccuracies in the readings sensed by the oxygen sensor (which requires access to 'raw' combustion gases) which would lead to rough running.

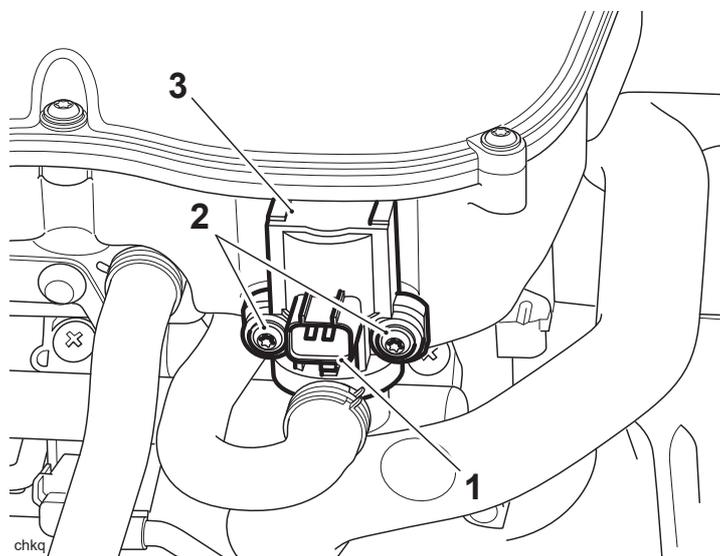
Secondary Air Injection Solenoid Valve - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
1. Release the hose attached to the valve.
 2. Disconnect the electrical connector, release the fixings and remove the valve.



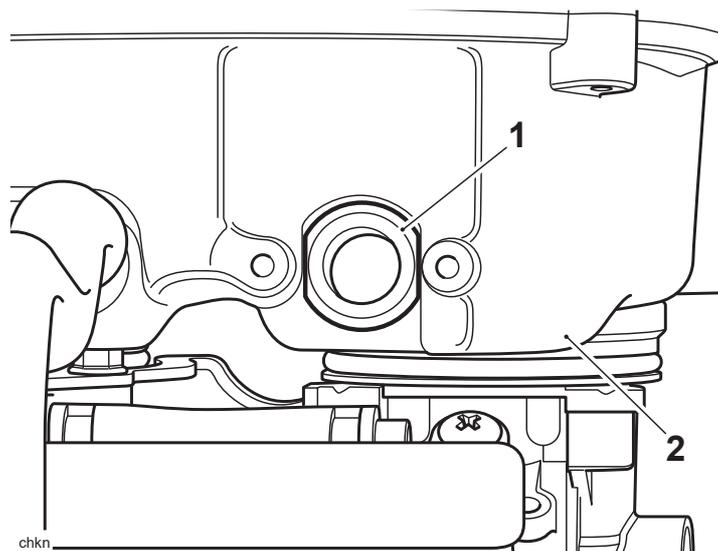
1. **Electrical connector**
2. **Fixings**
3. **Valve**

Secondary Air Injection Solenoid Valve - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Carefully fit the solenoid valve to the airbox, ensure that its seal remains fitted to the airbox.



1. **Seal**
2. **Airbox**

2. Fit the screws and tighten to **2 Nm**.
3. Reconnect the electrical connector and the hose to the valve.

Perform the following operations:

- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Secondary Air Injection Reed Valves - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

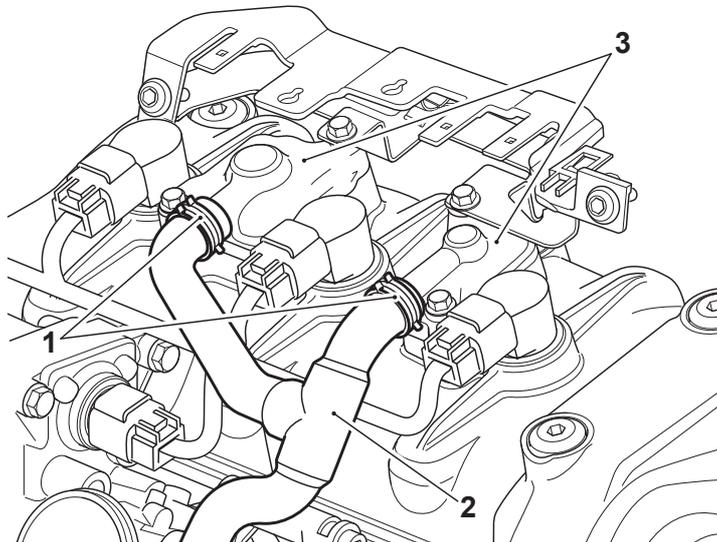
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Airbox - Removal

Note

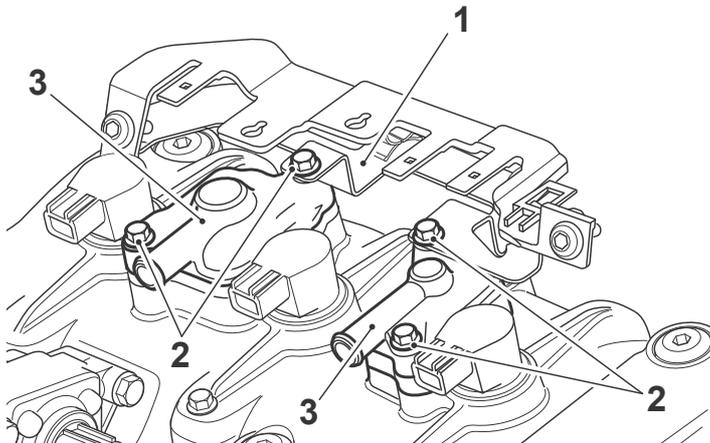
- **Note the routing of the secondary air injection hoses for installation.**

1. Detach the secondary air injection feed hoses from the reed valves on the camshaft cover.



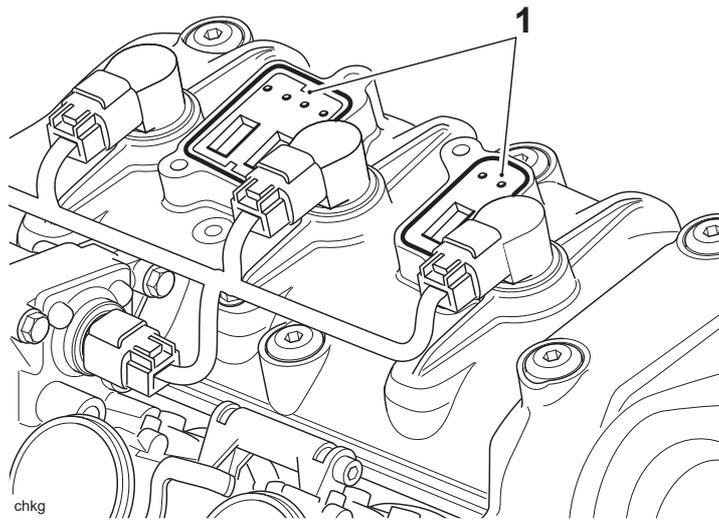
1. **Spring-close clip**
2. **Secondary air injection hose**
3. **Reed valve assemblies**

2. Note the position of the connector bracket and release the fixings securing the valve covers to the camshaft cover.



1. Connector bracket
2. Fixings
3. Reed valve assemblies

3. Ease the valve covers from the valves.
4. Note the orientation of the valves and remove them from the camshaft cover.



1. Valves

Secondary Air Injection Reed Valves - Inspection

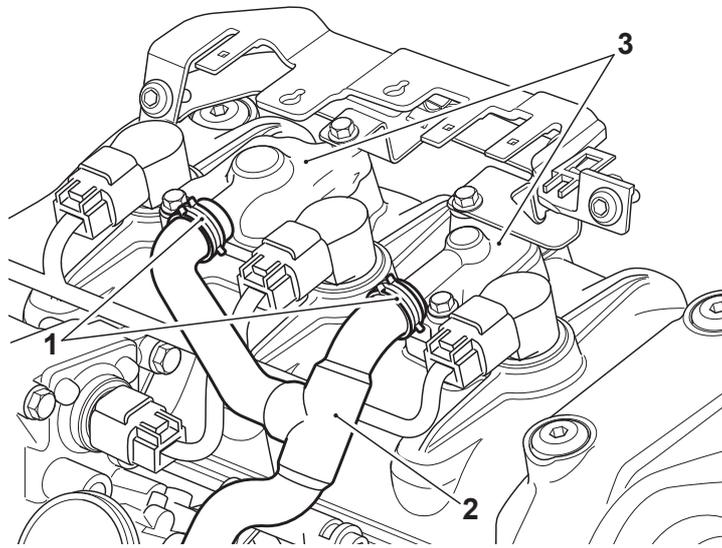
1. Check for cracks, bending or other damage to the valve flaps. Replace as necessary.
2. Check for damage to the seal areas. Replace as necessary.
3. Check the valve body to cylinder head seal for damage.

Secondary Air Injection Reed Valves - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the reed valves to the camshaft cover as noted for removal.
2. Refit the valve covers and the connector bracket as noted for removal. Tighten the fixings to **9 Nm**.
3. Refit the air hoses to the reed valves as noted for removal.



1. Spring-close clip
2. Secondary air injection hose
3. Reed valve assembly

Perform the following operations:

- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Removal and Installation - Engine Management Components

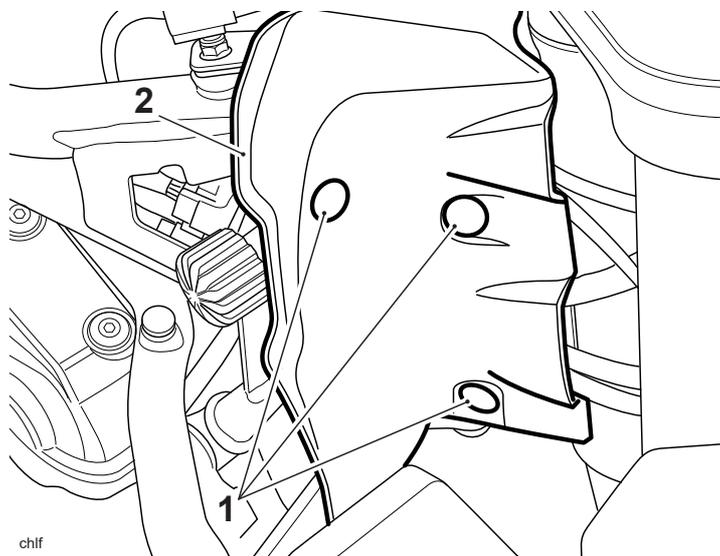
Twist Grip - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

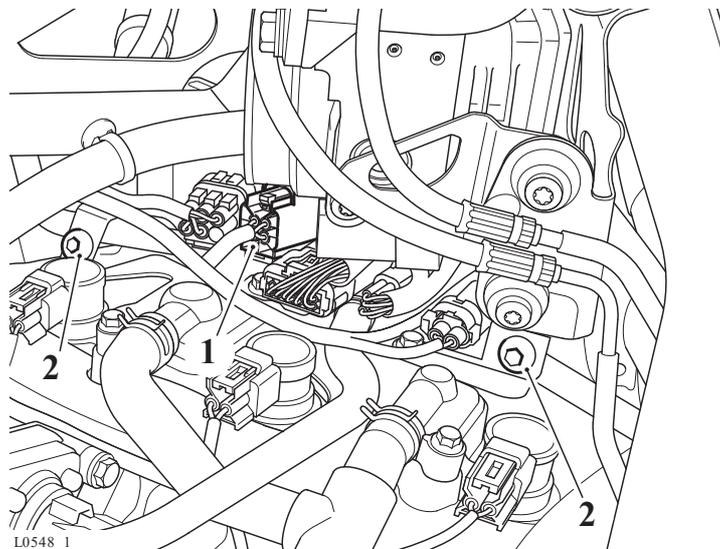
- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
 - Airbox - Removal
 - Remove the right hand handguard (see Handguards - Removal)
1. Remove the Scrivets and detach the headstock infill panel from the frame.



1. Scrivets
2. Infill panel

Note

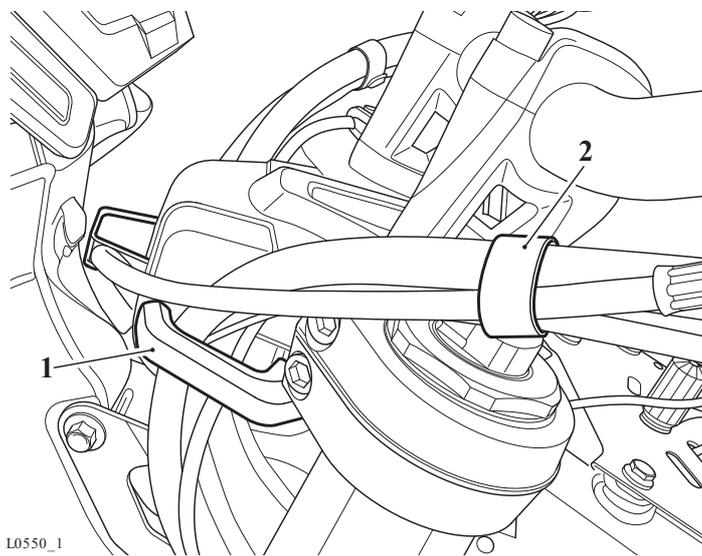
- The connector bracket fixings may be removed to allow movement of the bracket for improved access.
2. Detach the heated grip subharness connector from the bracket and disconnect from the main harness.



1. Heated grips subharness connector
2. Bracket fixings

Note

- Note the routing of the heated grip subharness for installation.
 - Note the routing of the harnesses around the left hand side of the headstock for installation.
 - Note the position of the harnesses in the left hand upper yoke harness guide.
3. Route the heated grip subharness out of the frame to the upper yoke harness guide.
 4. Detach the heated grip subharness from the harness guide and remove the rubber band.



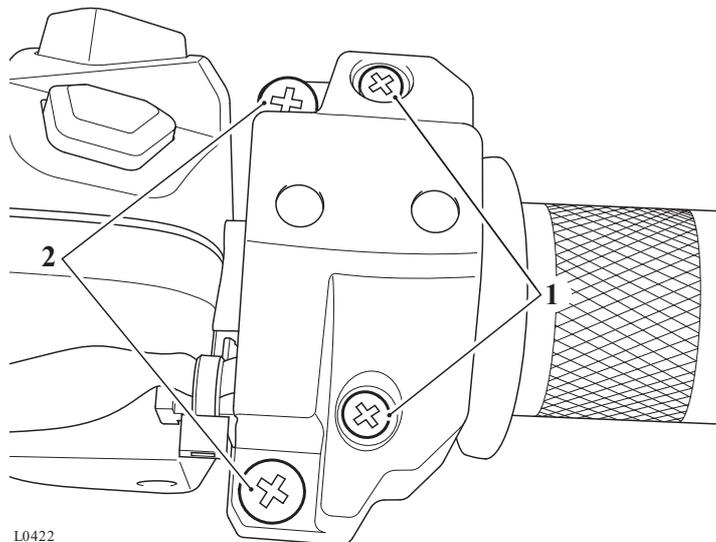
L0550_1

1. Left hand top yoke harness guide
2. Rubber band

Note

- The anti-tamper fixings on the twist grip housing must not be loosened or removed.
- If the anti-tamper fixings have been loosened or removed any warranty claims for the twist grip housing will not be honoured.

5. Release the fixings and remove the clamp for the twist grip housing from the handlebar.



L0422

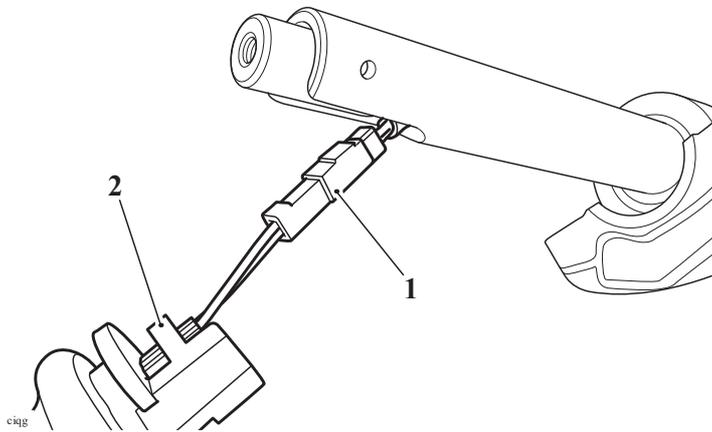
1. Anti-tamper fixings
2. Fixings

Note

- Note the position and orientation of the twist grip to its housing for installation.
- Note the routing of the heated grip harness for installation.

6. Slide the heated twist grip off the handlebar while carefully feeding the heated grip subharness into the hole on the left hand side of the handlebar.

7. Disconnect the electrical connector and remove the heated twist grip.



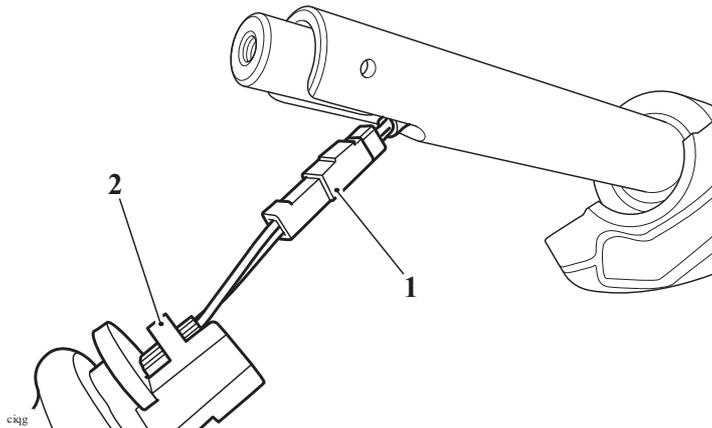
1. **Electrical connector**
2. **Heated twist grip**

Twist Grip - Installation

WARNING

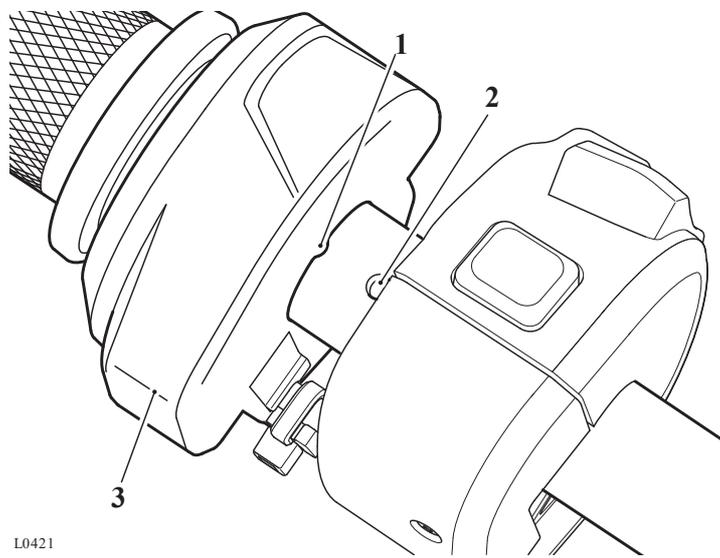
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Connect the electrical connector of the heated twist grip to the subharness.



1. **Electrical connector**
2. **Heated twist grip**

2. Fit the heated twist grip while carefully feeding the subharness out from the hole on the left hand side of the handlebar.
3. Align the twist grip to the twist grip position sensor as noted for removal.
4. Fit the twist grip clamp. Ensure the locating lug fits into its hole on the handlebar.

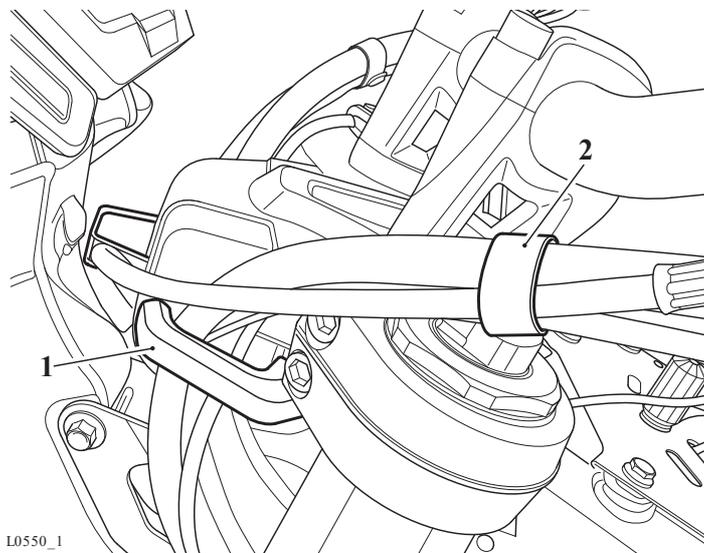


L0421

1. **Locating lug**
2. **Hole**
3. **Twist grip clamp**

5. Fit and fixings and tighten, upper one first, to **2.5 Nm**.

6. Position the heated grip subharness into the upper yoke harness guide as noted for removal and fit the rubber band.

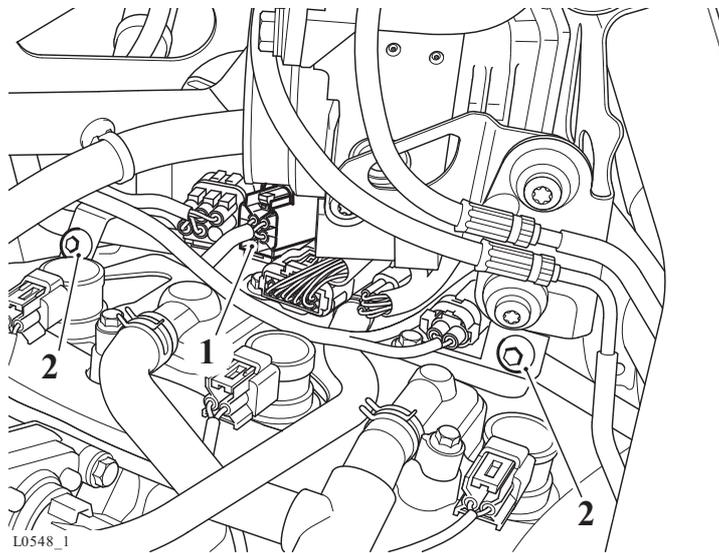


L0550_1

1. **Harness guide**
2. **Rubber band**

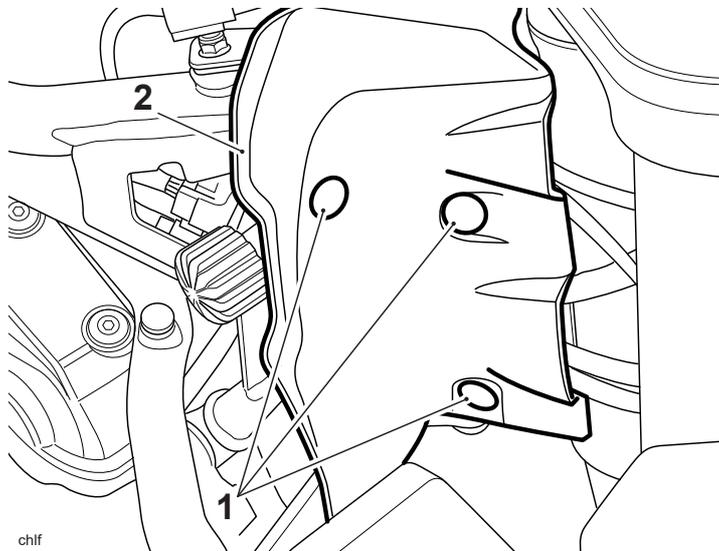
7. Route the heated grip subharness to the main harness as noted for removal.

8. Connect to the main harness then attach the connector to the bracket.



1. Heated grip subharness connector
2. Bracket fixings

9. If removed, refit the connector bracket fixings and tighten to **3 Nm**.
10. Refit the headstock infill panel and secure with the Scrivets.



1. Scrivets
2. Infill panel

Perform the following operations:

- Fit the right hand handguard (see Handguards - Installation)
- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

 **WARNING**

WARNING

Move the handlebars to left and right full lock while checking that the brake hose, clutch hose and electrical harnesses do not bind or that the steering feels tight or difficult to turn. A hose, cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

Check for correct operation of the front brake, clutch and twist grip. Check that the brake hose, clutch hose and electrical harnesses do not bind or restrict the steering when the handlebars are turned from lock-to-lock. Rectify as necessary.

Twist Grip Position Sensor - Removal

WARNING

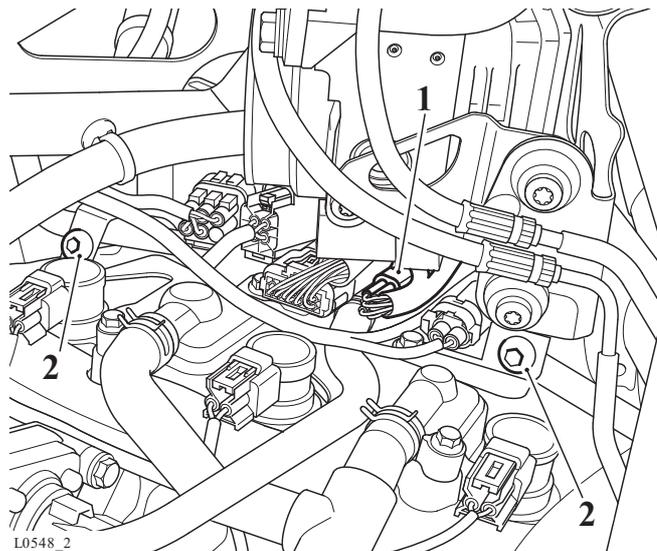
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Twist Grip - Removal

Note

- **The connector bracket fixings may be removed to allow movement of the bracket for improved access.**
1. Detach the twist grip harness electrical connector from the bracket and disconnect from the main harness.



1. **Twist grip connector**
2. **Bracket fixings**

Note

- **Note the routing of the twist grip harness for installation.**
 - **Note the routing of the harnesses around the right hand side of the headstock and the upper yoke harness guide for installation.**
2. Route the twist grip harness out of the frame to the twist grip.

Note

- **Note the orientation of the twist grip position sensor for installation.**

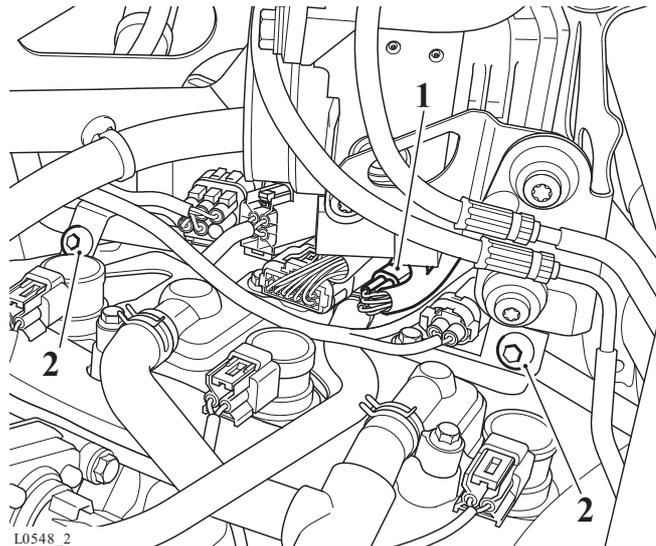
3. Slide the twist grip position sensor off the handlebar.

Twist Grip Position Sensor - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Slide the twist grip position sensor onto the handlebar in the orientation noted for removal.
2. Route the twist grip harness to the main harness as noted for removal.
3. Connect to the main harness then attach the connector to the bracket.



1. Twist grip connector
2. Bracket fixings

4. If necessary, refit the connector bracket fixings and tighten to **3 Nm**.

Perform the following operations:

- Twist Grip - Installation
- Battery - Installation
- Rider's Seat - Installation

WARNING

Move the handlebars to left and right full lock while checking that the brake hose, clutch hose and electrical harnesses do not bind or that the steering feels tight or difficult to turn. A hose, cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

Check for correct operation of the front brake, clutch and twist grip. Check that the brake hose, clutch hose and electrical harnesses do not bind or restrict the steering when the handlebars are turned from lock-to-lock. Rectify as necessary.

Engine Electronic Control Module (ECM) - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Turn the ignition to the OFF position and wait at least 1 minute for the engine ECM to complete its power down sequence.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Seat Bridge - Removal
- Remove the engine ECM from its housing and disconnect the two electrical connectors (see Electrical Connectors).

Engine Electronic Control Module (ECM) - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Fit the ECM into the under seat tray and reconnect the two connectors (see Electrical Connectors).
- Seat Bridge - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

If a replacement engine ECM has been fitted, it must be set up as described in Replacement Engine ECM Setup

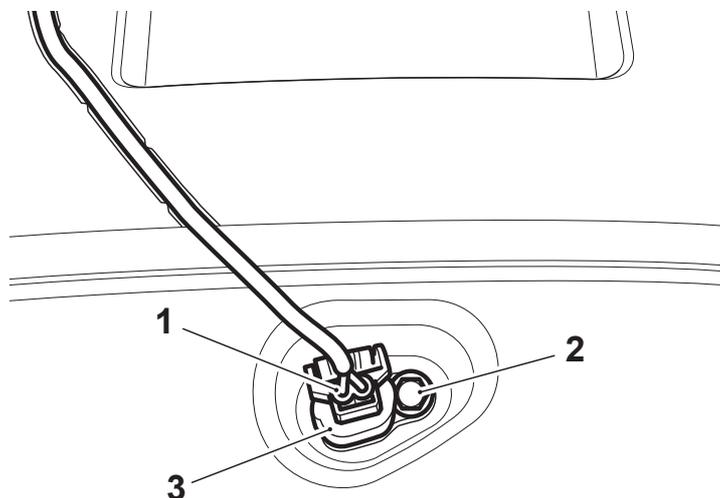
Intake Air Temperature Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Installation
 - Fuel Tank - Removal
1. Disconnect the multiplug from the air temperature sensor.



1. **Multiplug**
2. **Fixing**
3. **Air temperature sensor**

2. Release the fixing and remove the sensor from the airbox.

Intake Air Temperature Sensor - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the air temperature sensor to the airbox and tighten its fixing to **2 Nm**.
2. Connect the air temperature sensor multiplug.

Perform the following operations:

- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

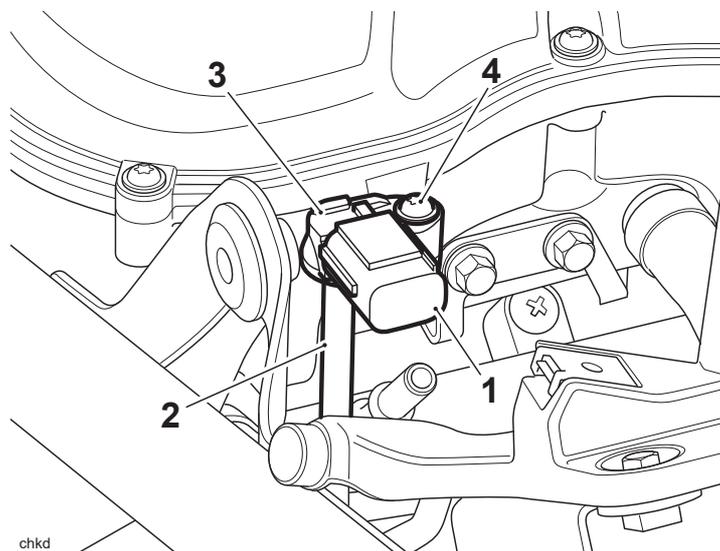
Manifold Absolute Pressure (MAP) Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
1. Disconnect the multiplug from the MAP sensor.
 2. Release the fixing securing the sensor to the airbox.
 3. Raise the sensor, disconnect the air hose and remove the sensor.



1. **Multiplug**
2. **Air hose**
3. **MAP sensor**
4. **Fixing**

Manifold Absolute Pressure (MAP) Sensor - Installation



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Refit the air hose.
2. Fit the sensor to the airbox and tighten its fixing to **1.5 Nm**.
3. Reconnect the multiplug.

Perform the following operations:

- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

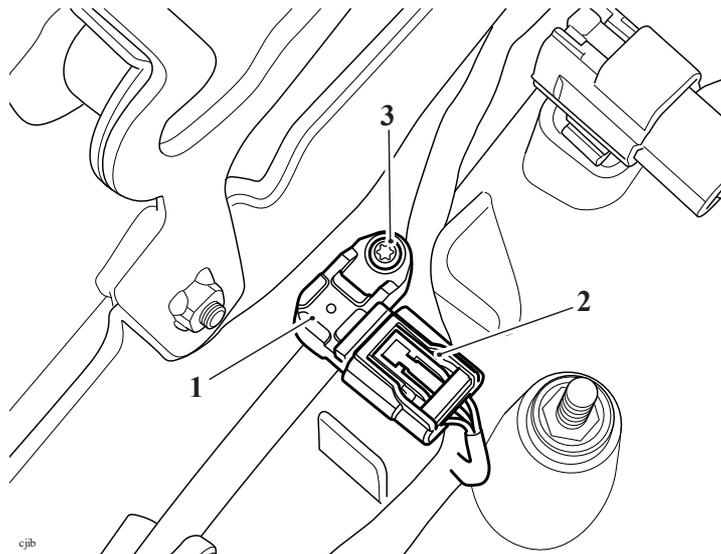
Ambient Air Pressure Sensor - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Disconnect the multiplug from the ambient air pressure sensor.
 2. Release the fixing and remove the sensor.



1. Ambient air pressure sensor
2. Multiplug
3. Fixing

Ambient Air Pressure Sensor - Installation



WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the sensor and tighten its fixing to **1.5 Nm**.
2. Reconnect the multiplug.

Perform the following operations:

- Battery - Installation
- Rider's Seat - Installation

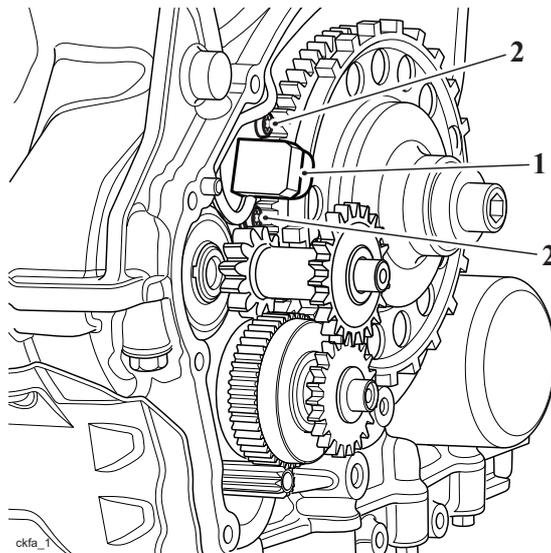
Crankshaft Position Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Expansion Tank - Removal
 - Trigger Wheel Cover - Removal
1. Remove and discard the two fixings securing the sensor to the crankcase.



1. **Sensor**
2. **Fixings**

2. Disconnect the sensor multiplug.
3. Detach the harness grommet from the opening in the crankcase.
4. Remove the crankshaft position sensor, detaching the harness from the crankcase retaining pegs as you do so.

Crankshaft Position Sensor - Installation

WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Refit the crankshaft position sensor. Fit and tighten new fixings to **6 Nm**.
2. Reconnect the sensor multiplug.
3. Refit the harness grommet to the crankcase opening.
4. Refit the harness to the retaining pegs on the crankcase.
 - Trigger Wheel Cover - Installation
 - Expansion Tank - Installation
 - Battery - Installation
 - Rider's Seat - Installation

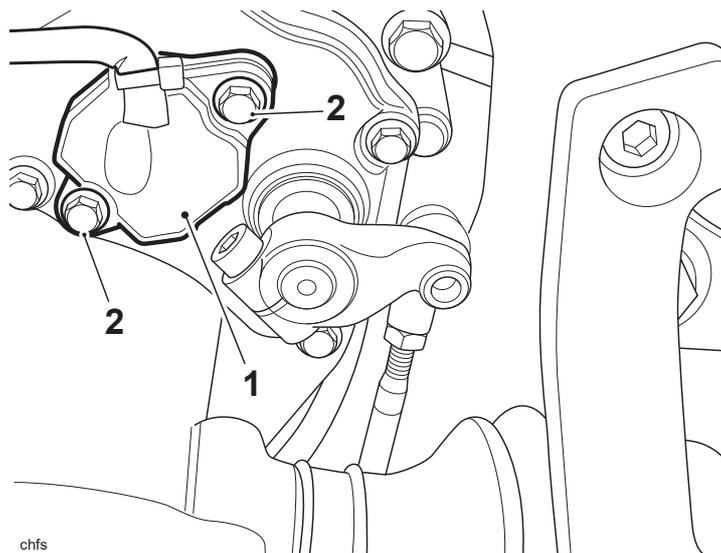
Gear Position Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Expansion Tank - Removal
1. Set the transmission in neutral.
 2. Disconnect the gear position sensor electrical connector.
 3. Remove the two fixings and remove the gear position sensor.



1. **Gear position sensor**
2. **Fixings**

Gear Position Sensor - Installation

WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Install a new O-ring to the gear position sensor.
2. Position the gear position sensor to the selector cover, ensuring the pin on the sensor engages with the slot on the selector drum shaft.
3. Fit two new fixings and tighten to **5 Nm**.
4. Reconnect the electrical connector.

Perform the following operations:

- Expansion Tank - Installation
- Battery - Installation
- Rider's Seat - Installation
- Neutral Position Adaption
- Gear Position Adaption (models fitted with Triumph Shift Assist only).

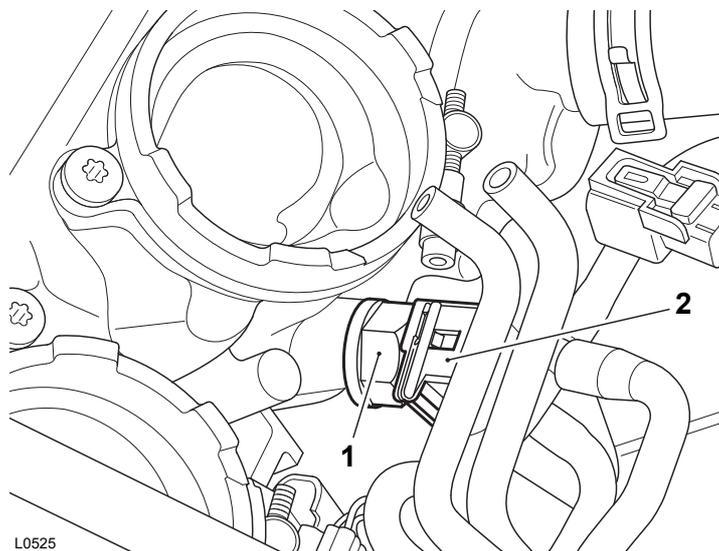
Coolant Temperature Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Installation
 - Battery - Removal
 - Fuel Tank - Removal
 - Airbox - Removal
 - Throttle Bodies/Injectors - Removal
 - Drain the cooling system (see Coolant Replacement - Drainage).
1. Press the wire locking device fully in and disconnect the harness from the coolant temperature sensor.
 2. Remove the coolant temperature sensor.



1. **Wire locking device**
2. **Connector**

3. Remove the coolant temperature sensor.

Coolant Temperature Sensor - Installation

1. Fit the coolant temperature sensor into the cylinder head and tighten to **18 Nm**.
2. Refit harness to the coolant temperature sensor.

Perform the following operations:

- Throttle Bodies/Injectors - Installation
- Airbox - Installation
- Coolant Replacement - Filling
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

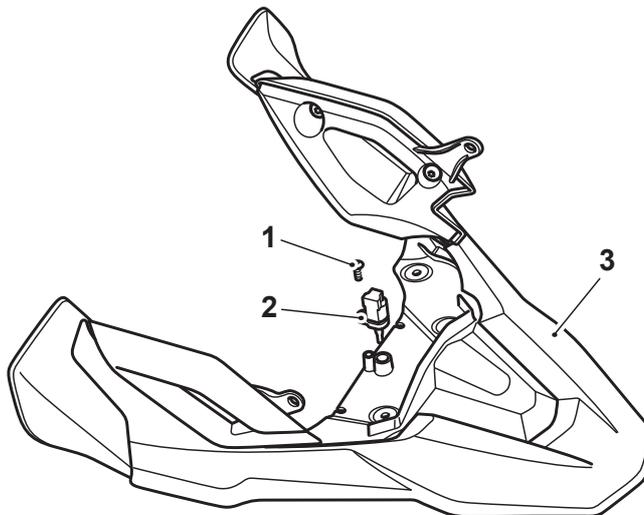
Ambient Air Temperature Sensor - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - High Level Mudguard - Removal
1. Remove the fixing and remove the ambient air temperature sensor from the high level mudguard assembly.



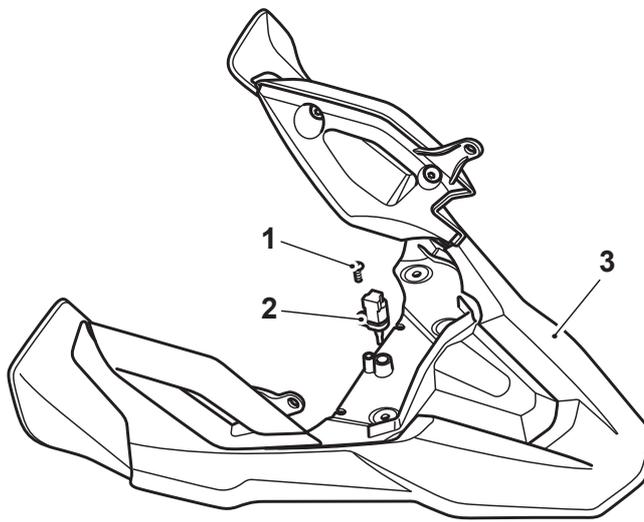
1. **Fixing**
2. **Ambient air temperature sensor**
3. **High level mudguard assembly**

Ambient Air Temperature Sensor - Installation



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Refit the ambient air temperature sensor to the high level mudguard assembly and tighten its fixing to **1.5 Nm**.



1. Fixing
2. Ambient air temperature sensor
3. High level mudguard assembly

Perform the following operations:

- High Level Mudguard - Installation
- Battery - Installation
- Rider's Seat - Installation

Removal and Installation - Exhaust System Components

Exhaust Silencer - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

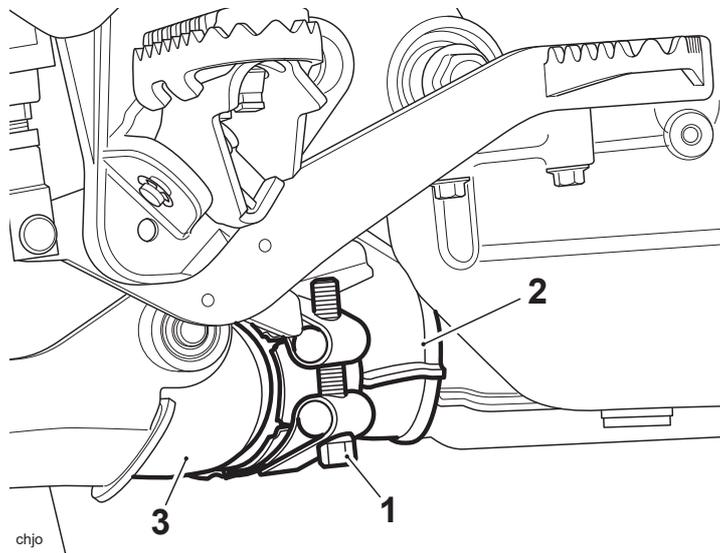
WARNING

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

Note

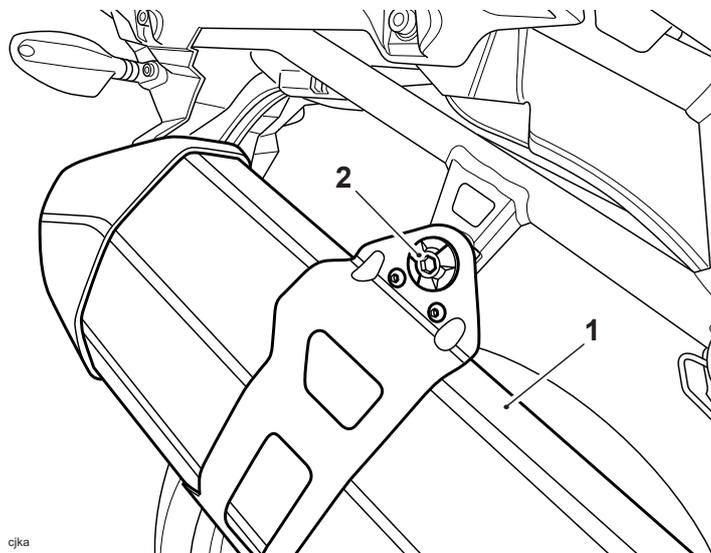
- **Note the position and orientation of the exhaust clamp for installation.**

1. Release the clamp securing the silencer to the intermediate pipe.



1. **Clamp fixing**
2. **Silencer**
3. **Header pipe**

2. Release the nut, bolt and washer securing the silencer to the frame.



1. **Silencer**
2. **Bolt**

3. Remove the silencer and collect its gaskets.

4. Collect the flanged sleeves from the silencer mounting on the frame.

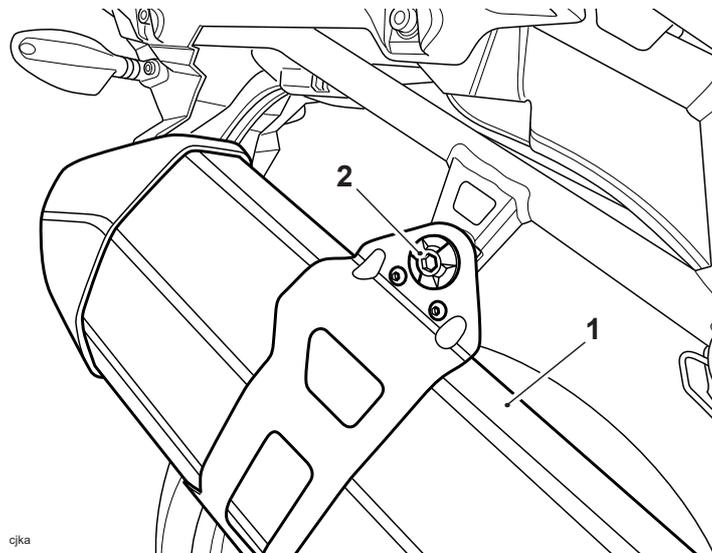
Exhaust Silencer - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Check the condition of the exhaust gasket for the silencer, replace if necessary. Fit the gasket to the header pipe.
2. Position the silencer clamp to the header pipe.
3. Refit the flanged sleeves to the silencer mounting on the frame.

4. Engage the silencer to the header outlet, align its mounting to the frame and fit the mounting bolt, washer and nut. Do not fully tighten at this stage.
5. Orientate the clamps for the silencer as noted for removal.
6. Tighten the silencer clamp to **10 Nm**.
7. Tighten the silencer mounting bolt to **30 Nm**.



1. Silencer
2. Bolt

! WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

- Start the engine and check for exhaust leaks. Rectify if necessary.

Exhaust Header Pipes - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

! WARNING

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

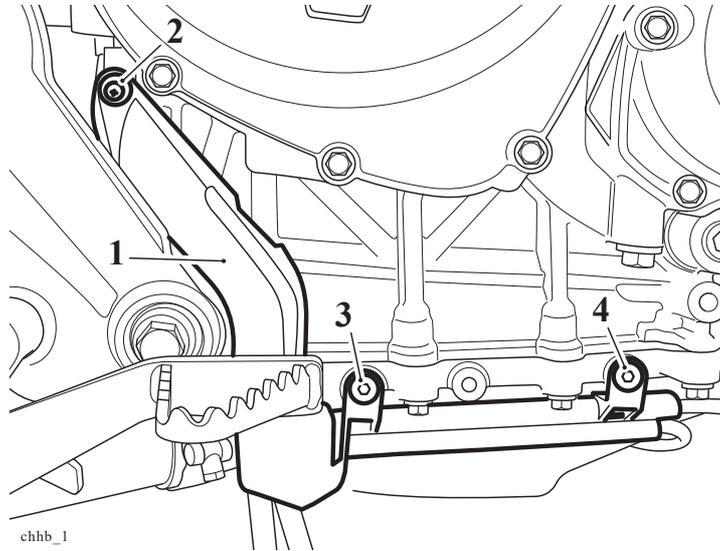
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Exhaust Silencer - Removal
- Sump Guard - Removal
- Radiator - Removal

Note

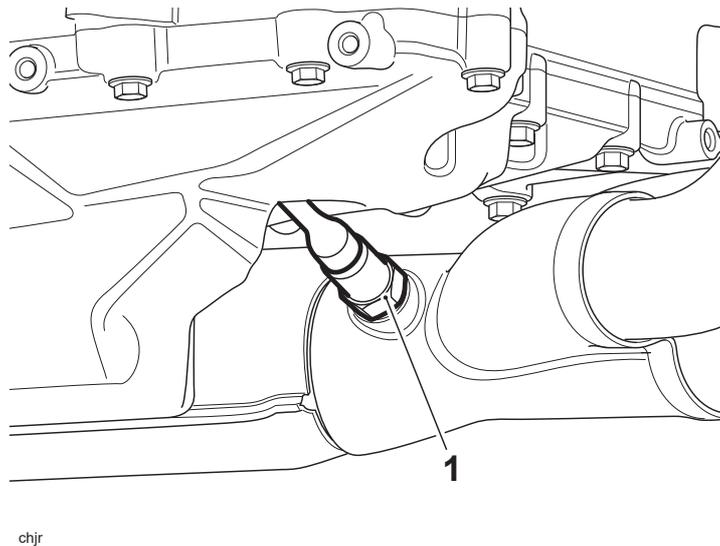
- **Note the routing of the harnesses and drain pipes for installation.**

1. Remove the scrivet, bolt(s) and fir tree clip (if fitted) and remove the harness guide from the right hand side of the engine. Discard the bolt(s) and fir tree clip.



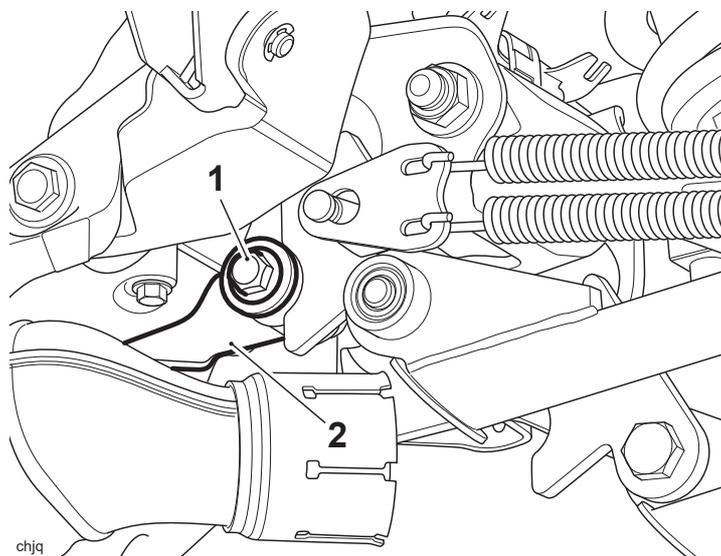
1. **Harness guide**
2. **Scrivet**
3. **Bolt**
4. **Bolt/fir tree clip**

2. Detach the oxygen sensor harness from the cable tidy.
3. Locate and disconnect the oxygen sensor multiplug and release it from the wiring harness.
4. Remove the oxygen sensor if necessary.



1. **Oxygen sensor**

5. Remove the bolt from the rear mounting point on the header pipe.



- 1. Bolt
- 2. Header pipe

- 6. Release the header pipe fixings at the cylinder head.
- 7. Detach the header pipe assembly and collect the seals from the cylinder head ports.

Exhaust Header Pipes - Installation

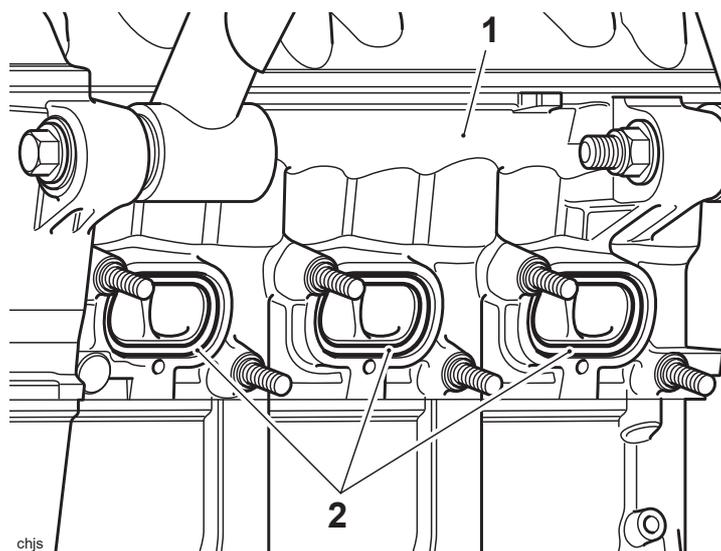
! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- 1. Fit new seals to the cylinder head.

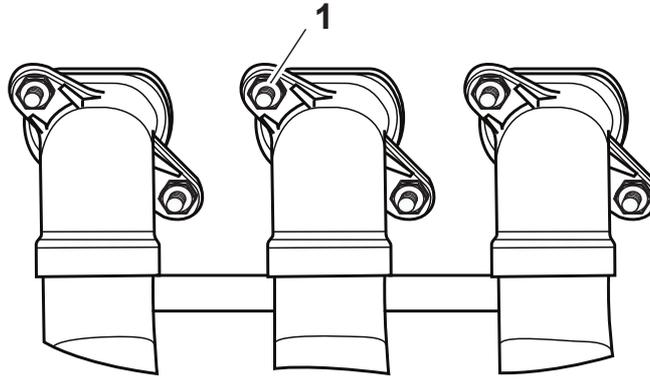
Note

- A smear of grease may be used to retain the seals in the cylinder head during assembly.



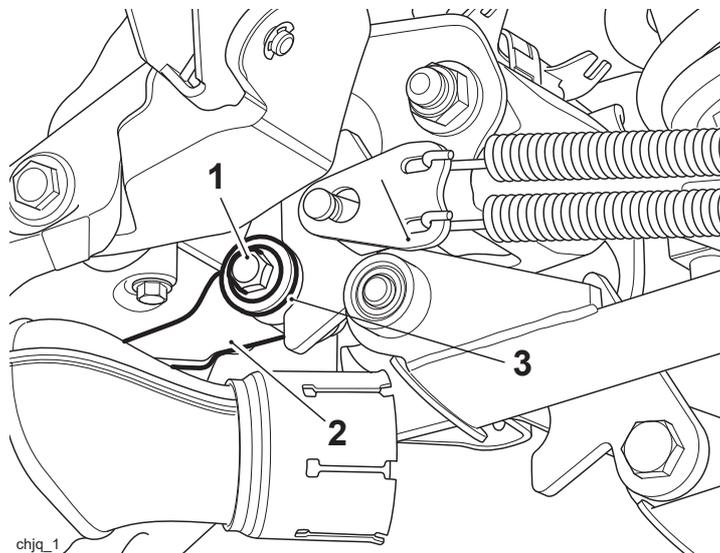
- 1. Cylinder head
- 2. Seals

- 2. Locate the header pipe and align the flanges to the cylinder head.
- 3. Fit the header pipe nuts loosely, then tighten the top centre nut hand tight to retain the header pipes in position.



1. Top centre nut

4. Fit the rear mounting point bolt such that it is positioned to the front of the mounting lug. Do not fully tighten at this stage.



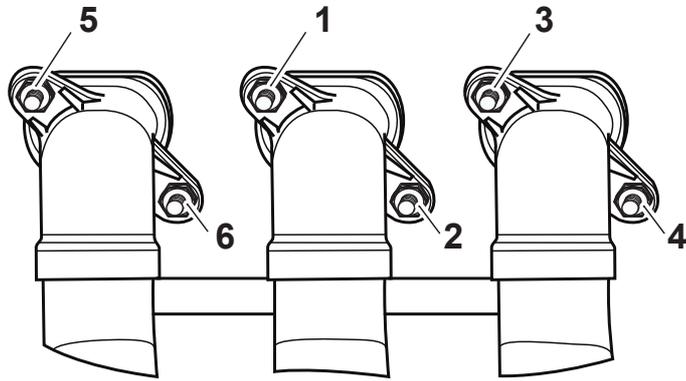
- 1. Bolt**
- 2. Header pipe**
- 3. Mounting lug**

Note

- **The header pipe nuts are tightened in stages in order to progressively and evenly compress the seals.**

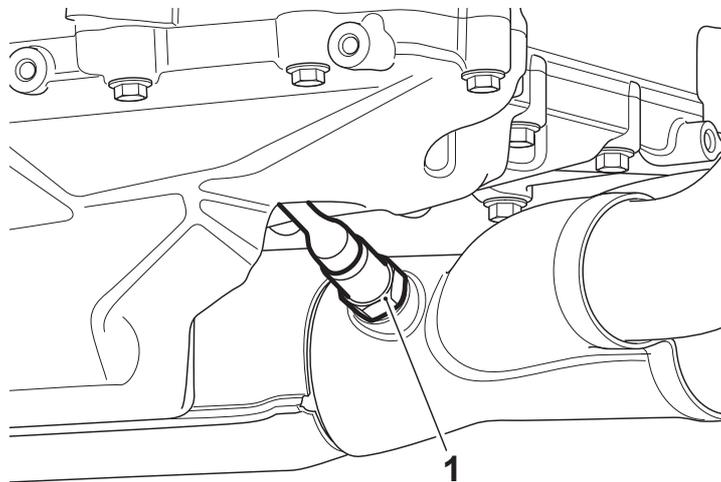
5. Tighten the header pipe nuts in three stages as follows:

- Stage 1 - Tighten the nuts to **6 Nm** in the sequence shown below.
- Stage 2 - Tighten the nuts to **12 Nm** in the sequence shown below.
- Stage 3 - Tighten the nuts to **15 Nm** in the sequence shown below.



Exhaust to Cylinder Head Tightening Sequence

6. Ensure that the rear mounting point bolt is positioned to the front of the mounting lug, then tighten the bolt to **15 Nm**.
7. Refit and tighten the oxygen sensor to **25 Nm**.



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1. Oxygen sensor

8. Attach the harness for the oxygen sensor to the cable tidy for the sump as noted for removal.
9. Connect oxygen sensor electrical connector to the main harness.
10. Secure the cable tidy to the sump with its fixings and tighten the bolt(s) to **3 Nm**. Ensure that the routing of the harnesses and drain hoses are as noted for removal.

Perform the following operations:

- Radiator - Installation
- Sump Guard - Installation
- Exhaust Silencer - Installation
- Battery - Installation
- Rider's Seat - Installation

WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

- Start the engine and check for exhaust leaks. Rectify if necessary.

Evaporative System Components

Evaporative Emissions Control System

All Tiger 1200 models are fitted with a system to control the evaporation of fuel vapour to the atmosphere.

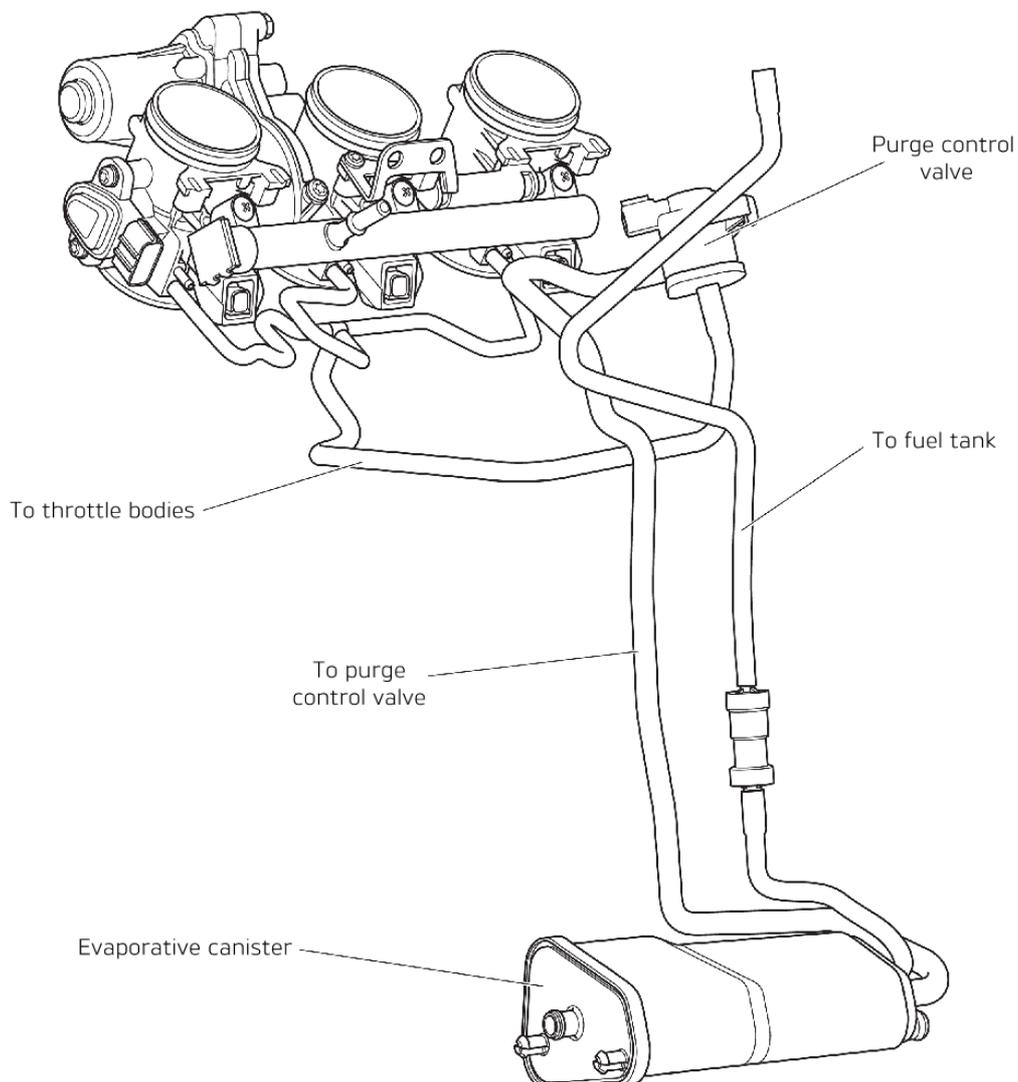
A carbon filled evaporative canister absorbs vapour while the engine is not running. When the engine is started, the vapour is returned to the engine and burnt.

There are two distinct phases to the system's operation, engine off and engine running. See Evaporative Emissions Control System - Engine Off and Evaporative Emissions Control System - Engine Running.

Component Locations

Carbon Canister - on the frame above the centre stand.

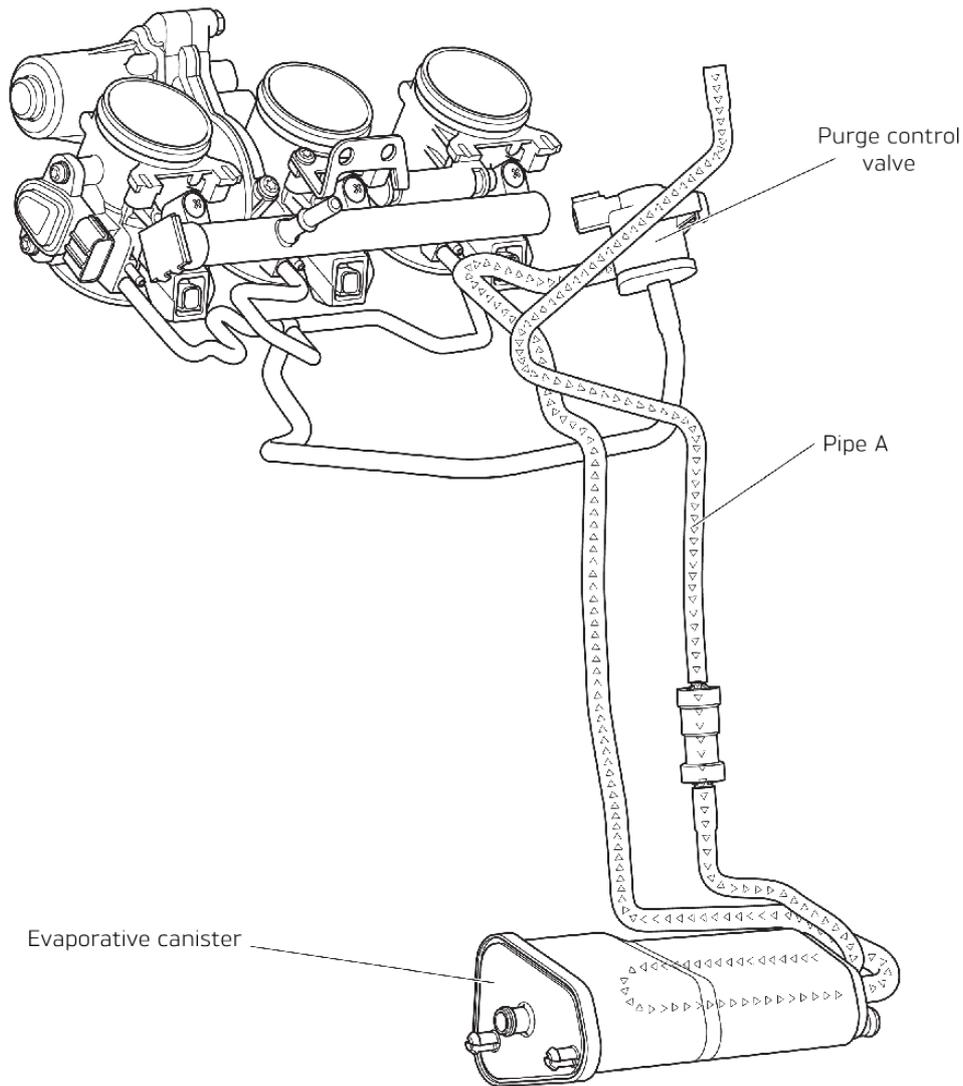
Purge Control Valve - (electronically controlled by the Engine ECM) mounted beneath the fuel tank, to the right hand side of the frame.



Evaporative Emissions Control System - Engine Off

When the engine is stationary any pressure increase in the fuel tank due to a rise in ambient temperature will cause the fuel vapour to pass down the breather pipe A to a carbon filled evaporative canister which stores the vapour.

Once in the canister, vapour cannot return to the fuel tank because the purge valve is closed.



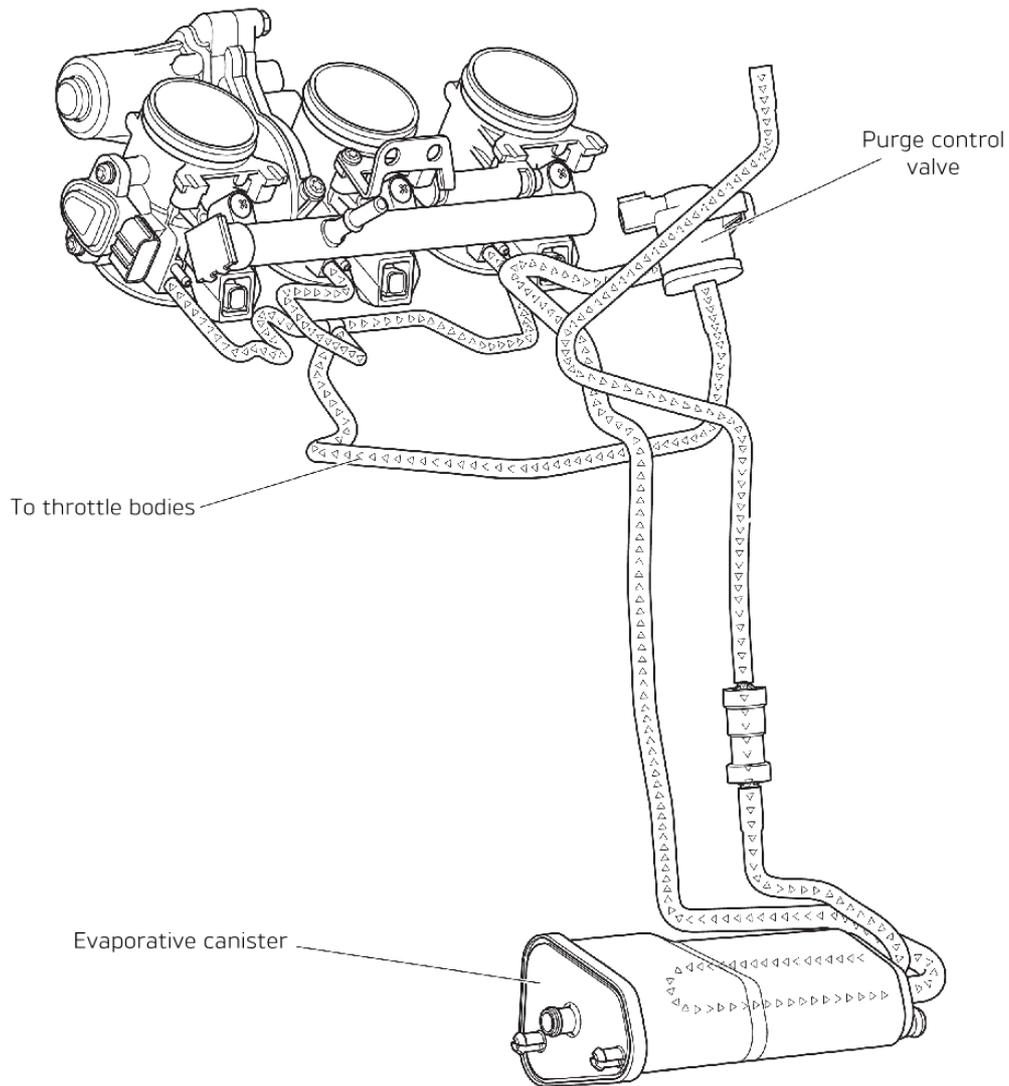
Evaporative Emissions Control System - Engine Running

Evaporative Control System – Engine Running

When the engine is started, a vacuum is applied to the purge hose from the throttle bodies.

At certain times, the Engine ECM opens the purge valve. The vacuum applied to the purge valve now begins to draw stored vapour from the carbon filled evaporative canister and returns it to the throttle bodies for burning in the engine.

In order to control the speed at which vapour is purged from the canister, the engine management system regularly shuttles the purge control valve between open and closed positions.



Evaporative Canister - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

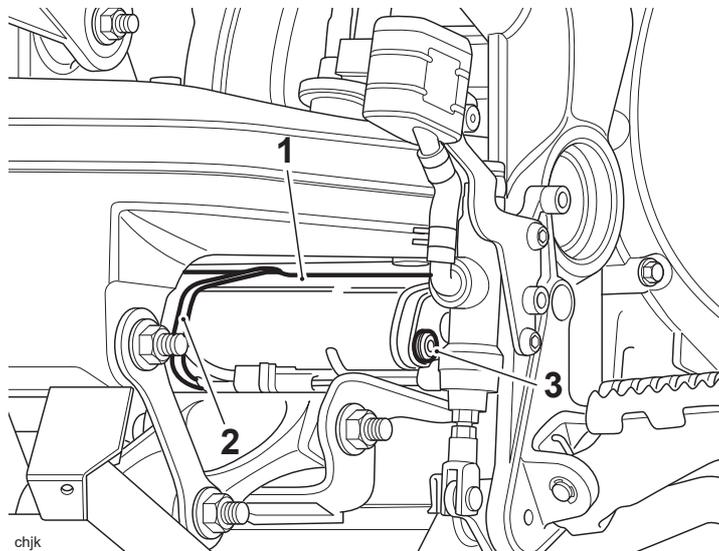
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Exhaust Silencer - Removal
- Rear Suspension Unit - Removal

Note

- **Note the routing of the cable tie for installation.**

1. Cut the cable tie securing the canister to its bracket.
2. Remove the fixing from the right hand side of the canister.

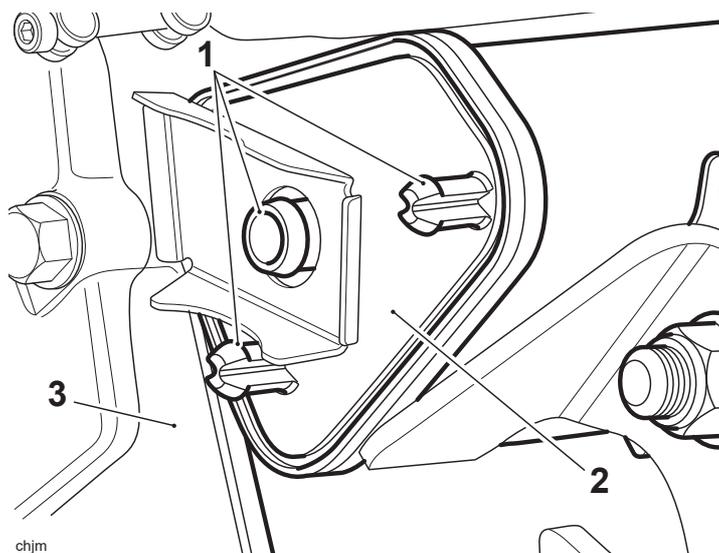


1. Canister
2. Cable tie
3. Fixing

Note

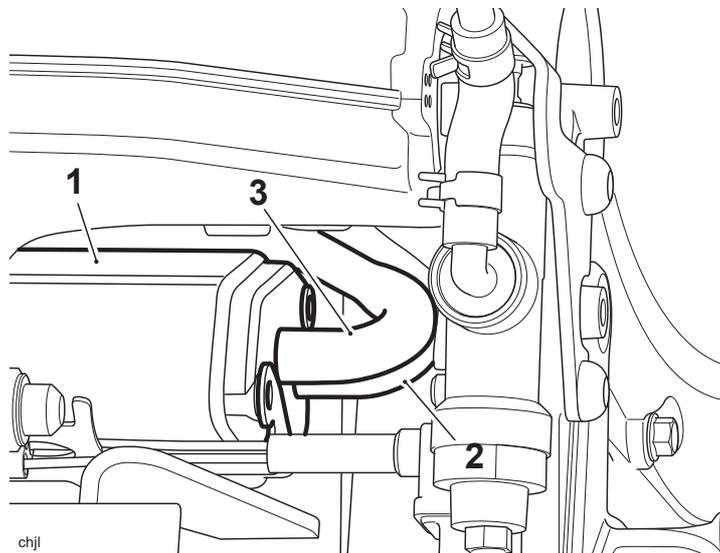
- Note the orientation of the canister for installation.

3. Slide the canister to the right to disengage its locating lugs from the frame.



1. Lugs
2. Canister
3. Frame, left hand side

4. Disconnect the vacuum and purge hoses from the canister.



1. **Canister**
2. **Vacuum hose**
3. **Purge hose**

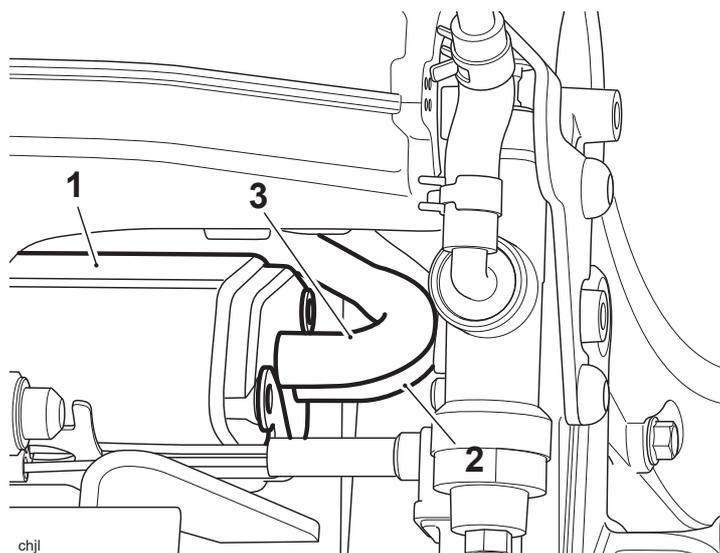
5. Remove the canister from the right hand side of the motorcycle.

Evaporative Canister - Installation

WARNING

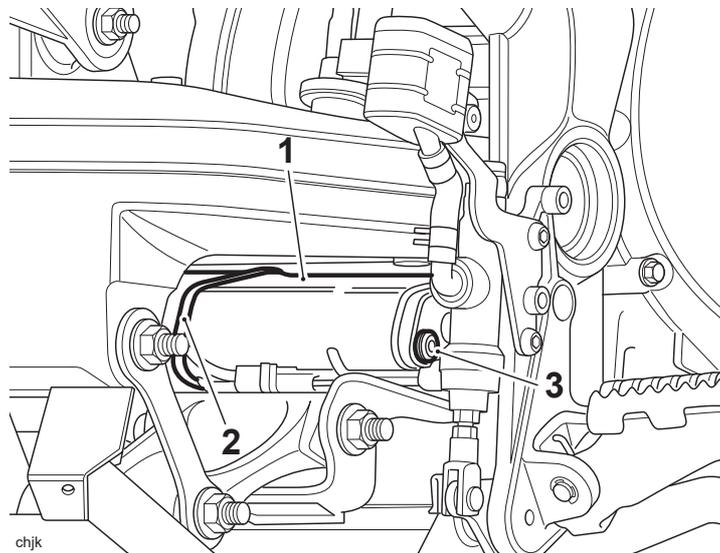
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the new cable ties to the mounting bracket for the canister, as noted at removal.
2. Refit the vacuum and purge hoses to the canister.



1. **Canister**
2. **Vacuum hose**
3. **Purge hose**

3. Fit the canister to its bracket in the orientation noted for removal. Ensure the locating lugs on the canister locate into their respective positions on the right hand frame.
4. Refit the fixing and tighten to **8 Nm**.



1. Canister
2. Cable tie
3. Fixing

5. Secure the canister in place with the cable tie and trim off any excess cable tie.

Perform the following operations:

- Rear Suspension Unit - Installation
- Exhaust Silencer - Installation
- Battery - Installation
- Rider's Seat - Installation

Purge Control Valve - Removal

WARNING

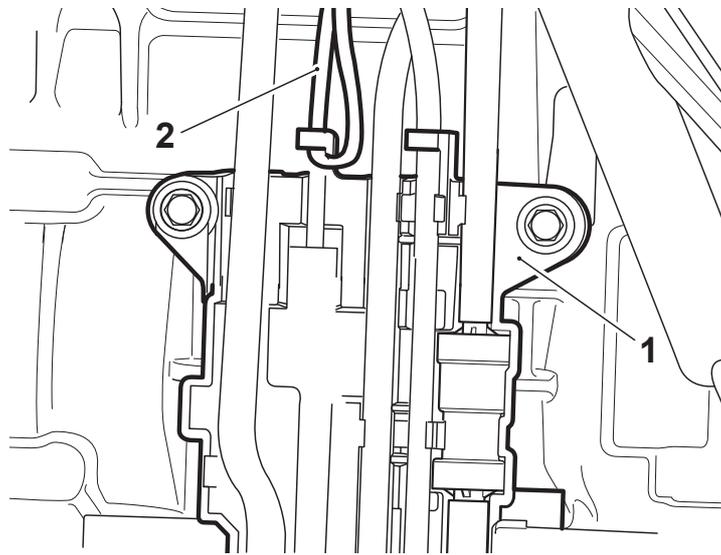
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Disconnect the swinging arm position sensor push rod from the swinging arm and position aside.

Note

- The electrical connector for the purge control valve is located above the crankcase tidy. Note the position of the electrical connector for installation.
- The main harness for the purge valve electrical connector is looped over the hook at the top of the crankcase tidy. Note the routing of the main harness for the purge valve electrical connector, and the purge valve fly lead for installation.



1. Crankcase tidy
2. Main harness to purge valve electrical connector

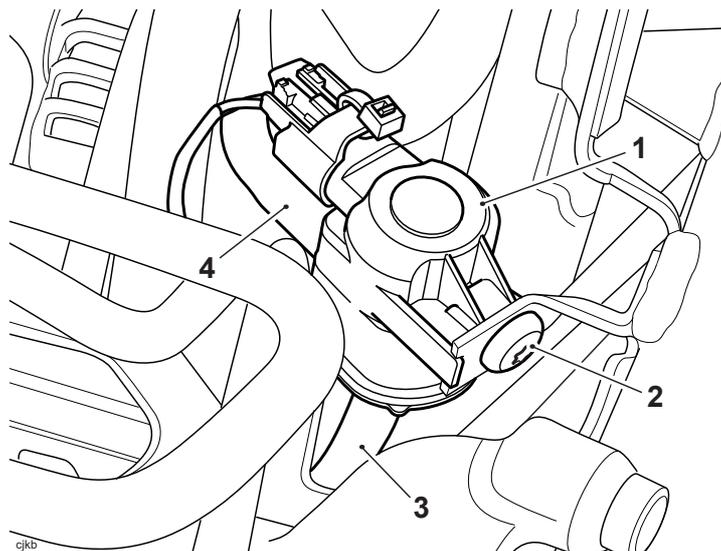
1. Carefully unhook the main harness for the purge valve electrical connector from the crankcase tidy.

Note

- The cable tied electrical connector on the purge valve body must not be disconnected.
2. Carefully feed the electrical connector and harness upwards and out from beneath the front edge of the battery tray. Press the wire locking device fully in and disconnect the electrical connector.
 3. Release the fixing securing the purge control valve to the frame.

Note

- Note the position of the purge control valve hoses for installation.
4. Disconnect the hoses and remove the purge control valve from the motorcycle.



1. Purge control valve
2. Fixing
3. Hose to throttle bodies
4. Hose to evaporative canister

Purge Control Valve - Installation



WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

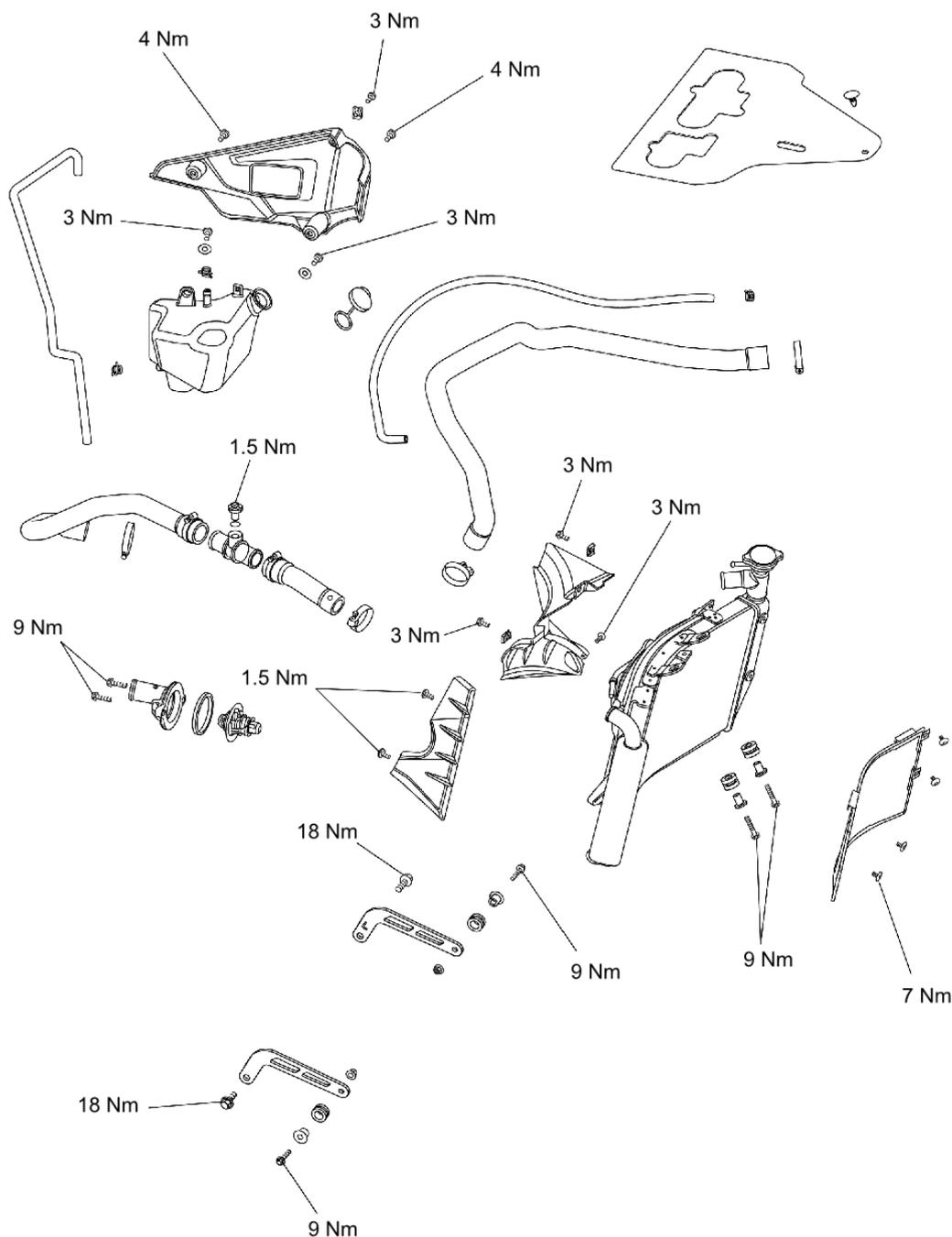
1. Reconnect the purge control valve electrical connector. Route the connector and main harness and position to the crankcase tidy as noted during removal.
2. Reconnect the hoses to the purge control valve as noted during removal.
3. Fit the purge control valve to the frame and tighten the fixing to **3 Nm**.

Perform the following operations:

- Apply a smear of proprietary general purpose grease to NLGI 2 standard to the ball stud and reconnect the swinging arm position sensor linkage to the swinging arm.
- Refit the fuel tank (see Fuel Tank - Installation).
- Refit the battery (see Battery - Installation).
- Refit the rider's seat (see Rider's Seat - Installation).
- Calibrate the rear suspension unit preload motor (see Rear Suspension Unit Preload Motor - Calibration).
- Calibrate the swinging arm position sensor (see Swinging Arm Position Sensor - Calibration).

Cooling

Exploded View – Cooling System



Coolant

A year-round, Hybrid Organic Acid Technology (known as Hybrid OAT or HOAT) coolant is installed in the cooling system when the motorcycle leaves the factory. It is coloured green, contains a 50% solution of ethylene glycol based antifreeze, and has a freezing point of -35°C (-31°F).

Always change the coolant at the intervals specified in the Scheduled Maintenance chart.

WARNING

The standard coolant mixture contains toxic chemicals that are harmful to the human body. Never swallow neat antifreeze or any of the coolant mixture.

CAUTION

 **CAUTION**

The antifreeze incorporated in the coolant mixture contains a corrosion inhibitor that helps prevent damage to the cooling system and engine. Without this inhibitor, the coolant would 'attack' the metals and the resulting corrosion would cause blockages in the cooling system leading to engine overheating and damage.

Always use the antifreeze listed in the Specification section and never use a methanol based antifreeze as this does not contain the required corrosion inhibition properties.

Note

- **HD4X Hybrid OAT coolant, as supplied by Triumph, is premixed and does not need to be diluted prior to filling or topping up the cooling system.**

 **CAUTION**

If hard water is used in the cooling system, it will cause scale accumulation in the engine and radiator and considerably reduce the efficiency of the cooling system. Reduced cooling system efficiency may cause the engine to overheat and suffer severe damage.

Radiator Hoses

Check the radiator hoses for cracks or deterioration, and hose clamps for tightness in accordance with scheduled maintenance requirements.

Radiator and Cooling Fan Inspection

Radiator

 **CAUTION**

Using high pressure water, such as from a pressure-washer, can damage the radiator fins and impair the radiator's efficiency.

Do not obstruct or deflect airflow through the radiator by installing unauthorised accessories in front of the radiator or behind the cooling fan. Interference with the radiator airflow can lead to overheating and consequent engine damage.

1. Check the radiator for stone damage.
2. Check the radiator core for damage to fins or obstructions to air flow.
3. Clean off any obstructions with a stream of low-pressure water.

 **CAUTION**

To avoid overheating and consequent engine damage, replace the radiator if the cores are blocked or if the fins are badly deformed or broken.

4. Rectify any damage.

Cooling Fan

 **WARNING**

WARNING

The cooling fan is turned on or off by the chassis ECM, in response to a request sent by the engine ECM. The request from the engine ECM to turn the cooling fan on or off, is sent to the chassis ECM in response to a signal received from the coolant temperature sensor.

To prevent injury, never place loose clothing, fingers or hands near the cooling fan, until the engine is stopped. Loose clothing, fingers or the hands could become trapped during cooling fan operation and cause crushing injury to the fingers, hands or other parts of the anatomy.

The motorcycle is fitted with a thermostatically controlled electric fan situated behind the radiator. When the fan operates with the motorcycle stationary or at slow speed, cool air is drawn through the radiator from the front of the motorcycle.

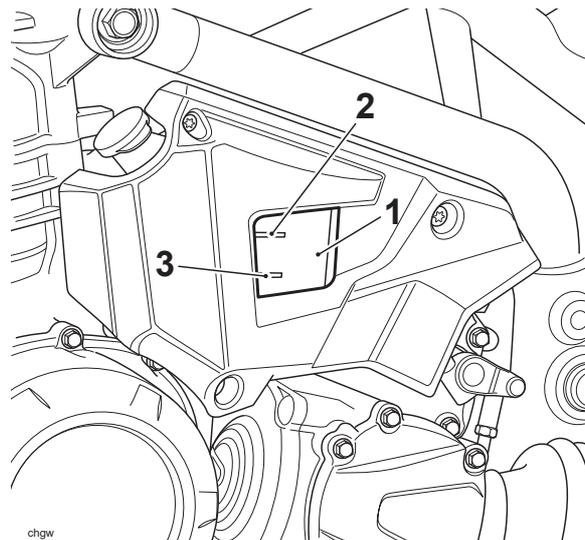
1. Check that the cooling fan spins freely and without tight spots.
2. Check the cooling fan blades for signs of heat distortion.
3. Rectify as necessary.

Coolant Level Inspection

WARNING

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Position the motorcycle on level ground and in an upright position.
2. The coolant level within the expansion tank can be inspected on the left hand side of the motorcycle without removing any covers.
3. Check the coolant level in the expansion tank. The coolant level must be between the MAX and MIN level marks moulded into the expansion tank cover. If the coolant is below the minimum level, the coolant level must be adjusted.



1. **Expansion tank**
2. **MAX mark**
3. **MIN mark**

CAUTION

If the coolant level is found to be low, or if coolant has to be added regularly, inspect the cooling system for coolant leaks. If necessary, pressure test the system to locate the source of the leak and rectify as necessary. Loss of coolant may cause the engine to overheat and suffer severe damage.

Coolant Level Adjustment

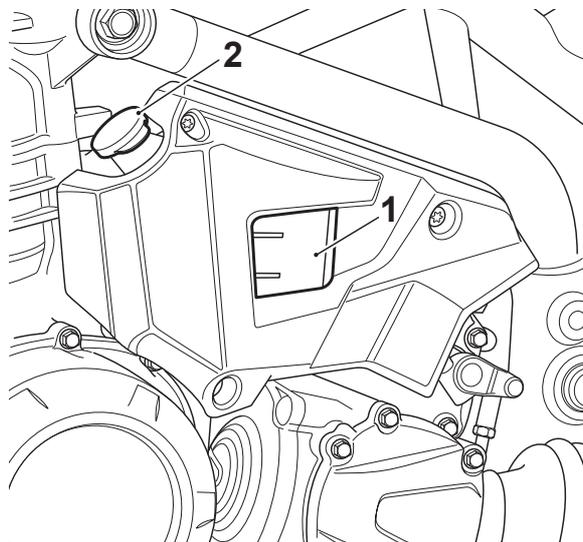
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Allow the engine to cool.
2. The coolant within the expansion tank can be topped up on the left hand side of the motorcycle without removing any covers.
3. Remove the cap from the expansion tank and add coolant mixture through the filler opening until the level reaches the MAX mark on the expansion tank cover.



chgw_4

1. Expansion tank
2. Expansion tank cap

4. Refit the cap.

Note

- If the coolant level is being checked because the coolant has overheated, also check the level in the radiator and top up if necessary.
- In an emergency, distilled water can be added to the cooling system. However, the coolant must then be drained and replenished with HD4X Hybrid OAT coolant as soon as possible.

CAUTION

If hard water is used in the cooling system, it will cause scale accumulation in the engine and radiator and will considerably reduce the efficiency of the cooling system. Reduced cooling system efficiency may cause the engine to overheat and suffer severe damage.

Coolant Replacement - Drainage

WARNING

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

! WARNING

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

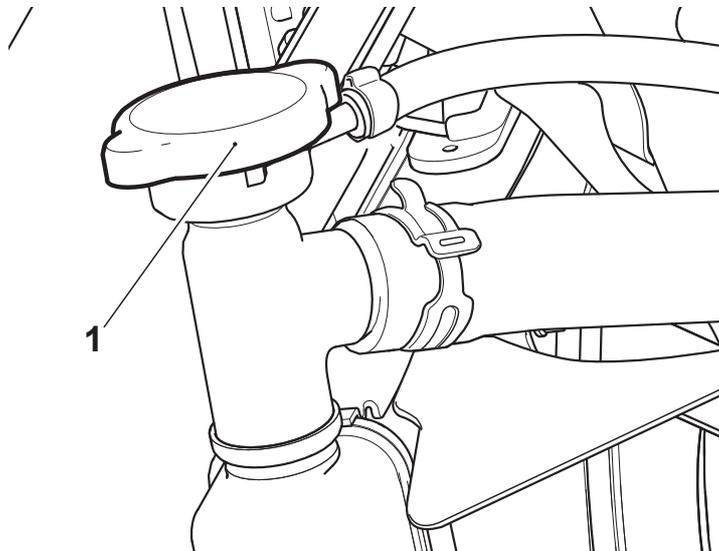
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal

Note

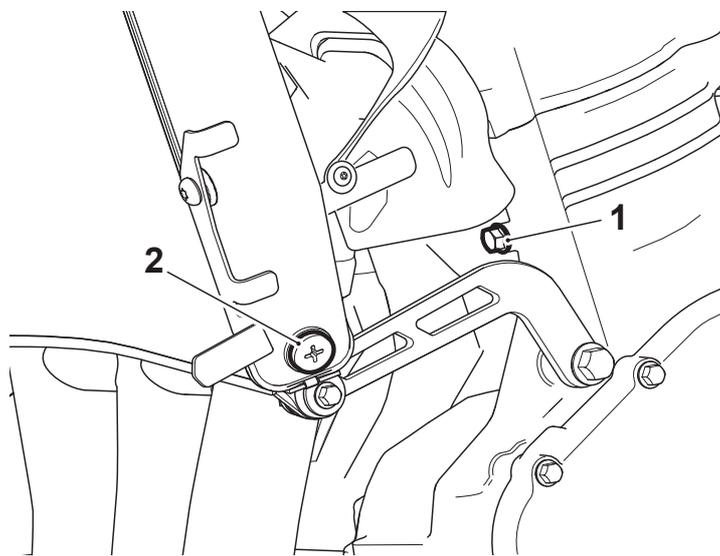
- **Prior to disassembly of the coolant hoses, note the orientation and position of the hose clips to help ensure that they are returned to the same positions and orientation on assembly.**

1. Remove the coolant pressure cap on the radiator.



1. Coolant pressure cap

2. Position a container to collect the displaced coolant.
3. Remove the drain screw located on the left hand side of the radiator and allow the coolant to drain.
4. To drain the crankcase, remove the drain screw shown in the illustration below. Discard the washer.



1. Crankcase coolant drain screw
2. Radiator coolant drain screw

Note

- It is not possible to completely drain all of the coolant, a small amount may remain in the water pump or heat exchanger.

Coolant Replacement - Filling

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

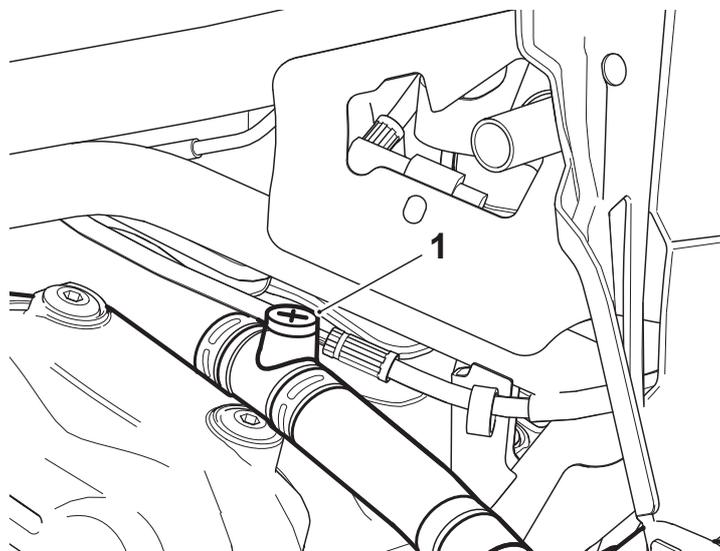
CAUTION

Filling the cooling system with the motorcycle positioned on the centre stand will cause an airlock, reducing the cooling system efficiency

Always place the motorcycle on the side stand when filling the cooling system.

Reduced cooling system efficiency may cause the engine to overheat and suffer severe damage.

1. Refit the radiator drain screw and tighten to **1.5 Nm**.
2. Fit a new washer to the drain screw and refit to the crankcase. Tighten to **8 Nm**.
3. Remove the bleed screw from the right hand hose.



1. Bleed screw

4. With the motorcycle positioned on its side stand, slowly add coolant mixture to the system, through the filler opening in the radiator, until the system is full.
5. If the system has filled correctly and fully, there should be coolant visible through the:
 - o Right hand hose bleed screw opening
 - o Radiator filler opening.
6. If there is no coolant visible through the right hand hose bleed screw opening, but the filler side appears to be full, attach a length of clear tubing to the bleed screw spigot and syphon coolant into the bleed screw side of the radiator.

Note

- **A hand-operated vacuum pump or similar should be used to syphon the coolant through the system.**
7. If necessary, top up the system through the filler and refit the pressure cap.
 8. Install the right hand hose bleed screw and tighten to **1.5 Nm**.
 9. With the aid of an assistant, lean the motorcycle fully over to the right hand side, and then the left hand side, to release air trapped in the cooling system.
 10. Remove the radiator cap and top up the coolant.
 11. Refit the cap and repeat as necessary.
 12. Refit the battery (see Battery - Installation).

WARNING

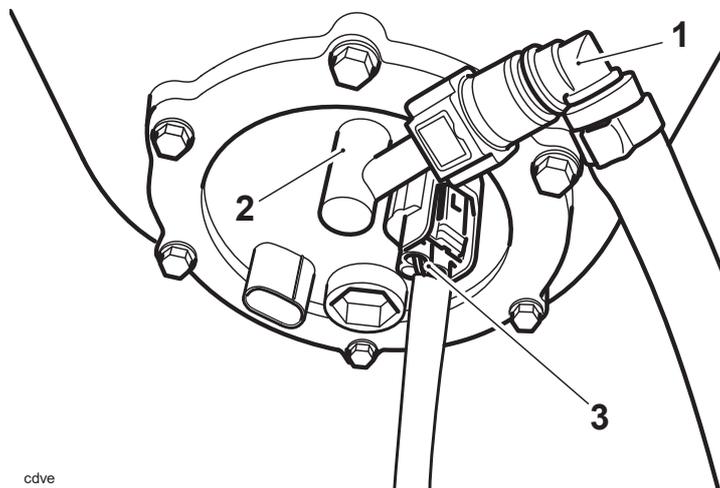
Observe the fuel handling precautions given in the General Information section.

13. Place the fuel tank on a suitable support, close to the motorcycle.
14. Using T3880123 - Extension Cable, carefully connect the fuel pump connection to the fuel tank. Connect the other end of the extension cable to the motorcycle main harness.
15. Select the fuel pressure gauge adapter marked 'B' from T3880001 - Fuel Pressure Gauge.

WARNING

Always use the correct fuel pressure gauge adapter (**adapter 'B' for Explorer models**). Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

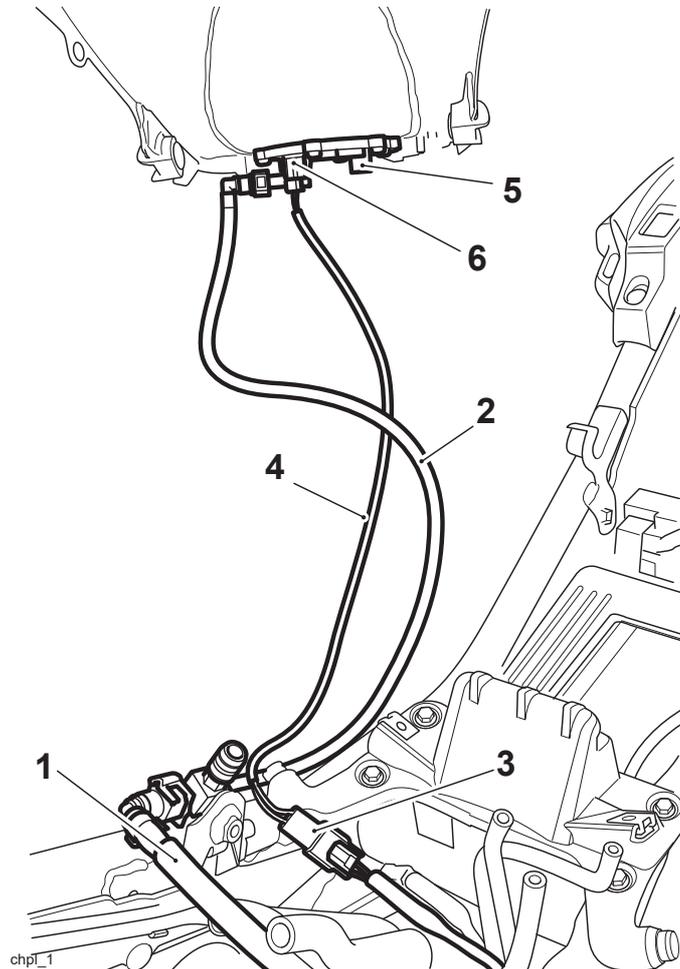
16. Connect the adapter hose to the fuel pump plate outlet as shown in the illustration below.



1. Adaptor hose 'B'

2. Fuel pump plate outlet
3. T3880123 - Extension Cable

17. Connect the fuel hose to the adaptor hose as shown in the illustration below.



1. Motorcycle fuel hose
2. Adaptor hose 'B'
3. Fuel pump connection
4. T3880123 - Extension Cable
5. Fuel pump connection
6. Fuel pump plate outlet

18. Start the motorcycle and allow to run for approximately 20 to 30 seconds. Briefly raise the engine speed several times to allow any air to be expelled from the system.
19. Stop the engine. Remove the radiator cap and check and top up the coolant level as necessary.
20. Refit the radiator cap.
21. Disconnect the fuel tank adaptor hose and extension harness.
22. With the aid of an assistant, lean the motorcycle fully over to the right hand side, and then the left hand side, to release air trapped in the cooling system.
23. Refit the fuel tank (see Fuel Tank - Installation).
24. Start the motorcycle. Briefly raise the engine speed several times to allow any air to be expelled from the system.
25. Allow the engine to run until the cooling fan operates.
26. Stop the motorcycle and allow the engine to cool.

 **WARNING**

WARNING

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.

27. Check the expansion tank level and top up if necessary (see Coolant Level Adjustment).
28. Refit the rider's seat (see Rider's Seat - Installation).

Water Pump

Note

- The oil pump and water pump are supplied as an assembly and cannot be separated. For additional information, refer to Oil Pump (see Oil Pump - Removal for removal and Oil Pump - Installation for installation).

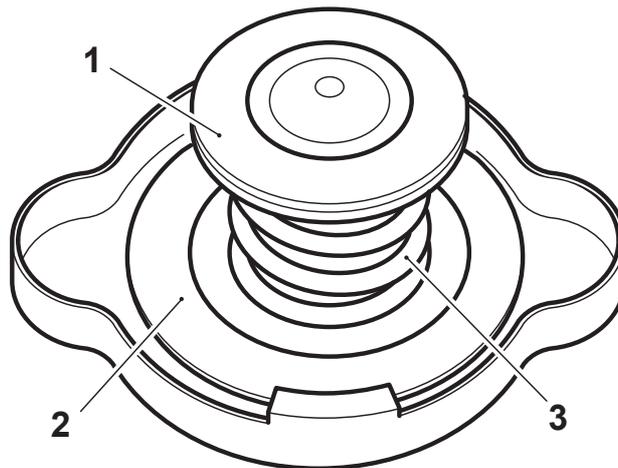
Coolant Pressure Cap and Coolant System Testing

WARNING

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

Inspection and Testing

1. Allow the engine temperature to cool for at least 30 minutes.
2. Remove the coolant pressure cap.
3. Check the condition of the upper and lower seals of the coolant pressure cap.



cdbu

1. Lower seal
2. Upper seal
3. Spring

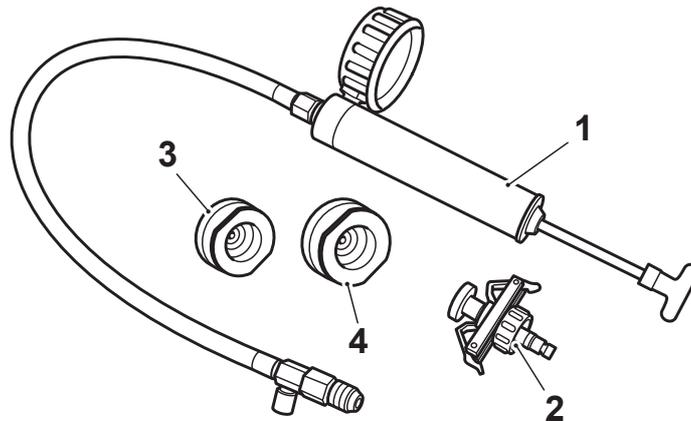
Note

- If there is any sign of damage or deterioration replace the cap.
4. Pressure test the cap and cooling system to the blow off pressure of 1.1 bar as described below using T3880147 - Radiator and Cap Tester Kit. If the cap opens at a lower pressure or fails to open at 1.1 bar, replace the cap.

Note

- It is recommended to carry out coolant pressure cap and cooling system pressure tests consecutively.

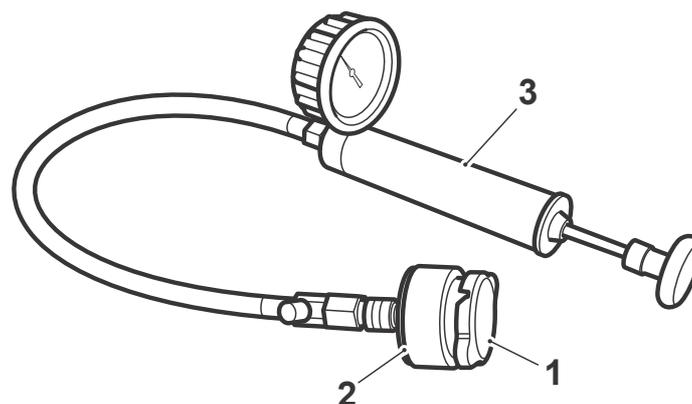
Coolant Pressure Cap Test



cgwp

1. Hand held pump
2. Bayonet type connector
3. Pressure cap test adaptor, 44 mm
4. Pressure cap test adaptor, 46 mm

1. Select the correct test adaptor and securely fasten to the pressure cap.
2. Carefully connect the hand pump to the adaptor ensuring an air tight seal is maintained.



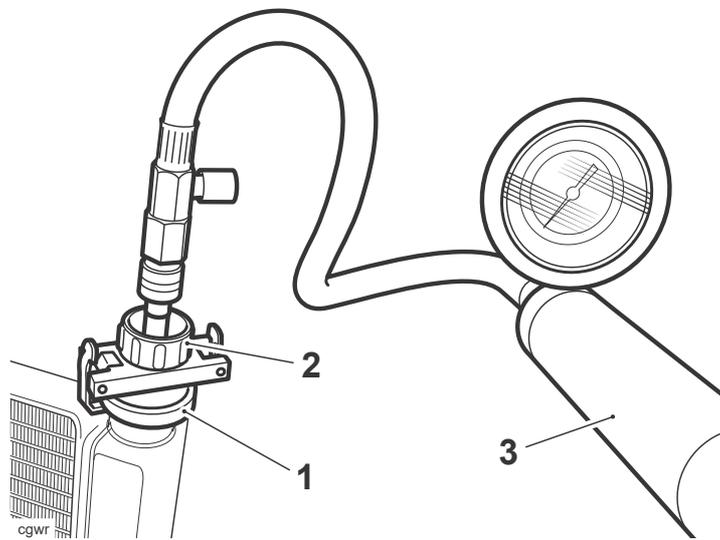
cgwq

1. Pressure cap
2. Test adaptor
3. Hand held pump

3. Pressure test the coolant cap to the blow off pressure. If the coolant cap opens at a lower pressure, fails to open at the correct pressure or the seal leaks, replace the cap.

Coolant System Pressure Test

1. Select the bayonet type adaptor and securely fasten to the radiator.
2. Carefully connect the hand pump to the bayonet connector ensuring an air tight seal is maintained.

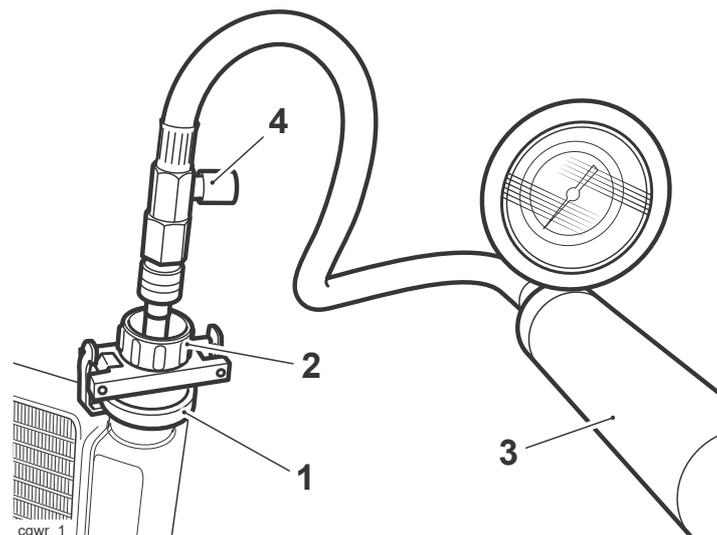


1. Radiator filler
2. Bayonet type connector
3. Hand held pump

3. Pressurise the cooling system to the operating pressure, using the hand pump taking care not to exceed the maximum cap pressure.
4. Hold the pressure for a minimum of 10 minutes, whilst visually inspecting the external components of the coolant system for leaks.
5. Remove the engine oil filler cap/dipstick and check for contamination of the engine oil caused by coolant escaping into the engine sump.

Note

- If the engine oil is contaminated further exploratory investigation will be required.
 - If the engine oil is contaminated rectify the cause of the problem and then renew the oil and filter.
6. Depressurise the coolant test kit using the pressure release valve.



1. Radiator filler
2. Bayonet type connector
3. Hand held pump
4. Pressure release valve

7. Refit the coolant cap.
8. Fill the coolant to the maximum mark (see Coolant Level Adjustment).

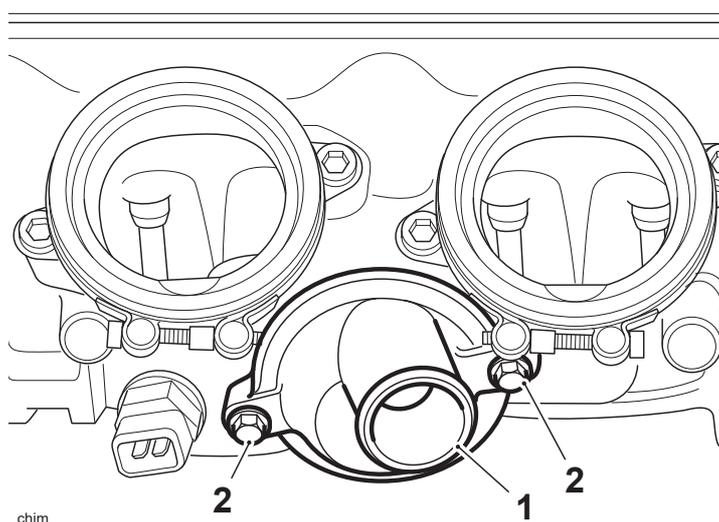
Thermostat - Removal

WARNING

Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Coolant Replacement - Drainage
 - Throttle Bodies/Injectors - Removal
1. Detach the top hose from the thermostat elbow.
 2. Release the fixings securing the thermostat housing to the cylinder head.
 3. Remove the thermostat housing.



1. **Thermostat housing**
2. **Fixings**

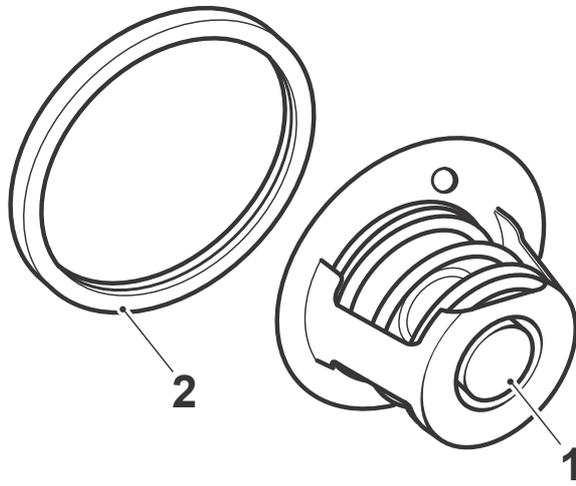
4. Remove the thermostat from the cylinder head. Discard the seal.

Thermostat - Inspection

1. Inspect the thermostat at room temperature. If the valve is open, the thermostat must be replaced.
2. To check the valve opening temperature, suspend the thermostat in a container of water and raise the temperature of the water until the thermostat opens. The thermostat should start to open at 88°C +/-5°C.
3. If the temperature at which thermostat opening takes place is incorrect, replace the thermostat.

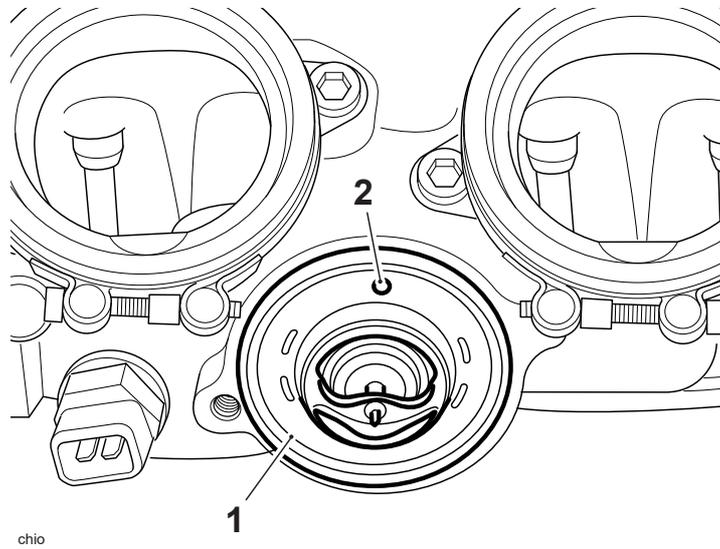
Thermostat - Installation

1. Fit a new seal to the thermostat.



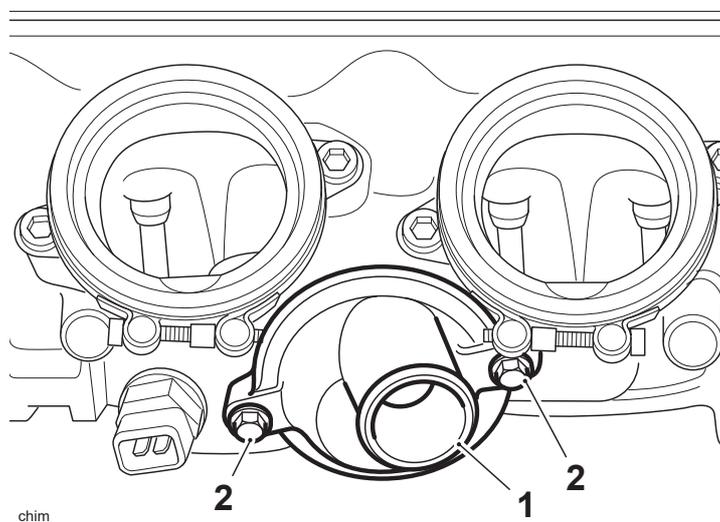
- 1. Thermostat
- 2. Seal

2. Locate the thermostat into the cylinder head, with the bleed hole uppermost.



- 1. Thermostat
- 2. Bleed hole

3. Refit the thermostat housing and secure with the two fixings.



1. Thermostat housing

2. Fixings

4. Tighten the fixings to **9 Nm**.

5. Reconnect the top hose and refit the hose clip using T3880207 - Hose Clip Pliers.

Perform the following operations:

- Throttle Bodies/Injectors - Installation
- Coolant Replacement - Filling
- Battery - Installation
- Rider's Seat - Installation

Radiator - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

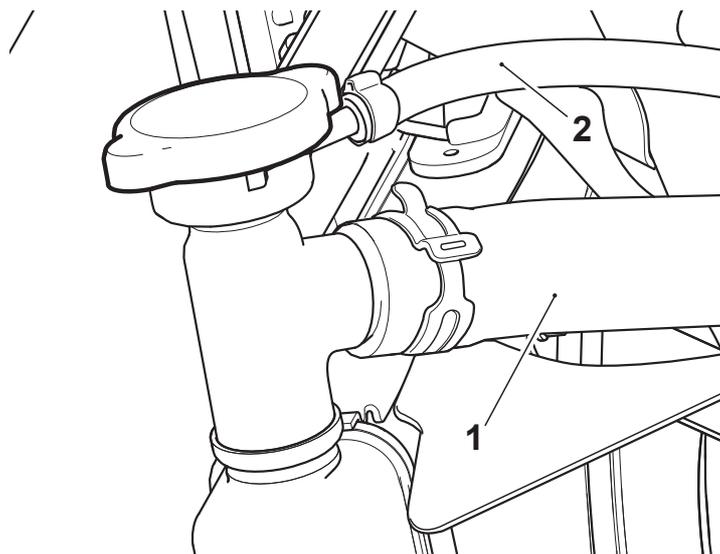
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Coolant Replacement - Drainage

Note

- **Note the orientation of the clips for installation.**

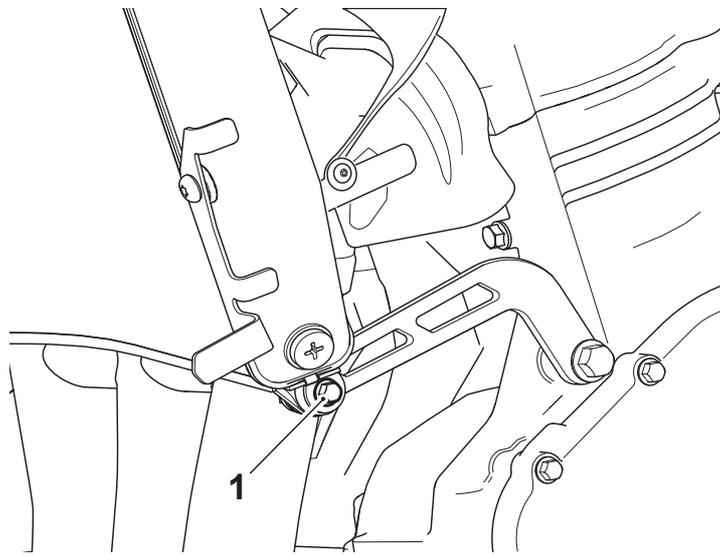
1. Disconnect the expansion tank, right hand and left hand hoses at the radiator.



1. **Left hand hose**

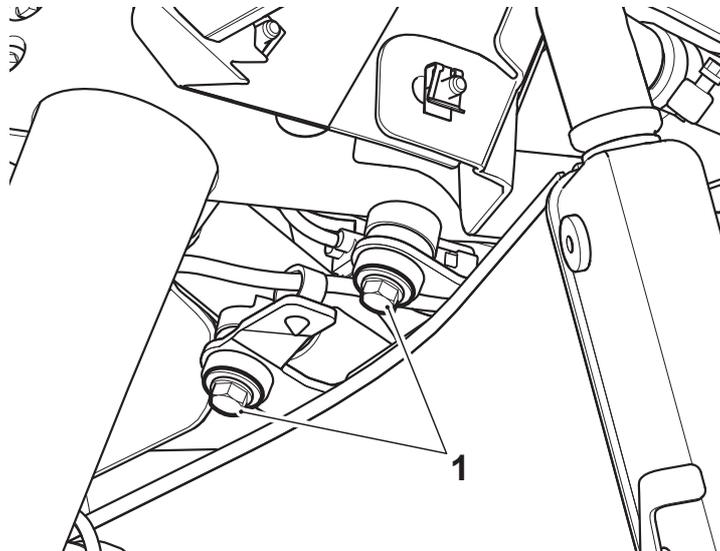
2. **Expansion tank hose**

2. Remove the two fixings securing the radiator to the lower radiator brackets.



1. Fixing (left hand shown)

3. Remove the air deflector firtree clip.
4. Release the two upper bolts securing the radiator to the frame.



1. Fixings

5. Lower the radiator and disconnect the cooling fan connection, located below the headstock.
6. Remove the radiator.

Radiator - Inspection

1. Check the radiator for stone damage.
2. Check the radiator core for damage to fins or obstructions to air flow.
3. Repair any damage and clear all obstructions.

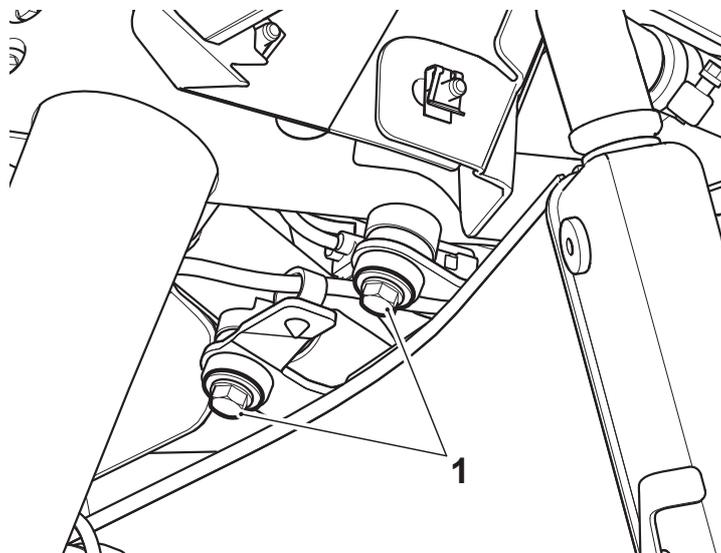
! CAUTION

To avoid overheating and consequent engine damage, replace the radiator if the cores are blocked or if the fins are badly deformed or broken.

4. Check that the fan spins freely and without tight spots.
5. Check the fan blades for signs of heat distortion.

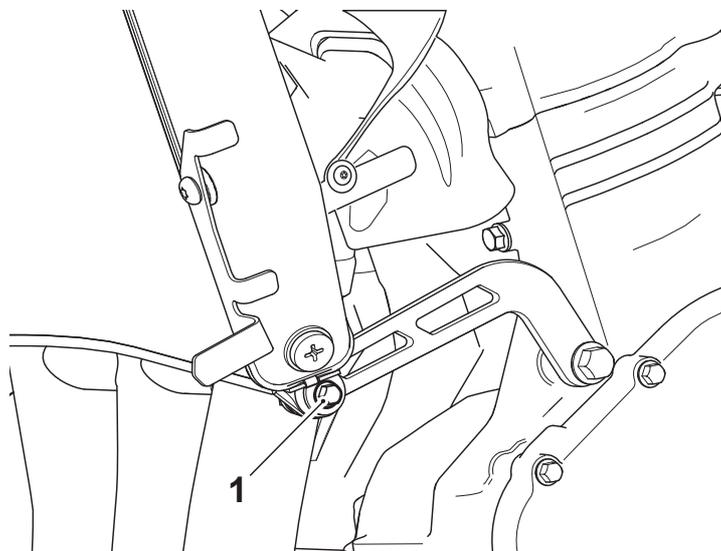
Radiator - Installation

1. Position the radiator to the frame and connect the fan connector.
2. Align the radiator upper mounting to the frame. Fit the two fixings but do not fully tighten at this stage.



1. Fixings

3. Fit the two lower mounting fixings and tighten to **9 Nm**.



1. Fixing (left hand shown)

4. Tighten the upper fixings to **9 Nm**.
5. Reconnect the expansion tank, left hand and right hand hoses. Align the hoses clips as noted during disassembly.

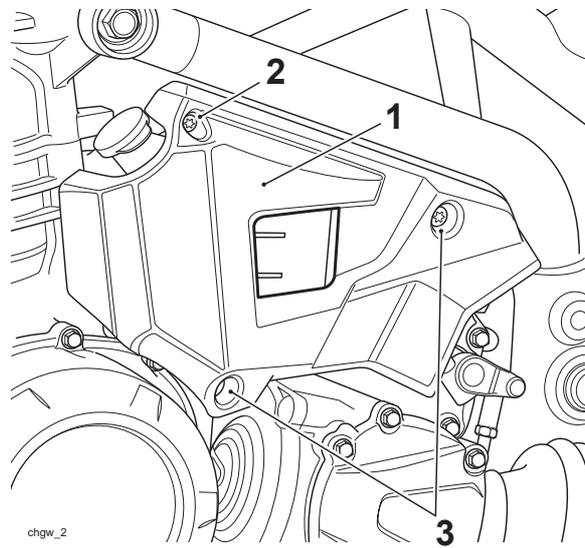
Perform the following operations:

- Coolant Replacement - Filling
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Expansion Tank - Removal

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Installation
1. Remove the three fixings and remove the expansion tank cover. Discard the upper M5 fixing. Retain the lower M6 fixings for reuse.



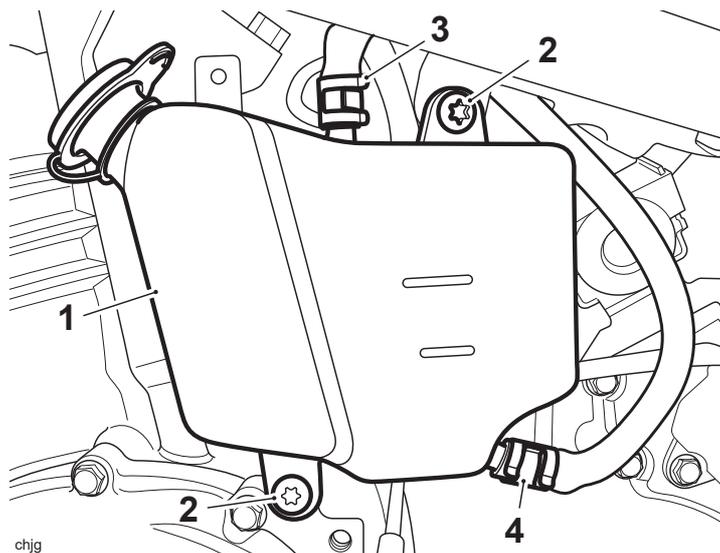
1. **Expansion tank cover**
2. **Upper fixings (M5)**
3. **Lower fixings (M6)**

2. Position a container to collect the displaced coolant.

! WARNING

Do not disconnect the two coolant hoses from the expansion tank when the engine is hot. When the engine is hot the coolant in the expansion tank will be hot.
Contact with hot coolant will cause scalds and skin damage.

3. Disconnect the upper hose from the expansion tank.
4. Release the two fixings and manoeuvre the expansion tank away from the frame. Collect the washers.



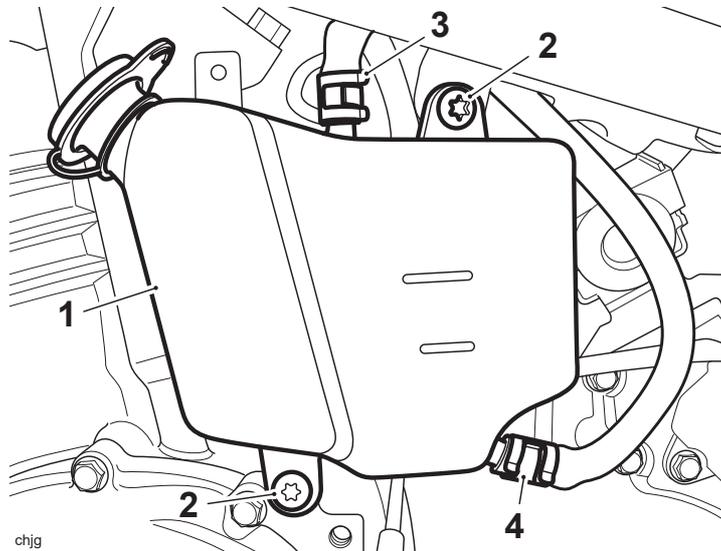
1. **Expansion tank**
2. **Fixings**
3. **Upper hose**
4. **Lower hose**

5. Release the clip, disconnect the lower hose and remove the expansion tank.

Expansion Tank - Installation

1. Align the expansion tank to the frame, fit the lower hose and secure in position with its clip.

2. Position the expansion tank to the engine and secure with the two washers and fixings. Tighten to **3 Nm**.

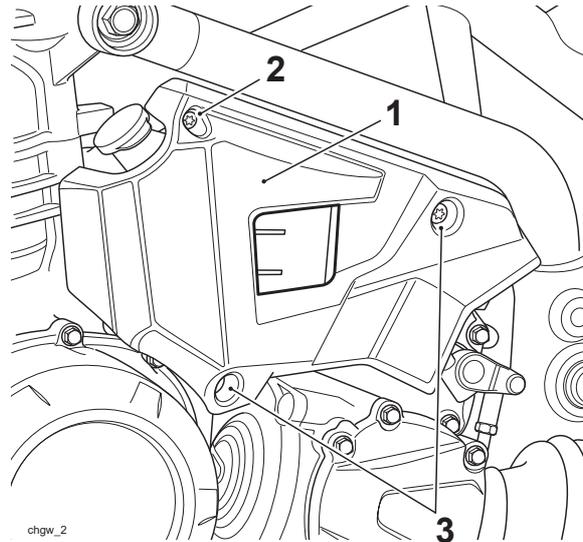


1. Expansion tank
2. Fixings
3. Upper hose
4. Lower hose

3. Refit the upper hose and secure in position with its clip.

4. Check and adjust the coolant level as necessary (see Coolant Level Adjustment).

5. Refit the expansion tank cover. Secure the upper mounting with a new M5 encapsulated fixing. Secure the lower mountings with the two original fixings. Tighten the upper fixing to **3 Nm** and the lower fixings to **4 Nm**.



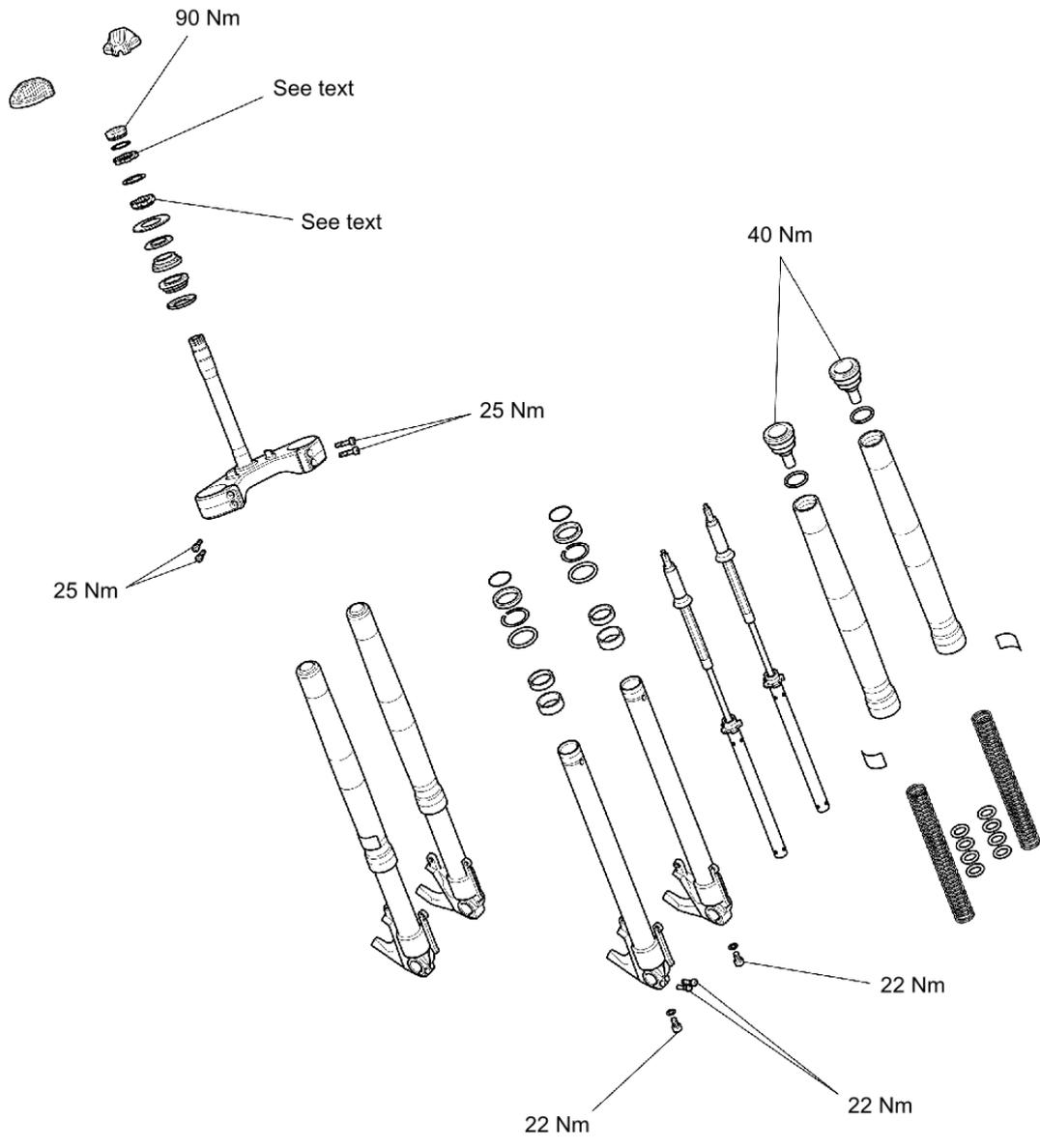
1. Expansion tank cover
2. Upper fixing (M5)
3. Lower fixings (M6)

Perform the following operations:

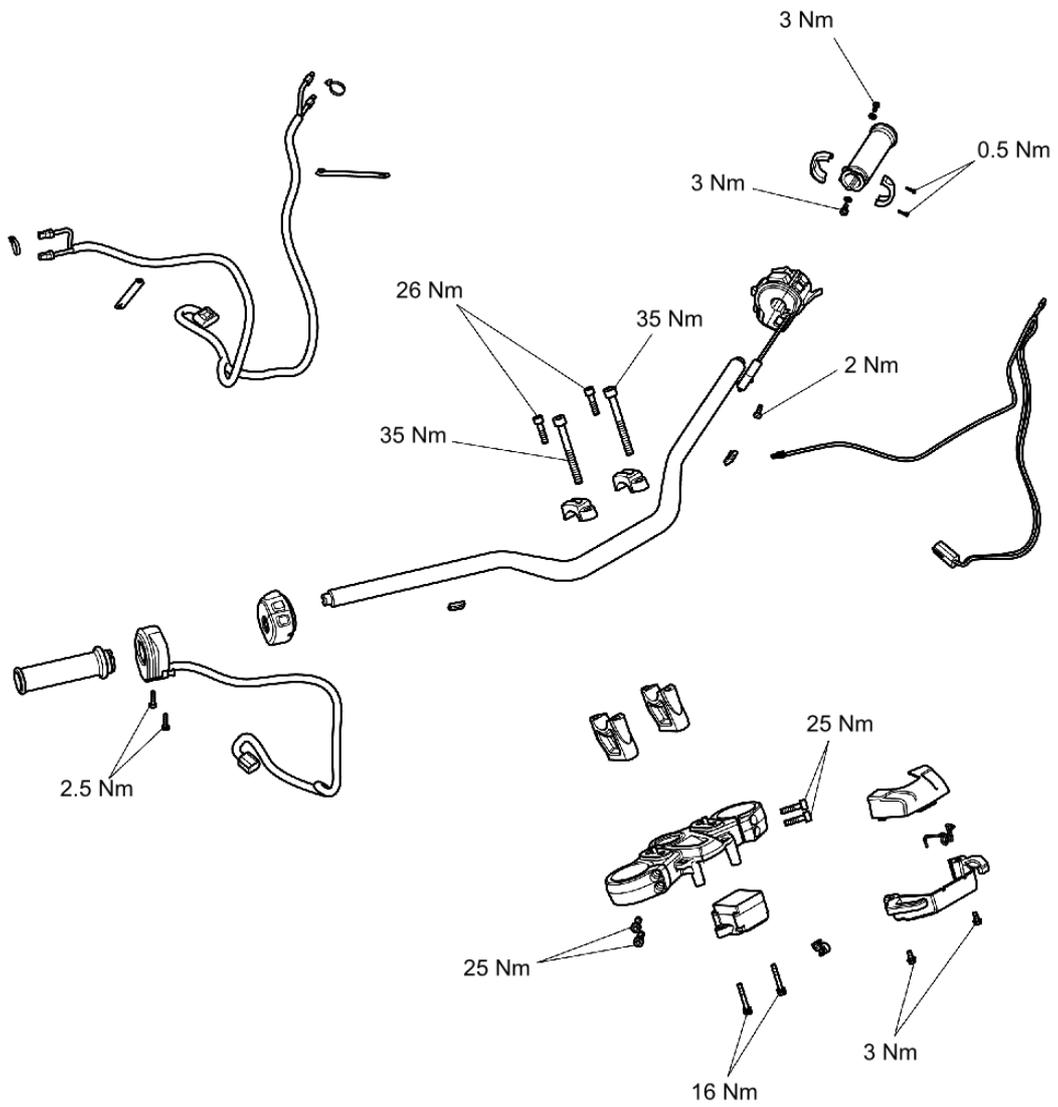
- Battery - Installation
- Rider's Seat - Installation

Front Suspension

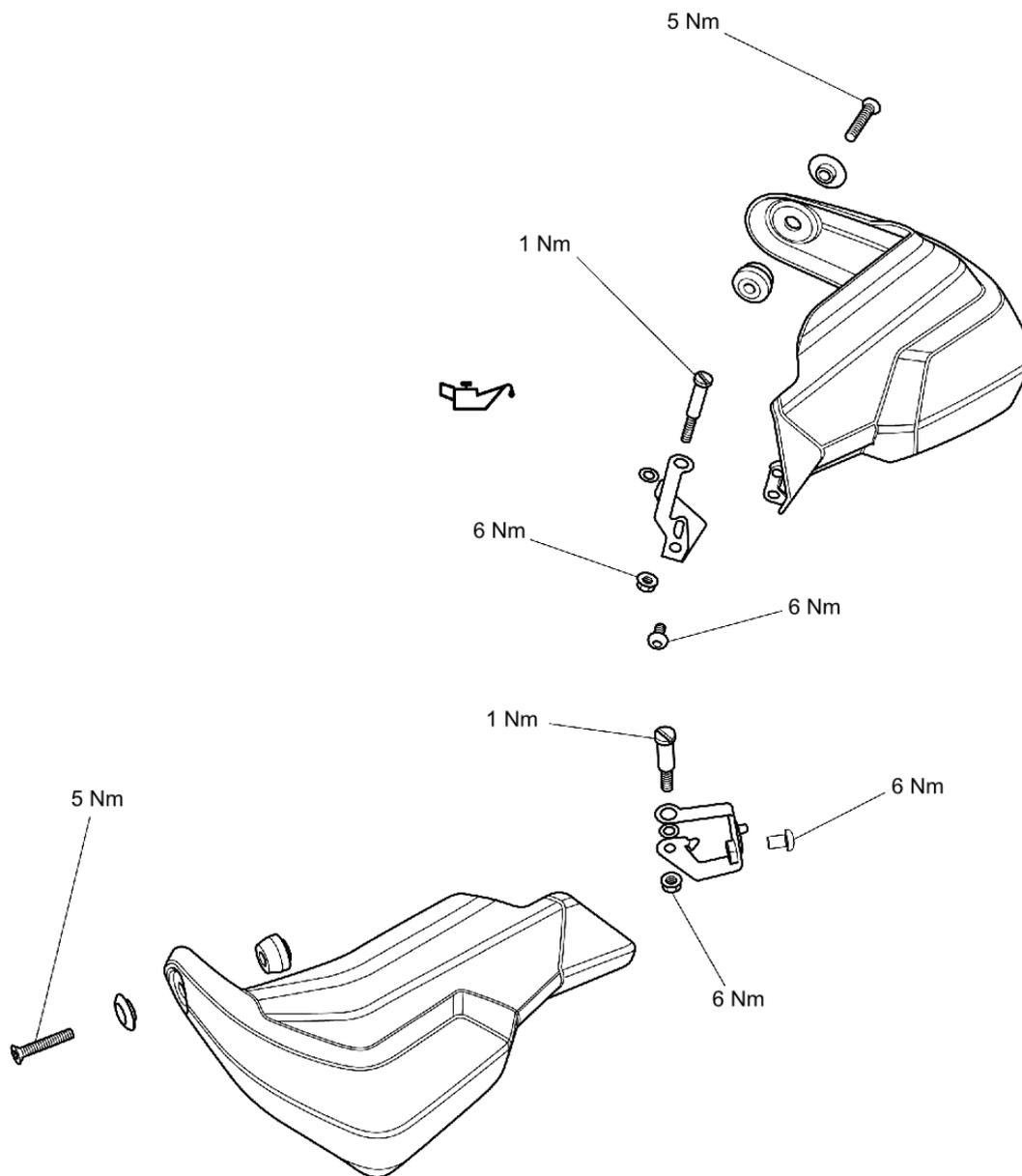
Exploded View - Front Fork



Exploded View – Handlebars



Exploded View – Hand Guards



2209

Front Suspension

This model is equipped with hydraulic, telescopic front forks. The front suspension has electronic adjustment of compression and rebound damping (TSAS). Adjustment is carried out using instrument menus.

Periodic inspection for damage and fluid leaks is essential for safe riding. Always follow the inspection instructions at the intervals stated in the scheduled maintenance chart.

Fork Inspection

Examine each fork for any sign of damage or scratching of the slider surface or for oil leaks.

If any damage or oil leakage is found, strip and repair as described in this section or consult an authorised Triumph dealer.

Check for smooth operation of the forks as follows:

- Place the motorcycle on level ground
- While holding the handlebars and applying the front brake, pump the forks up and down several times.

If roughness or excessive stiffness is detected, repair as described in this section or consult an authorised Triumph dealer.

WARNING

Riding the motorcycle with defective or damaged suspension can cause loss of motorcycle control and an accident. Never ride with damaged or defective suspension.

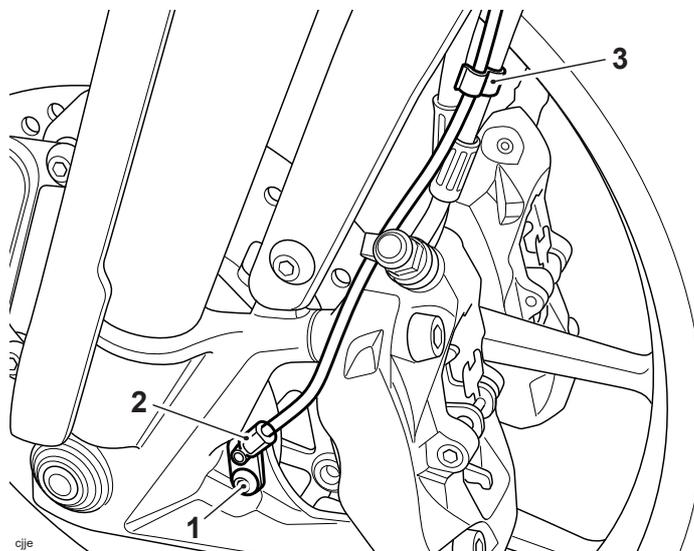
Front Fork - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Raise and support the front of the motorcycle.
 2. Release the fixing and detach the front wheel sensor from the left hand fork leg. Collect the shim from between the sensor and fork leg and discard the fixing.



1. **Fixing**
2. **Front ABS wheel speed sensor**
3. **Clip**

WARNING

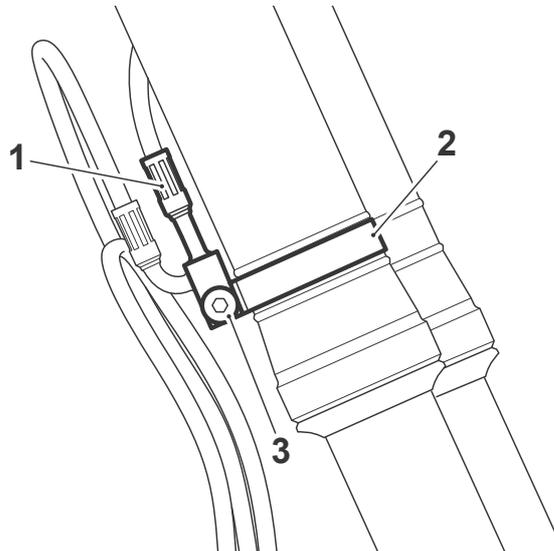
Do not allow the calipers to hang on the brake hoses as this may damage the hoses. Damaged hoses could cause brake failure leading to loss of control and an accident.

Note

- **It is not necessary to disconnect the brake hoses.**
3. Detach and support the front brake calipers such that the weight of the caliper is not supported by the brake hose (see Front Brake Caliper - Removal).
 4. Remove the front wheel (see Front Wheel - Removal).
 5. Remove the front mudguard (see Front Mudguard - Removal).

Note

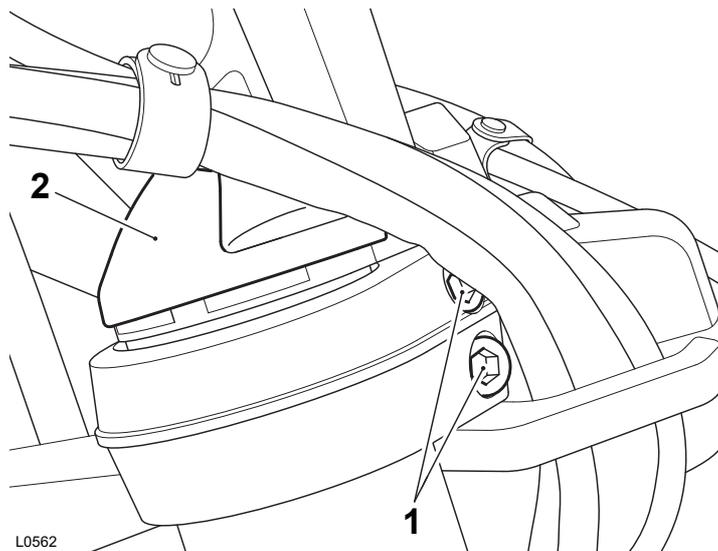
- The brake hose clip on the right hand fork leg is angled outwards by 20°. Note its orientation for installation.
6. Remove the fixing and detach the brake hose from the clip on the right hand fork leg. Discard the fixing.



chnj

1. Brake hose
2. Brake hose clip
3. Fixing

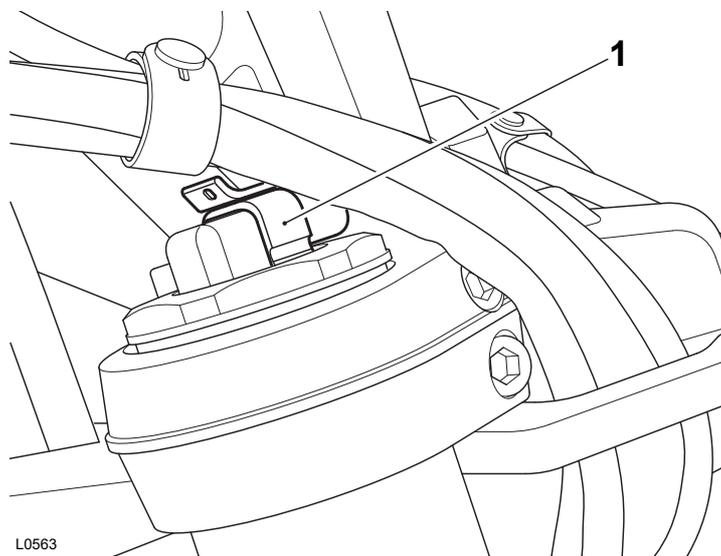
7. Loosen the upper yoke clamp bolts.
8. Remove the TSAS damping motor connector cover.



L0562

1. Upper yoke clamp bolts
2. TSAS damping motor connector cover

9. Disconnect the TSAS damping motor connector.



L0563

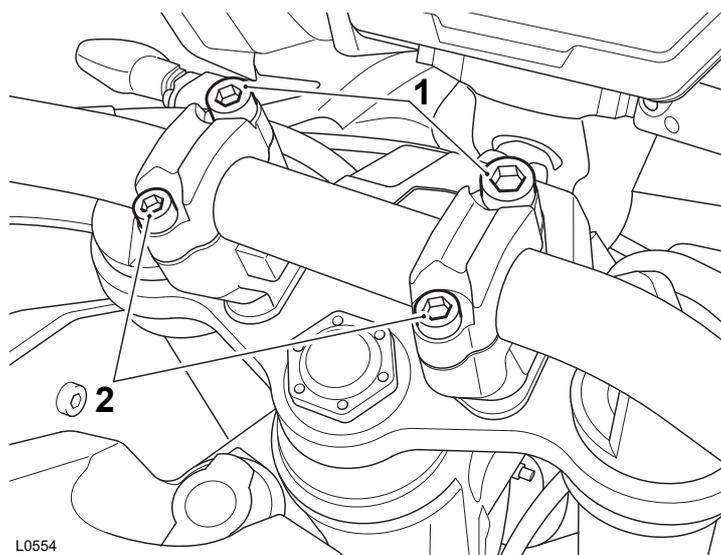
1. TSAS damping motor connector (rebound shown)

10. If the fork is to be dismantled carry out the following:

- Note the orientation of the adjustable handlebar risers, in order that they can be returned to the same position when the repair operation is complete.

Note

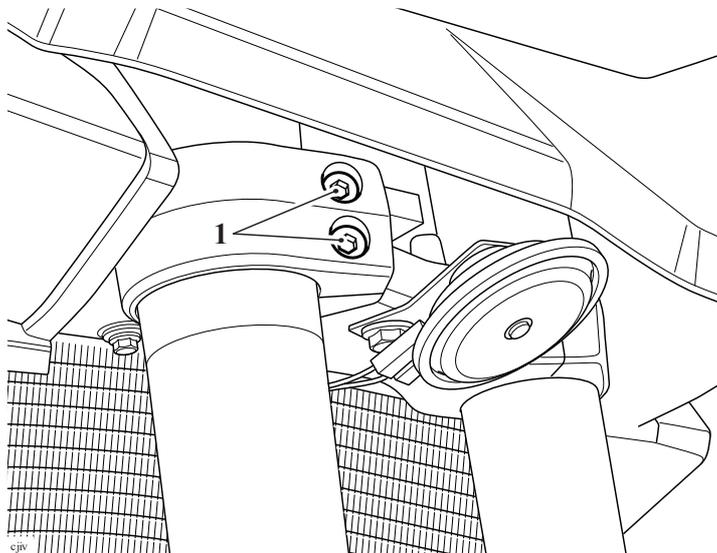
- **The bolt positions shown below are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**
- Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.



L0554

- 1. 10 mm bolts**
- 2. 8 mm bolts**

- As an assembly, raise the handlebars until clear of the top yoke. Rest the assembly such that access to the fork top caps is unrestricted. Ensure the clutch and front brake master cylinders remain in an upright position.
 - Using T3880643 - Fork Top Cap Socket, loosen the fork top cap a little to aid disassembly.
 - Temporarily refit the handlebars and secure with the clamps. Tighten the M10 fixings first to **35 Nm**, then the M8 fixings to **26 Nm**.
 - If the damping cylinder is to be removed, loosen the lower damping cylinder bolt a little to aid disassembly.
11. Loosen the lower yoke clamp bolts.



1. Lower yoke clamp bolts

CAUTION

Care must be taken when removing the forks, to ensure that the outer surfaces do not become scratched.

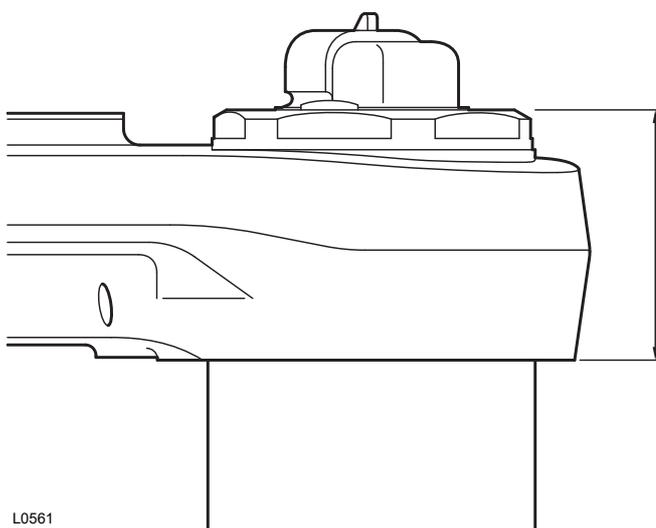
12. Using a downward, twisting action, withdraw the forks from between the yokes.

Front Fork - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

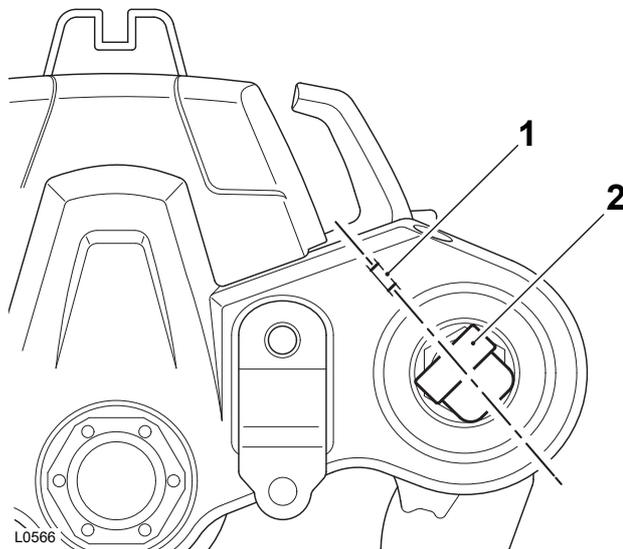
1. Position the forks within the yokes so that the upper surface of the fork top cap is 42.5 mm above the flat/machined surface on the underside of the upper yoke.



L0561

Fork Pull Through Measurement

2. Ensure that the TSAS damping motor connectors are aligned with the clamp slip line in the upper yoke.



1. **Clamp split line (right hand side shown)**
2. **Connector**

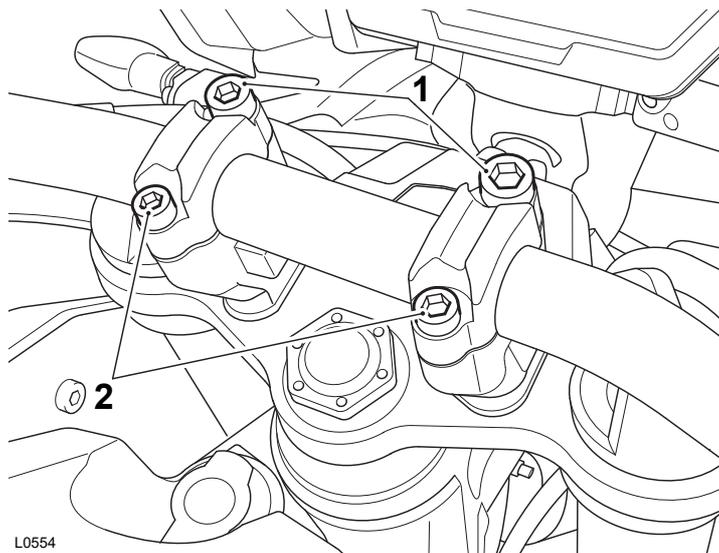
3. Tighten the lower yoke clamp bolts to **25 Nm**.

4. If the forks have been dismantled, carry out the following:

- o Note the orientation of the adjustable handlebar risers, in order that they can be returned to the same position when the repair operation is complete.

Note

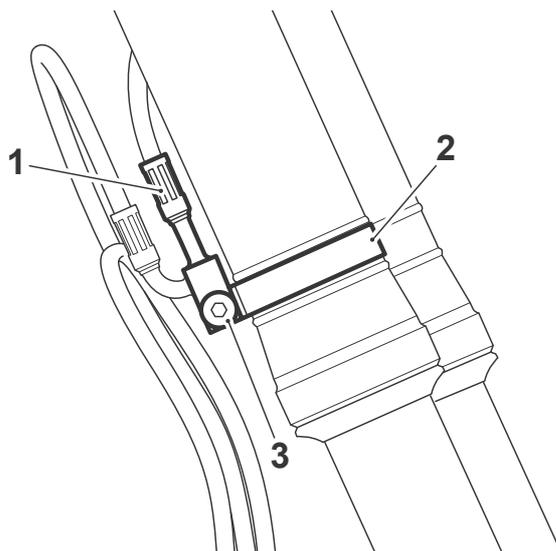
- **The bolt positions shown below are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**
- o Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.



1. **10 mm bolts**
2. **8 mm bolts**

- o As an assembly, raise the handlebars until clear of the top yoke. Rest the assembly forward of the steering stem such that access to the fork top caps is unrestricted. Ensure the clutch and front brake master cylinders remain in an upright position.
- o Using T3880643 - Fork Top Cap Socket, tighten the fork top cap to **40 Nm**.
- o If necessary, loosen the lower yoke clamp bolts and realign the TSAS damping motor connection with the clamp split line in the upper yoke.
- o Ensure the upper surface of the fork top cap remains 42.5 mm above the flat/machined surface on the underside of the upper yoke.

- Retighten the lower yoke clamp bolts to **25 Nm**.
 - Refit the handlebars and secure with the clamps. Tighten the M10 fixings first to **35 Nm**, then the M8 fixings to **26 Nm**.
 - If removed, tighten the lower damping cylinder bolt to **22 Nm**.
5. Tighten the upper yoke clamp bolts to **25 Nm**.
 6. Reconnect the TSAS damping motor connector.
 7. Refit the TSAS damping motor connector cover.
 8. Refit the front mudguard (see Front Mudguard - Installation).
 9. Position the brake hose to the clip on the right hand fork leg as noted for removal. Secure with a new fixing and tighten to **3 Nm**.



chnj

1. **Brake hose**
2. **Brake hose clip**
3. **Fixing**

10. Install the front wheel (see Front Wheel - Installation).
11. Refit the front brake calipers (see Front Brake Caliper - Installation).

Note

- **Check the condition of the shim before use. Do not use a shim which is bent or damaged.**
12. Position the wheel speed sensor to the left hand fork leg with its shim between the sensor and fork leg. Temporarily fit the original fixing and tighten to **9 Nm**.
 13. Check and adjust the wheel speed sensor air gap as described in Air Gap Measurement (see Front Wheel Speed Sensor Air Gap Measurement).
 14. Secure the harness for the front wheel speed sensor to its clips on the front brake hose.
 15. Lower the motorcycle to the ground and park it on the side stand.

Perform the following operations:

- Battery - Installation
- Rider's Seat - Installation

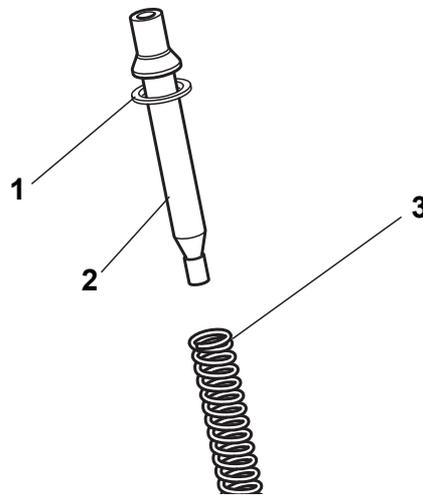
Fork Oil Change - Oil Draining



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the fork (see Front Fork - Removal).
2. Remove the top cap assembly from the fork outer tube (see Front Fork - Disassembly).
3. Holding the inner and outer tubes together, invert the fork and pour out the fork oil into a suitable container.

4. Remove the top cap assembly from the damping rod and remove the spring guide, upper spring preload spacer(s) and spring (see Front Fork - Disassembly).



abmh_2

1. Upper preload spacer(s)
2. Spring guide
3. Spring

Note

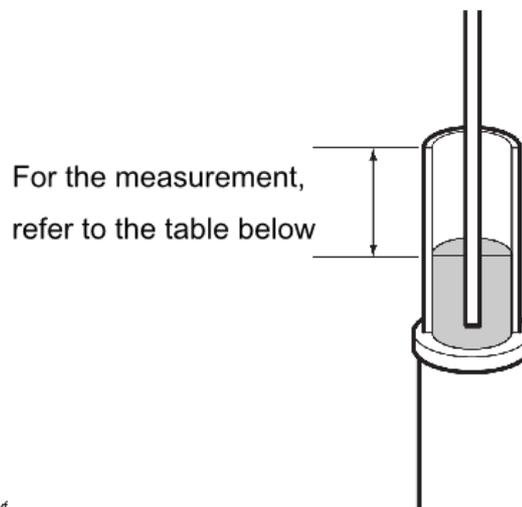
- Ensure that the lower spring seat and lower spring preload spacer(s) (if fitted) are left in position on the damper assembly.
5. Holding the inner and outer tubes together, invert the fork and pour out any remaining fork oil into a suitable container. Pump the damper rod to remove all the oil.

Fork Oil Change - Oil Refilling

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

The oil level is measured from the upper surface of the fork outer tube, with the fork fully compressed and with the spring guide, upper spring preload spacer(s) and spring removed.



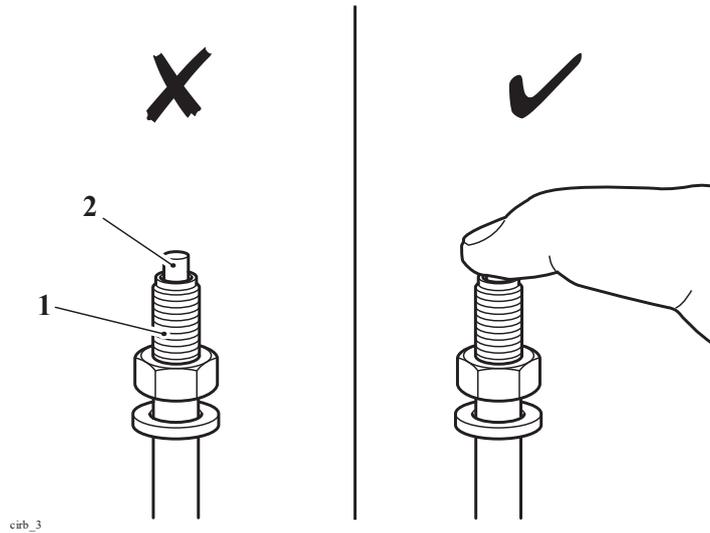
cbyf

Fork Oil Level (fork fully compressed with spring guide, upper spring preload spacer(s) and spring removed)

1. Fill the fork with the grade of oil specified in the fork oil table, to a level above that which will finally be required.

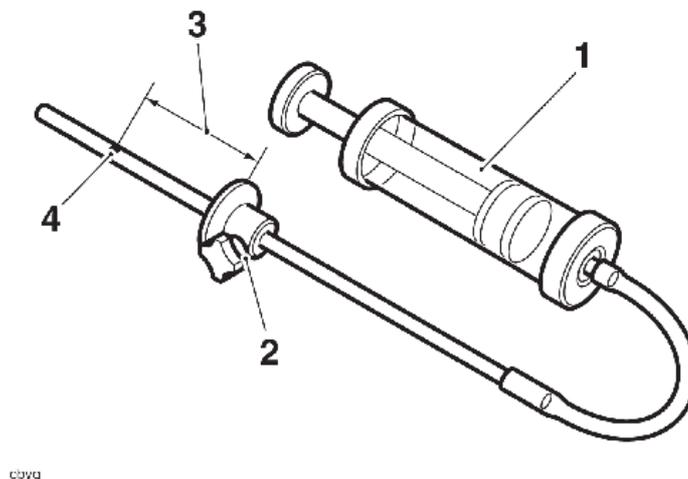
Note

- There are holes near the top of the fork inner tube to allow any oil between the fork inner and outer tubes to go into the inner tube.
- While pumping the fork assembly to expel any trapped air, keep the inner damper rod pressed down into the main damper rod assembly using one finger.



1. Main damper rod assembly
2. Inner damper rod

2. Pump the fork and damper assembly several times to expel any trapped air then fully compress the fork and support it in an upright position. Leave the fork for a few minutes to allow the oil to stabilise.
3. Raise the outer tube to the top of the inner tube and hold there for a couple of seconds then fully lower the outer tube.
4. Set the scale on T3880160 - Fork Oil Filler/Evacuator to 105 mm, as shown below.



1. T3880160 - Fork Oil Filler/Evacuator
2. Adjustment plate
3. Scale area
4. Hole (zero position)

Note

- **Zero level on the tool is set at the small exit hole in the side of the scale tube, NOT AT THE END TIP. Do not attempt to block this side hole as this will cause the final fluid level to be incorrect.**
5. Insert the scale end of the tool into the fork inner tube.
 6. Hold the tool adjuster plate level with the upper surface of the fork outer tube and draw fluid into the syringe until fluid flow ceases (empty the syringe if the body becomes full before fluid flow stops).
 7. The fluid level in the fork is now set to the height set on the tool scale. Check the tool scale setting and repeat the process if incorrectly set.

WARNING

Incorrect fork oil levels could result in an unsafe riding condition leading to loss of control and an accident.

8. Assemble the fork (see Front Fork - Assembly).
9. Refit the fork (see Front Fork - Installation).

Fork Oil Level Chart

Oil Level*	Oil Volume	Oil Grade
105 mm	700 cc	WP 4860-1166 SAE4

*Fork fully compressed with spring guide, upper spring preload spacer(s) and spring removed.

Front Fork - Disassembly

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

If the damping cylinder is to be removed, we recommend that one fork is disassembled and assembled prior to starting work on the other. The damping cylinder in the left hand fork is for compression damping while the damping cylinder in the right hand fork is for rebound damping. Should these damping components get fitted to the wrong fork, the front suspension will not function correctly and may lead to loss of motorcycle control and an accident.

- Turn the ignition on and note the instrument TSAS mode and damping setting so that the system can be restored to its original setting upon re-assembly.
- Set the TSAS damping to its softest (comfort) setting as described in the Owner's Handbook.

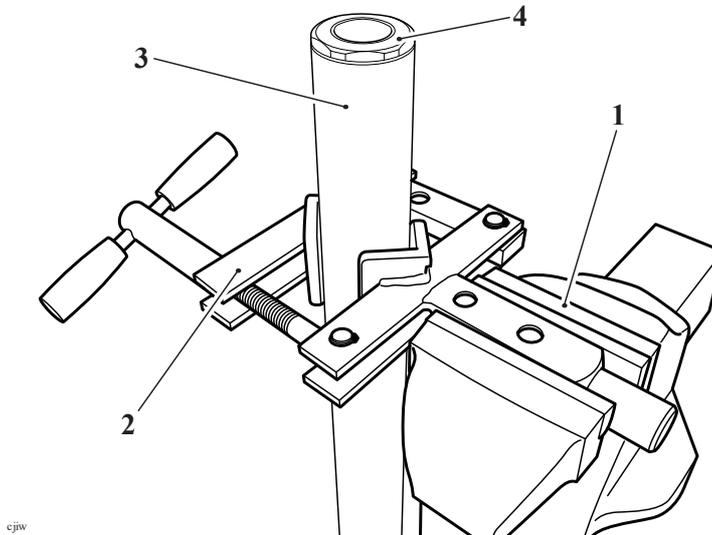
Note

- **When removing the forks, ensure the top cap is loosened as described in Front Fork - Removal.**
 - **The fork seals can be renewed without removal of the damping cylinder. Unless removal of the damping cylinder is necessary, omit step 24 of this procedure.**
 - **If the damping cylinder is to be removed, ensure the lower damping cylinder bolt is loosened as described in Front Fork - Removal.**
- Remove the front forks (see Front Fork - Removal).
 1. Using a soft jawed vice, clamp T3880171 - Fork Holding Tool such that the fork can be mounted vertically.
 2. With the top cap facing upwards, very gently clamp the fork outer tube into T3880171 - Fork Holding Tool.

Note

- **The top cap is not under spring tension and will not spring upwards when the threads disengage.**

3. Unscrew the top cap from the outer tube.



1. **Soft jawed vice**
2. **T3880171 - Fork Holding Tool**
3. **Fork**
4. **Top cap**

4. Remove the fork from the fork holding tool.
5. Holding the inner and outer tubes together, invert the fork and pour out the fork oil into a suitable container.
6. Return the fork to the fork holding tool.
7. Counter hold the top cap to prevent it from turning and loosen the top cap lock nut.
8. Remove the top cap.
9. Fit a suitable ring spanner over the spring guide and seat it onto the taper section of the spring guide.

! WARNING

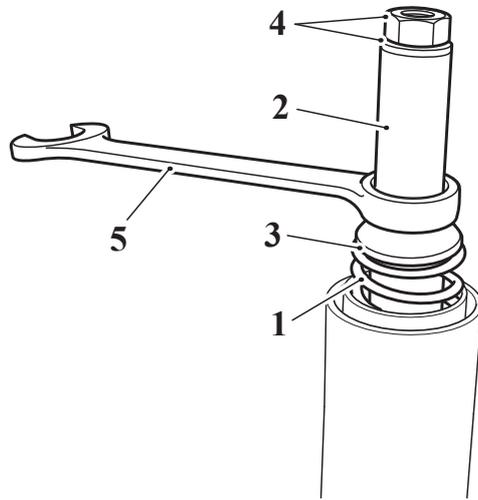
While compressing the fork spring always wear protective equipment for the face and eyes and never look directly down on the fork. If the spring compressor should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

10. While supporting the fork inner tube, press down on the spanner to compress the spring and remove the nut and washer.
11. Remove the spanner used to compress the spring.

Note

- **Between the spring and the spring guide there could be one or more spacers fitted.**

12. Remove the spring guide, collecting the spring preload spacer(s) as you do so.

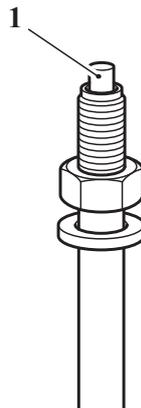


1. Spring
2. Spring guide
3. Spring preload spacer(s)
4. Nut and washer
5. Spanner

13. Remove the spring.
14. Remove the fork from the fork holding tool.

Note

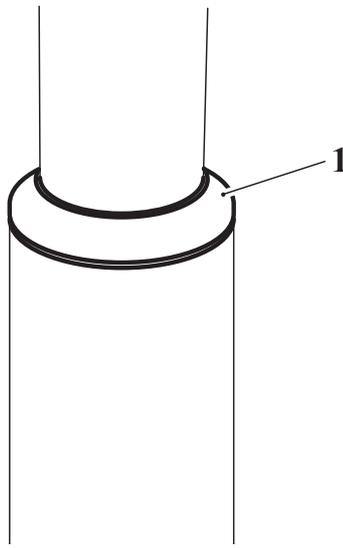
- Ensure that the inner damping rod is retained in position when inverting the fork assembly.



cirb_4

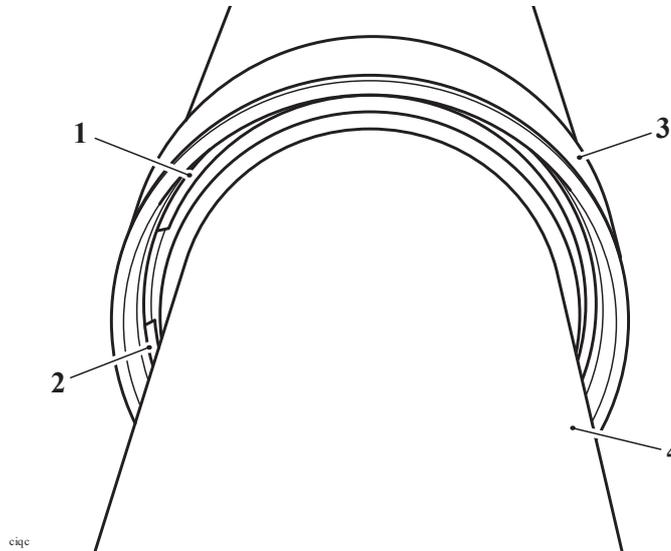
1. Inner damping rod

15. Holding the inner and outer tubes together, invert the fork and pour out any remaining fork oil into a suitable container. Pump the damper rod to remove all the oil.
16. Ensuring that the inner damping rod is retained, invert the fork and return it to the fork holding tool.
17. Raise the inner tube and remove the dust seal from the outer tube.



1. Dust seal

18. Remove and discard the circlip.



- 1. Circlip**
- 2. Cut out**
- 3. Fork outer tube**
- 4. Fork inner tube**

19. Remove the fork from the fork holding tool.

! WARNING

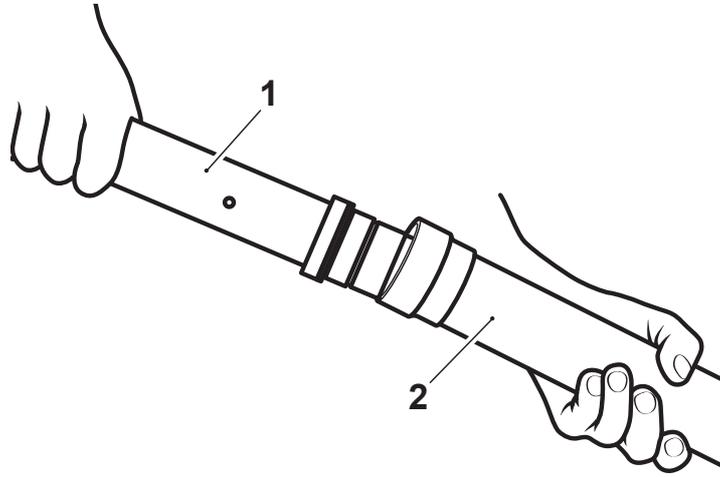
The air from a heat gun, and the heat gun itself, are very hot. Wear suitable protective clothing and gloves and do not point the heat gun at any part of your body as serious burns to the skin may result.

20. Using a suitable heat gun, heat the outer tube in the area of the lower bush and oil seal, to 50°C (122°F). Use a suitable heat sensitive marker or thermometer to accurately measure the temperature.

! WARNING

The fork outer tube will be hot to the touch. Avoid contact with the hot outer tube by wearing suitable protective clothing and gloves. Contact with hot components may cause the skin to be burned.

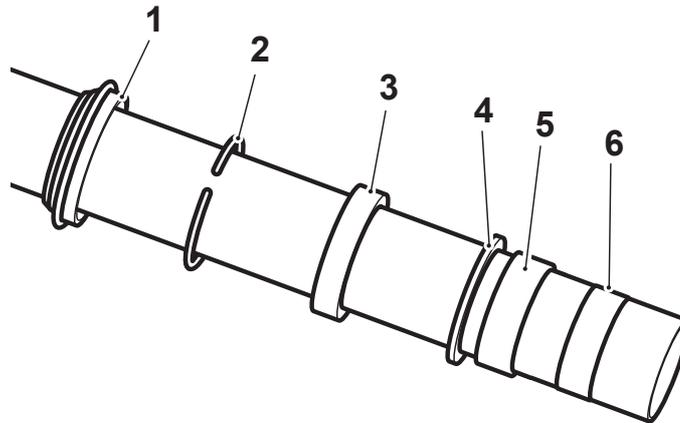
21. Using a slide hammer action to release the oil seal and lower bush from the outer tube, separate the fork inner and outer tubes leaving the seals and bushes in place on the fork inner tube. Note the relative positions and orientation of all bushes and seals before removal.



ccuw

1. Inner tube
2. Outer tube

22. To allow the removal of the seals and bushes, carefully remove the upper bush from the inner tube.
23. Discard the circlip, seal, washer and dust cap. Once removed, these components must not be reused.



ccup_2

1. Dust seal
2. Circlip
3. Seal
4. Washer
5. Upper bush
6. Lower bush

24. If removal of the damping cylinder is required, remove the damper bolt from the bottom of the fork. Discard the washer from the damper bolt. Remove the damping cylinder from the fork inner tube.
25. Clean the inner and outer tubes using Castrol Metal Parts Cleaner.



WARNING

Always wear eye, hand and face protection when using compressed air. Eye face and skin damage will result from direct contact with compressed air.

26. Using compressed air, remove the Castrol Metal Parts Cleaner from the inner and outer tubes.

Front Fork - Inspection

1. Inspect the inner tube for stone chips, scoring, scratches, excessive wear and any other damage. Renew as necessary.

Note

- **Small inclusions in the inner tube may be removed using a fine grade stone or similar.**
2. Inspect the spring for damage, cracks and deformation. Renew the spring if necessary.
3. Inspect the bushes for damage. Renew if necessary.
4. Always renew the oil seal, washer, circlip and dust cap every time the fork is dismantled. Once removed, these components must not be reused.
5. If the damping cylinder has been removed, always renew the damper bolt washer upon reassembly.

Front Fork - Assembly

WARNING

The front forks comprise many precision machined parts. Total cleanliness must be observed at all times and assembly must take place in a dirt/dust-free environment.

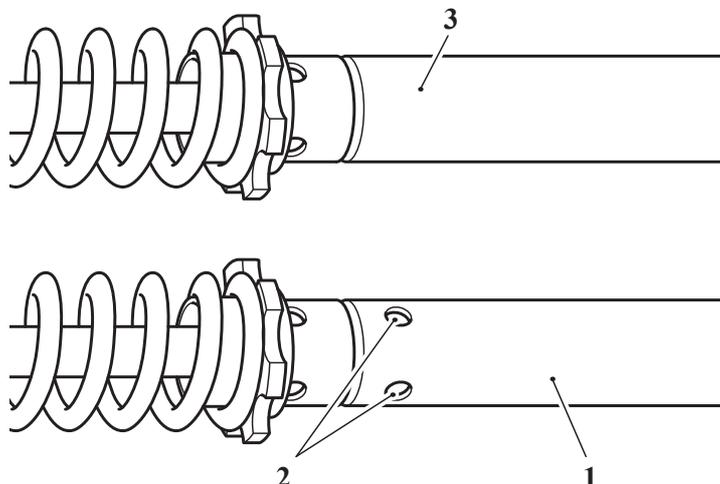
Dirt ingress may cause damage to the fork parts, leading to incorrect operation, instability, loss of motorcycle control or an accident.

WARNING

The damping cylinder in the left hand fork is for compression damping while the damping cylinder in the right hand fork is for rebound damping. Should these damping components get fitted to the wrong fork, the front suspension will not function correctly and may lead to loss of motorcycle control and an accident.

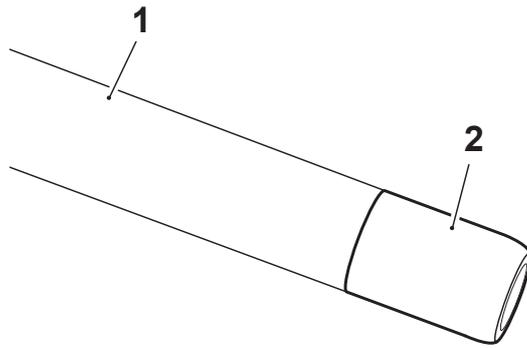
Note

- **If removed, ensure the correct damper is fitted to its correct front fork assembly.**
- **The compression damper tube has four holes in its casing.**
- **The rebound damper tube does not have the additional holes.**
- **If the damping cylinder has not been removed, omit steps 1 and 2.**



1. **Compression damper - left hand fork**
2. **Holes (compression damper only)**
3. **Rebound damper - right hand fork**

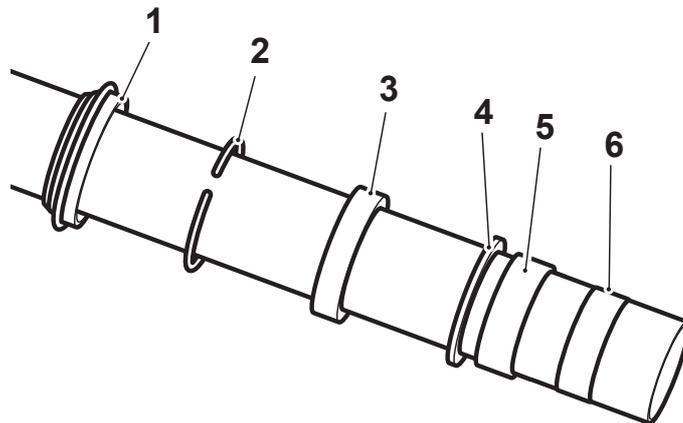
1. Fit the damping cylinder to the inner tube.
2. Fit a new damping cylinder bolt and a new sealing washer. Tighten the damping cylinder bolt to **22 Nm**.
3. Invert the fork outer tube and very gently clamp it into T3880171 - Fork Holding Tool.
4. Install T3880662 - Fork Seal Guide to the fork inner tube. Ensure the tool is not damaged and that it covers the bush groove fully.



ccup_4

1. **Fork inner tube**
2. **T3880662 - Fork Seal Guide**

5. Apply a smear of fork oil to the upper and lower bushes and the new fork seal and dust cover.
6. Slide the dust seal, circlip and seal over T3880662 - Fork Seal Guide and position to the inner tube as noted prior to removal. Ensure the seal (item 3) is positioned with the text end facing the circlip. Use a new circlip.
7. Remove the service tool and install the washer, lower bush and upper bush.



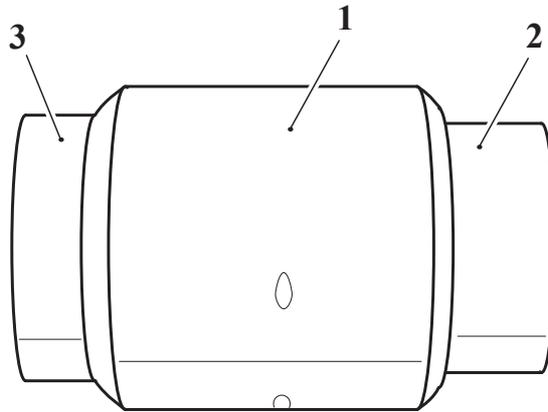
ccup_2

1. **Dust seal**
2. **Circlip**
3. **Seal**
4. **Washer**
5. **Lower bush**

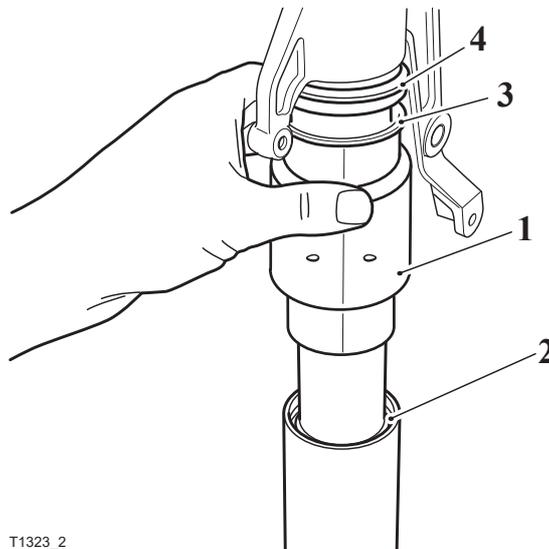
6. Upper bush

8. Position the fork inner tube assembly to the fork outer tube.

9. Using the long (small diameter) end of T3880661 - Fork Seal Installer, drive the lower bush into the fork outer tube.



1. T3880661 - Fork Seal Installer
2. Long (small diameter) end
3. Short (large diameter) end

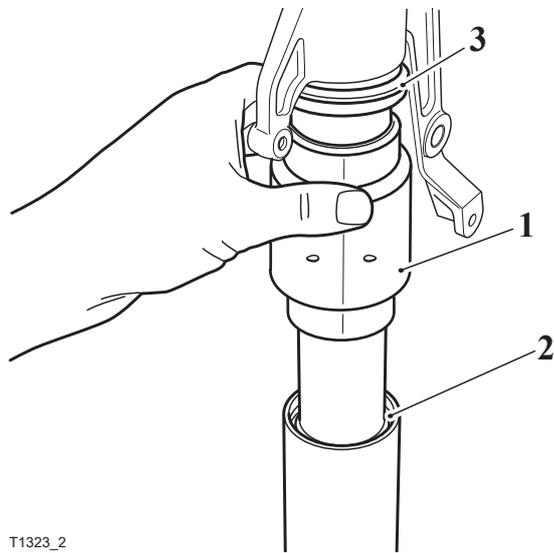


T1323_2

1. T3880661 - Fork Seal Installer
2. Bush
3. Circlip
4. Seal and dust seal

10. Reposition the washer into the fork outer tube.

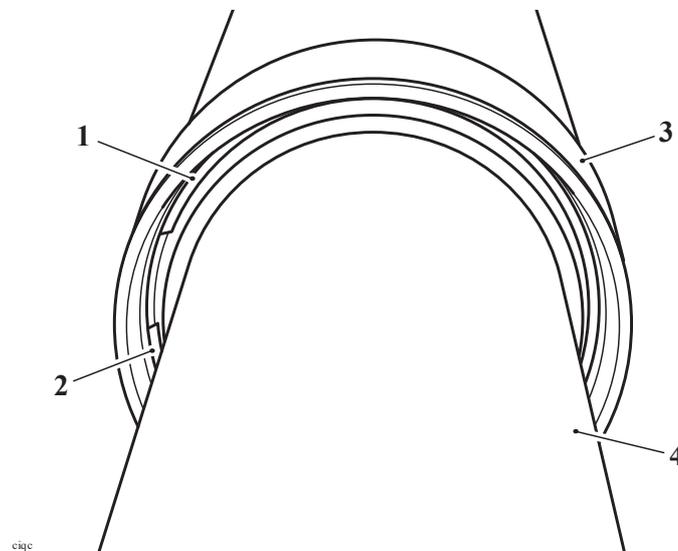
11. Remove T3880661 - Fork Seal Installer and reverse it, so the short (large diameter) end is in contact with the seal and drive the seal in to place.



T1323_2

1. **T3880661 - Fork Seal Installer**
2. **Seal**
3. **Dust seal**

12. Remove T3880661 - Fork Seal Installer.
13. Retain the bush, washer and seal with a new circlip.



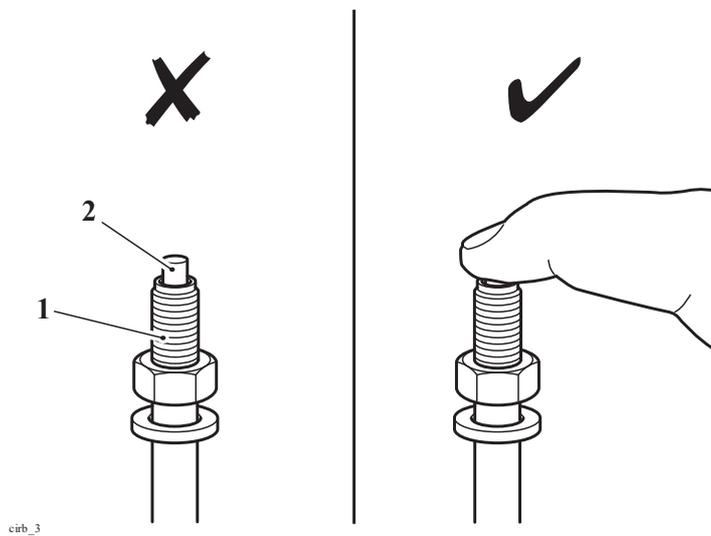
1. **Circlip**
2. **Cut out**
3. **Fork outer tube**
4. **Fork inner tube**

14. Position the dust seal to the fork outer tube.
15. Using hand pressure only, push the dust seal squarely into the fork outer tube.
16. Fill the fork with oil (see Fork Oil Change - Oil Refilling).

! WARNING

While performing steps 17 to 25, If for any reason the main damper rod assembly needs to be moved up or down inside the fork assembly, keep the inner damping rod pressed down into the main damper rod assembly using one finger. Failure to do so may allow oil to flow into the main damper rod assembly, resulting in an incorrect fork oil level.

Incorrect fork oil levels could result in an unsafe riding condition leading to loss of motorcycle control and an accident.

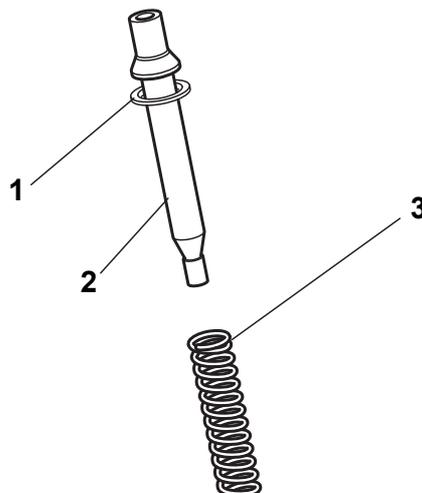


1. Main damper rod assembly
2. Inner damper rod

Note

- A new spring may be supplied with or without spacer(s) to maintain the correct spring length.
- New springs must be fitted only with any spacers supplied with it.
- Spacers removed with an original spring must not be used with a replacement spring.

17. Refit the fork spring, ensuring the spring seats correctly on the damping cylinder.
18. Ensure the spacer(s), if required, is/are in position on the spring guide.



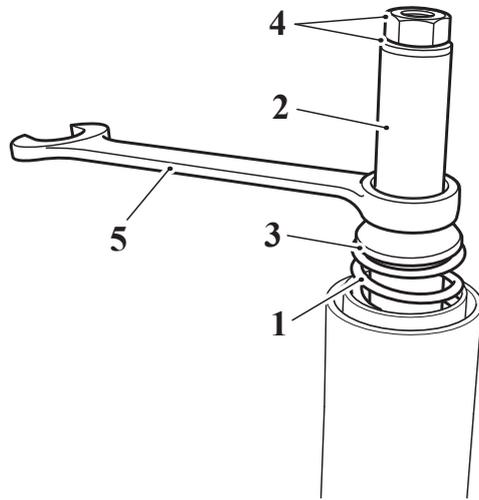
1. Spacer
2. Spring guide
3. Spring

19. Refit the spring guide.
20. Fit a suitable ring spanner over the spring guide and seat it onto the taper section of the spring guide.

! WARNING

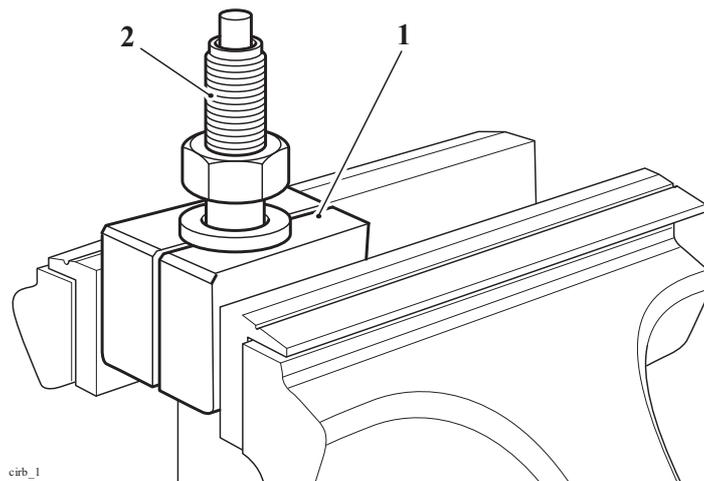
While compressing the fork spring always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

21. Compress the spring using the spanner and fit the washer and nut. While continuing to compress the spring, thread the nut fully on to the damper rod.



1. Spring
2. Spring guide
3. Spacer(s)
4. Nut and washer
5. Spanner

22. Remove the spanner used to compress the spring.
23. Fit a new O-ring to the top cap.
24. Remove the fork from the fork holding tool.
25. With the aid of an assistant, compress the spring and fit T3880317 - Damper Tube Clamp to the damper rod, then secure in a soft jawed vice.



1. T3880317 - Damper Tube Clamp
2. Damper rod

26. Fit the top cap to the damper rod and tighten to **2.5 Nm**.
27. Hold the top cap while tightening the damper rod lock nut to **25 Nm**.
28. With the aid of an assistant, remove T3880317 - Damper Tube Clamp and the front fork from the vice, compress the spring and remove T3880317 - Damper Tube Clamp.
29. Lubricate the O-ring on the top cap with a smear of fork oil then screw the top cap fully into the fork outer tube.

Note

- It is much easier to tighten the top cap when the fork has been refitted.
- When refitting the fork, tighten the top cap as described in Front Fork - Installation.

30. Refit the front fork (see Front Fork - Installation).

- Turn the ignition on and allow the Triumph Semi Active Suspension (TSAS) system to calibrate.

WARNING

Always return the TSAS system to its original settings as noted prior to disassembly. Riding the motorcycle with unfamiliar suspension settings may cause unexpected handling characteristics leading to loss of motorcycle control and an accident.

- Ensure that the instrument TSAS mode and damping settings are returned to the settings noted prior to disassembly.
- Turn the ignition off.

Upper Yoke - Removal

WARNING

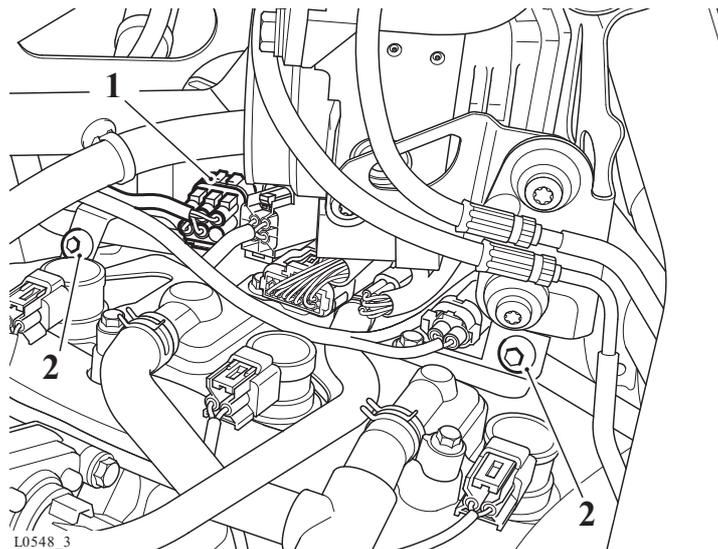
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Handlebars - Removal
- Front Fork - Removal

Note

- **The connector bracket fixings may be removed to allow movement of the bracket for improved access.**
1. Detach the electronic steering lock connector from the bracket and disconnect from the main harness.



1. **Electronic steering lock connector**
2. **Bracket fixings**

Note

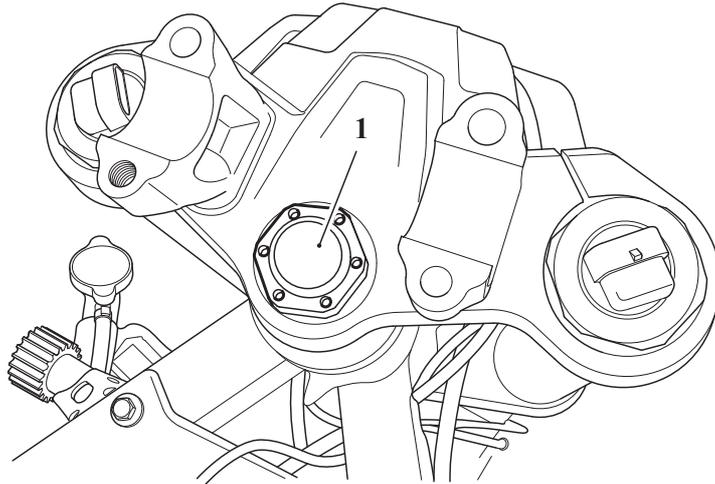
- **Note the routing of the electronic steering lock harness for installation.**
 - **Note the position and routing of the harnesses and hoses through the upper yoke harness guides.**
2. Route the electronic steering lock harness out of the frame to the electronic steering lock.
 3. Detach all harnesses and hoses from the upper yoke harness guides.

4. Detach the clutch hose from the wire guide at the front of the upper yoke.
5. Detach the handle bar switches subharness from the clip on the underside of the electronic steering lock cover.

! CAUTION

Care must be taken when removing the headstock upper nut, to ensure that the nut and upper yoke do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

6. Remove the headstock upper nut and its washer. Discard the washer.



L0559

1. Headstock upper nut

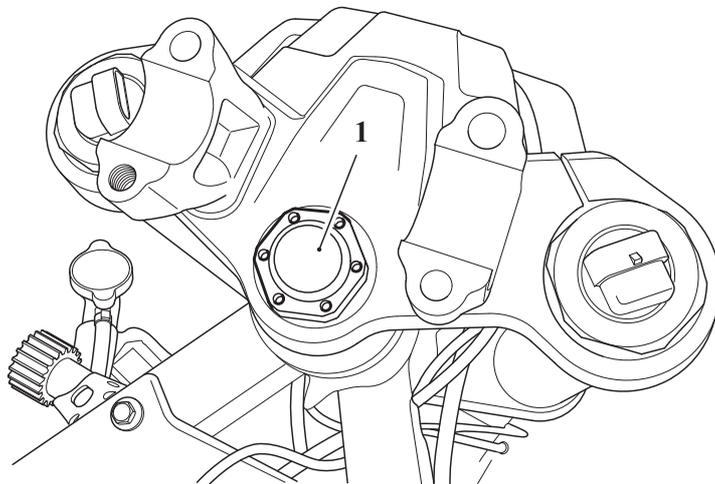
7. Remove the upper yoke.

Upper Yoke - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

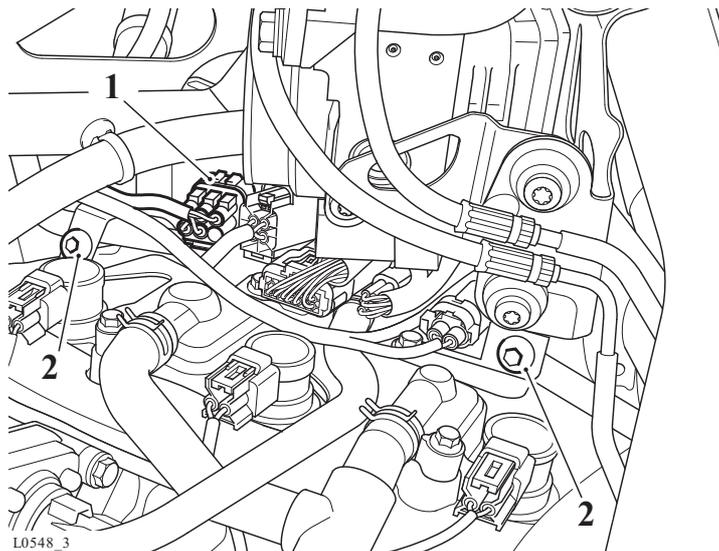
1. Position the upper yoke to the steering stem and secure with the upper headstock nut and new washer. Do not fully tighten at this stage.



L0559

1. Headstock upper nut

2. Refit the front forks (see Front Fork - Installation).
3. Tighten the headstock upper nut to **90 Nm**.
4. Position the right hand handlebar switch subharness to the clip on the underside of the electronic steering lock cover).
5. Position the clutch hose to the wire guide at the front of the upper yoke.
6. Position all harnesses and hoses to the upper yoke harness guides as noted for removal.
7. Route the electronic steering lock harness to the main harness as noted for removal.
8. Connect to the main harness then attach the connector to the bracket.
9. If removed, refit the connector bracket fixings and tighten to **3 Nm**.



1. **Electronic steering lock connector**
2. **Bracket fixings**

Perform the following operations:

- Handlebars - Installation
- Battery - Installation
- Rider's Seat - Installation

Headstock Bearing Check/Adjustment

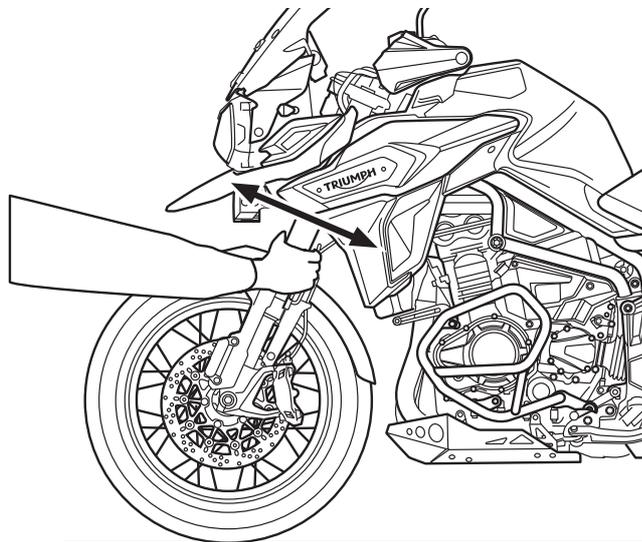
Check



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **When checking the headstock free play, hold the lower end of the fork outer tubes.**
1. Raise and support the front of the motorcycle.
 2. Hold the lower end of the outer tube of the front forks as illustrated and 'rock' with a front-to-rear motion. If free play can be detected, the headstock bearings require adjustment.



Headstock Bearing Adjustment Check

Adjustment

WARNING

Always return the handlebars and risers to their original position. Operating the motorcycle with a handlebar position that is unfamiliar may lead to loss of control or an accident.

CAUTION

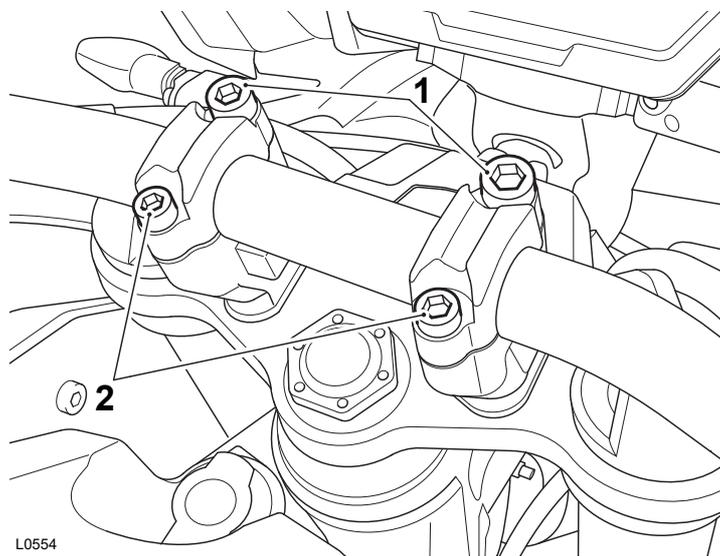
Care must be taken when detaching the handlebar and upper yoke assemblies, not to damage the instruments, cockpit area and surrounding bodywork.

Prior to detaching the handlebar and upper yoke assemblies, position a suitable cloth to protect the instruments, cockpit area and surrounding bodywork from damage.

1. Note the orientation of the adjustable risers, in order that they can be returned to the same position when the repair operation is complete.
2. Raise and support the front of the motorcycle.

Note

- **The bolt positions shown below are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**
3. Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.



L0554

1. 10 mm bolts
2. 8 mm bolts

4. As an assembly, raise the handlebars until clear of the upper yoke. Rest the assembly forward of the steering stem such that access to the headstock top nut and the adjustment nuts is unrestricted. Ensure the master cylinder remains in an upright position.
5. Loosen the upper yoke clamp bolts.

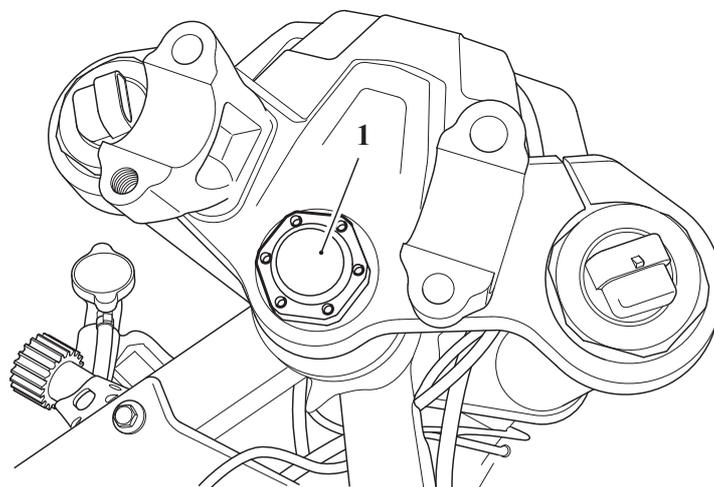
! WARNING

If the lower yoke fixings are also loosened, the forks will no longer support the weight of the motorcycle. Do not loosen the lower yoke fixings as, in this condition, the motorcycle could topple over causing damage and/or risk of injury.

! CAUTION

Care must be taken when removing the headstock top nut, to ensure that the top nut and upper yoke do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

6. Remove the headstock upper nut and its washer. Discard the washer.



L0559

1. Headstock upper nut

7. Ease the upper yoke from the forks and support while detached.

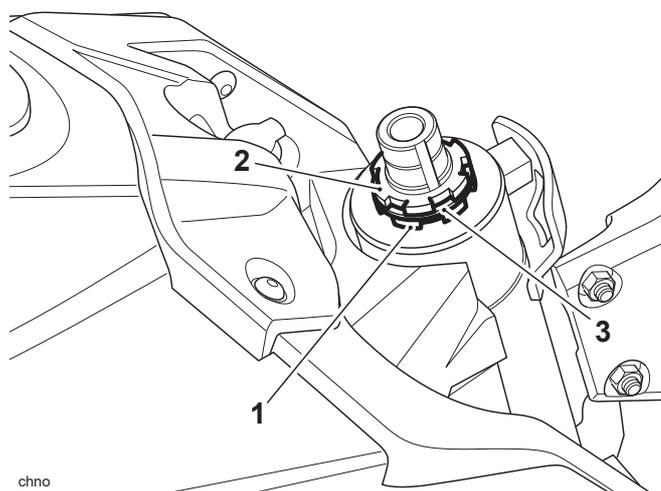
8. Adjust the bearing free play as follows, all using T3880620 - Adjuster Socket, 48 mm:

- Ensure that the threads are free from grease.
- Remove the lock nut and tab washer.
- Loosen the adjuster nut then tighten to **40 Nm**.
- Loosen the adjuster nut, then re-tighten to **10 Nm**.
- Fit the tab washer and lock nut.

! WARNING

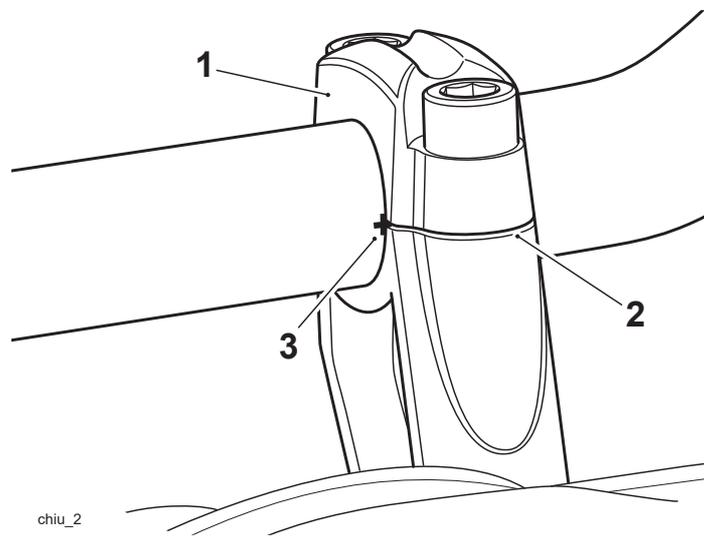
It is essential that the adjuster nut is not over-tightened. If the adjuster is over-tightened it will cause a preload on the headstock bearings. This will introduce tight steering, which could cause loss of motorcycle control and an accident.

- Hold the adjuster nut in position while tightening the lock nut to **40 Nm**.



- 1. Adjuster nut**
- 2. Lock nut**
- 3. Tab washer**

9. Refit the upper yoke assembly to the forks.
10. Fit a new washer and the original top nut. Tighten the top nut to **90 Nm**.
11. Tighten the upper yoke clamp bolts to **25 Nm**.
12. Ensure that the risers are in the same orientation as noted for removal.
13. Locate the handlebar assembly in the risers. Fit the upper clamps and the 10 mm bolts.
14. Rotate the handlebar so that the alignment marking on the handlebar aligns with the front left hand split line of the clamp riser.



1. **Upper clamp**
2. **Clamp split line**
3. **Alignment marking**

15. Tighten the 10 mm bolts to **35 Nm**.
16. Fit the 8 mm bolts and tighten to **26 Nm**.
17. Recheck the bearing adjustment.

Lower Yoke and Headstock Bearing - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Front Fork - Removal

! CAUTION

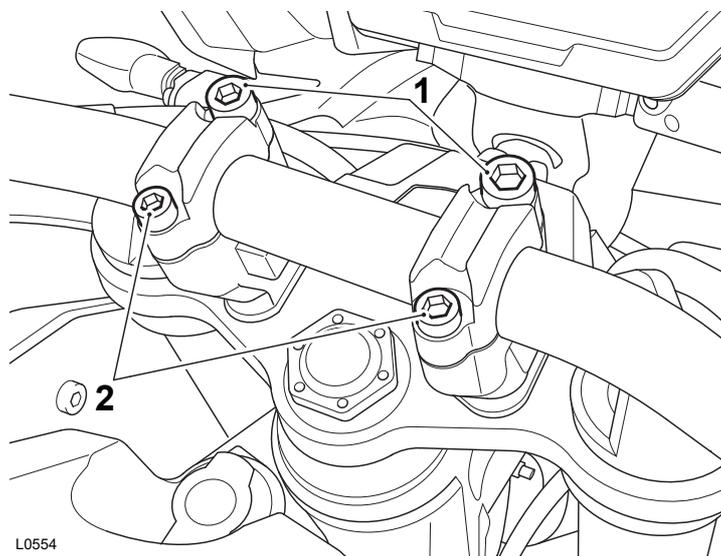
Care must be taken when detaching the handlebar and upper yoke assemblies, not to damage the instruments, cockpit area and surrounding bodywork.

Prior to detaching the handlebar and upper yoke assemblies, position a suitable cloth to protect the instruments, cockpit area and surrounding bodywork from damage.

1. Note the orientation of the adjustable risers, in order that they can be returned to the same position when the repair operation is complete.

Note

- **The bolt positions shown below are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**
2. Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.



L0554

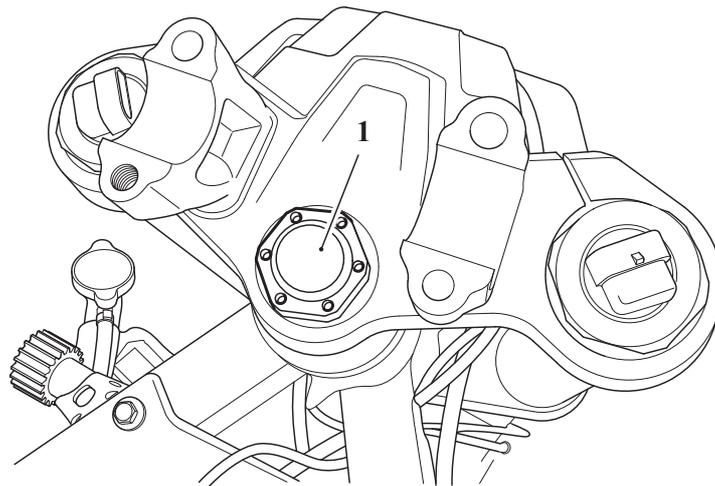
1. 10 mm bolts
2. 8 mm bolts

3. As an assembly, raise the handlebars until clear of the upper yoke. Rest the assembly forward of the steering stem such that access to the headstock top nut and the adjustment nuts is unrestricted. Ensure the master cylinder remains in an upright position.
4. Loosen the upper yoke clamp bolts.

! CAUTION

Care must be taken when removing the headstock top nut, to ensure that the top nut and upper yoke do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

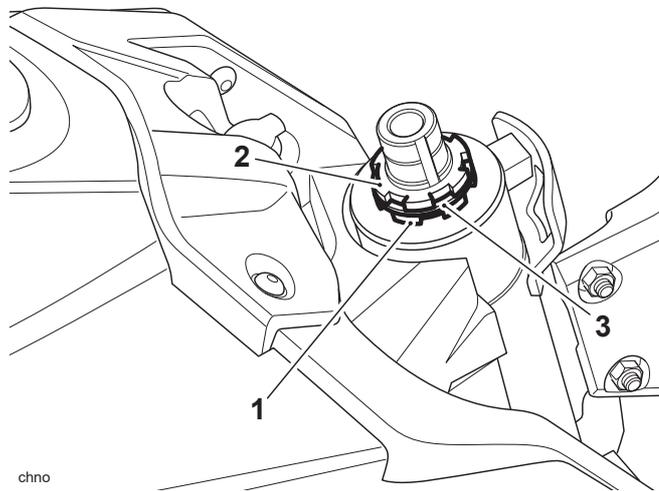
5. Remove the headstock upper nut.



L0559

1. Headstock upper nut

6. Remove the upper yoke and support while detached.
7. Using T3880620 - Adjuster Socket, 48 mm remove the lock nut and tab washer. Discard the tab washer.



- 1. Adjuster nut
- 2. Lock nut
- 3. Tab washer

- 8. Using the same tool, remove the adjuster nut.
- 9. Remove the bearing cover and dust seal.
- 10. Remove the lower yoke from below the frame headstock.

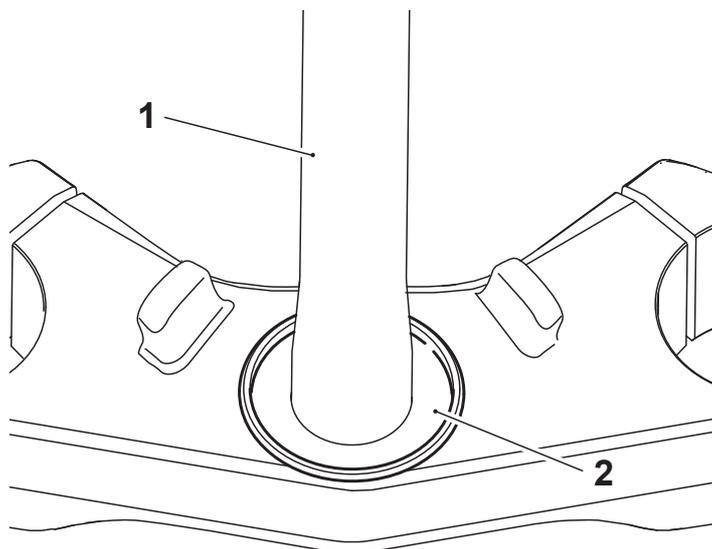
! WARNING

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

- 11. Using a suitable drift, evenly and progressively drive the bearing races from the frame headstock.
- 12. Remove the inner race and dust seal from the lower yoke using a press or puller.

Lower Yoke and Headstock Bearing - Installation

- 1. Fit a new dust seal to the steering stem on the lower yoke.

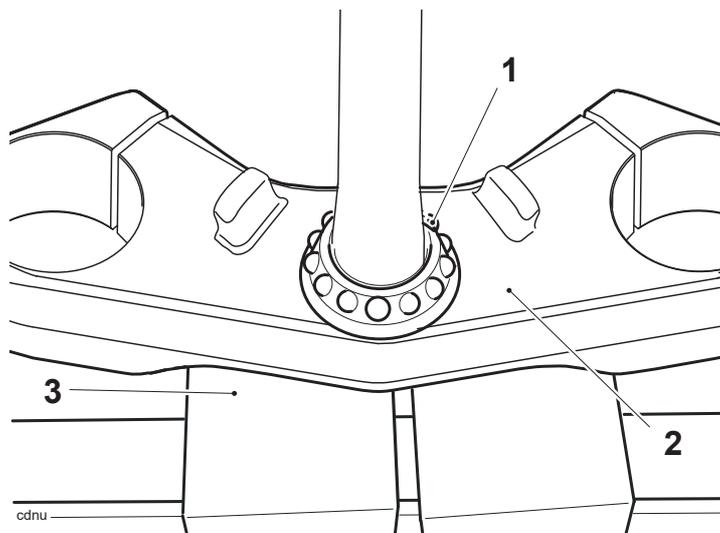


- 1. Steering stem
- 2. Dust seal

CAUTION

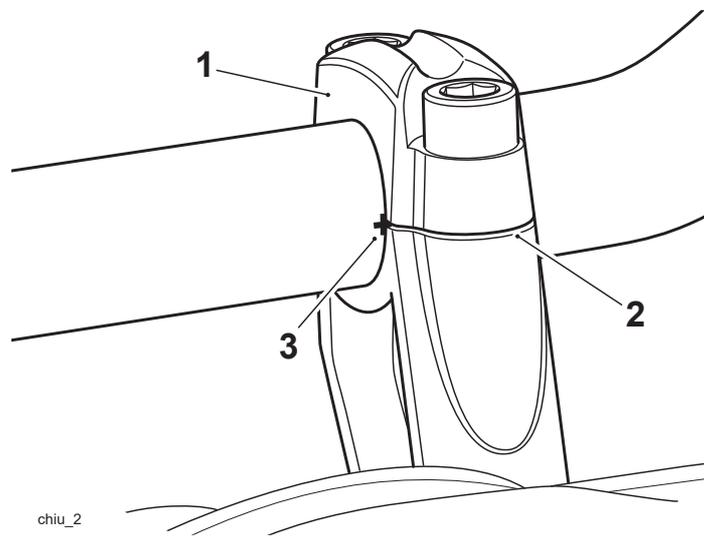
Protect the threads of the lower yoke when using a press or puller as damaged threads may mean replacing the yoke completely.

2. Press a new lower bearing inner race onto the steering stem of the lower yoke.



1. Bearing
2. Lower yoke
3. Press bed

3. Evenly and progressively drive a new complete upper bearing into the frame headstock.
4. Lubricate the lower bearing using multipurpose grease.
5. Drive a new lower outer bearing into the frame headstock.
6. Lubricate the upper bearing using multipurpose grease.
7. Insert the lower yoke to the frame, fit the upper bearing and race.
8. Fit a new upper dust seal and bearing cover, and retain with the adjuster nut.
9. Adjust the headstock bearings (see Headstock Bearing Check/Adjustment).
10. Locate the upper yoke to the steering stem. Install but do not fully tighten the headstock top nut at this stage.
11. Fit the forks (see Front Fork - Installation).
12. Tighten the headstock upper nut to **90 Nm**.
13. Check that no free play exists in the headstock bearings. Adjust as necessary (see Headstock Bearing Check/Adjustment).
14. Ensure that the risers are in the same orientation as noted for removal.
15. Locate the handlebar assembly in the risers. Fit the upper clamps and the 10 mm bolts.
16. Rotate the handlebar so that the alignment marking on the handlebar aligns with the front left hand split line of the clamp riser.



chiu_2

1. Upper clamp
2. Clamp split line
3. Alignment marking

17. Tighten the 10 mm bolts to **35 Nm**.
18. Fit the 8 mm bolts and tighten to **26 Nm**.
19. Recheck the bearing adjustment.

Handlebars - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Handguards - Removal
 - Twist Grip - Removal
 - Twist Grip Position Sensor - Removal
 - Left Hand Heated Grip and Switch - Removal
 - Left Hand Switch Housing - Removal
 - Right Hand Switch Housing - Removal
1. Note the routing of the heated grips subharness, then carefully remove the subharness from the handlebar and lay aside.

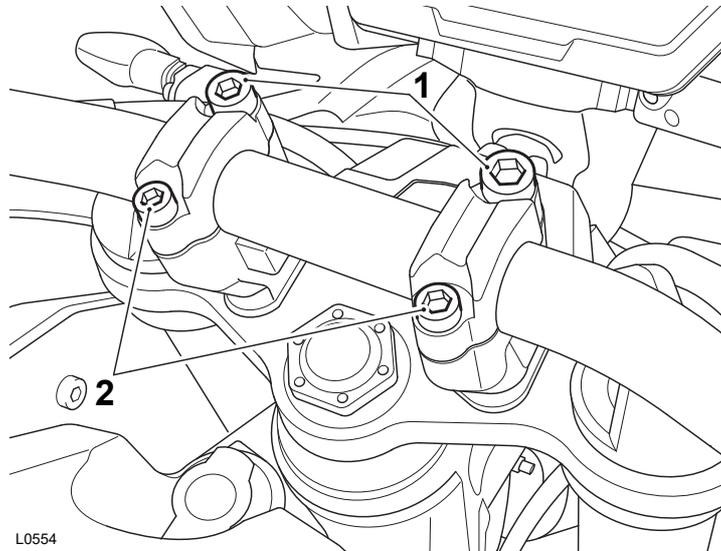
WARNING

Always return the risers to their original position. Operating the motorcycle with a handlebar position that is unfamiliar may lead to loss of control or an accident.

Note

- The bolt positions shown are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.
- Note the orientation of the risers for installation, in order that they can be returned to the same position when the repair operation is complete.
- Note the position of the 8 mm and 10 mm bolts for installation.

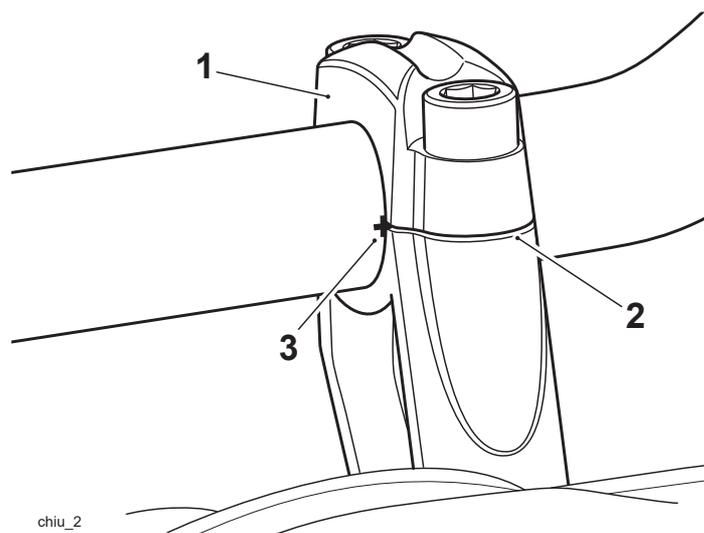
2. Supporting the handlebar, remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.
3. Remove the clamps and the handlebar.



1. 10 mm bolts
2. 8 mm bolts

Handlebars - Installation

1. Ensure that the risers are in the same orientation as noted for removal.
2. Locate the handlebar assembly into the risers. Fit the upper clamps and the 10 mm bolts.
3. Rotate the handlebar so that the alignment mark on the handlebar aligns with the front left hand split line of the clamp riser.



1. Upper clamp
2. Clamp split line
3. Alignment marking

4. Tighten the 10 mm bolts to **35 Nm**.
5. Fit the 8 mm bolts and tighten to **26 Nm**.
6. Feed the heated grips subharness into the handlebar as noted during removal.

Perform the following operations:

- Right Hand Switch Housing - Installation
- Left Hand Switch Housing - Installation

- Left Hand Heated Grip and Switch - Installation
- Twist Grip Position Sensor - Installation
- Twist Grip - Installation
- Handguards - Installation
- Battery - Installation
- Rider's Seat - Installation
- Check for correct operation of the handlebar switches. Rectify if necessary.

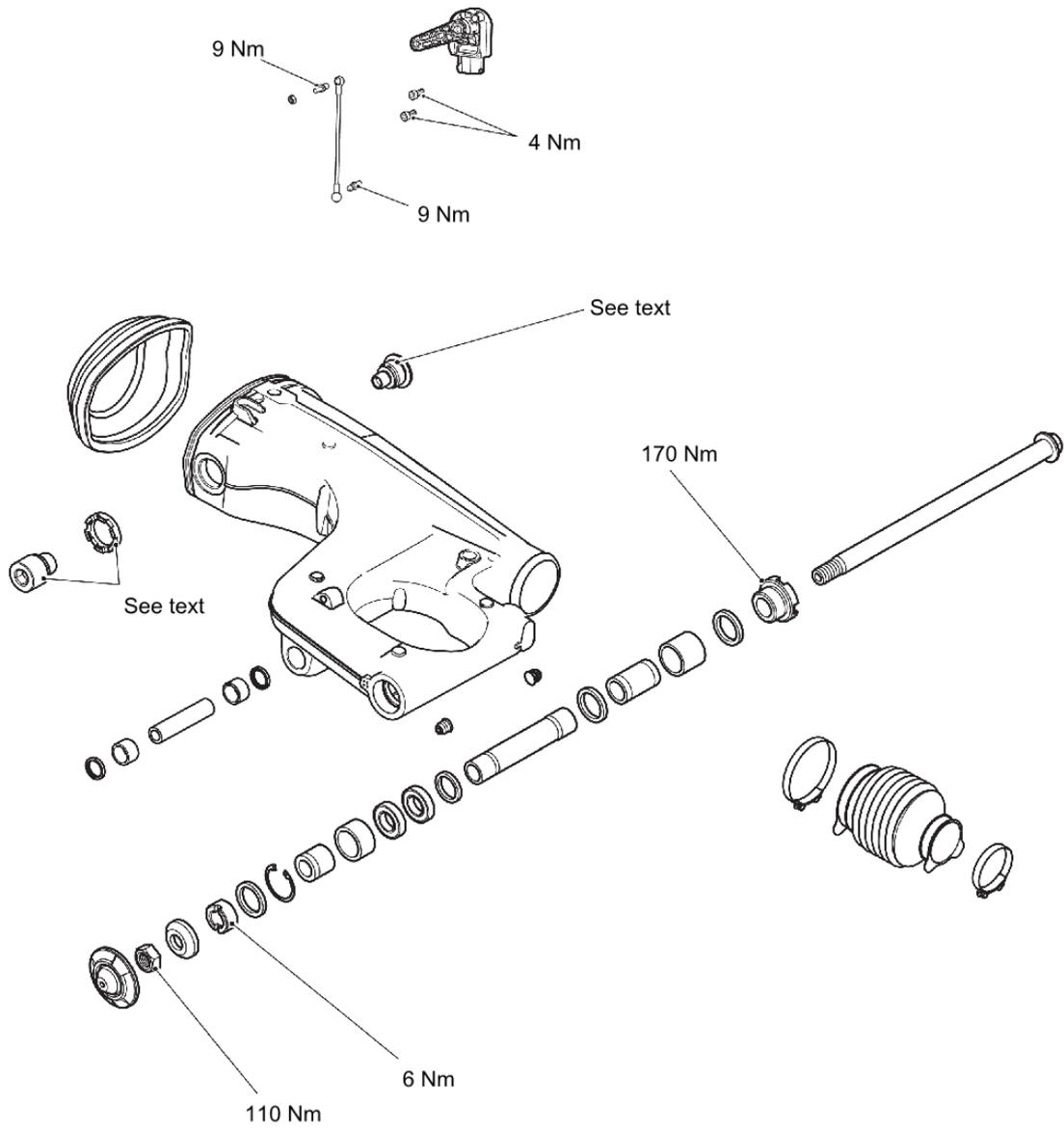
 **WARNING**

Move the handlebars to left and right full lock while checking that the brake hose, clutch hose and electrical harnesses do not bind or that the steering feels tight or difficult to turn. A hose, cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

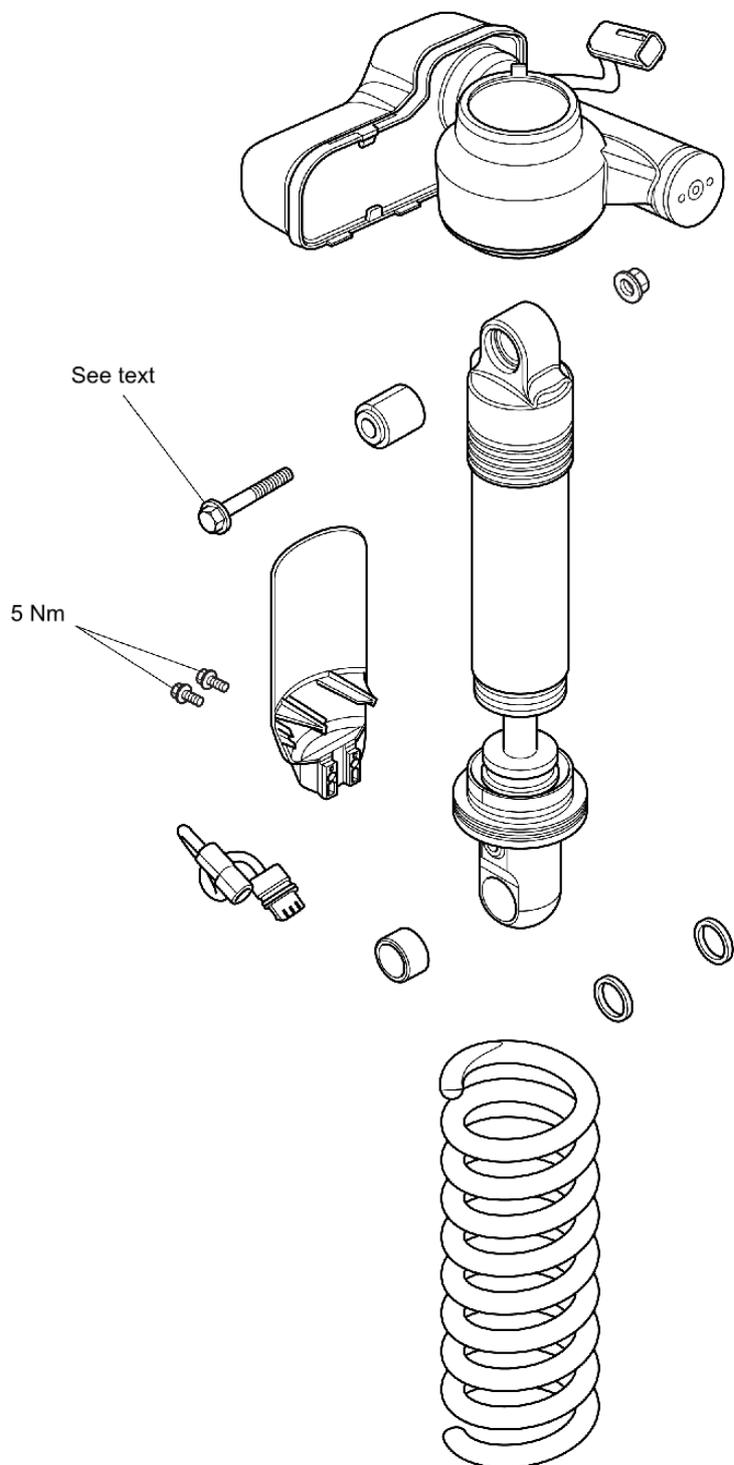
Check for correct operation of the front brake, clutch and twist grip. Check that the brake hose, clutch hose and electrical harnesses do not bind or restrict the steering when the handlebars are turned from lock-to-lock. Rectify as necessary.

Rear Suspension

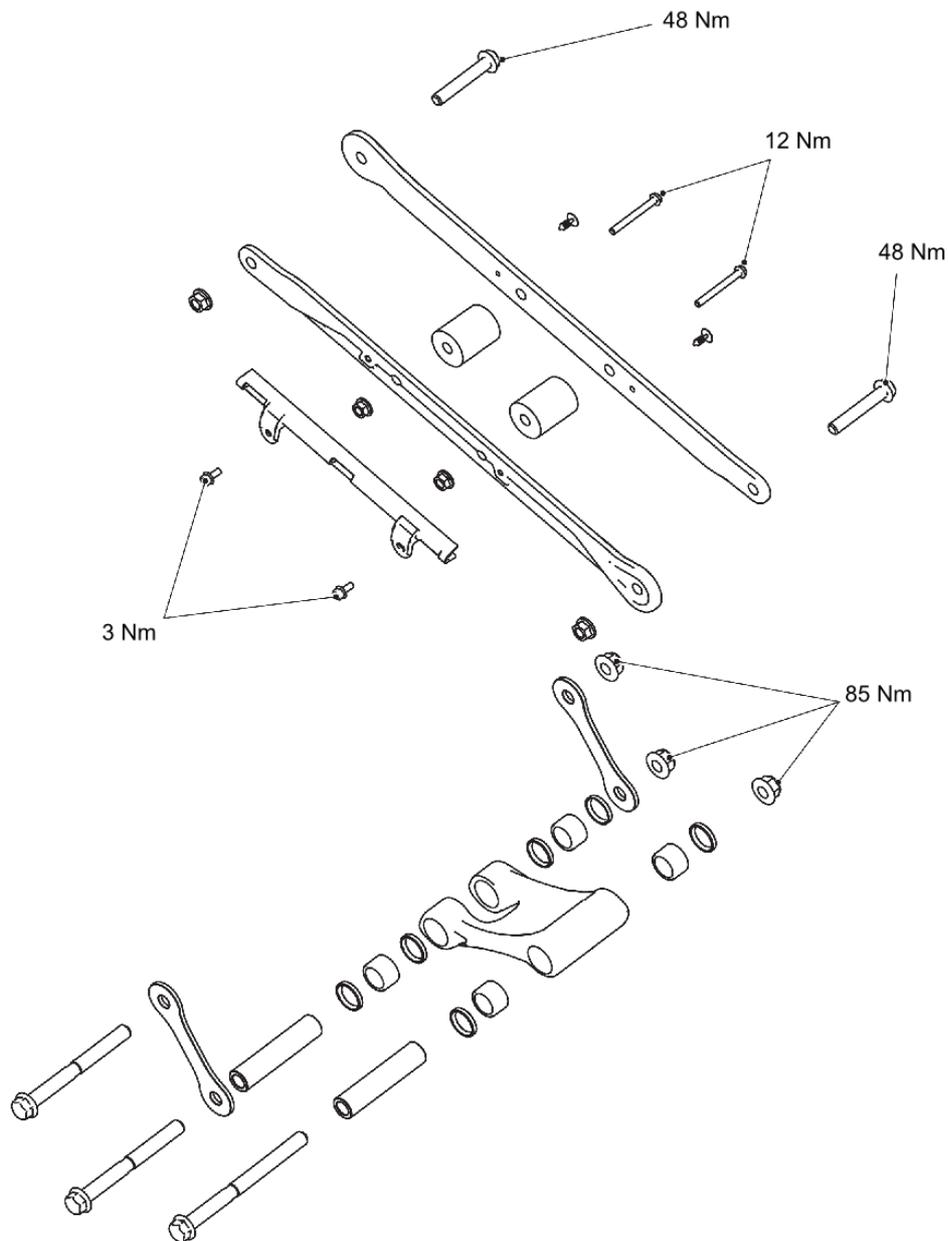
Exploded View – Swinging Arm



Exploded View – Rear Suspension Unit



Exploded View – Drop/Drag Link



Drag and Drop Links - Removal

WARNING

If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

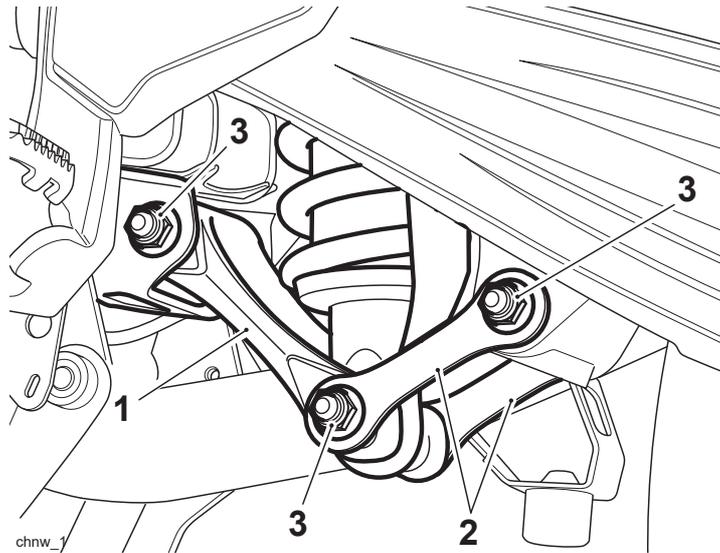
- Rider's Seat - Removal

- Battery - Removal
- Exhaust Silencer - Removal

1. Raise and support the rear of the motorcycle beneath the frame or engine. Position a block to support the rear wheel, or if the rear wheel has been removed, position a suitable strap to support the swinging arm.

Note

- **The bolt securing the drag link to the frame is longer than the two bolts securing the drop links to the rear suspension unit and the swinging arm.**



1. Drag link
2. Drop links
3. Lock nuts

2. Remove the fixing securing the drop links to the swinging arm. Discard the lock nut.
3. Remove the fixing securing the drag link and drop links to the rear suspension unit and remove the drop links. Discard the lock nut.
4. Remove the bearing sleeve from the drag link and rear suspension unit lower mounting.

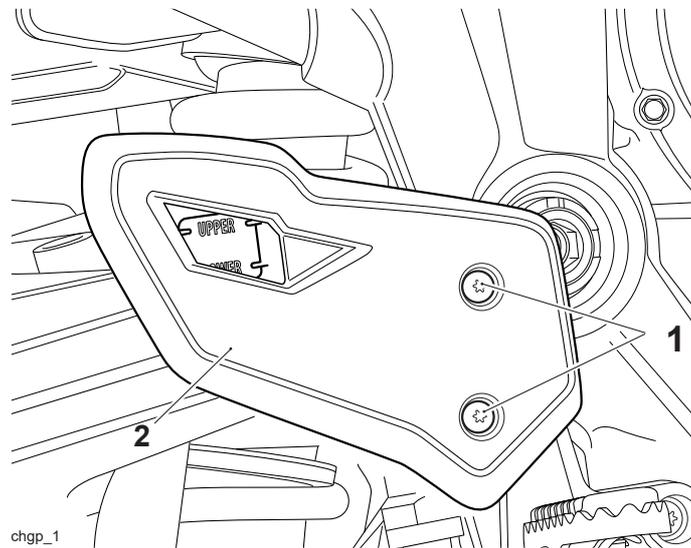
! WARNING

Do not allow the right hand control plate to hang on the brake hose as this may damage the hose and could lead to loss of motorcycle control and an accident.

Note

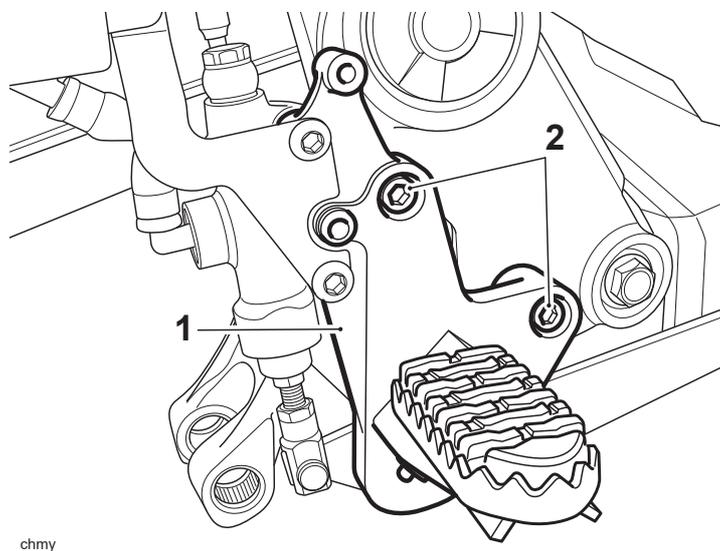
- **Note the orientation of the drag link for installation.**

5. Release the fixings and remove the right hand heel guard.



1. Fixings
2. Heel guard

6. Temporarily detach the right hand control plate from the frame.

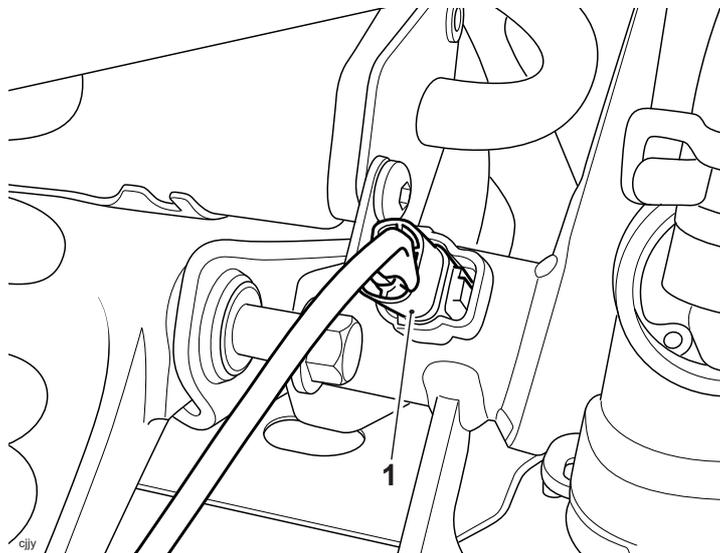


1. Control plate
2. Fixings

7. Remove the fixings securing the drag link to the frame and remove the drag link. Discard the lock nut.

Note

- **Disconnect the damping solenoid electrical connector to allow removal of the drag link bolt.**



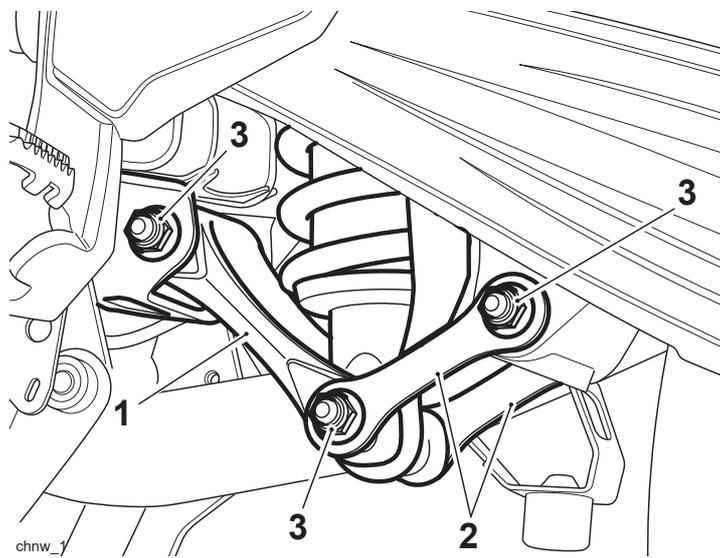
1. Damping solenoid electrical connector

Drag and Drop Links - Inspection

1. Clean all components and inspect the drag link and bearings for damage/wear.
2. Check the rear suspension unit lower bearings for wear.
3. Check the drop link bearings for wear.
4. Renew as necessary.

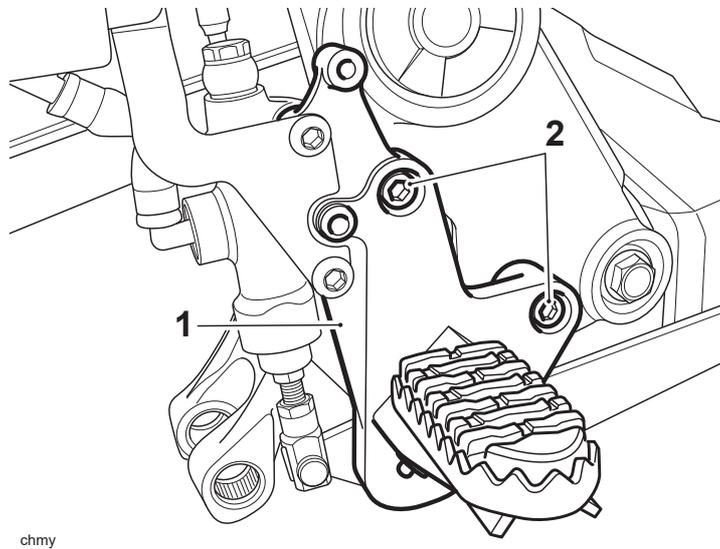
Drag and Drop Links - Installation

1. Remove the drag link sleeves and pack the bearings with fresh grease (NLGI 2 specification grease). Refit the sleeves.
2. Remove the swinging arm drop link sleeve and pack the bearings with fresh grease (NLGI 2 specification grease). Refit the sleeve.
3. Refit the drag link to the frame. Fit the bolt and a new lock nut from the right hand side. Do not fully tighten at this stage.
4. Pack the rear suspension unit bearing with fresh grease (NLGI 2 specification grease).
5. Locate the drag link to the rear suspension unit and fit the drag link bearing sleeve.
6. Refit the drop link plates and fit the bolts and new lock nuts from the right hand side. Do not fully tighten them at this stage.
7. With the weight of the motorcycle on its wheels:
 - Hold the rear suspension unit lower mounting bolt and tighten the lock nut to **85 Nm**.
 - Hold the drop link to swinging arm bolt and tighten the lock nut to **85 Nm**.
 - Hold the drag link to frame bolt and tighten the lock nut to **85 Nm**.
 - If loosened or removed, hold the rear suspension unit upper mounting bolt and tighten the new lock nut to **75 Nm**.



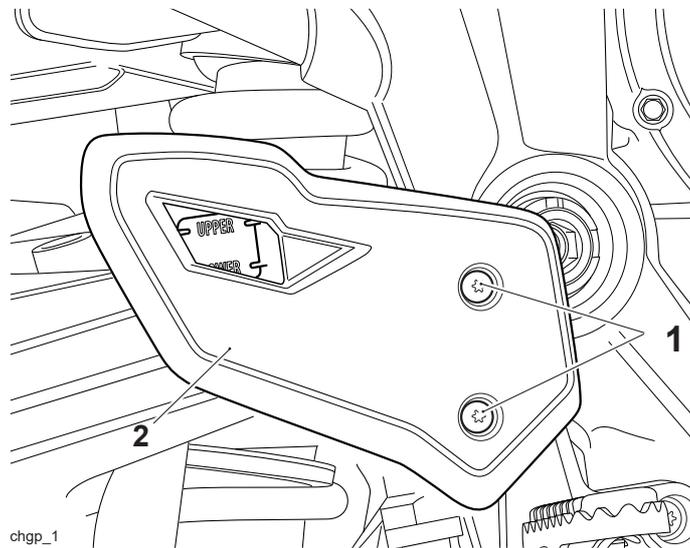
1. Drag link
2. Drop links
3. Lock nuts

8. Refit the right hand control plate and tighten its fixings to **18 Nm**.



1. Control plate
2. Fixings

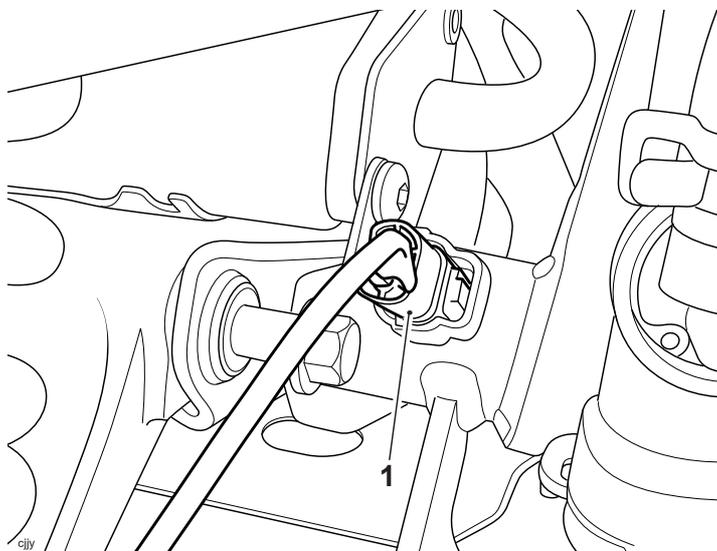
9. Refit the heel guard and tighten its fixings to **7 Nm**.



1. Fixings
2. Heel guard

Note

- Reconnect the damping solenoid electrical connector.



1. Damping solenoid electrical connector

Perform the following operations:

- Exhaust Silencer - Installation
- Battery - Installation
- Rider's Seat - Installation

Rear Suspension Unit

WARNING

Contents under pressure. Never attempt to open this rear suspension unit. Never attempt to service this rear suspension unit. Never incinerate, puncture, or disassemble this rear suspension unit. Opening this rear suspension unit may result in severe injuries or even death.

The rear suspension units are sealed units and do not have any internally user serviceable parts.



Rear Suspension Unit - Removal

WARNING

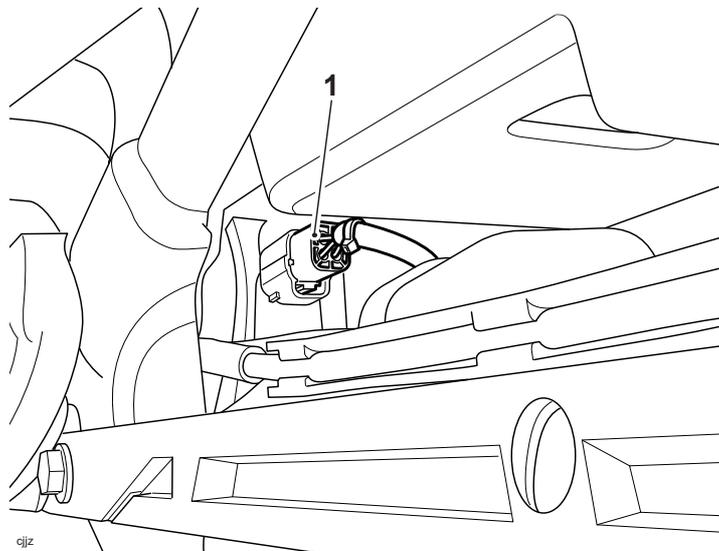
If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

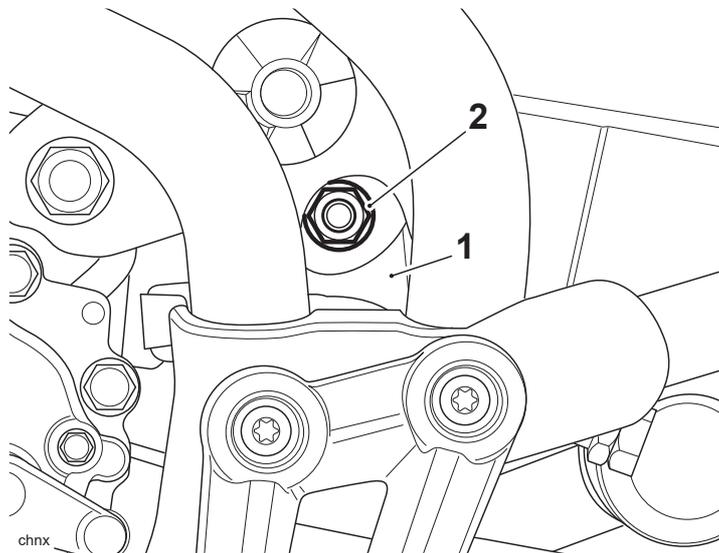
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Swinging Arm - Removal
1. Disconnect the electrical connector for the rear suspension unit preload motor.



1. Electrical connector

2. Remove the bolt securing the rear suspension unit to its upper mounting and remove the unit. Discard the lock nut.



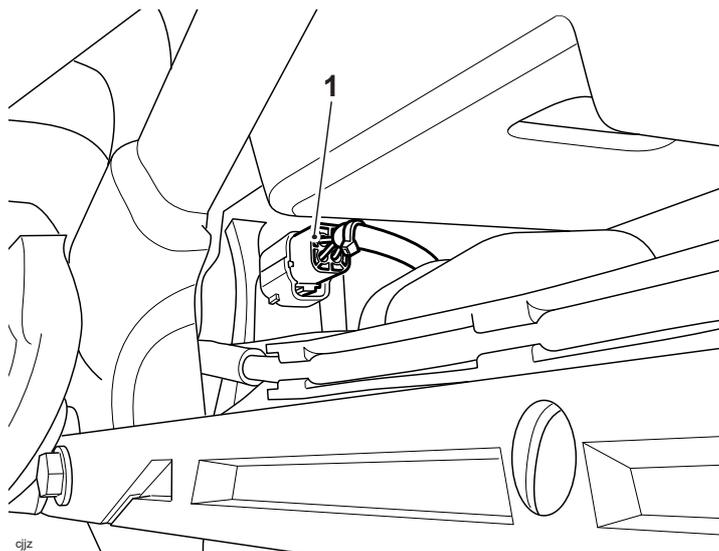
1. Rear suspension unit
2. Lock nut

Rear Suspension Unit - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Locate the rear suspension unit and fit the upper mounting bolt and a new lock nut from the right hand side. Do not fully tighten at this stage.
2. Connect the electrical connector for the rear suspension unit preload motor.



1. Electrical connector

Perform the following operations:

- Swinging Arm - Installation
- Battery - Installation
- Rider's Seat - Installation

Swinging Arm - Removal

WARNING

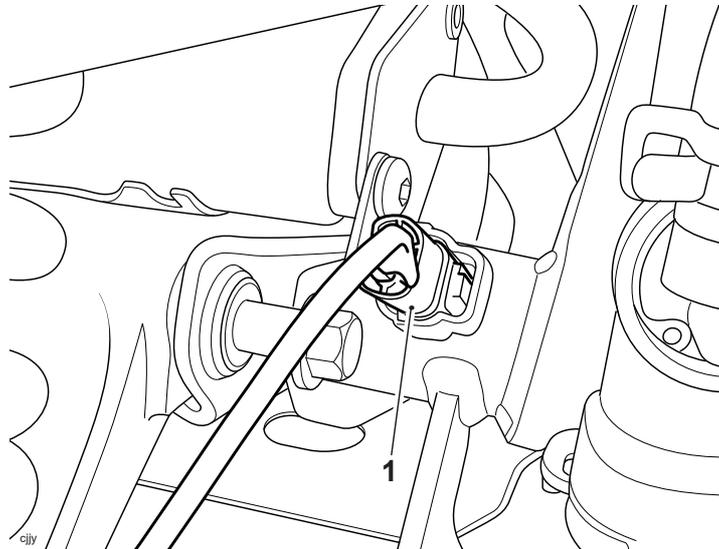
If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

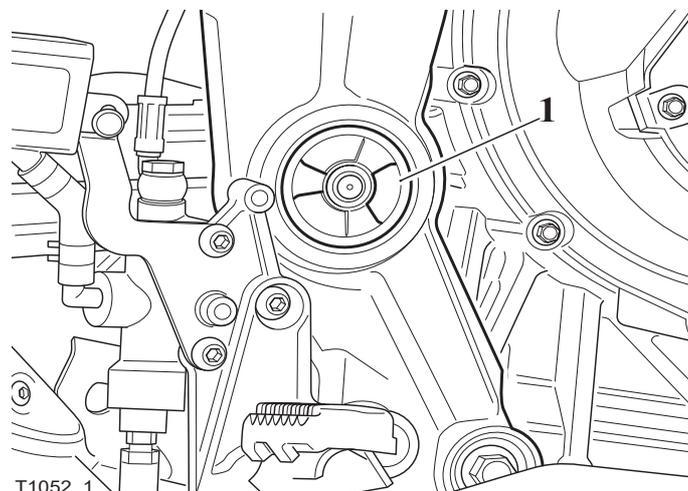
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Exhaust Silencer - Removal
 - Rear Wheel - Removal
 - Rear Bevel Box - Installation
1. Disconnect the swinging arm position sensor linkage from the swinging arm.
 2. Disconnect the electrical connector for the rear suspension unit damping solenoid.



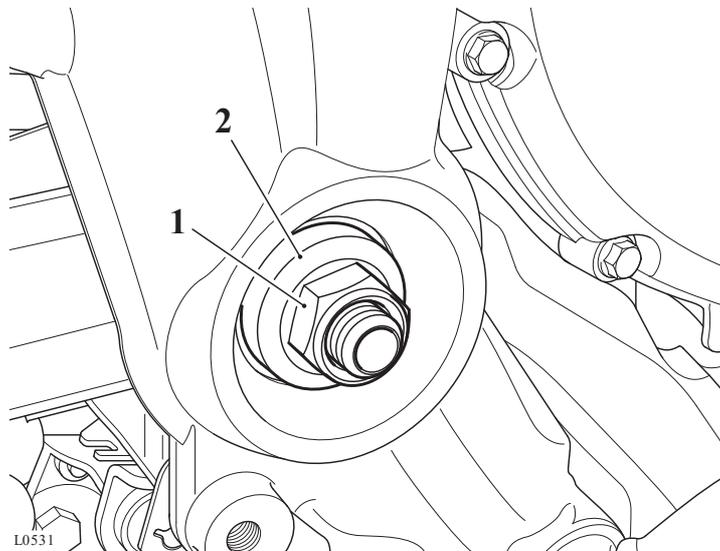
1. Electrical connector

3. Remove the drag and drop links (see Drag and Drop Links - Removal).
4. Carefully remove the cover from the right hand side of the swinging arm spindle.



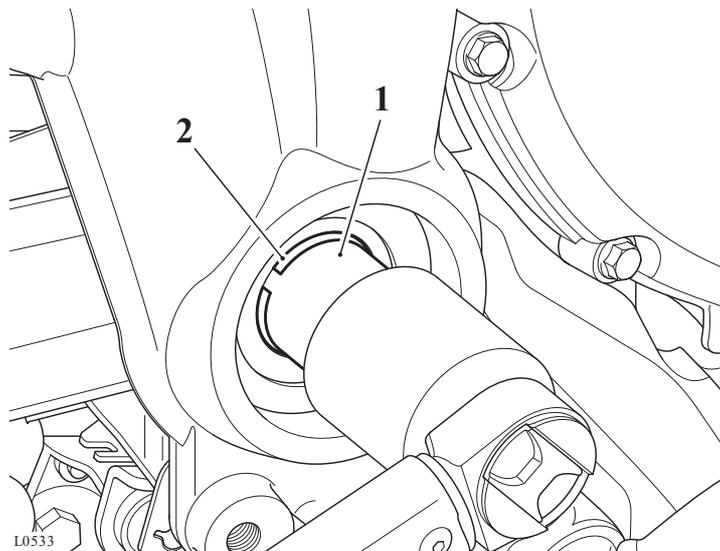
1. Cover

5. Loosen and remove the lock nut from the swinging arm spindle.
6. Collect the adapter from the swinging arm spindle, noting its orientation.



1. Lock nut
2. Adapter

7. Using T3880182 - Wrench, Frame Adjuster, loosen the right hand swinging arm frame adjuster only.



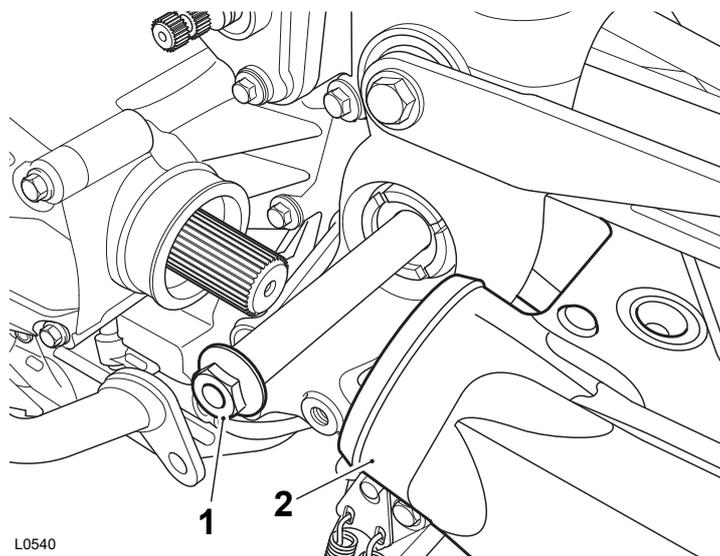
1. T3880182 - Wrench, Frame Adjuster
2. Right hand swinging arm frame adjuster

CAUTION

When removing the swinging arm, care must be taken not to damage swinging arm and rear suspension unit.

Use a soft cloth or other suitable material to protect the swinging arm and rear suspension unit while the swinging arm is being removed.

8. While supporting the swinging arm, remove the swinging arm spindle from left hand side of the motorcycle.



1. **Swinging arm spindle**
2. **Swinging arm**

9. Remove the swinging arm from the motorcycle, carefully passing the rear suspension unit through the opening in the swinging arm as you do so.

CAUTION

The left hand swinging arm frame adjuster is tightened to a high torque during manufacture and is considered a permanent frame fixture. It is not necessary to loosen or remove the left hand swinging arm frame adjuster.

Swinging Arm - Inspection

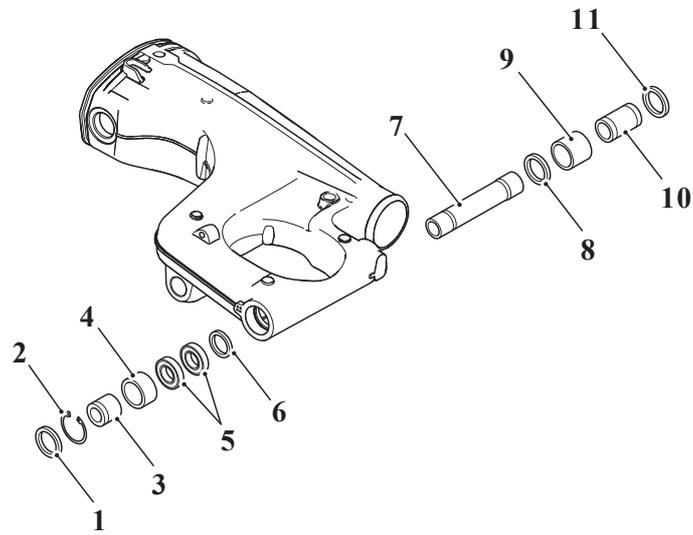
1. Check the swinging arm bearings for damage, pitting, and cracks. Replace as necessary.
2. Inspect the swinging arm spindle for damage and deformation. Replace as necessary.
3. Check the swinging arm for damage. Replace as necessary.
4. Check all bearing seals for damage, splits etc. Replace as necessary.
5. Check the swinging arm gaiters for splits and other damage. Replace as necessary.

Swinging Arm - Disassembly

Pivot Bearings

Note

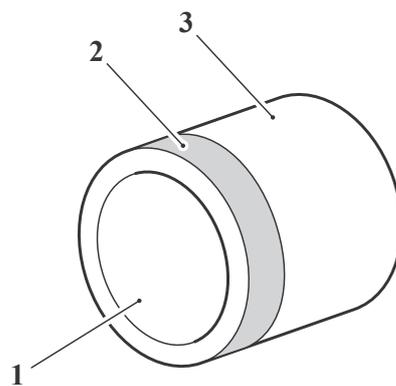
- **The swinging arm pivot bearings cannot be removed undamaged.**



1. Outer seal
2. Circlip
3. Bearing sleeve
4. Needle roller bearing
5. Ball bearings
6. Inner seal
7. Spacer tube
8. Inner seal
9. Needle roller bearing
10. Bearing sleeve
11. Outer seal

Note

- The right hand bearing sleeve (item 3) orientation can be identified by a ground section and a darker coated section on its outer surface. Note the orientation of the right hand bearing sleeve for installation.
- The left hand bearing sleeve (item 10) is symmetrical and can be fitted in either orientation.



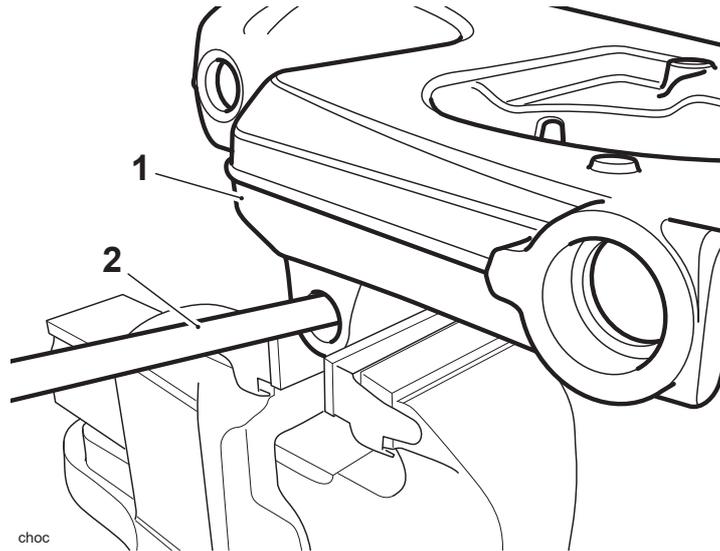
1. Right hand bearing sleeve
2. coated section
3. Ground section

1. Remove the bearing sleeves and outer seals from both sides of the swinging arm.
2. Remove the circlip from the right hand side.

3. Using a suitable drift acting on the left hand side of the spacer tube, drift out the right hand needle roller bearing and two ball bearings.
4. Remove the spacer tube.
5. Remove the right hand inner seal.
6. Remove the left hand inner seal and needle roller bearing by drifting through from the right.

Drop Link Bearings

1. Remove the bearing sleeve for the drop links from the swinging arm.
2. Secure the swinging arm in a soft jawed vice as shown below.
3. Working from the opposite side of the arm to the bearing being removed, drift out the drop link bearing and seal.



1. **Swinging arm**
2. **Drift**

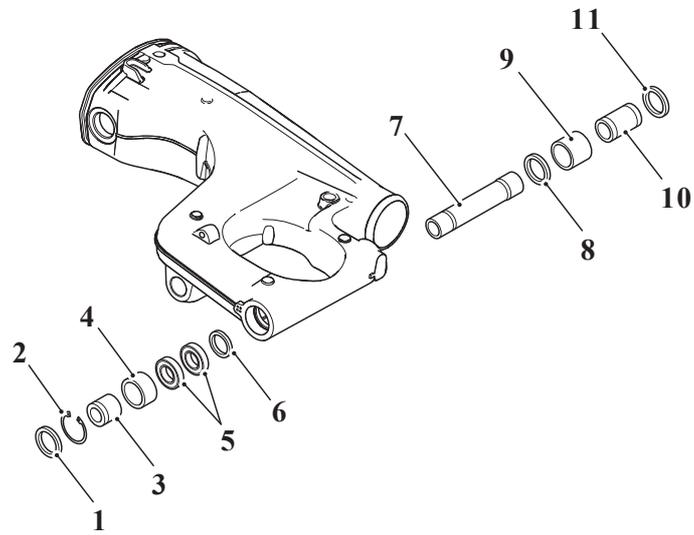
Swinging Arm - Assembly

Pivot Bearings

WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

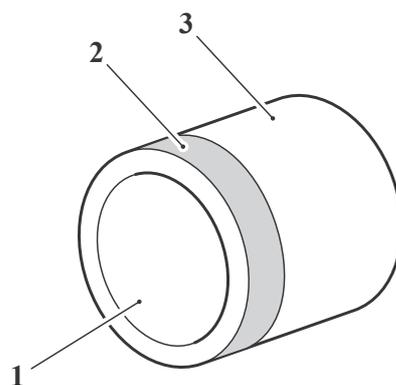
Never wear loose clothing which could become trapped in the press and cause a crushing injury to the hand, arms or other parts of the anatomy.



1. Outer seal
2. Circlip
3. Bearing sleeve
4. Needle roller bearing
5. Ball bearings
6. Inner seal
7. Spacer tube
8. Inner seal
9. Needle roller bearing
10. Bearing sleeve
11. Outer seal

Note

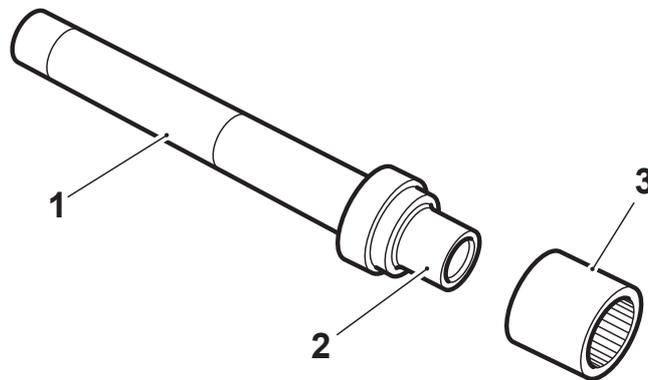
- Use new bearings, seals and a new circlip.
- The right hand bearing sleeve (item 3) must be installed with the darker coated surface facing outwards.



1. Right hand bearing sleeve
2. coated section
3. Ground section

1. Install the right hand bearings (marked faces outwards), seals, sleeve and circlip in the order shown above.
2. Install the left hand inner seal.

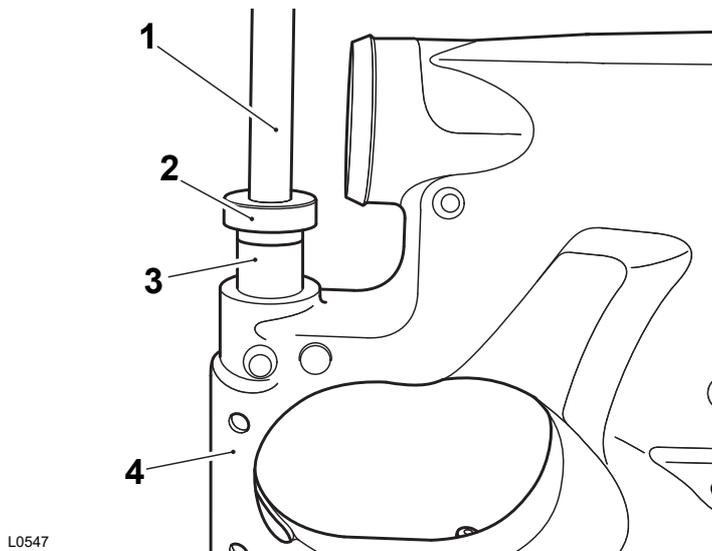
3. Ensure T3880663 - Bearing Installer, 32 mm is clean.
4. Assemble T3880629 - Bearing Installer Handle to T3880663 - Bearing Installer, 32 mm, fully engaging the threads.



chob_1

1. T3880629 - Bearing Installer Handle
2. T3880663 - Bearing Installer, 32 mm
3. Needle roller bearing
4. Swinging arm

5. Position the service tools and bearing (marked side facing outwards) to the swinging arm on a press.



L0547

1. T3880629 - Bearing Installer Handle
2. T3880663 - Bearing Installer, 32 mm
3. Needle roller bearing
4. Swinging arm

6. Press in the new bearing until the tool contacts the swinging arm.
7. Install the spacer tube from the left hand side.

Note

- The left hand bearing sleeve is symmetrical and can be fitted in either orientation.
8. Install the left hand outer seal and bearing sleeve.

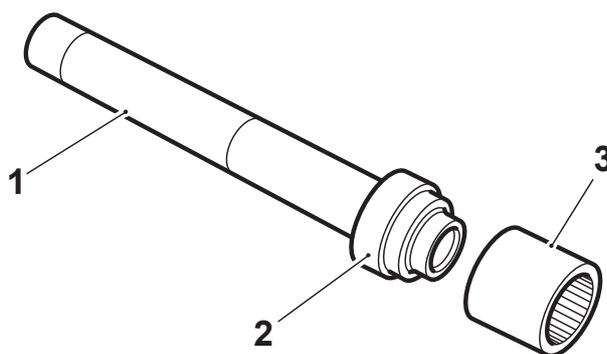
Drop Link Bearings

! WARNING

The bearings must be installed with the marked side of the bearing facing towards T3880628 - Bearing Installer, 26 mm.

Failure to follow this instruction will result in damage to the bearing.

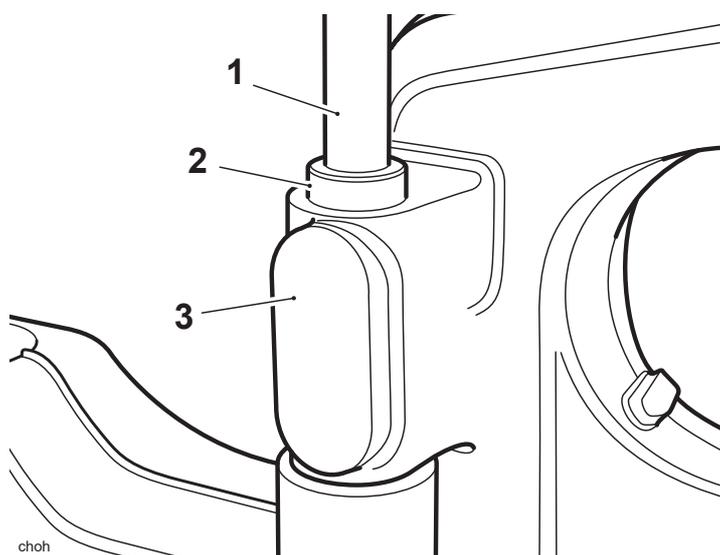
1. Ensure T3880628 - Bearing Installer, 26 mm is clean.
2. Assemble T3880629 - Bearing Installer Handle to T3880628 - Bearing Installer, 26 mm, fully engaging the threads.
3. Position a new bearing to T3880628 - Bearing Installer, 26 mm, with the marked side of the bearing facing towards the tool.



chob

1. **T3880629 - Bearing Installer Handle**
2. **T3880628 - Bearing Installer, 26 mm**
3. **Bearing**

4. Position the service tools and bearing to the swinging arm on a press.
5. Press in the new bearing until the tool contacts the swinging arm.

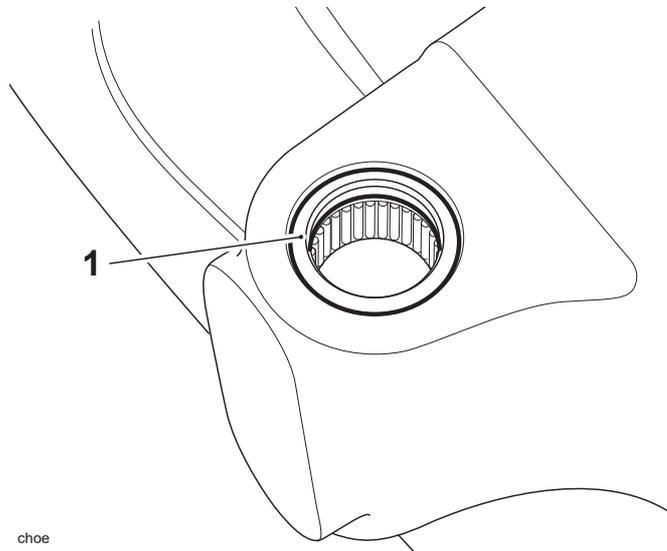


choh

1. **T3880629 - Bearing Installer Handle**
2. **T3880628 - Bearing Installer, 26 mm**
3. **Swinging arm**

6. Repeat for the other side.

7. Install new seals, with the marked edge of the seal facing outwards, until they stop against the bearing.



1. Seal

8. Refit the bearing sleeve.

Swinging Arm - Installation

WARNING

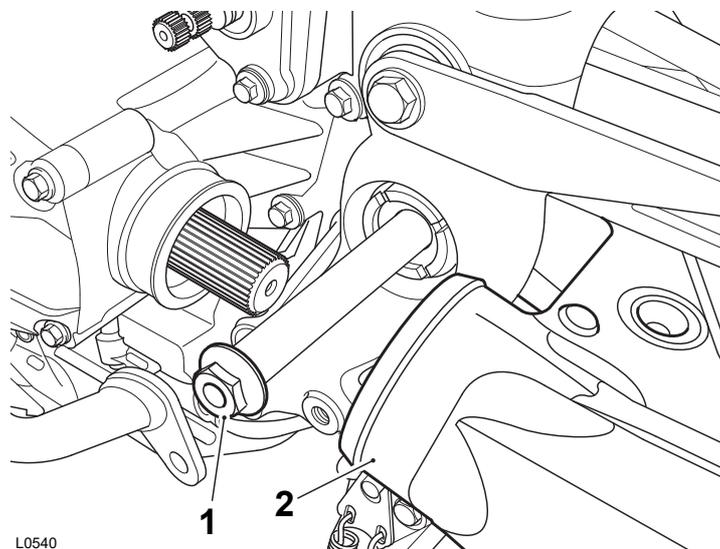
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

When installing the swinging arm, care must be taken not to damage the swinging arm and rear suspension unit.

Use a soft cloth or other suitable material to protect the swinging arm and rear suspension unit while the swinging arm is being positioned to the frame.

1. Position the swinging arm to the frame, carefully passing the rear suspension unit through the opening in the swinging arm as you do so.
2. Fit the swinging arm spindle from the left hand side, through the swinging arm and into the adjuster on the right hand side.



L0540

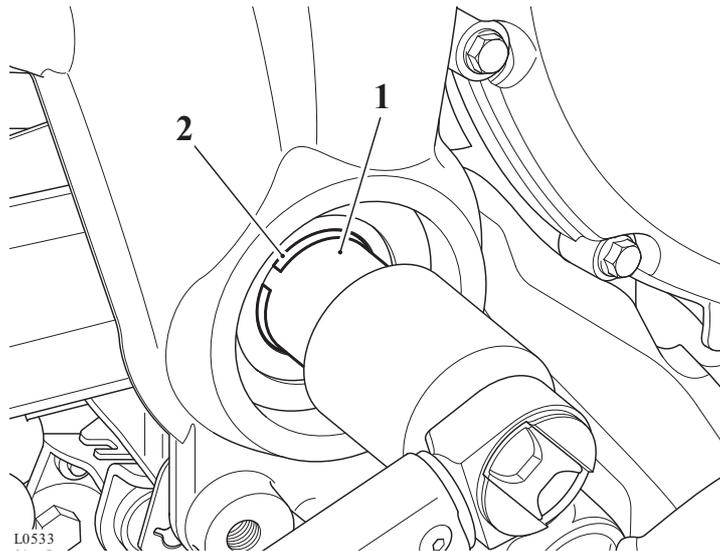
1. **Swinging arm spindle**
2. **Swinging arm**

! CAUTION

Do not allow the swinging arm to drop as this may cause damage to the swinging arm and rear suspension unit.

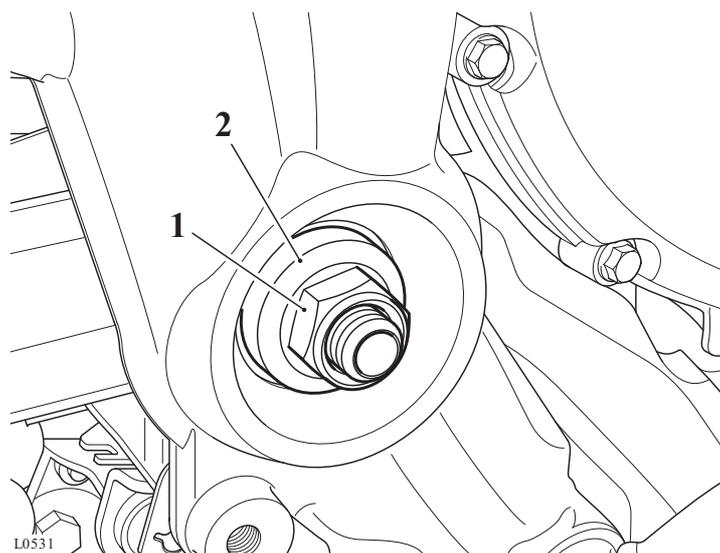
Position a suitable strap to support the swinging arm during the installation procedure.

3. Using T3880182 - Wrench, Frame Adjuster, tighten the right hand swinging arm frame adjuster to **6 Nm**.



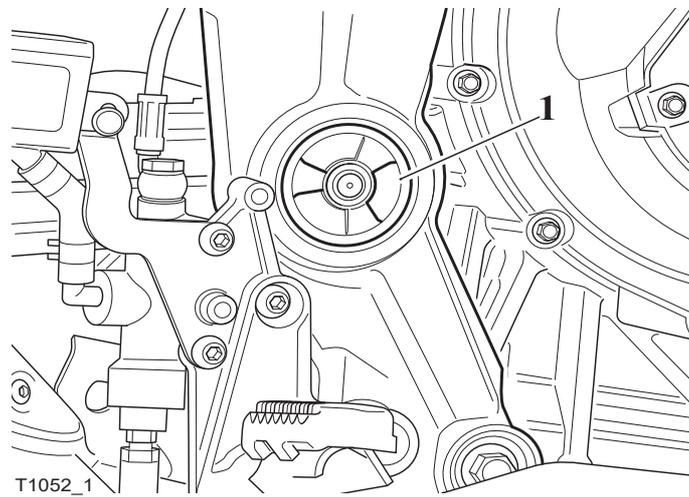
1. **T3880663 - Bearing Installer, 32 mm**
2. **Adjuster**

4. Fit the adapter to the swinging arm spindle as noted during removal and fit a new lock nut.



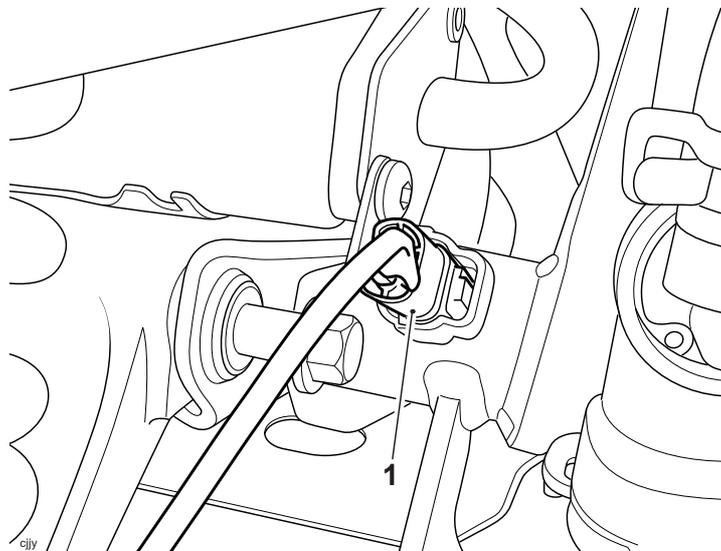
1. **Lock nut**
2. **Adapter**

5. Holding the swinging arm spindle to prevent rotation, tighten the lock nut to **110 Nm**.
6. Refit the cover to the right hand side of the swinging arm pivot.



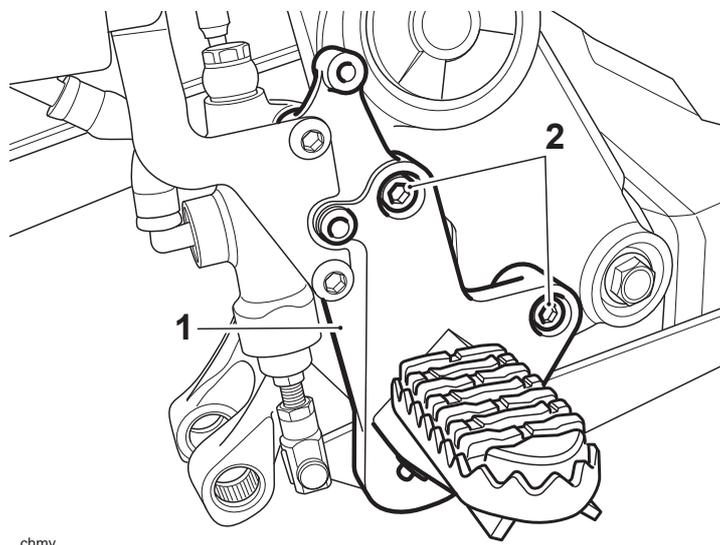
1. Cover

7. Remove and discard the rear suspension unit upper mounting lock nut. Fit a new nut but do not fully tighten at this stage.
8. Refit the drag and drop links (see Drag and Drop Links - Installation). Do not fully tighten the linkage fixings at this stage.
9. Reconnect the electrical connector for the rear suspension unit damping solenoid.



1. Electrical connector

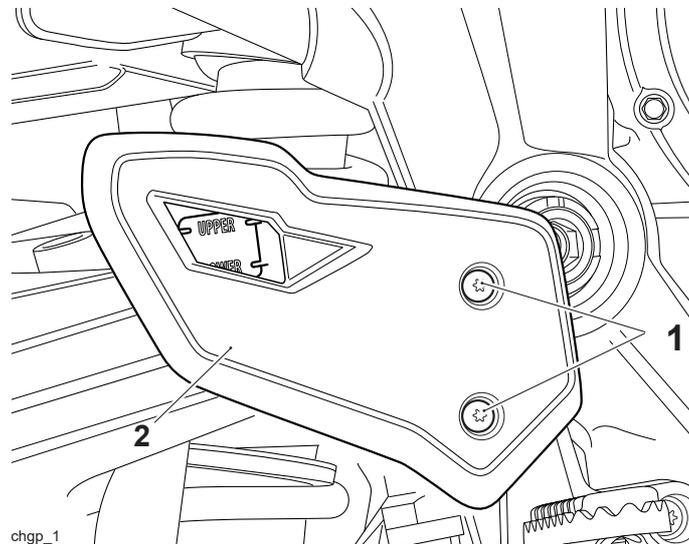
10. Refit the rear bevel box (see page Rear Bevel Box - Installation).
11. Refit the rear wheel (see Rear Wheel - Installation).
12. Refit the exhaust silencer (see Exhaust Silencer - Installation).
13. With the weight of the motorcycle on its wheels:
 - o Hold the rear suspension unit lower mounting bolt and tighten the new lock nut to **85 Nm**.
 - o Hold the drop link to swinging arm bolt and tighten the new lock nut to **85 Nm**.
 - o Hold the drag link to frame bolt and tighten the new lock nut to **85 Nm**.
 - o If removed, hold the rear suspension unit upper mounting bolt and tighten the new lock nut to **75 Nm**.
14. Refit the right hand control plate and tighten its fixings to **18 Nm**.



chmy

1. Control plate
2. Fixings

15. Refit the heel guard and tighten its fixings to **7 Nm**.



chgp_1

1. Fixings
2. Heel guard

- Apply a smear of proprietary general purpose grease to NLGI 2 standard to the ball stud and reconnect the swinging arm position sensor linkage to the swinging arm.
- Reconnect the battery, positive (red) lead first and tighten the terminals to **4.5 Nm**.
- Calibrate the rear suspension unit preload motor (see Rear Suspension Unit Preload Motor - Calibration).
- Calibrate the swinging arm position sensor (see Swinging Arm Position Sensor - Calibration).

Pump the rear brake pedal several times to position the brake pads in the caliper. Rectify as necessary if correct brake operation is not restored.

! WARNING

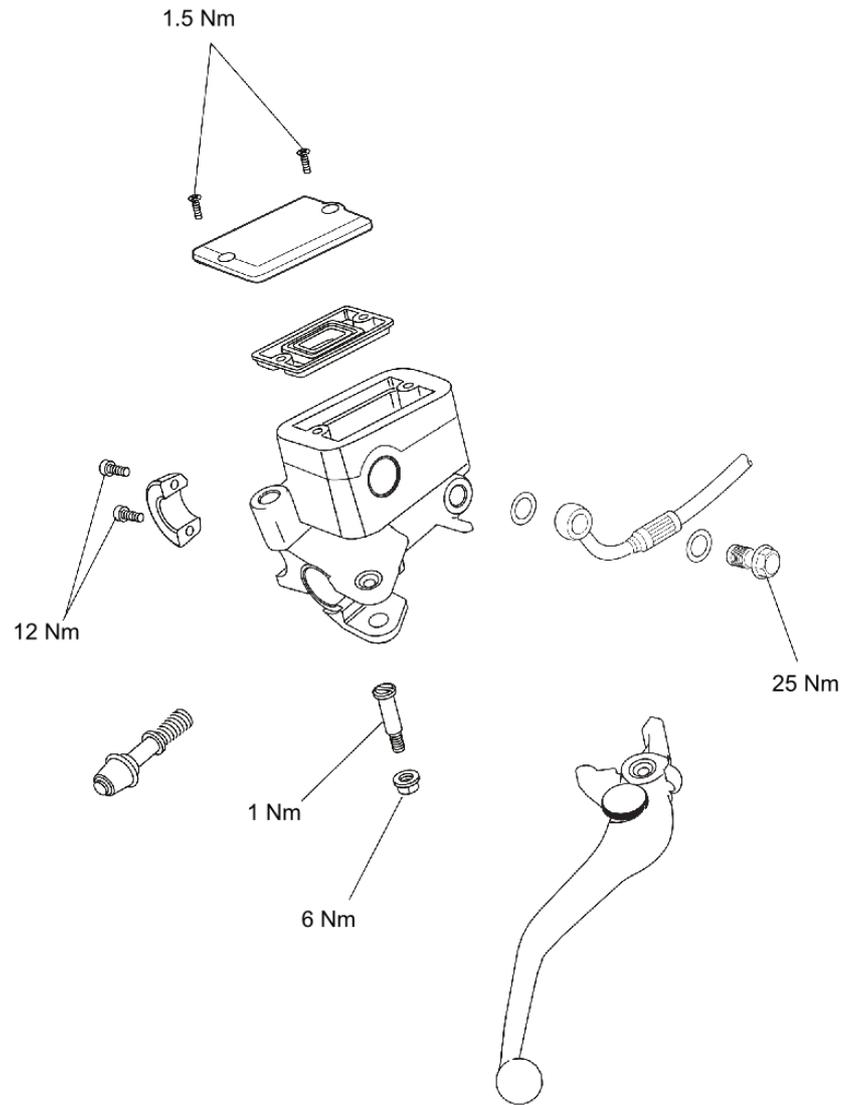
It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

- Refit the rider's seat (see Rider's Seat - Installation).

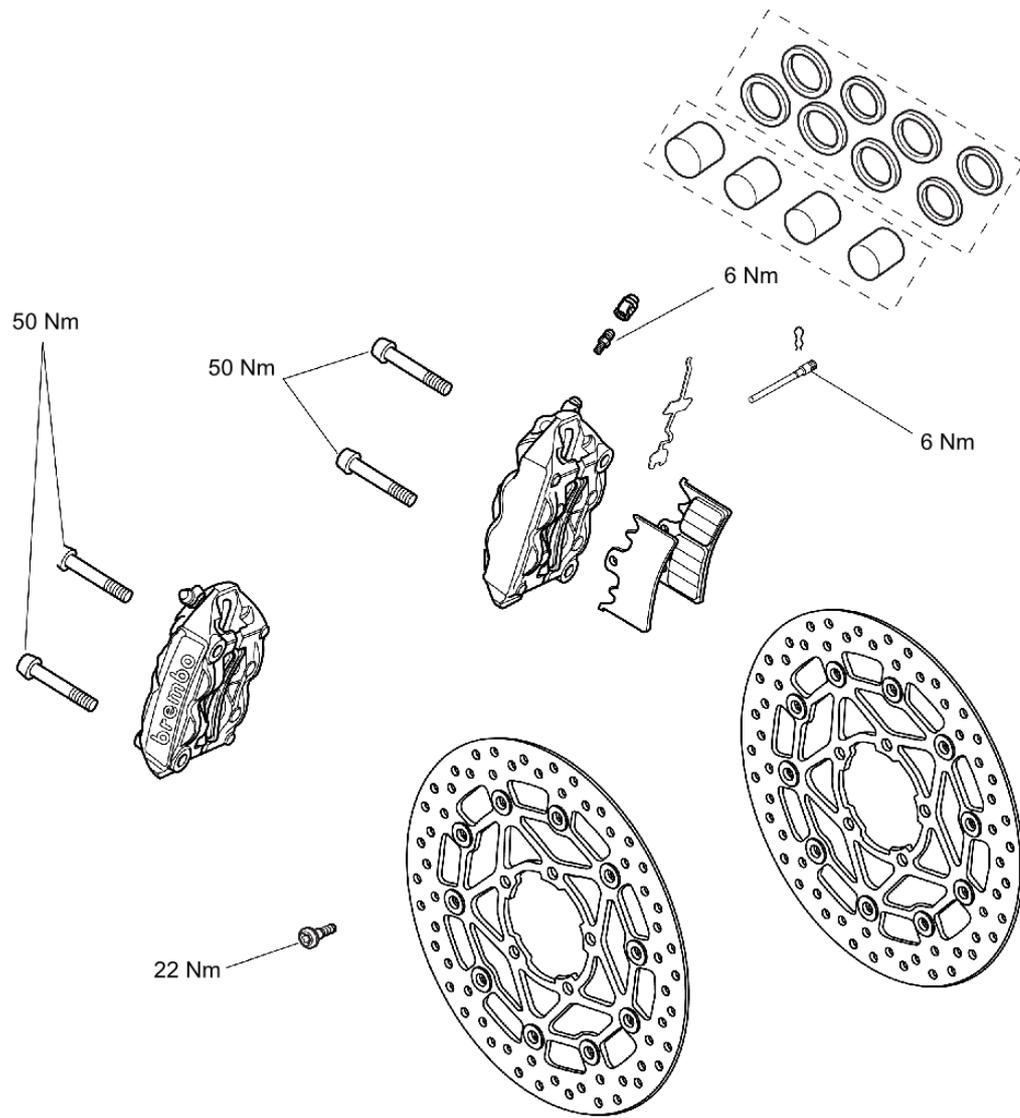
Brakes

Exploded Views

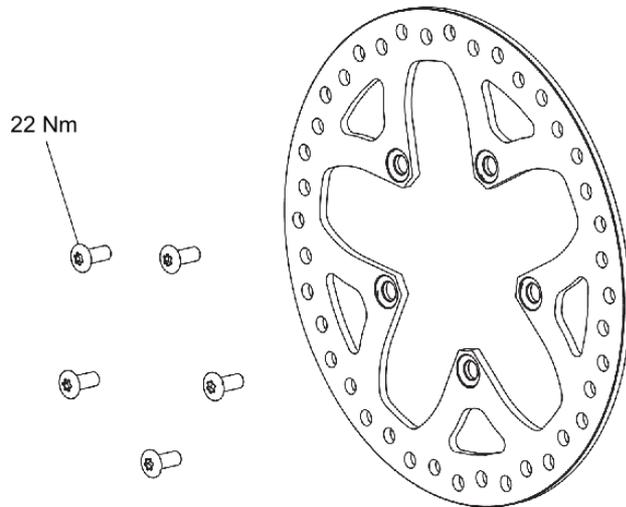
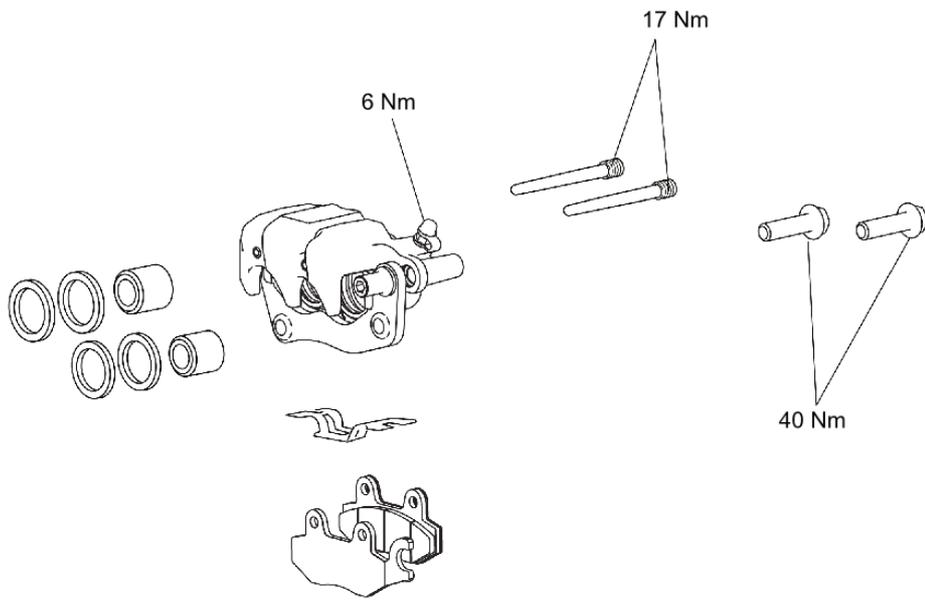
Exploded View – Front Brake Master Cylinder



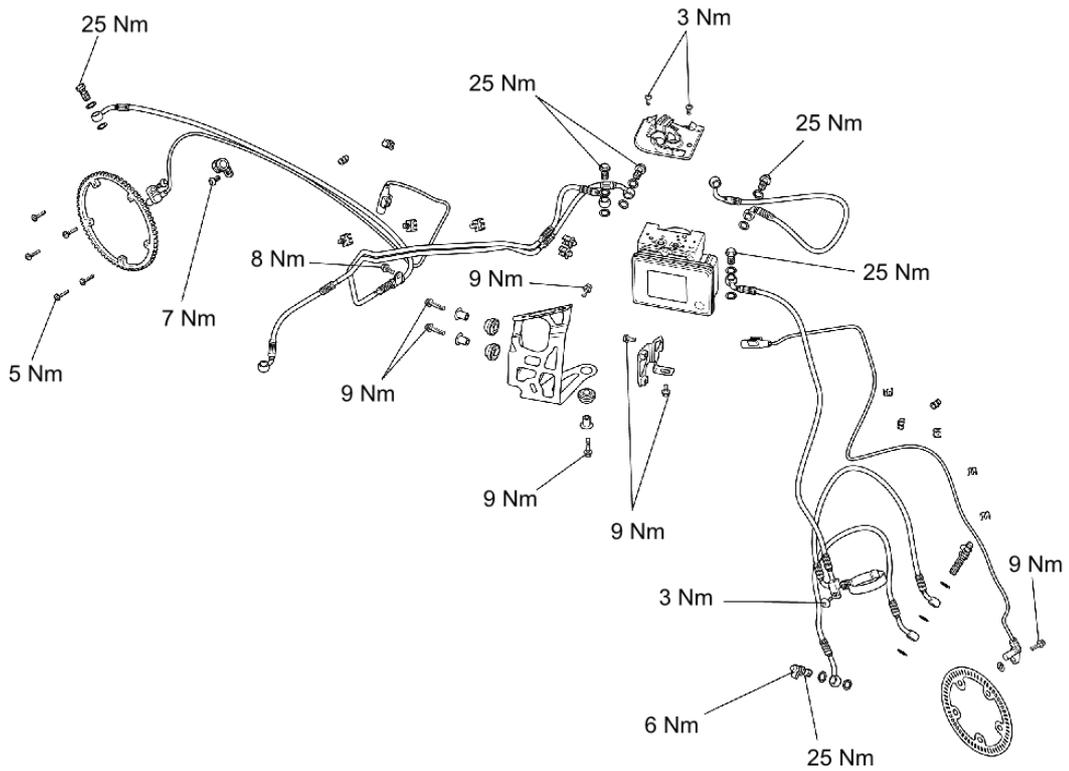
Exploded View – Front Brake Caliper



Exploded View – Rear Brake Master Cylinder



Exploded View – ABS System



Braking System Maintenance and Safety

Braking System Maintenance Safety Precautions



 **WARNING**

Brake fluid is hygroscopic which means it will absorb moisture from the air. The absorbed moisture will greatly reduce the boiling point of the brake fluid causing a reduction in braking efficiency.

Replace brake fluid in line with the Scheduled Maintenance chart. A dangerous riding condition could result if this important maintenance item is neglected.

Do not spill brake fluid onto any area of the bodywork as this will damage any painted or plastic surface.

Always use new brake fluid from a sealed container and never use fluid from an unsealed container or from one that has been previously opened.

Do not mix different brands of fluid. Check for fluid leakage around brake fittings, seals and joints.

Check regularly for brake hose damage.

FAILURE TO OBSERVE ANY OF THE ABOVE WARNINGS MAY REDUCE BRAKING EFFICIENCY LEADING TO LOSS OF MOTORCYCLE CONTROL AND AN ACCIDENT.

 **WARNING**

If there has been an appreciable drop in the level of the fluid in either brake fluid reservoir, consult your authorised Triumph dealer before riding.

If the brake lever or pedal feels soft when it is applied, or if the lever/pedal travel becomes excessive, there may be air in the brake lines or the brake may be defective.

It is dangerous to operate the motorcycle under such conditions and you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

 **WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Failure to change the brake fluid at the interval specified in the Scheduled Maintenance chart may reduce braking efficiency resulting in loss of motorcycle control and an accident.

 **WARNING**

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

 **WARNING**

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

 **WARNING**

WARNING

A magnetised brake disc and/or a magnetised ABS pulser ring may cause problems with the ABS sensor which will illuminate the ABS warning light and disable the ABS.

To prevent these parts becoming magnetised, we strongly recommend that magnets, and items that contain magnets, must not be stored near or placed on brake discs or ABS pulser rings.

This includes parts fitted to motorcycles, parts removed during motorcycle service and new parts in dealer stores.

Examples of items that may contain magnets, are listed below:

- Alternator rotor
- Magnetic fuel tank bags
- Audio speakers
- Magnetic dial test indicator stand
- Magnetic parts tray.

If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

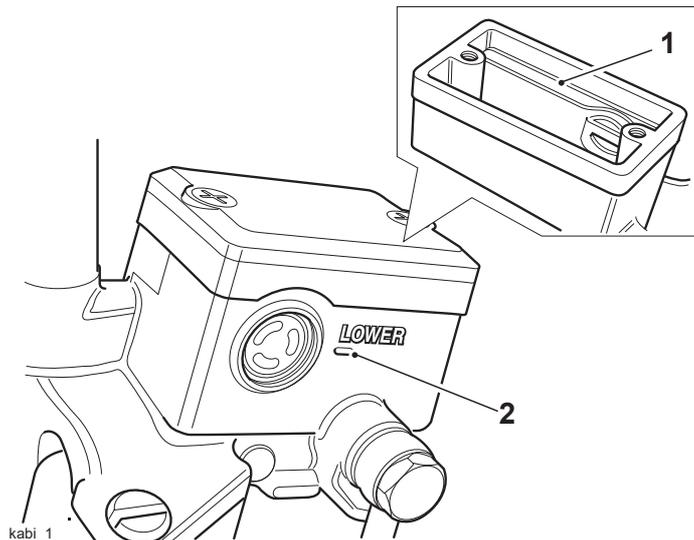
Front Brake Fluid Level Inspection

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

1. To inspect the fluid level, check the level of fluid visible in the window at the front of the reservoir body.



1. Front reservoir upper level
2. Front reservoir lower level

2. Ensure that the brake fluid level in the front brake fluid reservoir is between the upper and lower level lines (reservoir held horizontal).
3. To adjust the fluid level:
 - Remove the two fixings.

- Remove the reservoir cap and the diaphragm seal.
- Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
- Refit the reservoir cap, ensuring that the diaphragm seal is correctly positioned between the cap and reservoir body.
- Refit the two fixings and tighten to **1.5 Nm**.

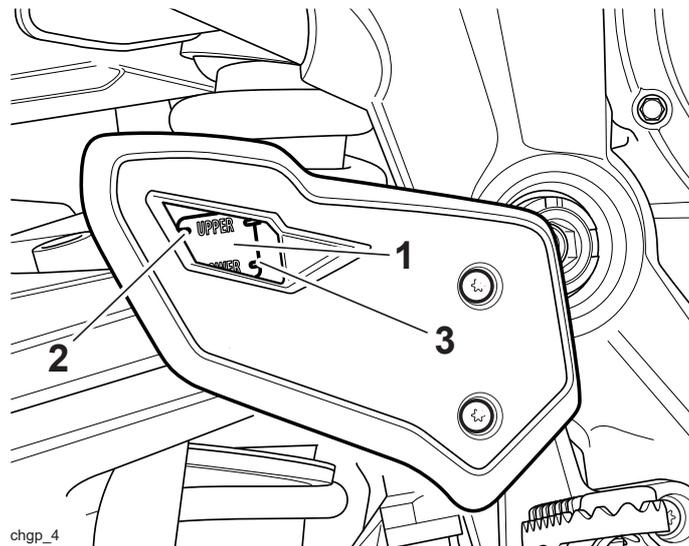
Rear Brake Fluid Level Inspection

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

1. Ensure that the brake fluid level in the rear brake fluid reservoir is between the upper and lower level lines (reservoir held horizontal).



1. **Rear brake fluid reservoir**
2. **Rear reservoir upper level**
3. **Rear reservoir lower level**

2. To adjust the fluid level:

- Remove the two fixings.
- Remove the reservoir cap and the diaphragm seal.
- Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
- Refit the reservoir cap, ensuring that the diaphragm seal is correctly positioned between the cap and reservoir body.
- Refit the two fixings and tighten to **1.5 Nm**.

Changing Brake Fluid

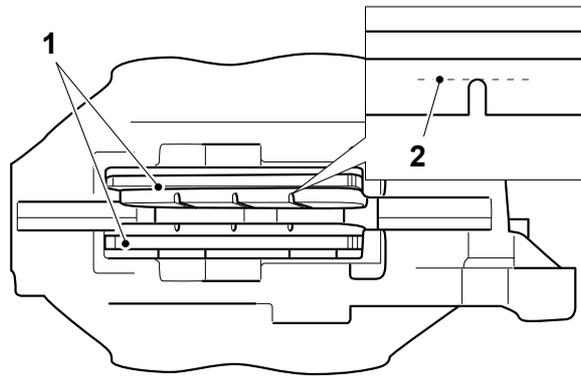
Brake fluid must be changed every two calendar years, irrespective of the mileage the motorcycle has covered in that time.

Brake Pads Wear

Front and rear brake pad wear is automatically compensated for and has no effect on brake lever or pedal action.

Brake Wear Inspection

In accordance with the Scheduled Maintenance chart, inspect the brake pads for wear. The minimum thickness of lining material for any front or rear brake pad is 1.5 mm. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



cbmz_1

1. Brake pads
2. Minimum thickness line

WARNING

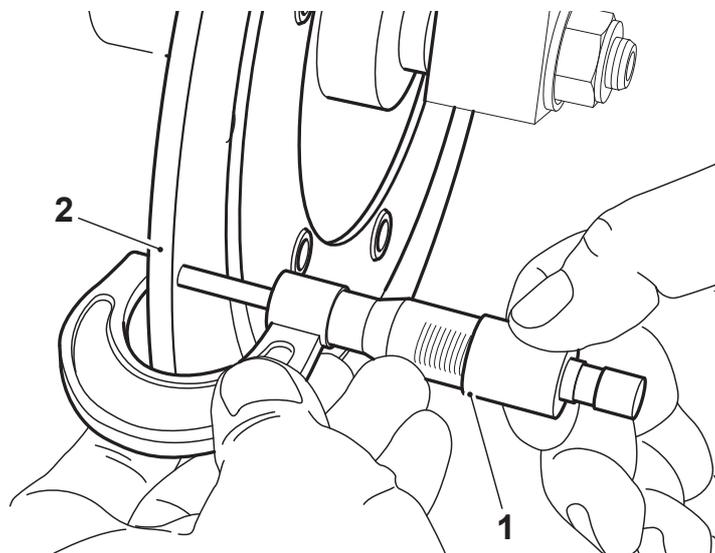
Do not replace individual brake pads; replace both pads in the brake caliper. On the front where two calipers are mounted on the same wheel, all the pads in both calipers must be replaced simultaneously. Replacing individual pads will reduce braking efficiency and may cause loss of motorcycle control and an accident.

Brake Disc -Thickness Check

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Support the motorcycle on a stand so the wheel is raised clear of the ground.
2. Using a micrometer, measure the brake disc at several points.



1. Micrometer

2. Brake disc

3. Replace any brake disc if worn beyond the service limit.

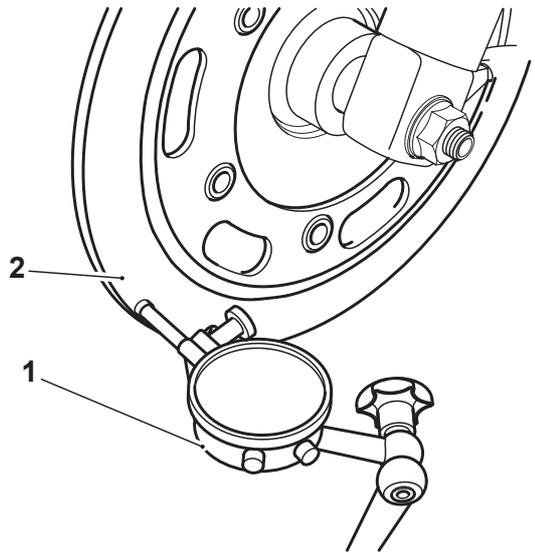
For specifications refer to Brakes.

Brake Disc - Run-out Check

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Support the motorcycle on a stand so the wheel is raised clear of the ground.
2. Measure disc run-out using an accurate dial gauge mounted on a surface plate.



1. **Dial gauge**
2. **Brake disc**

3. Replace any brake disc that exceeds the disc run-out limit.

For specifications refer to Brakes.

Breaking-in New Brake Pads and Discs

After replacement brake discs and/or pads have been fitted to the motorcycle, we recommend a period of careful breaking-in that will optimise the performance and longevity of the discs and pads. The recommended distance for breaking in new pads and discs is 200 miles (300 km).

After fitting new brake discs and/or pads avoid extreme braking, ride with caution and allow for greater braking distances during the breaking-in period.

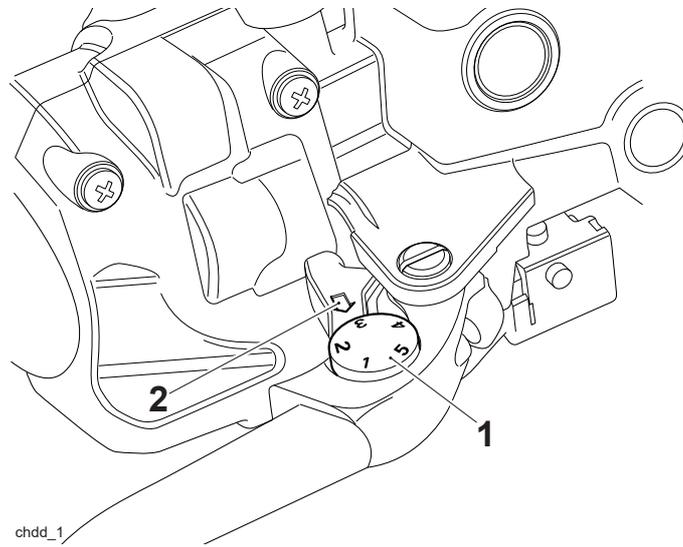
Bleeding the Front Brakes, Renewing Brake Fluid

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Preliminary Steps

- Note the original setting of the brake lever adjuster in order that it can be returned to the same position when the bleeding operation is complete. Set the brake lever adjuster to position No. 1.



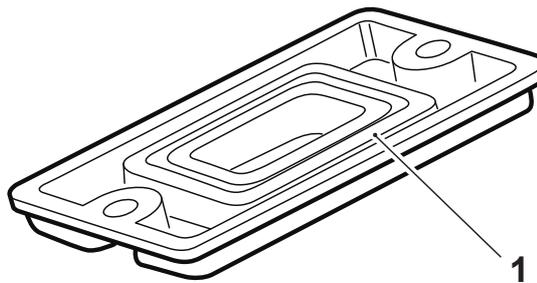
1. Adjuster wheel
2. Arrow mark

- Turn the handlebars to bring the fluid reservoir to a level position.

! CAUTION

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

- Remove the screws from the reservoir cover and remove the cover and sealing diaphragm.
- Check the condition of the reservoir sealing diaphragm. Replace if necessary.



1. Sealing diaphragm

Core Activity

! WARNING

WARNING

Ensure absolute cleanliness when adding brake and clutch fluid to the brake fluid reservoir. Do not allow moisture or debris to enter the cylinder, as this will adversely affect the fluid properties. Always use fluid from a sealed container and do not use fluid from a container that has been opened for any period of time. Always check for fluid leakage around hydraulic fittings and for damage to hoses. A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

CAUTION

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

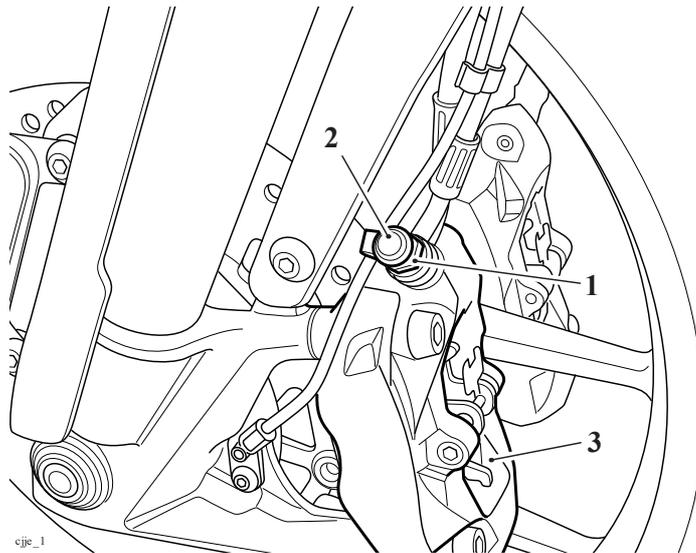
To correctly bleed the front brake system, both manual and ABS system bleed procedures must be completed then repeated in the following sequence:

- Complete the manual bleed procedure for the left and right front calipers.
- Complete the ABS system bleed procedure.
- Repeat the manual bleed procedure.
- Repeat the ABS system bleed procedure.
- Repeat the manual bleed procedure.

Manual Bleed Procedure

Note

- **The left hand caliper should be bled first, followed by the right hand caliper.**
1. Working on the left hand caliper first, remove the rubber cap from the bleed nipple on the brake hose union.



1. **Bleed nipple**
2. **Rubber cap**
3. **Brake caliper (left hand shown)**

2. Attach a transparent tube to the bleed nipple and place the other end of the tube in a suitable receptacle containing new brake fluid. Keep the tube end below the level of fluid.
3. Release the bleed nipple.

Note

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**

4. Get an assistant to slowly pull the brake lever to the handlebar.
5. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
6. Repeat steps 3 to 5 until no more air appears in the bleed tube.

Note

- **Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.**
7. When all air has been expelled from the system, hold the lever fully against the handlebar and close the bleed nipple.
 8. Tighten the bleed nipple to **6 Nm**.
 9. Repeat the procedure for the right hand caliper.

Note

- **If the manual bleed procedure is to be followed by an ABS system bleed, leave the transparent tube and receptacle in place on the right hand caliper.**

ABS System Bleed Procedure

1. Connect the Triumph diagnostic tool (see System Diagnostics).
2. Follow the on screen menu to ABS Diagnostics. From the menu, select 'BLEED SYSTEM' (see the Triumph Diagnostic Tool User Guide).

Note

- **On pressing the Start button, the diagnostic software will send a command to the ABS ECM to begin the ABS bleed sequence.**
 - **The bleed sequence lasts for 140 seconds and consists of three stages; Flush stage, Bleed stage 1 and Bleed stage 2.**
 - **The bleed sequence can be stopped at any time by pressing the Stop button on the diagnostic software.**
3. Press the Start button to activate the bleed sequence on the diagnostic tool.

Note

- **The flush stage lasts for 20 seconds. The ABS modulator can be heard operating during the flush stage and will become silent when flush stage has completed.**
4. With bleed nipples closed, repeatedly operate the front brake lever for the duration of the flush stage.

Note

- **Bleed stage 1 will start when the flush stage has completed and will be automatically followed by bleed stage 2.**
 - **Bleed stages 1 and 2 last for 60 seconds each. The ABS modulator will remain silent during bleed stage 1 but can be heard operating during bleed stage 2.**
5. Release the right hand caliper bleed nipple.

Note

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**
6. Get an assistant to slowly pull the brake lever to the handlebar.
 7. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
 8. Repeat steps 5 to 7 for the duration of bleed stages 1 and 2.

Note

- **Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.**
9. Once the bleed sequence has completed the diagnostic tool will display a message '**ABS system bleed complete**'. Note that this message may take a few seconds to appear after the ABS modulator has become silent.

10. Tighten the bleed nipple to **6 Nm**.

Final Steps

WARNING

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of brake and clutch fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake and clutch fluid handling warnings given earlier in this section of the manual.

CAUTION

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

WARNING

Always return the lever adjuster to the original setting as noted during the preliminary steps. Operating the motorcycle with lever settings that are unfamiliar may lead to loss of motorcycle control and an accident.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

- Ensure both manual and ABS system bleed procedures have been completed and repeated in the sequence described at the beginning of the Core Activity section.
- In the Triumph diagnostic software, navigate to ENGINE DIAGNOSTICS - FUNCTION TEST and perform the cruise control switch check (see Cruise Control Switch Check) to ensure correct brake switch operation.
- Disconnect the Triumph diagnostic tool.
- When both calipers have been bled, ensure the brake lever operation has a firm resistive feel to it, does not feel spongy and that the lever cannot be pulled directly back to the handlebar. Take remedial action as necessary.
- Remove the bleed tube.
- Replace the bleed nipple cap.
- Fill the reservoir to the upper level with new DOT 4 fluid.
- Refit the diaphragm and reservoir cover. Refit the screws and tighten to **1.5 Nm**.
- Reset the brake lever adjuster to the original setting.
- Check the operation of the front brake. Rectify as necessary.

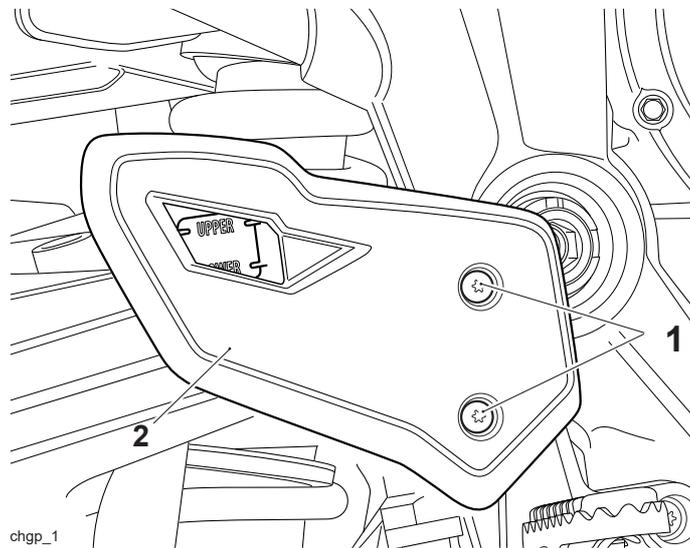
Bleeding the Rear Brakes, Renewing Brake Fluid

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Preliminary Steps

- Release the fixings and remove the right hand heel guard.

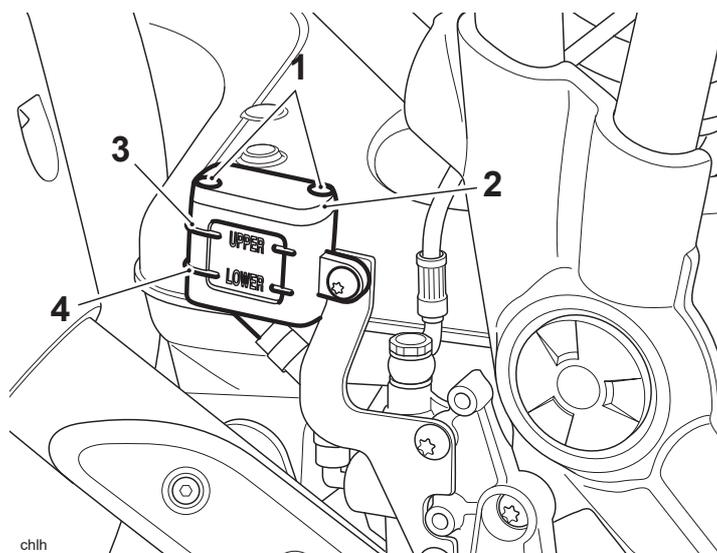


1. Fixings
2. Heel guard

CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

- Unscrew and remove the rear brake reservoir cover and diaphragm, taking care not to spill any fluid.



1. Fixings
2. Rear reservoir cap
3. Upper level
4. Lower level

- Check the condition of the sealing diaphragm. Replace the diaphragm as necessary.

Core Activity

WARNING

WARNING

Ensure absolute cleanliness when adding brake fluid to the brake fluid reservoir. Do not allow moisture or debris to enter the cylinder as this will adversely affect the fluid properties. Always use fluid from a sealed container and do not use fluid from a container which has been opened for any period of time. Always check for fluid leakage around hydraulic fittings and for damage to hoses.

A dangerous riding condition leading to an accident could result if this warning is ignored.

CAUTION

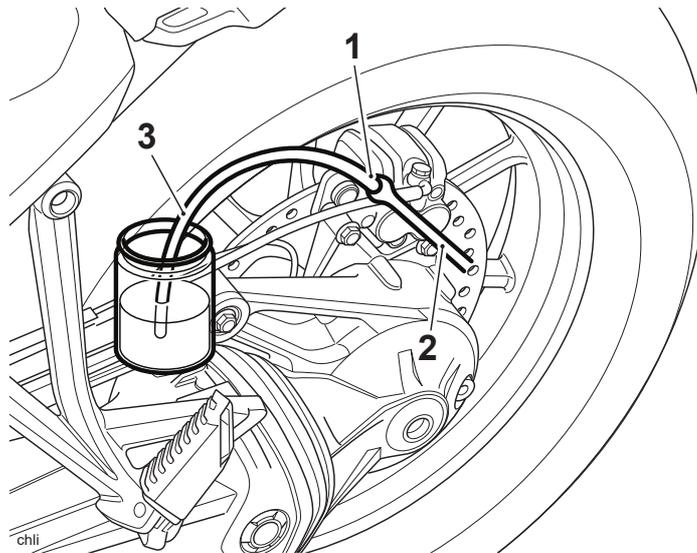
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

To correctly bleed the rear brake system, both manual and ABS system bleed procedures must be completed then repeated in the following sequence:

- Complete the manual bleed procedure for rear caliper.
- Complete the ABS system bleed procedure.
- Repeat the manual bleed procedure.
- Repeat the ABS system bleed procedure.
- Repeat the manual bleed procedure.

Manual Bleed Procedure

1. Remove the cap from the rear bleed nipple.
2. Attach a transparent tube to the bleed nipple.



1. Bleed nipple
2. Spanner
3. Bleed tube

3. Place the other end of the tube in a suitable receptacle containing new brake fluid.
4. Release the bleed nipple.

Note

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**
5. Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple.
 6. Repeat steps 4 and 5 until no more air appears in the bleed tube.

Note

- **Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.**
7. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **6 Nm**.

Note

- **If the manual bleed procedure is to be followed by an ABS system bleed, leave the transparent tube and receptacle in place on the rear caliper.**

ABS System Bleed Procedure

1. Connect the Triumph diagnostic tool (see System Diagnostics).
2. Follow the on screen menu to ABS Diagnostics. From the menu, select BLEED SYSTEM (see the Triumph Diagnostic Tool User Guide).

Note

- **On pressing the Start button, the diagnostic software will send a command to the ABS ECM to begin the ABS bleed sequence.**
 - **The bleed sequence lasts for 140 seconds and consists of three stages; Flush stage, Bleed stage 1 and Bleed stage 2.**
 - **The bleed sequence can be stopped at any time by pressing the Stop button on the diagnostic software.**
3. Press the Start button to activate the bleed sequence on the diagnostic tool.

Note

- **The flush stage lasts for 20 seconds. The ABS modulator can be heard operating during the flush stage and will become silent when the flush stage has completed.**
4. With bleed nipple closed, repeatedly operate the rear brake pedal for the duration of the flush stage.

Note

- **Bleed stage 1 will start when the flush stage has completed and will be automatically followed by bleed stage 2.**
 - **Bleed stages 1 and 2 last for 60 seconds each. The ABS modulator will remain silent during bleed stage 1 but can be heard operating during bleed stage 2.**
5. Release the bleed nipple.

Note

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**
6. Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple.
 7. Repeat steps 5 and 6 for the duration of bleed stages 1 and 2.

Note

- **Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.**
8. Once the bleed sequence has completed the diagnostic tool will display a message '**ABS system bleed complete**'. Note that this message may take a few seconds to appear after the ABS modulator has become silent.
 9. Apply pressure to the brake lever and close the bleed nipple. Tighten the nipple to **6 Nm**.

Final Steps



WARNING

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

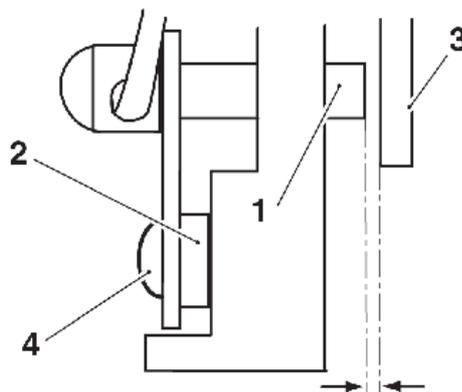
- Ensure both manual and ABS system bleed procedures have been completed and repeated in the sequence described at the beginning of the Core Activity section.
- In the Triumph diagnostic software, navigate to ENGINE DIAGNOSTICS - FUNCTION TEST and perform the cruise control switch check (see Cruise Control Switch Check) to ensure correct brake switch operation.
- Disconnect the Triumph diagnostic tool.
- Fill the reservoir to the maximum level with new DOT 4 fluid.
- Fit the reservoir cover and diaphragm. Check for correct diaphragm fitment before final tightening of the cover.
- Remove the bleed tube from the nipple.
- Replace the bleed nipple cap.
- Refit the heel guard and tighten its fixings to **7 Nm**.
- Check for correct brake operation. Rectify as necessary.

Front Wheel Speed Sensor Air Gap Measurement

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Using feeler gauges, measure the air gap between the front wheel speed sensor and its pulser ring.



1. **ABS sensor**
2. **Shim**
3. **Pulser ring**
4. **Fixing**

2. Rotate the wheel and repeat the measurement in several places to ensure the pulser ring is not distorted or bent. Renew a damaged pulser ring.
3. Adjust the air gap using the correct shim(s) to achieve an air gap between 0.1 mm to 1.5 mm.

! WARNING

Shims are available in the following sizes, 0.5 mm, 1.0 mm, 1.5 mm and 2.0 mm.

Do not install more than two shims. If the required air gap cannot be achieved using two shims, investigate and rectify the cause before proceeding.

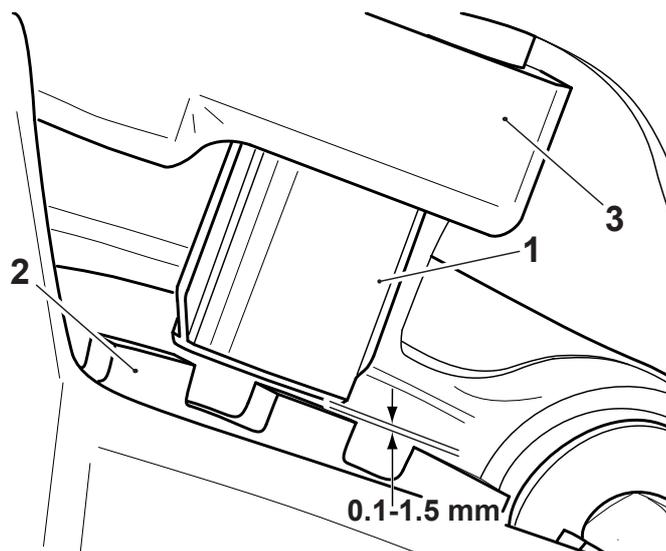
4. If necessary, remove the wheel speed sensor, fit the correct thickness shim(s) and refit the wheel speed sensor.
5. If removed, install a new fixing and tighten to **9 Nm**.
6. Repeat the air gap measurement. Re-adjust as necessary.
7. Once the wheel speed sensor air gap measurement is correct, install a new bolt (if not already replaced during air gap adjustment) and tighten to **9 Nm**.

Rear Wheel Speed Sensor Air Gap Measurement

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Inspect the rear bevel box hub bearings for signs of wear (see Rear Bevel Box - Inspection).
2. Using feeler gauges, measure the air gap between the rear wheel speed sensor and its pulser ring.



1. **ABS sensor**
2. **Pulser ring**
3. **Bevel box**

! CAUTION

CAUTION

Do not install shims. If the specified air gap cannot be achieved, investigate and rectify the cause before proceeding.

3. If the rear wheel speed sensor has been removed, install a new fixing and tighten to **9 Nm**.
4. Re-check the air gap measurement.
5. For specifications refer to Brakes.

Anti-lock Brake System (ABS) Management

ABS - System Description

This model is fitted with an electronic, partially integrated, Optimised Cornering Anti-lock Brake System (OCABS) which is designed to prevent the wheels from locking or skidding by reducing braking effort to the front or rear brake caliper when wheel-lock is detected.

The system consists of a hydraulic modulator and ABS ECM assembly mounted to a bracket to the right hand side of the frame near the headstock, a front wheel speed sensor mounted to the front fork, a rear wheel speed sensor mounted to the rear bevel box and an Inertial Measurement Unit (IMU) mounted beneath the seat bridge.

The front pulser ring is mounted to the left hand brake disc and the rear pulser ring is mounted to the rear bevel box hub.

The front and rear master cylinders are connected by lines to the modulator and from the modulator the pipes connect to the brake calipers.

The front and rear brakes are partially integrated electronically by the ABS ECM. When the front brake is applied, the ABS ECM will also apply a small amount of rear brake for balanced braking. The amount of rear brake application is related to the level of braking force applied by the rider through the front brake lever. Use of the rear brake pedal alone will only apply the rear brake.

The front and rear brake hydraulic circuits are separate and are not connected in any way inside the modulator.

The ABS ECM continuously calculates the front and rear wheel speeds, and from these inputs the ABS ECM calculates the estimated motorcycle speed, wheel deceleration/acceleration, the wheel speed difference and the wheel slip (skid) rate. This is calculated by comparing the calculated wheel speeds with the calculated vehicle speed, so that if one wheel speed deviates significantly from the other two readings, this wheel is determined to be skidding.

Under braking, if the ABS ECM detects that either wheel is about to slip, due to the brake force exceeding the available traction between the tyre and road surface (the wheel will begin to slip or 'skid'), the ABS ECM very rapidly releases and re-applies the brake pressure to prevent the wheel from skidding.

This is felt through the brake pedal or lever as a rapid 'pulsing'.

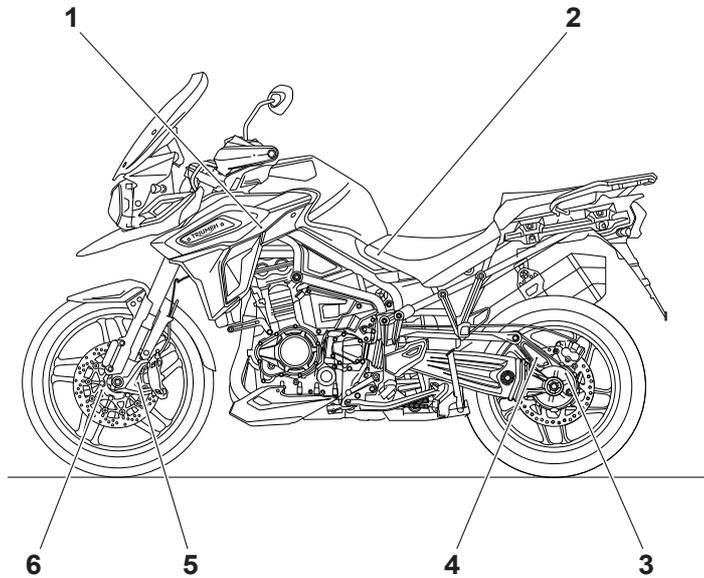
The ABS ECM also continuously monitors the motorcycle lean angle measurements provided by the IMU. If the motorcycle is leaning in a corner and ABS is activated, the ABS ECM uses the lean angle measurements to continually adapt the level of ABS intervention in a manner most suitable to help the rider maintain motorcycle control.

If the rider reduces braking effort, or traction increases (so that traction exceeds braking force, the wheel will rotate once more) the wheel will no longer lock up. The ABS system will detect this and stop controlling brake pressure, and return to its monitoring state.

The system has a self diagnostic function built-in which monitors the fail safe relay, solenoid valves, motor relay, wheel speed sensors, power supply and ground, as well as internal ABS ECM functions. In the event of a malfunction being detected, the ABS ECM will illuminate the ABS warning light, and store a diagnostic trouble code in the system memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

Under normal operation, the ABS warning light will flash on and off after ignition on until the vehicle speed exceeds 3mph (5 km/h). If a trouble code is stored the ABS warning light will stay illuminated and the ABS will not function, however the brakes will continue to operate as a non-ABS braking system. If the ABS warning light does not extinguish, or illuminates whilst the motorcycle is being ridden, refer to the ABS system diagnostics (see System Diagnostics).

ABS - Component Location



1. **ABS modulator**
2. **Inertial Measurement Unit (IMU)**
3. **Rear pulser ring**
4. **Rear wheel speed sensor**
5. **Front wheel speed sensor**
6. **Front pulser ring**

Key to ABS System Circuit Diagram

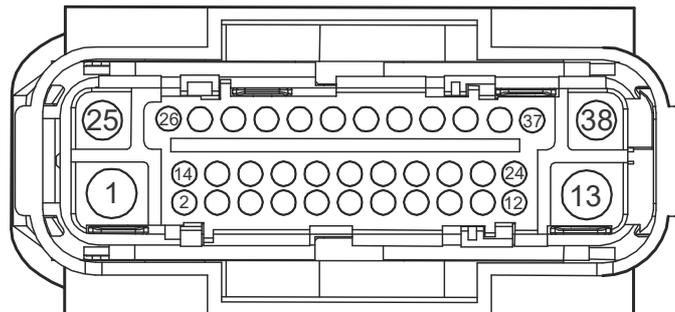
Key	Item Description
1	ABS Modulator
2	Diagnostic Connector
3	Rear Wheel Speed Sensor
4	Front Wheel Speed Sensor
5	Engine ECM
6	ABS Fuse Box

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown

Code	Wiring Colour
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

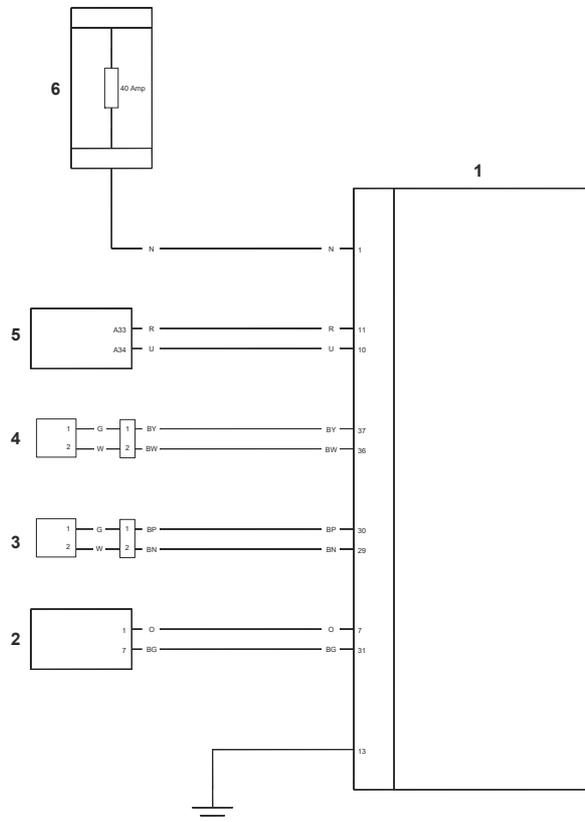
ABS ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from left to right with number one in the bottom left hand corner.

ABS System Circuit Diagram



Diagnostics and Testing

System Diagnostics

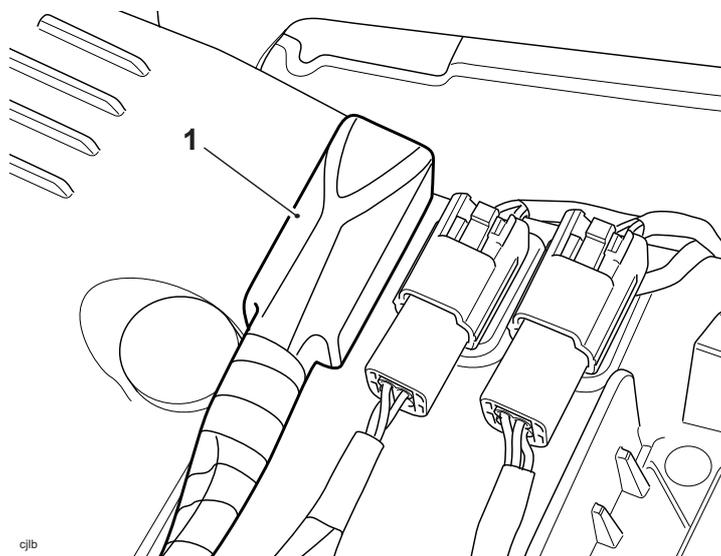
The ABS system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the seat. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

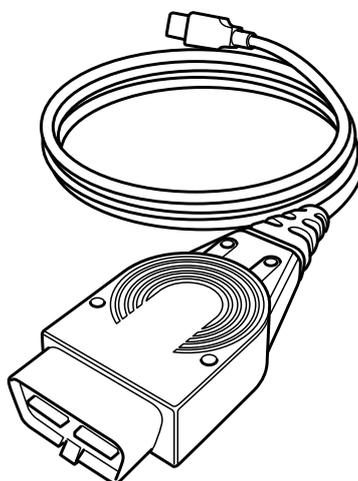
Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see Rider's Seat - Removal) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

2. Plug the Triumph diagnostic interface directly into the diagnostic connector.



T3880057 - Triumph Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see Rider's Seat - Installation).

Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the ABS ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph Diagnostic Tool as a four digit code.

Triumph Diagnostic Software - ABS

Described on the following pages is the range of information which can be retrieved from the ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

Note

- Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.

Build Data

The **Build Data** screen will display the following information:

Function Examined
ECM type
ECM ID number
Software version number

Current Data

The **Current Data** screen will display the following information:

Function Examined	Result Reported (Scale)
Front wheel speed	km/h
Rear wheel speed	km/h
Brake switch status	On/Off
ABS warning light status	On/Off

Bleed System

Using the Triumph diagnostic tool, it is possible to bleed the ABS modulator of trapped air. This is necessary when the hydraulic brake system has been dismantled, or the ABS modulator renewed.

Full details of this procedure are provided on page Bleeding the Front Brakes, Renewing Brake Fluid for front brakes or page Bleeding the Rear Brakes, Renewing Brake Fluid for rear brakes.

Diagnostic Trouble Codes

Diagnostic Trouble Codes (DTCs) are logged in the ABS ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic tool as a four digit code.

DTCs can be removed at any time using the Triumph diagnostic tool.

The system will log the diagnostic trouble codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description	Pinpoint Test
C1611	Front wheel sensor short circuit to ground or open circuit	Front Wheel Sensor Open Circuit/Short Circuit
C1612	Front wheel sensor incorrect or missing signal	Front Wheel Sensor Incorrect or Missing Signal
C1613	Rear wheel sensor short circuit to ground or open circuit	Rear Wheel Sensor Open Circuit/Short Circuit
C1614	Rear wheel sensor incorrect or missing signal	Rear Wheel Sensor

		Incorrect or Missing Signal
C1621	Front wheel pulser ring missing teeth	Front Wheel Pulser Ring Missing Teeth
C1623	Rear wheel pulser ring missing teeth	Rear Wheel Pulser Ring Missing Teeth
C1631	Front wheel input solenoid short circuit to ground or open circuit	Front or Rear Input/Output Solenoid Open/Short Circuit
C1632	Front wheel output solenoid short circuit to ground or open circuit	Front or Rear Input/Output Solenoid Open/Short Circuit
C1633	Rear wheel input solenoid short circuit to ground or open circuit	Front or Rear Input/Output Solenoid Open/Short Circuit
C1634	Rear wheel output solenoid short circuit to ground or open circuit	Front or Rear Input/Output Solenoid Open/Short Circuit
C1635	Master cylinder isolation valve short circuit to ground or open circuit	Front or Rear Input/Output Solenoid Open/Short Circuit
C1636	Low pressure feed valve short circuit to ground or open circuit	Front or Rear Input/Output Solenoid Open/Short Circuit
C1641	Front wheel Actuator (Hydraulic control) wheel lock	Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock
C1643	Rear wheel Actuator (Hydraulic control) wheel lock	Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock
C1651	Motor circuit fault	Motor - Lock; Motor Does Not Run; Motor Runs Continually
C1652	Motor - does not run	Motor - Lock; Motor Does Not Run; Motor Runs Continually

C1653	Motor - runs continually	Motor - Lock; Motor Does Not Run; Motor Runs Continually
C1654	Solenoid relay does not operate or operates continually	Front or Rear Input/Output Solenoid Open/Short Circuit
C1661	Power source voltage too low	Power Source Voltage Drop/Voltage Rise
C1662	Power source voltage too high	Power Source Voltage Drop/Voltage Rise
C1663	Power source - short term under-voltage detected	Power Source Voltage Drop/Voltage Rise
C1664	Power source - long term Under-voltage detected	Power Source Voltage Drop/Voltage Rise
C1671	Incorrect tyre size detected	Incorrect Tyre Size Detected
C1681	ABS ECM internal error	ABS ECM Internal Error
C1682	CAN fault - lost communication with engine ECM	ECM Communication (CAN)
C1683	CAN fault - lost communication with instrument panel	Instrument Communication (CAN)
C1684	CAN fault - all communication lost	All Communication Lost (CAN)
C1690	Modulator - active pressure control malfunction	ABS Modulator Malfunction
C1691	Modulator input (master cylinder) pressure sensor malfunction	ABS Modulator Malfunction
C1692	Modulator output (wheel) pressure sensor malfunction	ABS Modulator Malfunction
C1700	ABS variant coding error	ABS Variant Coding Error
C1711	Inertial Measurement Unit (IMU) ID incompatible	Inertial Measurement Unit (IMU) Incompatible

C1712	CAN fault - lost communication with Inertial Measurement Unit (IMU)	Inertial Measurement Unit (IMU) Communication
C1713	Inertial Measurement Unit (IMU) signal error	Inertial Measurement Unit (IMU) Communication
C1714	Inertial Measurement Unit (IMU) voltage too high or voltage too low	Inertial Measurement Unit (IMU) Voltage Too High or Too Low
C1715	Inertial Measurement Unit (IMU) signal error prior to ABS initialisation	Inertial Measurement Unit (IMU) Signal Error Prior to ABS Initialisation

ABS System Actions

Dependant on the DTC stored, the ABS ECM will act in one of two ways when a fault is detected:

1. Inhibit ABS operation immediately, irrespective of the ABS operating state.
2. Allow an ABS manoeuvre to complete before inhibiting ABS operation.

Note

- **ABS manoeuvre means that the ABS system is in its active state and is controlling brake pressure to prevent the wheel(s) from slipping (skidding).**

Once ABS operation has been inhibited, the ABS ECM will act in one of three ways:

1. Allow the ABS to resume operation immediately if the fault clears.
2. Allow the ABS to resume operation after an ignition cycle if the fault clears.
3. Inhibit the ABS function until the fault is rectified and the DTC erased.

The ABS system will act on the DTC stored according to the table:

Note

- **When vehicle speed has exceeded 6 mph (10 km/h) and the flashing ABS warning light has been extinguished, the ABS has initialised.**

Fault code and description	ABS warning light illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)
C1611 Front wheel sensor short circuit to ground or open circuit	Yes	Yes		No DTC stored for 40 cycles.

Fault code and description	ABS warning light illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)
C1612 Front wheel sensor incorrect or missing signal	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1613 Rear wheel sensor short circuit to ground or open circuit	Yes	Yes		No DTC stored for 40 cycles.
C1614 Rear wheel sensor incorrect or missing signal	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1621 Front wheel pulser ring missing teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1623 Rear wheel pulser ring missing teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1631 Front wheel input solenoid short circuit to ground or open circuit	Yes	Yes		No
C1632 Front wheel output solenoid short circuit to ground or open circuit	Yes		Yes	No

Fault code and description	ABS warning light illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)
C1633 Rear wheel input solenoid short circuit to ground or open circuit	Yes	Yes		No
C1634 Rear wheel output solenoid short circuit to ground or open circuit	Yes		Yes	No
C1635 Master cylinder isolation valve short circuit to ground or open circuit	Yes	Yes		No
C1635 Low pressure feed valve short circuit to ground or open circuit	Yes	Yes		No
C1641 Front wheel Actuator (Hydraulic control) wheel lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1641 Rear wheel Actuator (Hydraulic control) wheel lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1651 Motor circuit fault	Yes		Yes	No
C1651 Motor - does not run	Yes		Yes	No
C1653 Motor - runs continually	Yes		Yes	No

Fault code and description	ABS warning light illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)
C1654 Solenoid relay does not operate or operates continually	Yes	Yes		No
C1661 Power source voltage too low	Yes	Yes		Yes, if voltage rises above a preset threshold.
C1662 Power source voltage too high	Yes	Yes		Yes, if voltage drops below a preset threshold.
C1663 Power source - short term under-voltage detected	Yes	Yes		Yes, if voltage rises above a preset threshold.
C1664 Power source - long term Under-voltage detected	Yes	Yes		No DTC stored for 40 cycles.
C1671 Incorrect tyre size detected	Yes	Yes		Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.
C1681 ABS ECM internal error	Yes	Yes		No
C1682 CAN fault - lost communication with engine ECM				DTC stored for 40 cycles.
C1683 CAN fault - lost communication with instrument panel				DTC stored for 40 cycles.

Fault code and description	ABS warning light illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)
C1684 CAN fault - all communication lost				DTC stored for 40 cycles.
C1690 Modulator - active pressure control malfunction	Yes	Optimised Cornering ABS (OCABS) is inhibited only. Standard ABS remains operational		No DTC stored for 40 cycles.
C1691 Modulator input (master cylinder) pressure sensor malfunction	Yes	Partially intergrated braking and hill hold (If Fitted) are inhibited Standard ABS remains operational		No DTC stored for 40 cycles.
C1692 Modulator output (wheel) pressure sensor malfunction	Yes	Partially intergrated braking and hill hold (If Fitted) are inhibited Standard ABS remains operational		No DTC stored for 40 cycles.
C1700 ABS variant coding error	Yes	Yes	Not applicable	Not applicable
C1711 Inertial Measurement Unit (IMU) ID incompatible	Yes	Not applicable	Not applicable	Motorcycle will not start when this fault is present DTC stored for 40 cycles.
C1712 CAN fault - lost communication with Inertial Measurement Unit (IMU)	Yes	Optimised Cornering ABS (OCABS) is inhibited only. Standard ABS remains operational		No DTC stored for 40 cycles.

Fault code and description	ABS warning light illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)
C1713 Inertial Measurement Unit (IMU) signal error	Yes	Optimised Cornering ABS (OCABS) is inhibited only. Standard ABS remains operational		No DTC stored for 40 cycles.
C1714 Inertial Measurement Unit (IMU) voltage too high or voltage too low	Yes	Optimised Cornering ABS (OCABS) is inhibited only. Standard ABS remains operational		No DTC stored for 40 cycles.
C1715 Inertial Measurement Unit (IMU) signal error prior to ABS initialisation	Yes	Not applicable Fault code is logged before ABS is initialised After ABS has initialised Optimised Cornering ABS (OCABS) is inhibited only. Standard ABS remains operational		No DTC stored for 40 cycles.

ABS Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

Note

- **A major cause of hidden electrical faults can be traced to faulty electrical connectors.**

For example:

- Dirty/corroded terminals
- Damp terminals
- Broken or bent cable pins within multiplugs.

For example, the ABS electronic control module (ABS ECM) relies on the supply of accurate information to enable it to monitor and control the brake system. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

Before Disconnection:

- If testing with a voltmeter, the voltage across a connector should be virtually battery Volts (unless a resistor is fitted in the circuit). If there is a noticeable change, suspect faulty/dirty connections.

When Disconnecting a Connector:

- Check for a security device that must be released before the connector can be separated e.g. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

When Connecting a Connector:

- Ensure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

Disconnection of ABS ECM Connector

! CAUTION

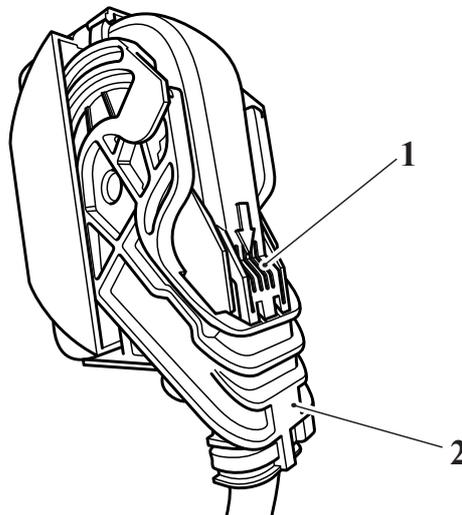
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

! CAUTION

Never disconnect the ABS ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

Always disconnect an ECM after disconnecting the battery negative (black) lead first.

1. Press the locking device and move the lever to the top of the connector while disconnecting it from the ABS ECM.
2. When disconnected, ensure the lever is fully to the top of the connector. An audible click can be heard when it is locked in position.



1. Locking device
2. Lever

CAUTION

The ABS ECM is an integral part of the ABS modulator. Under no circumstances should the ECM be removed from the ABS modulator. If a new ECM is required, repair is by replacement of the ABS modulator and ECM as an assembly only.

Reconnection of the ABS ECM Connector

CAUTION

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

1. Ensure the lever is fully to the top of the connector.
2. Align the connector to its socket on the ABS modulator.

CAUTION

If the lever is not moved fully down into its locked position, it is possible that the connector may not fully engage into its socket.

3. Release the lever by pushing it downwards. At the same time, push the connector into its socket until the lever is fully down and locked in position. An audible click can be heard when locked.

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Pinpoint Tests

Before Starting Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.

WARNING

If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If the DTC is not repeated, this indicates the DTC may have been stored due to external influences such as bad road surfaces or electrical interference.

After Completion of Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If a DTC is stored, there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

Pinpoint Tests

Front Wheel Sensor Open Circuit/Short Circuit

Fault Code	Possible Cause	Action
C1611	Front wheel sensor short circuit to ground or open circuit	Ensure wheel speed sensor connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

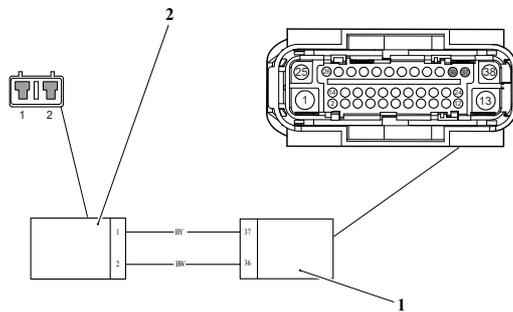
Test	Result	Action	
1	Check cable and terminal integrity: - ABS ECM connector pin 36 and ABS ECM connector pin 37	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit: - ABS ECM connector pin 37 and Ground	OK	Proceed to test 4
		Short circuit	Proceed to test 3
3	Disconnect the front wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 2 (motorcycle harness side) and Ground	OK	Replace the wheel speed sensor, proceed to test 9
		Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4	Check cable for short circuit: - ABS ECM connector pin 36 and Ground	OK	Proceed to test 6
		Short circuit	Proceed to test 5
5	Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and Ground	OK	Replace the wheel speed sensor, proceed to test 9
		Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6	Check cable continuity: - ABS ECM connector pin 36 and Wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
		Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7	Check cable continuity: - ABS ECM connector pin 37 and Wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
		Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8	Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 10 V and 16 V between ABS ECM connector pin 36 (positive) and pin 37 (negative), and measure the current consumption of the wheel speed sensor	1.8 mA to 16.8 mA	Proceed to test 9

Test	Result	Action
	Faulty	Replace the wheel speed sensor, proceed to test 9
9 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Supply Voltage	Min	Typical	Max
10 - 16 V	1.8 mA	7.5 mA	16.8 mA



- 1.
- 2.

Rear Wheel Sensor Open Circuit/Short Circuit

Fault Code	Possible Cause	Action
C1613	Rear wheel sensor short circuit to ground or open circuit	Ensure wheel speed sensor connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

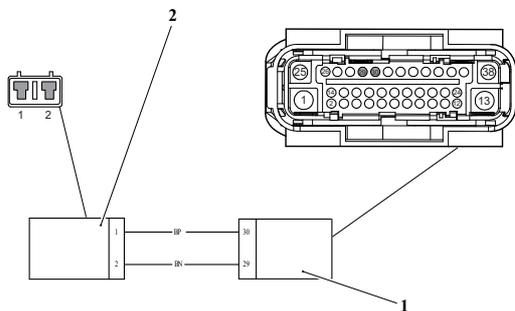
Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 29 and ABS ECM connector pin 30	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 9
2 Check cable for short circuit:	OK	Proceed to test 4

Test	Result	Action
- ABS ECM connector pin 29 and Ground	Short circuit	Proceed to test 3
3 Disconnect the rear wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 29 (motorcycle harness side) and Ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4 Check cable for short circuit: - ABS ECM connector pin 30 and Ground	OK	Proceed to test 6
	Short circuit	Proceed to test 5
5 Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and Ground	OK	Replace the wheel speed sensor, proceed to test 9
	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6 Check cable continuity: - ABS ECM connector pin 29 and Wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7 Check cable continuity: - ABS ECM connector pin 30 and Wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8 Reconnect the rear wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 10 V and 16 V between ABS ECM connector pin 29 (positive) and pin 30 (negative), and measure the current consumption of the wheel speed sensor	1.8 mA to 16.8 mA	Proceed to test 9
	Faulty	Replace the wheel speed sensor, proceed to test 9
9 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Supply Voltage	Min	Typical	Max
10 - 16 V	1.8 mA	7.5 mA	16.8 mA



- 1.
- 2.

Front Wheel Sensor Incorrect or Missing Signal

Fault Code	Possible cause	Action
C1612	Front wheel sensor incorrect or missing signal Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure Ensure wheel speed sensor connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 2
2 Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
	Faulty	Clean or replace the ABS pulser ring, proceed to test 3
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 4
4 Check the wheel speed sensor circuit (see Front Wheel Sensor Open Circuit/Short Circuit)	OK	Contact Triumph service
	Faulty	Rectify the fault and proceed to test 5
5 Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Rear Wheel Sensor Incorrect or Missing Signal

Fault Code	Possible Cause	Action
C1614	Rear wheel sensor incorrect or missing signal Incorrect wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Measure the air gap of the rear wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 2	
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
	Faulty	Clean or replace the ABS pulser ring, proceed to test 3	
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 4	
4	Check the wheel speed sensor circuit (see Rear Wheel Sensor Open Circuit/Short Circuit)	OK	Contact Triumph service
	Faulty	Rectify the fault and proceed to test 5	
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Front Wheel Pulser Ring Missing Teeth

Fault Code	Possible Cause	Action
C1621	Front wheel pulser ring missing teeth Incorrect Wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring:	OK	Proceed to test 2

Test	Air gap between 0.1 mm to 1.5 mm	Result	Action
		Faulty	Rectify the fault and proceed to test 2
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 3
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 4
4	Check the motorcycle wheel for damage/incorrect size	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Rear Wheel Pulser Ring Missing Teeth

Fault Code	Possible cause	Action
C1623	Rear wheel pulser ring missing teeth Incorrect Wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Measure the air gap of the rear wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK Faulty	Proceed to test 2 Rectify the fault and proceed to test 2
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK Faulty	Proceed to test 3 Clean or replace the ABS pulser ring, proceed to test 3
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK Faulty	Proceed to test 4 Rectify the fault and proceed to test 4
4	Check the motorcycle wheel for damage/incorrect size	OK	Proceed to test 5

Test	Result	Action	
	Faulty	Rectify the fault and proceed to test 5	
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Front or Rear Input/Output Solenoid Open/Short Circuit

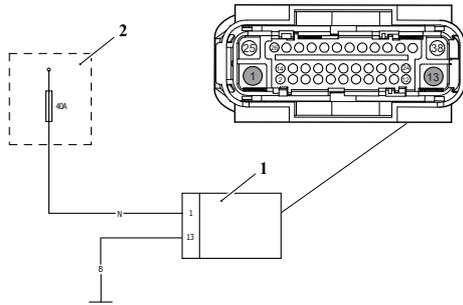
Fault Code	Possible Cause	Action
C1631	Front wheel input solenoid short circuit to ground or open circuit	Ensure ABS ECM connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:
C1632	Front wheel output solenoid short circuit to ground or open circuit	
C1633	Rear wheel input solenoid short circuit to ground or open circuit	
C1634	Rear wheel output solenoid short circuit to ground or open circuit	
C1635	Master cylinder isolation valve short circuit to ground or open circuit	
C1636	Low pressure feed valve short circuit to ground or open circuit	
C1654	Solenoid relay does not operate or operates continually	

Pinpoint Tests

Test	Result	Action	
1	Check the ABS fuse	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 2	
2	Check cable and terminal integrity: - ABS ECM connector pin 1 and ground pin 13	OK	Replace fuse, proceed to test 5
	Faulty	Rectify fault, replace fuse, proceed to test 5	
3	Check cable continuity: With Ignition 'ON', check voltage between: - ABS ECM connector pin 1 and ground pin 13	Voltage greater than 11 V	Proceed to test 4
	Voltage less than 11 V	Locate and rectify wiring fault, proceed to test 5	
4	Check cable for continuity:	OK	Proceed to test 5

Test	Result	Action
ABS ECM connector pin 13 and Ground	Faulty	Locate and rectify wiring fault, proceed to test 5
5 Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



- 1.
- 2.

Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock

Fault Code	Possible Cause	Action
C1641	Front wheel Actuator (Hydraulic control) wheel lock	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:
C1643	Rear wheel Actuator (Hydraulic control) wheel lock	

Pinpoint Tests

Test	Result	Action
1 Check the relevant wheel for brake bind caused by caliper or master cylinder faults, or other mechanical causes	OK	Proceed to test 2
	Faulty	Rectify the fault and proceed to test 4
2 Measure the air gap of the wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 3
	Faulty	Rectify the fault and proceed to test 4
3 Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4

Test	Result	Action	
	Faulty	Rectify the fault and proceed to test 4	
4	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

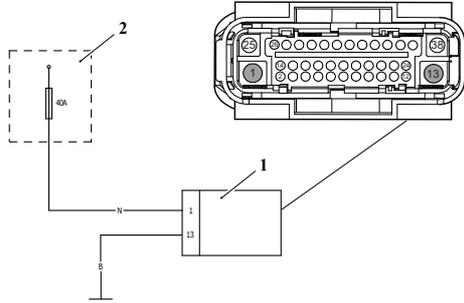
Motor - Lock; Motor Does Not Run; Motor Runs Continually

Fault Code	Possible Cause	Action
C1651	Motor circuit fault	Ensure ABS ECM connector is secure Turn the ignition 'ON' Proceed to pinpoint test 1:
C1652	Motor - does not run	
C1653	Motor - runs continually	

Pinpoint Tests

Test	Result	Action	
1	Check ABS fuse integrity	OK	Proceed to test 2
	Faulty	Replace fuse and proceed to test 5	
2	Check the motor function: Check that with the motorcycle stationary and the ABS ECM modulator connected, the motor does not operate	OK	Proceed to test 3
	Motor runs continually	Contact Triumph service	
3	Check cable continuity: With Ignition 'ON', check voltage between: - ABS ECM connector pin 1 and ground pin 13	Voltage greater than 10 V	Proceed to test 4
	Voltage less than 10 V	Locate and rectify wiring fault, proceed to test 5	
4	Check cable for continuity: - ABS ECM connector pin 13 and Ground	OK	Proceed to test 5
	Faulty	Locate and rectify fault, proceed to test 5	
5	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



- 1.
- 2.

Power Source Voltage Drop/Voltage Rise

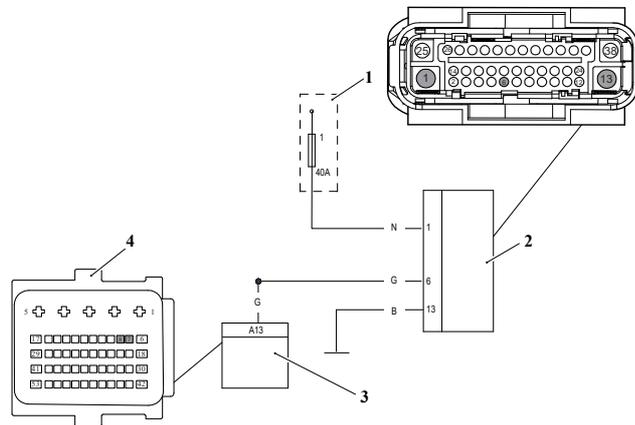
Fault Code	Possible Cause	Action
C1661	Power source voltage too low	Ensure ABS ECM connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:
C1662	Power source voltage too high	
C1663	Power source - short term under-voltage detected	
C1664	Power source - long term Under-voltage detected	

Pinpoint Tests

Test	Result	Action
1 Check ABS fuse integrity	OK	Proceed to test 2
	Faulty	Replace fuse and proceed to test 6
2 Check cable and terminal integrity: - ABS ECM connector pin 6 - ABS ECM connector pin 13 - ABS ECM connector pin 1	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 6
3 Check the cable for continuity: - ABS ECM connector pin 13 and Ground	OK	Proceed to test 4
	Faulty	Rectify wiring harness fault, proceed to test 6
4 Check battery voltage: With engine stop switch in RUN position, check the voltage between:	Voltage greater than 10 V	Proceed to test 5

Test	Result	Action
ABS ECM connector pin 6 and Ground pin 13	Voltage less than 10 V	Locate and rectify fault, proceed to test 6
5 Check battery voltage: Reconnect ABS ECM connector and start the engine. Check the voltage between: - Battery positive (red) terminal and negative (black) terminal	Voltage between 10 V and 16 V	Proceed to test 6
	Voltage greater than 16 V	Check the battery charging circuit. Locate and rectify fault, proceed to test 6
6 Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



- 1.
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Incorrect Tyre Size Detected

Fault Code	Possible Cause	Action
C1671	Incorrect tyre size detected Incorrect tyre pressures Incorrect wheel speed sensor air gap Damaged or dirty pulser ring	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check for installation of wheels and tyres of the correct size	OK	Proceed to test 2

Test	Result	Action	
	Faulty	Rectify fault, proceed to test 5	
2	Check the tyre pressures	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5	
3	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 4
	Faulty	Clean or replace the ABS pulser ring, proceed to test 5	
4	Measure the air gap of the wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 5
	Faulty	Rectify the fault and proceed to test 5	
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

ABS ECM Internal Error

Fault Code	Possible Cause	Action
C1681	ABS ECM internal error	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Measure the air gap of the wheel speed sensors between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 1
	Faulty	Rectify the fault and proceed to test 4	
2	Check the pulser rings for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 2
	Faulty	Clean or replace the ABS pulser ring, proceed to test 4	
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
	Faulty	Rectify the fault and proceed to test 4	
4	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

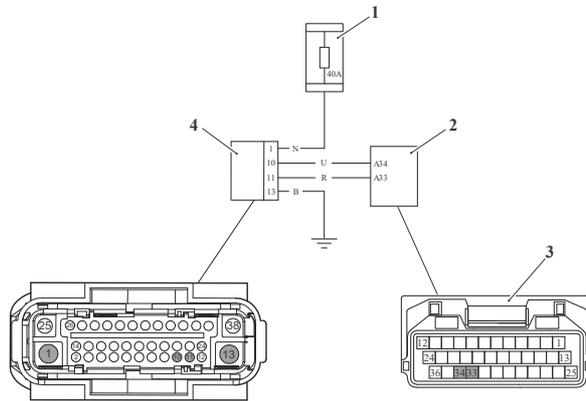
ECM Communication (CAN)

Fault Code	Possible Cause	Action
C1682	CAN fault - lost communication with engine ECM	View and note 'freeze-frame' data if available Disconnect Engine ECM and ABS ECM connectors and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check that the engine stop switch is in the RUN position	RUN	Proceed to test 2
		STOP	Turn the engine stop switch to the RUN position
2	Verify Engine ECM is powered, Turn on Ignition and measure the voltage between: - Engine ECM pin B01 and Engine ECM pin B08	10 - 14 V	Proceed to test 3
		Faulty	Check main fuse box, fuse 8. Replace if blown. Proceed to test 3
3	Check cable and terminal integrity: - ABS ECM pin 11 - ABS ECM pin 10 - Engine ECM pin A33 - Engine ECM pin A34	OK	Proceed to test 4
		Faulty	Rectify fault, proceed to test 7
4	Check cable for short circuit: - ABS ECM pin 11 to ground - ABS ECM pin 10 to ground	OK	Proceed to test 5
		Short Circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable continuity: - ABS ECM pin 11 to Engine ECM pin A33 - ABS ECM pin 10 to Engine ECM pin A34	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
6	Check cable for short circuit: - ABS ECM pin 11 to ABS ECM pin 10	OK	Proceed to test 7
		Short Circuit	Locate and rectify wiring fault, proceed to test 7
7	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



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- 3.
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Instrument Communication (CAN)

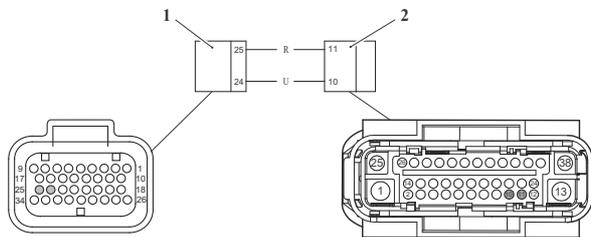
Fault Code	Possible Cause	Action
C1683	CAN fault - lost communication with instrument panel	View and note 'freeze-frame' data if available Ensure instrument connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Verify instrument pack is operating, Turn on Ignition:	OK	Proceed to test 2
	Faulty	Check fuse 9. Replace if blown. Proceed to test 2
2 Check cable and terminal integrity: - ABS ECM pin 11 - ABS ECM pin 10 - Instruments pin 25 - Instruments pin 24	OK	Disconnect instruments and proceed to test 3
	Faulty	Rectify fault, proceed to test 6
3 Check cable for short circuit: - ABS ECM pin 11 to ground - ABS ECM pin 10 to ground	OK	Proceed to test 4
	Short Circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable continuity: - ABS ECM pin 11 to instruments pin 25	OK	Proceed to test 5

Test	Result	Action
ABS ECM pin 10 to instruments pin 24	Open circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable for short circuit: - ABS pin 11 to ABS pin 10	OK	Proceed to test 6
	Short Circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



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- 2.

All Communication Lost (CAN)

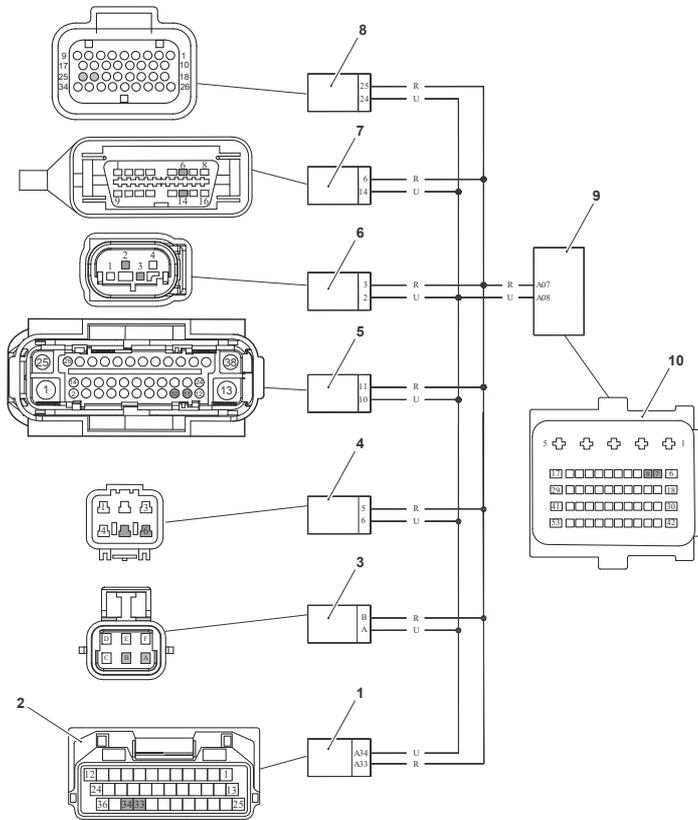
Fault Code	Possible Cause	Action
C1684	CAN fault - all communication lost	View and note 'freeze-frame' data if available Disconnect Chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM pin 11 - ABS ECM pin 10 - Chassis ECM pin A07 - Chassis ECM pin A08 - Instruments pin 25 - Instruments pin 24	OK	Proceed to test 2

Test	Result	Action
<ul style="list-style-type: none"> - Diagnostic connector pin 6 - Diagnostic connector pin 14 - Engine ECM pin A33 - Engine ECM pin A34 - IMU pin 3 - IMU pin 2 - Electronic steering lock pin 5 - Electronic steering lock pin 6 - Headlights pin A - Headlights pin B 	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: <ul style="list-style-type: none"> - ABS ECM pin 11 to ground - ABS ECM pin 10 to ground 	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: <ul style="list-style-type: none"> - ABS ECM pin 11 to instruments pin 25 - ABS ECM pin 10 to instruments pin 24 - ABS ECM pin 11 to Chassis ECM pin A07 - ABS ECM pin 10 to Chassis ECM pin A08 - ABS ECM pin 11 to Diagnostic Connector pin 6 - ABS ECM pin 10 to Diagnostic Connector pin 14 - ABS ECM pin 11 to Engine ECM pin A33 - ABS ECM pin 10 to Engine ECM pin A34 - ABS ECM pin 11 to IMU pin 3 - ABS ECM pin 10 to IMU pin 2 - ABS ECM pin 11 to electronic steering lock pin 5 - ABS ECM pin 10 to electronic steering lock pin 6 - ABS ECM pin 11 to headlights pin B - ABS ECM pin 10 to headlights pin A 	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: <ul style="list-style-type: none"> - ABS ECM pin 11 to Chassis ECM pin A08 	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



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ABS Modulator Malfunction

Fault Code	Possible Cause	Action
C1690	Modulator - active pressure control malfunction	Contact Triumph service
C1691	Modulator input (master cylinder) pressure sensor malfunction	
C1692	Modulator output (wheel) pressure sensor malfunction	

ABS Variant Coding Error

Fault Code	Possible cause	Action
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Fault Code	Possible cause	Action
C1700	ABS variant coding error	Note the ABS build data. Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check ABS modulator part number is correct for the motorcycle.	OK	Proceed to test 2
		Incorrect	Replace ABS modulator with correct part and proceed to test 2
2	Clear fault code, check for normal operation.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Inertial Measurement Unit (IMU) Incompatible

Fault Code	Possible Cause	Action
C1711	Inertial Measurement Unit (IMU) ID incompatible	Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check IMU part number is correct for the motorcycle	OK	Proceed to test 2
		Incorrect	Replace IMU with correct part and proceed to test 3
2	Check that the engine ECM calibration is correct for the motorcycle using the diagnostic tool	OK	Proceed to test 3
		Incorrect	Download the correct calibration using diagnostic tool, proceed to test 3
3	Clear fault code and check for normal operation	OK	Action complete - quit test
		Fault still present	Contact Triumph service

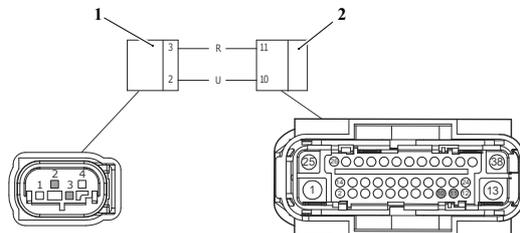
Inertial Measurement Unit (IMU) Communication

Fault Code	Possible Cause	Action
C1712	CAN fault - lost communication with Inertial Measurement Unit (IMU)	View and note 'freeze-frame' data if available Disconnect ABS ECM and IMU. Proceed to pinpoint test 1:
C1713	Inertial Measurement Unit (IMU) signal error	

Pinpoint Tests

Test	Result	Action
1 Verify IMU is powered. Turn on Ignition. Measure voltage between: - IMU pin 4 and IMU pin 1	10 V - 14 V	Proceed to test 2
	Faulty	Check fuse 6. Replace if blown. Proceed to test 2
2 Check cable and terminal integrity: - ABS ECM pin 11 - ABS ECM pin 10 - IMU pin 3 - IMU pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 6
3 Check cable for short circuit: - ABS ECM pin 11 to ground - ABS ECM pin 10 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable continuity: - ABS ECM pin 11 to IMU pin 3 - ABS ECM pin 10 to IMU pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable for short circuit: - ABS pin 11 to ABS pin 10	OK	Proceed to test 6
	Short Circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



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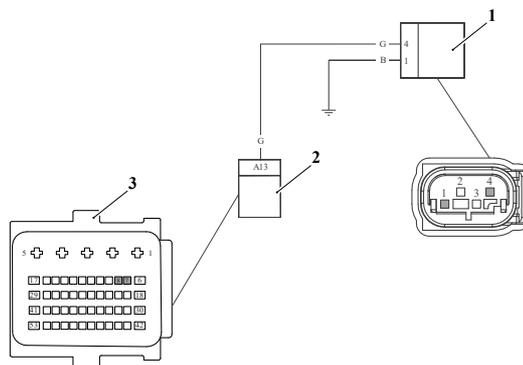
Inertial Measurement Unit (IMU) Voltage Too High or Too Low

Fault Code	Possible Cause	Action
C1714	Inertial Measurement Unit (IMU) voltage too high or voltage too low	View and note 'freeze-frame' data if available

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - IMU pin 1 - IMU pin 4	OK	Disconnect IMU and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for short circuit: - IMU pin 4 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable continuity: - IMU pin 1 to ground Engine stop switch in RUN position and check cable continuity: - Chassis ECM pin 13 to IMU pin 4	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 4
4 Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



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- 3.

Inertial Measurement Unit (IMU) Signal Error Prior to ABS Initialisation

Fault Code	Possible Cause	Action
C1715	Inertial Measurement Unit (IMU) signal error prior to ABS initialisation	Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check IMU part number is correct for the motorcycle.	OK	Proceed to test 2
		Incorrect	Replace IMU with correct part and proceed to test 3
2	Check the IMU and its mounting arrangement for correct installation: - Check all components are correctly assembled. - Check all fixings are tightened to the correct torque. - Check the IMU electrical connector is securely connected.	OK	Proceed to test 3
		Incorrect	Rectify fault Proceed to test 3
3	Clear fault code and check for normal operation.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Removal and Installation - Front Brakes Components

Front Brake Pads - Removal

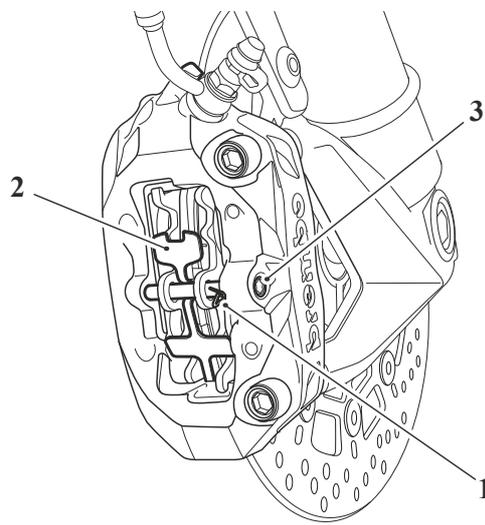
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **Note the position and orientation of the pad retaining pin clip, anti-rattle spring and brake pads prior to removal.**

1. Remove the clip from the brake pad retaining pin.
2. While pressing down on the anti-rattle spring, remove the brake pad retaining pin.



1. **Clip**
2. **Anti-rattle spring**
3. **Brake pad retaining pin**

3. Collect the anti-rattle spring.

CAUTION

In the following operation, never lever directly against the disc, caliper or pad lining material. Always use a levering tool made from a soft material that will not cause damage to the load bearing surfaces.

Brake fluid will be displaced as the caliper pistons are compressed. To prevent body damage, ensure that the displaced fluid does not come into contact with any part of the bodywork.

4. Carefully push the brake pads apart to force the caliper pistons back to allow withdrawal of the pads.

Note

- **Complete the installation of the brake pads to one caliper (see Front Brake Pads - Installation) before removing the pads from the other caliper.**

Front Brake Pads - Inspection

1. Check the brake pad retaining pin, retaining pin clip and anti-rattle spring. Renew any component which shows signs of damage and corrosion.
2. Inspect the brake pads for wear (see Brake Wear Inspection).

Front Brake Pads - Installation

WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

1. Fit new brake pads as an axle set or, if all the pads are in a serviceable condition, clean the pad grooves before refitting all pads in their original positions.

WARNING

 **WARNING**

Do not apply more than a minimum coating of grease to the brake pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Lubricate the brake pad retaining pins using a minimum amount of proprietary high temperature brake grease.
3. Fit the anti-rattle spring over the brake pads as noted during removal and push down to allow the brake pad retaining pin to slide across the top of the spring.
4. Fit the brake pad retaining pin as noted during removal and tighten to **6 Nm**.
5. Fit the brake pad retaining pin clip.
6. Pump the brake lever to correctly position the caliper pistons.

 **WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident. Observe the brake fluid handling warnings given in the General Information section (see Brakes).

 **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

7. Check the front brake fluid level and top up as required with new DOT 4 fluid.
8. Check for correct brake operation. Rectify as necessary.

 **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Caliper - Removal

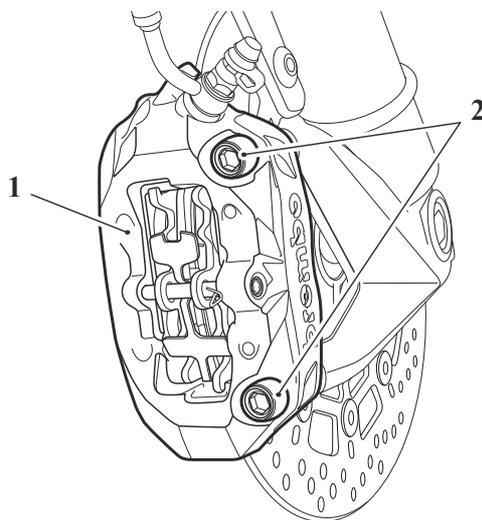
 **WARNING**

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

 **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Remove the brake pads (see Front Brake Pads - Removal).
2. Disconnect the brake hose at the caliper (two hoses on left hand caliper), and place the free end of the hose(s) in a suitable container to collect the brake fluid. Discard the sealing washers.
3. Remove the two caliper bolts.



1. Caliper
2. Bolts

4. Manoeuvre the caliper clear of the disc, taking care not to damage the wheel.

Front Brake Caliper - Disassembly

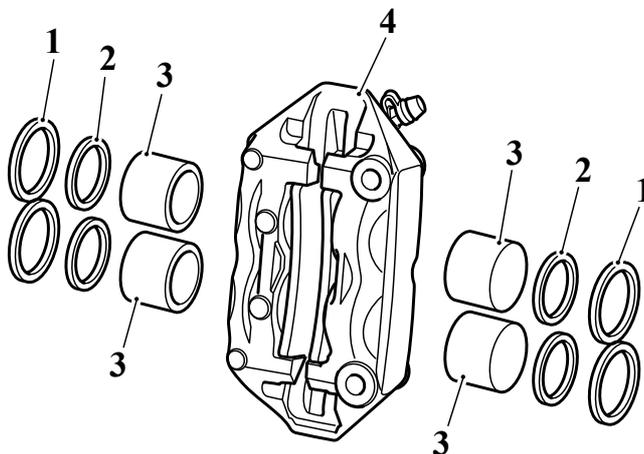
! WARNING

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

! WARNING

Ensure the seal grooves in the caliper bores are not damaged during the removal of the seals. Damage to the seal grooves may allow brake fluid to leak past the seals resulting in a dangerous riding condition leading to loss of motorcycle control and an accident.

1. Cover the caliper opening with a clean heavy cloth and using either compressed air or by reconnecting the master cylinder and pumping the brake lever, remove the pistons one at a time.



chbd

1. Dust seal
2. Piston seal

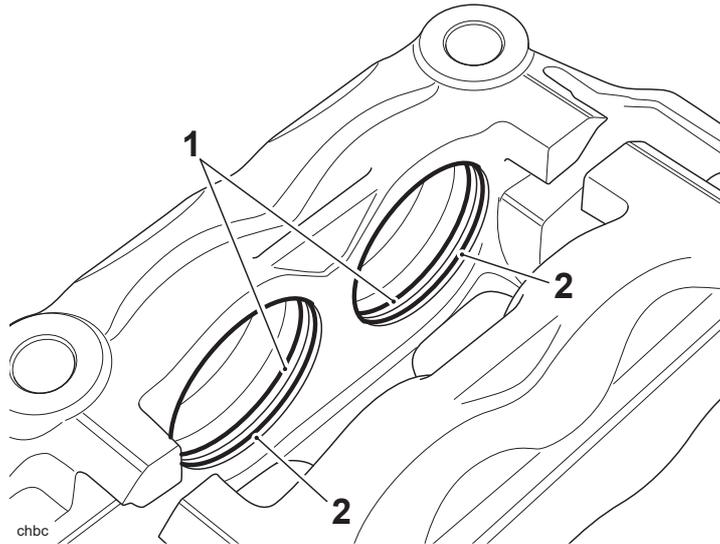
3. Pistons

4. Caliper

2. Extract the dust seals and piston seals, taking care not to damage the caliper bores. Discard the old seals, these must not be re-used.

Note

- The piston seals are slightly thicker than the dust seals.



1. Piston seals

2. Dust seals

3. Check the pistons, caliper and mounting bracket for signs of damage, paying particular attention to the caliper bores and pistons. If damage is present, renew the worn component or the complete caliper assembly.

Front Brake Caliper - Inspection

WARNING

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

A dangerous riding condition leading to loss of control of the motorcycle or an accident could result if this warning is ignored.

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Front Brake Caliper - Assembly

WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

WARNING

WARNING

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

If all components are serviceable, obtain a piston seal kit and reassemble the caliper as follows:

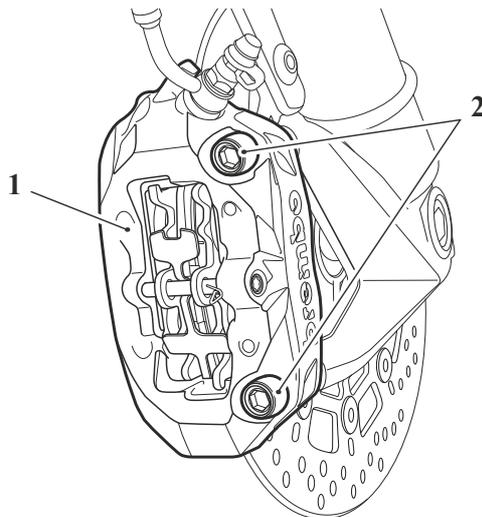
1. Ensure all components are clean, then fit the new seals to their grooves in the caliper bores.
2. Lubricate the fluid seals, caliper bore and the outside of the pistons with clean DOT 4 brake fluid.
3. Ease the pistons squarely back into the bores, taking care not to displace the seals.

Front Brake Caliper - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

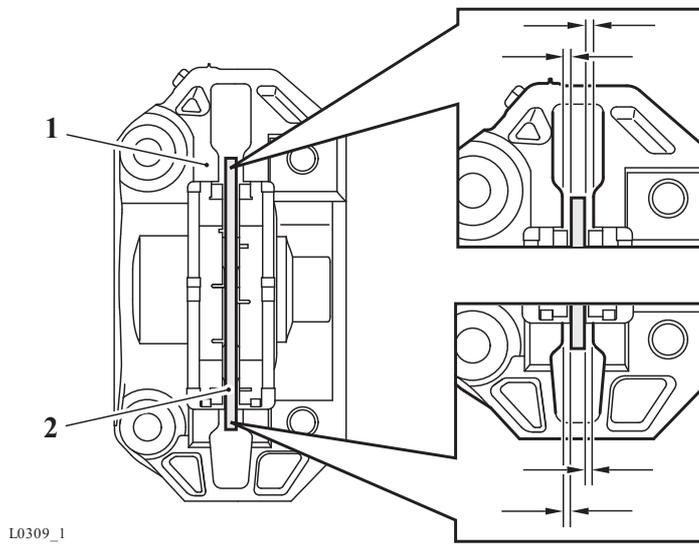
1. Thoroughly clean the threaded fixing holes for the front fork brake caliper fixings.
2. Thoroughly clean the threaded part of the brake caliper fixings and smear the first four threads with a proprietary copper based grease.
3. Position the brake caliper over the disc.
4. Secure the brake caliper with the fixings and tighten sufficiently to bring the caliper into contact with its mounting points, while allowing a small amount of lateral movement. Do not fully tighten at this stage.



1. Caliper
2. Fixings

Note

- Before tightening, the brake caliper should be positioned such that it is aligned as centrally as possible over the brake disc.
5. Visually check the clearances between the caliper body and brake disc in the four locations shown below.



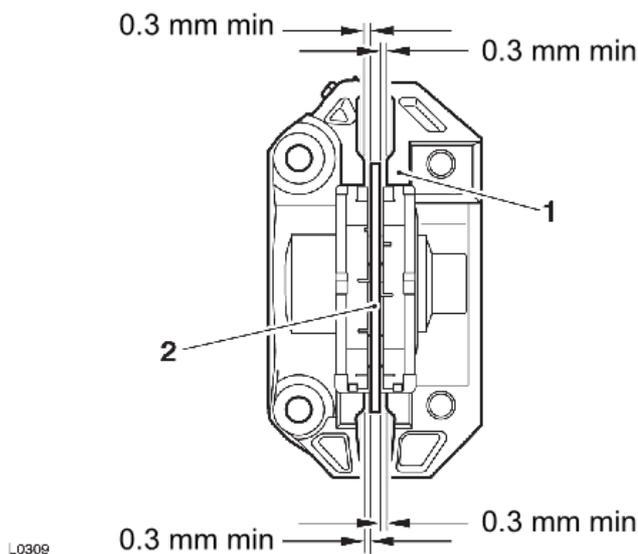
L0309_1

1. Caliper body
2. Brake disc

6. Slide the caliper body inwards or outwards against its fixings as required to achieve the most equal clearances possible on either side of the brake disc.
7. Holding the caliper in position against its mounting fixings, tighten the fixings to **50 Nm**.

Note

- When the brake caliper is fitted, there must be a minimum gap of 0.3 mm between the caliper and brake disc.
8. Using feeler gauges, measure the gap between the brake disc and the caliper at the four measurement points shown in the following illustration. Minimum gap to be 0.3 mm.



L0309

1. Caliper
2. Brake disc

9. If necessary, loosen the caliper fixings and adjust the caliper alignment to achieve the minimum gap of 0.3 mm on all four measurement points. Re-tighten the bolts to **50 Nm**.
10. If removed, refit the brake pads (see Front Brake Pads - Installation).
11. Connect the brake hose(s) to the caliper incorporating new sealing washers on each side of the union(s). Ensure that the brake hose is located into its retaining lug on the mudguard.

12. Tighten the brake hose union bolt to **25 Nm**.

 **WARNING**

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.
Observe the brake fluid handling warnings given earlier in this section of the manual.

 **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

- Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
- Bleed the front brakes (see Bleeding the Front Brakes, Renewing Brake Fluid).
- Check the brakes for correct operation. Rectify any faults as necessary.

 **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Discs - Removal

 **WARNING**

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

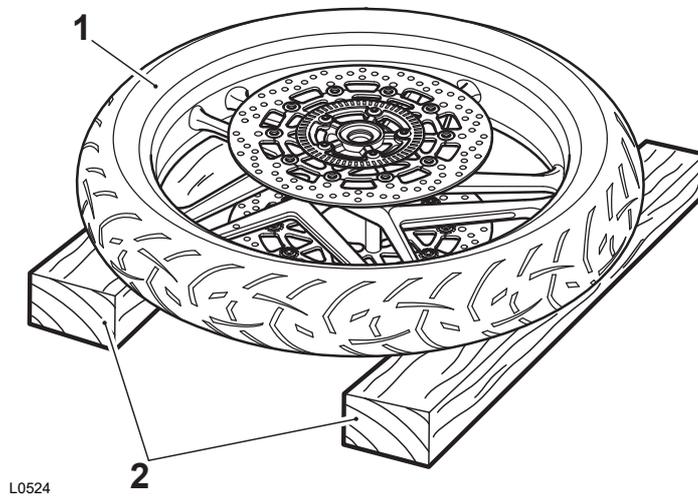
 **WARNING**

Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable.

A dangerous riding condition leading to an accident could result if this warning is ignored.

Perform the following operations:

- Front Wheel - Removal
1. Support the wheel on blocks as illustrated to avoid damage to the wheel centre.



1. **Wheel**
2. **Support blocks**

2. Remove and discard the bolts.
3. Detach the disc. Collect the ABS pulser ring from the left hand disc.
4. Repeat for the other disc.

Front Discs - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Locate the left hand brake disc and ABS pulser ring to the wheel.
2. Fit new bolts and tighten to **22 Nm**.
3. Fit the right hand brake disc in the same way.

Perform the following operations:

- Front Wheel - Installation
- Check for correct brake operation. Rectify if necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Master Cylinder - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Handguards - Removal

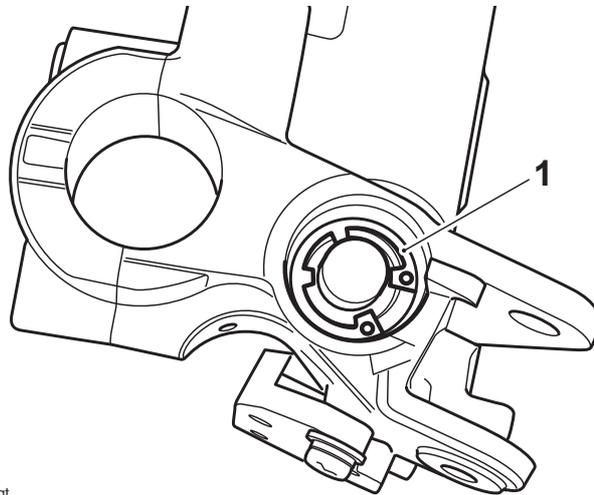
1. To drain the fluid from the master cylinder, attach a tube to the right hand caliper bleed nipple, loosen the nipple and allow the fluid to drain into a suitable container. Operate the brake lever until all fluid has been expelled.

Note

- **Note the setting of the brake lever adjuster to ensure it is returned to the same position when the overhaul operation is complete.**
 - **Note the position of the handguard bracket for installation.**
2. Remove the lock nut and pivot bolt securing the brake lever to the master cylinder and remove the lever. Collect the handguard bracket.
 3. Disconnect the brake hose from the master cylinder. Discard the two sealing washers.
 4. Release the clamp bolts from the handlebar and remove the master cylinder.

Front Brake Master Cylinder - Disassembly

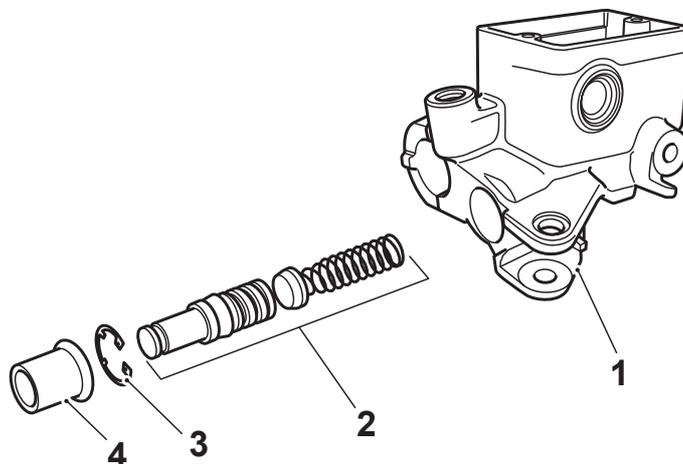
1. Detach the rubber boot from the lever end of the cylinder.
2. Remove the circlip from beneath the boot.



ceqt

1. Circlip

3. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.

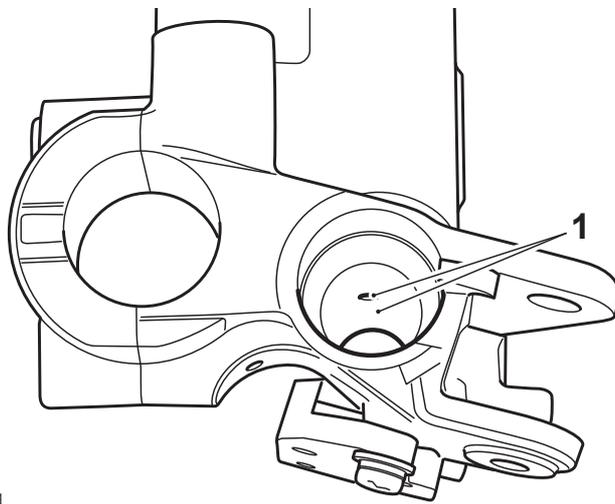


cequ

1. Master cylinder
2. Spring and piston assembly
3. Circlip
4. Rubber boot

Front Brake Master Cylinder - Inspection

1. Check the following for wear, damage, cracks or deterioration:
 - o Cylinder bore
 - o Rubber boot
 - o Spring
 - o Piston
 - o Pivot bolt.
2. Always renew the piston and seal set if the cylinder is dismantled.
3. Check that the two ports in the master cylinder bore are not blocked.



1. Ports

Front Brake Master Cylinder - Assembly

WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

WARNING

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake and clutch fluid.

Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Lubricate the piston and cylinder with new, clean brake and clutch fluid.

WARNING

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

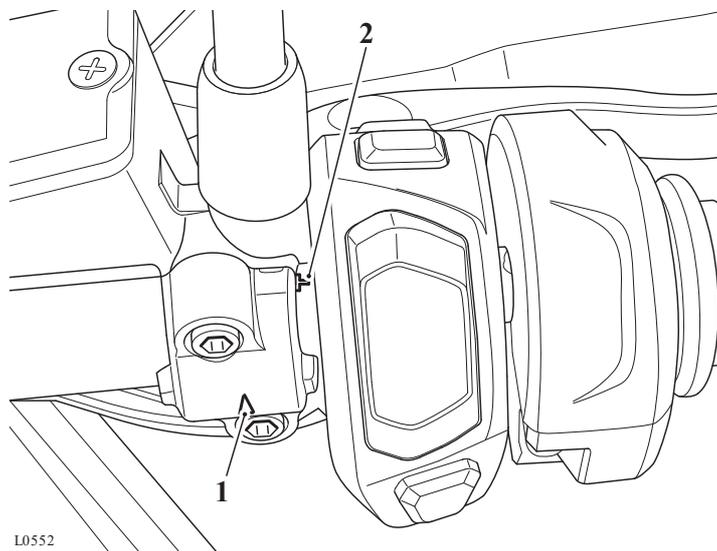
2. Fit the new piston set into the master cylinder and retain with a new circlip.
3. Refit the master cylinder boot.

Front Brake Master Cylinder - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Locate the master cylinder to the handlebars and position the clamp with the 'UP' arrow pointing upwards.



1. 'UP' Arrow
2. Alignment mark

2. Align the master cylinder/clamp split line with the alignment mark on the handlebar.
3. Tighten the clamp bolts, upper first and then the lower to **12 Nm**.
4. Connect the brake hose to the master cylinder incorporating new sealing washers. Tighten the banjo bolt to **25 Nm**.
5. Position the brake lever ensuring that the pivot boss is correctly aligned to the push rod. position the handguard bracket as noted during removal.
6. Apply a smear of silicone grease to the shank of the brake lever pivot bolt.
7. Fit and tighten the pivot bolt to **1 Nm**.
8. Counter hold the pivot bolt, fit and tighten the lock nut to **6 Nm**.
9. Refit the right hand handguard (see Handguards - Installation).

WARNING

Use only DOT 4 specification brake and clutch fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

10. Refit the battery (see Battery - Installation).
11. Fill and bleed the front brakes (see Bleeding the Front Brakes, Renewing Brake Fluid).

WARNING

Always return the lever adjuster to the original setting noted during removal. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of control or an accident.

12. Reset the brake lever adjuster to the original setting.
13. Examine the system for correct operation and fluid leaks. Rectify as necessary.
14. Refit the rider's seat (see Rider's Seat - Installation).
15. Check for correct brake operation. Rectify as necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Removal and Installation - Rear Brakes Components

Rear Brake Pads - Removal

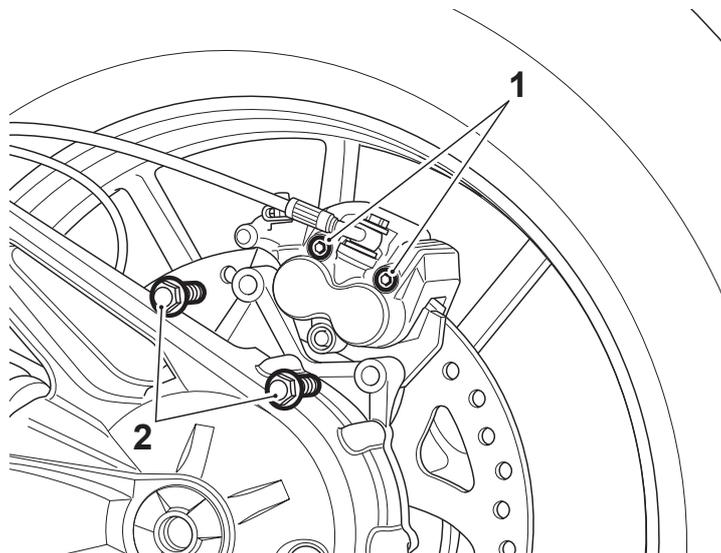
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Do not allow a brake component to hang unsupported on the brake hose or line.
Brake hoses or lines that are not supported may become damaged or bent.
Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

1. Loosen the brake pad retaining pins.
2. Remove the caliper mounting bolts and position the caliper to allow withdrawal of the pad retaining pins.

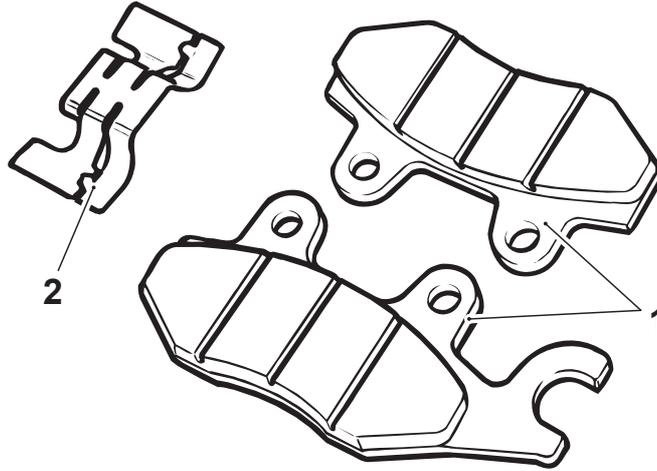


1. **Pad retaining pins**
2. **Caliper mounting bolts**

WARNING

Before removing the brake pads, note the relationship of the pads to the caliper and ensure that, on assembly, they are fitted in the same way.

3. Press downwards on both pads and remove the pad retaining pins.
4. Remove the brake pads and inspect for damage or wear beyond the service limit. Replace if necessary.
5. Remove the anti-rattle spring and inspect for damage. Replace if necessary.



gaed1

1. **Brake pads**
2. **Anti-rattle spring**

Rear Brake Pads - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. If fitting new pads, use hand pressure to compress the caliper piston fully into its bore.
2. Fit the anti-rattle spring into the caliper.
3. Renew the brake pads as a pair or, if both pads are in a serviceable condition, clean the pad grooves before fitting them.
4. Fit the brake pads to the caliper in the positions noted during removal.

 **WARNING**

Do not apply more than a minimum coating of grease to the brake pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

5. Lubricate the brake pad retaining pin using a minimum amount of proprietary high temperature copper based grease. Press down on both pads and fit the retaining pins.
6. Position the caliper over the disc ensuring both pads are correctly fitted.
7. Fit the caliper bolts and tighten to **40 Nm**.
8. Tighten the brake pad retaining pin to **17 Nm**.
9. Pump the brake pedal to correctly position the caliper pistons.
10. Check the brake fluid level in the rear reservoir and top-up as required with new DOT 4 fluid.

 **WARNING**

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

11. Check for correct brake operation. Rectify as necessary.

 **WARNING**

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Caliper - Removal

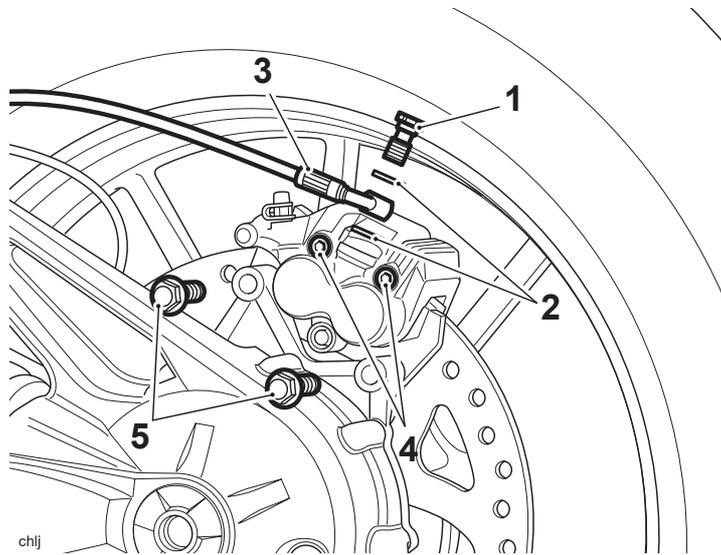
 **WARNING**

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

 **CAUTION**

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Disconnect the rear brake hose at the caliper and place the free end of the hose in a suitable container to collect the brake fluid. Discard the sealing washers.
2. Loosen the pad retaining pins.
3. Remove the caliper mounting bolts.
4. Remove the brake caliper assembly.



1. Banjo bolt
2. Sealing washers
3. Brake hose
4. Pad retaining pins
5. Caliper mounting bolts

Rear Brake Caliper - Disassembly

WARNING

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

1. Remove the brake pads and anti-rattle spring (see Rear Brake Pads - Removal).
2. Cover the caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake lever, remove the piston.

Rear Brake Caliper - Inspection

WARNING

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

A dangerous riding condition leading to loss of control of the motorcycle or an accident could result if this warning is ignored.

1. Check the piston and caliper bore for corrosion, scoring and damage. Renew as necessary.
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Rear Brake Caliper - Assembly

WARNING

! WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

! WARNING

Ensure that the caliper bores do not become scratched during removal and assembly.

A dangerous riding condition leading to an accident could result if this warning is ignored.

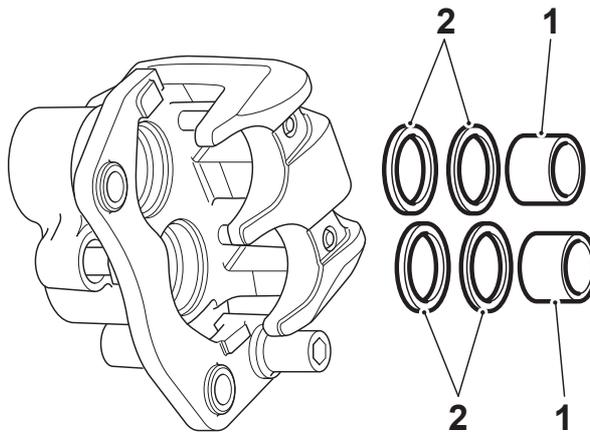
! WARNING

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Fit new fluid seals to the caliper. Apply brake fluid to the outside of the caliper pistons and fluid seal.



chlp

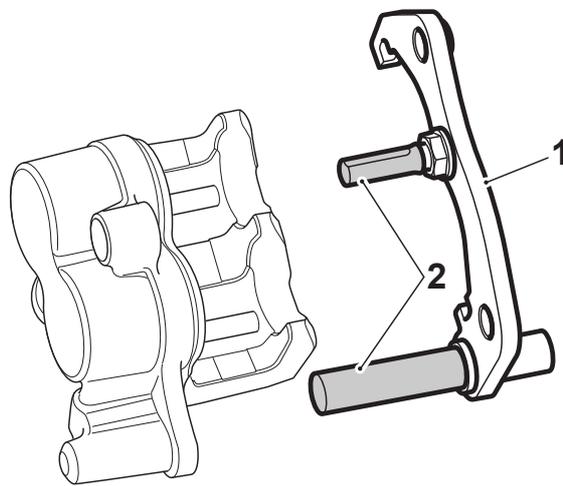
1. **Pistons**
2. **Seals**

! WARNING

Ensure that the piston does not tip during assembly as this could damage the caliper.

A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Carefully push the piston into the caliper by hand.
3. Lubricate the mounting bracket pins with silicone based grease (such as T2022021 supplied by Triumph) then reassemble the bracket and caliper. Ensure the pin gaiters are correctly located on both the bracket and caliper.



chlo

1. **Mounting bracket**
2. **Sliding pins**

WARNING

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

4. Fit the brake pads (see Rear Brake Pads - Installation).

Rear Brake Caliper - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the caliper over the disc ensuring the pads are correctly aligned on both sides of the disc.
2. Fit the caliper retaining bolts and tighten to **40 Nm**.
3. Connect the brake hose to the caliper incorporating new washers on each side of the banjo bolt.
4. Tighten the banjo bolt to **25 Nm**.

WARNING

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

5. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
6. Bleed the rear brake (see Bleeding the Rear Brakes, Renewing Brake Fluid).
7. Check for correct brake operation. Rectify as necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Disc - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

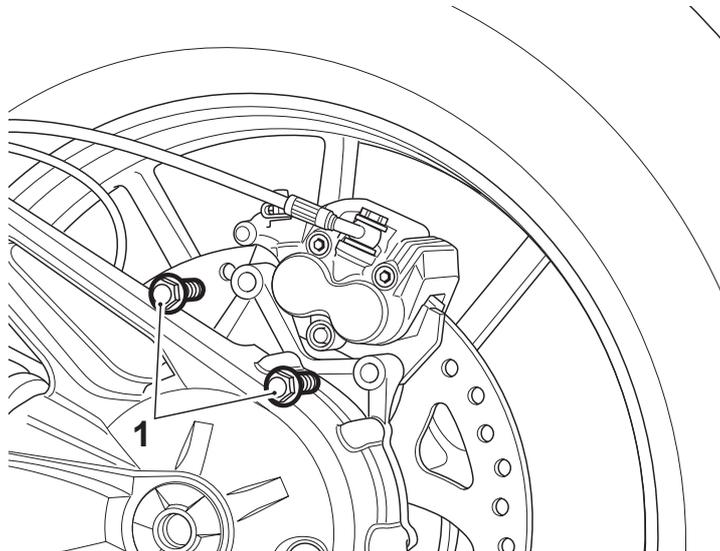
WARNING

Do not allow a brake component to hang unsupported on the brake hose or line.

Brake hoses or lines that are not supported may become damaged or bent.

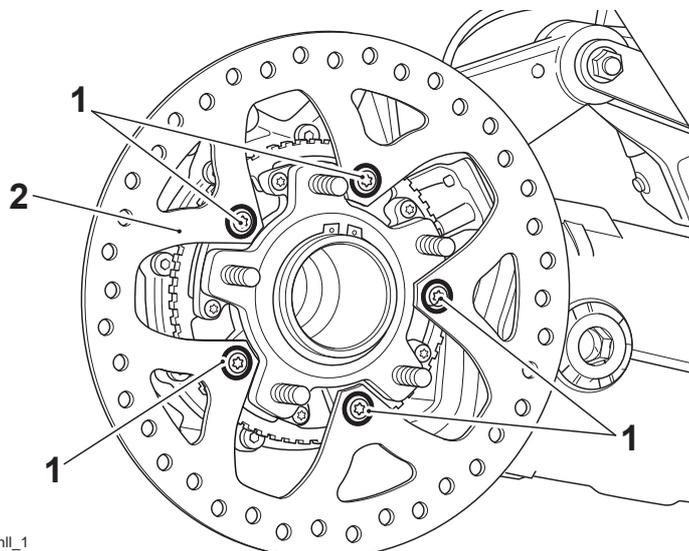
Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

1. Remove the rear wheel (see Rear Wheel - Removal).
2. Detach and support the rear brake calipers such that the weight of the caliper is not supported by the brake hose.



1. Caliper mounting bolts

3. Remove and discard the fixings securing the brake disc, remove the disc.



chll_1

- 1. Fixings**
- 2. Brake disc**

Rear Brake Disc - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Align the brake disc to the hub.
2. Fit new fixings and tighten to **22 Nm**.
3. Position the caliper over the disc ensuring the pads are correctly aligned on both sides of the disc.
4. Fit the caliper retaining bolts and tighten to **40 Nm**.
5. Refit the rear wheel (see Rear Wheel - Installation).
6. Check for correct brake operation. Rectify as necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Master Cylinder - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

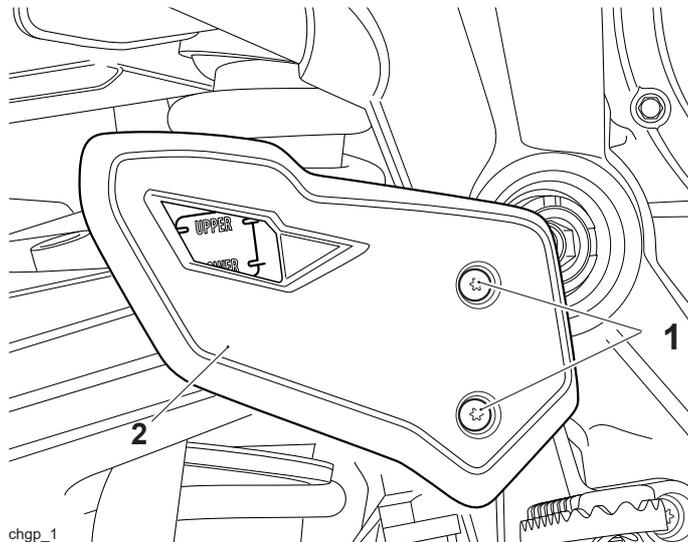
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal

CAUTION

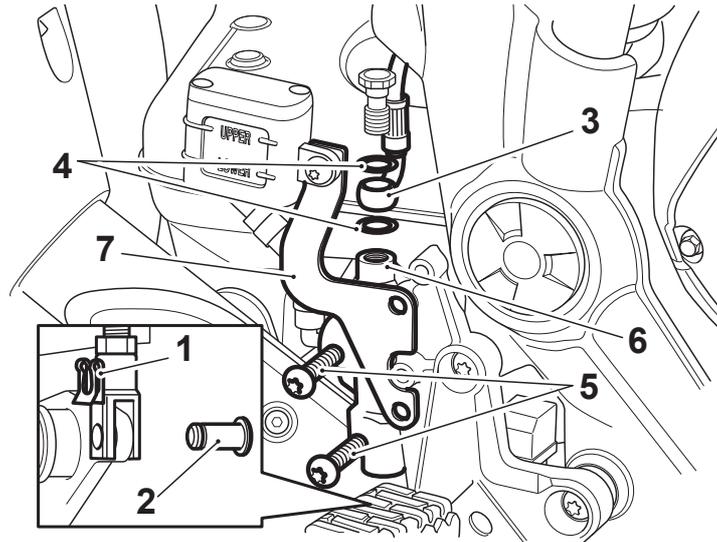
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Release the fixings and remove the right hand heel guard.



1. **Fixings**
2. **Heel guard**

2. Drain the fluid from the master cylinder by bleeding the system at the rear caliper until all fluid has been expelled (see Bleeding the Rear Brakes, Renewing Brake Fluid).
3. Detach the brake fluid reservoir from its bracket.
4. Remove the clip from the clevis pin at the lower end of the brake pushrod and remove the clevis pin.
5. Disconnect the rear brake hose from the master cylinder, noting its orientation. Discard the two sealing washers.
6. Remove the fixings and remove the master cylinder and reservoir bracket assembly.



1. **Clip**
2. **Clevis pin**
3. **Brake hose**
4. **Sealing washers**
5. **Fixings**
6. **Master cylinder**
7. **Reservoir bracket**

7. Disconnect the reservoir hose from the master cylinder.

Rear Master Cylinder - Disassembly

1. Remove the boot from the cylinder and pushrod.
2. Remove the circlip retaining the pushrod to the cylinder. Discard the circlip.
3. Remove the pushrod and piston set from the master cylinder bore, noting the relative position of the seals and piston components.

Rear Master Cylinder - Inspection

1. Visually inspect the master cylinder bore for wear, scratches or corrosion. Replace as necessary.
2. Check the piston and cylinder bore for damage, wear or deterioration. Replace as necessary.
3. Always renew the piston and seal set if the cylinder is dismantled.
4. Examine the pushrod for bends and damage. Replace as necessary.

Rear Master Cylinder - Assembly



WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

WARNING

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake fluid.

Never use solvents, petrol (gasoline), engine oil, or any other petroleum distillate on internal brake components as this will cause deterioration of the hydraulic seals in the calipers and master cylinders.

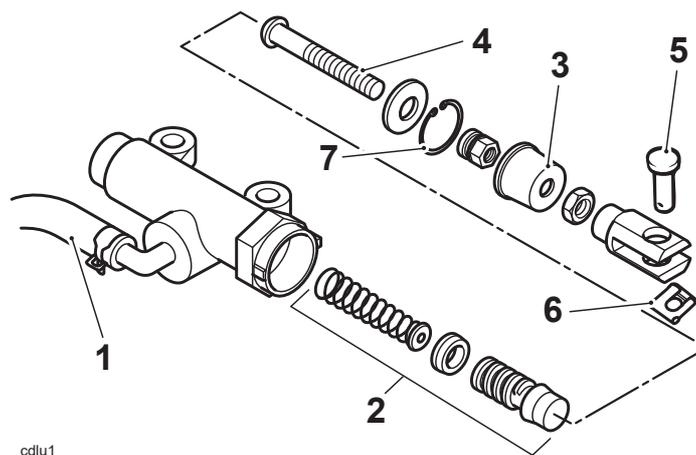
A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Clean the master cylinder bore, piston and seals, with new brake fluid.
2. Ensure all ports are clear of obstruction.

WARNING

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

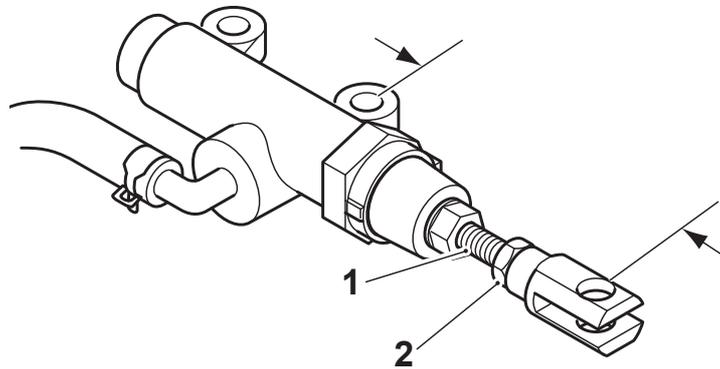
3. Install the spring and piston set together.
4. Apply a small amount of brake grease to the pushrod.
5. Install the pushrod in the master cylinder and retain with a new circlip.
6. Refit the boot.



cdlu1

1. Reservoir hose
2. Piston set
3. Dust boot
4. Push rod
5. Clevis pin
6. Clip
7. Circlip

7. If the pushrod has been disassembled, set the pushrod free length to 73.5 mm, as shown below:



1. Pushrod
2. Lock nut

8. Tighten the lock nut to **18 Nm**.

Rear Master Cylinder - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the reservoir hose to the master cylinder.
2. Fit the master cylinder and reservoir bracket assembly to the frame and tighten the fixings to **18 Nm**.
3. Connect the push rod to the brake pedal using a new clevis pin and clip.
4. Incorporating new washers, fit the brake hose to the master cylinder. Ensuring correct orientation of the brake hose, tighten the banjo bolt to **25 Nm**.
5. Refit the brake fluid reservoir to its mounting bracket and tighten the fixing to **6 Nm**.

WARNING

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

6. Refit the battery (see Battery - Installation).
7. Fill and bleed the rear brake system (see page Bleeding the Rear Brakes, Renewing Brake Fluid).
8. Refit the right hand heel guard, tightening the fixings to **7 Nm**.

Perform the following operations:

- Rider's Seat - Installation
- Check for correct brake operation. Rectify if necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Removal and Installation - ABS Components

Front ABS Wheel Speed Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

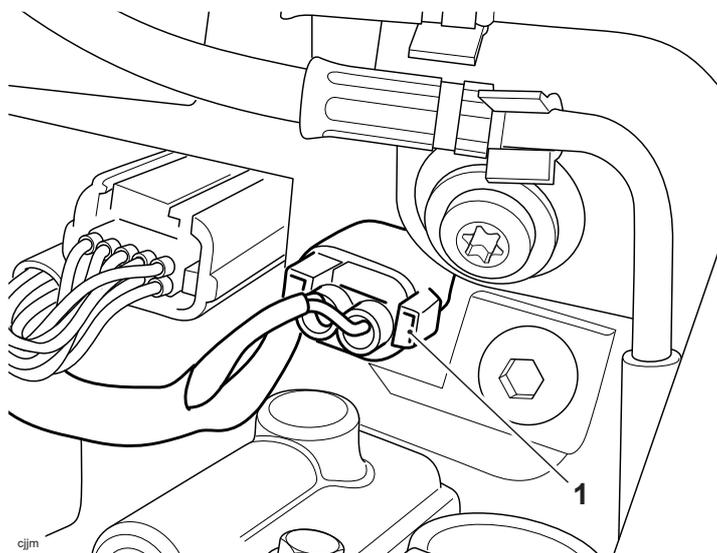
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Airbox - Removal

Note

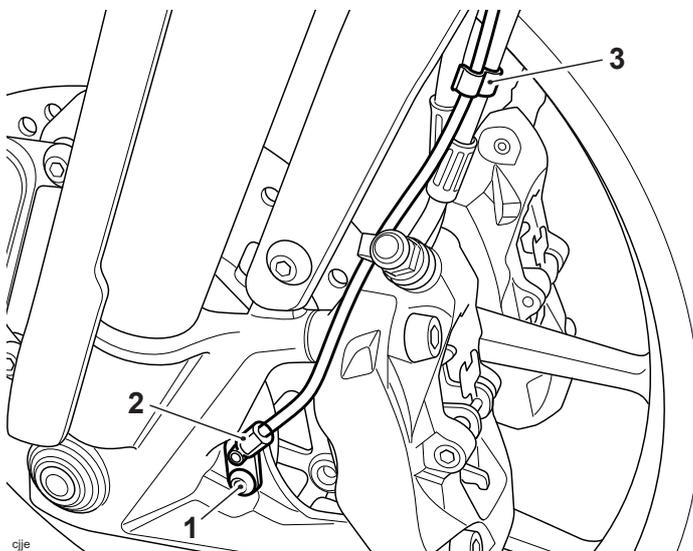
- **Note the routing of the front ABS wheel speed sensor harness and its retaining clips for installation.**
- **The front ABS wheel speed sensor multiplug is identified as the white connector located on the bracket mounted to the camshaft cover.**

1. Detach the wheel speed sensor multiplug from its bracket on the camshaft cover and disconnect.



1. Wheel speed sensor multiplug

2. Release the wheel speed sensor harness from its clips on the upper radiator mounting and front brake hoses.
3. Release the fixing and remove the sensor. Collect the shim from between the sensor and fork leg and discard fixing.



1. Fixing
2. Front ABS wheel speed sensor
3. Clip

Front ABS Wheel Speed Sensor - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Check the condition of the shim before use. Do not use a shim which is bent or damaged.

1. Position the wheel speed sensor to the fork leg with its shim between the sensor and fork leg. Temporarily fit the original bolt and tighten to **9 Nm**.
2. Check and adjust the wheel speed sensor air gap (see Front Wheel Speed Sensor Air Gap Measurement).
3. Route the harness and secure to its clips on the upper radiator mounting and front brake hoses, as noted during removal.
4. Connect the wheel speed sensor multiplug to the main harness. Fit the multiplug to its mounting bracket on the camshaft cover.

Perform the following operations:

- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation
- Check for correct brake operation. Rectify if necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front ABS Pulsar Ring - Removal

WARNING

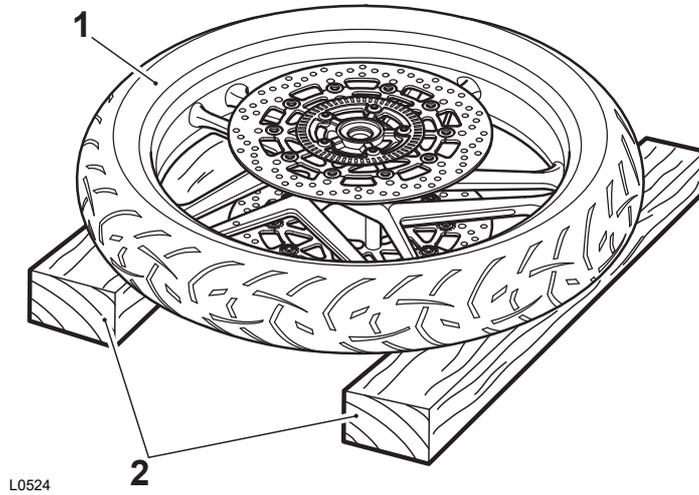
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the front wheel (see Front Wheel - Removal).

WARNING

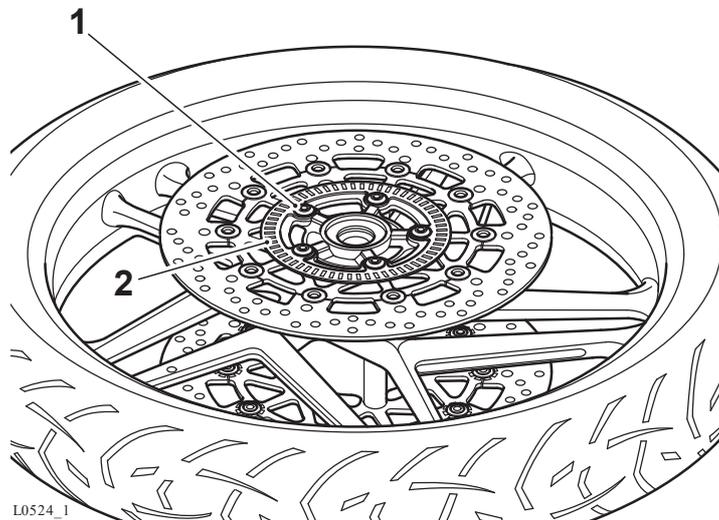
Damage to the wheel centre could cause misalignment of the wheel when refitted. A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Support the wheel on blocks as illustrated below.



1. Wheel
2. Support block

3. Remove and discard the five disc bolts and remove the pulser ring from the brake disc.



1. Disc bolt
2. Pulser ring

Front ABS Pulser Ring - Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Front ABS Pulser Ring - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Locate the brake disc and pulser ring onto the wheel, fit new disc bolts and tighten to **22 Nm**.
2. Refit the front wheel (see Front Wheel - Installation).
3. Check, and if necessary, adjust the air gap between the front wheel speed sensor and the pulser ring (see Front Wheel Speed Sensor Air Gap Measurement).

4. Check for correct brake operation. Rectify as necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

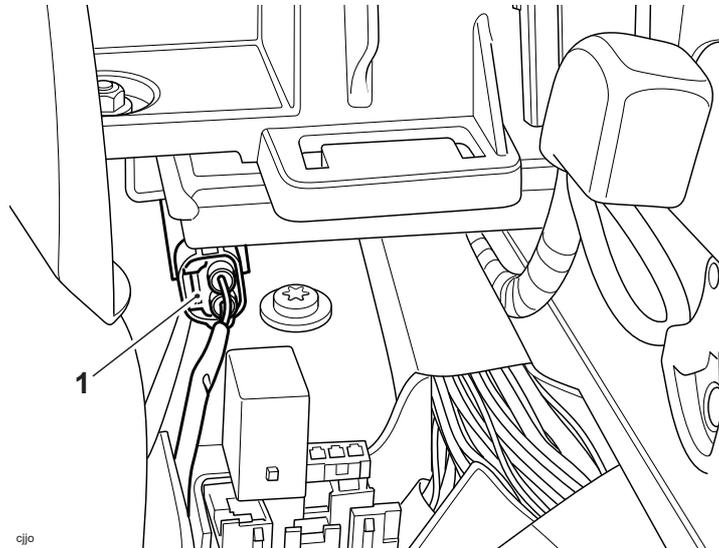
Rear ABS Wheel Speed Sensor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

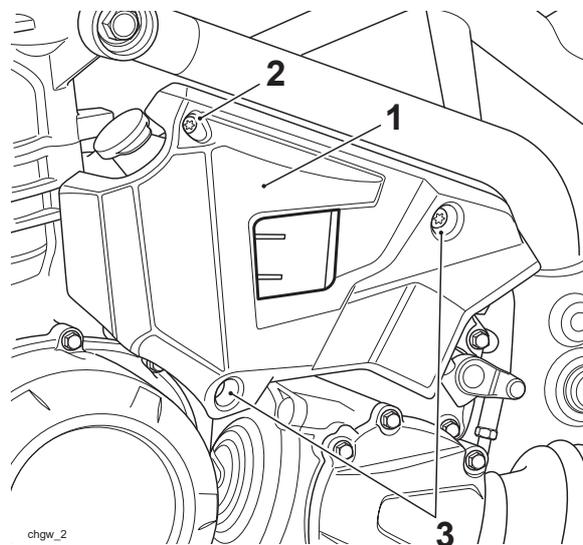
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Disconnect the wheel speed sensor multiplug, identified as the white connector, located in the left hand side of the battery tray, under the seat bridge.



1. Wheel speed sensor multiplug

2. Remove the three fixings and remove the expansion tank cover. Discard the upper M5 fixing. Retain the lower M6 fixings for reuse.

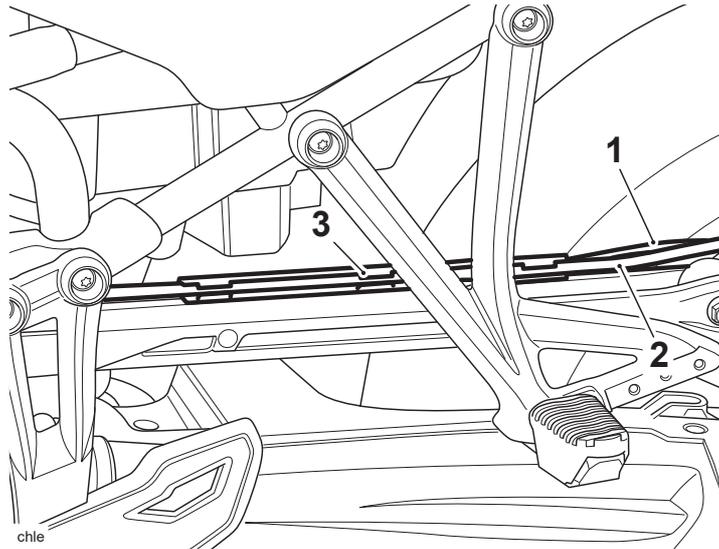


1. Expansion tank cover
2. Upper fixings (M5)
3. Lower fixings (M6)

Note

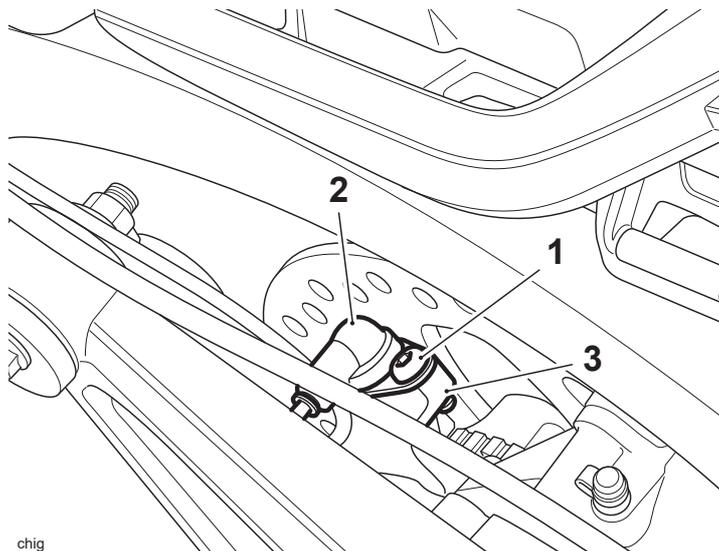
- Note the routing of the harness and its retaining clips for installation.

3. Detach the brake line and the harness for the rear wheel speed sensor from the cable guide.



1. Harness
2. Brake line
3. Cable guide

4. Detach the harness from its clip on the final drive unit.
5. Release the fixing securing the wheel speed sensor to the final drive unit and remove the sensor. Discard the fixing.



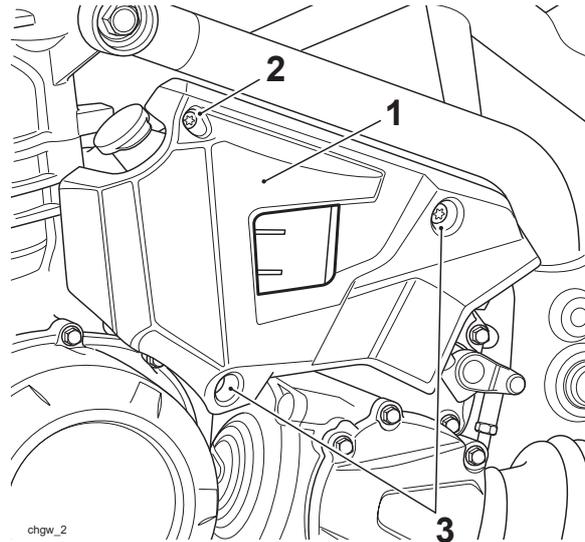
1. Fixing
2. Rear ABS wheel speed sensor
3. Final drive unit

Rear ABS Wheel Speed Sensor - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the wheel speed sensor to the brake caliper carrier as noted during removal.
2. Install a new fixing and tighten to **9 Nm**.
3. Route the ABS sensor harness as noted for removal.
4. Connect the wheel speed sensor multiplug.
5. Refit the expansion tank cover. Secure the upper mounting with a new M5 encapsulated fixing. Secure the lower mounting with the two original fixings. Tighten the upper fixing to **3 Nm** and the lower fixings to **4 Nm**.



1. **Expansion tank cover**
2. **Upper fixing (M5)**
3. **Lower fixings (M6)**

Perform the following operations:

- Battery - Installation
- Rider's Seat - Installation
- Check for correct brake operation. Rectify as necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

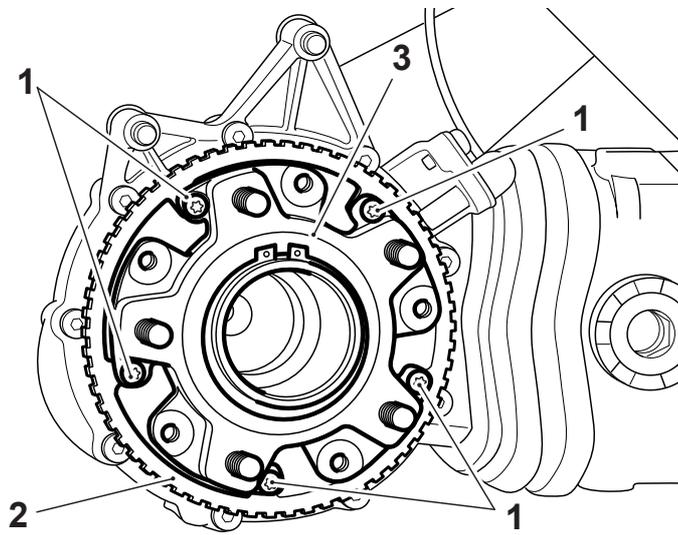
Rear ABS Pulsar Ring - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rear Wheel - Removal
 - Rear Brake Disc - Removal
1. Remove and discard the five fixings and remove the pulser ring.



1. Fixings
2. Pulser ring
3. Hub

Rear ABS Pulser Ring - Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Rear ABS Pulser Ring - Installation

1. Locate the pulser ring to the hub.
2. Install new fixings and tighten to **5 Nm**.

Perform the following operations:

- Rear Brake Disc - Installation
- Rear Wheel - Installation
- Check that the brakes operate correctly.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

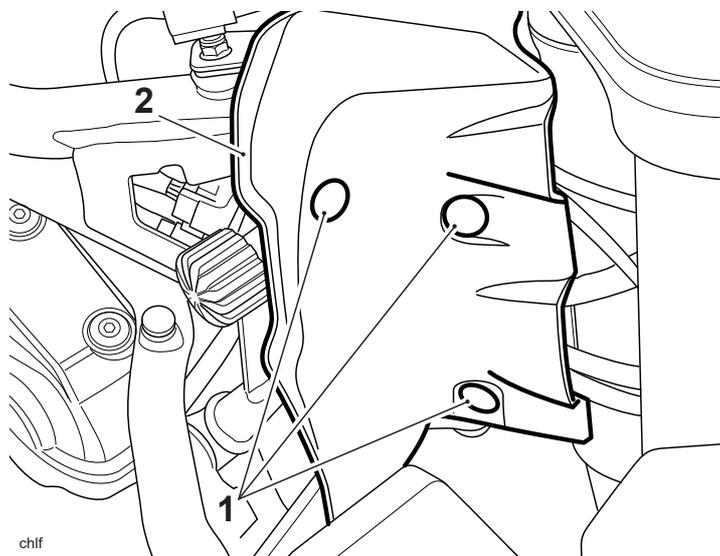
ABS Hydraulic Modulator/ECM - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

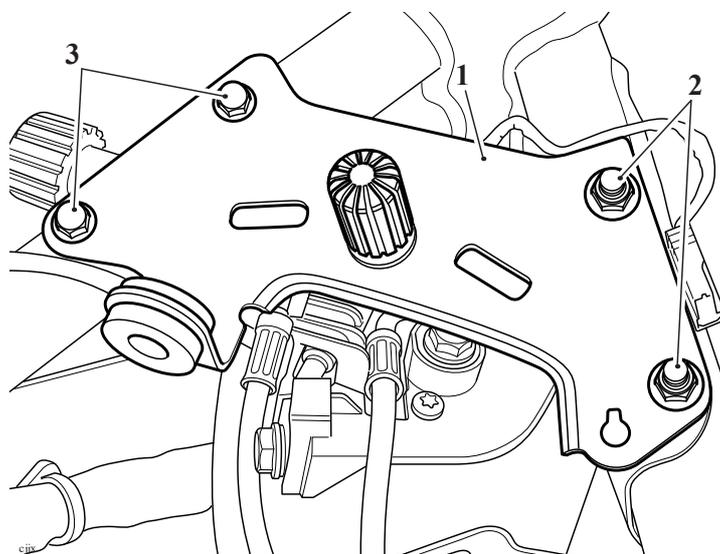
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
 - Airbox - Removal
1. Remove the fir-trees and detach the headstock infill panel from the frame.



1. Scrivets
2. Infill panel

2. Remove the lock nuts and bolts and remove the headstock brace. Discard the two lock nuts.



1. Headstock brace
2. Lock nuts
3. Bolts

! CAUTION

To prevent body damage, do not spill brake fluid onto any area of the bodywork or wheels.

3. Drain the brake fluid from the front and rear master cylinders (for front brake master cylinder see Front Brake Master Cylinder - Removal, and for rear brake master cylinder see Rear Master Cylinder - Removal).
4. Disconnect the ABS modulator multiplug (see ABS Electrical Connectors).

! WARNING

Before the disassembly of any brake lines in the ABS hydraulic circuit, always mark their position so that they can be returned to the same position when assembled.

If the brake lines are incorrectly assembled the performance of the ABS system will be seriously compromised, leading to loss of motorcycle control and an accident.

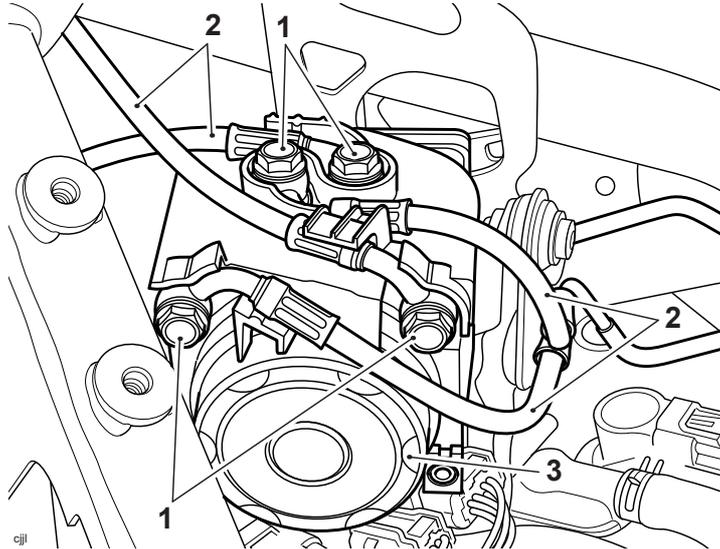
WARNING

Do not allow the brake hard lines to become bent or kinked during ABS modulator removal. If the brake lines are bent or kinked the performance of the ABS system will be seriously compromised, leading to loss of motorcycle control and an accident.

CAUTION

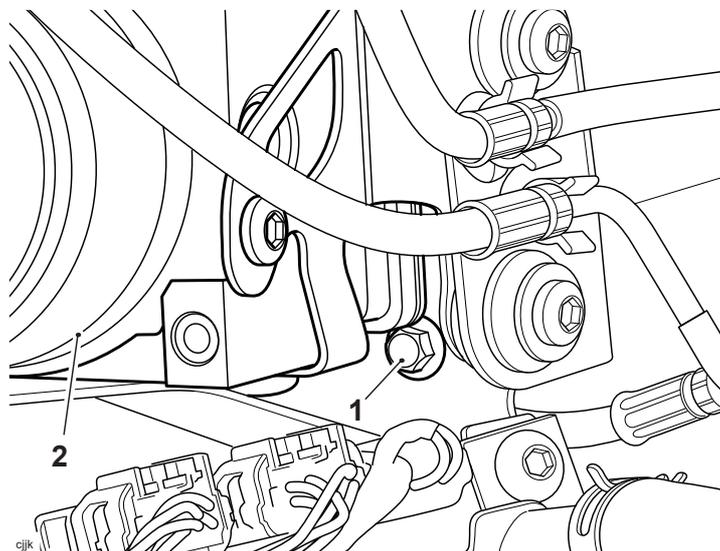
To prevent body damage, do not spill brake fluid onto any area of the bodywork or engine covers.

5. Remove the union bolts and carefully disconnect the four brake lines from the ABS modulator. Discard the sealing washers.



1. **Union bolts**
2. **Brake lines**
3. **ABS modulator**

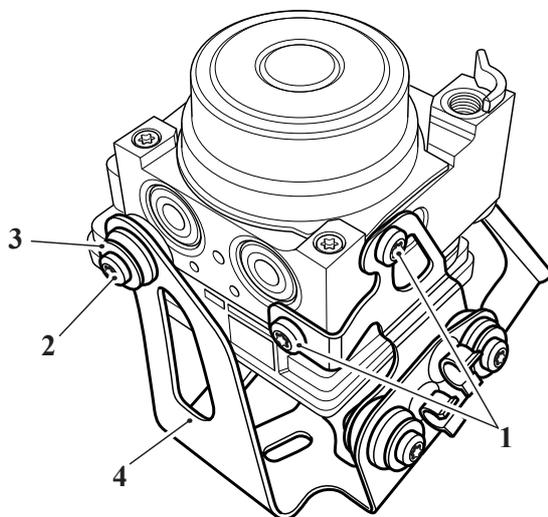
6. Remove the lower ABS modulator fixing.



1. **Lower fixing**
2. **ABS modulator**

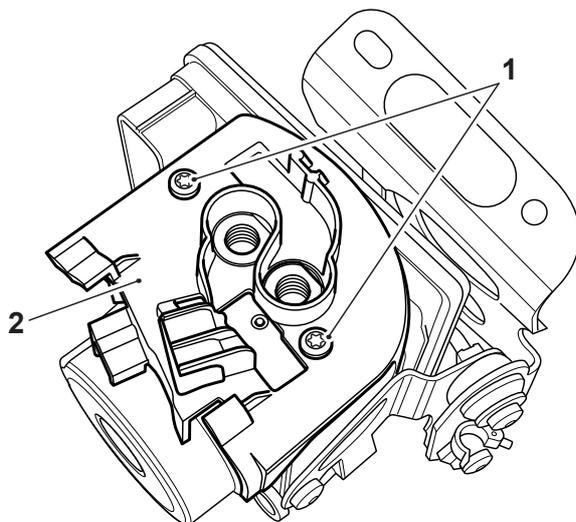
7. Carefully remove the ABS modulator and bracket assembly from the motorcycle.

8. If removal of the mounting brackets is required, release the fixings shown below, collect the flanged sleeve and remove the mounting bracket from the ABS modulator. Discard the fixings.



- 1. M6 x 10 fixings
- 2. M6 x 25 fixing
- 3. Flanged sleeve
- 4. Bracket

9. Release the fixings and remove the brake hose guide from the ABS modulator.



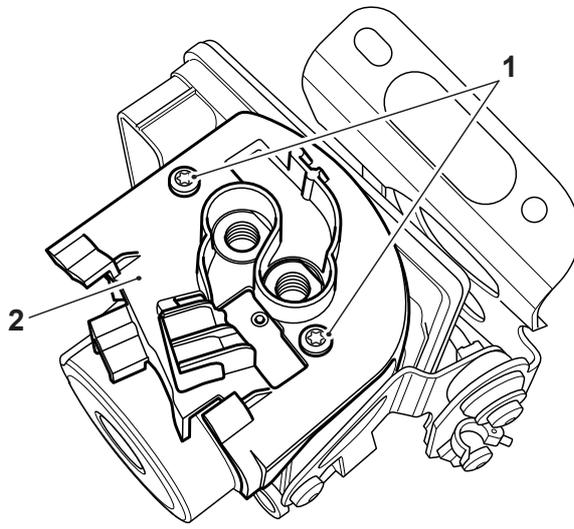
- 1. Fixings
- 2. Brake hose guide

ABS Hydraulic Modulator/ECM - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

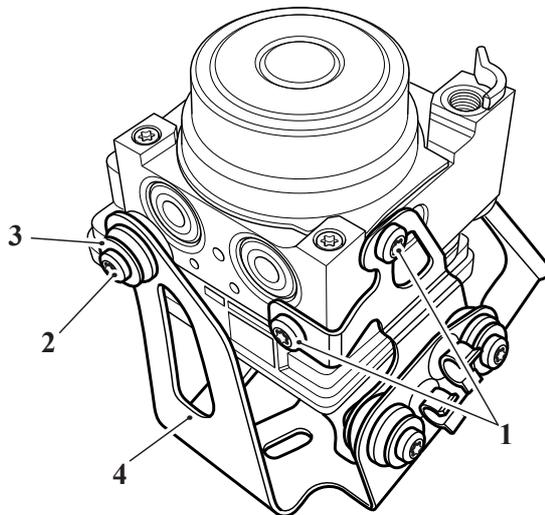
1. If removed, refit the brake hose guide to the ABS modulator. Tighten the fixings to **3 Nm**.



cji

1. **Fixings**
2. **Brake hose guide**

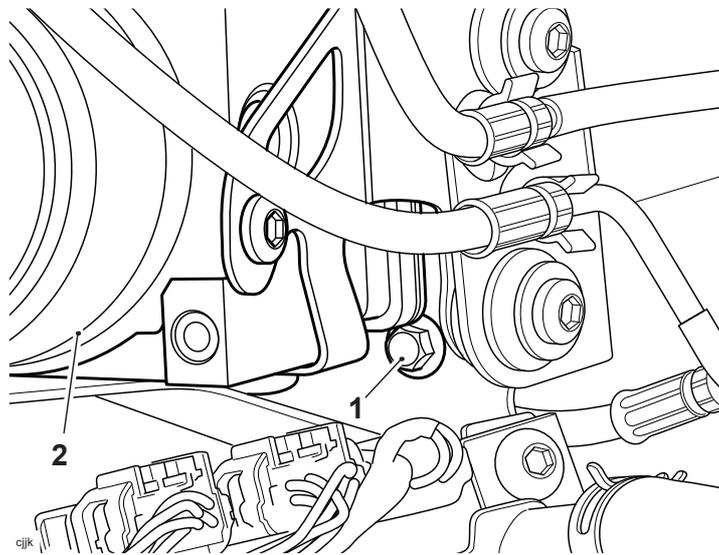
2. Align the ABS modulator to its bracket and secure with two new M6 x 10 mm fixings. Do not fully tighten at this stage.
3. Fit the flanged sleeve to the grommet on the bracket and fit a new M6 x 25 mm fixing. Tighten the fixing to **9 Nm**.
4. Tighten the two M6 x 10 mm fixings to **9 Nm**.



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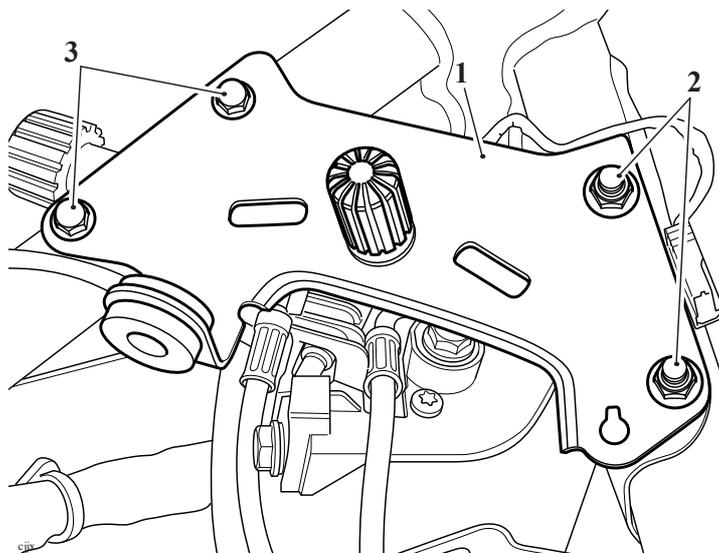
1. **M6 x 10 fixings**
2. **M6 x 25 fixing**
3. **Flanged sleeve**
4. **Bracket**

5. Carefully manoeuvre the ABS modulator and bracket assembly to its fitted position on the frame.
6. Fit the lower fixing and tighten to **9 Nm**.



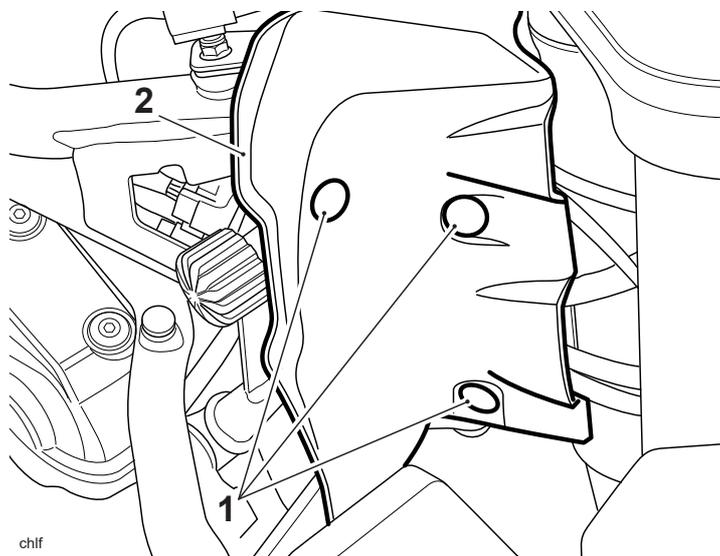
1. Lower fixing
2. ABS modulator

7. Incorporating new sealing washers to either side of the unions, refit the brake lines to the ABS module as marked for removal.
8. Tighten the four unions to **25 Nm**, taking care to ensure the brake lines do not twist during tightening.
9. Reconnect the ABS modulator multiplug (see ABS Electrical Connectors).
10. Refit the headstock brace and secure with the bolts and new lock nuts. Tighten the new lock nuts to **12 Nm**. Tighten the bolts to **12 Nm**.



1. Headstock brace
2. Lock nuts
3. Bolts

11. Refit the headstock infill panel and secure with the Scrivets.



1. Scrivets
2. Infill panel

Perform the following operations:

- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation

! WARNING

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident.

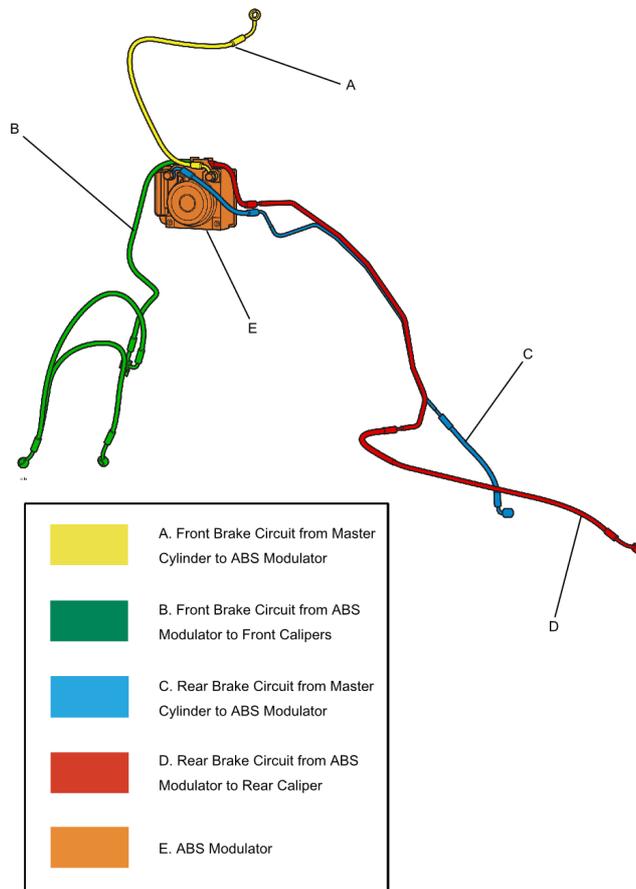
Observe the brake fluid handling warnings given earlier in this section of the manual.

- Fill and bleed the front brakes (see Bleeding the Front Brakes, Renewing Brake Fluid)
- Fill and bleed the rear brakes (see Bleeding the Rear Brakes, Renewing Brake Fluid)
- Rider's Seat - Installation
- Check for correct brake operation. Rectify as necessary.

! WARNING

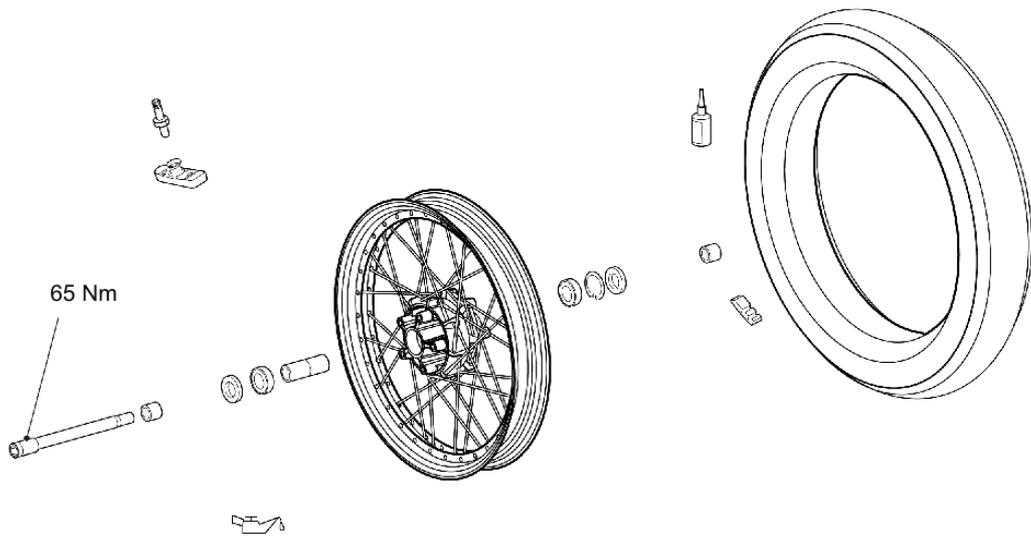
It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

ABS Hydraulic Circuit Layout

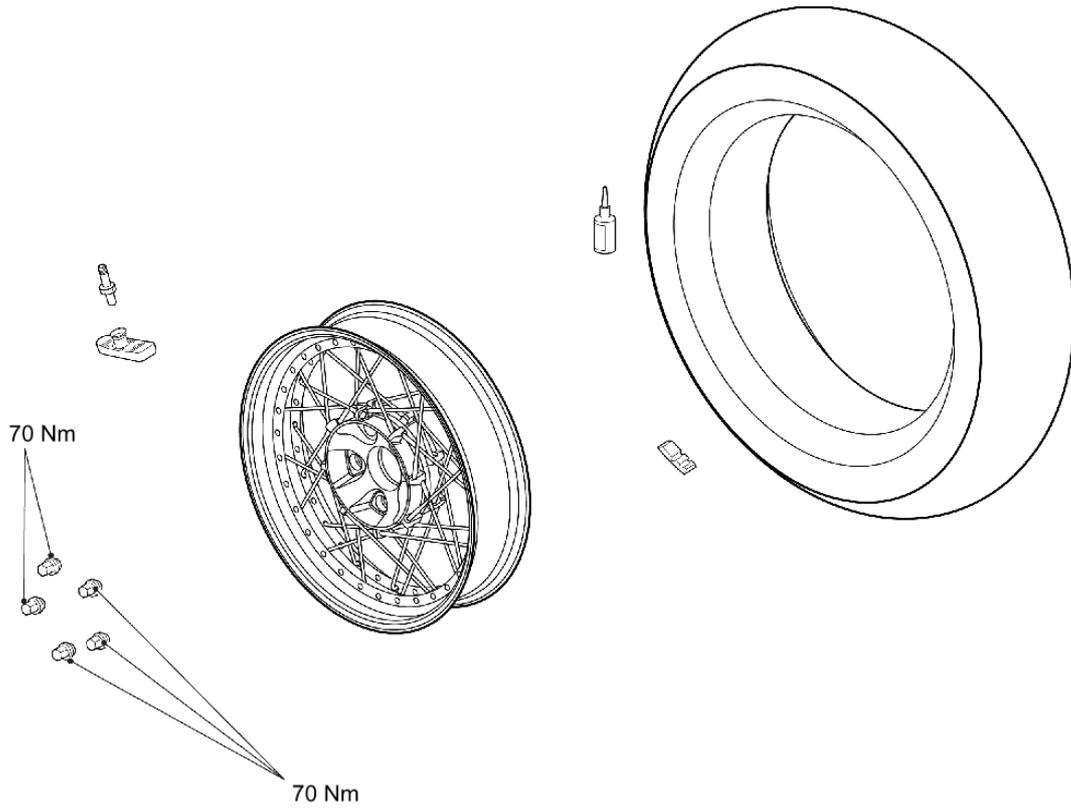


Wheels and Tyres

Exploded View – Front Wheel

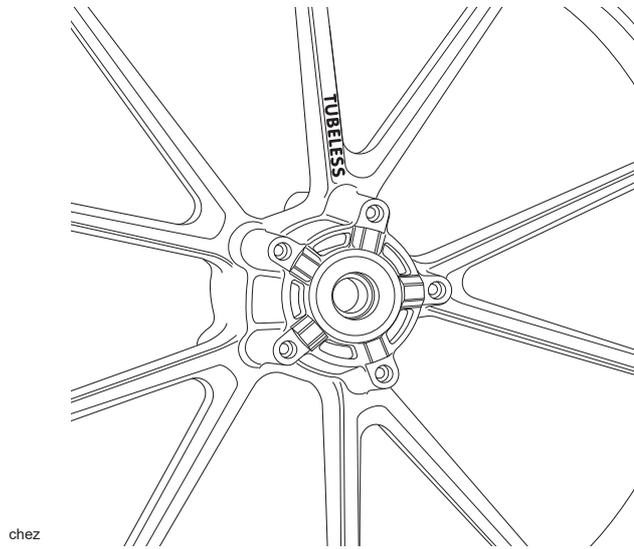


Exploded View – Rear Wheel

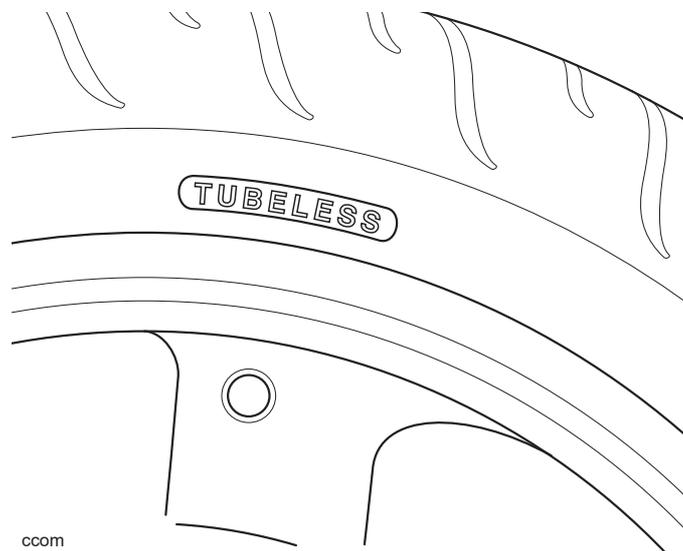


Tyres

This model is equipped with tubeless tyres, valves and wheel rims. Use only tyres marked 'TUBELESS' and tubeless valves on rims marked 'SUITABLE FOR TUBELESS TYRES'.



Typical Wheel Marking



Typical Tyre Marking

! WARNING

Tyres that have been used on a rolling road dynamometer may become damaged. In some cases, the damage may not be visible on the external surface of the tyre.

Tyres must be replaced after such use as continued use of a damaged tyre may lead to instability, loss of control and an accident.

Tyre Pressures

Correct inflation pressure will provide maximum stability, rider comfort and tyre life.

Always check tyre pressures before riding when the tyres are cold. Check tyre pressures daily and adjust if necessary.

For details of the correct tyre inflation pressures (see Wheels and Tyres).

! WARNING

WARNING

Incorrect tyre inflation will cause abnormal tread wear and instability problems which may lead to loss of control and an accident.

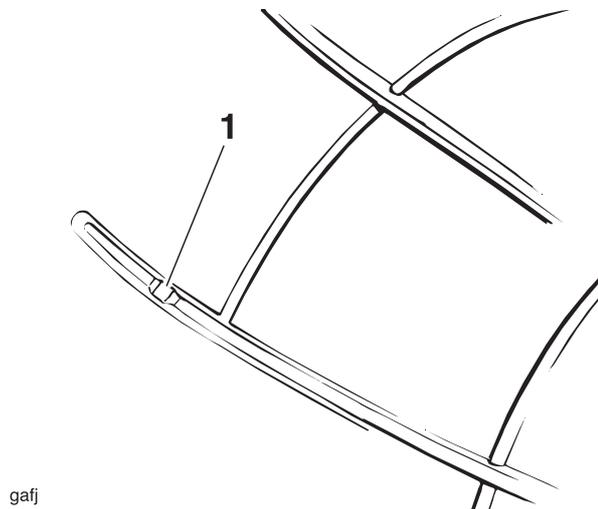
Under-inflation may result in the tyre slipping on, or coming off the rim. Over-inflation will cause instability and accelerated tread wear.

Both conditions are dangerous as they may cause loss of control leading to an accident.

Tyre Wear/Wheel Inspection

As the tyre tread wears down, the tyre becomes more susceptible to puncture and failure. It is estimated that 90% of all tyre failures occur during the last 10% of tread life (90% worn). It is false economy and unsafe to use tyres until they are worn to their minimum.

All tyres are fitted with tread wear indicators. When the tyre becomes worn down as far as the top of a tread wear indicator, the tyre is worn beyond its service life and must be replaced.



1. Tread wear indicator

Attention must also be paid to the legal limits for tread wear, which differ from country to country. Tyres that have worn to the legal limit in the country or region in which the motorcycle is operated must be replaced, even if tread wear has not yet reached the level of the tread wear indicators.

In accordance with the scheduled maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum allowable tread depth.

Inspect wheels for cracks, splits and kerb damage. Always replace wheels that are suspected of having become damaged.

WARNING

Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control and an accident.

When tubeless tyres, used without a tube, become punctured, leakage is often very slow. Always inspect tyres very closely for punctures. Check the tyres for cuts, embedded nails or other sharp objects. Operation with punctured or damaged tyres will adversely affect motorcycle stability and handling which may lead to loss of control or an accident.

Check the rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.

Always consult your authorised Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

Minimum Recommended Tread Depth

In accordance with the periodic maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum legally allowable tread depth specified (see Wheels and Tyres).

WARNING

Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed-course conditions.

WARNING

Only operate this Triumph motorcycle at high speed in closed-course, on-road competition or on closed-course racetracks. High-speed operation should only then be attempted by riders who have been instructed in the techniques necessary for high speed riding and are familiar with the motorcycle's characteristics in all conditions. High-speed operation in any other circumstances is dangerous and may lead to loss of motorcycle control and an accident.

Important Tyre Information

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the internet at www.triumph.co.uk.

WARNING

The ABS computer operates by comparing the relative speed of the front and rear wheels. Use of non-recommended tyres can affect wheel speed and cause the ABS function not to operate, potentially leading to loss of motorcycle control and an accident in conditions where the ABS would normally function.

WARNING

Always check tyre pressures before riding when the tyres are cold. Operation with incorrectly inflated tyres may affect handling leading to loss of control and an accident.

WARNING

Operation with excessively worn or damaged tyres will adversely affect handling and control leading to loss of control or an accident.

WARNING

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE-TYPE' unless marked otherwise.

Use of an inner tube with a tyre marked 'TUBELESS' without appropriate marking and/or on an alloy wheel can lead to loss of motorcycle control and an accident.

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the internet at www.triumph.co.uk.

WARNING

If a tyre or inner tube sustains a puncture, the tyre and inner tube must be replaced together. Failure to replace a punctured tyre and inner tube together, or operation with a repaired tyre or inner tube can lead to instability, loss of motorcycle control or an accident.

If tyre or inner tube damage is suspected, such as after striking the kerb, ask your authorised Triumph dealer to inspect the tyre both internally and externally and to also inspect the inner tube. Remember, tyre damage may not always be visible from the outside. Operation of the motorcycle with damaged tyres could lead to loss of motorcycle control and an accident.

When replacing a 'TUBE-TYPE' tyre on a spoked wheel, always inspect the rim tape (rim protection band) to ensure that it is correctly protecting the tube from the spoke threads. A damaged rim tape may lead to rapid tyre deflation causing loss of control and an accident.

WARNING

Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing tyre deflation that may result in a loss of motorcycle control and an accident.

Do not install an inner tube inside a tubeless tyre unless it is clearly marked on the side wall that you can do so. This may cause instability and excessive heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.

WARNING

The use of tyres other than those listed at your authorised Triumph dealer, or on the internet, at www.triumph.co.uk, may adversely affect handling leading to loss of motorcycle control or an accident. Use the recommended tyre options only in the combinations listed at your authorised Triumph dealer, or on the internet at www.triumph.co.uk. Do not mix tyres from different manufacturers or tyres from the same manufacturer but from another option.

WARNING

Accurate wheel balance is important for safe, stable handling of the motorcycle. Do not remove or change any wheel balance weights. Incorrect wheel balance may cause instability leading to loss of motorcycle control and an accident.

When wheel balancing is required, such as after tyre replacement, see your authorised Triumph dealer.

Only use self-adhesive weights. Clip-on weights will damage the wheel and tyre potentially resulting in tyre deflation, loss of motorcycle control and an accident.

WARNING

When replacement tyres are required, consult your authorised Triumph dealer who will arrange for the tyres to be fitted according to the tyre manufacturer's instructions.

When tyres are replaced, allow time for the tyre to seat itself to the rim (approximately 24 hours). During this seating period, ride cautiously as an incorrectly seated tyre could cause loss of motorcycle control or an accident. Initially, the new tyre will not produce the same handling characteristics as the worn tyre and the rider must allow adequate riding distance (approximately 100 miles/160 km) to become accustomed to the new handling characteristics.

After both 24 hours and 100 miles (160 km), the tyre pressures should be checked and adjusted and the tyre examined for correct seating and rectified as necessary.

Use of a motorcycle when not accustomed to its handling characteristics, with incorrect tyre pressures or an incorrectly seated tyre is dangerous and may lead to loss of motorcycle control and an accident.

Front Wheel - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

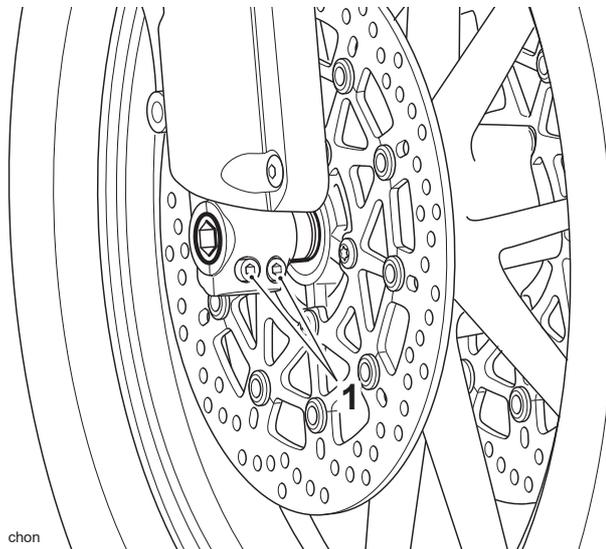
1. Position the motorcycle on a paddock stand.
2. Raise and support the front of the motorcycle.

WARNING

Do not allow the calipers to hang on the brake hoses as this may damage the hoses. Damaged hoses could cause brake failure leading to loss of control and an accident.

Note

- **It is not necessary to disconnect the brake hoses.**
3. Detach and support the front brake calipers such that the weight of the caliper is not supported by the brake hose (see Front Brake Caliper - Removal).
 4. Loosen both pinch bolts at the lower end of the right hand fork.

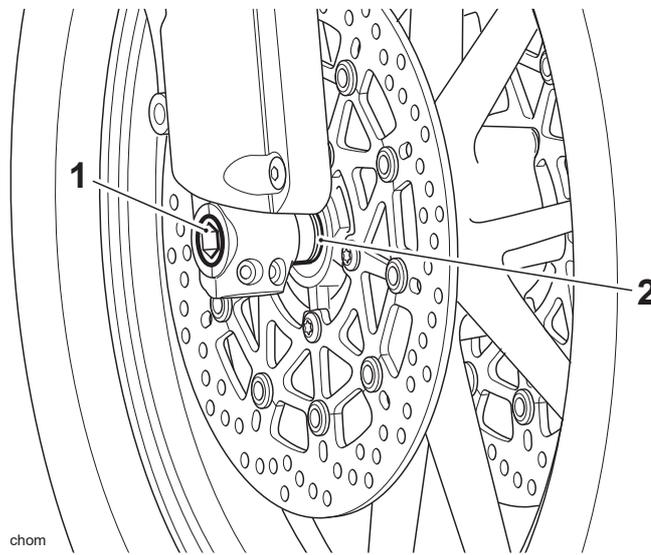


1. Fork pinch bolts

5. Release and remove the wheel spindle, which is threaded into the left hand fork.

Note

- **The right hand spacer is longer than the left. To identify the spacers, the right hand spacer has two machined rings while the left has a single machined ring.**
 - **Note the position of the spacers.**
6. Remove the wheel and the wheel spacers.



1. **Wheel spindle**
2. **Wheel spacer (right hand shown)**

7. Place the wheel on wooden blocks.

! WARNING

Do not allow the wheel to rest on either brake disc as this may damage the disc and could lead to an accident.

! CAUTION

To prevent wheel and bearing damage, observe absolute cleanliness and ensure there is no dirt ingress to the wheel bearings while the wheel is removed.

8. Thoroughly clean all components and inspect for wear or damage.

Front Wheel Bearings - Removal

1. Remove the front wheel (see Front Wheel - Removal).

! CAUTION

Do not allow the wheel to rest on the brake discs, as this may damage the discs. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake discs are raised above the ground.

2. Place the wheel on wooden blocks to prevent damage to the brake discs.

3. Remove and discard the seals and the bearing circlip.

! WARNING

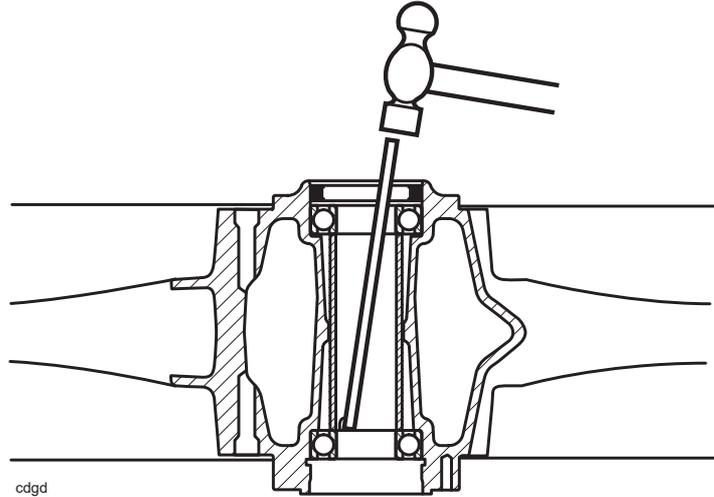
Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

! CAUTION

! CAUTION

To prevent wheel damage and to aid bearing removal, always apply force evenly on both sides of the bearing to prevent it from 'tipping' and becoming stuck. Application of uneven force will lead to difficulty in removing the bearing and to a damaged wheel.

- Using a suitable pin punch, through the centre of the wheel, drift out the wheel bearings. Collect the centre sleeve.



Wheel Bearing Removal

Inspection - Wheels

! WARNING

Only remove raised witness marks from within the wheel. Removal of material below any raised areas will reduce the level of interference between the wheel and the bearings. Loss of interference could cause the bearing to become loose in the wheel leading to loss of motorcycle control and an accident.

- Examine the wheel for any raised witness marks caused by the removal process. Remove any such marks with fine emery paper or a gentle file.

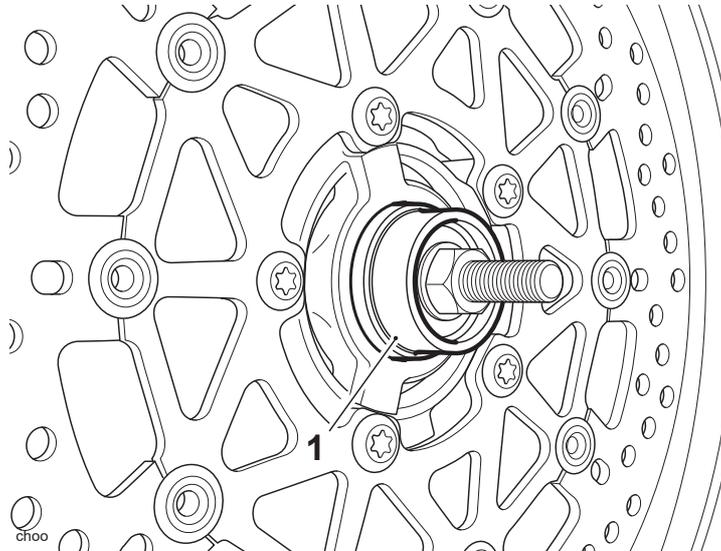
Front Wheel Bearings - Installation

Note

- Refer to the chart below for the correct tool and tool face when inserting bearings. Bearings are inserted by means of a draw-bolt acting on the insertion tool. A support tool is located on the opposite side of the wheel to the insertion tool and as the bolt is tightened, the bearing is drawn into the wheel.
- Insert bearings with the marked or shielded side facing outwards and always fit a new bearing circlip and seals.

	Bearing Insertion Tool	Support Tool
Left Bearing	T3880053 - Wheel Bearing Extraction Kit Large face to bearing	T3880070 - Bearing Installer Large face to wheel
Right Bearing	T3880053 - Wheel Bearing Extraction Kit	T3880070 - Bearing Installer Large face to wheel

1. Fit the wheel bearing to the left hand side of the wheel using the method described above.
2. Fit the wheel bearings and centre sleeve using the method described opposite.



1. T3880053 - Wheel Bearing Extraction Kit

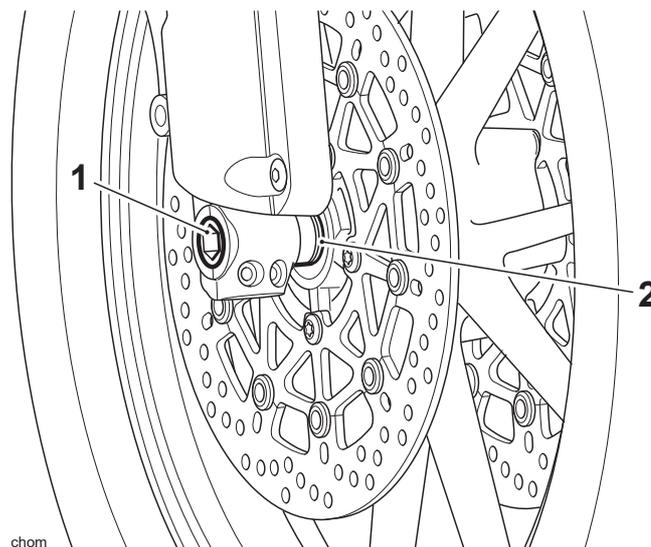
3. Fit a new circlip.
4. Lubricate and fit new seals to the front wheel. Lubricate the seal's knife-edge with grease to NLGI 2 specification.
5. Fit the front wheel (see Front Wheel - Installation).

Front Wheel - Installation

WARNING

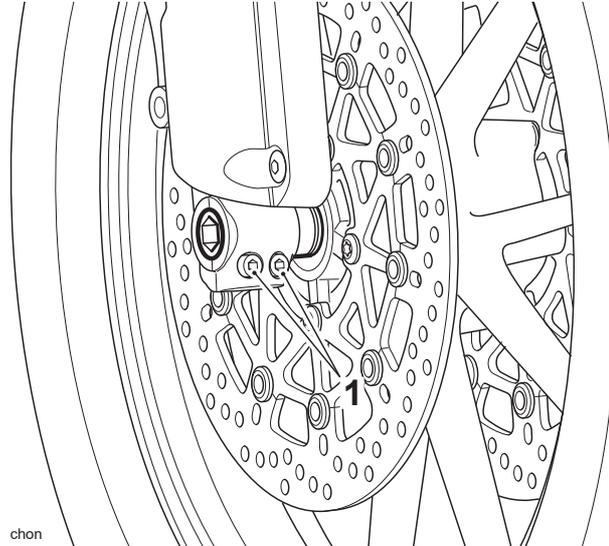
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Lightly smear the wheel spacers with grease and locate in the hubs as noted for removal.
2. Position the wheel between the forks ensuring the spacers remain in position on both sides.
3. Refit the wheel spindle from the right hand side and tighten to **65 Nm**.



1. Wheel spindle
2. Wheel spacer (right hand shown)

4. Lower the motorcycle to the ground and pump the front suspension to allow the left hand fork to 'float' to its natural position on the wheel spindle.
5. Tighten the fork pinch bolts to **22 Nm**.



1. Fork pinch bolts

6. Thoroughly clean and degrease the brake discs.
7. Refit the front brake calipers, see Front Brake Caliper - Installation.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

8. Check the air gap between the wheel speed sensor and the pulser ring (see Front Wheel Speed Sensor Air Gap Measurement).
9. Check the operation of the front brake.

Rear Wheel - Removal

WARNING

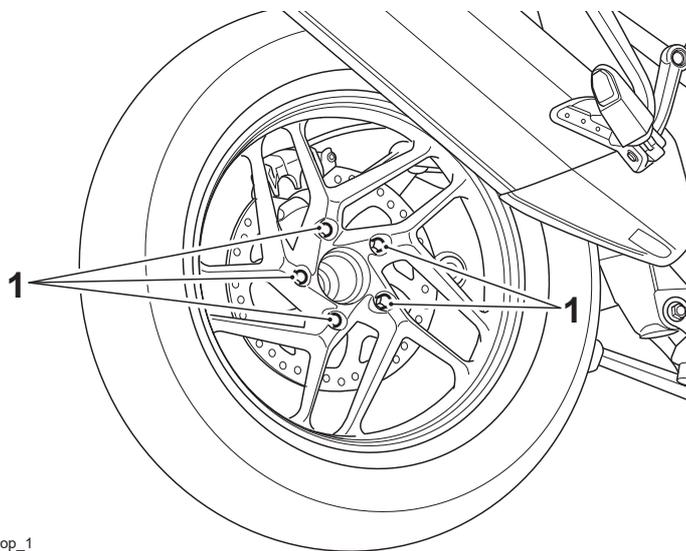
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the rear of the motorcycle to allow removal of the rear wheel.

WARNING

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

2. Release the five nuts and remove the rear wheel.



chop_1

1. Rear wheel nuts

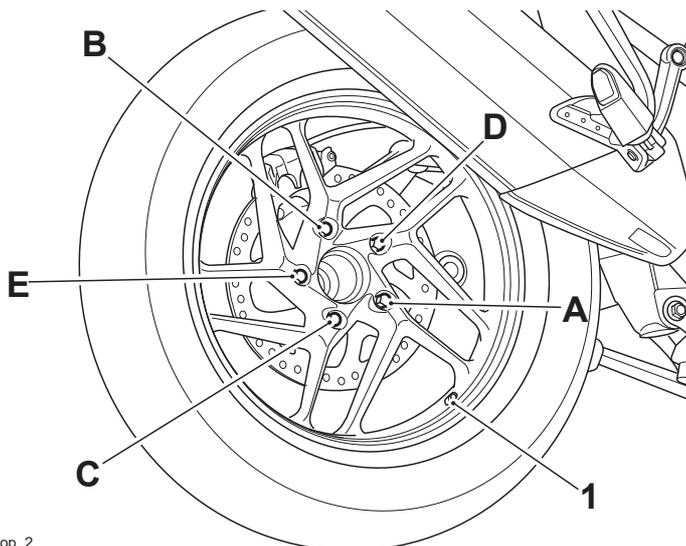
3. The rear brake disk and caliper will remain in position on the final drive unit when the wheel is removed.

Rear Wheel - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Lift the rear wheel into position, aligning the wheel, onto the five studs on the final drive unit.
2. Loosely fit the wheel nuts.
3. Using the tyre valve as a reference point, evenly and progressively tighten the wheel nuts to **70 Nm** in the sequence shown below.



chop_2

Rear Wheel Nut Tightening Sequence

1. Tyre valve location

4. Lower the motorcycle to the ground.

WARNING

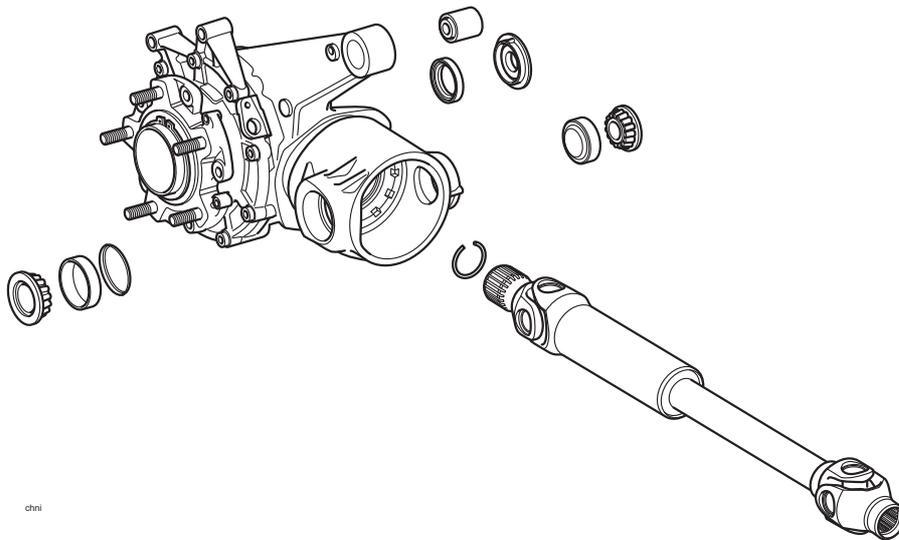
WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

5. Check the operation of the rear brake.
6. Inform the owner to check and, if necessary, tighten the rear wheel nuts to **70 Nm**.

Final Drive

Exploded View – Rear Bevel Box and Drive Shaft



chri

Rear Bevel Box and Drive Shaft Specification

This model is fitted with a drive shaft coupling the transmission to the rear bevel box. The drive shaft is fitted with single Hookes universal joints which require no maintenance.

The rear bevel box consists of a crown wheel and pinion arrangement that has no dealer serviceable parts.

Maintenance of the rear bevel box consists solely of the following:

- Oil change - at the first 500 mile (800 km) service only
- Oil level checks
- Pivot pin bearings
- Oil seal.

WARNING

Under no circumstance should the rear bevel box be disassembled beyond what is described in this section of the Service Manual.

Failure to observe the above warning could lead to a malfunction of the rear bevel box causing lock-up of the rear wheel leading to loss of motorcycle control and an accident.

Rear Bevel Box Oil Specification

The rear bevel box must be filled and topped up with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil.

WARNING

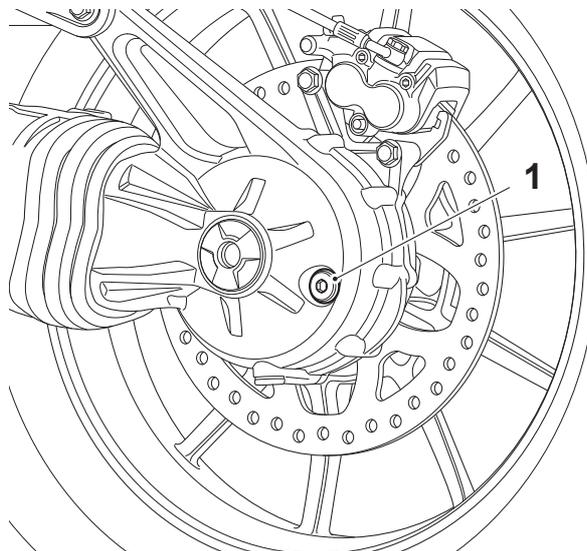
Use of incorrect bevel box lubricant could result in a malfunction of the final drive unit causing lock-up of the rear wheel leading to loss of motorcycle control and an accident.

Rear Bevel Box Oil Level Check

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Have an assistant stand the motorcycle upright.
2. Clean the area around the filler then remove the filler level plug. Discard the washer.



1. Filler/level plug

3. Fill with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil, until the level of oil inside the unit is level with the bottom of the filler.
4. Incorporating a new washer, refit the plug and tighten to **25 Nm**.

Rear Bevel Box Oil Change

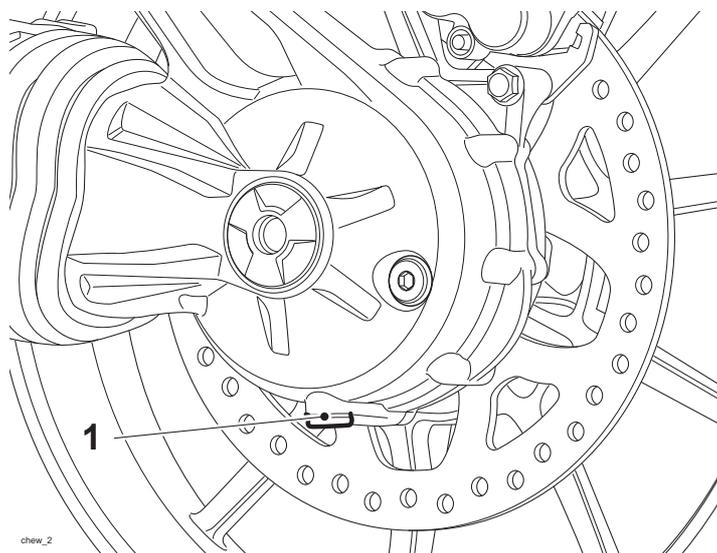
Note

- **Change the rear bevel box oil at the 500 mile (800 km) service only. At subsequent services check the oil level and top up if necessary.**

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position a container beneath the rear bevel box oil drain plug.



1. Drain plug

2. Remove the drain plug and allow all the oil to fully drain out. Discard the sealing washer.
3. Wipe the drain plug clean, fit a new sealing washer then refit to the final drive and tighten to **25 Nm**.

Note

- **The drain plug is magnetic. It is normal for metallic deposits to be attached to the drain plug magnet.**
4. Have an assistant stand the motorcycle upright.
 5. Remove the filler level plug.
 6. Fill with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil, until the level of oil inside the unit is level with the bottom of the filler.
 7. Incorporating a new washer, refit the plug and tighten to **25 Nm**.

Rear Bevel Box - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

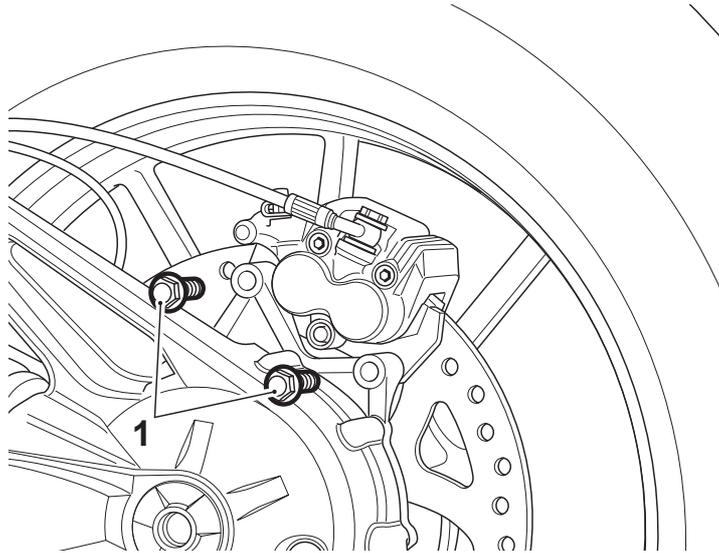
- Rider's Seat - Removal

- Battery - Removal
- Support the motorcycle so that the rear wheel is clear of the ground.
- Rear Wheel - Removal

! WARNING

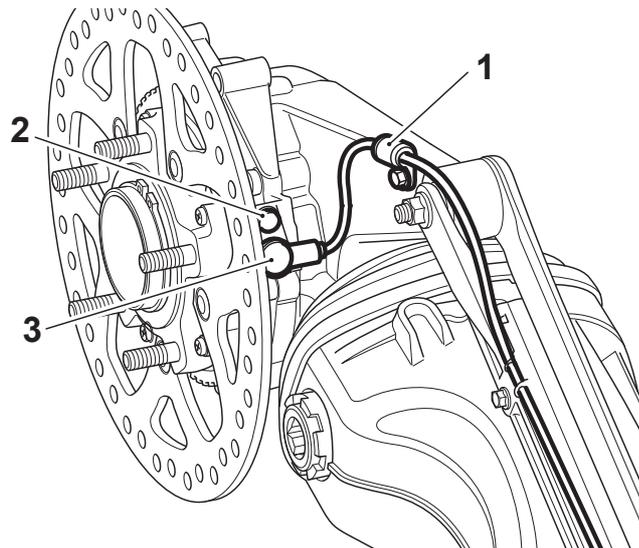
Do not allow the caliper to hang on the brake hose as this may damage the hose and could lead to loss of motorcycle control and an accident.

1. Detach and support the rear brake caliper such that the weight of the caliper is not supported by the brake hose.



1. Caliper mounting bolts

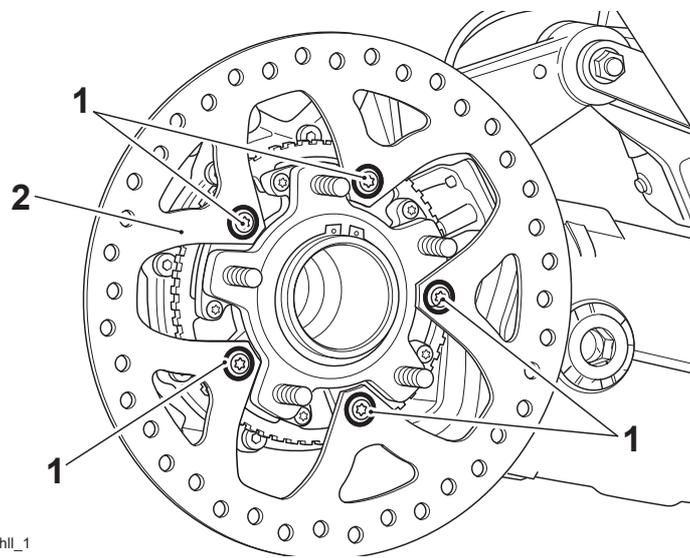
2. Detach the P-clip securing the harness for the rear wheel speed sensor to the rear bevel box.
3. Release the fixing, detach the rear wheel speed sensor and position it aside. Discard the fixing.



chnb

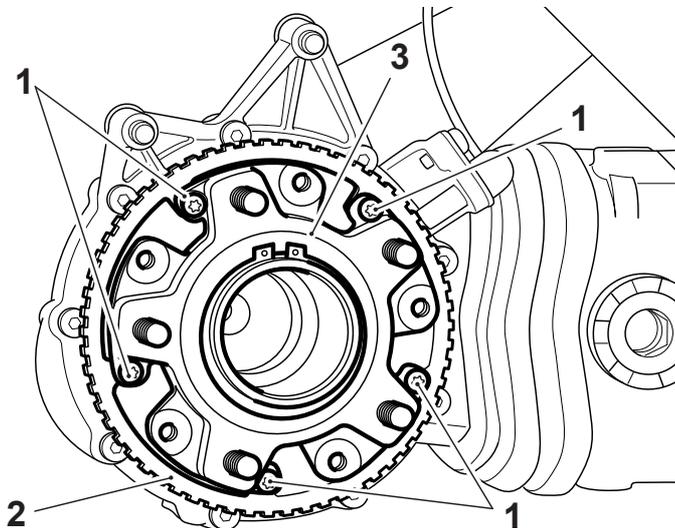
- 1. P-clip**
- 2. Fixing**
- 3. Wheel speed sensor**

4. Remove and discard the five fixings and remove the brake disc.



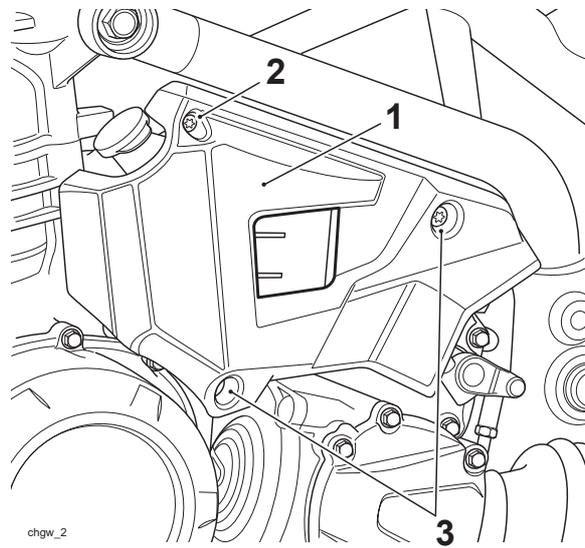
1. Fixings
2. Brake disc

5. Remove and discard the five fixings and remove the pulser ring.



1. Fixings
2. Pulser ring
3. Hub

6. Remove the three fixings and remove the expansion tank cover. Discard the upper M5 fixing. Retain the lower M6 fixings for reuse.



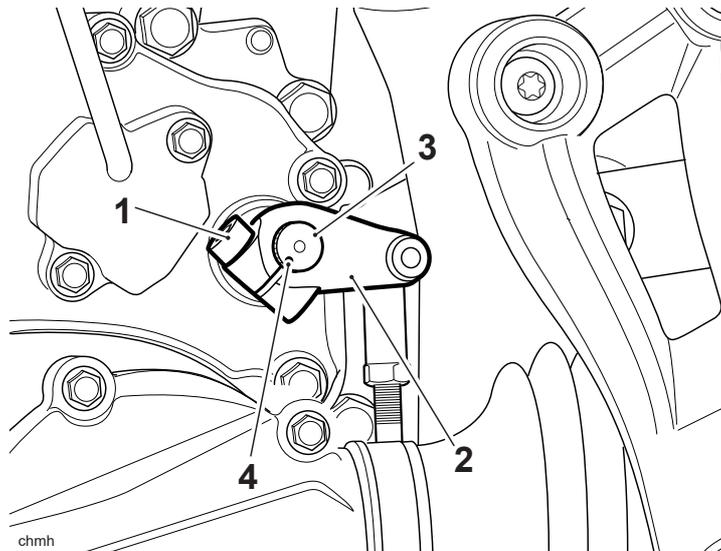
chgw_2

1. Expansion tank cover
2. Upper fixings (M5)
3. Lower fixings (M6)

Note

- Note the position of the transmission linkage in relation to the punch mark on the gear change mechanism.

7. Select neutral, remove the pinch bolt and disconnect the transmission linkage from the gear change mechanism.



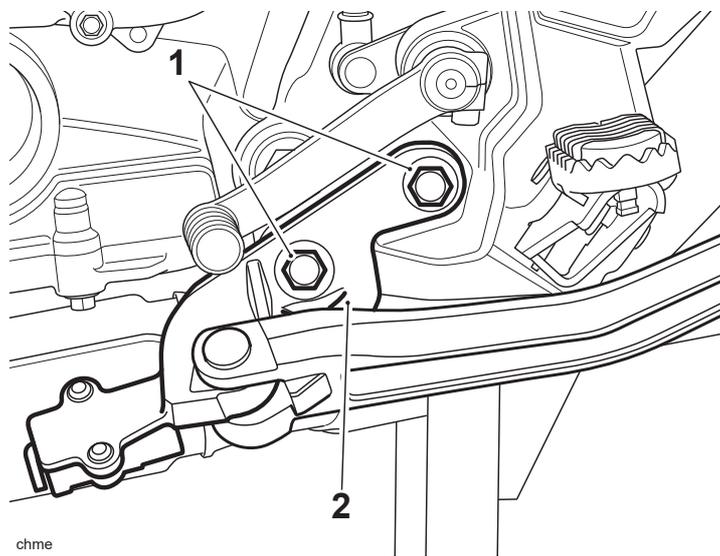
chmh

1. Pinch bolt
2. Transmission linkage
3. Gear change mechanism
4. Punch mark

Note

- Do not allow the side stand to hang on the harness for the side stand switch.
- Note the routing of the harness for the side stand switch for installation.

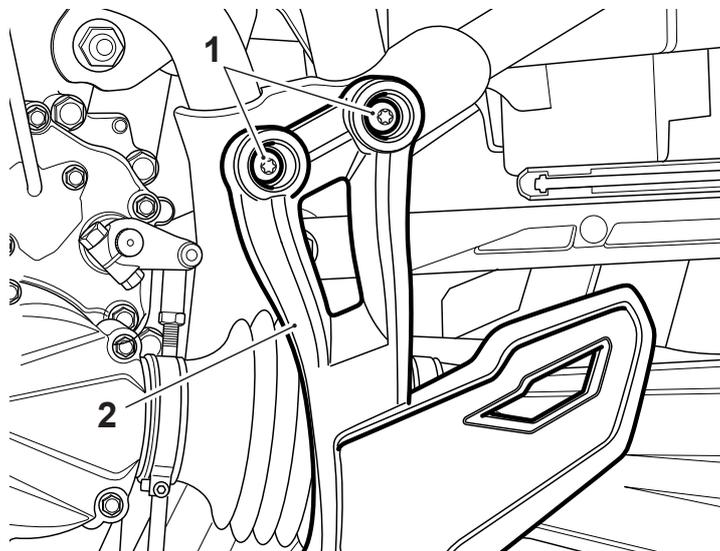
8. Release the fixings, detach the side stand and position aside.



chme

1. Fixings
2. Side stand

9. Release the fixings and remove the left hand control plate.

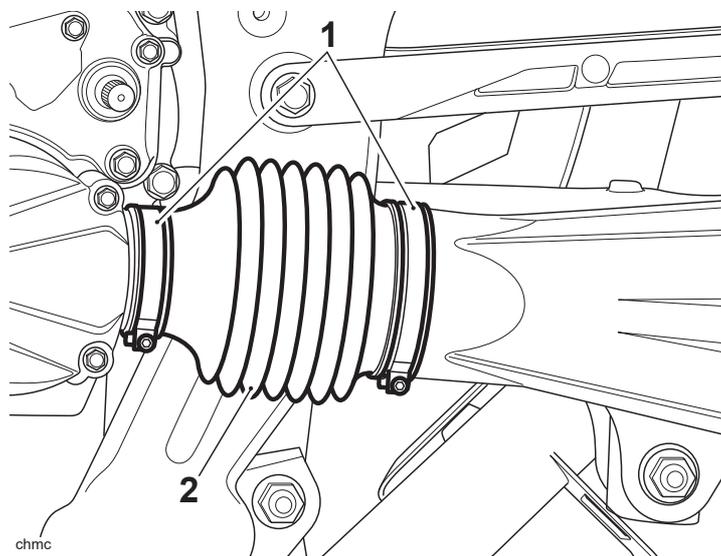


1. Fixings
2. Control plate

Note

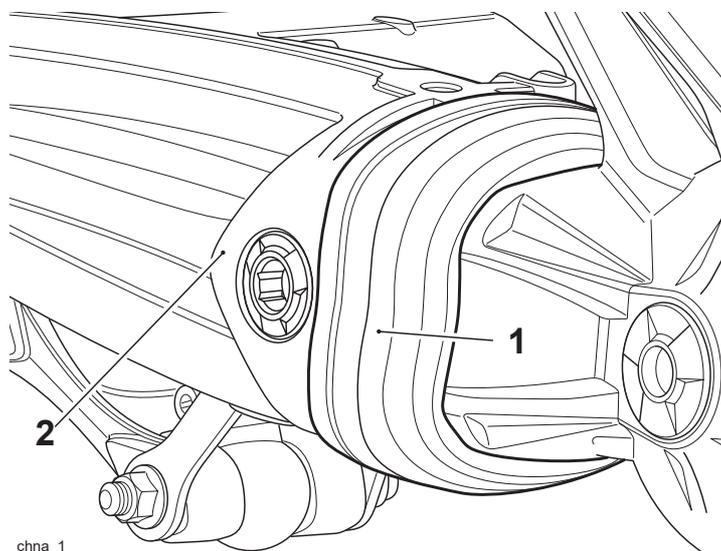
- Note the position and orientation of the clamps for installation.

10. Release the two clamps and detach the rubber boot from the front of the swinging arm and the transmission.



1. Clamps
2. Boot

11. Detach the rubber boot from the rear of the swinging arm.

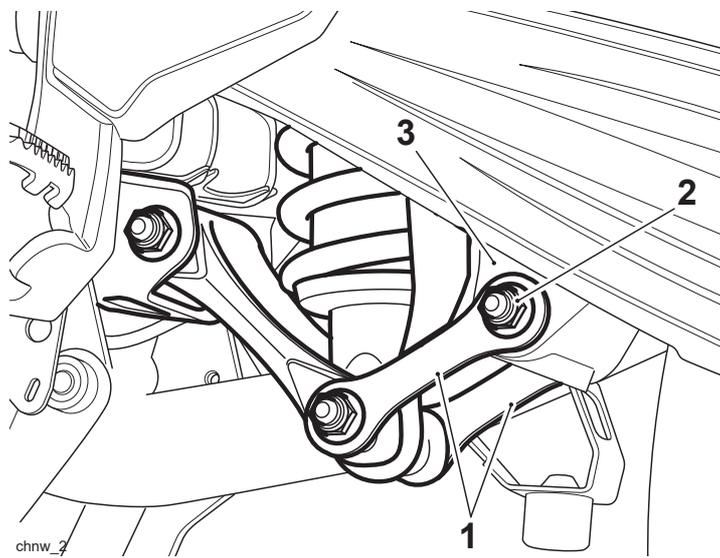


1. Boot
2. Swinging arm

Note

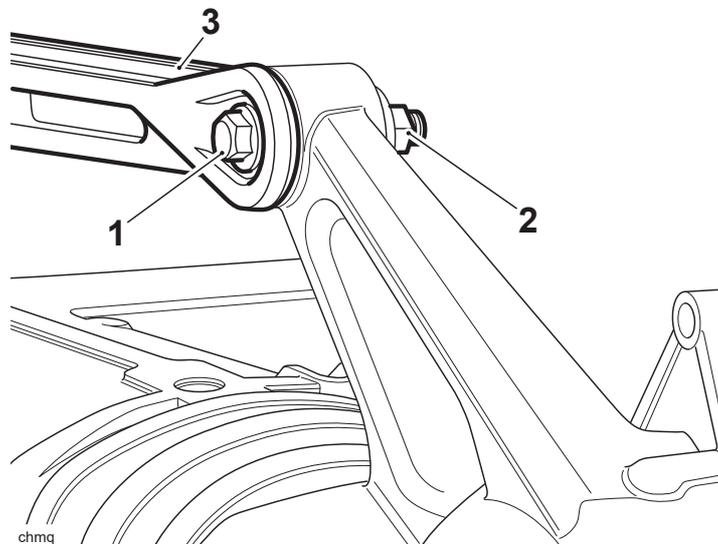
- It is possible that the swinging arm may obstruct the drive shaft detaching from the transmission.

12. To allow for movement of the swinging arm, position a suitable strap to support the swinging arm then remove the lock nut and bolt securing the drop links to the swinging arm. Discard the lock nut.



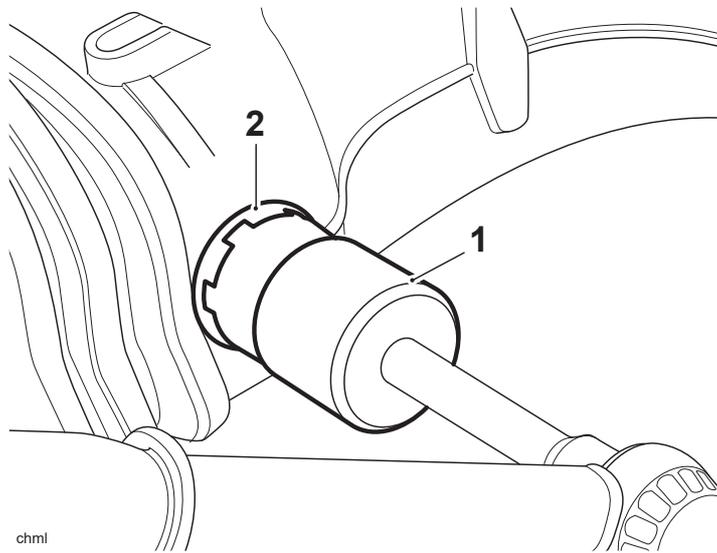
1. Drop links
2. Lock nut
3. Swinging arm

13. Remove the bolt and lock nut securing the rear bevel box to the torque arms. Discard the lock nut.



1. Bolt
2. Lock nut
3. Torque arms

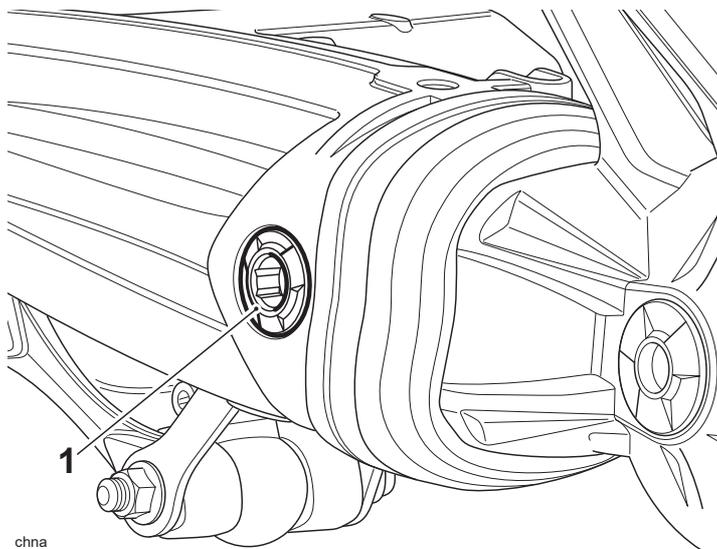
14. Using T3880620 - Adjuster Socket, 48 mm loosen the locking ring for the right hand pivot pin.



1. T3880620 - Adjuster Socket, 48 mm
2. Locking ring

Note

- The drive shaft is secured to the rear bevel box by a spring clip and will also be removed with the bevel box.
15. While supporting the rear bevel box, remove both pivot pins and move the bevel box rearwards to disengage the drive shaft from the transmission.



1. Pivot pin, left hand shown

16. While supporting the drive shaft, continue to move the bevel box and drive shaft assembly rearwards for complete removal.

Rear Bevel Box - Inspection

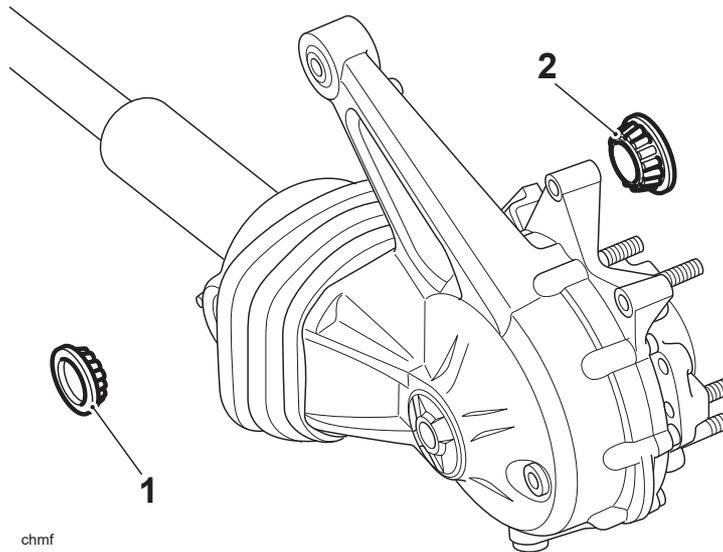
1. Inspect the rear bevel box bearings and the bearings outer race for damage, cracks and signs of bearing rollers indenting the outer race. Renew the bearings if damage is present in either bearing (see Rear Bevel Box Bearings - Removal).
2. Inspect the pivot pins for damage and deformation. Renew as necessary.
3. Inspect the rubber boot for splits and other damage. Replace as necessary.
4. Inspect the drive shaft and its universal joints for damage. Renew as necessary.

Rear Bevel Box - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

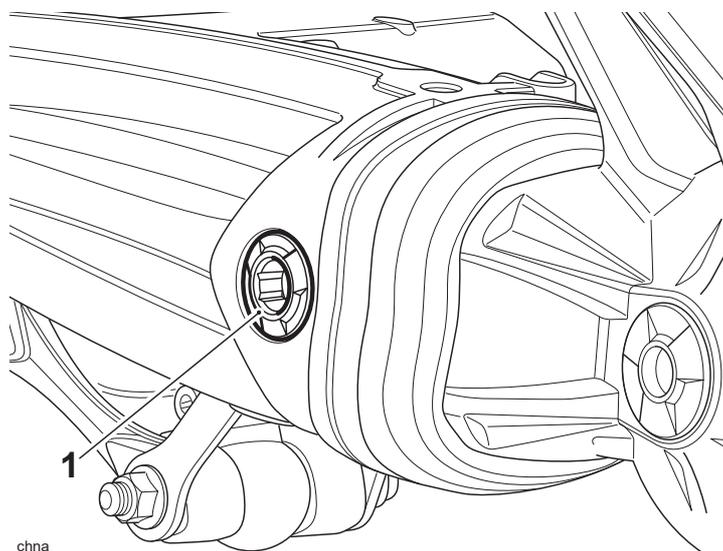
1. Apply a smear of grease, to NLGI 2 specification, to the splines of the drive shaft and the transmission output shaft.
2. Lubricate the threads of both pivot pins with a smear of proprietary high temperature copper-based grease.
3. Thoroughly lubricate the pivot pin bearings with grease, to NLGI 2 specification, and fit them to the rear bevel box.



1. **Left hand bearing**
2. **Right hand bearing**

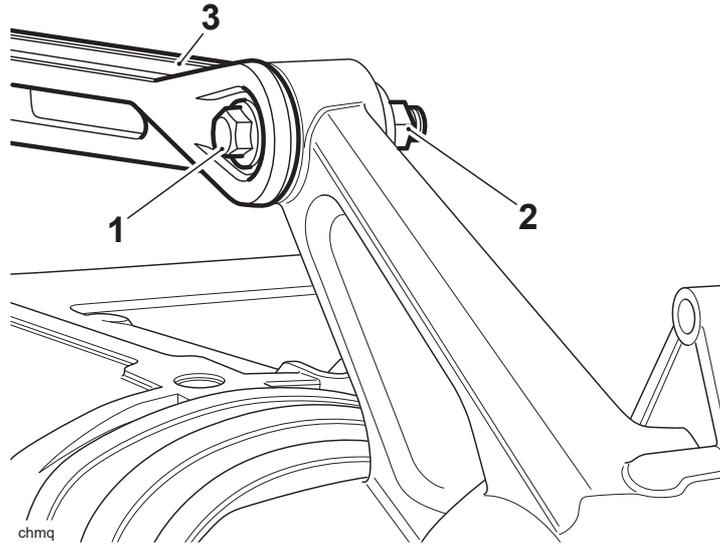
Note

- It may be necessary to raise the rear of the swinging arm to align the drive shaft on to the transmission shaft.
4. With the aid of an assistant, position the drive shaft through the swinging arm and fit it onto the transmission output shaft.
 5. Align the rear bevel box to the swinging arm and fit the pivot pins. Do not fully tighten at this stage.



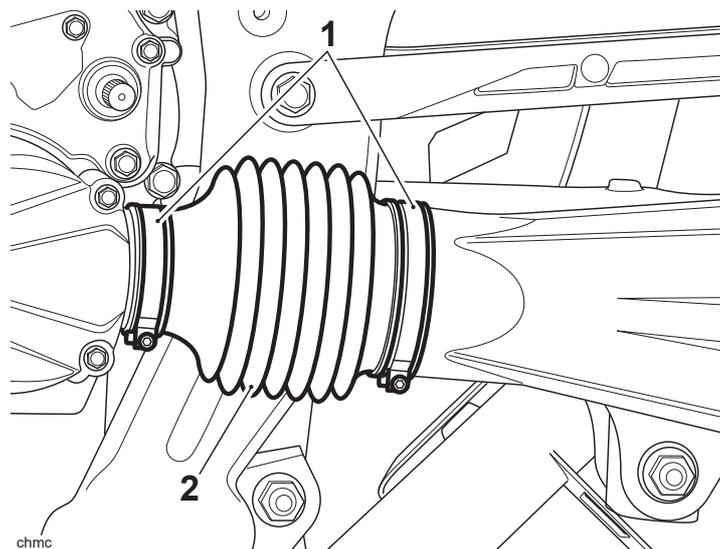
1. **Pivot pin, left hand shown**

6. Attach the torque arms to the rear bevel box. Fit the bolt and new lock nut but do not fully tighten at this stage.
7. Attach the drop links to the swinging arm with the original bolt and a new lock nut. Do not fully tighten at this stage.
8. Tighten the pivot pins in the sequence described below:
 - o Tighten the left hand pivot pin to **100 Nm**
 - o Tighten the right hand pivot pin to **48 Nm**
 - o Fit the locking ring to the right hand pivot pin and tighten to **110 Nm**.
9. Hold the nut while tightening the torque arms bolt to **48 Nm**.



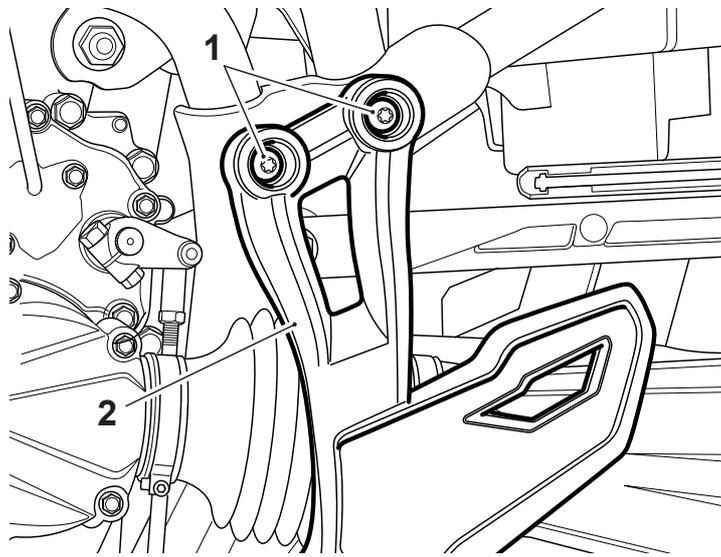
1. Bolt
2. Lock nut
3. Torque arms

10. Attach the rubber boot to the rear of the swinging arm.
11. Attach the rubber boot to the front of the swinging arm and the transmission. Position the clips as noted for removal and tighten to **1.5 Nm**.



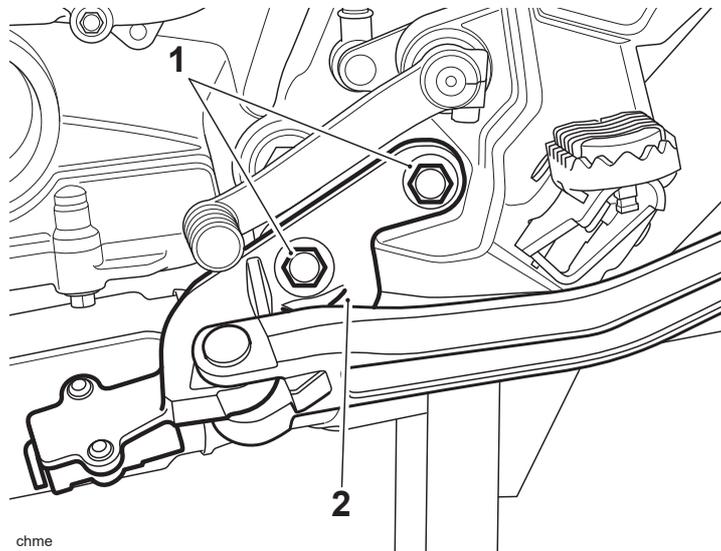
1. Clamps
2. Boot

12. Align the left hand control plate to the frame and fit the two upper fixings. Do not fully tighten at this stage.



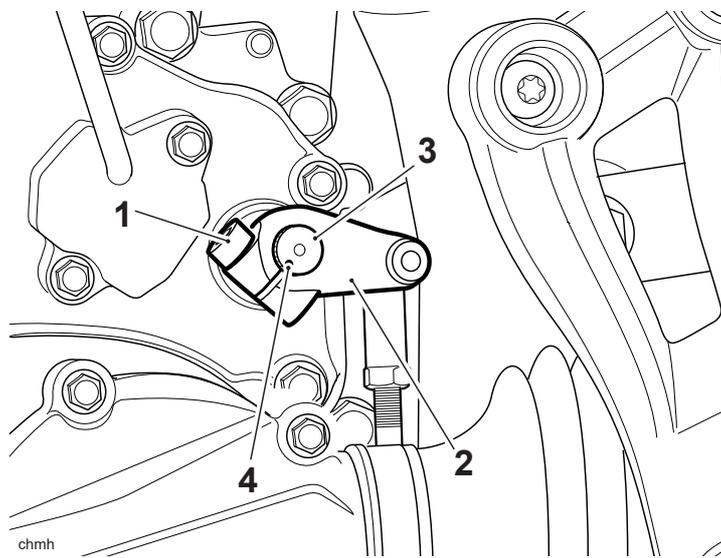
1. Fixings
2. Control plate

13. Route the harness for the side stand switch as noted for removal.
14. Fit the side stand and tighten its fixings to **70 Nm**.



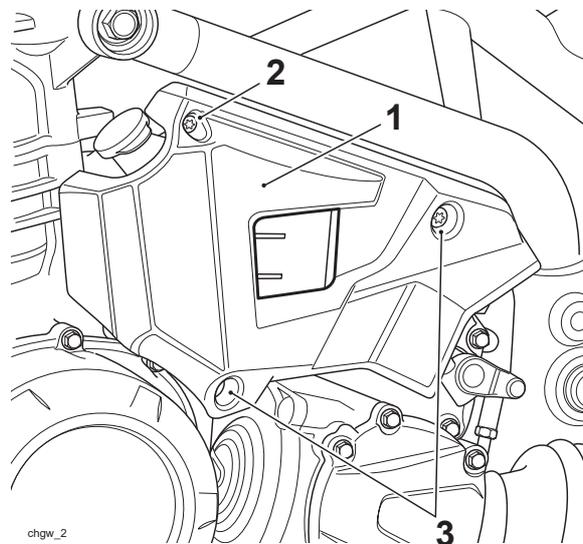
1. Fixings
2. Side stand

15. Tighten the upper fixings for the left hand control plate to **18 Nm**.
16. Fit the transmission linkage to the gear change mechanism as noted for removal.
17. Fit the pinch bolt and tighten it to **9 Nm**.



1. Pinch bolt
2. Transmission linkage
3. Gear change mechanism
4. Punch mark

18. Refit the expansion tank cover. Secure the upper mounting with a new M5 encapsulated fixing. Secure the lower mounting with the two original fixings. Tighten the upper fixing to **3 Nm** and the lower fixings to **4 Nm**.



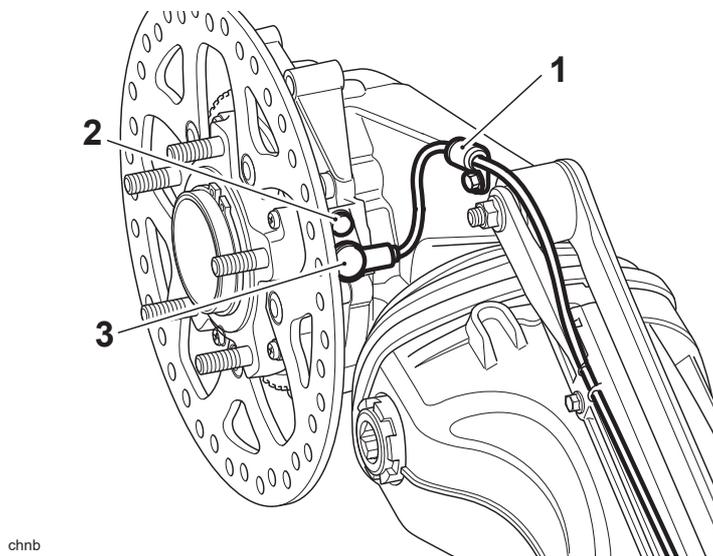
1. Expansion tank cover
2. Upper fixing (M5)
3. Lower fixings (M6)

19. Align the pulser ring to the hub. Fit new fixings and tighten to **5 Nm**.

20. Align the brake disc to the hub. Fit new fixings and tighten to **22 Nm**.

21. Fit the rear wheel speed sensor and tighten the new fixing to **9 Nm**.

22. Secure the harness for the rear wheel speed sensor and its P-clip to the rear bevel box.



1. **P-clip**
2. **Fixing**
3. **Wheel speed sensor**

23. Position the caliper over the disc ensuring the pads are correctly aligned on both sides of the disc.
24. Fit the caliper retaining bolts and tighten to **40 Nm**.
25. Fit the rear wheel (see Rear Wheel - Installation).
26. With the weight of the motorcycle on its wheels, hold the drop link to swinging arm bolt while tightening the nut to **85 Nm**.
27. Check and, if necessary, adjust the oil level in the rear bevel box (see Rear Bevel Box Oil Level Check).
28. Reconnect the battery, positive (red) lead first.
29. Fit the rider's seat (see Rider's Seat - Installation).
30. Check for correct brake operation. Rectify as necessary.

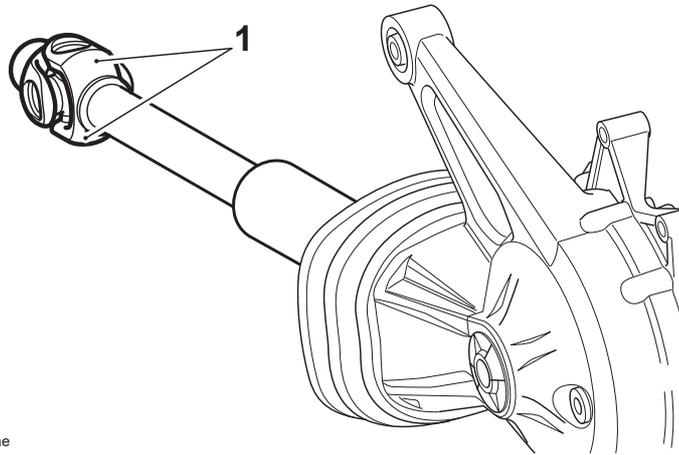
Rear Bevel Box Bearings - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rear Bevel Box - Removal
1. With the aid of an assistant holding the rear bevel box, align the drive shaft such that it is straight.
 2. Using a soft faced mallet, give a sharp tap to one of the universal joint yokes on the drive shaft, indicated below, to release the snap ring securing the drive shaft to the bevel box.



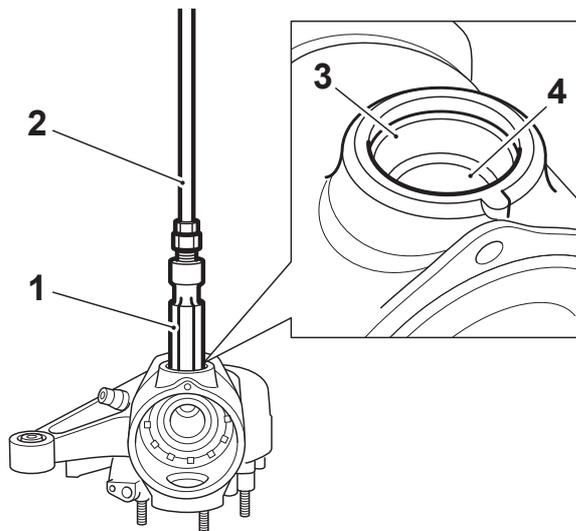
chne

1. Universal joint yoke

3. Remove the drive shaft.

Note

- **When removing the bearing outer race, the cap will separate from the outer race.**
4. Fit T3880627 - Bearing Puller, 32-42 mm such that the lugs of the tool are between the bearing outer race and its cap.
 5. Assemble T3880627 - Bearing Puller, 32-42 mm to T3880208 - Slide Hammer, fully engaging the threads.
 6. Draw back the slide part of the hammer swiftly to facilitate the removal of the bearing outer race.



chmm

1. T3880627 - Bearing Puller, 32-42 mm
2. T3880208 - Slide Hammer
3. Bearing outer race
4. Cap

7. Repeat for the other bearing race.

Rear Bevel Box Bearings - Installation

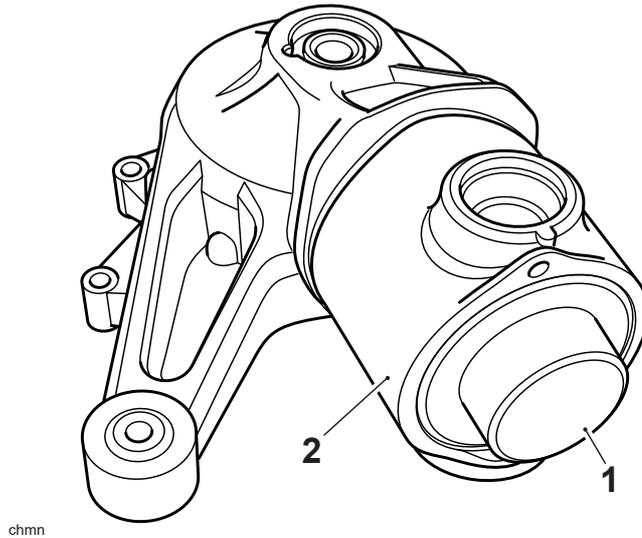
Note

- The left hand replacement bearing is supplied with the cap attached to the outer race by means of an adhesive.
- The right hand replacement bearing is supplied with the cap detached from the bearing race.

! CAUTION

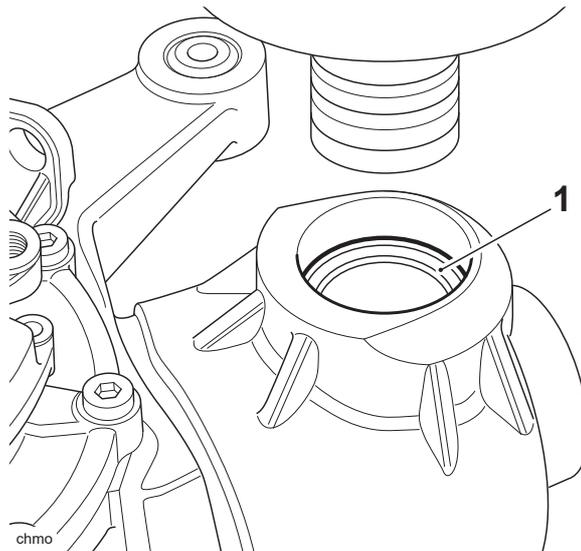
T3880624 - Housing Support must be used when pressing in the bearing outer race. Failure to use this service tool may result in damage to the bevel box housing.

1. Fit T3880624 - Housing Support into the bevel box housing, as shown below.



1. **T3880624 - Housing Support**
2. **Bevel box**

2. If not attached to the bearing race, fit the cap into the bearing housing, ensuring that it is central, as shown below.



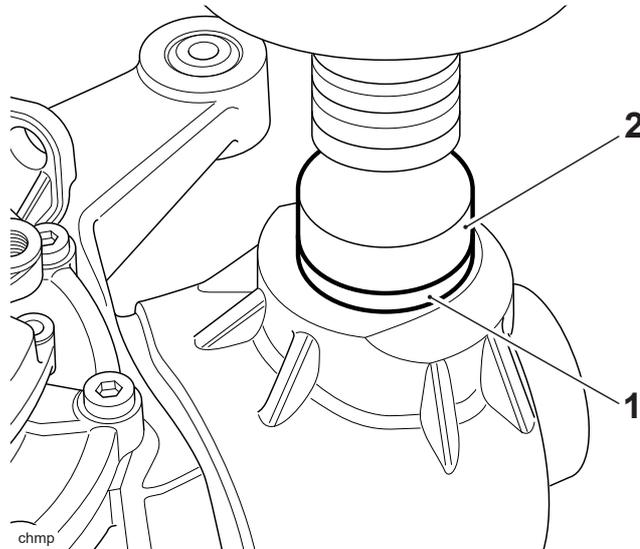
1. **Cap**

! WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

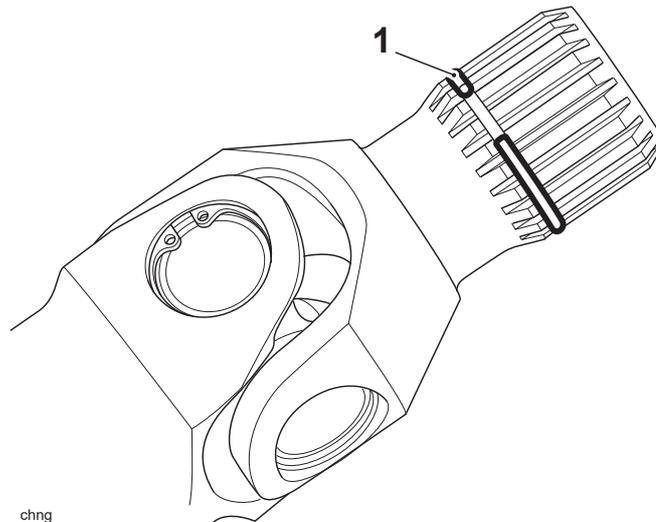
Never wear loose clothing which could become trapped in the press and cause a crushing injury to the hand, arms or other parts of the anatomy.

- Using T3880625 - Bearing Installer, 39 mm, press the new bearing race to the left hand side of the rear bevel box until it is pressed fully to the locating shoulder in the bevel box.
- Using T3880626 - Bearing Installer, 46 mm, press the new bearing race to the right hand side of the rear bevel box until it is pressed fully to the locating shoulder in the bevel box.



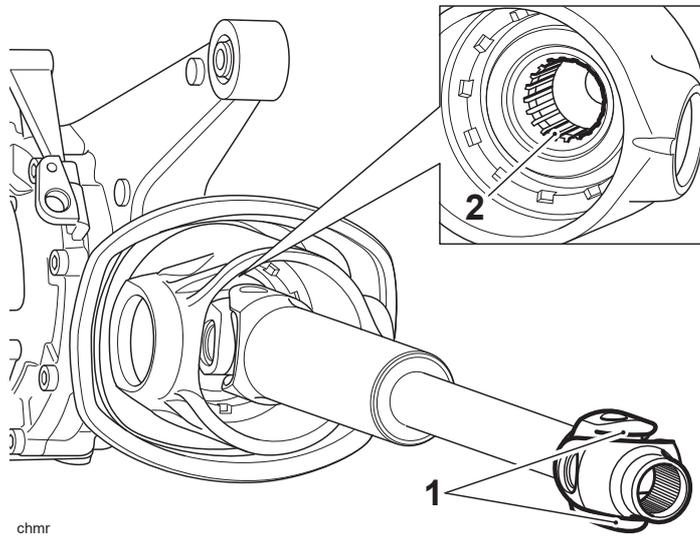
- Bearing race, right hand**
- T3880626 - Bearing Installer, 46 mm**

- Remove the service tools.
- Using a suitable tool, remove the snap ring on the drive shaft and fit a new snap ring.



- Snap ring**

- Apply a smear of grease, to NLGI 2 specification, to the splines of the drive shaft.
- With the aid of an assistant holding the rear bevel box, align the drive shaft to the bevel box such that it is straight.
- Using a soft faced mallet, give a sharp tap to one of the universal joint yokes on the drive shaft, indicated below, to locate the snap ring into its groove in the bevel box.



- 1. Universal joint yoke
- 2. Groove, for snap ring

10. Thoroughly lubricate the bearings with grease, to NLGI 2 specification, and fit them to the rear bevel box. Perform the following operations:

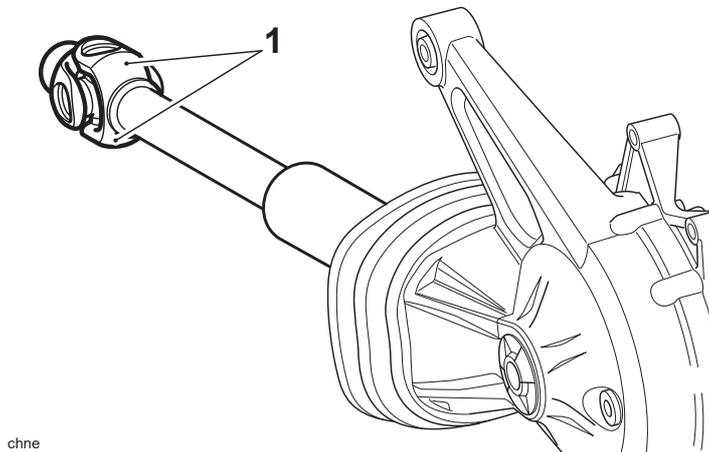
- Rear Bevel Box - Installation

Rear Bevel Box Oil Seal - Removal

! WARNING

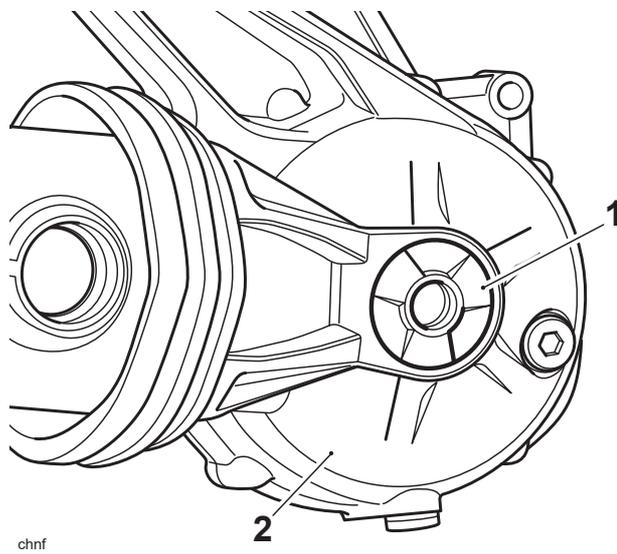
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Drain the oil from the rear bevel box (see Rear Bevel Box Oil Change).
2. Remove the rear bevel box (see Rear Bevel Box - Removal).
3. With the aid of an assistant holding the rear bevel box, align the drive shaft such that it is straight.
4. Using a soft faced mallet, give a sharp tap to one of the universal joint yokes on the drive shaft, indicated below, to release the snap ring securing it to the bevel box.



- 1. Universal joint yoke

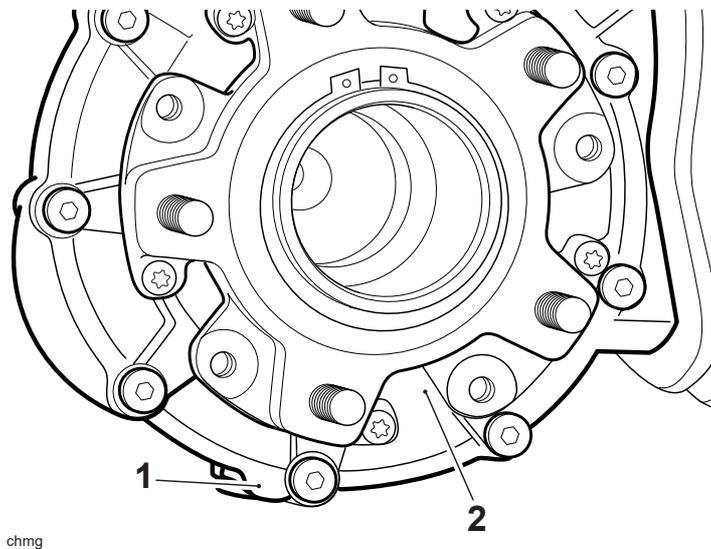
5. Remove the drive shaft.
6. Remove the cap from the bevel box housing.



1. Cap
2. Housing

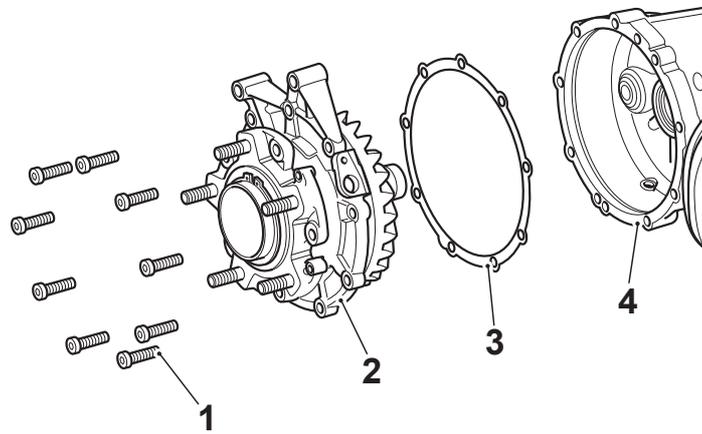
Note

- A shim or shims are fitted between the back plate assembly and the bevel box housing. Ensure the shims are kept clean when removed from the bevel box.
- The shims and back plate assembly will only fit the bevel box housing in one position. Note the position of the boss lug on the backing plate, shim(s) and housing for installation.



1. Boss
2. Back plate assembly

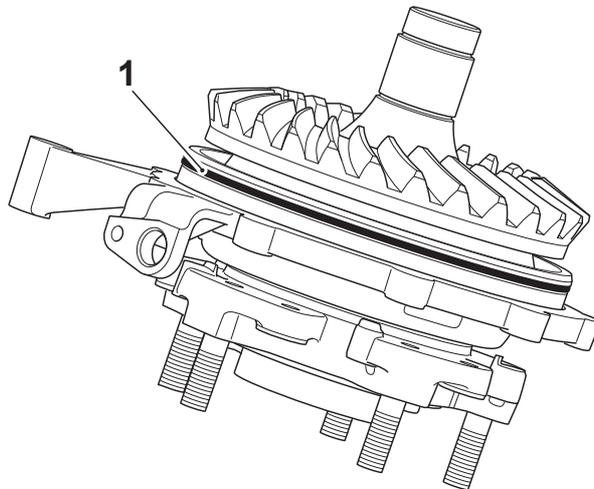
7. Release the nine fixings and remove the back plate assembly. Collect the shim(s) and ensure they are kept clean.



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1. Fixings
2. Back plate assembly
3. Shim (one shown)
4. Housing

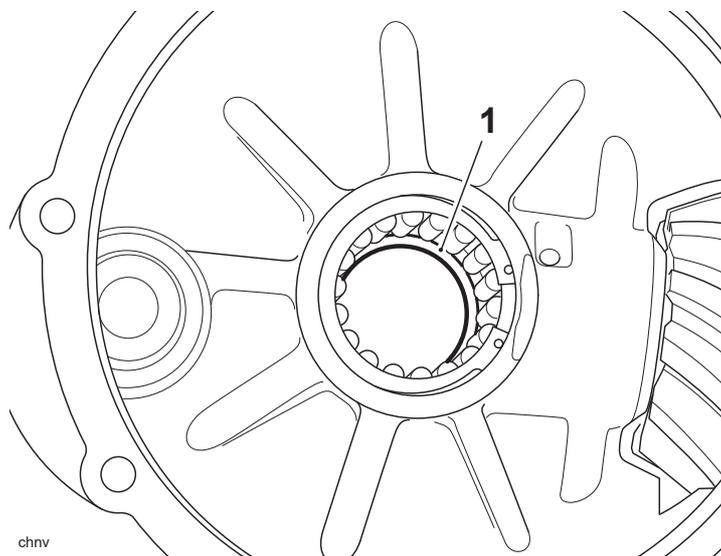
8. Remove and discard the O-ring.



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1. O-ring

9. Working from the opposite side of the housing to the seal, drift out the oil seal.



1. Seal

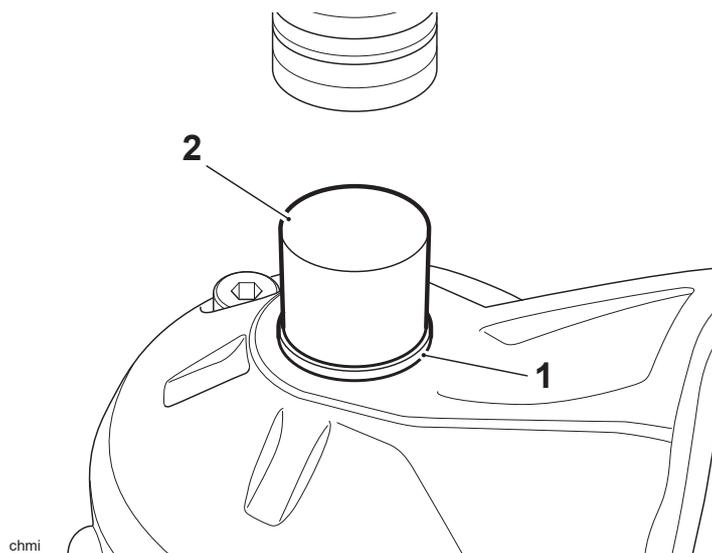
Rear Bevel Box Oil Seal - Installation

WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

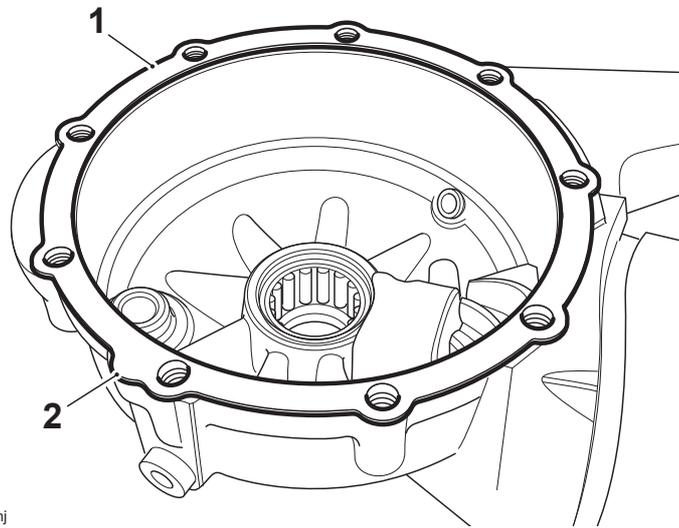
Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

1. Using a suitable drift, press in the new seal until it is against the bearing with the manufacturer's marks facing outwards.



- 1. Seal**
- 2. Drift**

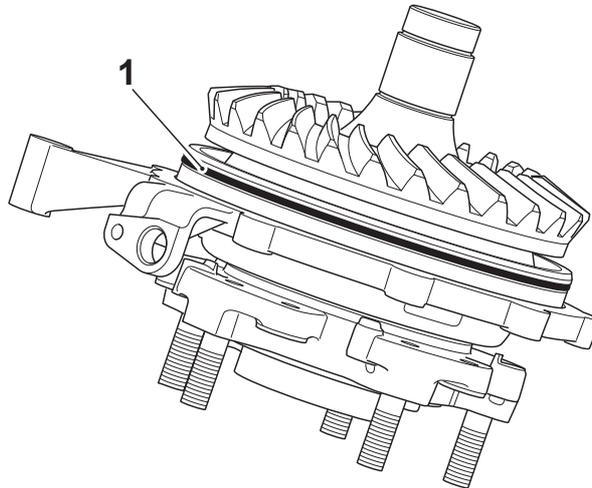
2. Align the shim(s) to the rear bevel box housing as noted for removal.



chmj

1. Shim(s)
2. Boss

3. Lubricate a new O-ring with clean oil for the rear bevel box and fit it to the back plate assembly.



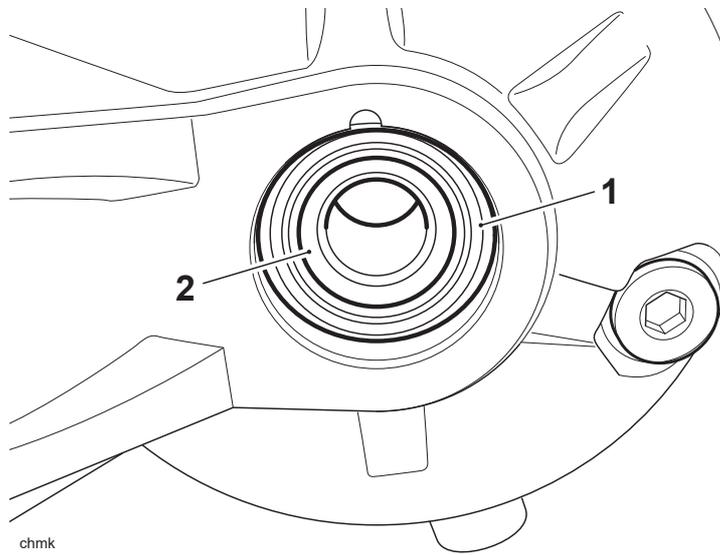
chmy

1. O-ring

4. Lubricate the sealing lips of the new seal with clean oil for the rear bevel box.
5. Align the back plate to the bevel box housing and shim(s) as noted for removal.

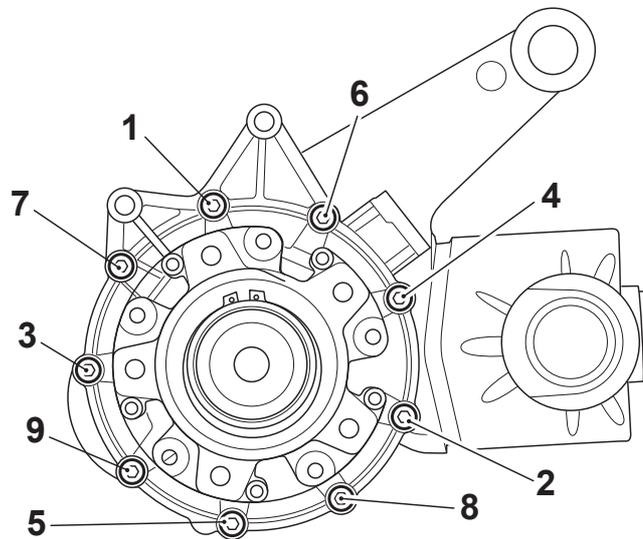
Note

- **When fitting the back plate to the bevel box housing, ensure that the sealing lips of the seal fit evenly around the shaft for the hub.**
6. Carefully press the back plate and bevel box housing together ensuring that the seal fits around the shaft for the hub evenly.



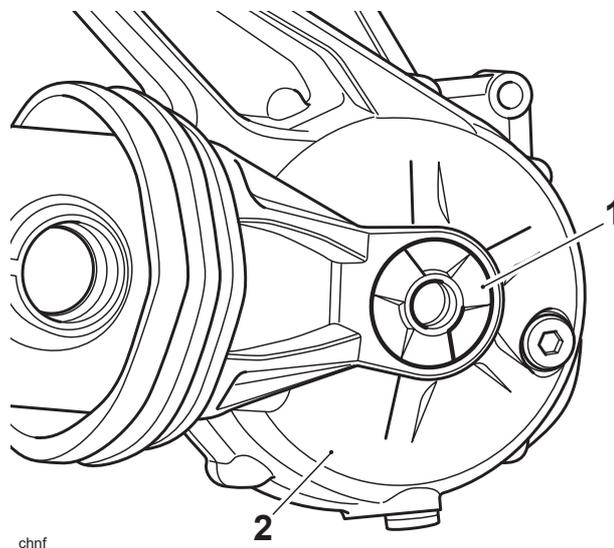
1. Seal
2. Shaft

7. Fit the fixings and tighten in the sequence shown below to **30 Nm**.



Tightening Sequence

8. Refit the cap to the bevel box housing.

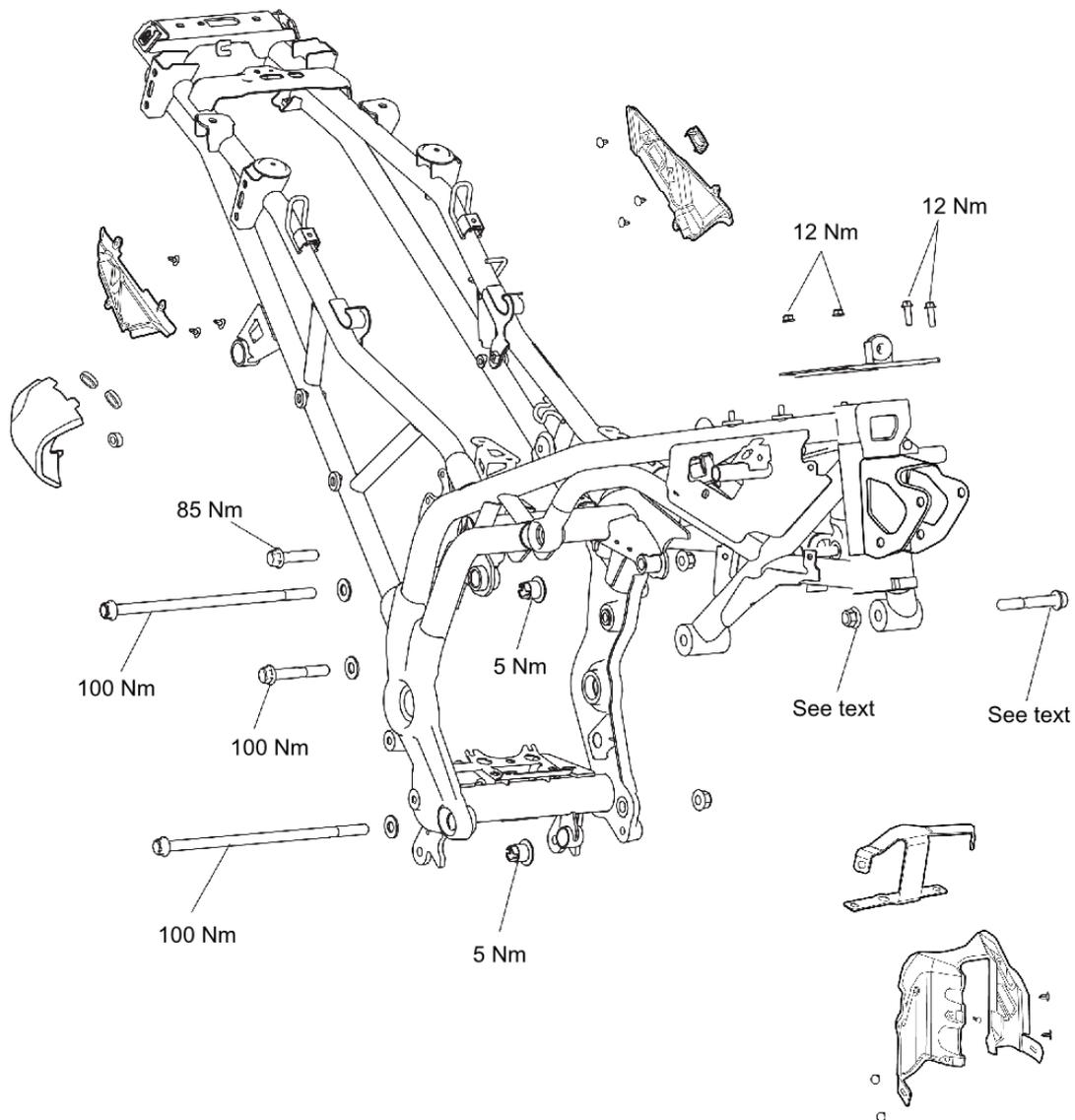


1. Cap
2. Housing

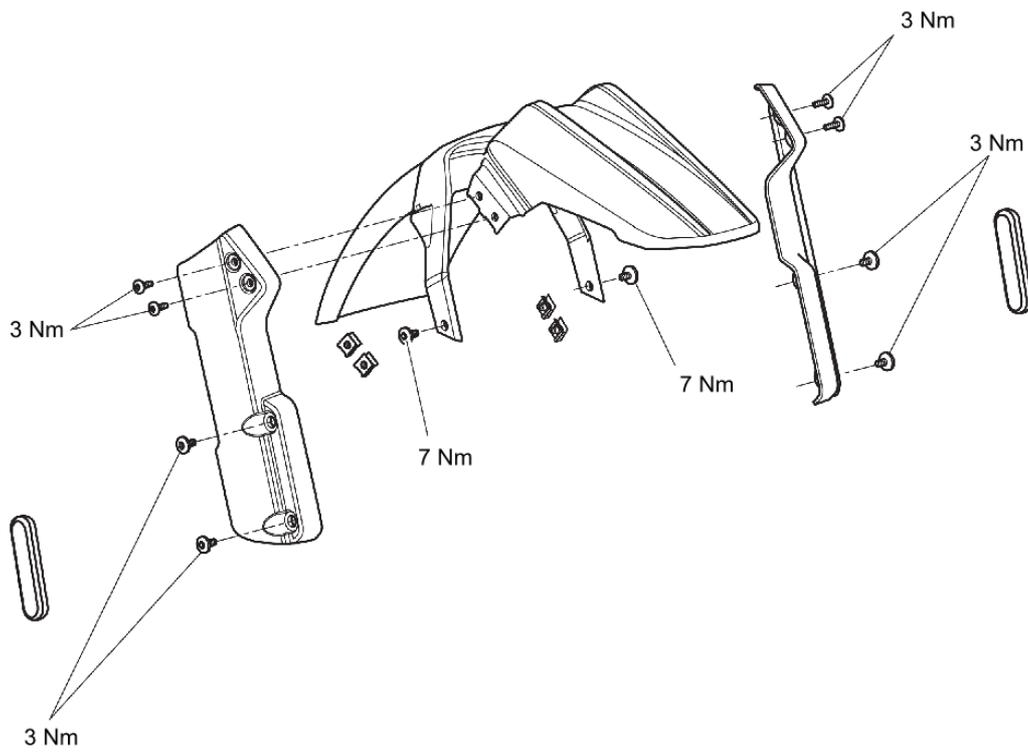
9. Fit the rear bevel box to the motorcycle (see Rear Bevel Box - Installation).
10. Fill the rear bevel box with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil (see Rear Bevel Box Oil Change).
11. Operate the motorcycle then check the rear bevel box for oil leaks. Rectify if necessary.

Frame and Bodywork

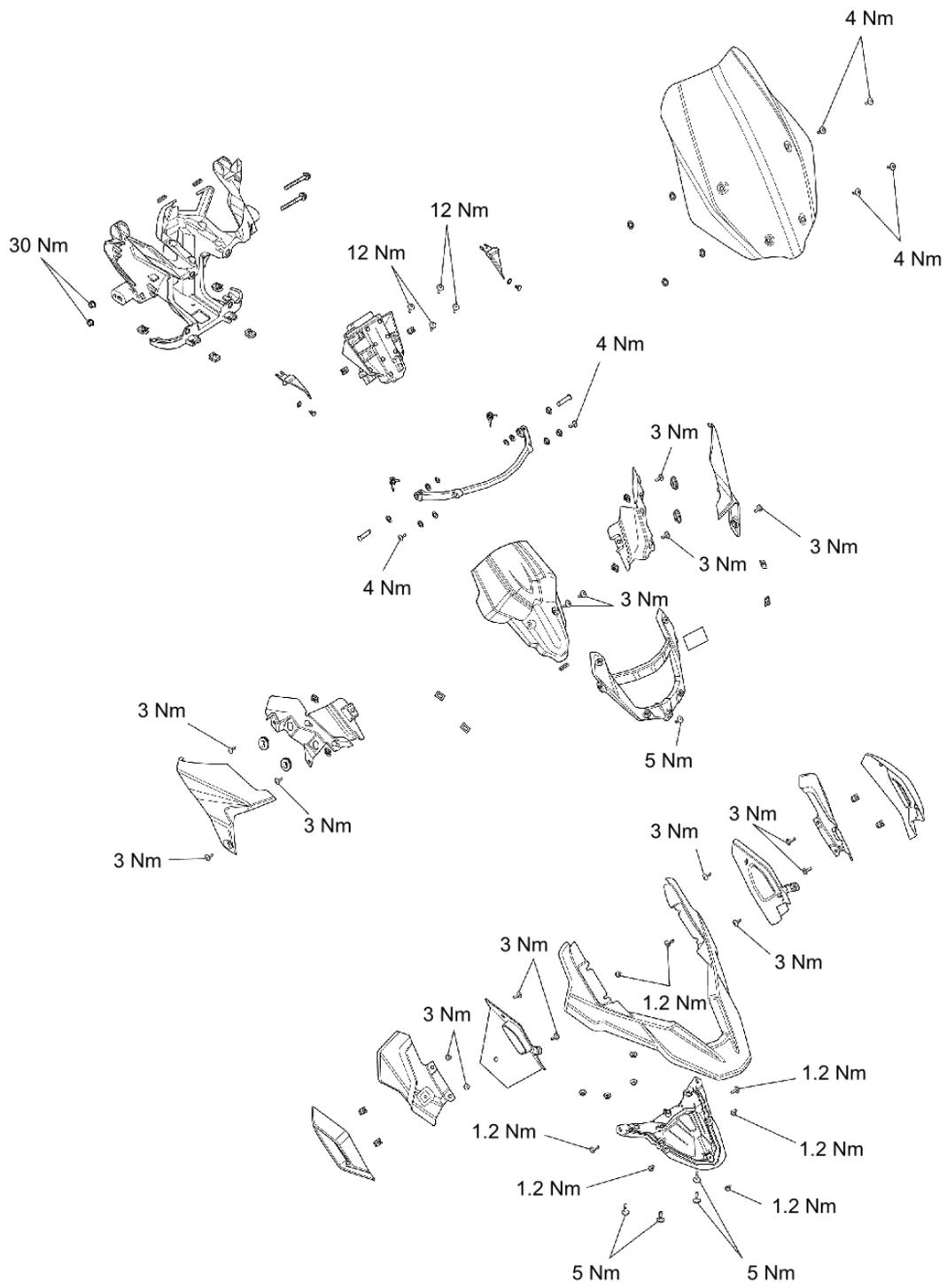
Exploded View – Frame



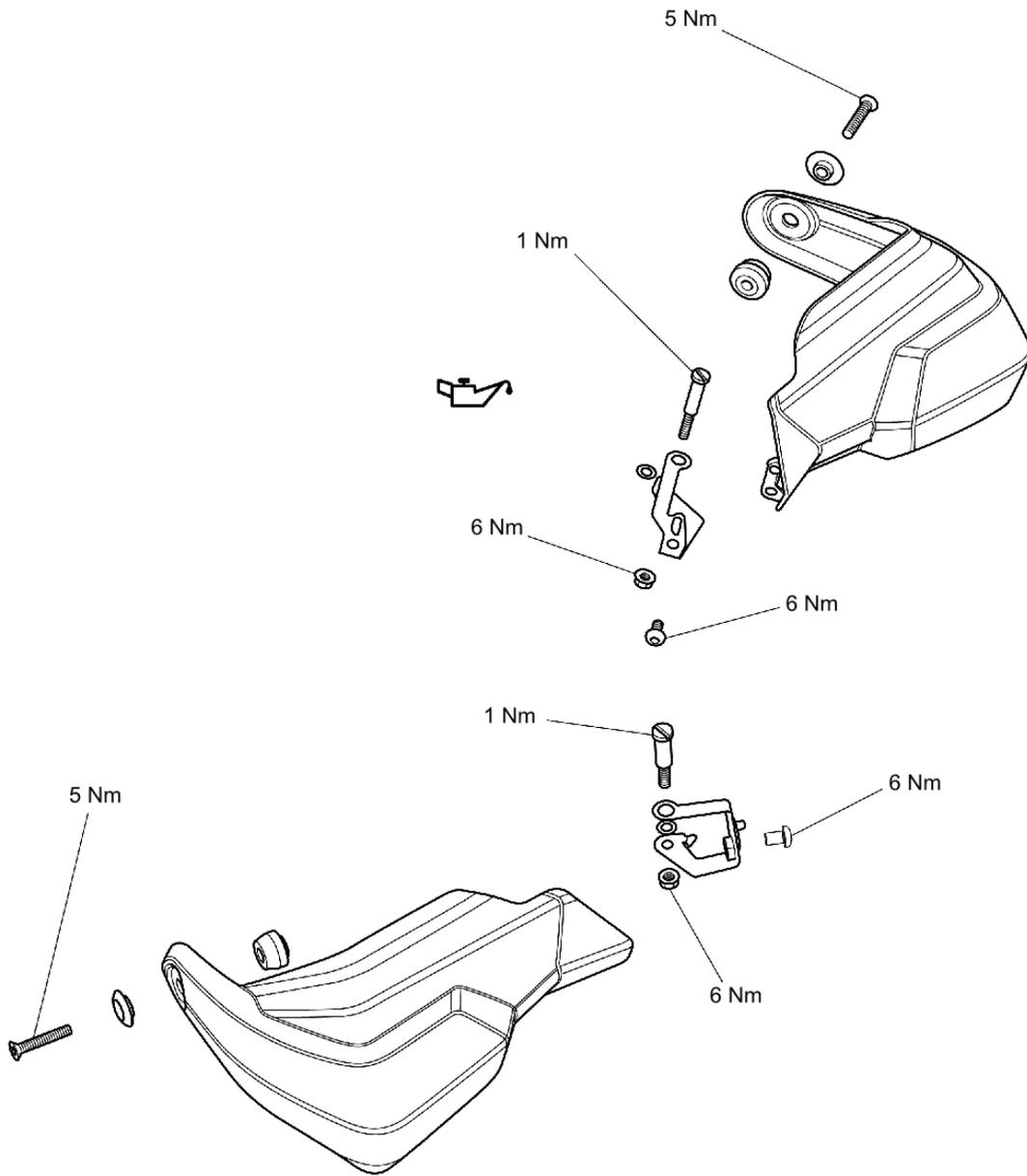
Exploded View – Front Mudguard



Exploded View – Cockpit and Mountings

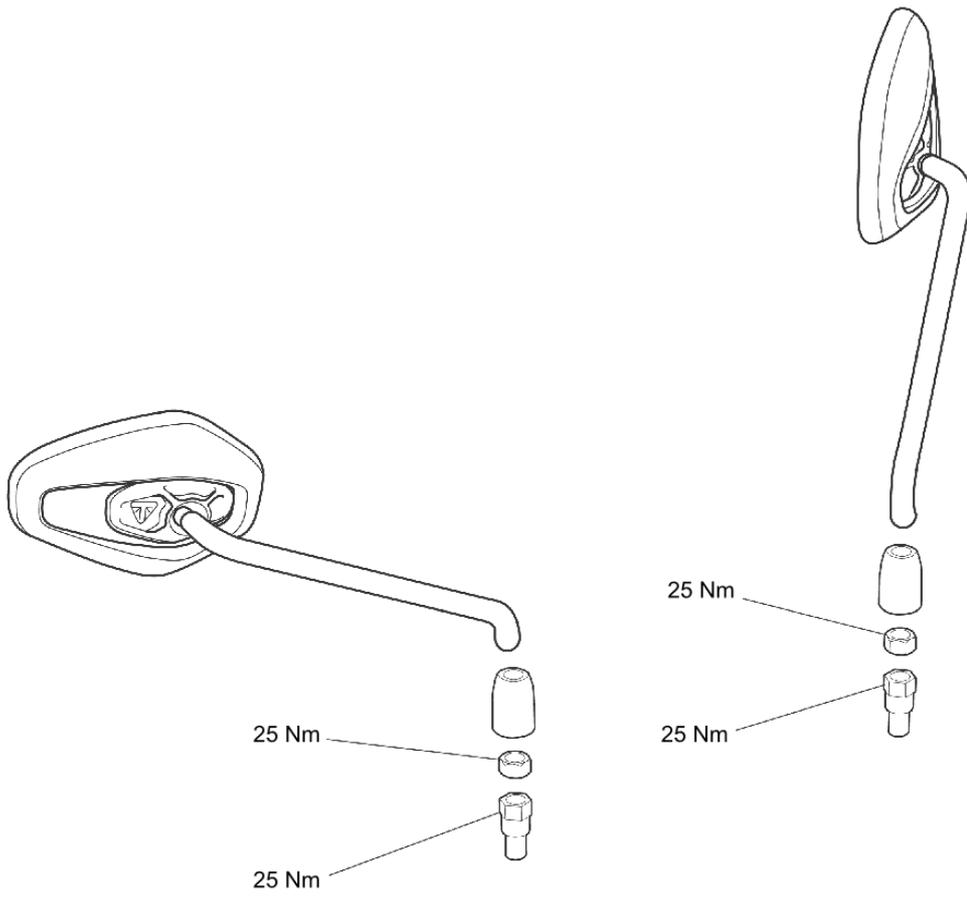


Exploded View – Hand Guards

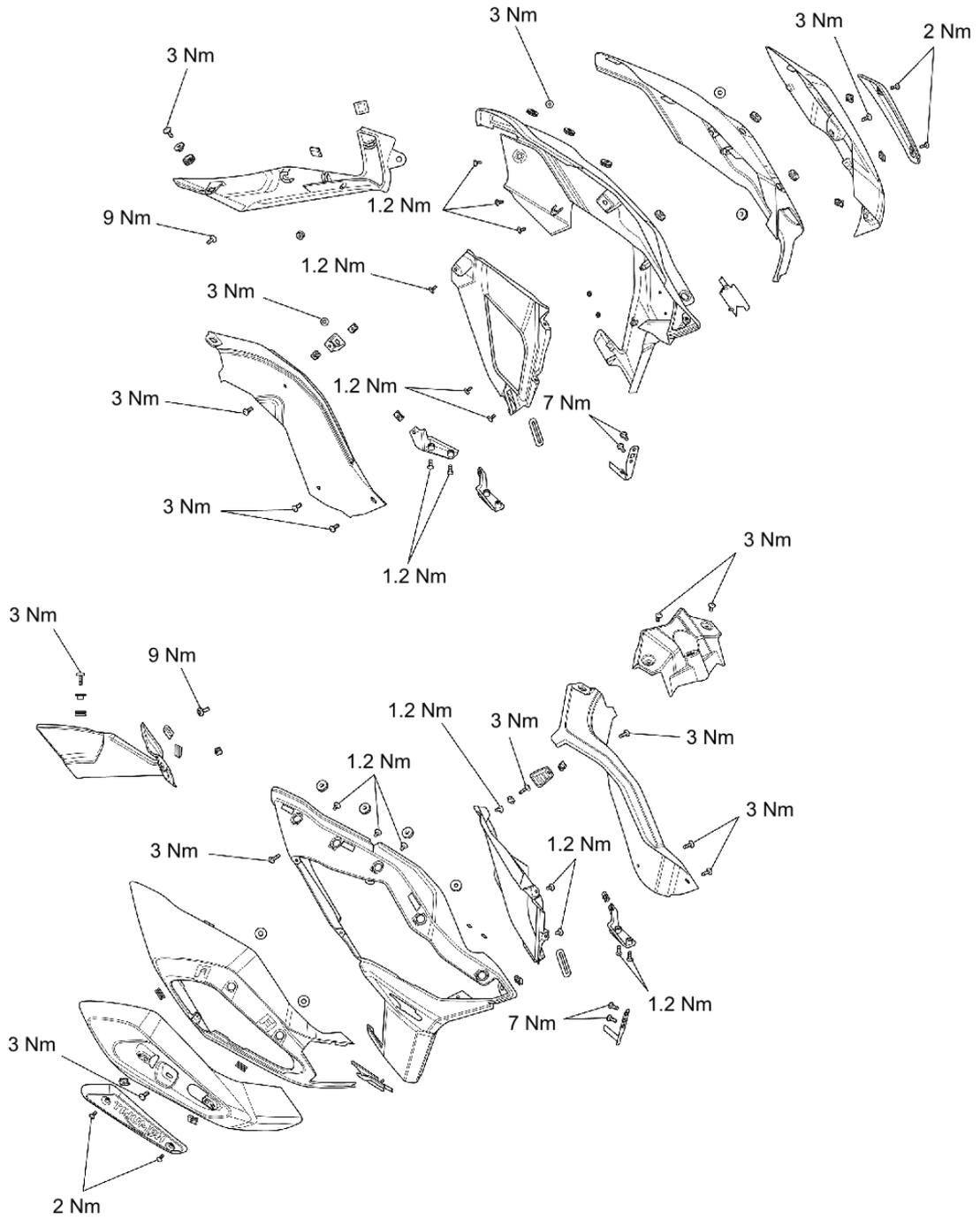


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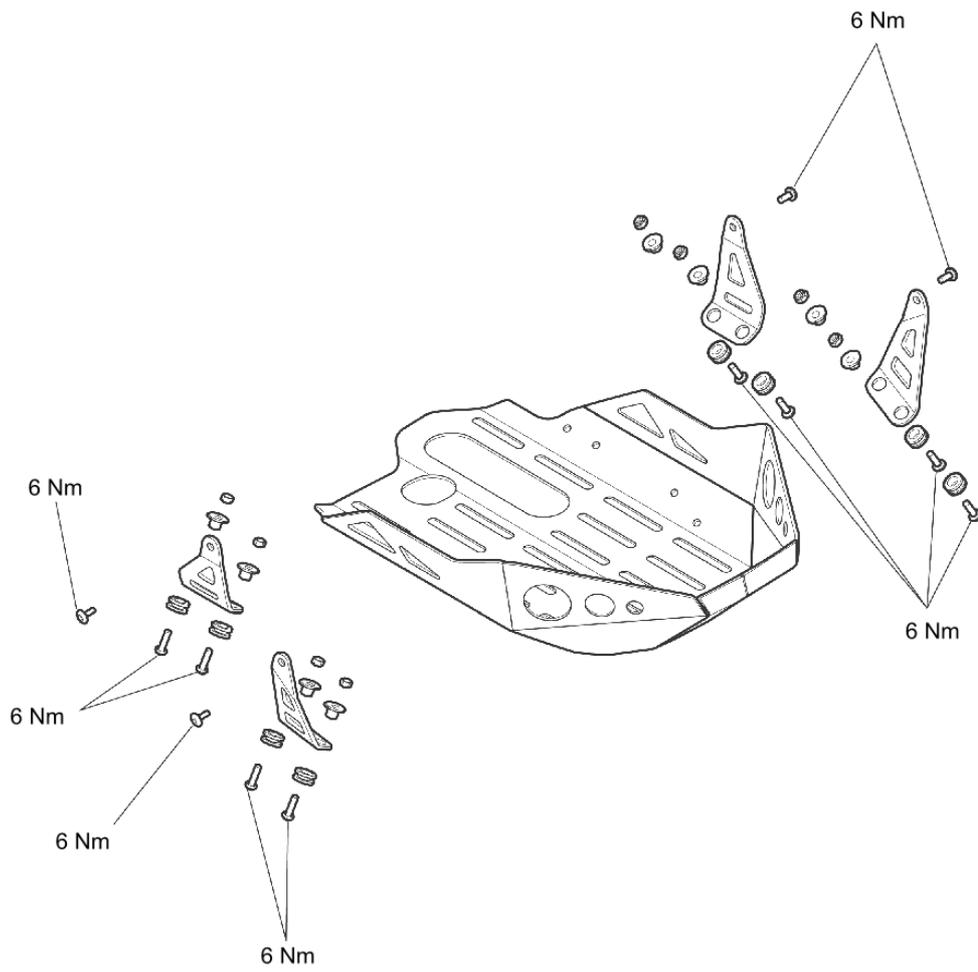
Exploded View - Mirrors



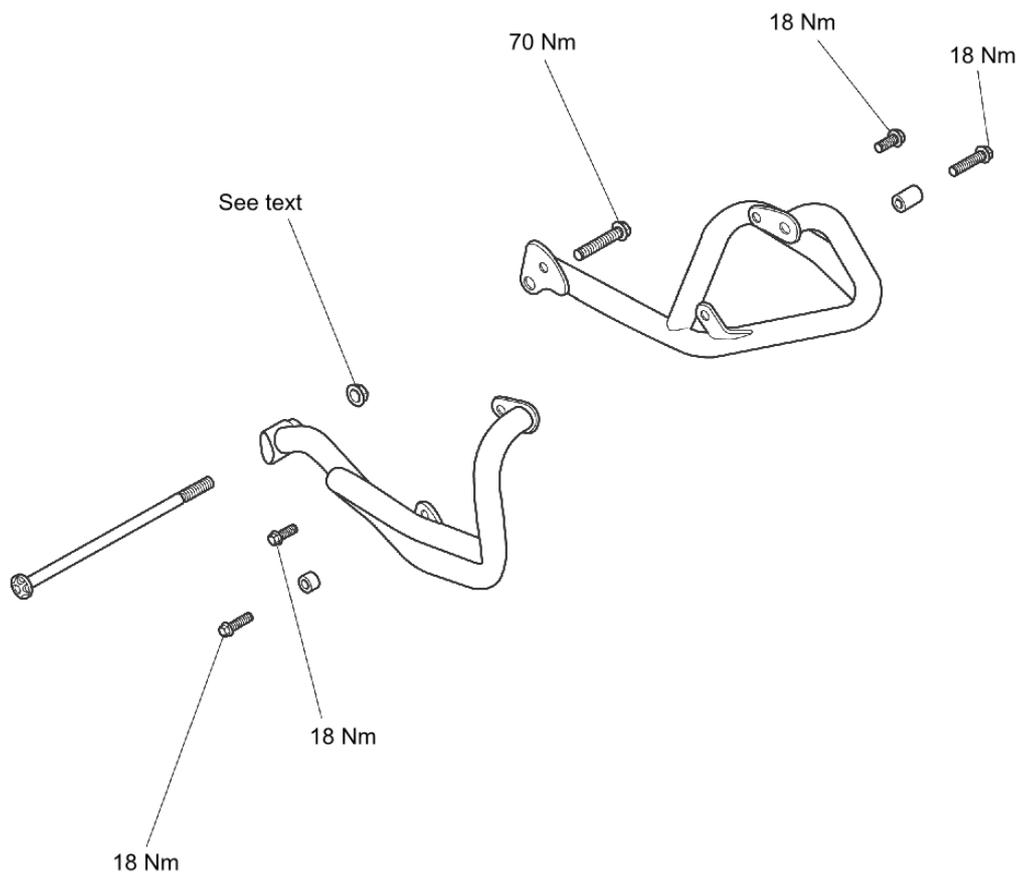
Exploded View – Side Fairings



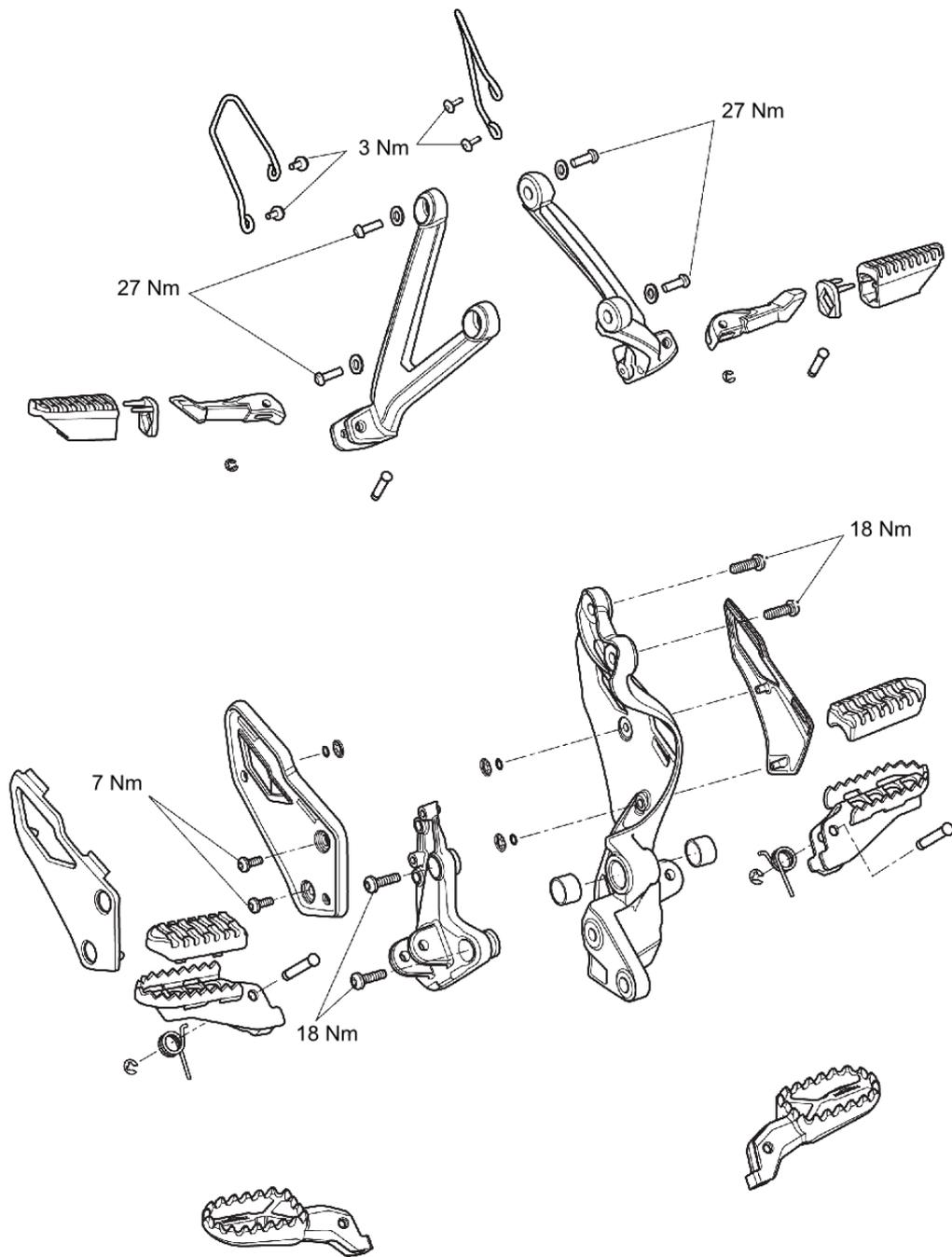
Exploded View – Sump Guard



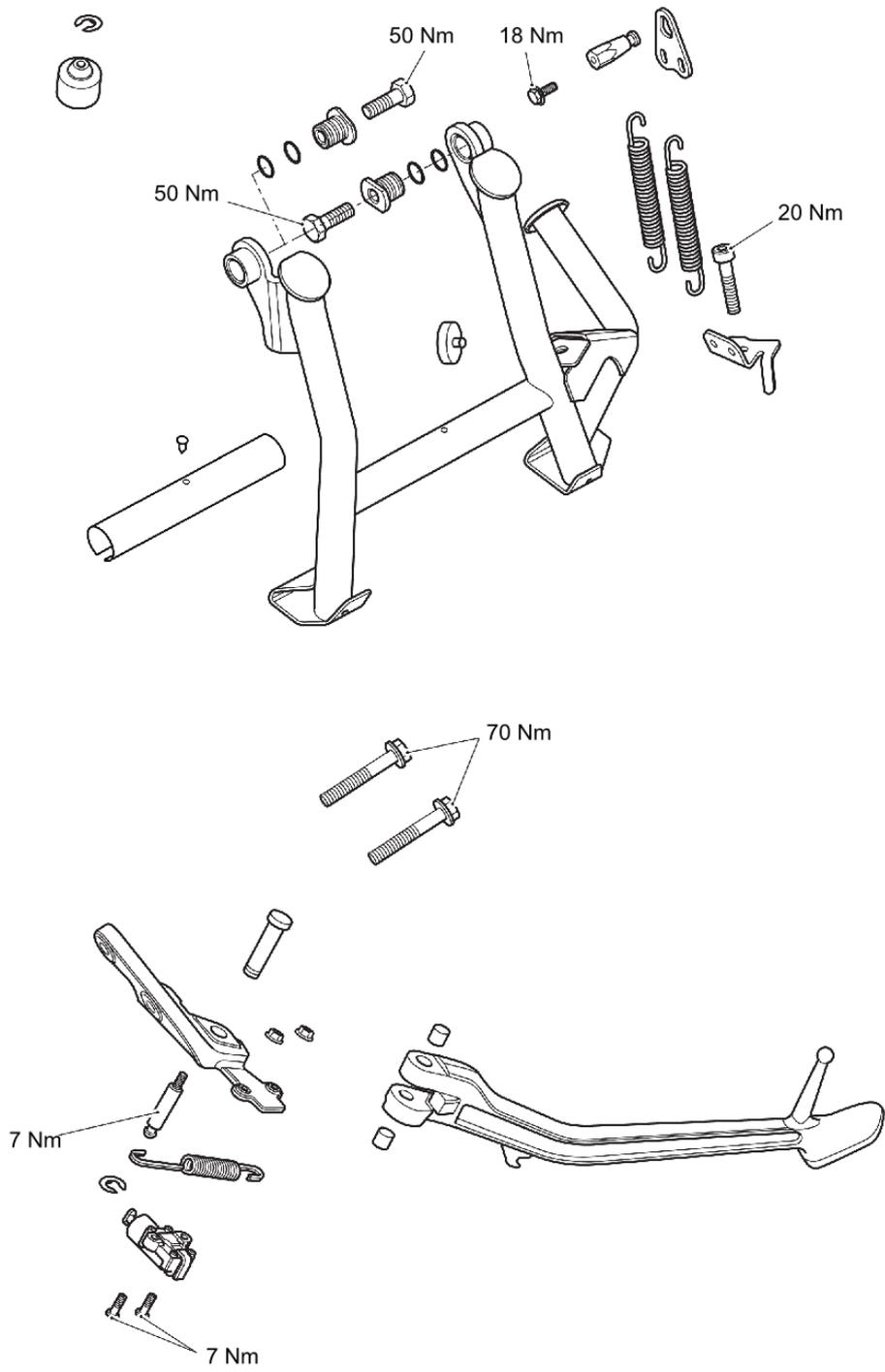
Exploded View – Engine Protection Bars



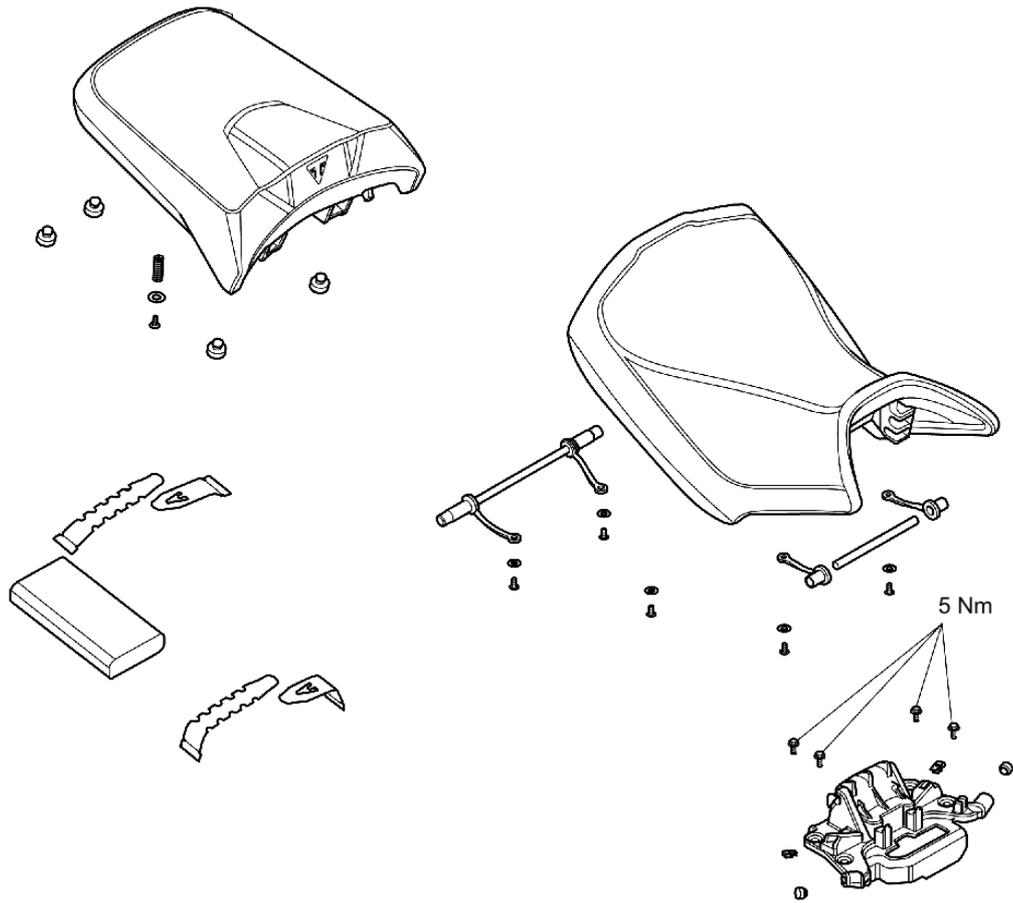
Exploded View - Front and Rear Footrests



Exploded View – Side Stand and Centre Stand

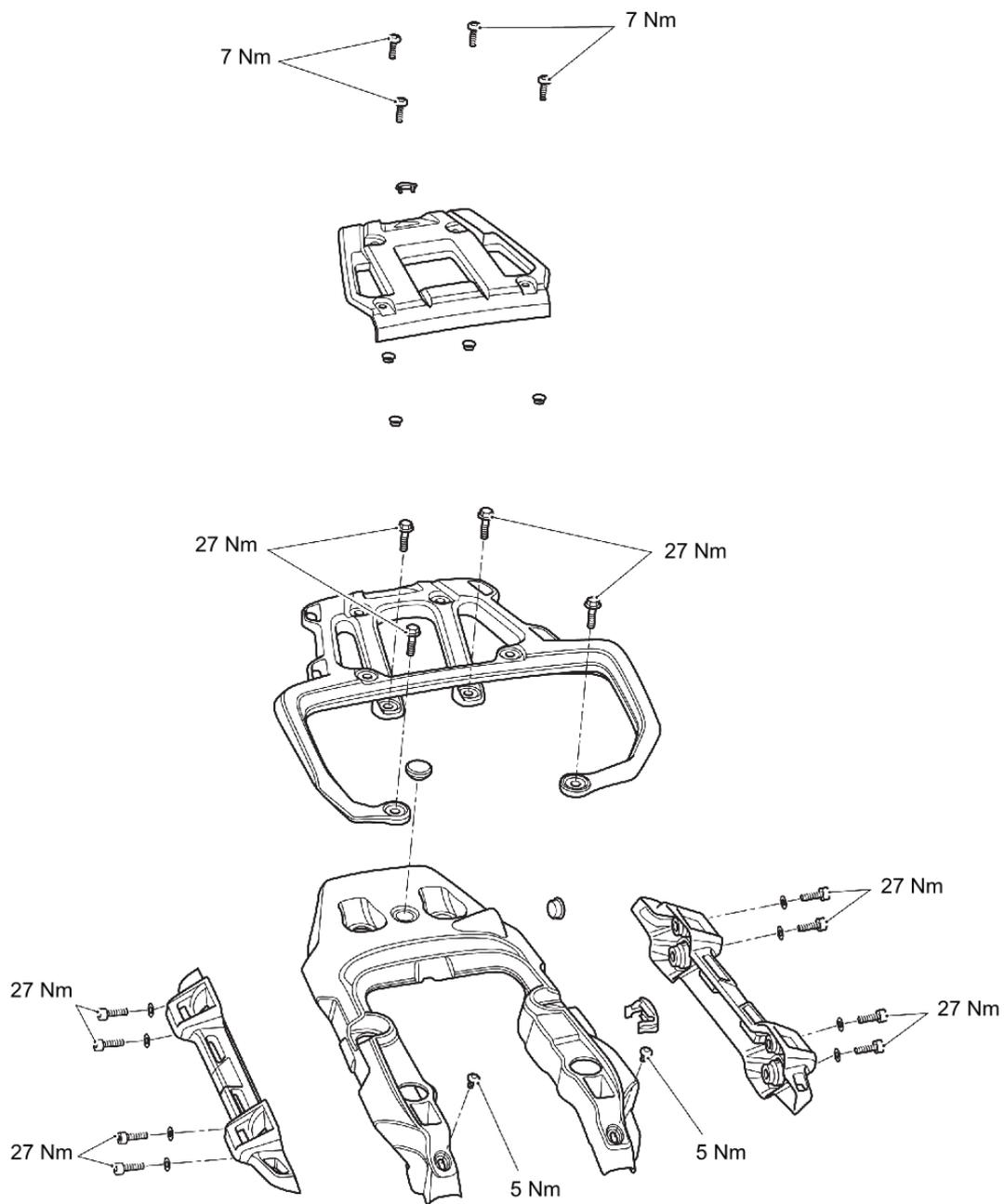


Exploded View - Seat and Tool Kit

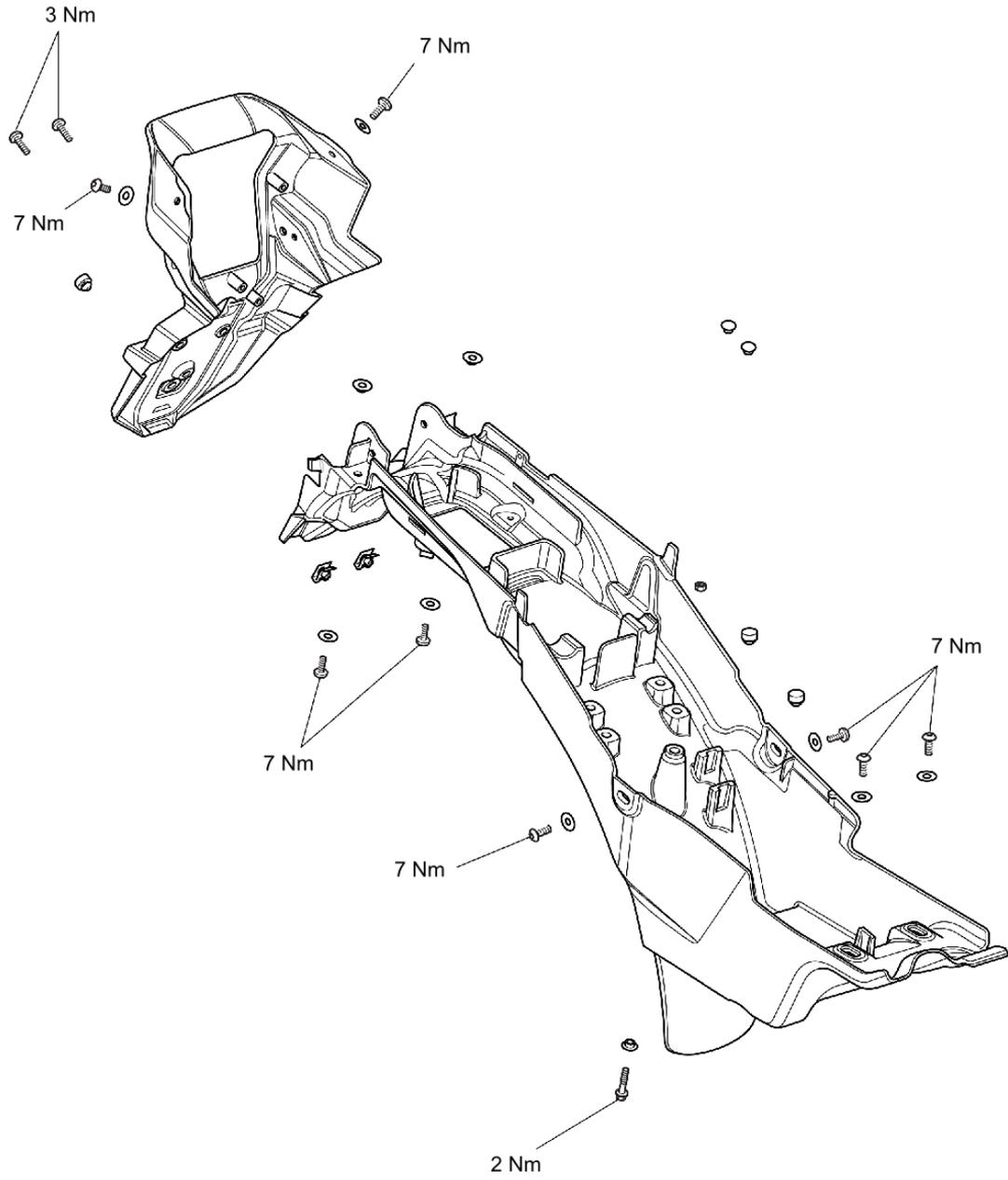


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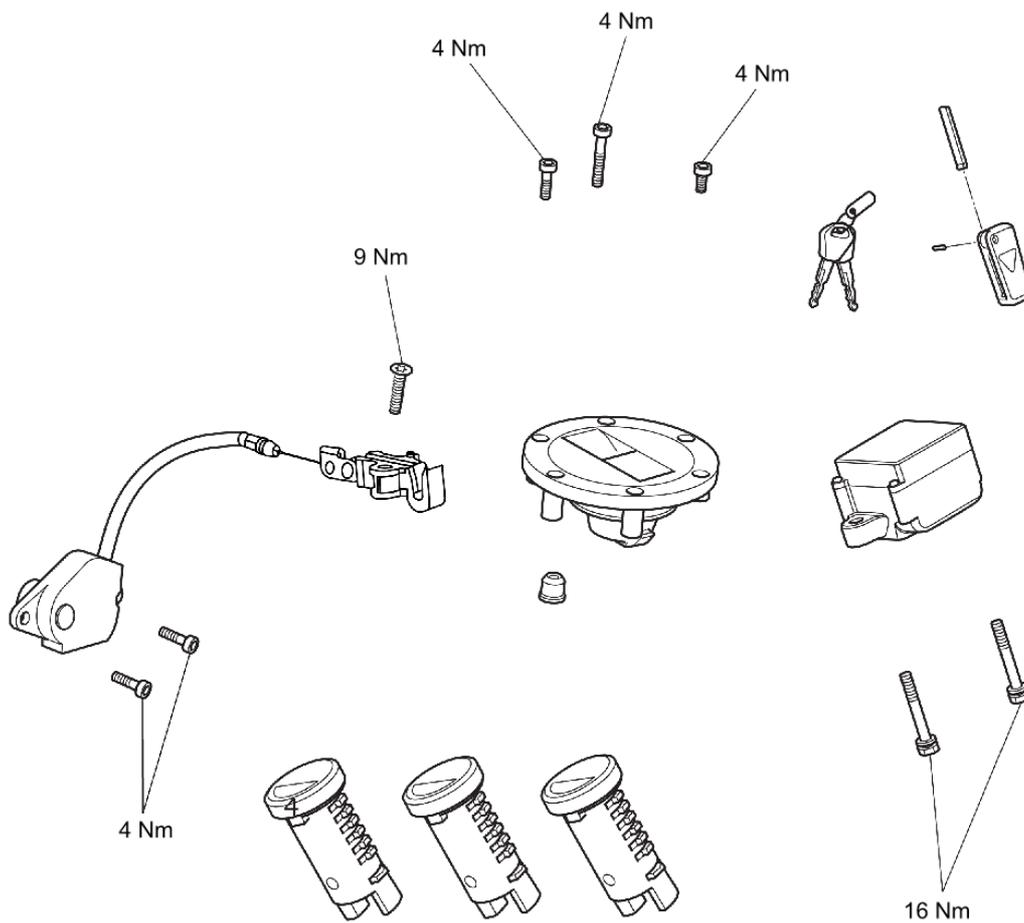
Exploded View – Rear Panels and Luggage Rack



Exploded View – Rear Mudguard and Battery Tray



Exploded View - Lockset



General Frame Inspection

1. Inspect the frame, bodywork and footrests for accident and other damage, cracks, splits and general dilapidation. Check all fixings for security. If any faults are found, rectify as necessary. If any faults with the frame are found, the frame must be replaced; repairs to the frame are not permitted.

WARNING

If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for inspection and repair before it is ridden again.

WARNING

WARNING

The frame must not be modified in any way. Any modification to the frame, such as welding or drilling, may weaken the structure causing an unsafe riding condition leading to loss of motorcycle control and an accident.

2. Check the operation of the side stand to make sure it is securely held in the retracted position by the spring. Rectify any faults.

WARNING

If the return spring is faulty, the side stand could extend whilst the motorcycle is being ridden. This will cause an unsafe riding condition, which could lead to loss of motorcycle control and an accident.

3. If fitted, check the operation of the centre stand to make sure it is securely held in the retracted position by the spring. Rectify any faults

WARNING

If the return spring is faulty, the centre stand will not be held in the retracted position whilst the motorcycle is being ridden. This will cause an unsafe riding condition, which could lead to loss of motorcycle control and an accident.

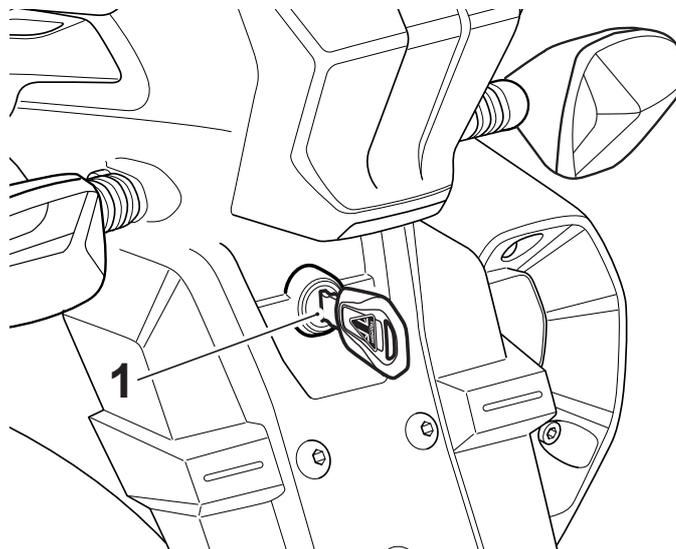
Passenger Seat - Removal

CAUTION

To prevent damage to the seats or seat covers, care must be taken not to drop the seats. Do not lean the seats against the motorcycle or any surface which may damage the seats or seat covers. Instead, place the seats, with the seat cover facing upwards, on a clean, flat surface which is covered with a soft cloth.

Do not place any item on the seats which may cause damage or staining to the seat covers.

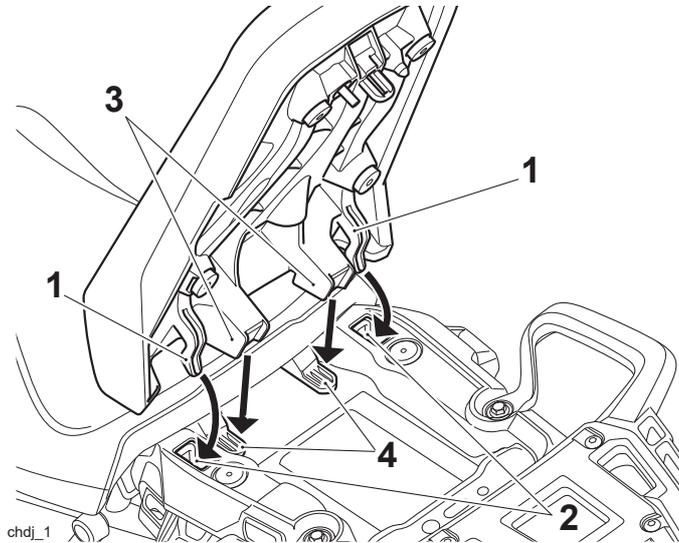
1. The passenger seat lock is located on the rear mudguard, below the rear light unit. To remove the seat, insert the ignition key into the seat lock and turn it anticlockwise while pressing down on the rear of the seat. This will release the seat from its lock and allow it to be slid rearwards. If equipped with heated seats, disconnect the heated seat's electrical connector for complete removal from the motorcycle.



1. Seat lock

Passenger Seat - Installation

1. To refit the passenger seat, reconnect the heated seat's electrical connector (if equipped), engage the seat's two outer brackets under the loops on the subframe and the two inner brackets to the brackets on the rider's seat. Gently push the seat forwards and press down at the rear to engage in the seat lock.



1. Rear seat outer brackets
2. Subframe loops
3. Rear seat inner brackets
4. Rider seat brackets

WARNING

To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured, it will detach from the lock. A loose or detached seat could cause loss of motorcycle control and an accident.

Rider's Seat - Removal

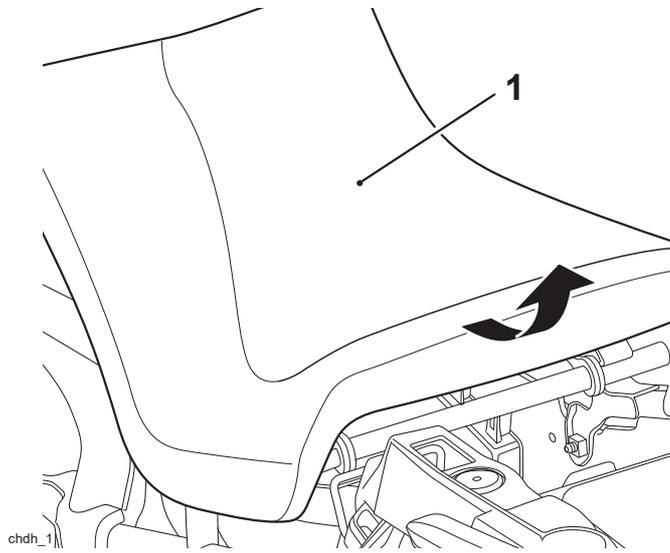
CAUTION

To prevent damage to the seats or seat covers, care must be taken not to drop the seats. Do not lean the seats against the motorcycle or any surface which may damage the seats or seat covers. Instead, place the seats, with the seat cover facing upwards, on a clean, flat surface which is covered with a soft cloth.

Do not place any item on the seats which may cause damage or staining to the seat covers.

Perform the following operations:

- Passenger Seat - Removal
1. Grasp the rider's seat on either side, and slide it rearwards and upwards. If equipped with heated seats, disconnect the heated seats electrical connector for complete removal from the motorcycle.



1. Rider's seat

Rider's Seat - Installation

1. To refit the seat, reconnect the heated seat's electrical connector (if equipped). Engage the seat's front rail into the bracket at the rear of the fuel tank and lower the rear rail in to the rear brackets. Push down firmly on the rear of the seat.

Perform the following operations:

- Passenger Seat - Installation

WARNING

To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured it will detach from the lock. A loose or detached seat could cause loss of motorcycle control and an accident.

Front Mudguard - Removal

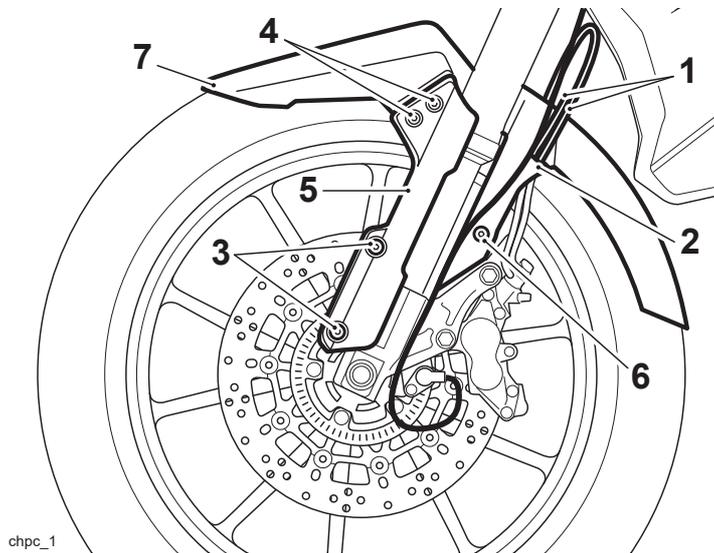
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **Note the position of the front brake hoses for installation.**

1. Detach the front brake hose(s) from their locating lugs on either side of the front mudguard.
2. Remove the shouldered bolts securing the fork protectors to the front forks.
3. Remove the fixings securing the fork protectors to the front mudguard and remove the fork protectors.
4. While supporting the front mudguard, remove the fixings securing the front mudguard to the forks. Discard the fixings.



chpc_1

1. **Brake hoses**
2. **Locating lug**
3. **Shouldered bolts**
4. **Fixings**
5. **Fork protector (left hand shown)**
6. **Fixing (left hand shown)**
7. **Front mudguard**

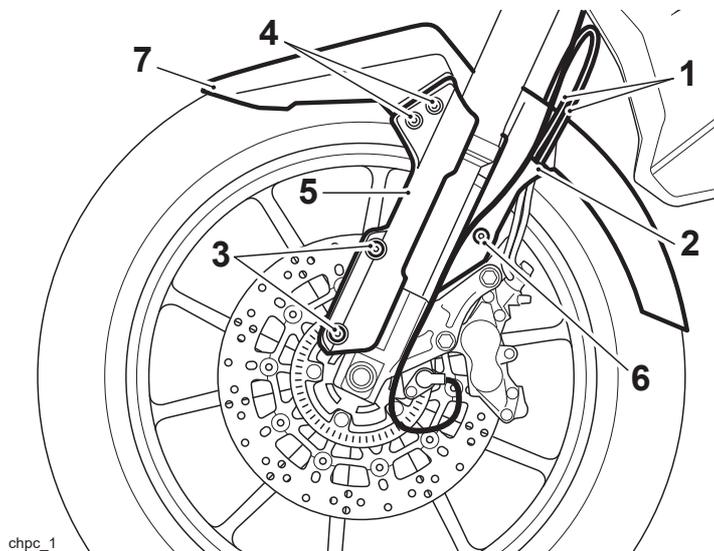
5. Carefully manoeuvre the mudguard towards the front to remove it from the motorcycle.

Front Mudguard - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the front mudguard to the front forks and secure with two new encapsulated fixings. Do not fully tighten at this stage.
2. Fit the fork protectors to the front mudguard and secure with the fixings. Do not fully tighten at this stage.
3. Secure the fork protectors to the fork with the shouldered bolts. Tighten to **3 Nm**.
4. Tighten the two fixings securing the front mudguard to the forks to **7 Nm**.
5. Tighten the fixings securing the fork protectors to the front mudguard to **3 Nm**
6. Position the front brake hose(s) to their locating lugs on the mudguard as noted for removal.



chpc_1

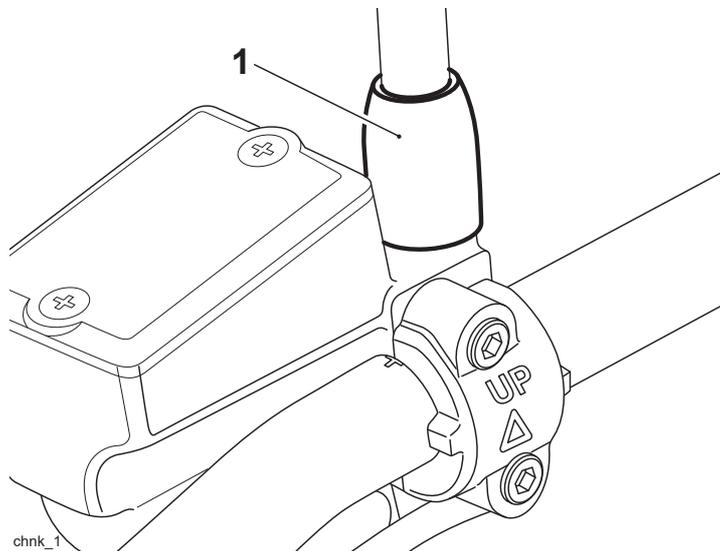
1. Brake hoses
2. Locating lugs
3. Shouldered bolts
4. Fixings
5. Front fork protector (left hand shown)
6. Fixing
7. Front mudguard

Mirror - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Slide the rubber cover off the mirror boss and lock nut.



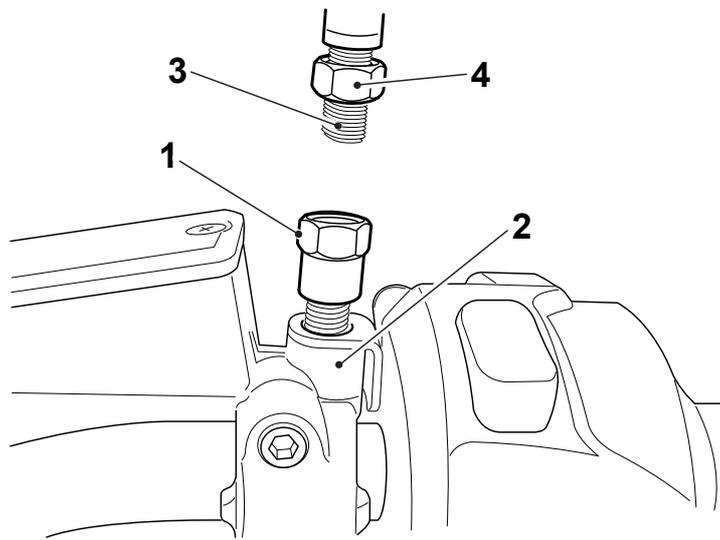
1. Rubber cover

Note

- The mirror arm and its lock nut has a left hand thread.
2. Loosen the lock nut and remove the mirror from the mirror boss.

Note

- The external thread on the mirror boss is a right hand thread.
3. If necessary, remove the mirror boss from the master cylinder housing.



1. **Mirror boss (external right hand thread)**
2. **Master cylinder housing**
3. **Mirror arm (left hand thread)**
4. **Lock nut (left hand thread)**

4. Repeat the procedure for the other mirror.

Mirror - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

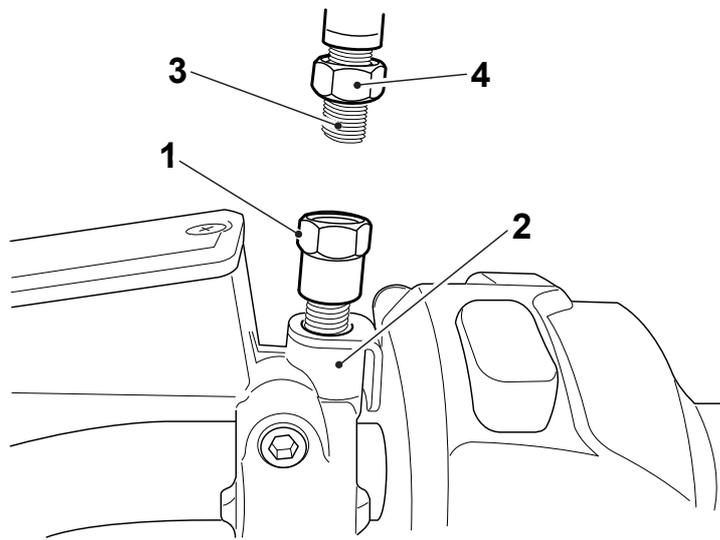
If the mirror fixing is too loose, the mirror may blow back at speed. This will result in a loss of vision to the rear of the motorcycle. It is dangerous to ride a motorcycle without sufficient rearward vision.

Note

- **The external thread on the mirror boss is a right hand thread.**
1. If removed, fit the mirror boss to the master cylinder housing and tighten to **25 Nm**.

Note

- **The mirror arm and its lock nut has a left hand thread.**
2. Fit the mirror arm to the mirror boss, tighten by hand until the lock nut makes contact with the mirror boss. Do not fully tighten at this stage.



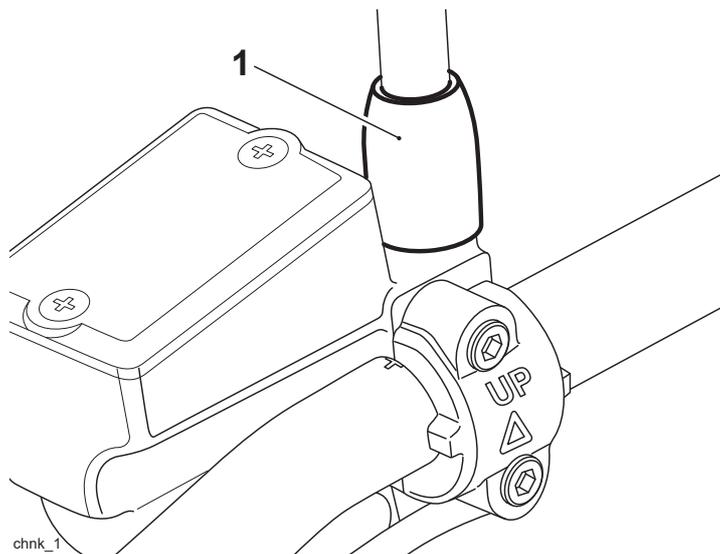
1. **Mirror boss**
2. **Master cylinder housing**
3. **Mirror arm (left hand thread)**
4. **Lock nut (left hand thread)**

3. Loosen the mirror arm by one complete turn.
4. Position the mirror arm to give rear visibility in the riding position.

! CAUTION

Use an open ended spanner to counter-hold the mirror boss as the mirror lock nut is tightened. Failure to counter-hold the boss will cause damage to the thread and the mirror to become loose.

5. Counter-hold the mirror boss and tighten the lock nut to **25 Nm**.
6. Slide the rubber cover over the lock nut and mirror boss.

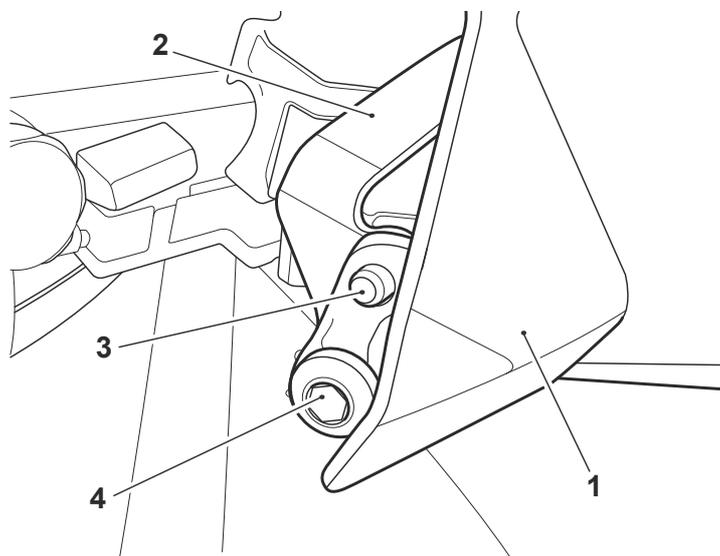


1. **Rubber cover**

7. Repeat the procedure for the other mirror.

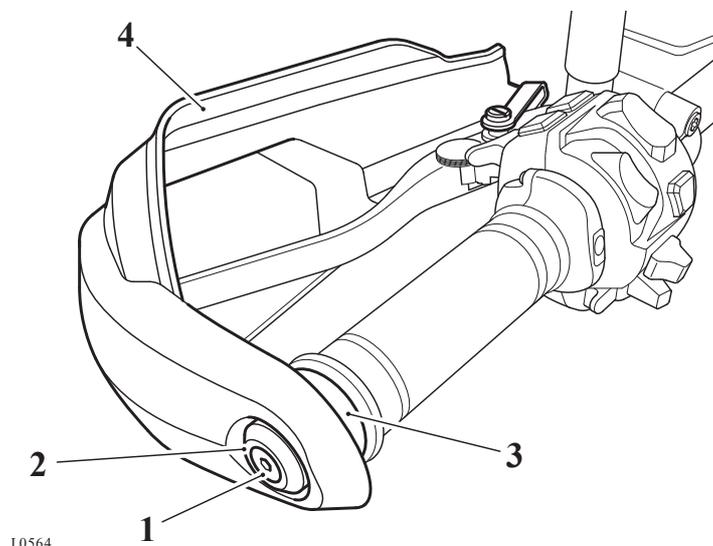
Handguards - Removal

1. Remove the fixing securing the handguard to its bracket. Discard the fixing.



1. Handguard (left handguard shown)
2. Bracket
3. Locating lug
4. Fixing

2. Remove the handlebar end fixing and remove the spacer, handguard and handlebar end weight. Discard the fixing.



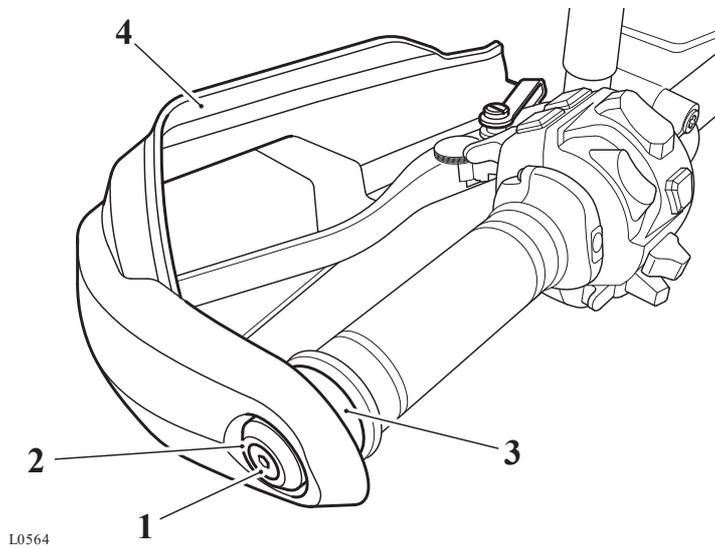
1. Fixing
2. Spacer
3. Handlebar end weight
4. Handguard

3. Repeat for the other handguard.

Handguards - Installation

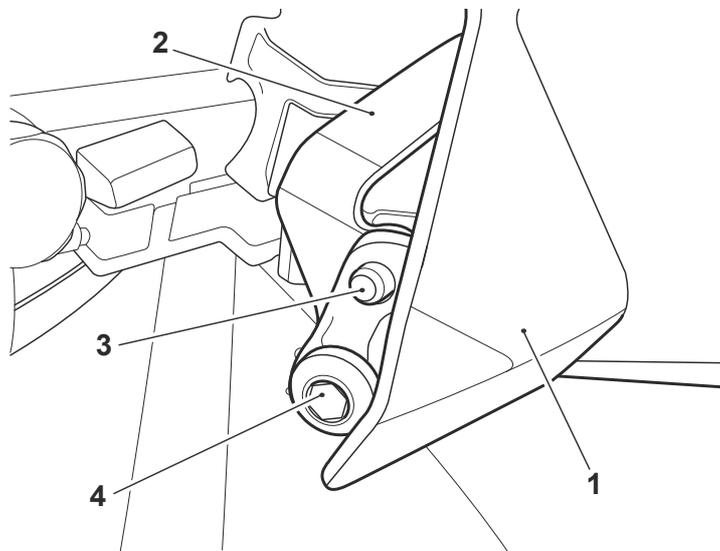
Note

- Ensure that the handlebar end weight anti-rotation lug is correctly located to the slot on the end of the handlebar.
1. Position the handlebar end weight, handguard and spacer to the handlebar and secure with a new fixing. Do not fully tighten at this stage.



1. Fixing (left handguard shown)
2. Spacer
3. Handlebar end weight
4. Handguard

2. Position the handguard onto the locating lug on the bracket and secure with a new fixing. Tighten the fixing to **6 Nm**.



1. Handguard (left handguard shown)
2. Bracket
3. Locating lug
4. Fixing

3. Tighten the handlebar end fixing to **5 Nm**.
 4. Repeat for the other handguard.

Windscreen - Removal

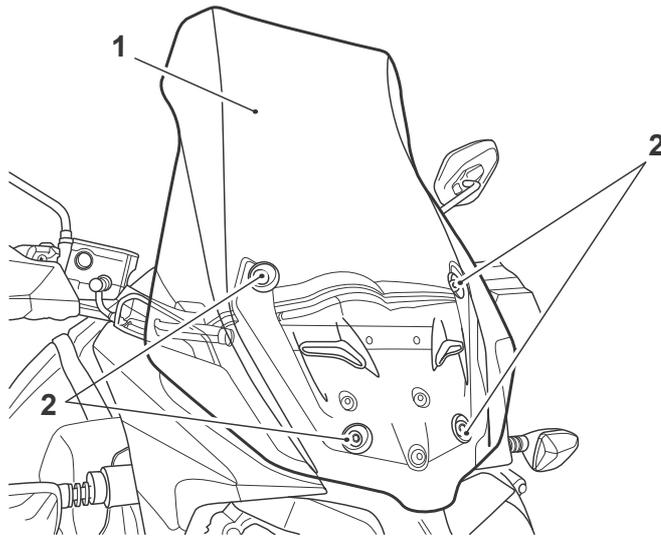
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

Care must be taken when removing or installing the windscreen. Damage to the windscreen surfaces could result from inadequate care during the removal or installation process.

1. Release the four fixings, remove the windscreen and place it on a clean soft surface.



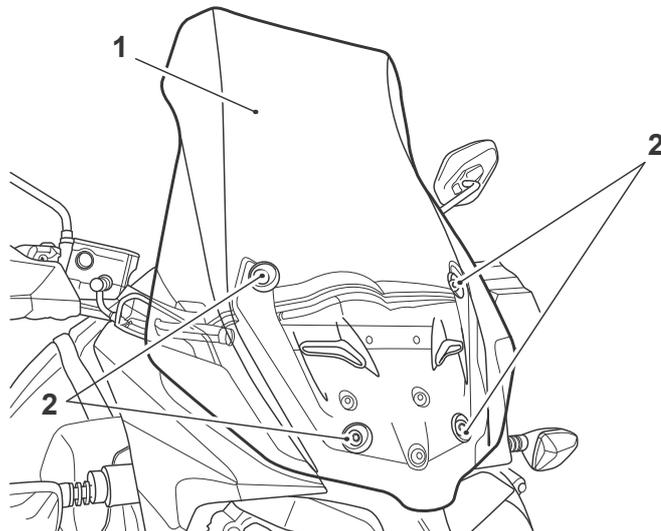
1. Windscreen
2. Fixings

Windscreen - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the windscreen to its mounting frame and tighten its fixings to **4 Nm**.



1. Windscreen
2. Fixings

Cockpit Panels - Removal

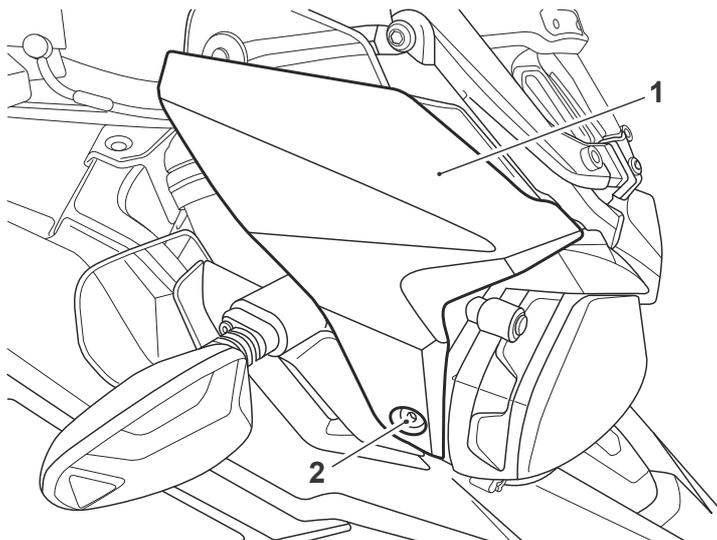
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Windscreen - Removal**

1. Remove the fixing securing the cockpit panel to the headlight.



1. **Cockpit panel (right hand shown)**
2. **Fixing**

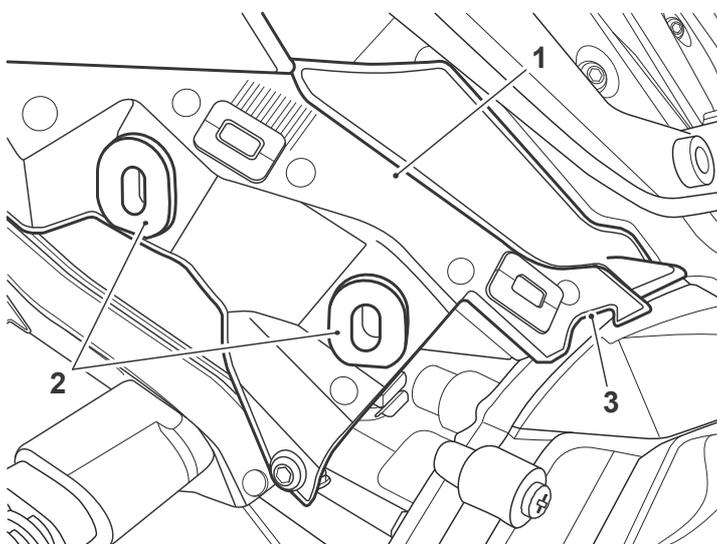
2. Carefully move the cockpit panel outwards to disengage its locating lugs and remove from the motorcycle.

Cockpit Panels - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

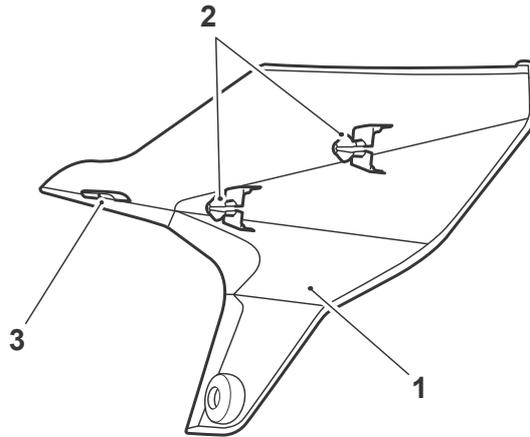
1. Ensure that the rubber grommets are fitted to the wind deflector panel.



1. **Wind deflector panel**

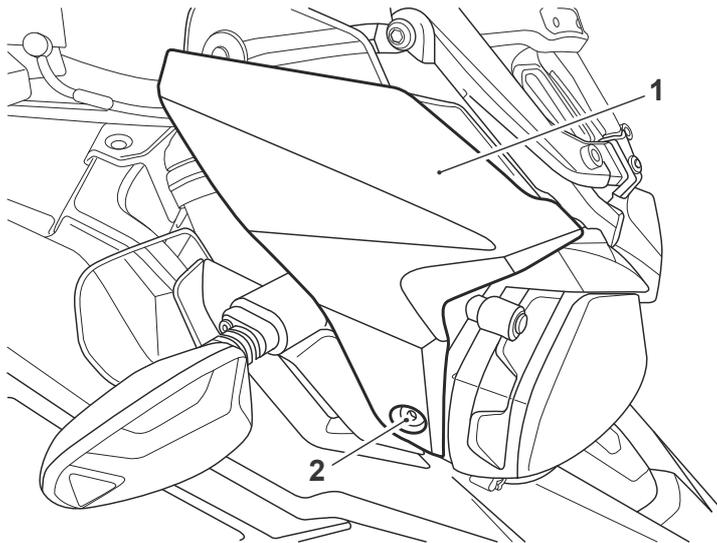
2. Grommets
3. Locating slot

2. Carefully align the cockpit panel's locating lugs to the grommets on the wind deflector panel.
3. Push the cockpit panel inwards to engage its locating lugs, ensuring that the tab on the cockpit panel locates correctly into the slot on the front edge of the wind deflector panel,



1. Cockpit panel (inside of right hand panel shown)
2. Locating lugs
3. Tab

4. Fit the fixing and tighten to **3 Nm**.



1. Cockpit panel (right hand shown)
2. Fixing

Perform the following operations:

- Windscreen - Installation

High Level Mudguard - Removal

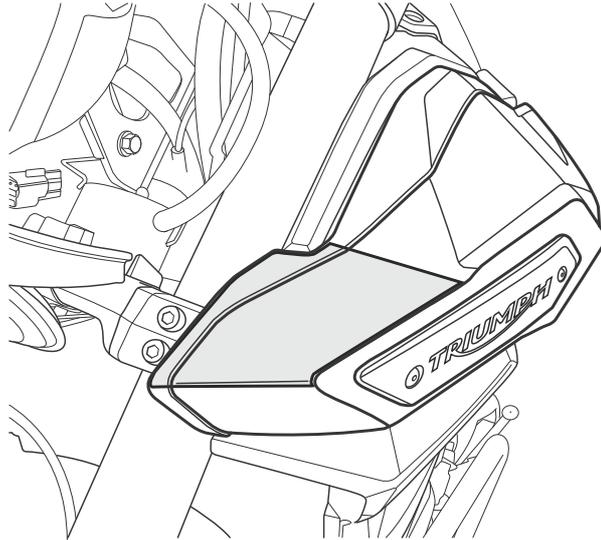


WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

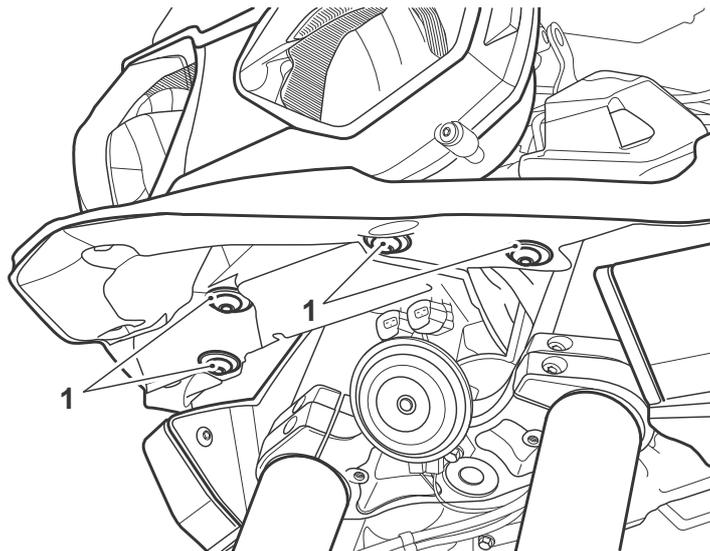
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Cockpit Panels - Removal
- Protect the side fairings from damage by applying masking tape to the area shown below.



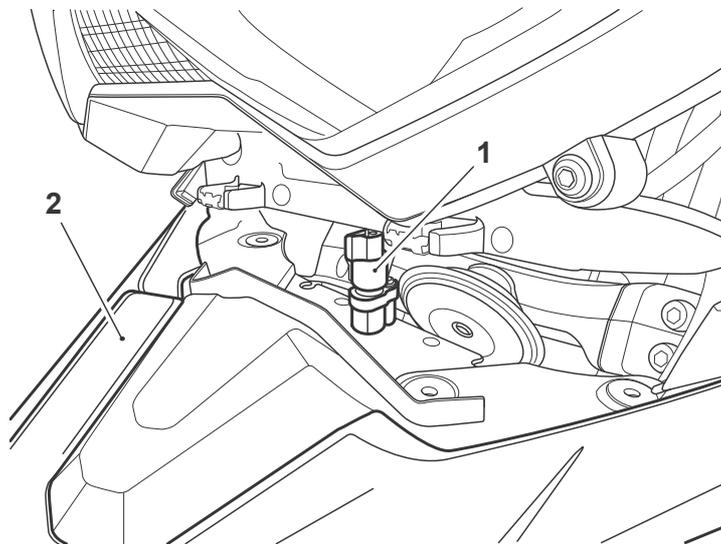
Masked Area (Left Hand Side Fairing Shown with High Level Mudguard Removed for Clarity)

1. Remove the four fixings securing high level mudguard to the cockpit sub-frame.



1. Fixings

2. Lower the high level mudguard and disconnect the ambient air temperature sensor's electrical connection.



1. Ambient air temperature sensor
2. High level mudguard

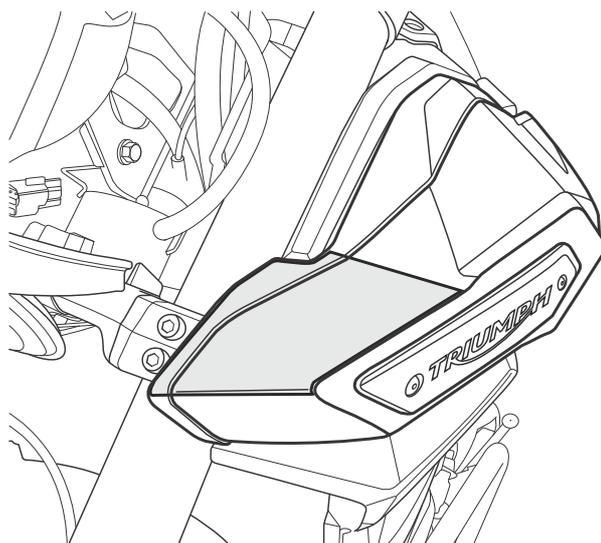
3. With the high level mudguard lowered sufficiently to allow the ambient air temperature sensor to pass below the cockpit subframe, carefully remove the high level mudguard towards the front of the motorcycle.
4. Noting their position and orientation, collect the four flanged sleeves from the high level mudguard.

High Level Mudguard - Installation

WARNING

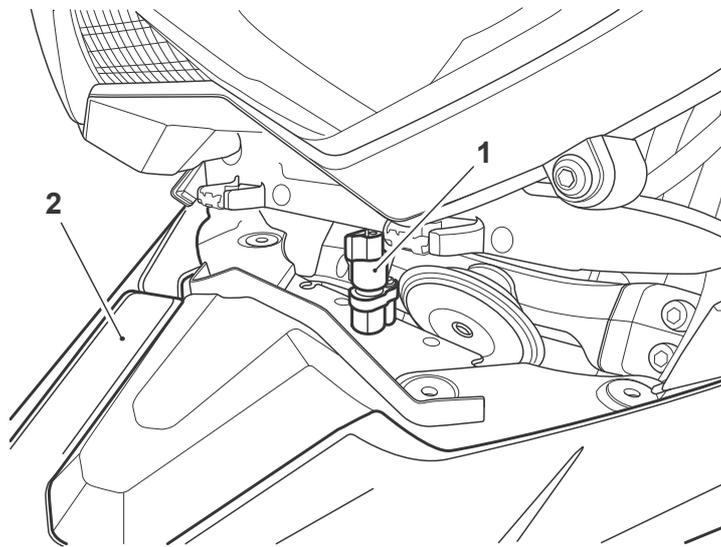
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- Protect the side fairings from damage by applying masking tape to the area shown below.



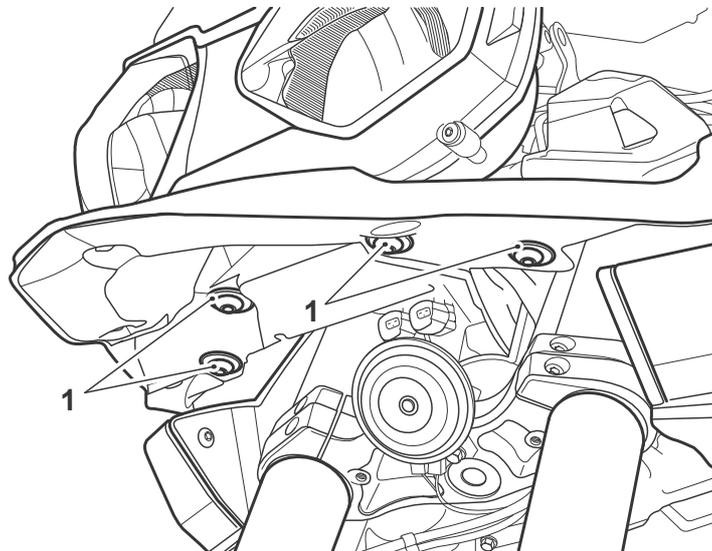
Masked Area (Left Hand Side Fairing Shown)

1. Fit the four flanged sleeves to the high level mudguard as noted during removal.
2. Carefully position the high level mudguard to the motorcycle and connect the ambient air temperature sensor's electrical connector.



1. Ambient air temperature sensor
2. High level mudguard

3. Secure the high level mudguard with the four fixings and tighten to **5 Nm**.



1. Fixings

4. Carefully remove the masking tape from the side fairings.

Perform the following operations:

- Cockpit Panels - Installation
- Battery - Installation
- Rider's Seat - Installation

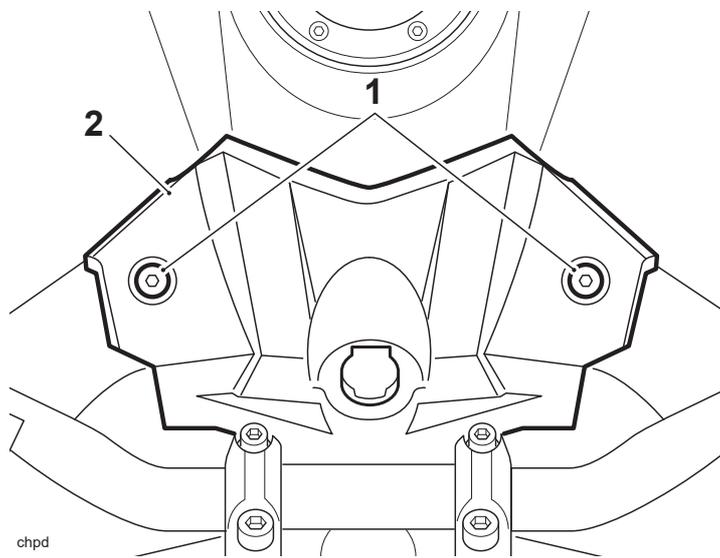
Fuel Tank Infill Panels - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

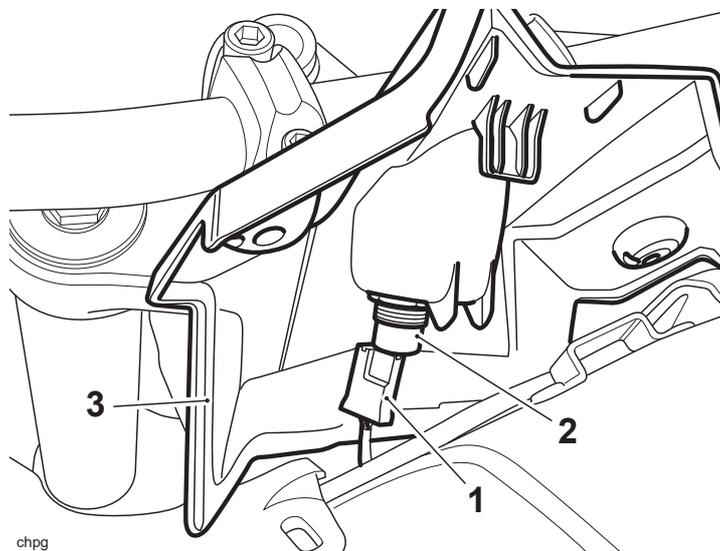
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Release the fixings and lift the front panel upwards to detach it from the fuel tank.



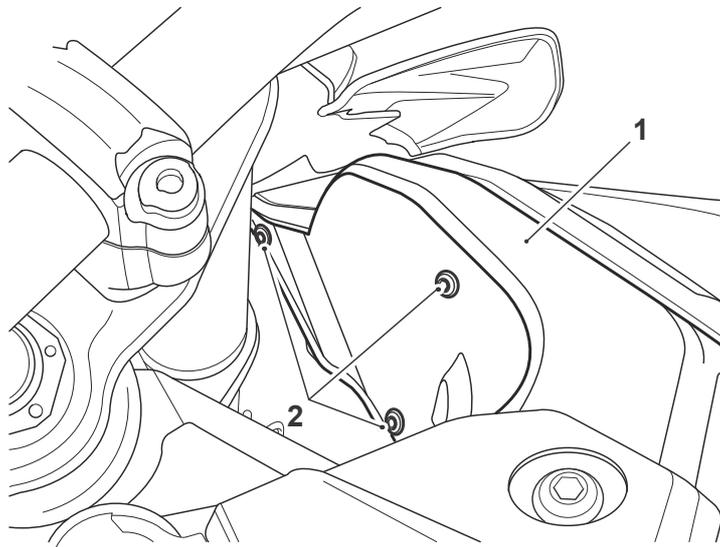
1. Fixings
2. Front panel

2. Disconnect the electrical connector from the auxiliary socket and remove the front panel.



1. Electrical connector
2. Auxiliary socket
3. Front panel

3. Release the three fixings and remove the fuel tank infill panel.



1. Infill panel (right hand shown)
2. Fixings

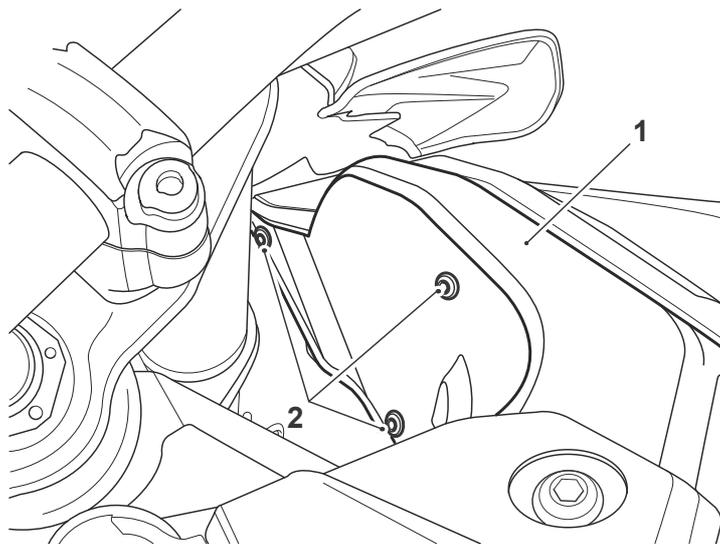
4. Repeat step 3 for the other infill panel.

Fuel Tank Infill Panels - Installation

WARNING

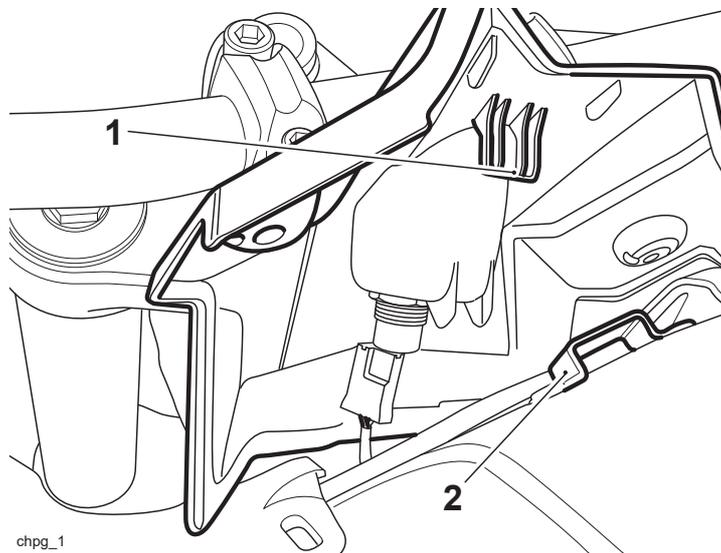
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the fuel tank infill panel to the fuel tank and tighten its fixings to **3 Nm**.



1. Fuel tank infill panel (right hand shown)
2. Fixings

2. Repeat step 1 for the other infill panel.
3. Connect the electrical connector to the auxiliary socket on the front panel.
4. Position the front panel onto the fuel tank, ensuring that its locating lug fits into its bracket on the fuel tank.



chpg_1

1. **Locating lug**
2. **Bracket**

5. Fit the fixings for the front panel and tighten them to **3 Nm**.

Perform the following operations:

- Battery - Installation
- Rider's Seat - Installation

Side Fairings - Removal

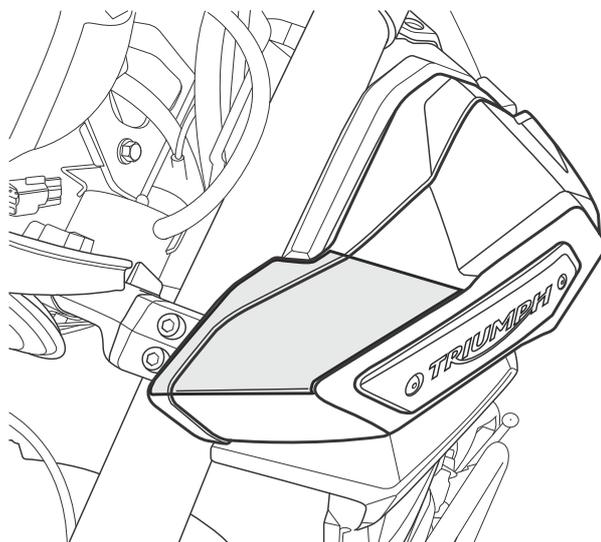
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

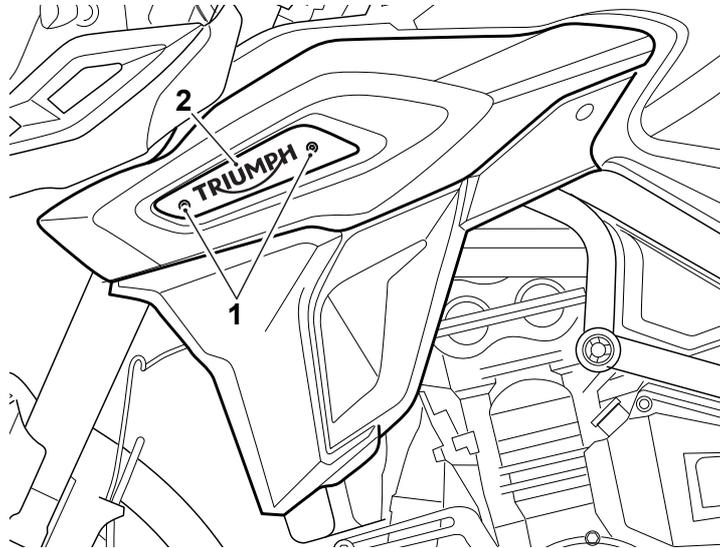
- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank Infill Panels - Removal

1. Protect the side fairings from damage by applying masking tape to the area shown below.



Masked Area (Left Hand Side Fairing Shown with High Level Mudguard Removed for Clarity)

2. Remove the fixings and remove the badge from the side fairings.

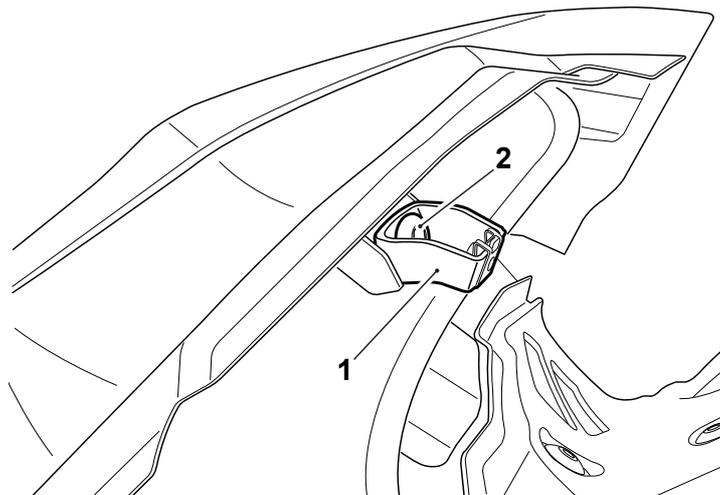


- 1. Fixings
- 2. Badge (left hand shown)

Note

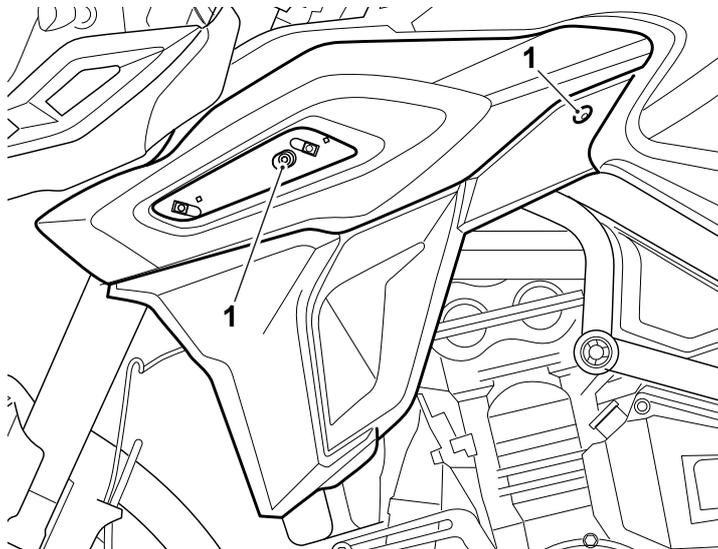
- Note the orientation of the mounting bracket for the fuel tank infill panels for installation.

3. Release the fixing and remove mounting bracket for the fuel tank infill panel.



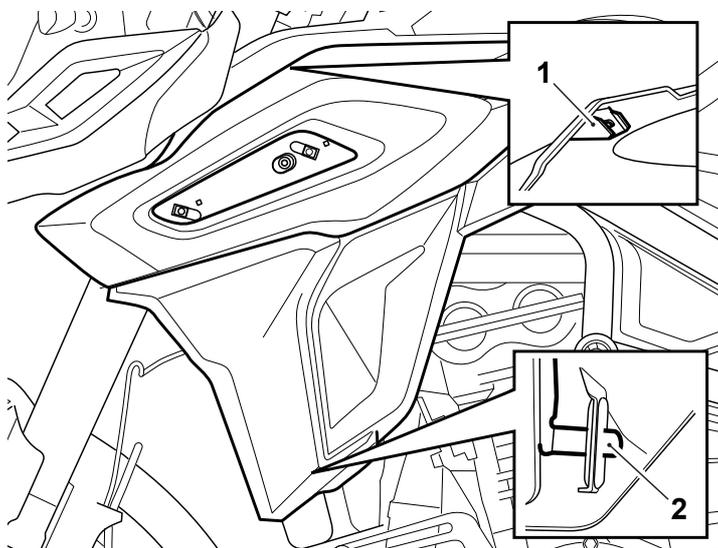
- 1. Mounting bracket
- 2. Fixing

4. Release the two fixings.



1. Fixings

5. Raise the upper edge of the side fairing to release its upper mounting from the fuel tank.
6. Release the side panel from the lower locating lug on the radiator and remove the side panel.



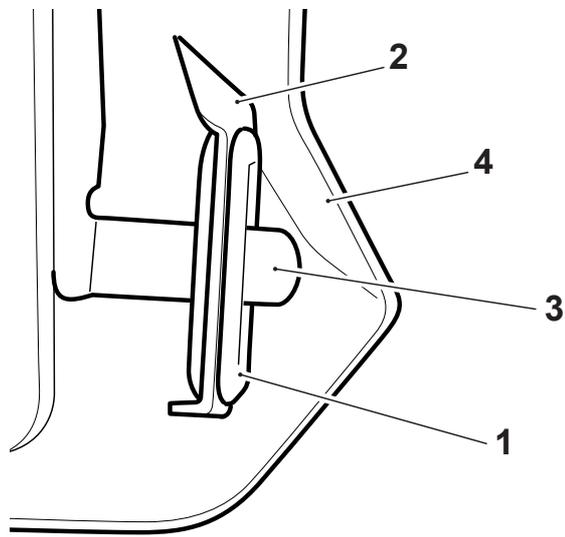
1. Upper mounting
2. Lower locating lug

Side Fairings - Installation

WARNING

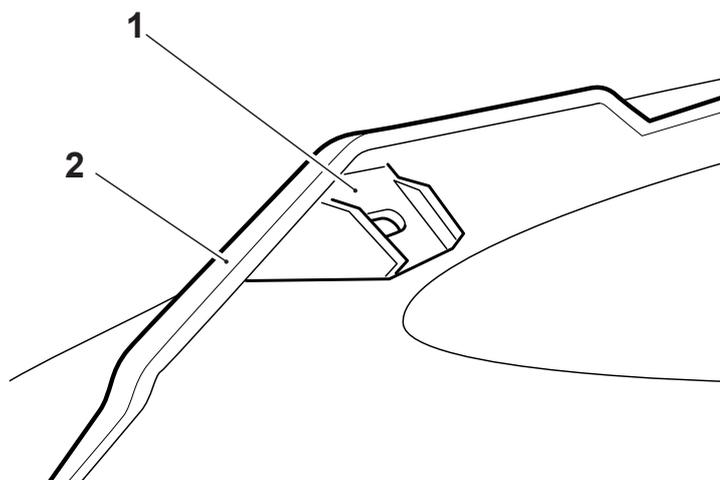
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Ensure that the rubber grommet is fitted to its bracket on the lower fairing.
2. Align the slot with the rubber grommet in the lower fairing to its locating lug on the radiator mounting bracket.



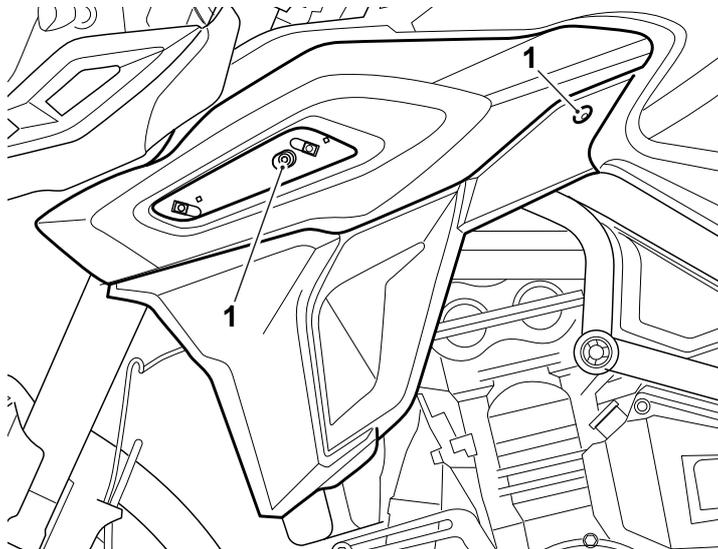
1. Rubber grommet
2. Bracket
3. Locating lug
4. Lower fairing

3. Position the upper fairing's mounting to its mounting bracket on the fuel tank.



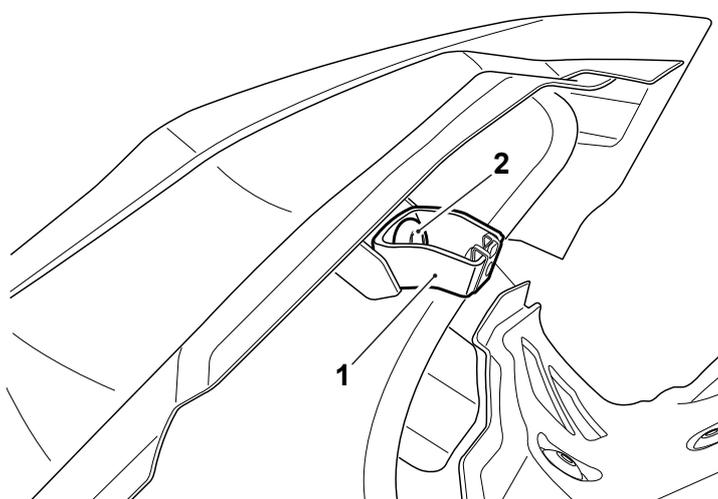
1. Mounting
2. Upper fairing

4. Fit the front and rear fixings and tighten to **3 Nm**.



1. Fixings

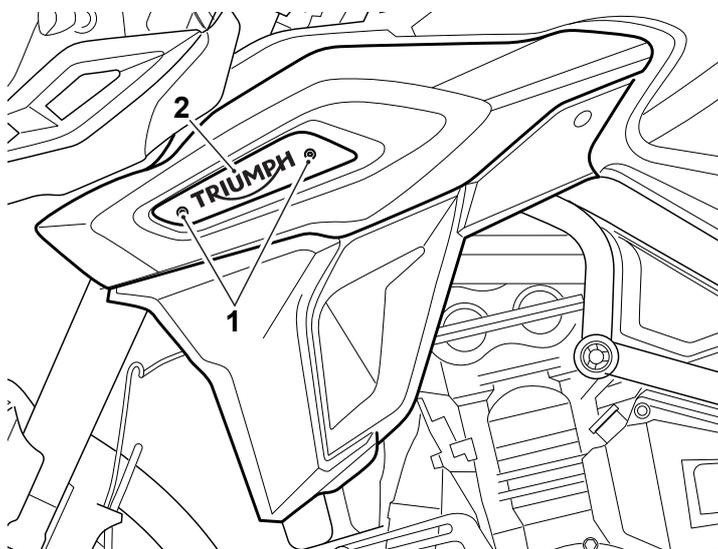
5. Fit the mounting bracket for the fuel tank infill panel as noted for removal and tighten the fixing to **3 Nm**.



1. Mounting bracket (left hand shown)

2. Fixing

6. Fit the badge to the side fairing and tighten the fixings to **2 Nm**.



1. **Fixings**
2. **Badge (left hand shown)**

Perform the following operations:

- Fuel Tank Infill Panels - Installation
- Battery - Installation
- Rider's Seat - Installation

Seat Infill Panel - Removal



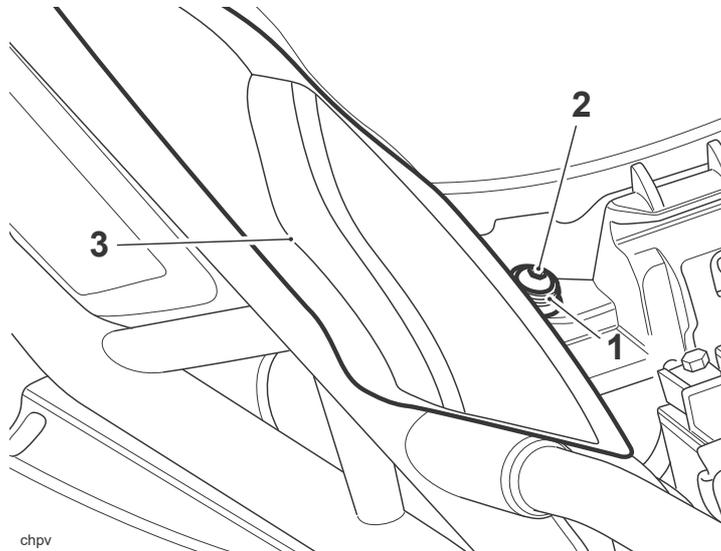
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

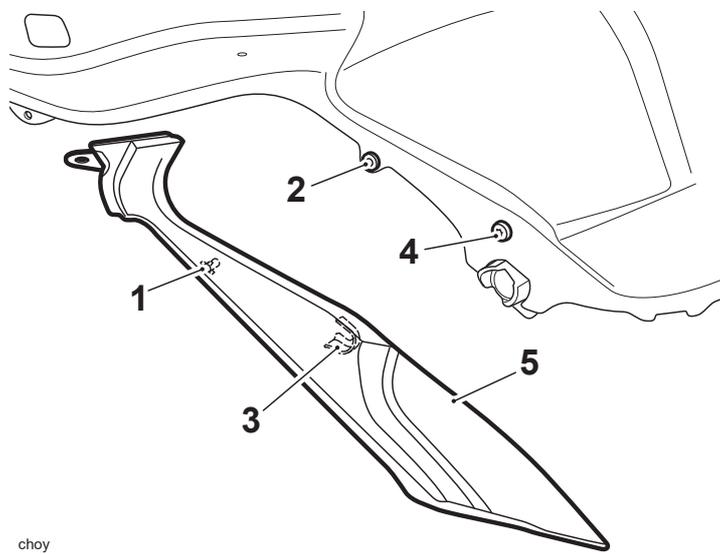
- Rider's Seat - Removal
- Battery - Removal
- Side Fairings - Installation

1. Release the fixing securing the rear of the seat infill panel to the frame. Remove the flanged sleeve.



1. **Flanged sleeve**
2. **Fixing**
3. **Seat infill panel (left hand shown)**

2. Carefully pull the front of the infill panel away from the fuel tank to release its front locating lug from its rubber grommet on the fuel tank.
3. Slide the infill panel rearwards to release the centre locating lug from its mounting screw on the fuel tank and remove the panel.



choy

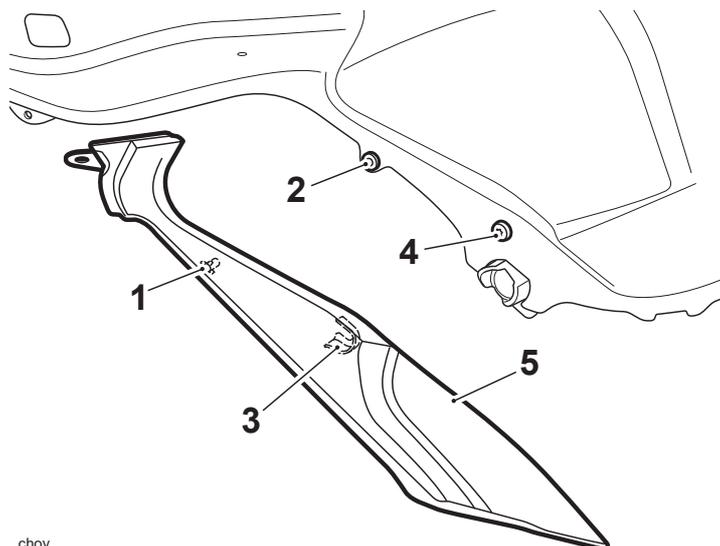
1. Front locating lug
2. Rubber grommet
3. Centre locating lug
4. Mounting screw
5. Seat infill panel (left hand shown)

Seat Infill Panel - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

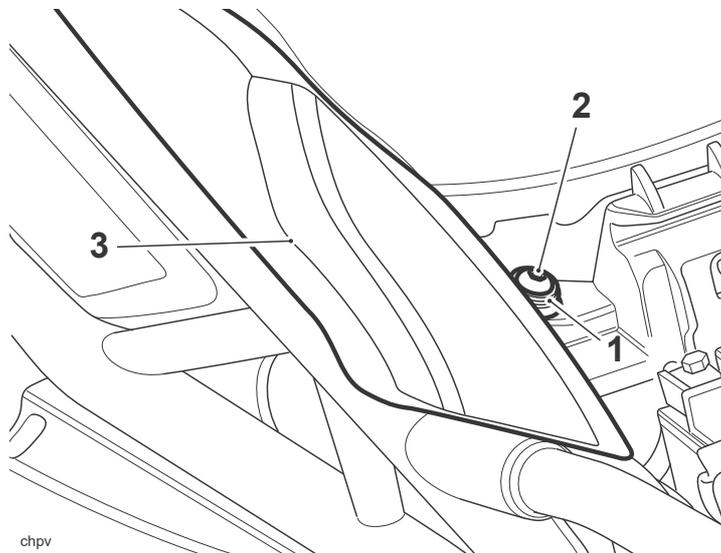
1. Align the centre locating lug on the infill panel to the rear of its mounting screw on the fuel tank. Move the infill panel forward to fully engage the centre lug to the mounting screw.
2. Align the front locating lug to its rubber grommet on the fuel tank and push it fully in.



choy

1. Front locating lug
2. Rubber grommet
3. Centre locating lug
4. Mounting screw
5. Seat infill panel (left hand shown)

3. Fit the flanged sleeve and fixing to the rear of the seat infill panel and tighten to **3 Nm**.



1. Flanged sleeve
2. Fixing
3. Seat infill panel (left hand shown)

Perform the following operations:

- Side Fairings - Installation
- Battery - Installation
- Rider's Seat - Installation

Seat Bridge - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
1. Detach the main fuse from the seat bridge.
 2. Note the routing of the fuel drain hose and release it from its clips on the seat bridge.

CAUTION

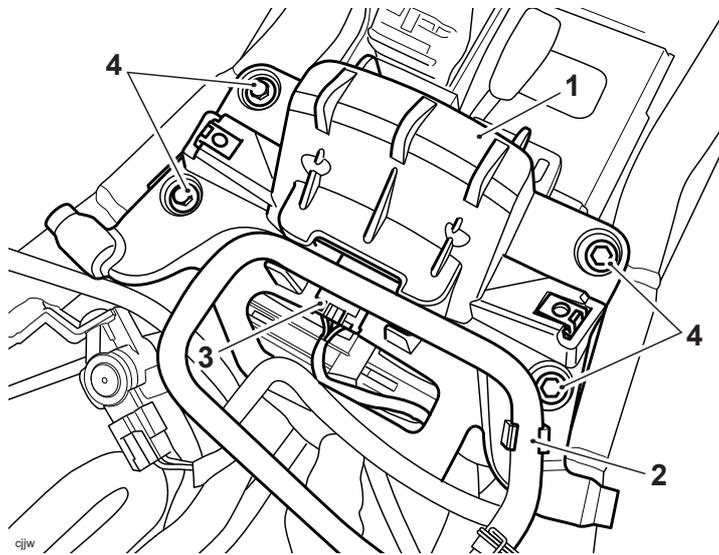
The Inertial Measurement Unit (IMU) located beneath the seat bridge is a highly sensitive device. Exposure to excessive shock and vibration can cause permanent damage to IMU internal components.

Care must be taken when removing or installing the seat bridge, not to expose the IMU to excessive shock or vibration. When releasing or tightening the fixings, use suitable hand tools only. Do not use air or battery powered tools.

When removed from the motorcycle, place the seat bridge and IMU assembly on a flat surface, in a location that is isolated from shock and vibrations caused by other workshop processes.

Do not drop the IMU. An IMU that has been dropped will be irreparably damaged and must be replaced.

3. Disconnect the electrical connector for the Inertial Measurement Unit (IMU).
4. Using a suitable hand tool, remove the four fixings and remove the seat bridge and IMU assembly from the motorcycle.



1. Rider's seat front mounting
2. Fuel drain hose
3. Electrical connector
4. Fixings

5. Place the seat mounting and IMU assembly on a flat surface, in a location that is isolated from shock and vibrations caused by other workshop processes.

Seat Bridge - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

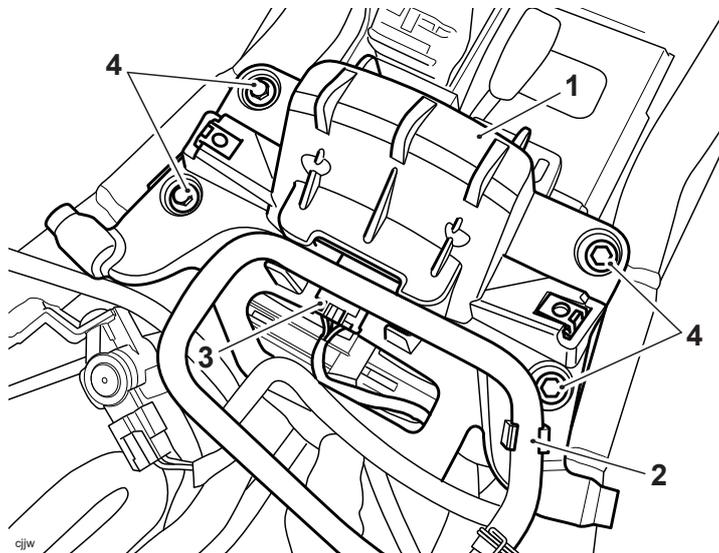
CAUTION

The Inertial Measurement Unit (IMU) located beneath the seat bridge is a highly sensitive device. Exposure to excessive shock and vibration can cause permanent damage to IMU internal components.

Care must be taken when removing or installing the seat bridge, not to expose the IMU to excessive shock or vibration. When releasing or tightening the fixings, use suitable hand tools only. Do not use air or battery powered tools.

Do not drop the IMU. An IMU that has been dropped will be irreparably damaged and must be replaced.

1. Position the seat bridge to the frame and secure with the four fixings. Using a suitable hand tool, tighten the fixings to **5 Nm**.
2. Reconnect the electrical connector for the IMU.
3. Attach the fuel drain pipe to its clips on the seat bridge as noted during removal.



1. **Seat bridge**
2. **Fuel drain hose**
3. **Electrical connector**
4. **Fixings**

Perform the following operations:

Perform the following operations:

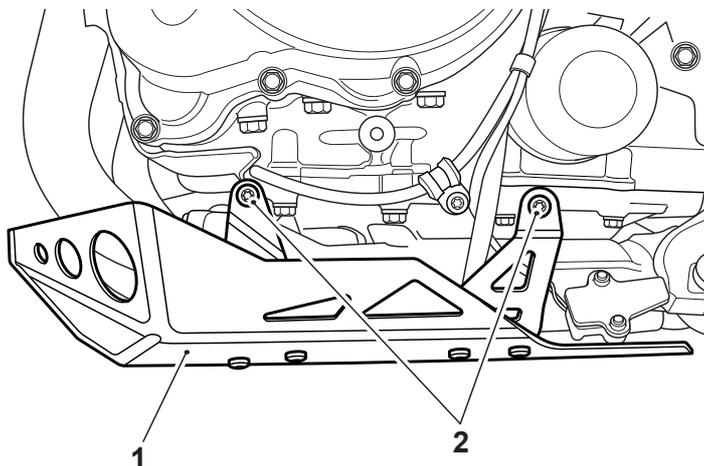
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Sump Guard - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the four fixings securing the sump guard to the engine and remove the sump guard. Discard the fixings.



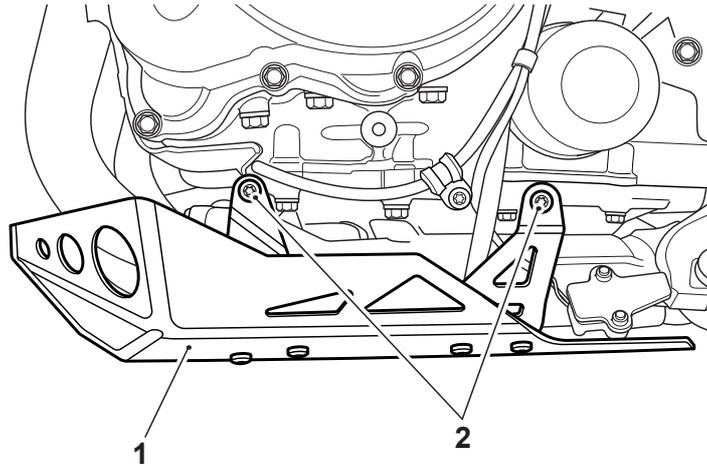
1. **Sump guard**
2. **Fixings (left hand shown)**

Sump Guard - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Align the sump guard assembly to the motorcycle, secure with four new fixings and tighten to **6 Nm**.



cjip

1. **Fixings (left hand shown)**
2. **Sump guard**

Engine Bars - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal

Note

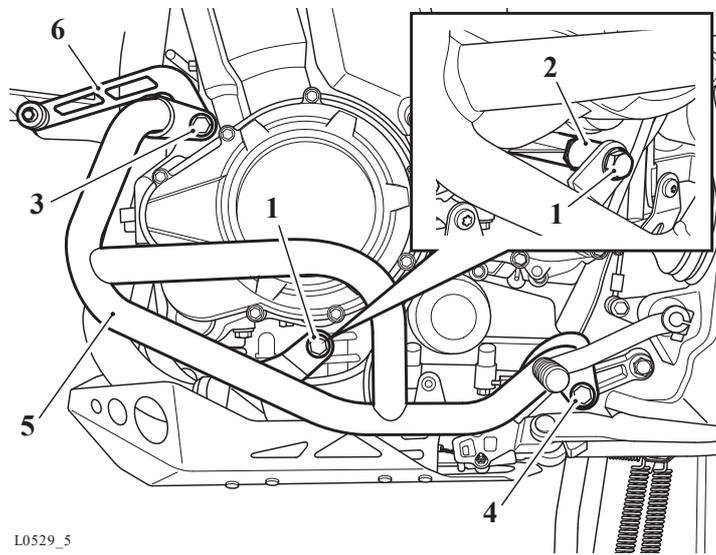
- **If the right hand engine bar is to be removed, the left hand engine bar must be removed first. This will allow access to the lock nut for the lower crankcase mounting bolt.**

Left Hand Engine Bar

Note

- **Note that there is a 25 mm spacer between the left hand engine bar's centre mounting and the engine for installation.**
- **Note that the radiator mounting bracket is positioned between the engine bar and the engine for installation.**

1. Release the three mounting bolts and remove the left hand engine bar. Collect the 25 mm spacer from the centre mounting.



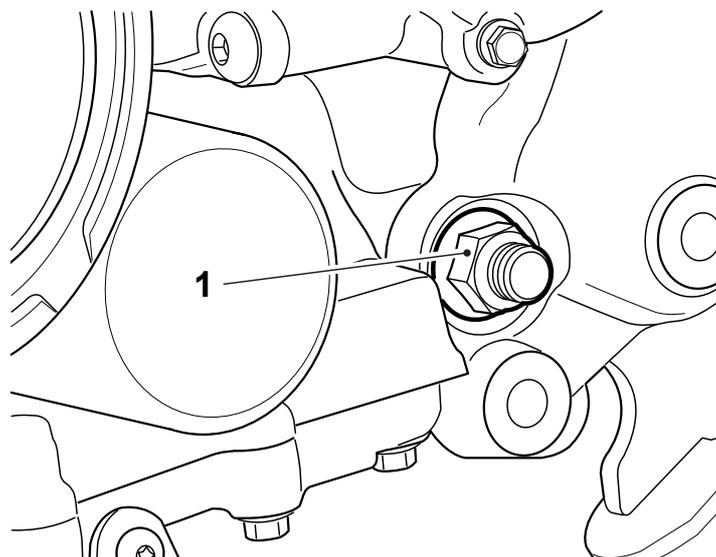
L0529_5

1. Centre mounting bolt
2. Spacer, 25 mm
3. Upper mounting bolt
4. Side stand bolt
5. Engine bar, left hand side
6. Radiator mounting bracket

Right Hand Engine Bar

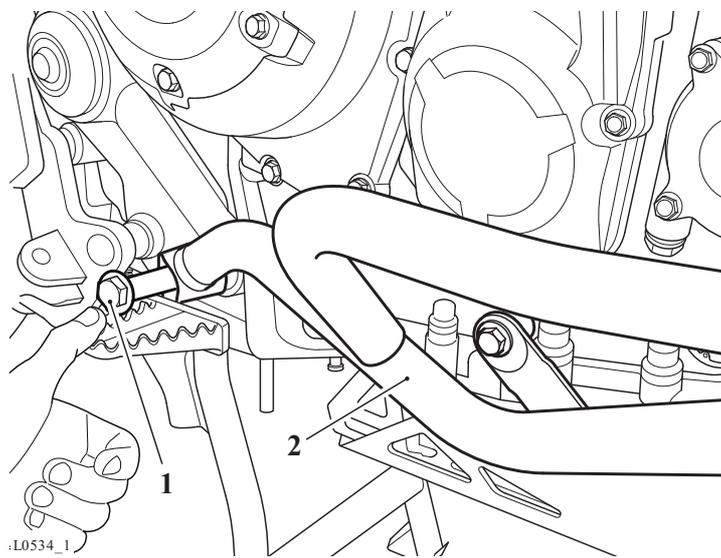
Note

- To access the lock nut for the lower crankcase mounting bolt, the left hand control plate and gear change linkage assembly must be removed.
2. Remove the left hand control plate and transmission linkage assembly (see Gear Change Linkage - Removal).
 3. Remove and discard the lock nut for the lower crankcase mounting bolt.



1. Lock nut

4. While holding down the rear brake pedal, remove the lower crankcase mounting bolt.

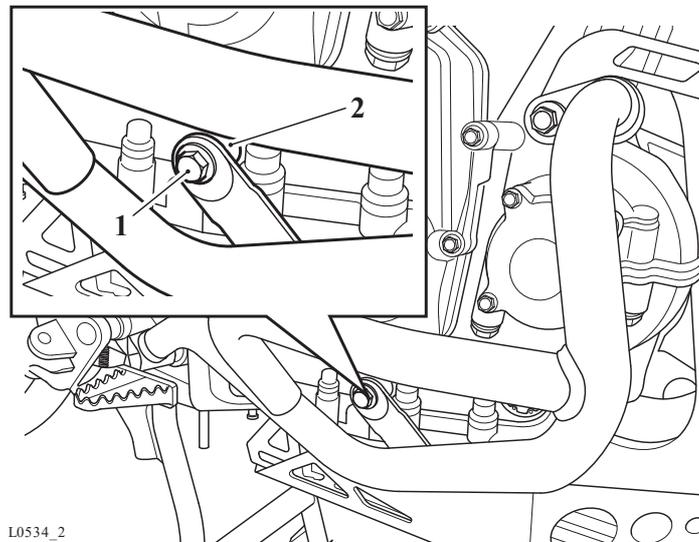


1. Lower crankcase mounting bolt
2. Right hand engine bar

Note

- Note that there is a 13 mm spacer between the right hand engine bar's centre mounting and the engine for installation.

5. Remove the centre mounting bolt and collect the 13 mm spacer from the centre mounting.

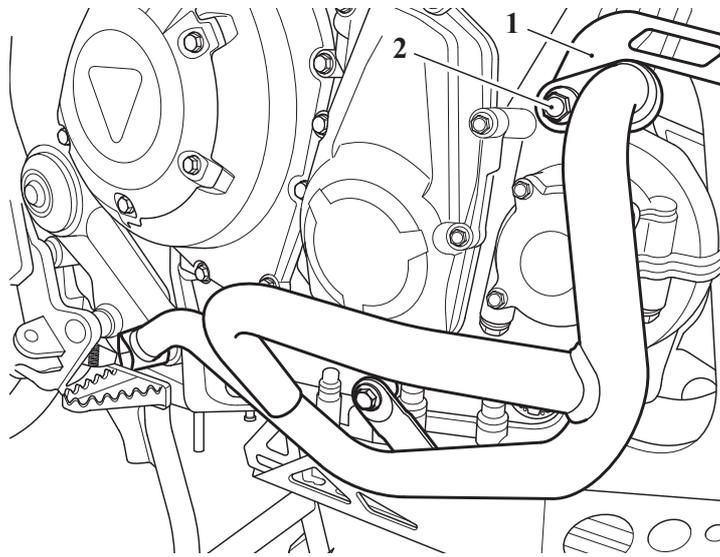


1. Centre mounting bolt
2. Spacer, 13 mm

Note

- Note that the radiator mounting bracket is positioned between the engine bar and the engine for installation.

6. Release the upper mounting bolt and remove the right hand engine bar.



1. Radiator mounting bracket
2. Upper mounting bolt

Engine Bars - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Right Hand Engine Bar

WARNING

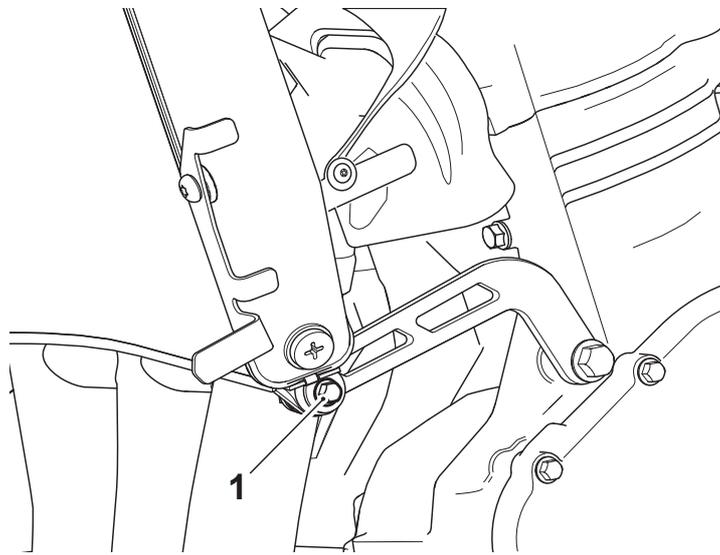
During installation of the right hand engine bar it is necessary to loosen various engine to frame and rear suspension mounting fixings. The engine to frame alignment must then be reset using T3880637 - Kit, Engine to Frame Alignment Bars and the mounting fixings re-tightened in a specific sequence. Failure to follow these instructions precisely will affect handling, stability and other aspects of the motorcycle's operation which may result in loss of motorcycle control and an accident.

Perform the following operations:

- Side Fairings - Removal
 - Sump Guard - Removal
1. Raise and securely support the motorcycle.
 2. Place a support beneath the engine and ensure the frame is adequately supported.

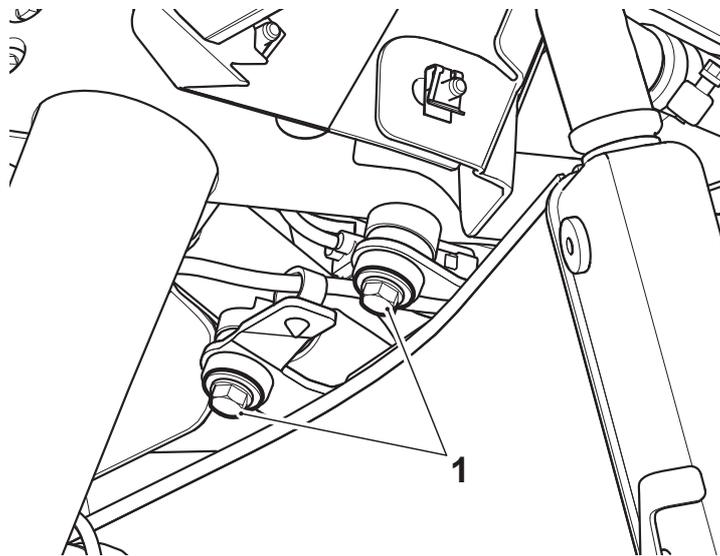
Note

- **It is necessary to loosen the radiator so that it can be positioned to allow access to the front cylinder head mountings and lock nuts.**
3. Remove the two fixings and remove the lower radiator brackets. Discard the lock nuts.



1. Fixing (left hand side shown)

4. Loosen the two upper fixings securing the radiator to the frame. Do not fully remove.



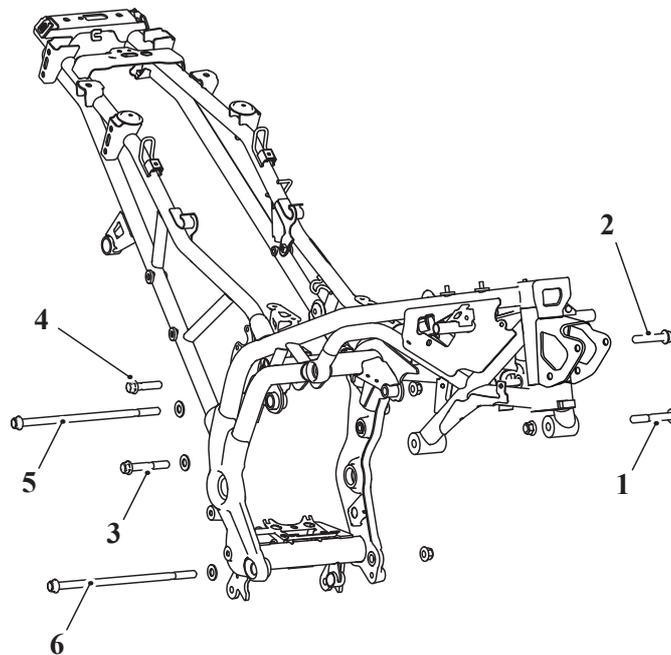
1. Fixings

5. Position the lower end of the radiator forwards to allow access to the front cylinder head frame mountings.

! CAUTION

Care must be taken not to damage the radiator when working on the front frame mountings. Damaged radiator fins can impair the radiator's efficiency leading to overheating and consequent engine damage.

Frame Bolts Exploded View



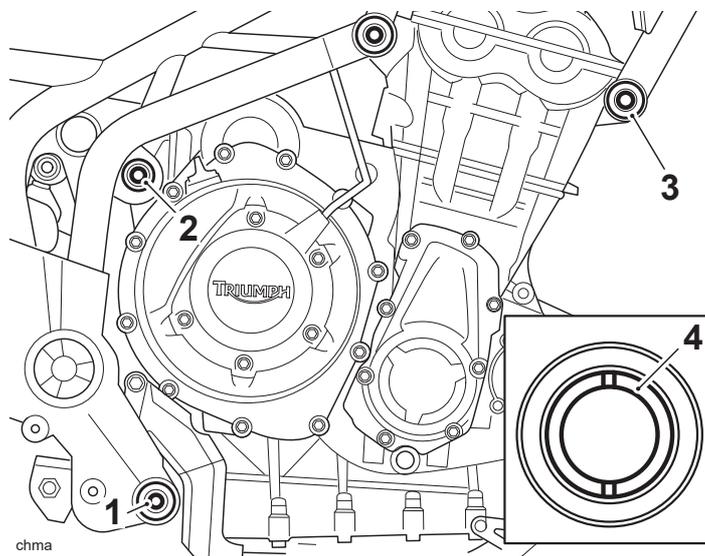
1. Left hand front cylinder head bolt
2. Left hand rear cylinder head bolt
3. Right hand front cylinder head bolt
4. Right hand rear cylinder head bolt
5. Upper crankcase bolt
6. Lower crankcase bolt

Note

- **Make sure the engine is still adequately supported.**
6. Remove and discard the lock nuts from the front cylinder head bolts.
 7. Loosen the rear cylinder head bolts. Do not fully remove.
 8. Remove the upper crankcase mounting bolt, washer and lock nut. Discard the lock nut.
 9. Remove the bolt and washer from the right hand front cylinder head mounting.

Note

- **There are three frame adjuster sleeves for this model. They are located as follows:**
 - **Two of the frame adjuster sleeves are located on the right hand side of the frame.**
 - **The third frame adjuster sleeve is located in the front right hand mounting of the cylinder head.**
10. Using T3880377 - Engine Mounting Adjuster, loosen the frame adjuster sleeves.

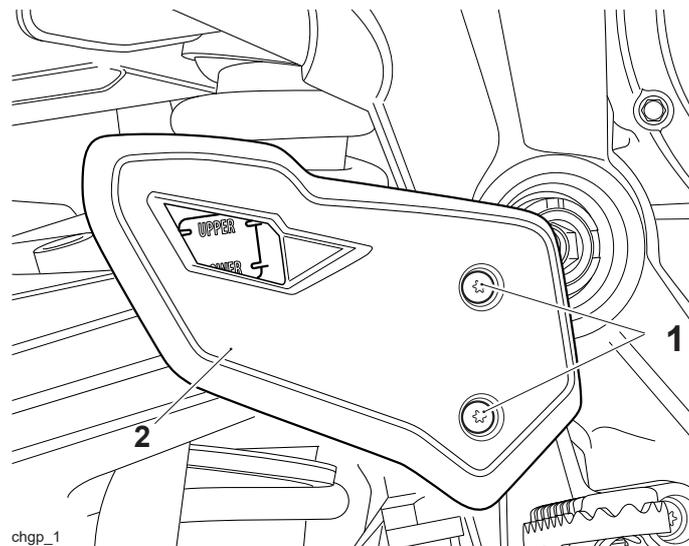


1. Lower crankcase adjuster
2. Upper crankcase adjuster
3. Cylinder head front right hand adjuster
4. Adjuster

Note

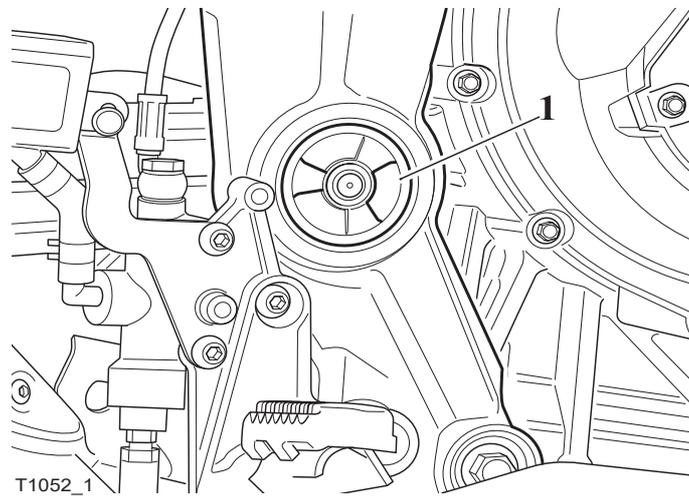
- The right hand swinging arm frame adjuster must be loosened before the frame bolts can be tightened.

11. Release the fixings and remove the right hand heel guard.



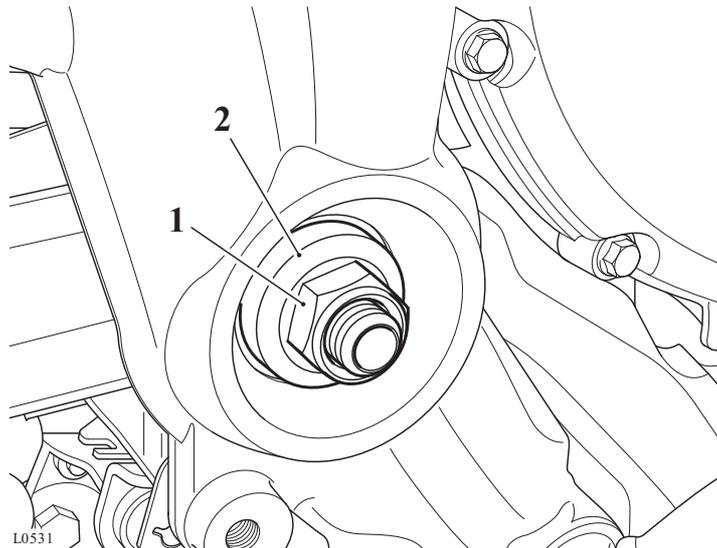
1. Fixings
2. Heel guard

12. Carefully remove the cover from the right hand swinging arm pivot pin.



1. Cover

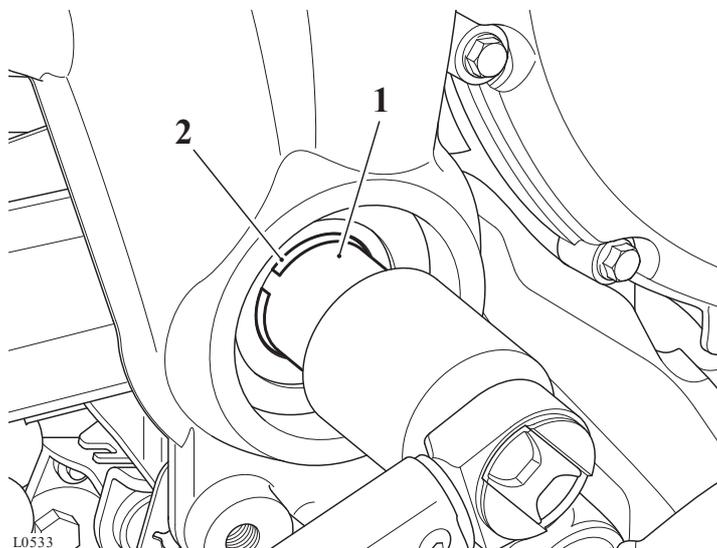
13. Remove the lock nut and adapter from the swinging arm spindle. Discard the lock nut.



1. Lock nut

2. Adapter

14. Using T3880182 - Wrench, Frame Adjuster, loosen the swinging arm frame adjuster but do not fully remove. Do not remove the swinging arm spindle.



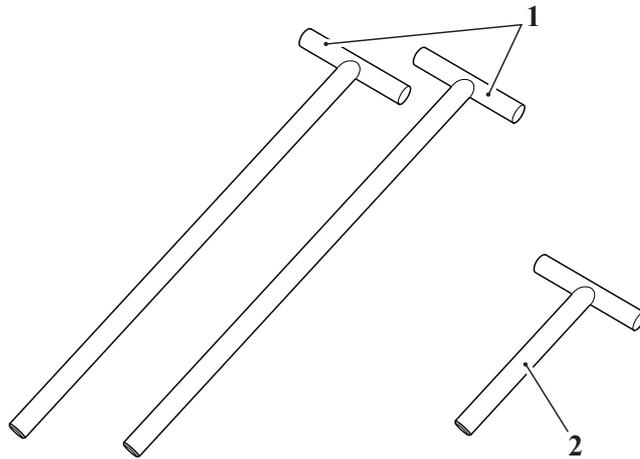
1. T3880182 - Wrench, Frame Adjuster
2. Swinging arm frame adjuster

! CAUTION

Unless the following engine mounting bolt tightening sequence is precisely followed, severe frame damage can occur.

Note

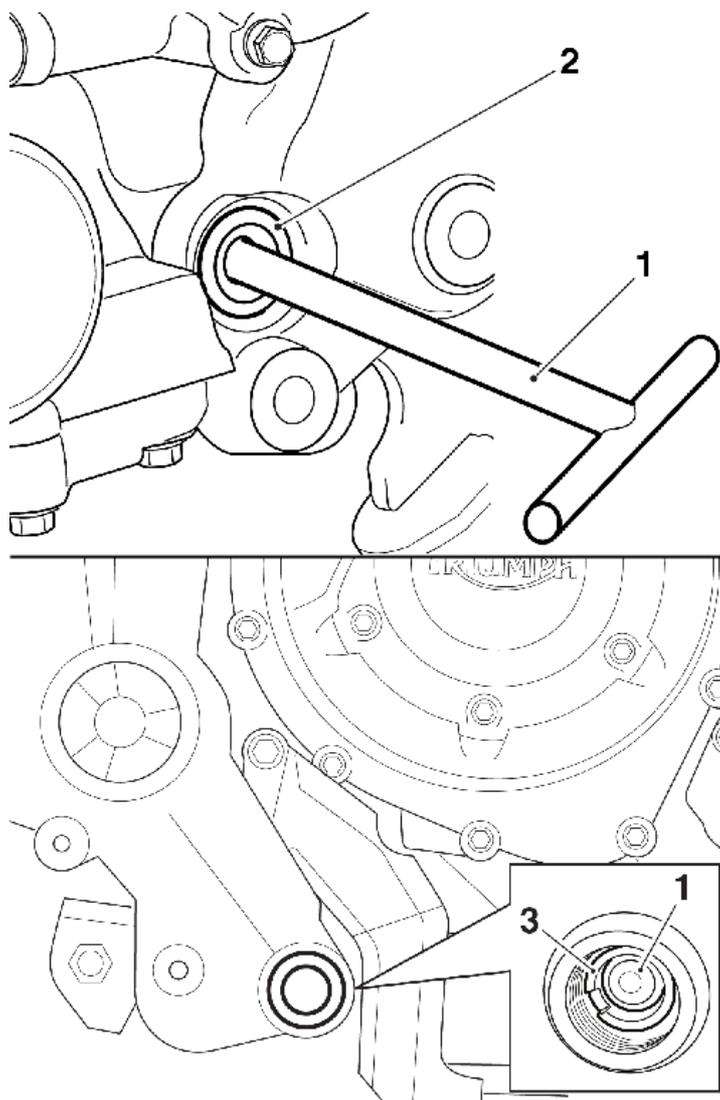
- The engine **MUST** be cold prior to starting the frame bolt tightening sequence.
- The T3880637 - Kit, Engine to Frame Alignment Bars is required to correctly align the engine to the frame for the following tightening sequence.
- Adjust the engine position as necessary to allow the engine to frame alignment bars to be inserted and removed freely.



T3880637 - Kit, Engine to Frame Alignment Bars

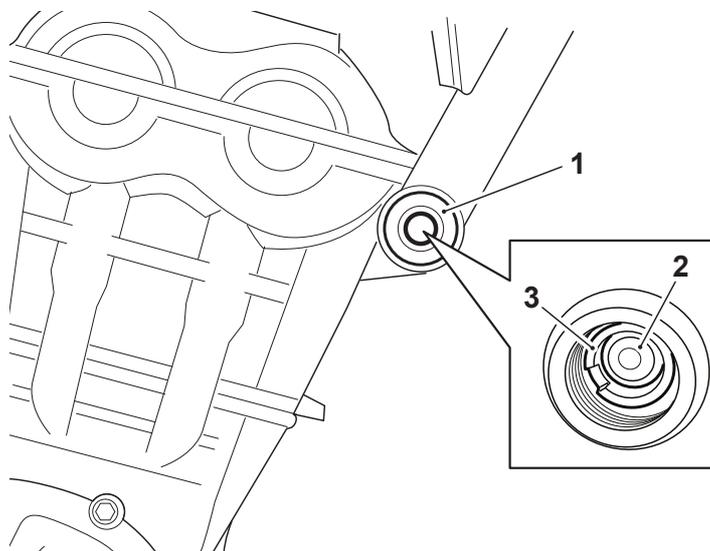
1. Crankcase alignment bars
2. Cylinder head alignment bar

15. Insert the crankcase alignment bars into the upper and lower crankcase mountings from the left hand side of the frame. Ensure the alignment bars are located through the engine and into the crankcase adjusters on the right hand side of the frame. Allow enough clearance on the right hand side of the frame to enable the threaded adjusters to be adjusted.



1. Crankcase alignment bar
2. Frame to crankcase mounting (lower mounting shown - left hand side of frame)
3. Crankcase adjuster (lower mounting shown - right hand side of frame)

16. Fit the cylinder head alignment bar into the left hand side of the right hand front cylinder head mounting point. Allow enough clearance on the right hand side of the frame to enable the threaded adjuster to be adjusted.



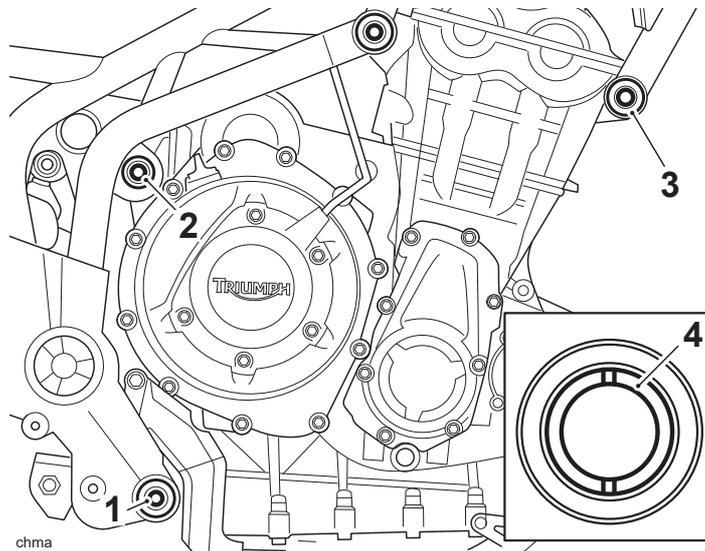
1. Right hand front cylinder head mounting point

2. **Cylinder head alignment bar (end of bar shown)**
3. **Cylinder head adjuster**

17. Fit a new lock nut to the left hand front cylinder head bolt and tighten to **24 Nm**.
18. Tighten the left hand rear cylinder head bolt to **85 Nm**.

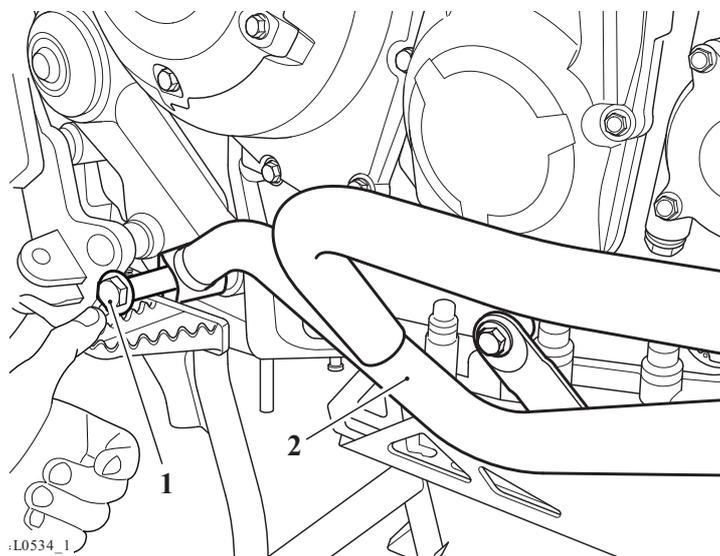
Note

- **If, after tightening each adjuster and frame fixing, any of the engine to frame alignment bars and frame fixings cannot be removed and inserted freely, check that the engine is still adequately supported, loosen all tightened adjusters and frame fixings and restart the tightening sequence from step 17.**
19. Using T3880377 - Engine Mounting Adjuster, tighten the three adjusters in the following sequence.
 - Tighten the lower crankcase adjuster to **5 Nm**.
 - Tighten the upper crankcase adjuster to **5 Nm**.
 - Tighten the right hand front cylinder head adjuster to **3 Nm**.



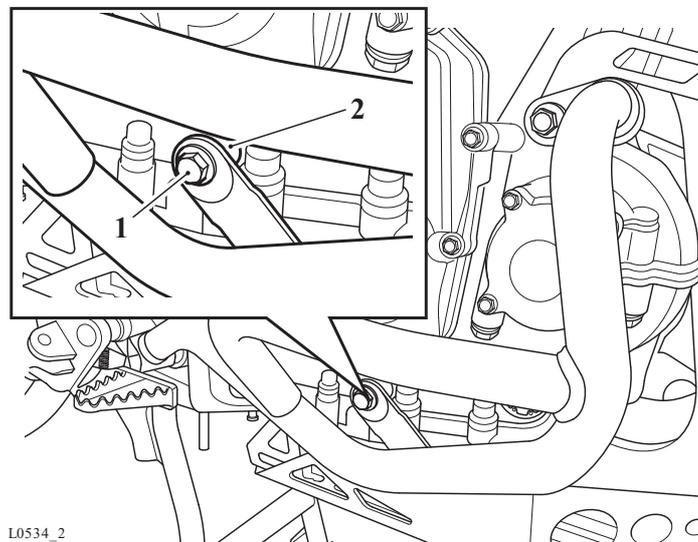
1. **Lower crankcase adjuster**
2. **Upper crankcase adjuster**
3. **Right hand front cylinder head adjuster**
4. **Adjuster**

20. Remove the upper crankcase alignment bar and fit the upper crankcase bolt and washer from the right hand side. Holding the bolt to prevent rotation, fit a new lock nut and tighten to **100 Nm**.
21. Align the right hand engine bar to the engine.
22. Remove the lower crankcase alignment bar and fit the lower crankcase mounting bolt through the rear mounting of the right hand engine bar, frame and lower crankcase. Loosely fit a new lock nut.



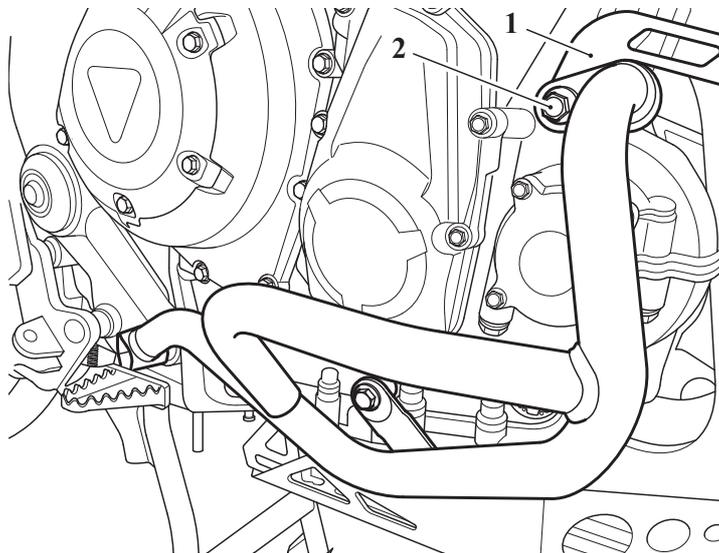
- 1. Lower crankcase mounting bolt
- 2. Right hand engine bar

23. Position the 13 mm spacer between the centre mounting and the engine as noted for removal. Fit the M8 x 33 mm bolt, do not fully tighten at this stage.



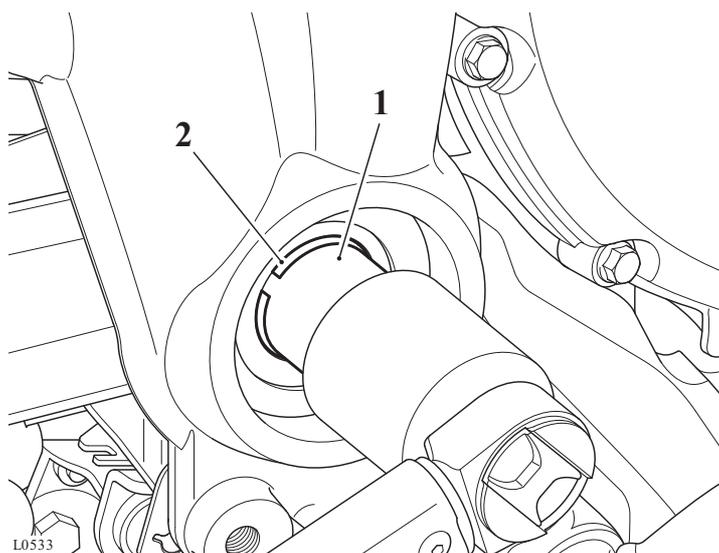
- 1. Lower crankcase mounting bolt
- 2. Bolt, M8 x 33 mm
- 3. Spacer, 13 mm

24. Position the right hand lower radiator bracket between the upper mounting for the engine bar and the engine as noted for removal. Fit the M8 x 25 mm bolt, do not fully tighten at this stage.



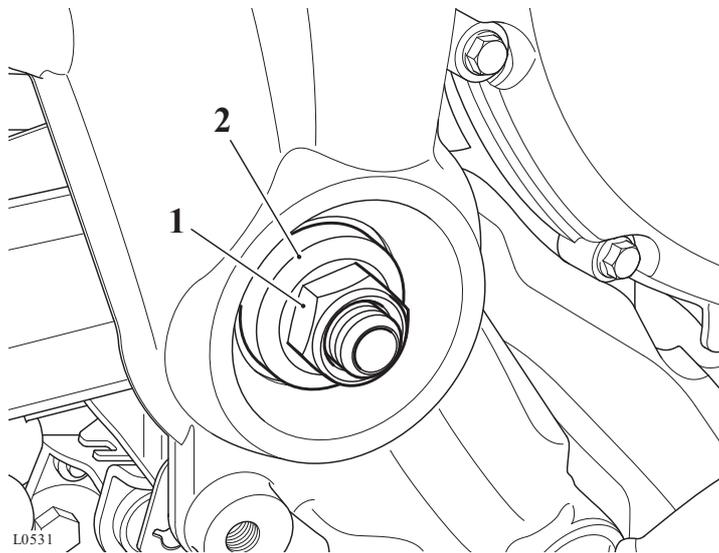
- 1. Radiator bracket
- 2. Bolt, M8 x 25 mm

- 25. Holding the lower crankcase mounting bolt to prevent rotation, tighten the lock nut to **100 Nm**.
- 26. Tighten the remaining frame bolts in the following sequence:
 - o Tighten the right hand rear cylinder head bolt to **85 Nm**.
 - o Tighten the left hand front cylinder head bolt to **115 Nm**.
 - o Using T3880377 - Engine Mounting Adjuster, re-tighten the right hand front cylinder head adjuster to **3 Nm**.
 - o Remove the cylinder head alignment bar from the right hand front cylinder head mounting and fit the bolt and washer. Fit a new lock nut and tighten to **100 Nm**.
- 27. Tighten the right hand engine bar centre mounting bolt to **18 Nm**.
- 28. Tighten the right hand engine bar upper mounting bolt to **18 Nm**.
- 29. Using T3880182 - Wrench, Frame Adjuster, tighten the right hand swinging arm frame adjuster to **6 Nm**.



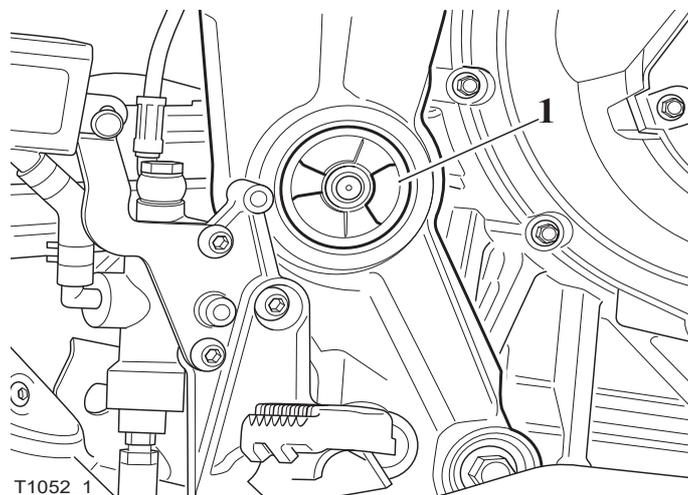
- 1. T3880182 - Wrench, Frame Adjuster
- 2. Swinging arm spindle frame adjuster

- 30. Fit the adapter to the swinging arm spindle as noted during removal and fit a new lock nut.



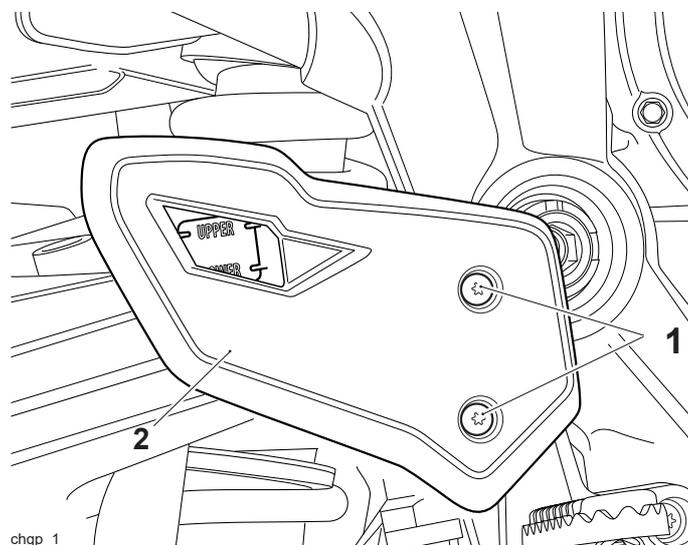
1. Adapter
2. Lock nut

31. Holding the swinging arm spindle to prevent rotation, tighten the lock nut to **110 Nm**.
32. Refit the cover to the swinging arm right hand pivot pin.



1. Cover

33. Refit the right hand heel guard and tighten its fixings to **7 Nm**.

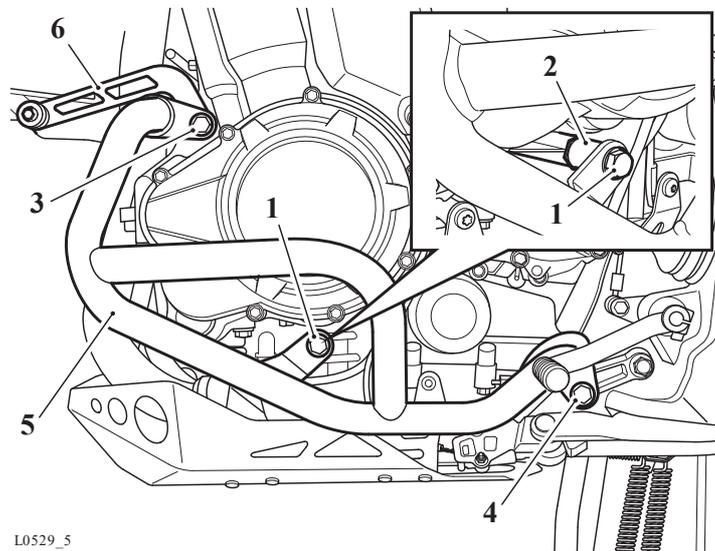


1. **Fixings**
2. **Heel guard**

34. Fit the left hand control plate and gear change linkage assembly to the frame (see Gear Change Linkage - Installation) noting the following:
 - o Secure the side stand with the rear fixing only at this stage.
 - o Do not fully tighten the left hand control plate and side stand fixings at this stage.
35. Remove the support from beneath the engine.

Left Hand Engine Bar

36. Align the left hand engine bar to the engine.
37. Position the left hand lower radiator bracket between the engine bar upper mounting and the engine. Fit the M8 x 25 mm bolt, do not fully tighten at this stage.
38. Position the 25 mm spacer between the centre mounting and the engine as noted for removal. Fit the M8 x 45 mm bolt, do not fully tighten at this stage.
39. Fit the side stand bolt to the engine bar lower mounting. Do not fully tighten at this stage.



1. **Bolt, M8 x 45 mm**
2. **Spacer, 25 mm**
3. **Bolt, M8 x 25 mm**
4. **Side stand bolt**
5. **Engine bar, left hand**
6. **Radiator bracket**

40. Refit the two fixings securing the radiator to the lower radiator brackets and secure with new lock nuts. Tighten to **9 Nm**.
41. Tighten the radiator upper fixings to **9 Nm**.
42. Tighten the upper fixings for the left hand control plate to **18 Nm**.
43. Tighten the side stand bolts to **70 Nm**.
44. Tighten the engine bar upper mounting bolt to **18 Nm**.
45. Tighten the engine bar centre mounting bolt to **18 Nm**.

Perform the following operations:

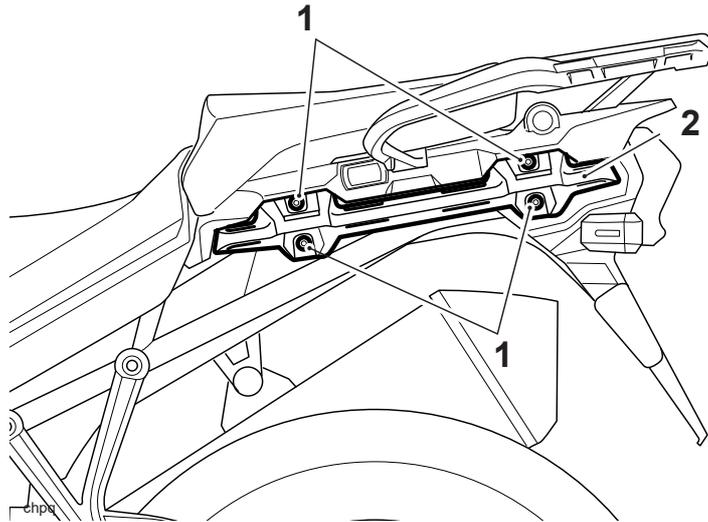
- Sump Guard - Installation
- Side Fairings - Installation
- Lower the motorcycle and park on the side stand.

Pannier Rails - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

- If fitted, remove accessory panniers and their mountings as described in the relevant accessory fitting instruction.
1. Remove the fixings and their washers then remove the pannier rail.



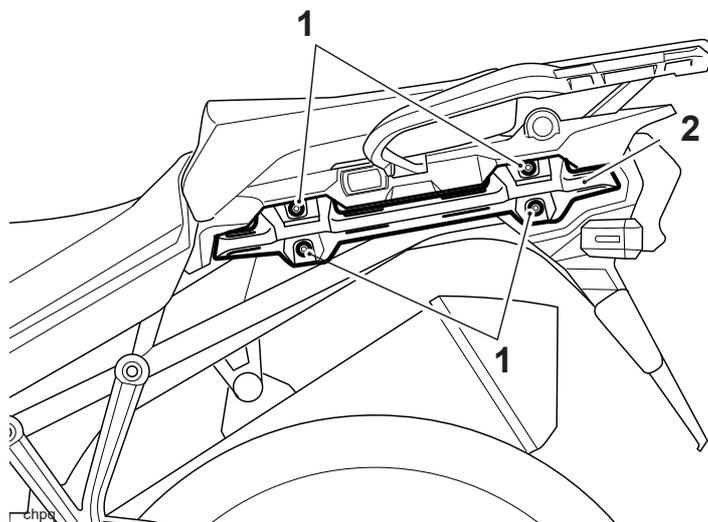
1. Fixings
2. Pannier rail

Pannier Rails - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Align the pannier rail to the frame.
2. Fit the fixings with their washers and tighten to **27 Nm**.



1. Fixings

2. Pannier rail

- If fitted, install accessory panniers and their mountings as described in the relevant accessory fitting instruction.

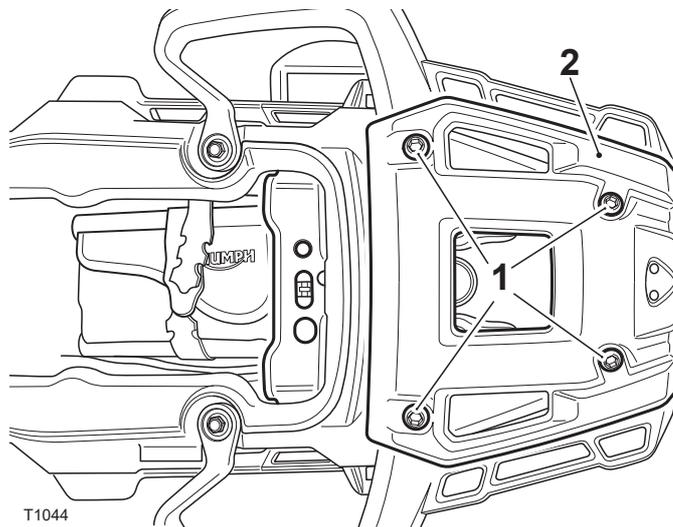
Luggage Rack - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

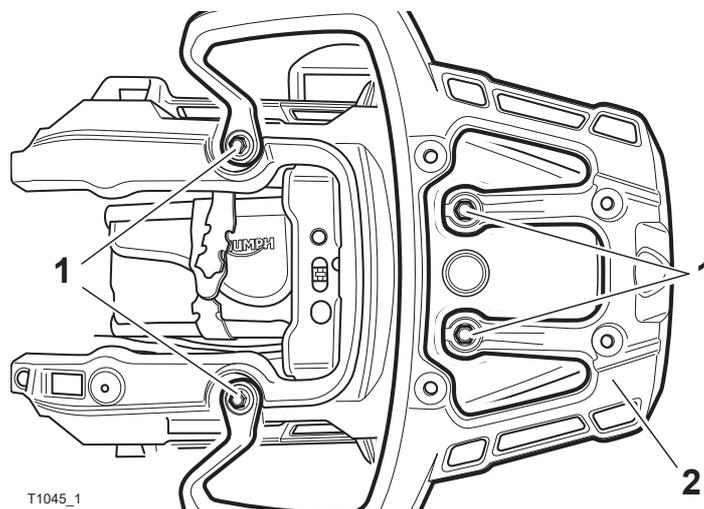
Perform the following operations:

- Passenger Seat - Removal
 1. Remove the four bolts and lock nuts and remove the luggage rack cover. Discard the lock nuts.



1. **Fixings**
2. **Rack cover**

2. Release the four fixings and remove the luggage rack.



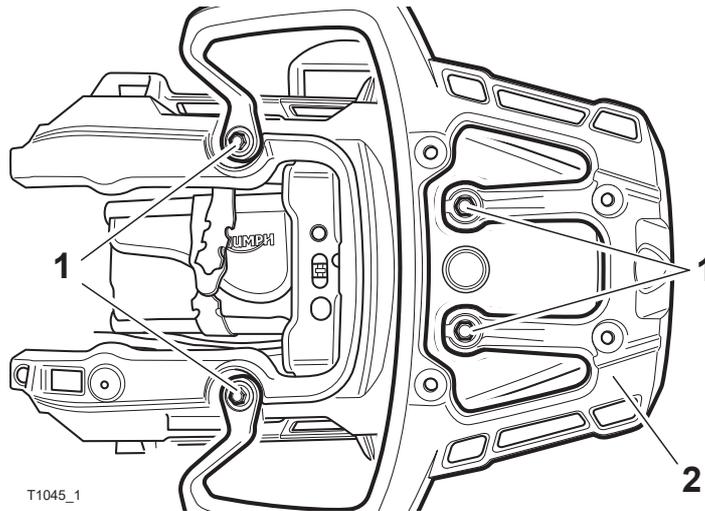
1. **Fixings**
2. **Luggage rack**

Luggage Rack - Installation

WARNING

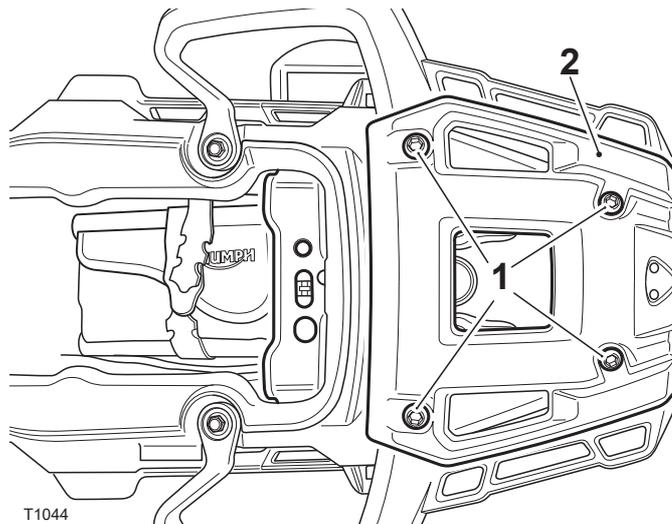
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the luggage rack to the motorcycle.
2. Refit the four fixings and tighten to **27 Nm**.



1. **Fixings**
2. **Luggage rack**

3. Position the cover to the luggage rack. Fit the bolts and new lock nuts and tighten to **7 Nm**.



1. **Fixings**
2. **Rack cover**

Perform the following operations:

- Passenger Seat - Installation

Rear Panel - Removal

WARNING

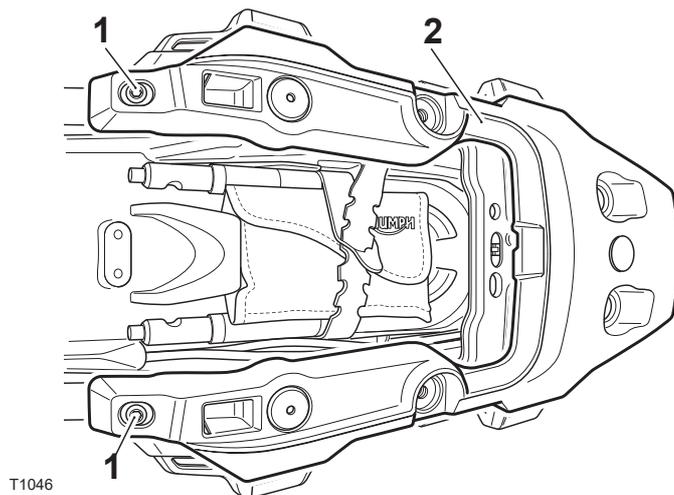
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Luggage Rack - Removal
1. Remove the fixings at the front of the rear panel then slide the rear panel rearwards for complete removal.

Note

- **If fitted, disconnect the electrical connectors for the rear heated seat switch and rear electrical accessory socket.**



1. **Fixings**
2. **Rear panel**

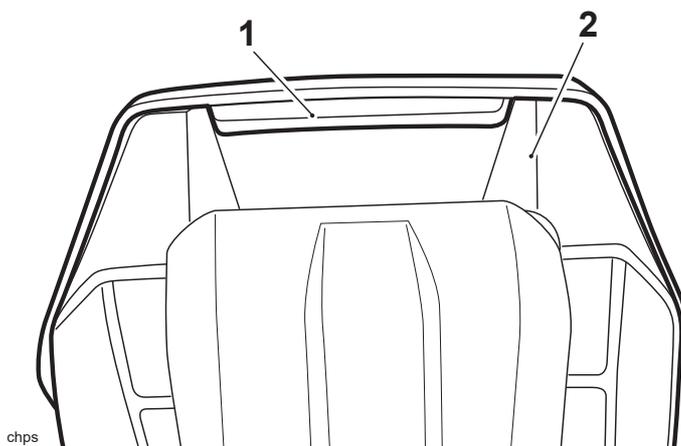
Rear Panel - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

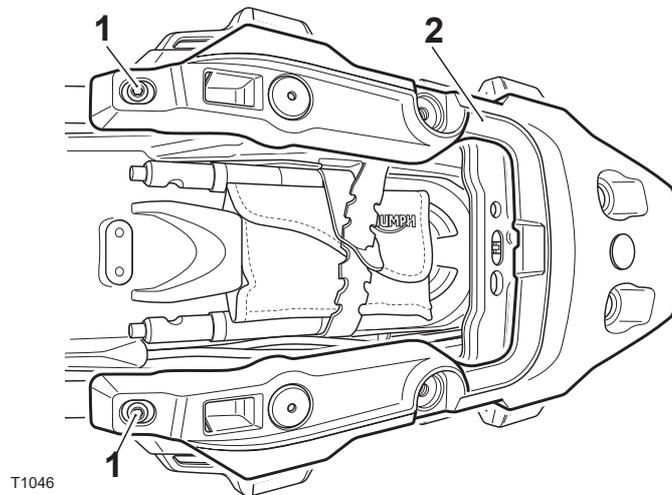
Note

- **If fitted, reconnect the electrical connectors for the rear heated seat switch and rear electrical accessory socket.**
1. Fit the rear panel to the motorcycle. Ensure that the lip at the rear of the panel is located over the rear mudguard, as shown below.



1. Lip, rear panel
2. Rear mudguard

2. Tighten the front fixings to **7 Nm**.



1. Fixings
2. Rear panel

Perform the following operations:

- Luggage Rack - Installation
- Battery - Installation
- Rider's Seat - Installation

Rear Mudguard - Removal

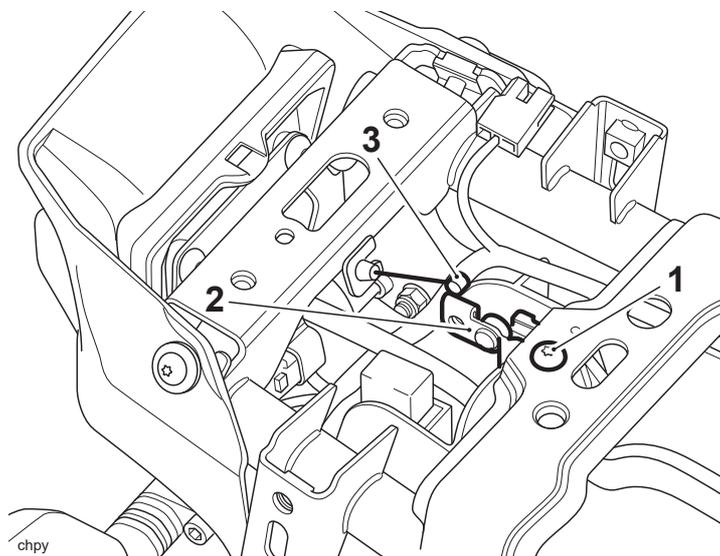
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Pannier Rails - Removal
- Rear Panel - Removal

1. Release the fixing and detach the seat latch from the frame. Discard the fixing.
2. Detach the seat latch cable from the seat's latch.



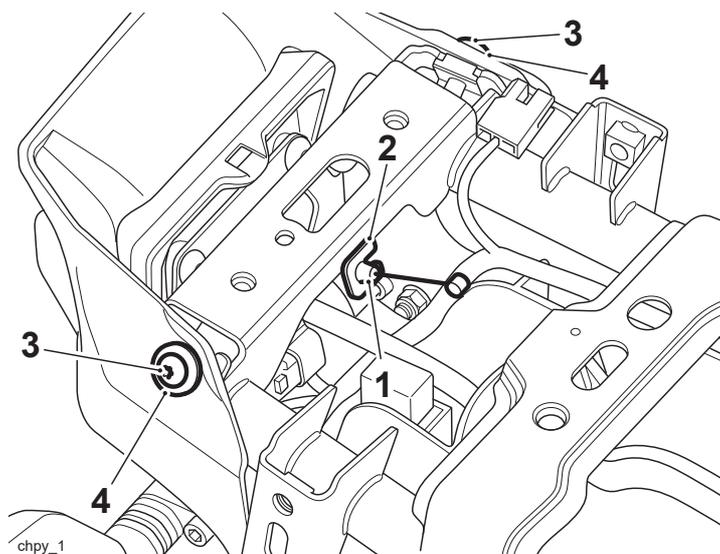
1. Fixing
2. Seat latch
3. Cable

3. Detach the seat latch outer cable from the subframe.

Note

- Note that the fixings for the top of the rear mudguard are fitted with washers. The lower two fixings are not fitted with washers.

4. Remove the two fixings and washers from the top of the rear mudguard. Discard the fixings.

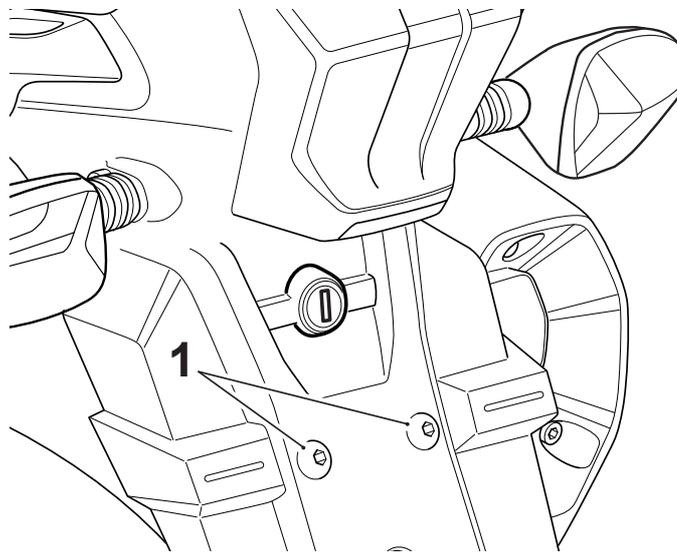


1. Outer cable
2. Subframe
3. Fixings
4. Washers

Note

- Note the position of the adjustable bracket for the rear reflector. It may have the under seat tray between it and the rear mudguard.

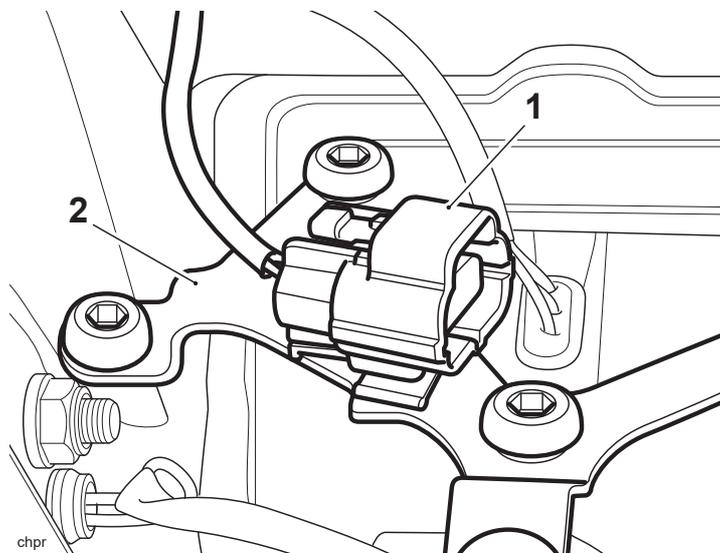
5. Remove the two fixings shown below and detach the rear mudguard from the frame. Collect the side reflectors bracket if fitted. Do not allow the rear mudguard to hang from the rear light and direction indicator harnesses.



1. Fixings

Note

- The right hand indicator wiring is identified by a red tape on it.
6. Disconnect the electrical connectors for the rear light and direction indicators.
 7. Detach the rear light connector block from the rear light bracket and remove the rear mudguard.



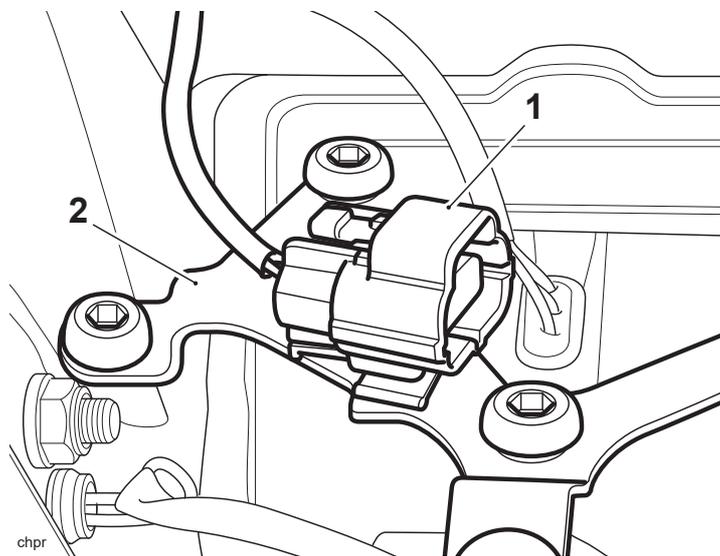
1. Connector block
2. Bracket

Rear Mudguard - Installation

WARNING

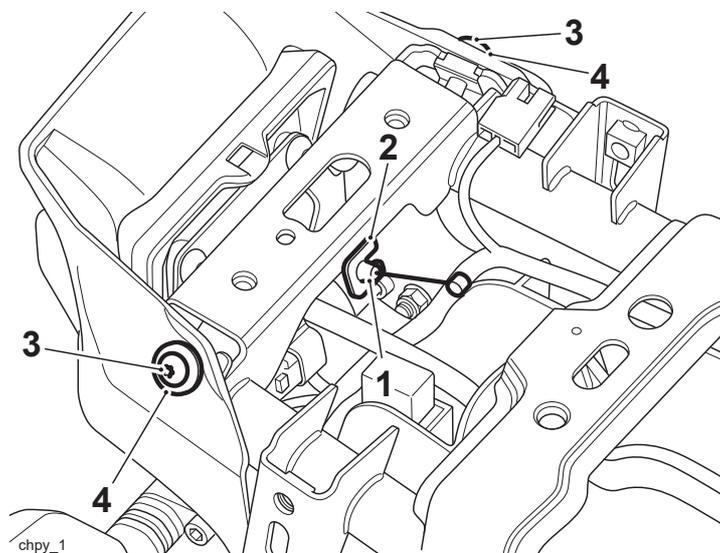
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Attach the rear light connector block to the rear light bracket.



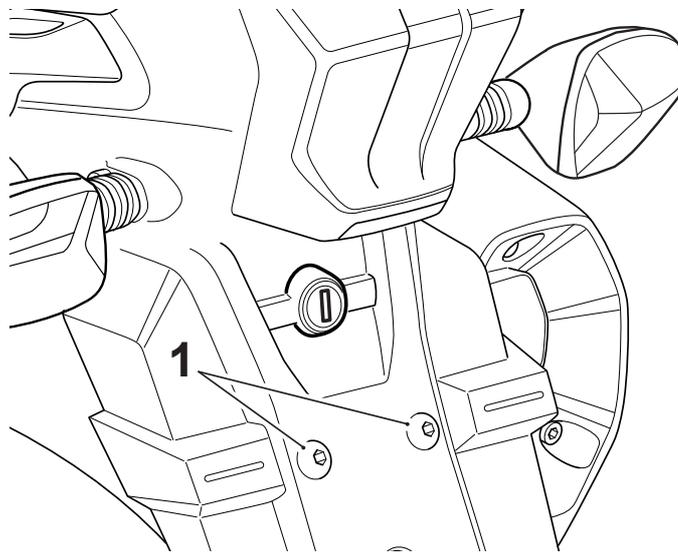
1. Connector block
2. Bracket

2. Connect the electrical connectors for the rear light and indicators as noted for removal.
3. Align the rear mudguard to the subframe while routing the seat latch cable as noted for removal.
4. Fit new fixings with the original washers to the top of the rear mudguard. Do not fully tighten at this stage.



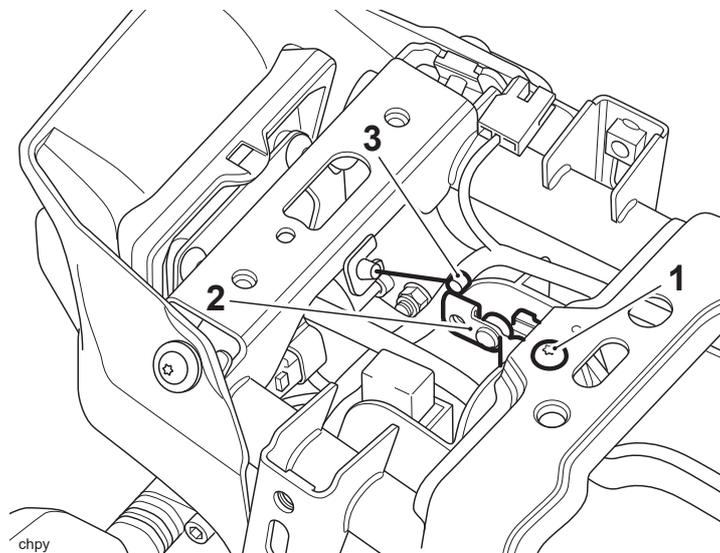
1. Outer cable
2. Subframe
3. Fixings
4. Washers

5. Fit the lower fixings (and side reflectors bracket if fitted) and tighten to **3 Nm**.



1. Fixings

6. Tighten the fixings at the top of the rear mudguard to **7 Nm**.
7. Attach the seat latch outer cable to the subframe.
8. Attach the seat latch inner cable to the seat's latch.
9. Fit the seat latch to the frame and tighten its new fixing to **9 Nm**.



1. Fixing
2. Seat latch
3. Cable

Perform the following operations:

- Rear Panel - Removal
- Pannier Rails - Installation
- Battery - Installation
- Rider's Seat - Installation

Battery Tray - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

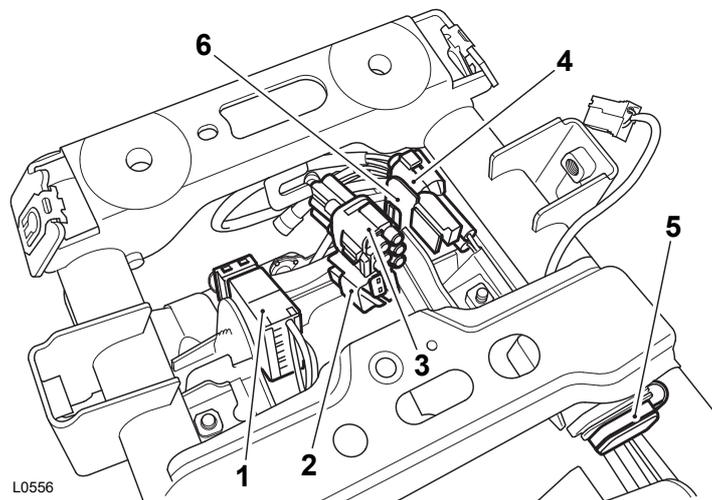
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Chassis Electronic Control Module (ECM) - Removal
- Engine Electronic Control Module (ECM) - Removal
- Rear Mudguard - Removal
- Rear Wheel - Removal

Note

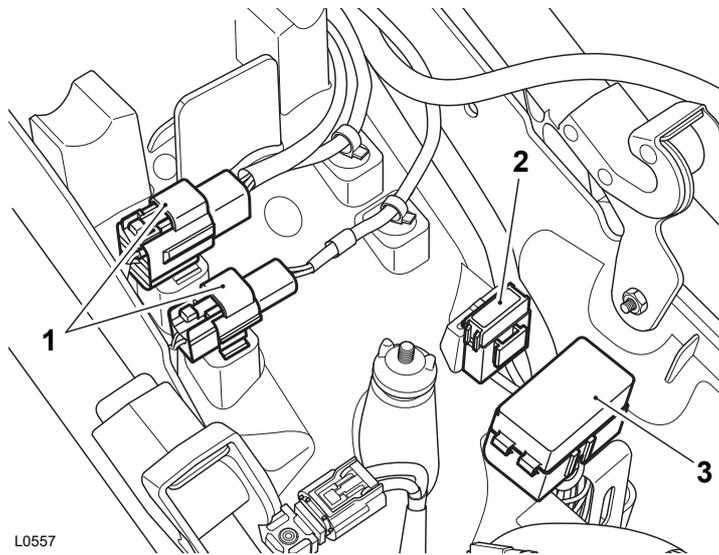
- **Note the routing of the rear section of the harness and the positions of its electrical connections prior to removal.**
- **Note the position of the connector bracket at the rear of the battery tray for installation.**

1. Disconnect the alarm and USB socket electrical connectors.
2. Detach the USB socket, powered top box and Reserved electrical connectors from the bracket and collect the bracket.



1. **Alarm electrical connector**
2. **Powered top box electrical connector**
3. **Reserved electrical connector**
4. **USB socket electrical connector**
5. **USB socket**
6. **Bracket**

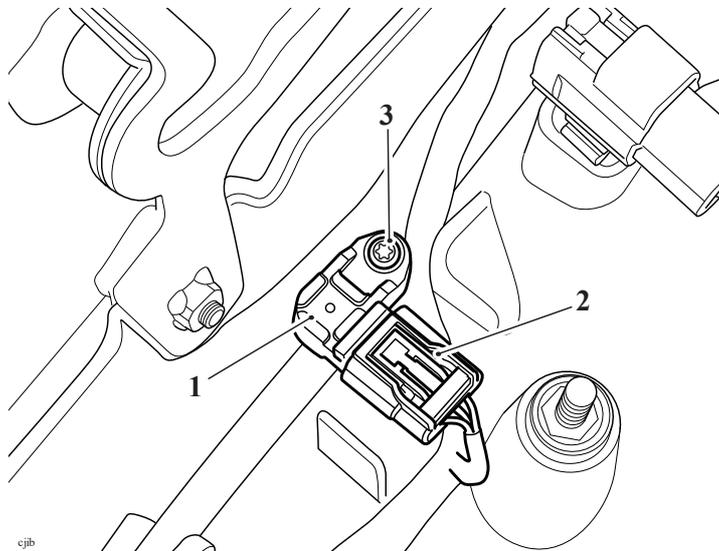
3. Disconnect the heated seats subharness electrical connectors.
4. Detach the heated seat electrical connectors, ABS fuse and main fuse box from the battery tray.



L0557

1. Heated seats electrical connectors
2. ABS fuse
3. Main fuse box

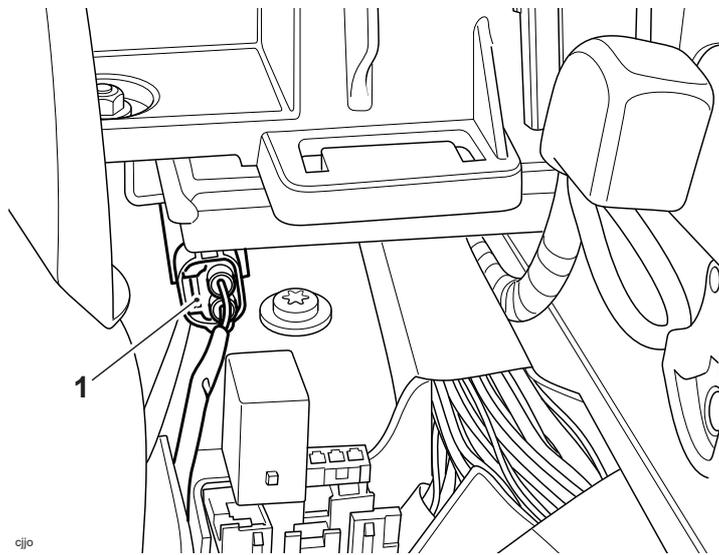
5. Remove the fixing securing the ambient air pressure sensor to the battery tray.



cjbb

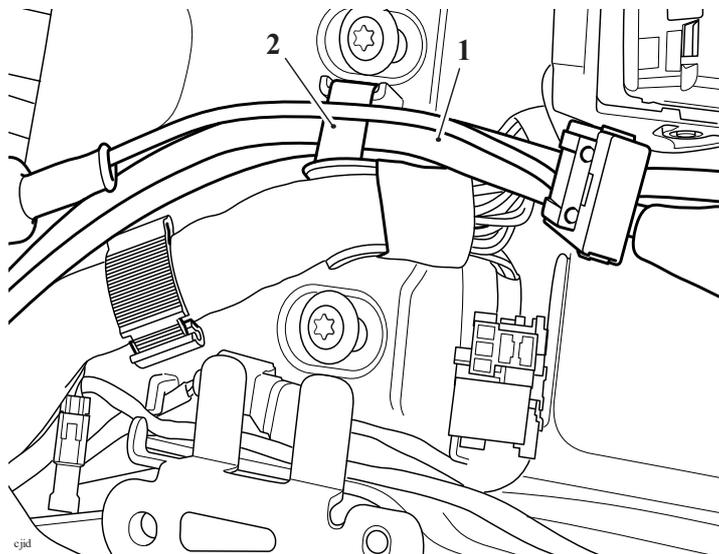
1. Ambient air pressure sensor
2. Electrical connector
3. Fixing

6. Disconnect the ABS rear wheel speed sensor electrical connector.



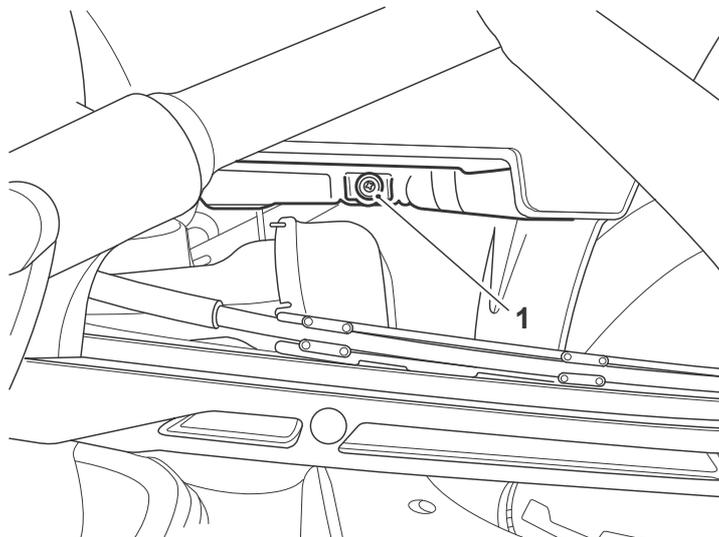
1. ABS rear wheel speed sensor electrical connector

7. Detach the battery leads from their channel on the main harness and position aside.



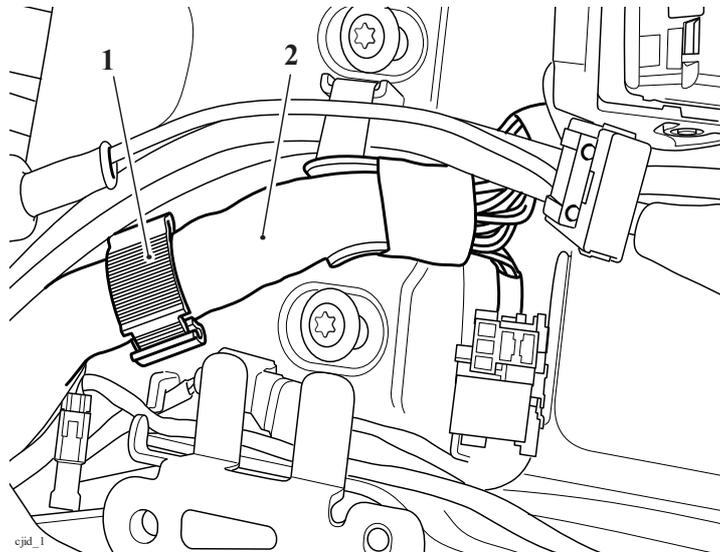
- 1. Battery leads**
- 2. Channel**

8. Remove the scrivet securing the harness channel to the battery tray.



1. Scrivet

9. Release the harness clip.

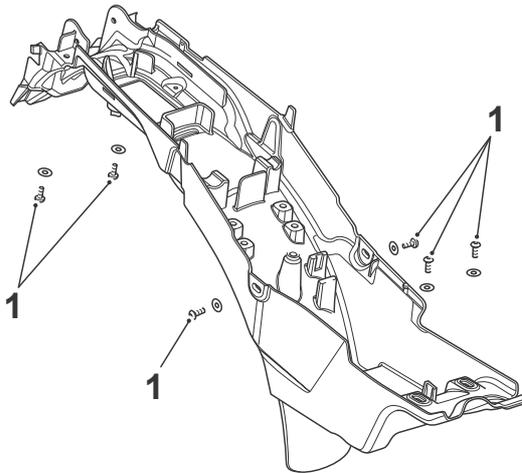


1. Clip

2. Harness

10. Carefully withdraw the rear section of the harness from the battery tray and position aside.

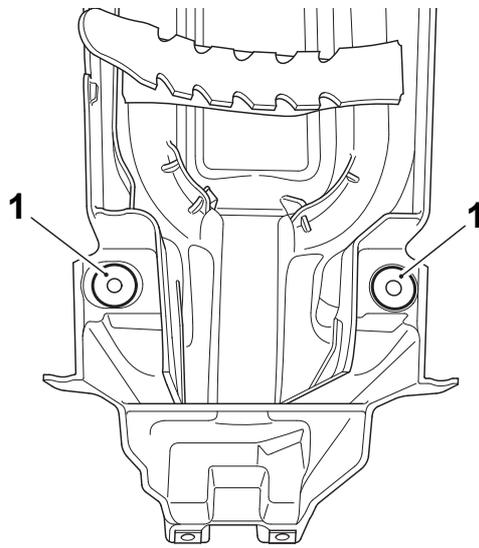
11. Remove the six fixings and washers. Discard the fixings.



1. Fixings

12. Lower the battery tray and remove towards the rear of the motorcycle.

13. Noting their position, collect the flanged sleeves from the rear mounting holes.



L0558

1. Flanged sleeves

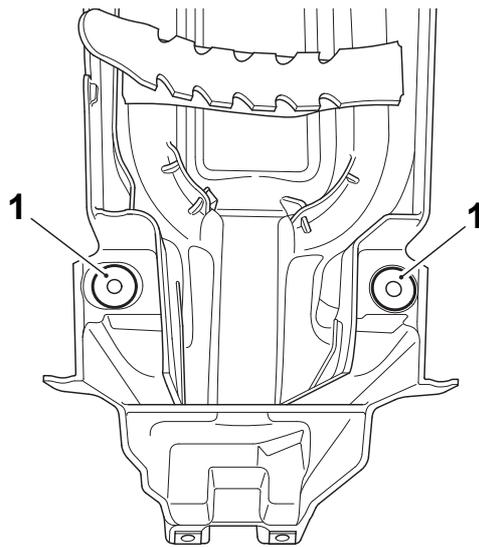
14. If necessary, detach the heated seats subharness and alarm connector blanking plug from the battery tray.

Battery Tray - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

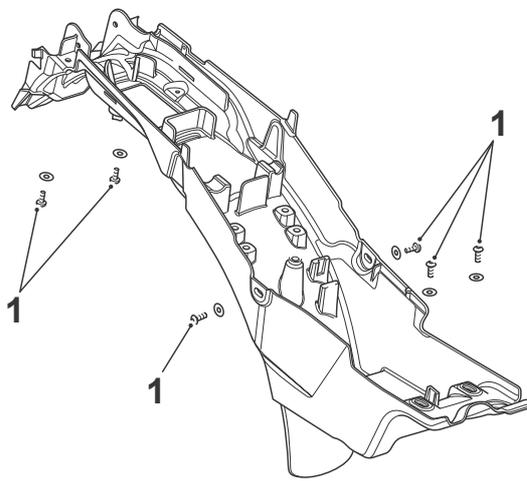
1. If removed, refit the heated seat subharness and alarm electrical connector blanking plug to the battery tray.
2. Fit the flanged sleeves to the battery tray rear mountings as noted for removal.



L0558

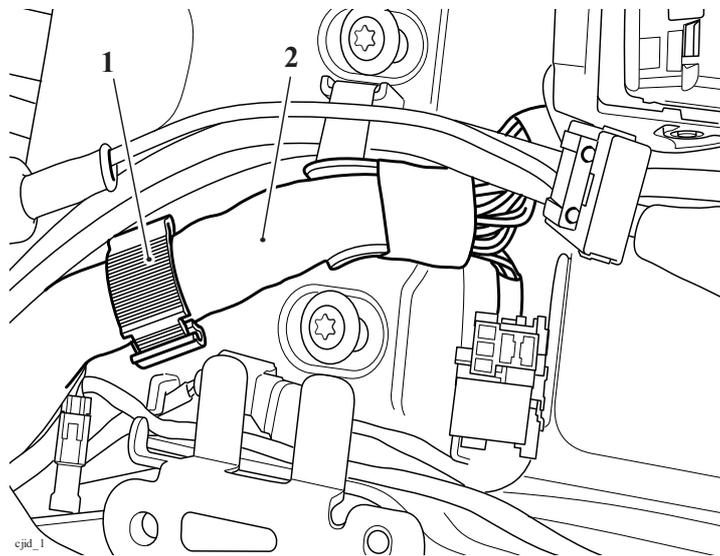
1. Flanged sleeves

3. Position the battery tray to the motorcycle and secure with the washers and six new fixings. Tighten the fixings to **7 Nm**.



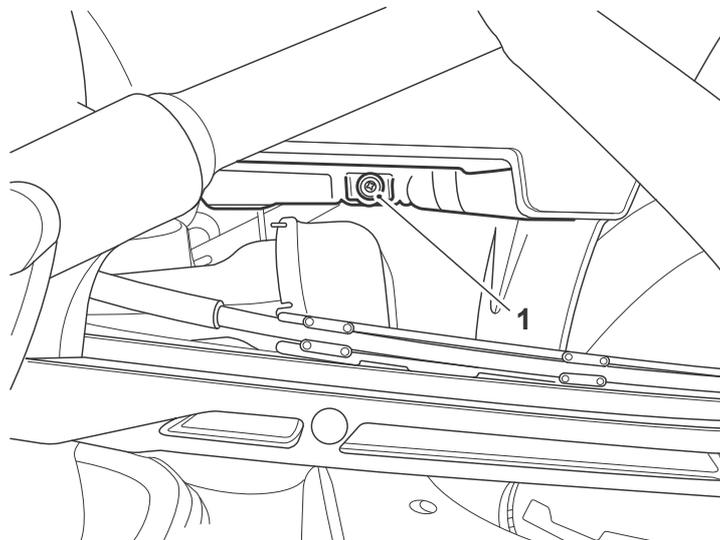
1. Fixings

4. Position the rear section of the harness to the battery tray as noted during removal and secure with the clip.



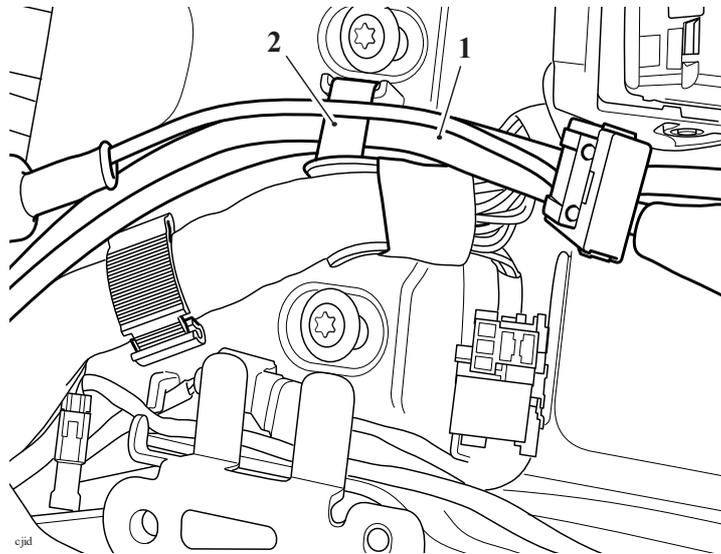
- 1. Clip**
- 2. Harness**

5. Ensure that the harness channel is located correctly to the battery tray and secure with a new scrivet.



1. Scrivet

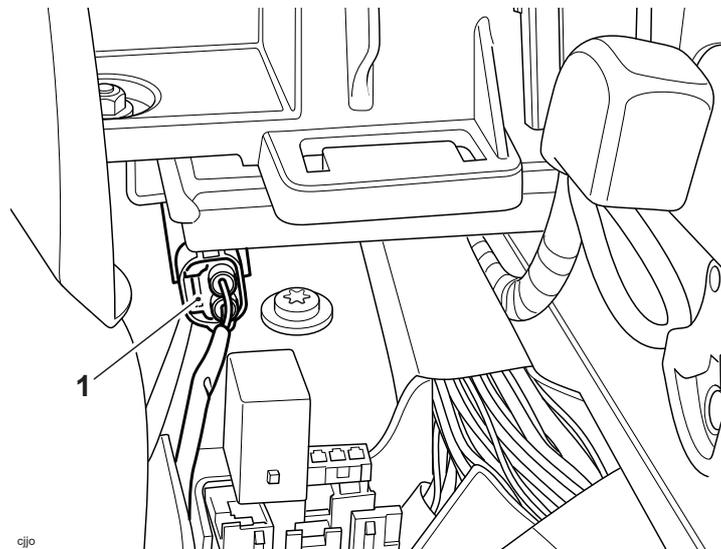
6. Route the battery leads into their channel on the main harness as noted during removal.



1. Battery leads

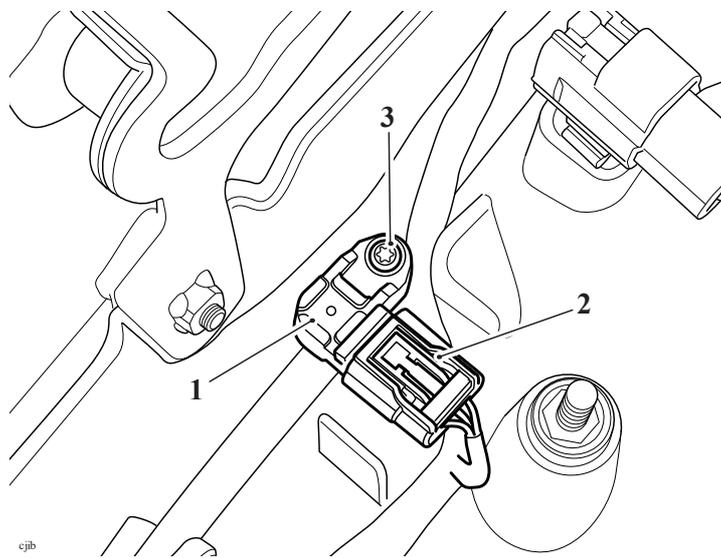
2. Channel

7. Connect the ABS rear wheel speed sensor electrical connector.



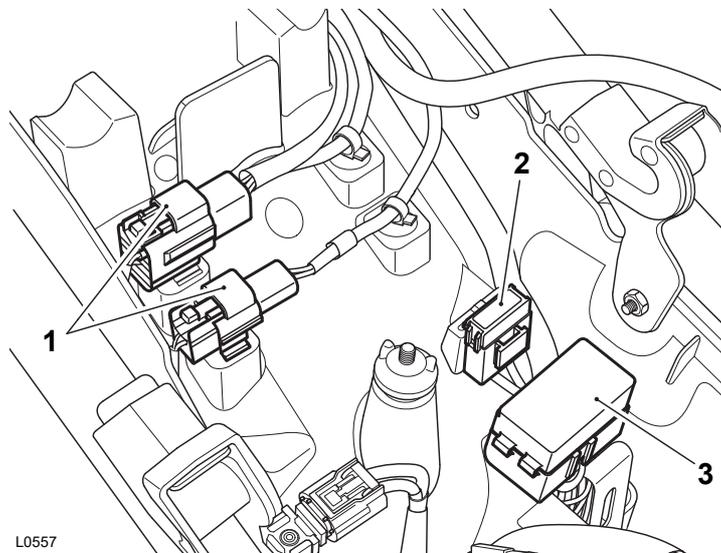
1. ABS rear wheel speed sensor electrical connector

8. Position the ambient air pressure sensor to its mounting on the battery tray and secure with the fixing. Tighten the fixing to **1.5 Nm**.



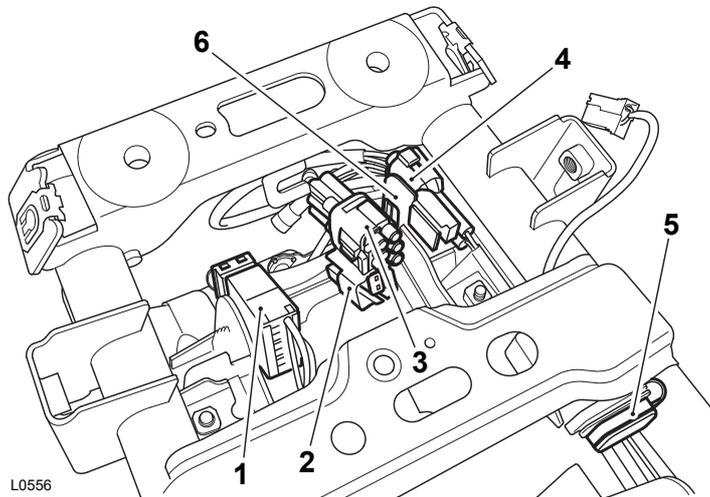
1. Ambient air pressure sensor
2. Electrical connector
3. Fixing

9. Route and attach the main fusebox, ABS fuse and heated seats electrical connectors to the battery tray as noted during removal:
10. Connect the heated seats subharness electrical connectors as noted during removal.



1. Heated seats electrical connectors
2. ABS fuse
3. Main fuse box

11. Route the USB socket, powered top box and Reserved electrical connectors and attach to the bracket and battery tray as noted during removal.
12. Connect the USB socket and Alarm electrical connectors.



1. **Alarm electrical connector**
2. **Powered top box electrical connector**
3. **Reserved electrical connector**
4. **USB socket electrical connector**
5. **Bracket**

Perform the following operations:

- Rear Mudguard - Installation
- Engine Electronic Control Module (ECM) - Installation
- Chassis Electronic Control Module (ECM) - Installation
- Rear Wheel - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Side Stand - Removal

WARNING

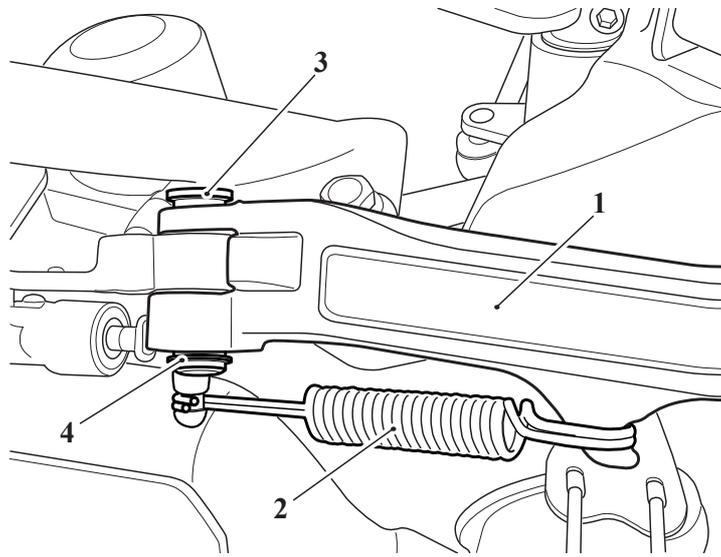
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the motorcycle.

WARNING

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

2. With the side stand in the up position, unhook the spring from the side stand and remove it from the motorcycle.
3. Remove and discard the E-clip securing the pivot pin.
4. Remove the pivot pin and remove the side stand.



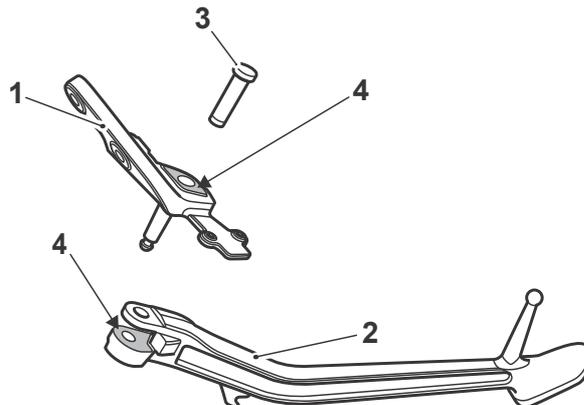
1. Side stand
2. Spring
3. Pivot pin
4. E-clip

Side Stand - Lubrication

1. Smear the upper and lower contact surfaces of the side stand and side stand carrier bracket with Castrol High Temperature Grease.

Note

- The side stand leg pivot holes are fitted with dry lubrication bushes. It is not necessary to lubricate the shank of the side stand pivot pin.



1. Side stand carrier bracket
2. Side stand
3. Pivot pin
4. Lubrication areas

Side Stand - Installation



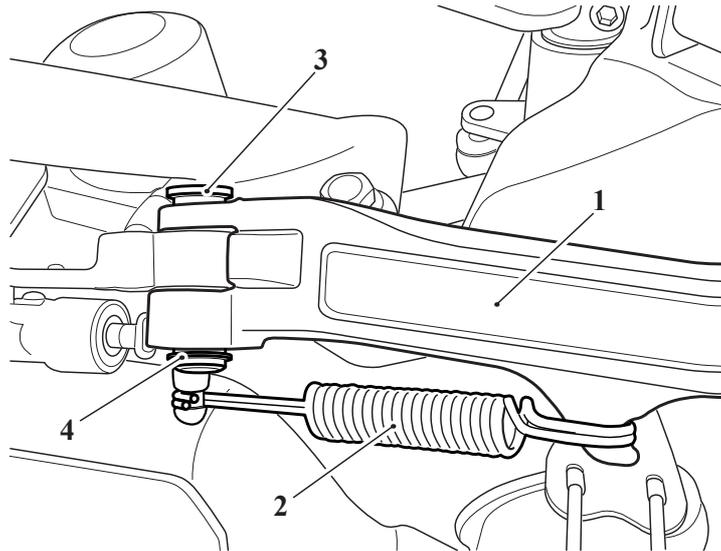
WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Side Stand - Lubrication
1. Fit the side stand to the motorcycle and insert the pivot pin.
 2. Fit a new E-clip to secure the pivot pin.



1. **Side stand**
2. **Spring**
3. **Pivot pin**
4. **E-clip**

WARNING

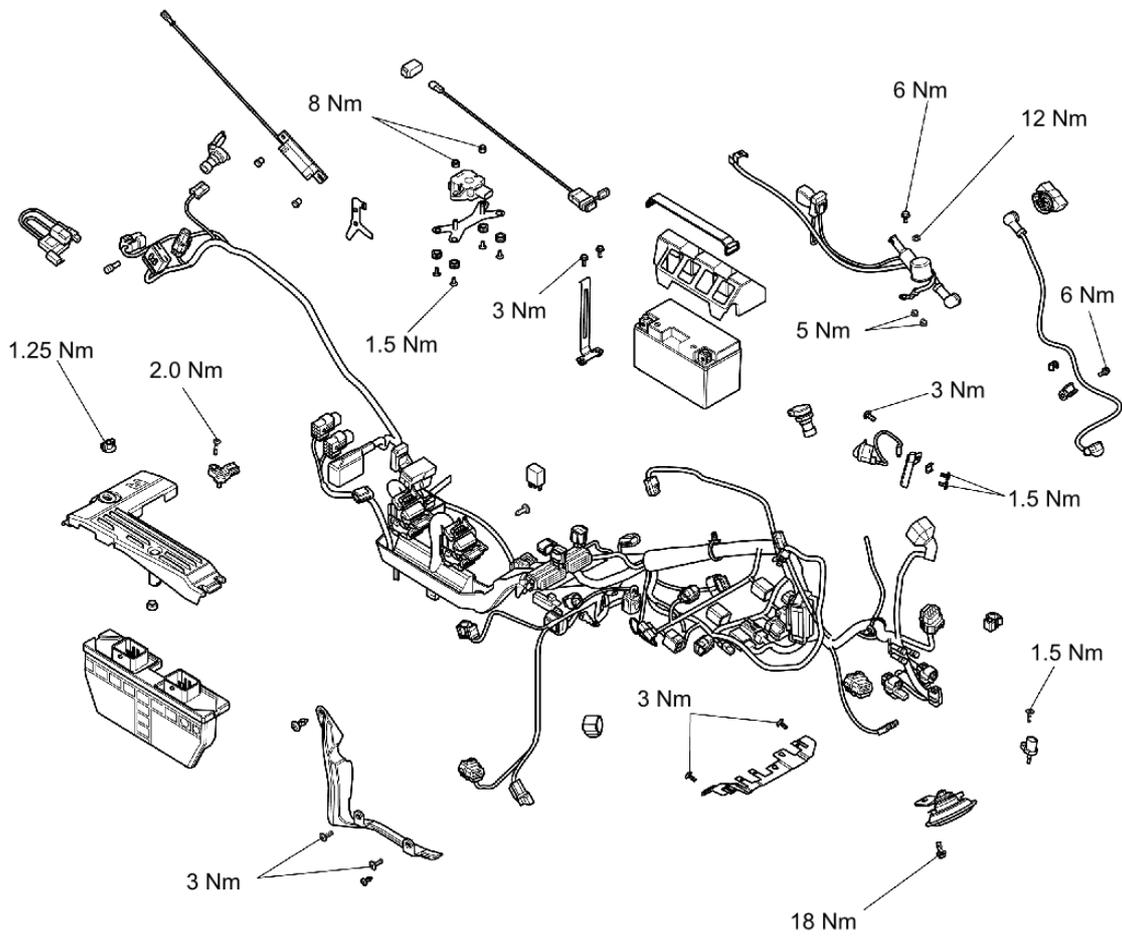
Wear hand, eye and face protection when fitting the stand spring. Take great care to minimise the risk of personal injury and loss of components.

3. With the side stand in the up position, hook the spring onto its frame lug then carefully hook it onto the side stand lug.
4. Check the operation of the side stand before riding the motorcycle. Ensure the spring holds the stand securely in the retracted position.

Electrical

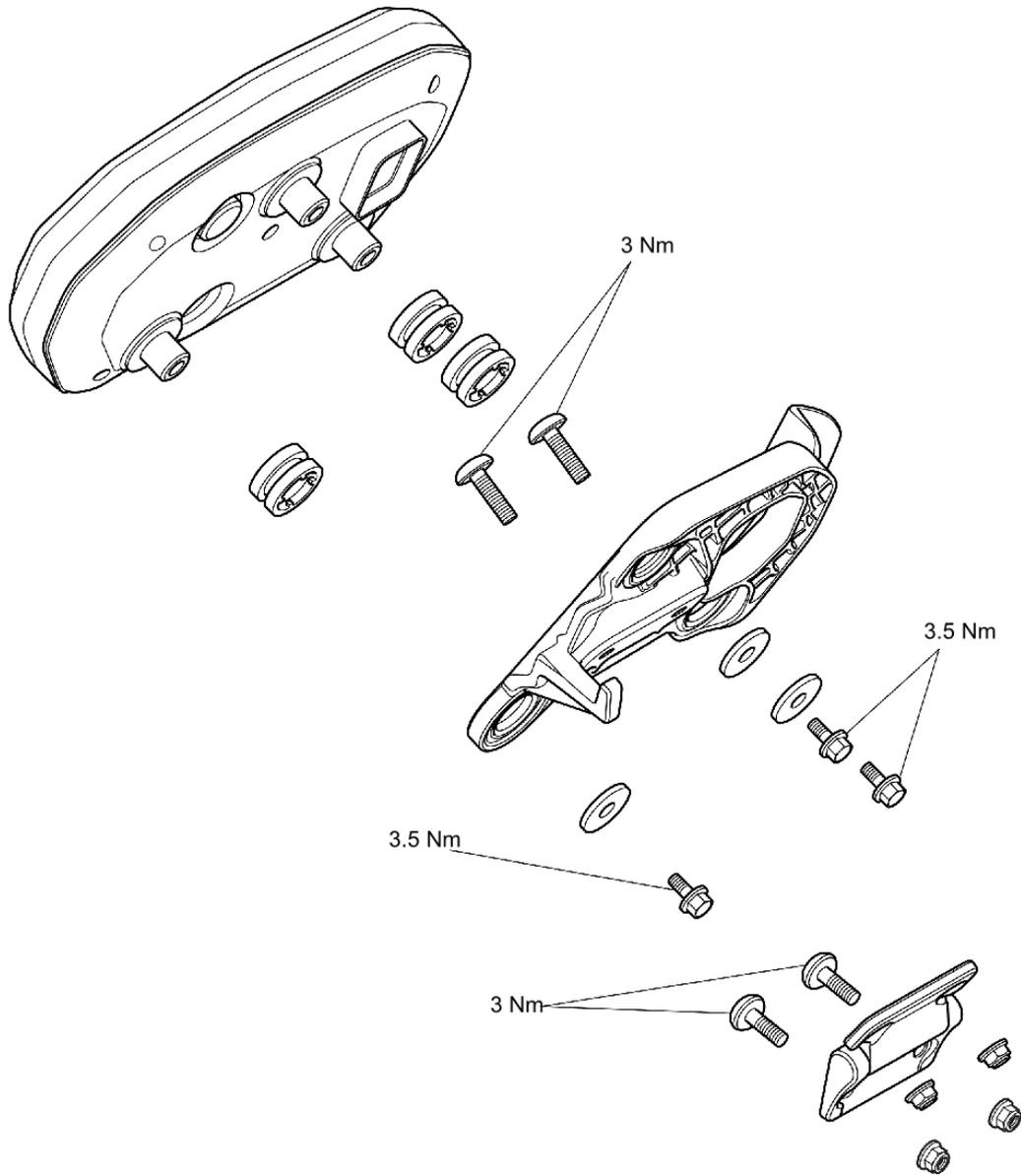
Exploded Views

Exploded View - Battery, Horn and Wiring



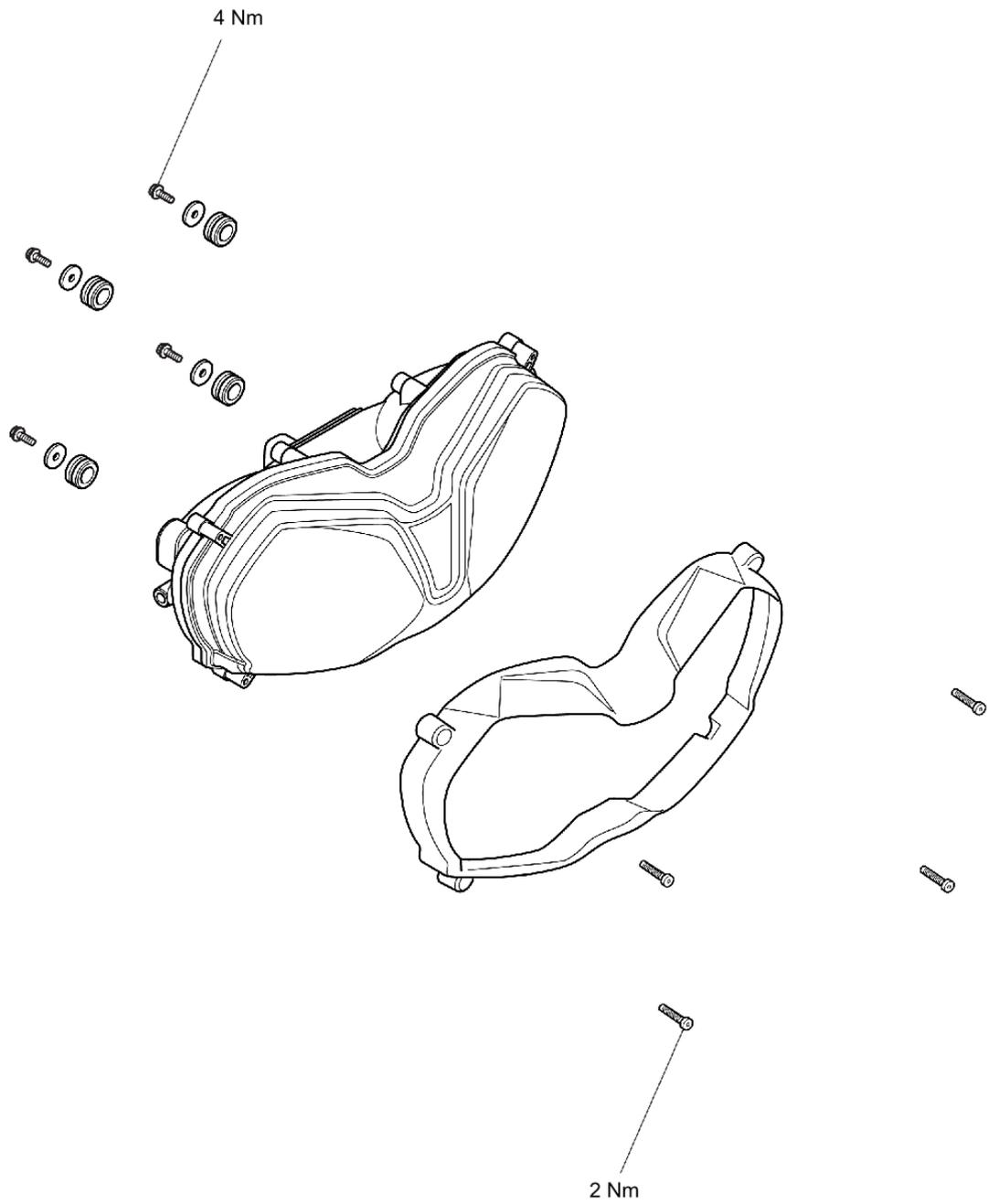
3800 1

Exploded View – Instruments



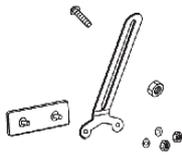
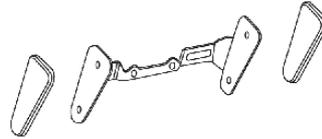
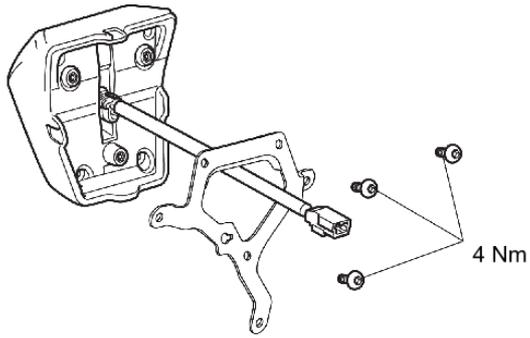
zboj

Exploded View – Headlight

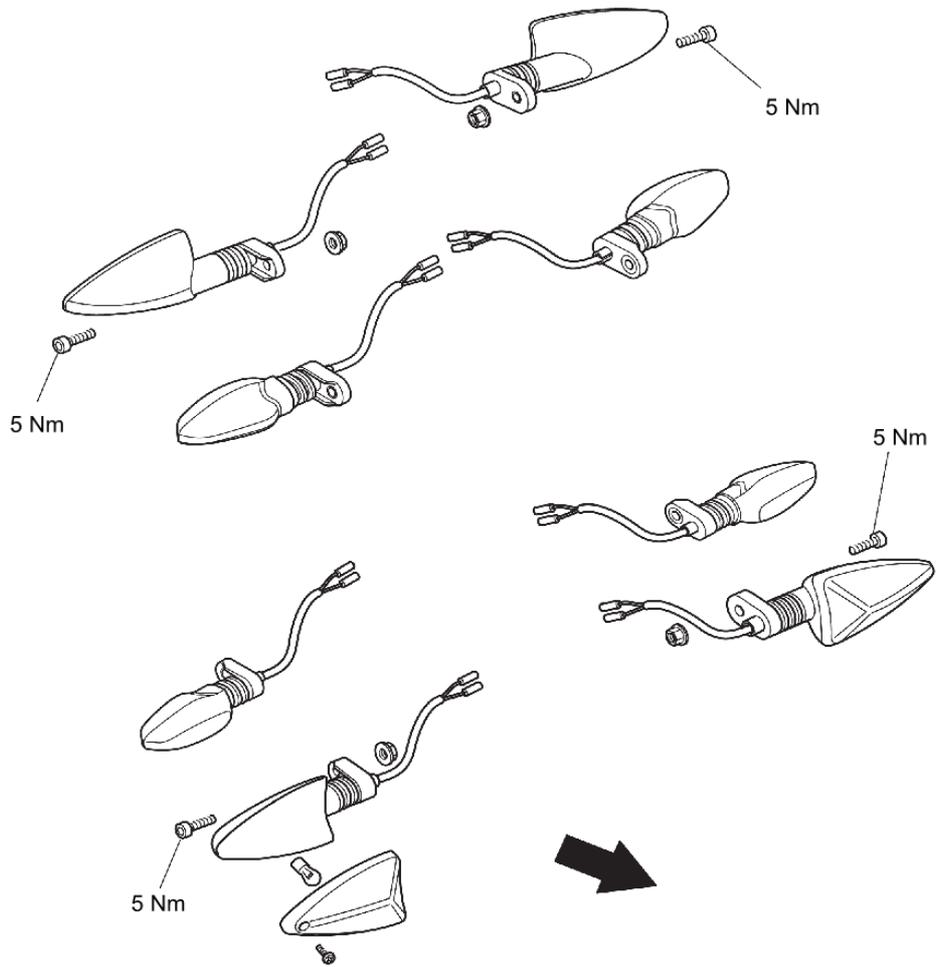


abwi

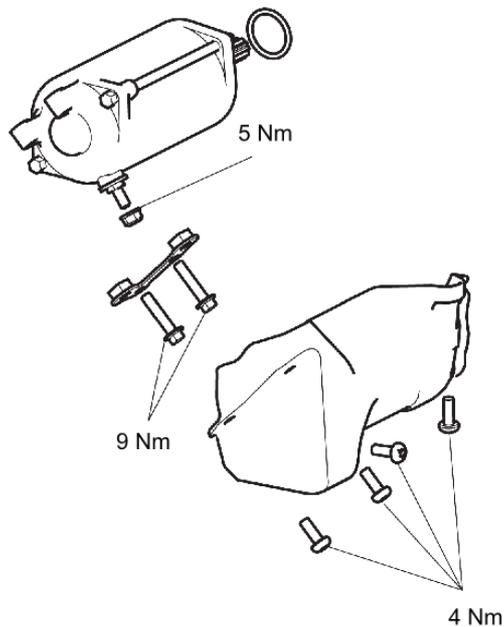
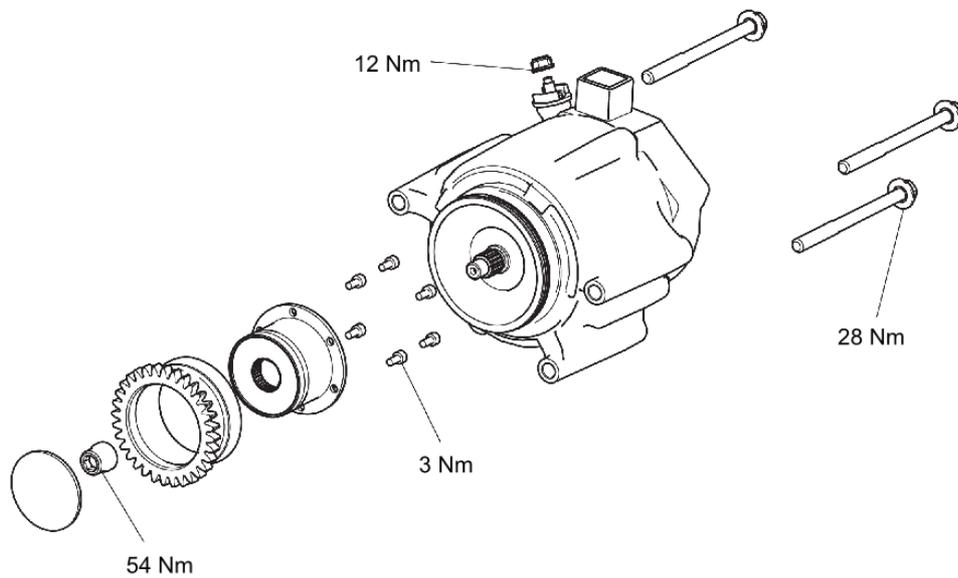
Exploded View – Rear Light and Reflectors



Exploded View – Direction Indicators



Exploded View – Alternator and Starter Motor



Battery, Fuses and Relays

Battery

WARNING

Under some circumstances, the battery can give off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.

The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

If electrolyte gets on your skin, flush with water immediately.

If electrolyte gets in your eyes, flush with water for at least 15 minutes and **SEEK MEDICAL ATTENTION IMMEDIATELY**.

If electrolyte is swallowed, drink large quantities of water and **SEEK MEDICAL ATTENTION IMMEDIATELY**. **KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.**

WARNING

The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

Do not attach jump leads to the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite battery gases causing a risk of personal injury.

Factory Activated Battery

This model is fitted with a factory activated battery and no commissioning is required. However, routine maintenance of the battery is required.

Refer to:

- Battery Maintenance
- Battery Already in Service

Battery - Removal

WARNING

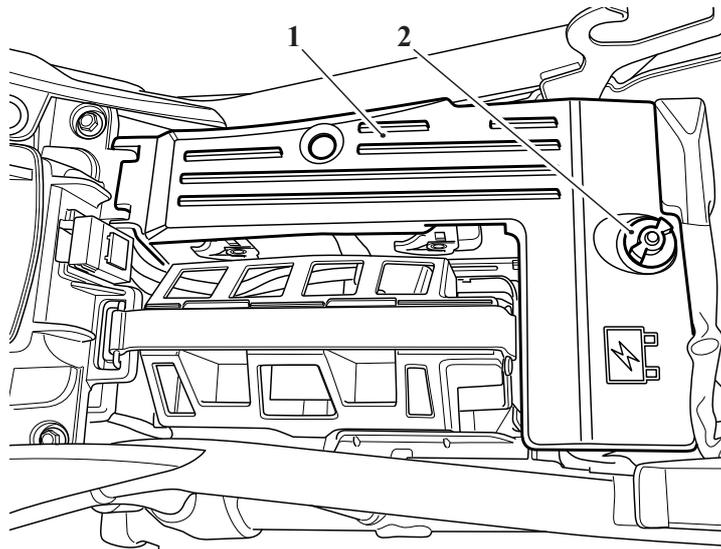
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

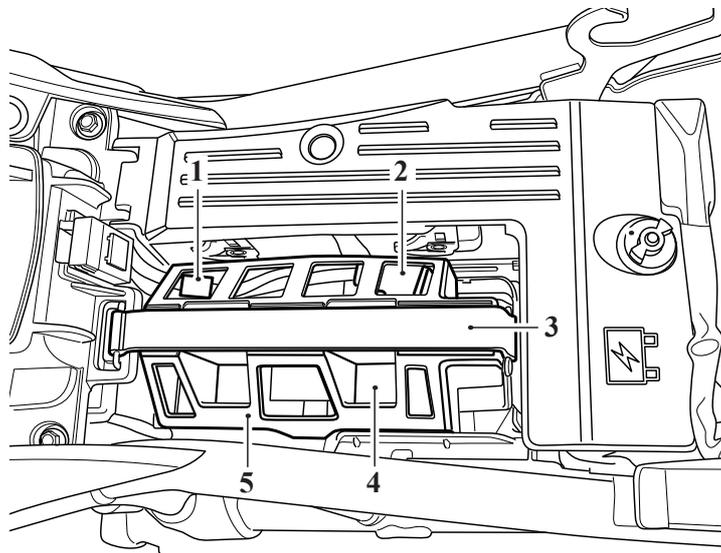
Perform the following operations:

- Rider's Seat - Removal
1. Remove the wing nut and remove the chassis Electronic Control Module (ECM) cover.



1. **Chassis ECM cover**
2. **Wing nut**

2. Remove the battery strap and the battery cover.
3. Disconnect the battery leads, negative (black) lead first.



1. **Negative (black) terminal**
2. **Positive (red) terminal**
3. **Battery strap**
4. **Battery**
5. **Battery cover**

4. Take the battery out of the case.

Battery - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

WARNING

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

1. Place the battery in the battery case.
2. Reconnect the battery, positive (red) lead first. Tighten the terminals to **4.5 Nm**.
3. Apply a light coat of grease to the terminals to prevent corrosion.
4. Cover the positive terminal with the protective cap.
5. Refit the battery cover and strap.
6. Refit the chassis ECM cover and secure with the wing nut. Tighten the wing nut to **1.25 Nm**.

Perform the following operations:

- Rider's Seat - Installation

Battery Disposal

Should the battery ever require replacement, the original battery must be handed to a recycling agent who will ensure that the dangerous substances from which the battery is manufactured do not pollute the environment.

Battery Maintenance

The battery is a sealed type and does not require any maintenance other than checking the voltage and routine recharging such as during storage.

It is not possible to adjust the electrolyte level in the battery.

Note

- **The charge level in the battery must be maintained to maximise the battery life.**

With normal use of the motorcycle, the charging system will keep the battery charged. If the motorcycle is unused, the battery will gradually discharge due to battery self discharge and the continuous current drain for the clock and the engine control module memory.

The rate of battery discharge can be greatly increased by the addition of electrical security systems or other accessories.

Allowing a battery to discharge, or leaving it discharged over a period of time, causes sulphation of the lead plates within the battery.

Sulphation is a normal chemical reaction inside the battery and over a period of time sulphate will crystallise on to the lead plates making charging difficult or impossible. The result is a permanently damaged battery, which would not be covered by the motorcycle warranty.

Keeping a battery at full charge reduces the chance of it freezing in cold conditions. Allowing a battery to freeze can cause serious internal damage to the battery.

When leaving the motorcycle standing for more than a few days, regularly check the battery voltage using a digital multimeter. Should the battery voltage fall below 12.8 V, charge the battery using the BatteryMate Battery Charger - see latest Parts Catalogue for part number information. Refer to the instructions supplied with the BatteryMate Battery charger.

For extended periods of storage (beyond two weeks) the battery should be removed and the battery voltage checked regularly and charged when below 12.8 V.

Battery Already in Service

Note

- **Before carrying out the following procedure the battery must be disconnected and removed from the motorcycle.**

Use the guidelines in the table below for charging. Always verify the battery condition before charging, and 30 minutes after charging.

Note

- **A fully charged battery should read 12.8 volts or higher after the battery has been off the charger for 30 minutes or more.**

Table of Battery Charging Times

State of charge	Voltage	Action	Charge time (using BatteryMate 150-9)
100%	12.8 V - 13.0 V	None. Check at 6 months from date of manufacture	None required
75% - 100%	12.5 V - 12.8 V	May need slight charge. If no charge given, check in 3 - 4 months	3 - 6 hours
50% - 75%	12.0 V - 12.5 V	Needs charge	5 - 11 hours
25% - 50%	11.5 V - 12.0 V	Needs charge	At least 13 hours
0% - 25%	11.5 V or less	Needs recovery using BatteryMate 150-9. Retest after recovery	20 hours

Fuses

If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of the correct current rating.

A blown fuse is indicated when all of the systems protected by that fuse become inoperative. When checking for a blown fuse, refer to Fuse Identification to establish which fuse has blown.

! WARNING

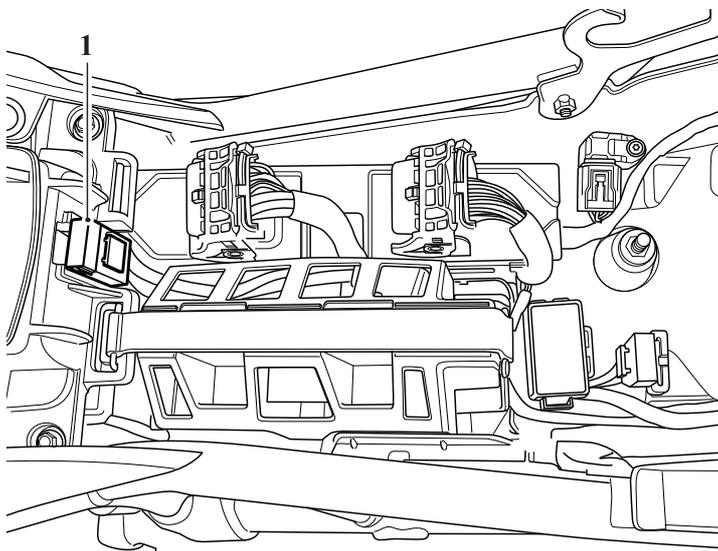
Always replace blown fuses with new ones of the correct current rating (as specified on the fuse box cover) and never use a fuse of higher rating.

Use of an incorrect fuse could lead to an electrical problem, resulting in motorcycle damage, loss of motorcycle control and an accident.

Fuse Identification

Main Fuse

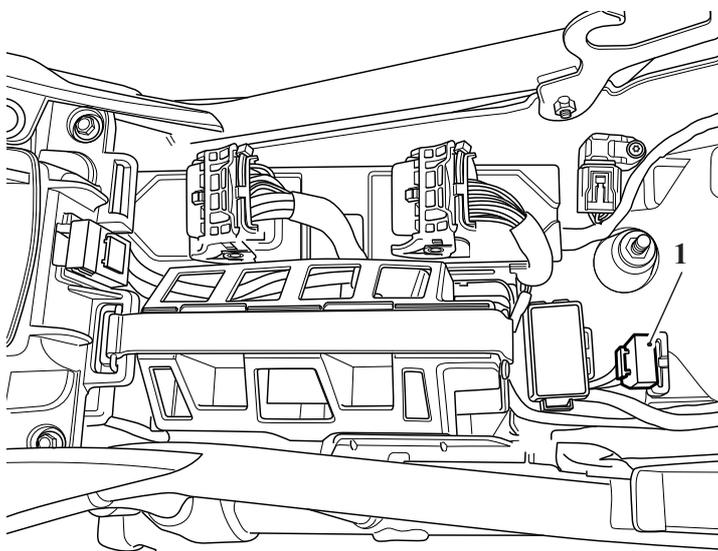
The 40 Amp main fuse is located beneath the rider's seat and behind the seat bridge. To allow access to the main fuse, the rider's seat must be removed.



1. 40 Amp main fuse

ABS Fuse Box

The 40 Amp ABS fuse is located beneath the rider's seat and behind the main fuse box. To allow access to the ABS fuse box the rider's seat and chassis ECM cover must be removed.

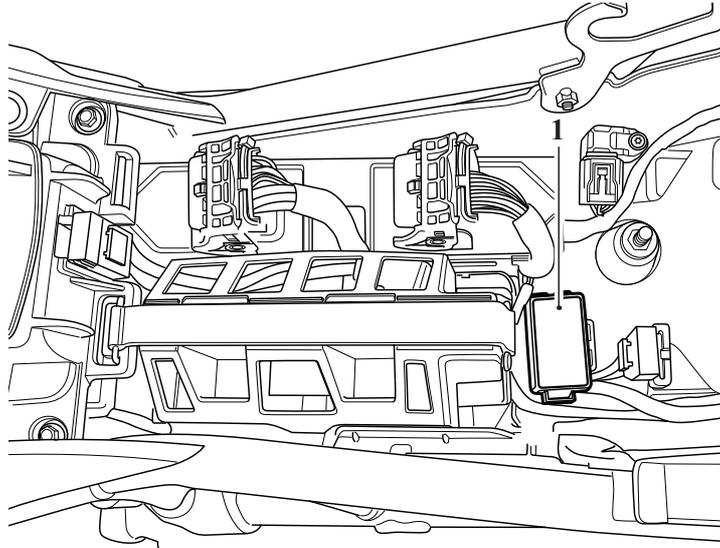


1. ABS fuse box

Main Fuse Box

The main fuse box is located beneath the rider's seat.

To allow access to the main fuse box the rider's seat and chassis ECM cover must be removed.



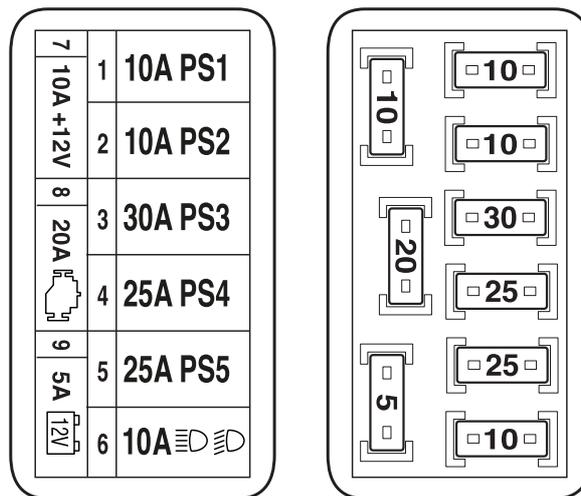
1. Main fuse box

A blown fuse is indicated when all of the systems protected by that fuse become inoperative. When checking for a blown fuse, use the table to establish which fuse has blown.

The fuse identification numbers listed in the tables correspond with those printed on the fuse box cover, as shown below. Spare fuses are located on the inside of the fuse box cover and should be replaced if used.

Note

- See Chassis Electronic Control Module (Chassis ECM) for details of the systems protected by fuses PS1 to PS5.



1. Cover
2. Fuse box

Circuits Protected	Fuse No.	Rating (Amps)
PS1	1	10

PS2	2	10
PS3	3	30
PS4	4	25
PS5	5	25
Headlights	6	10
Front accessory socket	7	10
Engine management	8	20
Instruments and Electronic Steering Lock (ESL)	9	5

Chassis Electronic Control Module (Chassis ECM)

Many of the motorcycle's electrical systems (such as lighting, TSAS if fitted, horn, cooling fan, fuel pump, and accessories such as heated grips or seats) are controlled by the chassis Electronic Control Module (chassis ECM).

The chassis ECM provides a primary level of protection to the electrical systems it controls. If a fault is detected, the chassis ECM will automatically cut power to the affected system.

The chassis ECM can be reset by turning the Ignition off then on again. Power will be restored to the inoperative system, providing that the condition that caused the fault has been rectified.

The systems controlled by the chassis ECM are also provided with a secondary level of protection, by fuses PS1 to PS5 in the main fuse box (see Fuse Identification). A blown fuse is likely when all of the systems protected by that fuse become inoperative.

Refer to the following table for full details of the chassis ECM controlled systems, and their corresponding fuses.

Electrical System	Fuse
Left front direction indicator	PS1
Left rear direction indicator	
Rear position light	
RSU position sensor (models with TSAS only)	
Right front direction indicator	PS2
Right rear direction indicator	
Brake light	
Ignition	
Windscreen adjustment motor	PS3
RSU pre-load adjustment motor (models with TSAS only)	
RSU damping solenoid (models with TSAS only)	

Electrical System	Fuse
Front suspension compression damping adjuster (models with TSAS only)	
Front suspension rebound damping adjustment motor (models with TSAS only)	
Fog lights (if fitted)	
USB connector	
Heated seats (if fitted)	PS4
Heated grips (if fitted)	
Rear electrical accessory socket (if fitted)	
Top box electrical accessory socket (if fitted)	
Cooling fan	PS5
Fuel pump	
Starter solenoid	
Horn	

 **WARNING**

Always replace blown fuses with new ones of the correct rating (as specified on the fuse box cover) and never use a fuse of higher rating. Use of an incorrect fuse could lead to an electrical problem, resulting in motorcycle damage, loss of motorcycle control and an accident.

If after resetting the automatic software protection system or replacing a blown fuse, a fault still persists, investigate the cause and take remedial action as necessary.

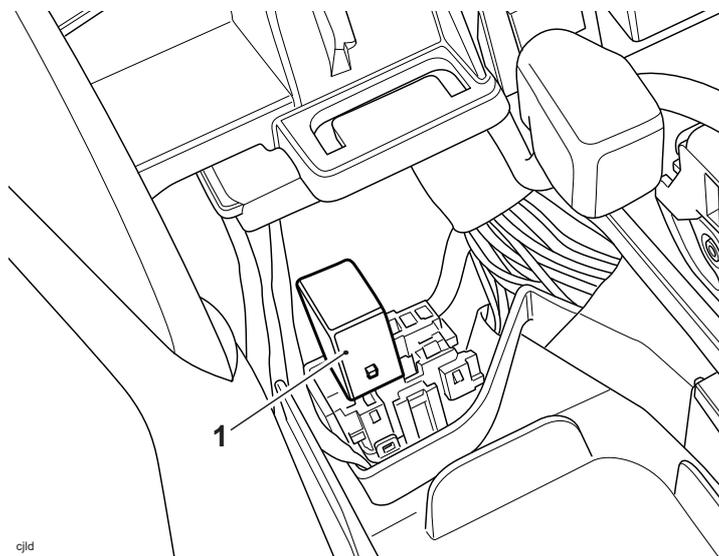
Relays

Note

- **This model is equipped with an Engine Management System (EMS) relay only.**
- **The starter, fuel pump, cooling fan, lighting, windscreen adjustment motor, Triumph Semi Active Suspension (if fitted), and accessory systems are all controlled by the chassis ECM.**

The EMS relay is located beneath the rider's seat, forward of the battery. To gain access to the relay:

- Remove the rider's seat (see Rider's Seat - Removal).
- Remove the battery (see Battery - Removal).



1. Engine Management System (EMS) relay

Diagnostics - Starter and Charging Circuits

Starting Circuit

All Triumph models are equipped with an electric start system. This system consists of a starter relay, starter motor, starter switch, side stand switch, engine stop switch, clutch switch and the sprag clutch. The starter motor is connected to the starter relay and the battery by heavy duty cables in order to supply the large currents required by the motor to start the engine. When the starter button is pressed, the relay is energised, which then allows current to the starter motor. The starter motor will not operate unless the clutch lever is pulled in. Also, the starter will not operate if the side stand is down, unless the transmission is in neutral. If the starter motor does not operate, the following basic checks must be carried out before further diagnosis is performed:

- Check the engine stop switch is in the 'RUN' position.
- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating.
- Using the Triumph Diagnostic Tool, check the operation of the neutral switch or gear position sensor (if fitted), side stand and clutch switches.

Note

- **The engine will not crank if the instruments, ABS ECM, or immobiliser/chassis ECM (if fitted) are disconnected.**

Rectify any defects as necessary.

General Fault Finding – Starter Motor and Relay

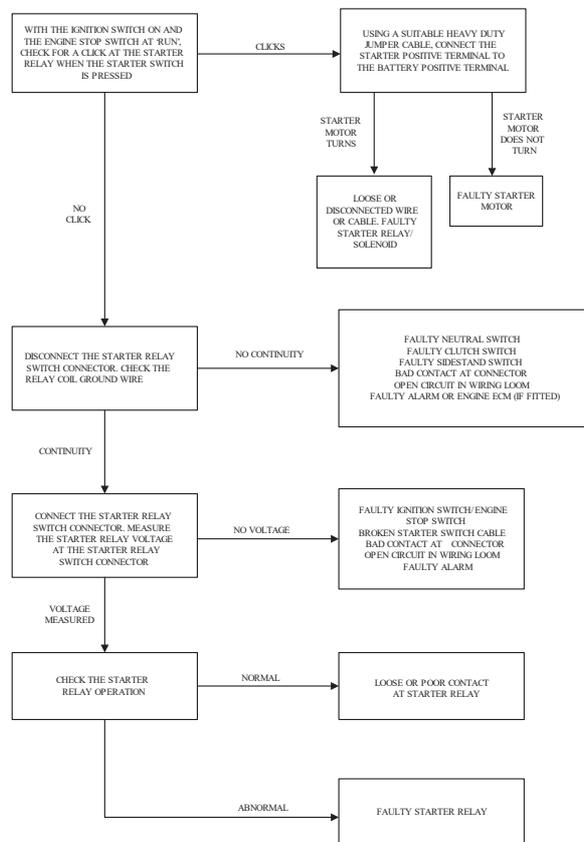
Symptom	Possible cause(s)
Starter relay does not click, starter motor does not turn	Battery discharged or defective
	Blown main or starter relay fuse
	Defective starter relay wiring or starter switch
	Check that the side stand, transmission and clutch lever are positioned for engine starting i.e. transmission in neutral, clutch lever pulled in and the side stand down

Symptom	Possible cause(s)
	Defective alarm system - ensure any alarm fitted is working correctly
Starter motor turns slowly	Battery discharged or defective
	Loose, corroded or dirty battery connections
	Loose, corroded or dirty starter motor or starter relay connections
	Defective starter motor
	Loose, corroded or dirty battery ground connections
Starter relay clicks but engine does not turn over	Battery discharged or defective
	Crankshaft does not turn due to engine defect
	Defective starter motor
	Starter cable open circuit
	Defective starter relay
Starter motor turns but engine does not turn over	Starter motor or starter ring gear

Diagnosis – Starter Circuit

Note

- Prior to carrying out the diagnosis, ensure the battery voltage is 12 - 13.5 V, the immobiliser system (if fitted) is functioning correctly, the transmission is in neutral and the clutch lever is pulled fully to the handlebar.



Alternator/Charging System

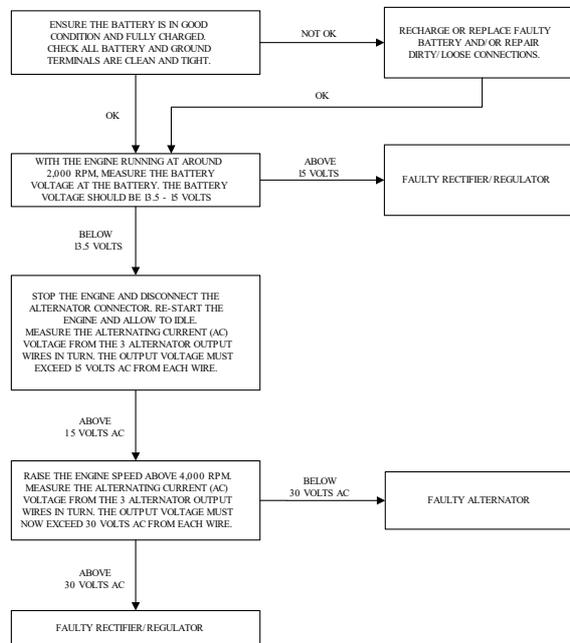
The charging system consists of an alternator, a rectifier/regulator assembly and the battery. The alternator is made up of two parts, the stator, which is mounted to the crankcase or the engine cover, and the rotor, mounted to the end of the crankshaft. The stator is an assembly of 18 coils, arranged into 3 phases. The rotor is a series of magnets mounted in the engine flywheel, which are arranged so as to be positioned around the outside of the stator coils. As the engine rotates the alternator produces an AC (alternating current) voltage in each of the three phases of the alternator, typically of around 35 to 40 volts AC at 4,000 - 5,000 rpm, although this figure varies between models. As the battery requires DC (direct current) voltage for correct charging, this AC voltage must be first rectified to DC current, and then regulated to the correct voltage for the battery of 14.5 +/- 0.5 volts. This is done by the rectifier/regulator, which uses diodes to convert the alternator output to DC Volts and limits the resulting output to the correct figure required for optimal battery charging.

If the charging circuit does not operate correctly, the following basic checks must be carried out before further diagnosis is performed:

- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating.

Rectify any defects as necessary.

Diagnosis – Charging Circuit



System Diagnostics - Chassis ECM

System Diagnosis

The chassis ECM has an on-board diagnostics feature which allows service technicians to retrieve stored data using the Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

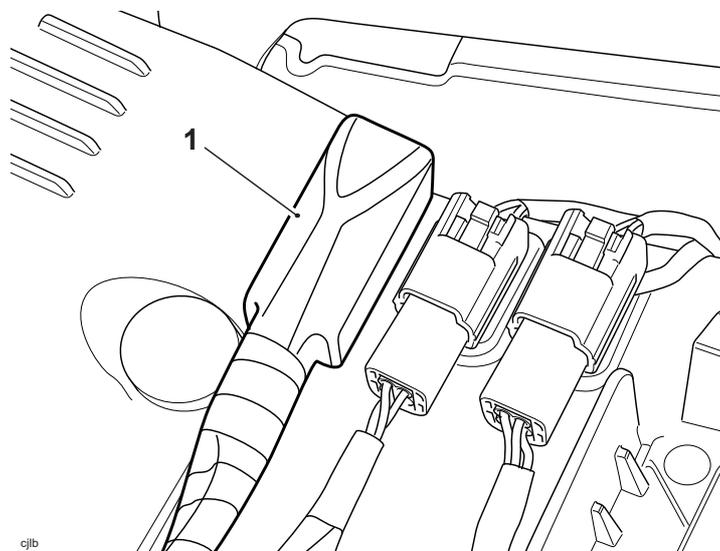
The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

On-board Fault Detection System

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted.

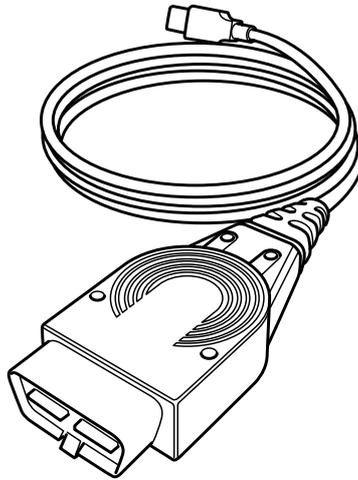
When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a predetermined threshold, the fault becomes confirmed and a DTC (Diagnostic Trouble Code) will be logged in the ECM's memory. A confirmed fault may be indicated by the effected system(s) simply becoming inoperative, or by the illumination of a system warning light and/or instrument warning message. Once a fault is confirmed, the number of ignition switch cycles made is counted. If the fault clears, the ignition switch cycle counter will restore operation to the affected system(s) and extinguish any warning lights or instrument messages at a predetermined count. DTCs are then erased from the ECM memory at another (higher) count.

1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see Rider's Seat - Removal) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

2. Plug the Triumph diagnostic interface directly into the diagnostic connector.



T3880057 - Triumph Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.

4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see Rider's Seat - Installation).

Triumph Diagnostic Software

Instrument Diagnostics

Described below is the range of information which can be retrieved from the Instruments and the adjustments which can be performed using the Triumph diagnostic software.

Set Interval

The Set Interval screen will show the following information.

- Current Odometer Configuration
- Current Odometer Reading
- Distance To Next Service
- Next Service Due At

It is also possible to manually adjust the service interval and reset the service interval.

Configure

The Configure screen can be used to set the instrument display measurement units by region. It can also be used to enable/disable certain instrument displays.

The menus available are:

- Market Variation (UK, US, Metric or Japanese)
- Units of Pressure (PSI or BAR)
- Display ABS Menu (Yes/No)
- Display Tyre Pressure (Yes/No)*

*If TPMS is fitted

Sensor Data

The data available under Sensor Data is:

Item Checked	Result Unit
High Beam/Passing Button	On/Off
Daylight Running Light Switch	On/Off

Mode Switch	On/Off
Direction Indicators Left Switch	On/Off
Direction Indicators Right Switch	On/Off
Direction Indicators Cancel Switch	On/Off
Horn Switch	On/Off
Joystick Up	On/Off
Joystick Down	On/Off
Joystick Left	On/Off
Joystick Right	On/Off
Joystick Centre	On/Off
Home Button	On/Off

Adjust

In the Adjust screen it is possible to set the clock on the instrument display.

Set

In the Set screen it is possible to set or reset the odometer reading, provided that the current odometer reading is lower than 120 miles (200 km).

Note, these functions can only be performed once.

Chassis ECM Diagnostics

Described below is the range of information which can be retrieved from the Chassis ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic software.

Note

- **Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.**

Build Data

The Build Data screen will display the following information:

- VIN
- Chassis ECM Part Number
- Chassis ECM Serial Number
- Boot Software ID
- Application Software ID
- Configuration ID
- Date of Last Application Download
- Total Application Downloads Since Manufacture
- TSAS Calibration Name
- TSAS Calibration Version
- Date of last TSAS Calibration Download
- Total TSAS Calibration Downloads since Manufacture.

Sensor Data

When using this function it is possible to check the status of various sensors and actuators.

The data sets are divided into seven groups - Sensor Voltages, Lighting, Direction Indicators, Inputs/Outputs, Switches, Heating and Pulse Width Modulation (PWM) Data. Each of these screens is described on the following pages.

Sensor Voltages

The data available under Sensor Voltages is:

Item Checked	Result Unit
Battery Voltage	Volts
Front Accessory Power Socket	Volts
Top Box Accessory Power Socket	Volts
Passenger Accessory Power Socket	Volts
Ambient Temperature Sensor	Volts
Swinging Arm Position	Volts

Lighting

The data available under Lighting is:

Item Checked	Result Unit
Main/Dipped Beam Switch	On/Off
Main Beam Left	On/Off
Main Beam Right	On/Off
Dipped Beam Left	On/Off
Dipped Beam Right	On/Off
Pass Switch	On/Off
Fog Lights Switch	On/Off
Fog Lights	On/Off
Brake Light	On/Off
Front Position Light	On/Off
Rear Position Light	On/Off

Direction Indicators

The data available under Direction Indicators is:

Function Examined	Result Unit
-------------------	-------------

Direction Indicators Cancel Switch	On/Off
Direction Indicators Left Switch	On/Off
Direction Indicator Left Front	On/Off
Direction Indicator Left Rear	On/Off
Direction Indicators Right Switch	On/Off
Direction Indicator Right Front	On/Off
Direction Indicator Right Rear	On/Off

Inputs/Outputs

The data available under Inputs/Outputs is:

Function Examined	Result Unit
Alarm Input	On/Off
Cooling Fan	On/Off
Fuel Pump Positive	On/Off
Fuel Pump Negative	On/Off
Horn	On/Off
Horn Switch	On/Off
Ignition Status	On/Off
Engine Stop Switch	On/Off
Rear Preload Motor Down	On/Off
Rear Preload Motor Up	On/Off
Starter Solenoid	On/Off
Starter Switch	On/Off
Windscreen Motor Down	On/Off
Windscreen Motor Up	On/Off

Switches

The data available under Switches is:

Function Examined	Result Unit
-------------------	-------------

Instruments Select Switch	On/Off
Instruments Scroll Up Switch	On/Off
Instruments Scroll Down Switch	On/Off
Mode Switch	On/Off

Heating

The data available under Heating is:

Function Examined	Result Unit
Heated Grips Switch	On/Off
Heated Grip Left	On/Off
Heated Grip Right	On/Off
Rider Heated Seat - Hot	On/Off
Rider Heated Seat - Warm	On/Off
Passenger Heated Seat - Hot	On/Off
Passenger Heated Seat - Warm	On/Off

Pulse Width Modulation (PWM) Data

The data available under Pulse Width Modulation (PWM) Data is:

Function Examined	Result Unit
Suspension Solenoid (Rear Rebound Damping)	% (10000 Hz)

Function Tests

The system allows the diagnostic software to perform a series of function tests on various systems controlled by the Chassis ECM. In some cases it is necessary to make a visual observation of a component and in others, if faults are present, DTCs will be logged.

The Function Tests available are:

Function Examined	Report Method
Rear Preload Motor Up	See Rear Preload Motor Up/Down Function Tests Rear preload motor must be calibrated after running this test, see Rear Suspension Unit Preload Motor - Calibration
Rear Preload Motor Down	See Rear Preload Motor Up/Down Function Tests Rear preload motor must be calibrated after running this test, see Rear Suspension Unit Preload Motor - Calibration
Cooling Fan	Observe the cooling fan/Stored fault code*
Horn	Listen for operation/Stored fault code*

Windscreen Motor Down	Observe the windscreen/Stored fault code*
Windscreen Motor Up	Observe the cooling fan/Stored fault code*
Calibrate Swinging Arm Position Sensor	See Swinging Arm Position Sensor - Calibration
Calibrate Rear Preload Motor	See Rear Suspension Unit Preload Motor - Calibration

*If a fault is detected

Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

Note

-
- **A major cause of hidden electrical faults can be traced to faulty electrical connectors. For example:**
- **Dirty/corroded terminals**
- **Damp terminals**
-

For example, the chassis Electronic Control Module (chassis ECM) relies on the supply of accurate information to enable it to monitor and control its various systems. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the chassis ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

When Disconnecting a Connector:



When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

- Check for a security device that must be released before the connector can be separated, e.g. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

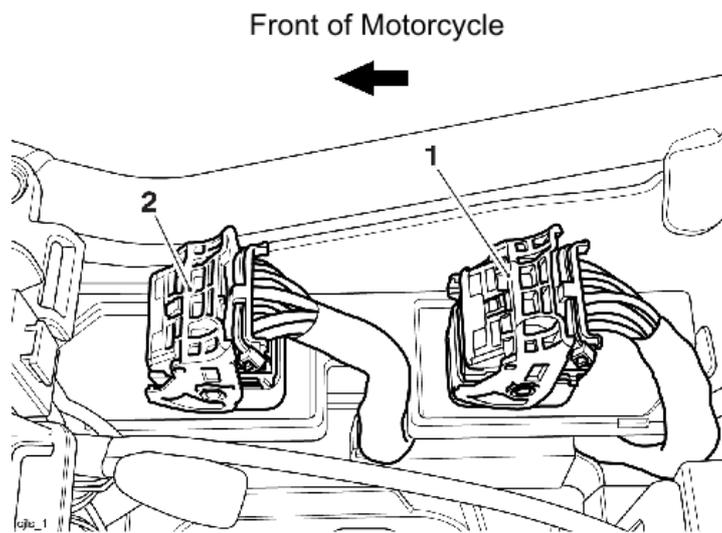
When Connecting a Connector:

- Ensure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

Chassis ECM Connectors

Identification of the Chassis ECM connectors

Chassis ECM connectors A and B can be identified as shown below:



1. Connector A
2. Connector B

Disconnection of the Chassis ECM Connectors

! CAUTION

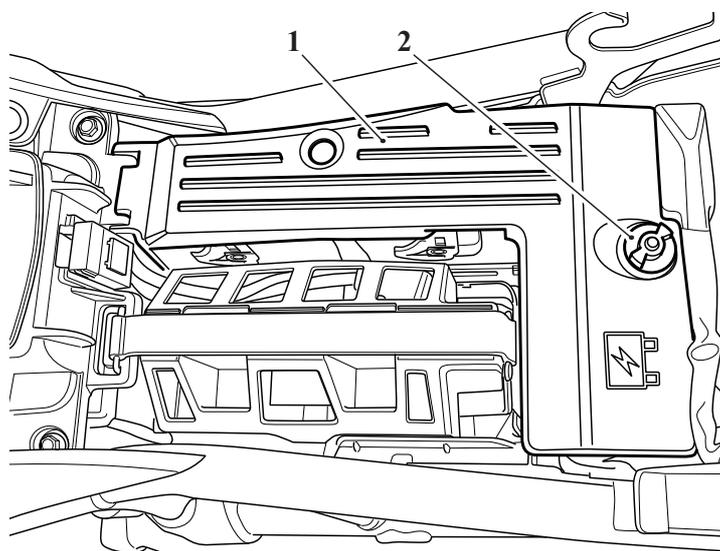
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

! CAUTION

Never disconnect an ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

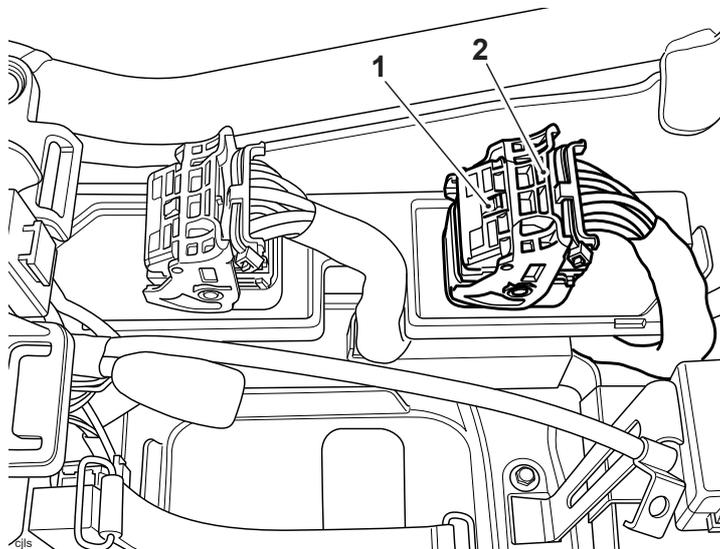
Always disconnect an ECM after disconnecting the battery negative (black) lead first.

1. Turn the ignition to the OFF position and wait at least one minute for the chassis ECM to complete its power down sequence.
2. Access to the chassis ECM can be gained by releasing the wing nut and removing the chassis ECM cover.



1. Chassis ECM cover
2. Wing nut

3. Press down on the locking device and gently pull back on the connector's lever to release it from the chassis ECM.



- 1. Locking device
- 2. Lever

Reconnection of the Chassis ECM Connectors

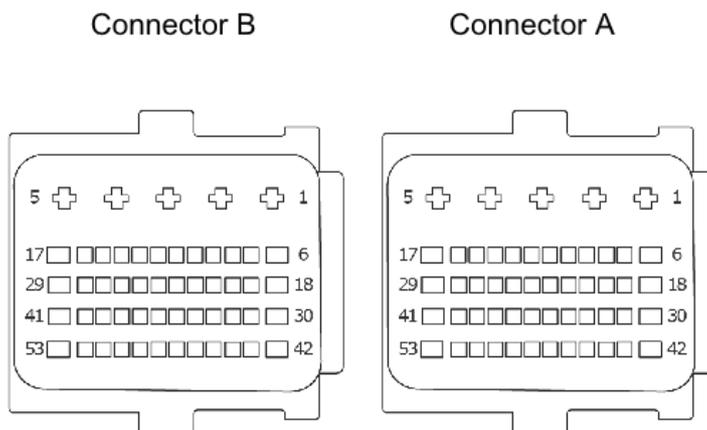
! CAUTION

Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.

Note

- **Two identical connectors are used for the chassis ECM. Ensure that the chassis ECM is in its fitted position on the motorcycle before reconnecting the connectors. This will ensure that the correct connector aligns with its corresponding socket on the chassis ECM.**
1. Fit the connector into its socket. When the locking lever starts to move, stop pushing the connector and use the locking lever to fully insert the connector home and lock it.
 2. Refit the chassis ECM cover and secure with the wing nut.

Chassis ECM Connector Pin Numbering



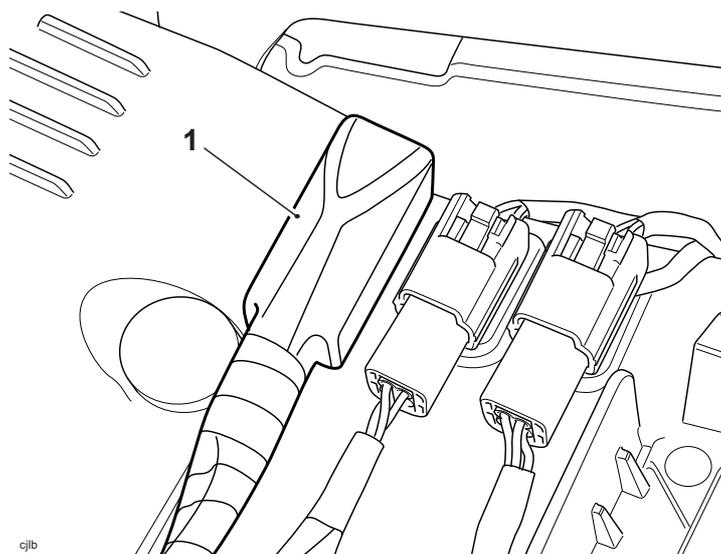
Chassis ECM Pin Numbering

The above illustration shows the pin numbering system used for the chassis ECM.

The rear connector's pins are prefixed A and the front connector's pins are prefixed B. As viewed on the mating face with the chassis ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

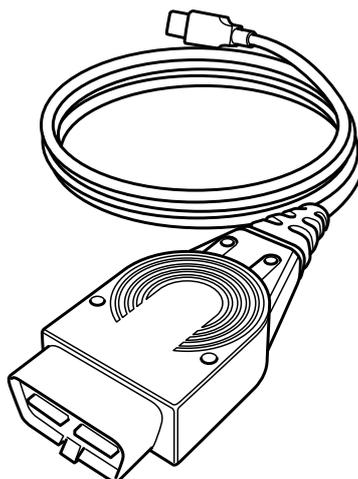
Triumph Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see Rider's Seat - Removal) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

2. Plug the Triumph diagnostic interface directly into the diagnostic connector.



T3880057 - Triumph Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see Rider's Seat - Installation).

Chassis ECM Diagnostic Trouble Codes

Diagnostic Trouble Codes (DTCs) are logged in the chassis ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic tool as a four digit code.

When the system detects a fault, it begins to count the number of times the fault occurs before confirming the fault and storing a fault code. A confirmed fault may be indicated by the effected system(s) simply becoming

inoperative, or by the illumination of a system warning light and/or instrument warning message.

Similarly, if a fault clears, the chassis ECM also records this fact and will extinguish any warning lights or instrument messages and restore normal operation to the affected system, when sufficient no-fault ignition switch cycles have taken place. Any fault codes will remain in the chassis ECM memory until the required number of no-fault ignition switch cycles have taken place. The number of ignition switch cycles required to restore normal operation will always be less than the number required to remove a DTC from the chassis ECM memory. DTCs can be removed at any time using the Triumph diagnostic tool.

The system will log the diagnostic trouble codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1001	Main power supply overvoltage	1	20	-	Power Supply Rail Overvoltage/Undervoltage
C1002	Main power supply undervoltage	1	20	-	Power Supply Rail Overvoltage/Undervoltage
C1003	Chassis ECM internal power supply malfunction	1	20	-	Chassis ECM Internal Power Supply Malfunction
C1004	Alarm/tracker input signal malfunction	1	40	-	Alarm/Tracker Input Signal Malfunction
C1007	Ignition ON switch correlation error	1	40	-	Ignition ON Switch Correlation Error
C1008	Starter motor switch malfunction	1	20	-	Starter Motor Switch Malfunction
C1009	Ambient temperature sensor signal under temperature	1	20	Blank or incorrect air temperature display	Ambient Air Temperature Sensor
C1010	Ambient temperature sensor signal over temperature	1	20	Blank or incorrect air temperature display	Ambient Air Temperature Sensor
C1011	Swinging arm position sensor signal low	1	40	TSAS light/warning message	Swinging Arm Position Sensor Signal
C1012	Swinging arm position sensor signal high	1	40	TSAS light/warning message	Swinging Arm Position Sensor Signal

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1013	Swinging arm position sensor signal implausible	1	40	TSAS light/warning message	Swinging Arm Position Sensor Signal
C1017	Instrument wake-up signal overcurrent	1	40	-	Instrument Wake-up Signal Overcurrent
C1022	Rear rebound damping solenoid undercurrent	1	40	TSAS light/warning message	Rear Suspension Unit Damping Solenoid Undercurrent/Overcurrent
C1023	Rear rebound damping solenoid overcurrent	1	40	TSAS light/warning message	Rear Suspension Unit Damping Solenoid Undercurrent/Overcurrent
C1024	Windscreen motor undercurrent	1	20	-	Windscreen Motor Undercurrent/Overcurrent
C1025	Windscreen motor overcurrent	1	20	-	Windscreen Motor Undercurrent/Overcurrent
C1026	Windscreen motor malfunction	1	20	-	Windscreen Motor Undercurrent/Overcurrent
C1027	5V sensor supply malfunction	1	40	TSAS light/warning message	5 Volt Sensor Supply
C1028	Preload motor undercurrent	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1029	Preload motor overcurrent	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1030	Preload motor malfunction	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1042	Fog lights undercurrent	1	40	-	Fog Lights Undercurrent/Overcurrent

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1043	Left and right fog light overcurrent	1	40	-	Fog Lights Undercurrent/Overcurrent
C1046	Rear light undercurrent	1	40	-	Rear Light Undercurrent/Overcurrent
C1047	Rear light overcurrent	1	40	-	Rear Light Undercurrent/Overcurrent
C1050	Brake light undercurrent	1	40	-	Brake Light Undercurrent/Overcurrent
C1051	Brake light overcurrent	1	40	-	Brake Light Undercurrent/Overcurrent
C1052	Left front direction indicator undercurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1053	Left front direction indicator overcurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1054	Left rear direction indicator undercurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1055	Left rear direction indicator overcurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1056	Right front direction indicator undercurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1057	Right front direction indicator overcurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1058	Right rear direction indicator undercurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1059	Right rear direction indicator overcurrent	1	40	Remaining direction indicators flash at a faster rate	Direction Indicators Undercurrent/Overcurrent
C1060	Horn undercurrent	1	40	-	Horn Undercurrent/Overcurrent
C1061	Horn overcurrent	1	40	-	Horn Undercurrent/Overcurrent
C1062	Rider heated seat undercurrent	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Rider Heated Seat Undercurrent/Overcurrent
C1063	Rider heated seat overcurrent	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Rider Heated Seat Undercurrent/Overcurrent
C1064	Passenger heated seat undercurrent	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Passenger Heated Seat Undercurrent/Overcurrent
C1065	Passenger heated seat overcurrent	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Passenger Heated Seat Undercurrent/Overcurrent
C1066	Right heated grip undercurrent	1	40	Heated grip symbol displayed on instruments but heat level indicators empty	Heated Grips Undercurrent/Overcurrent
C1067	Right heated grip overcurrent	1	40	Heated grip symbol displayed on instruments but heat level indicators empty	Heated Grips Undercurrent/Overcurrent
C1068	Left heated grip undercurrent	1	40	Heated grip symbol displayed on instruments but heat level indicators empty	Heated Grips Undercurrent/Overcurrent

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1069	Left heated grip overcurrent	1	40	Heated grip symbol displayed on instruments but heat level indicators empty	Heated Grips Undercurrent/Overcurrent
C1070	Cooling fan undercurrent	1	40	MIL* (and coolant temperature warning light if fault long term)	Cooling Fan Undercurrent/Overcurrent
C1071	Cooling fan overcurrent	1	40	MIL* (and coolant temperature warning light if fault long term)	Cooling Fan Undercurrent/Overcurrent
C1072	Fuel pump undercurrent	1	40	MIL*	Fuel Pump Undercurrent/Overcurrent
C1073	Fuel pump overcurrent	1	40	MIL*	Fuel Pump Undercurrent/Overcurrent
C1074	Universal Serial Bus (USB) power socket overcurrent	1	40	-	Universal Serial Bus (USB) Power Socket Overcurrent
C1075	Passenger accessory power socket overcurrent	1	40	-	Passenger Accessory Power Socket Overcurrent
C1076	Top box accessory power socket overcurrent	1	40	-	Top Box Accessory Power Socket Overcurrent
C1077	Starter motor solenoid undercurrent	1	40	MIL*	Starter Motor Solenoid Undercurrent/Overcurrent
C1078	Starter motor solenoid overcurrent	1	40	MIL*	Starter Motor Solenoid Undercurrent/Overcurrent
C1079	TSAS - Solenoid valves implausible signal	1	40	TSAS light/warning message	TSAS Error

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1080	Preload adjustment has not completed within set time period	1	40	TSAS light/warning message	Preload Adjustment has not Completed Within Set Time Period
C1081	Rear preload motor circuit malfunction	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1082	Rear preload motor adjustment prevented due to low battery voltage	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1083	Rear preload motor position error - motor travel during initialisation procedure was outside normal limits	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1084	Rear preload motor position error - motor end of travel position error	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1085	Rear preload motor initialisation interrupted by user	1	40	TSAS light/warning message	Rear Suspension Unit (RSU) Preload Motor
C1086	Rear preload motor initialisation completed	1	40	-	Rear Suspension Unit (RSU) Preload Motor
C1087	CAN fault - lost communication with instruments	1	40	-	Instrument Communication (CAN)
C1088	CAN fault - lost communication with ABS module	1	40	-	ABS Communication (CAN)

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1089	Inertial Measurement Unit (IMU) ID incompatible	1	40	TSAS light/warning message	Inertial Measurement Unit (IMU) ID Incompatible
C1090	CAN fault - lost communication with Inertial Measurement Unit (IMU)	1	40	TSAS light/warning message	Inertial Measurement Unit (IMU) Signal (CAN)
C1091	CAN fault - lost communication with Engine ECM	1	40	TSAS light/warning message	Engine ECM Communication (CAN)
C1092	Inertial Measurement Unit (IMU)	1	40	TSAS light/warning message	Inertial Measurement Unit (IMU) Signal (CAN)
C1095	Chassis ECM internal error	-	40	Bike continues to run when fault logged but will not start after first ignition cycle. Other DTCs will be stored	Chassis ECM Internal Error
C1097	Front wheel sensor unit battery alert	1	20	Information message	Tyre Pressure Monitoring System (TPMS) Wheel Sensors
C1098	Rear wheel sensor unit battery alert	1	20	Information message	Tyre Pressure Monitoring System (TPMS) Wheel Sensors
C1099	Front wheel sensor unit fault	1	20	TPMS light/warning message	Tyre Pressure Monitoring System (TPMS) Wheel Sensors
C1100	Rear wheel sensor unit fault	1	20	TPMS light/warning message	Tyre Pressure Monitoring System (TPMS) Wheel Sensors
C1101	Front wheel sensor unit loss of communication error	1	20	TPMS light/warning message	Tyre Pressure Monitoring System (TPMS) Wheel Sensors

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1102	Rear wheel sensor unit loss of communication error	1	20	TPMS light/warning message	Tyre Pressure Monitoring System (TPMS) Wheel Sensors
C1103	Immobiliser antenna - loss of communication with key	1	20	Alarm/immobiliser light	Immobiliser Antenna
C1104	Invalid key: key authentication unsuccessful	1	20	Alarm/immobiliser light	Immobiliser Antenna
C1105	Immobiliser antenna internal error	1	20	Alarm/immobiliser light	Immobiliser Antenna
C1106	No engine ECM immobiliser communication	1	20	Alarm/immobiliser light	Engine ECM Communication (CAN)
C1107	TSAS - Inertial Measurement Unit (IMU) implausible signal	1	40	TSAS light/warning message	Inertial Measurement Unit (IMU) Signal (CAN)
C1108	TSAS - ABS implausible signal	1	40	TSAS light/warning message	ABS Communication (CAN)
C1109	TSAS - engine ECM implausible signal	1	40	TSAS light/warning message	Engine ECM Communication (CAN)
C1110	TSAS general error	-	40	TSAS light/warning message	TSAS Error
C1114	Passenger heated seat switch malfunction	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Passenger Heated Seat Switch

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1115	Passenger heated seat switch position one malfunction	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Passenger Heated Seat Switch
C1116	Passenger heated seat switch position two malfunction	1	40	Heated seat symbol displayed on instruments but heat level indicators empty	Passenger Heated Seat Switch
C1117	Left fork stepper motor undercurrent	1	40	TSAS light/warning message	Left Fork Stepper Motor (Compression Damping)
C1118	Left fork stepper motor (compression) driver error	1	40	TSAS light/warning message	Left Fork Stepper Motor (Compression Damping)
C1119	Left fork stepper motor overcurrent	1	40	TSAS light/warning message	Left Fork Stepper Motor (Compression Damping)
C1120	Right fork stepper motor undercurrent	1	40	TSAS light/warning message	Right Fork Stepper Motor (Rebound Damping)
C1121	Right fork stepper motor (rebound) driver error	1	40	TSAS light/warning message	Right Fork Stepper Motor (Rebound Damping)
C1122	Right fork stepper motor overcurrent	1	40	TSAS light/warning message	Right Fork Stepper Motor (Rebound Damping)
C1124	Chassis ECM restarted due to process time out during normal operation	1	40	-	Chassis ECM Restarted Due to Process Time Out During Normal Operation
C1125	Chassis ECM restarted due to process time out during normal operation	1	40	-	Chassis ECM Restarted Due to Process Time Out During Normal Operation

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1126	Chassis ECM restarted due to process time out during normal operation	1	40	-	Chassis ECM Restarted Due to Process Time Out During Normal Operation
C1127	Chassis ECM restarted due to calibration download	1	40	-	Chassis ECM Restarted due to Calibration Download
C1128	Unexpected chassis ECM restart	1	40	-	Unexpected Chassis ECM Restart
C1129	Power supply interrupted	1	40	-	Chassis ECM Power Supply Interrupted
C1130	Chassis ECM parameters reset to default	1	40	-	Chassis ECM Parameters Reset to Default
C1131	Rear preload motor minimum end stop detection error. Preload motor not inhibited.	1	40	-	Rear Preload Motor Maximum/Minimum End Stop Detection Error
C1132	Rear preload motor minimum end stop detection error. Preload motor inhibited.	1	40	TSAS light/warning message	Rear Preload Motor Maximum/Minimum End Stop Detection Error
C1133	Rear preload motor Maximum end stop detection error. Preload motor not inhibited.	1	40	-	Rear Preload Motor Maximum/Minimum End Stop Detection Error
C1134	Rear preload motor Maximum end stop detection error. Preload motor inhibited.	1	40	TSAS light/warning message	Rear Preload Motor Maximum/Minimum End Stop Detection Error

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1136	Electronic steering lock ID incompatible	1	40	-	Electronic Steering Lock Internal Faults
C1137	Electronic steering lock Internal Error	1	40	-	Electronic Steering Lock Internal Faults
C1138	Electronic steering lock motor fault	1	40	-	Electronic Steering Lock Internal Faults
C1140	Electronic steering lock Intermediate stop	1	40	-	Electronic Steering Lock Internal Faults
C1141	Electronic steering lock operation time out	1	40	-	Electronic Steering Lock Internal Faults
C1142	Electronic steering lock internal switch fault - both switches ON	1	40	-	Electronic Steering Lock Internal Faults
C1143	Electronic steering lock internal switch fault - both switches OFF	1	20	-	Electronic Steering Lock Internal Faults
C1144	Electronic steering lock operation time out	1	40	-	Electronic Steering Lock Internal Faults
C1145	Incorrect chassis ECM calibration - electronic steering lock detected but not expected	1	40	-	Electronic Steering Lock Internal Faults
C1146	Electronic Steering Lock - lock conditions not correct, ABS message missing	1	40	-	Electronic Steering Lock Internal Faults

Diagnostic Trouble Code (DTC)	Fault Description	Ignition Switch Cycles Before Clearing Fault	Ignition Switch Cycles Before DTC is Erased	Warning Light/Instrument Message/Visual Indication	Pinpoint Test
C1147	Chassis ECM ignition output 1 over current	-	-	-	Chassis ECM Ignition Fault - Output 1
C1148	Chassis ECM ignition output 1 under current	-	-	-	Chassis ECM Ignition Fault - Output 1
C1149	Key missing during riding	-	-	-	Key Missing During Riding
C1150	CAN fault - lost communication with electronic steering lock	-	-	-	Electronic Steering Lock Communication
C1151	Ignition ON requested with no key in range	-	-	-	Ignition ON Requested With No Key in Range
C1152	Chassis ECM ignition output 2 over current	-	-	-	Chassis ECM Ignition Fault - Output 2
C1153	Chassis ECM ignition output 2 under current	-	-	-	Chassis ECM Ignition Fault - Output 2
C1154	Engine stop switch lock enabled	-	-	-	Engine Stop Switch Lock
C1155	Engine stop switch lock active	-	-	-	Engine Stop Switch Lock

* MIL illuminated by engine ECM in response to chassis ECM DTC being stored.

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Pinpoint Tests - Chassis ECM

Power Supply Rail Overvoltage/Undervoltage

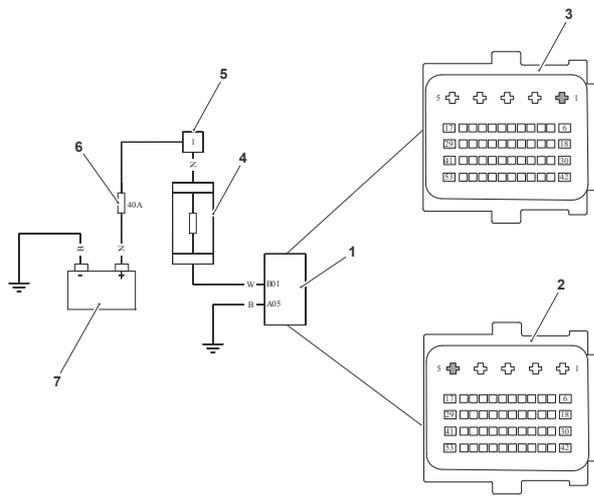
Fault Code	Possible Cause	Action
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Fault Code	Possible Cause	Action
C1001; C1002	Main power supply overvoltage Main power supply undervoltage Blown fuse Short circuit to ground or open circuit Charging system fault	Disconnect chassis ECM connectors and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check fuse integrity: - Main fusebox, fuse 3 (PS3): - Main 40 Amp fuse	OK	Proceed to test 2
		Faulty	Replace blown fuse(s), proceed to test 5
2	Check cable and terminal integrity: - Chassis ECM pin B01 - Alternator output terminal - Battery positive terminal - Battery negative terminal	OK	Proceed to test 3
		Faulty	Rectify fault, proceed to test 5
3	Check cable for short circuit: - Chassis ECM pin B01 to ground	OK	Proceed to test 4
		Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable continuity: - Battery positive terminal to Chassis ECM pin B01	OK	Reconnect harness and proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine. Measure the battery voltage while the engine is running	Greater than 14.6 V or Less than 13.9 V	Contact Triumph service
		13.9 V - 14.6 V	Action complete - quit test

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Chassis Electronic Control Module - Connector B
4. Fuse Box
5. Alternator
6. Main Fuse
7. Battery

Chassis ECM Internal Power Supply Malfunction

Fault Code	Possible Cause	Action
C1003	Chassis ECM internal power supply malfunction	If DTC C1002 is also present, rectify DTC C1002 (see Power Supply Rail Overvoltage/Undervoltage) then erase DTCs. Monitor for further instances. If C1002 is not present, check and record all other DTCs and contact Triumph service.

Alarm/Tracker Input Signal Malfunction

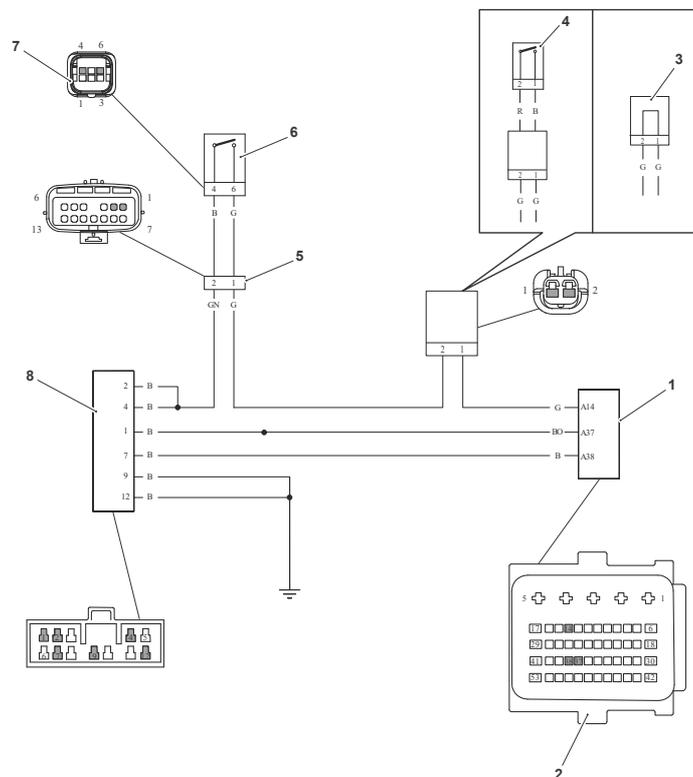
Fault Code	Possible Cause	Action
C1004	Alarm/tracker input signal malfunction	Disconnect chassis ECM connector A and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Chassis ECM pin A37 - Chassis ECM pin A14 - Chassis ECM pin A38	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to step 5
2 Check cable for short circuit:	OK	Proceed to test 3

Test	Result	Action
<ul style="list-style-type: none"> - Chassis ECM pin A37 to ground - Chassis ECM pin A14 ground - Chassis ECM pin A38 to ground 	Short Circuit	Rectify fault, proceed to test 5
<p>3 Check cable continuity:</p> <ul style="list-style-type: none"> - Chassis ECM pin A37 to Alarm pin 1 - Chassis ECM pin A38 to Alarm pin 7 - Alarm pin 9 to ground - Alarm pin 12 to ground <p>Note, for the following tests: The engine stop switch must be in the RUN position</p> <p>For all markets except US, the ignition master switch link connector must be fitted</p> <p>For US markets only, the ignition master switch must be in the ON position</p> <p>Check cable continuity:</p> <ul style="list-style-type: none"> - Chassis ECM pin A14 to Alarm pin 2 - Chassis ECM pin A14 to Alarm pin 4 	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
<p>4 Check cable for short circuit: Chassis ECM pin A37 to pin A38</p>	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
<p>5 Reconnect harness, clear fault code and run engine.</p>	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Ignition Master Switch Link Connector (all markets except US)
4. Ignition Master Switch (US Markets Only)
5. Switch Housing Subharness
6. Engine Stop/Run Switch
7. Right Hand Switch Housing Black Connector
8. Alarm

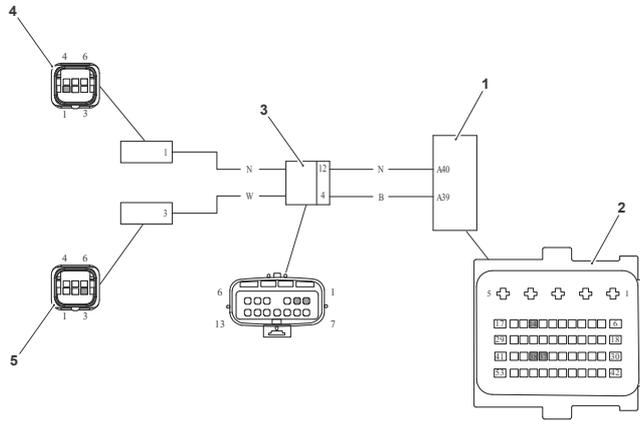
Ignition ON Switch Correlation Error

Fault Code	Possible Cause	Action
C1007	Ignition ON switch correlation error	Disconnect chassis ECM connector A and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Chassis ECM pin A39 - Chassis ECM pin A40	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to step 5
2 Check cable for short circuit: - Chassis ECM pin A39 to ground - Chassis ECM pin A40 ground	OK	Proceed to test 3
	Short Circuit	Rectify fault, proceed to test 5
3 Check cable continuity: - Chassis ECM pin A39 to right hand switch housing black connector pin 3 - Chassis ECM pin A40 to right hand switch housing grey connector pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: Chassis ECM pin A39 to pin A40	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Switch Housing Subharness
4. Right Hand Switch Housing Grey Connector
5. Right Hand Switch Housing Black Connector

Starter Motor Switch Malfunction

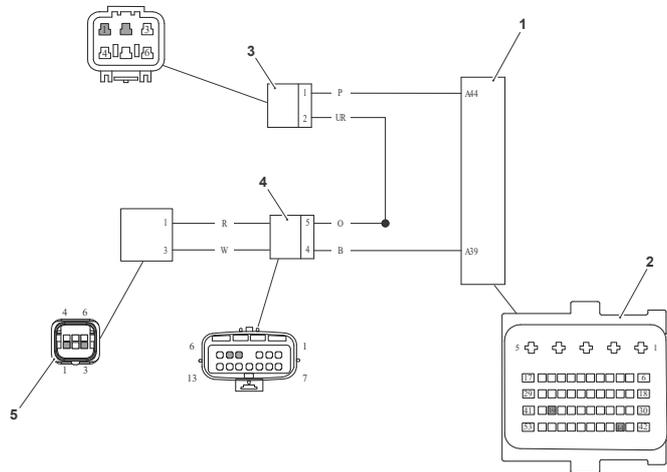
Fault Code	Possible Cause	Action
C1004	Starter motor switch malfunction	Disconnect chassis ECM connector A and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Chassis ECM pin A39 - Chassis ECM pin A44 - Electronic steering lock pin 1 - Electronic steering lock pin 2 - Switch housing subharness pin 4 - Switch housing subharness pin 5	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to step 5
2 Check cable for short circuit: - Chassis ECM pin A39 to ground - Chassis ECM pin A44 ground	OK	Proceed to test 3
	Short Circuit	Rectify fault, proceed to test 5
3 Check cable continuity: - Chassis ECM pin A44 to electronic steering lock pin 1 - Chassis ECM pin A39 to switch housing subharness pin 4 - Electronic steering lock pin 2 to switch housing subharness pin 4 - Switch housing subharness pin 5 to right hand switch housing black connector pin 1	OK	Proceed to test 4

Test	Result	Action
- Switch housing subharness pin 4 to right hand switch housing black connector pin 3	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: Chassis ECM pin A39 to pin A44 - Switch housing subharness pin 5 to pin 4	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Electronic Steering Lock
4. Switch Housing Subharness
5. Right Hand Switch Housing Black Connector

Ambient Air Temperature Sensor

Fault Code	Possible Cause	Action
C1009	Ambient temperature sensor signal under temperature	Check sensor is clean and clear of dirt Ensure sensor connector is secure Disconnect Chassis ECM and proceed to pinpoint test 1:
C1010	Ambient temperature sensor signal over temperature	Check sensor is clean and clear of dirt Ensure sensor connector is secure Disconnect Chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check fuse integrity: - Main fusebox, fuse 1 (PS1)	OK	Proceed to test 2
		Faulty	Replace fuse, proceed to test 6
2	Check cable and terminal integrity: - Chassis ECM pin A28 - Chassis ECM pin A01 - Temperature sensor pin 1 - Temperature sensor pin 2	OK	Disconnect temperature sensor connector. Proceed to test 3
		Faulty	Rectify fault, proceed to test 6
3	Check cable for short circuit: - Chassis ECM pin A28 to ground	OK	Proceed to test 4
		Short circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable continuity: - Chassis ECM pin A28 to temperature sensor pin 1 - Temperature sensor pin 2 to ground	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
5	Check sensor resistance: - Sensor pin 1 to sensor pin 2 (temperature dependent - see circuit diagram resistance data)	OK	Proceed to test 6
		Faulty	Replace temperature sensor, proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

If engine is warm, remove sensor and allow time to cool to ambient prior to test.

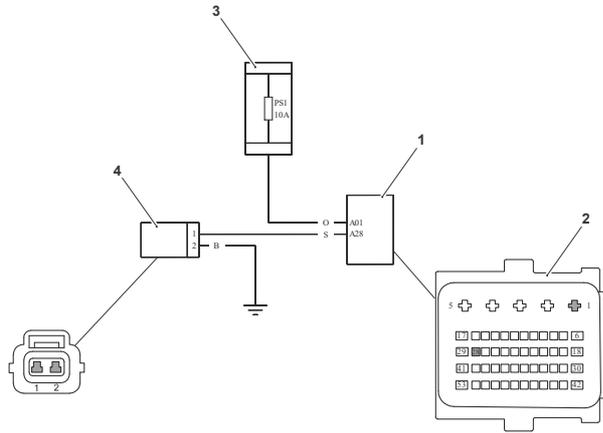
Resistance data:

Ambient temperature resistance value

80°C - 200 to 400 Ohms

20°C - 2.35 to 2.65 K Ohms

-10°C - 8.50 to 10.25 K Ohms



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Fuse Box
4. Ambient Temperature Sensor

Swinging Arm Position Sensor Signal

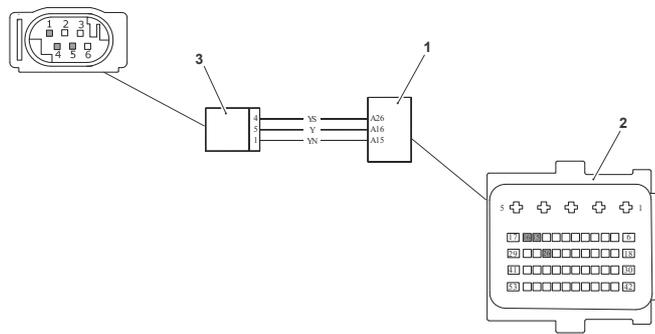
Fault Code	Possible Cause	Action
C1011	Swinging arm position sensor signal low	Proceed to pinpoint test 1:
C1012	Swinging arm position sensor signal high	
C1013	Swinging arm position sensor signal implausible	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Chassis ECM pin A26 - Chassis ECM pin A16 - Chassis ECM pin A15	OK	Disconnect swinging arm position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Chassis ECM pin A16 to ground - Chassis ECM pin A15 to ground - Chassis ECM pin A26 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Chassis ECM pin A26 to sensor pin 4 - Chassis ECM pin A16 to sensor pin 5 - Chassis ECM pin A15 to sensor pin	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5

4	Disconnect swing arm position sensor,	4.9 V 5.1 V	Replace swinging arm position sensor,
	Reconnect Chassis ECM, turn ignition to ON position and measure voltage across swinging arm position sensor pin 5 harness side and ground	Faulty	proceed to test 5 Refer to DTC C1027 (see 5 Volt Sensor Supply)
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Swinging Arm Position Sensor

Instrument Wake-up Signal Overcurrent

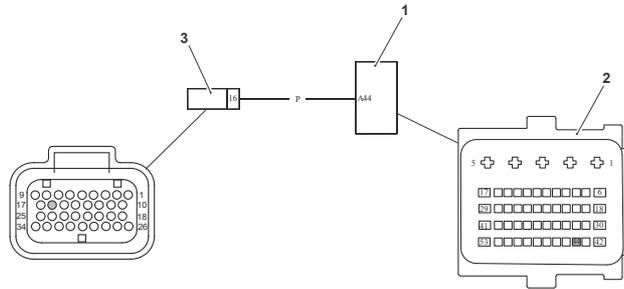
Fault Code	Possible Cause	Action
C1017	Instrument wake-up signal overcurrent	Disconnect chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Chassis ECM pin A44	OK Disconnect instruments connector and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - Chassis ECM pin A44 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity:	OK Proceed to test 4

Test	Chassis ECM pin A44 to instrument pin 16	Result	Action
4	Reconnect harness, clear fault code and run engine to verify fault cleared	Open circuit	Locate and rectify wiring fault, proceed to test 4
		OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Instruments

Rear Suspension Unit Damping Solenoid Undercurrent/Overcurrent

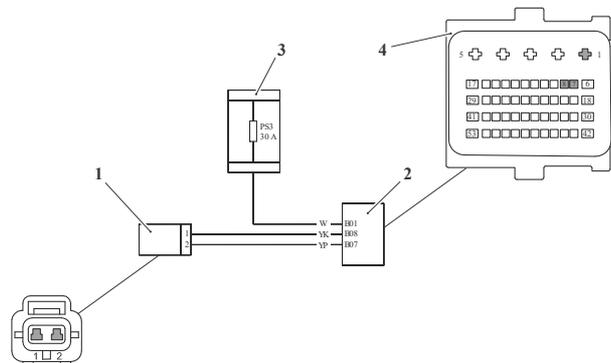
Fault Code	Possible Cause	Action
C1022	Rear rebound damping solenoid undercurrent	Disconnect chassis ECM and proceed to pinpoint test 1:
C1023	Rear rebound damping solenoid overcurrent	Disconnect chassis ECM and rear rebound damping solenoid Proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action	
1	Check fuse integrity: - Main fuse box, fuse 3 (PS3)	OK	Proceed to test 2
		Faulty	Replace fuse, proceed to test 5
2	Check cable and terminal integrity: - Chassis ECM pin B07 - Chassis ECM pin B08 - Chassis ECM pin B01	OK	Disconnect rear rebound damping solenoid and proceed to test 3

Test	Result	Action
	Faulty	Rectify fault, proceed to test 5
3 Check cable continuity: - Chassis ECM pin B07 to solenoid pin 2 - Chassis ECM pin B08 to solenoid pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Chassis ECM pin B07 to ground - Chassis ECM pin B08 to ground - Chassis ECM pin B07 to Chassis ECM pin B08	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. RSU Rebound Damping Solenoid
2. Chassis Electronic Control Module
3. Main Fuse Box
4. Chassis Electronic Control Module - Connector B

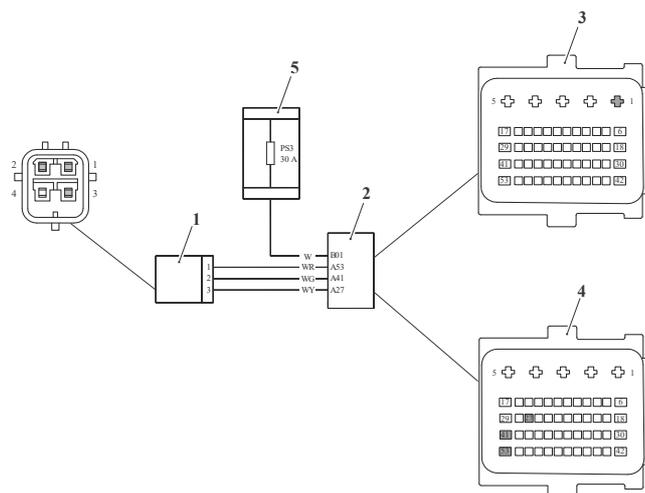
Windscreen Motor Undercurrent/Overcurrent

Fault Code	Possible Cause	Action
C1024	Windscreen motor undercurrent	Disconnect chassis ECM and proceed to pinpoint test 1:
C1025	Windscreen motor overcurrent	Disconnect chassis ECM and proceed to pinpoint test 2:
C1026	Windscreen motor malfunction	Disconnect chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 3 (PS3)	OK	Disconnect windscreen motor connector and proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin A53 - Chassis ECM pin A41 - Chassis ECM pin B01	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin A53 to ground - Chassis ECM pin A41 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin A53 to windscreen pin 1 - chassis ECM pin A41 to windscreen pin 2 - Main fusebox, fuse 3 (PS3) to Chassis ECM pin B01	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Windscreen Motor
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B
4. Chassis Electronic Control Module - Connector A
5. Main Fuse Box

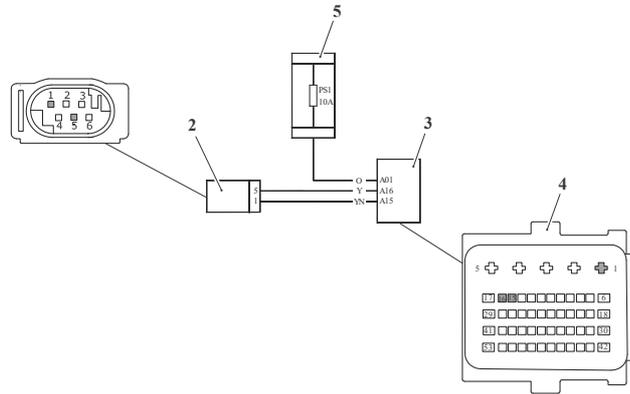
5 Volt Sensor Supply

Fault Code	Possible Cause	Action
C1027	5V sensor supply malfunction	Disconnect Chassis ECM connectors and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 1 (PS1)	Ok	Proceed to test 2
	Faulty	Replace blown fuse, proceed to test 6
2 Check cable and terminal integrity: - Chassis ECM pin A16 - Chassis ECM pin A15	Ok	Disconnect swinging arm position sensor connector. Proceed to test 3
	Faulty	Rectify fault, proceed to test 6
3 Check cable for short circuit: - Chassis ECM pin A16 to A15 - Chassis ECM pin A16 to ground - Chassis ECM pin A15 to ground	Ok	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable continuity: - Chassis ECM pin A16 to swinging arm position sensor pin 5 - Chassis ECM pin A15 to swinging arm position sensor pin 1	OK	Reconnect harness and proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 6
5 Reconnect the chassis ECM and swinging arm position sensor connectors With ignition in the ON position measure the voltage between the swinging arm position sensor pins 5 and 1 (harness side)	4.9 - 5.1 V	Proceed to test 6
	Faulty	Replace swinging arm position sensor, proceed to test 6
6 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Windscreen Motor
2. Swinging Arm Position Sensor
3. Chassis Electronic Control Module
4. Chassis Electronic Control Module - Connector A
5. Main Fuse Box

Rear Suspension Unit (RSU) Preload Motor

Fault Code	Possible Cause	Action
C1028	Preload motor undercurrent	Disconnect Chassis ECM Proceed to pinpoint test 1:
C1029	Preload motor overcurrent	Disconnect Chassis ECM and RSU preload motor connectors Proceed to pinpoint test 2:
C1030	Preload motor malfunction	Disconnect Chassis ECM Proceed to pinpoint test 1:
C1081	Rear preload motor circuit malfunction	Check preload system mechanism Disconnect Chassis ECM and proceed to pinpoint test 1:
C1082	Rear preload motor adjustment prevented due to low battery voltage	Ensure battery voltage is acceptable, note voltage Disconnect Chassis ECM and proceed to pinpoint test 1:
C1083	Rear preload motor position error - motor travel during initialisation procedure was outside normal limits	Allow rear preload motor to calibrate, see Rear Suspension Unit Preload Motor - Calibration If fault still occurs, disconnect Chassis ECM and proceed to pinpoint test 1:

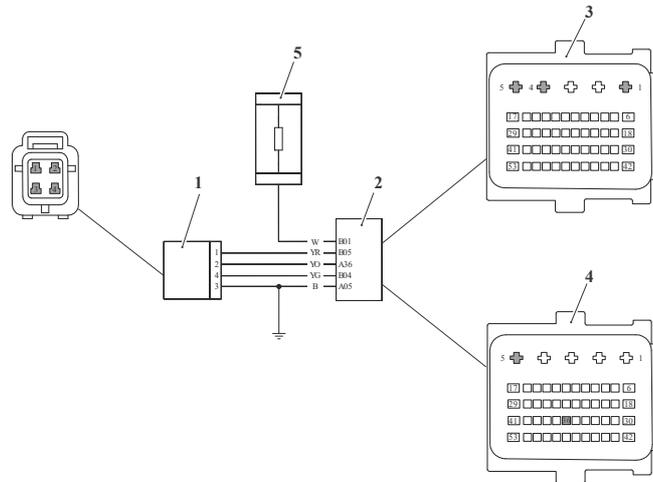
Fault Code	Possible Cause	Action
C1084	Rear preload motor position error - motor end of travel position error	Check preload system mechanism for obstructions Disconnect Chassis ECM and proceed to pinpoint test 1:
C1085	Rear preload motor initialisation interrupted by user	Allow rear preload motor to calibrate, see Rear Suspension Unit Preload Motor - Calibration
C1086	Rear preload motor initialisation completed	System ok Erase DTC No further action required

Pinpoint Tests

Test	Result	Action	
1	Check fuse integrity: - Main fuse box, fuse 3 (PS3)	OK	Proceed to test 2
		Faulty	Replace fuse, proceed to test 6
2	Check cable and terminal integrity: - Chassis ECM pin B05 - Chassis ECM pin B04 - Chassis ECM pin A36 - Chassis ECM pin B01 - Chassis ECM pin A05 - RSU preload motor pin 1 - RSU preload motor pin 2 - RSU preload motor pin 3 - RSU preload motor pin 4	OK	Disconnect RSU preload motor and proceed to test 3
		Faulty	Rectify fault, proceed to test 6
3	Check cable for short circuit: - Chassis ECM pin B05 to ground - Chassis ECM pin B04 to ground - Chassis ECM pin A36 to ground	OK	Proceed to test 4
		Short circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable continuity: - Chassis ECM pin A36 to RSU preload motor pin 2 - Chassis ECM pin B05 to RSU preload motor pin 1 - Chassis ECM pin B04 to RSU preload motor pin 4 - Main fusebox fuse 3 to Chassis ECM pin B01 - RSU preload motor pin 3 to ground	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
5	Check cable for short circuit: - Chassis ECM pin B04 to Chassis ECM pin B05	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 6

Test	Result	Action	
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. RSU Preload Motor
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B
4. Chassis Electronic Control Module - Connector A
5. Main Fuse Box

Preload Adjustment has not Completed Within Set Time Period

Fault Code	Possible Cause	Action
C1080	Preload adjustment has not completed within set time period Rear suspension unit preload motor mechanical fault	Run a rear suspension unit rear preload motor calibration (see Rear Suspension Unit Preload Motor - Calibration). Observe the preload motor adjustment collar for movement during the calibration. If movement is observed, erase the fault code and monitor for further instances. If no movement is observed, replace the rear suspension unit.

Fog Lights Undercurrent/Overcurrent

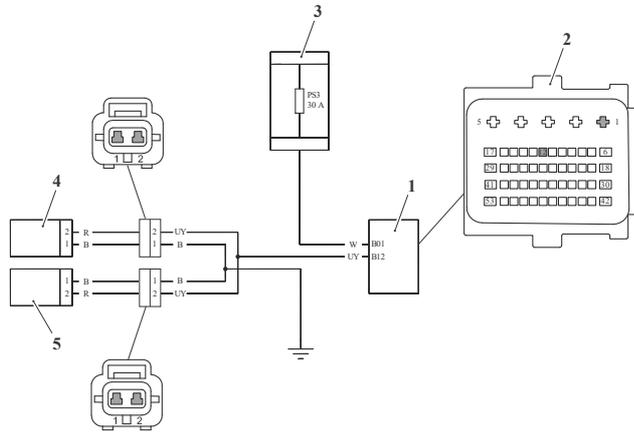
Fault Code	Possible Cause	Action
C1042	Fog lights undercurrent	Disconnect chassis ECM and fog light connectors Proceed to pinpoint test 1:

Fault Code	Possible Cause	Action
C1043	Left and right fog light overcurrent	Disconnect chassis ECM and fog light connectors Proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action	
1	Check fuse integrity: - Main fusebox, fuse 3 (PS3)	OK	Proceed to test 2
		Faulty	Replace fuse, proceed to test 5
2	Check cable and terminal integrity: - Chassis ECM pin B12 - Chassis ECM pin B01 - Left/Right fog light connector pin 1 - Left/Right fog light connector pin 2	OK	Proceed to test 3
		Faulty	Rectify fault, proceed to test 5
3	Check cable for short circuit: - Chassis ECM pin B12 to ground	OK	Proceed to test 4
		Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable continuity: - Chassis ECM pin B12 to left fog light connector pin 2 - Chassis ECM pin B12 to right fog light connector pin 2 - Left fog light connector pin 1 to ground - Right fog light connector pin 1 to ground - Main fusebox fuse 3 (PS3) to Chassis ECM pin B01	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Replace fog lights If fault still present, contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector B
3. Main Fuse Box
4. Right Hand Fog Light
5. Left Hand Fog Light

Rear Light Undercurrent/Overcurrent

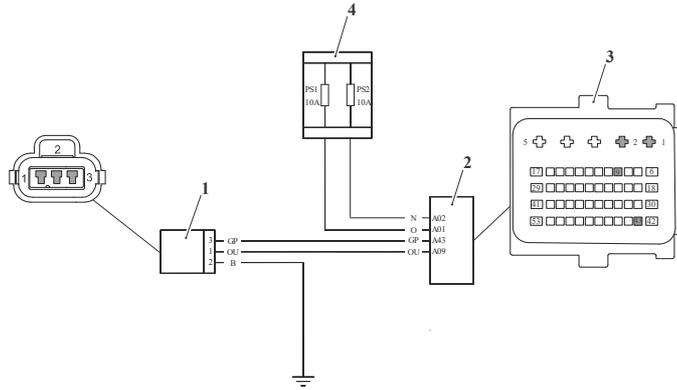
Fault Code	Possible Cause	Action
C1046	Rear light undercurrent	Disconnect chassis ECM and rear light connectors Proceed to pinpoint test 1:
C1047	Rear light overcurrent	Disconnect chassis ECM and rear light connectors Proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 1 (PS1)	OK	Proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin A43 - Chassis ECM pin A01 - Rear light connector pin 3 - Rear light connector pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin A43 to ground	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin A43 to rear light connector pin 3	OK	Proceed to test 5

Test	Result	Action
- Rear light connector pin 2 to ground	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Rear Light Unit
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector A
4. Main Fuse Box

Brake Light Undercurrent/Overcurrent

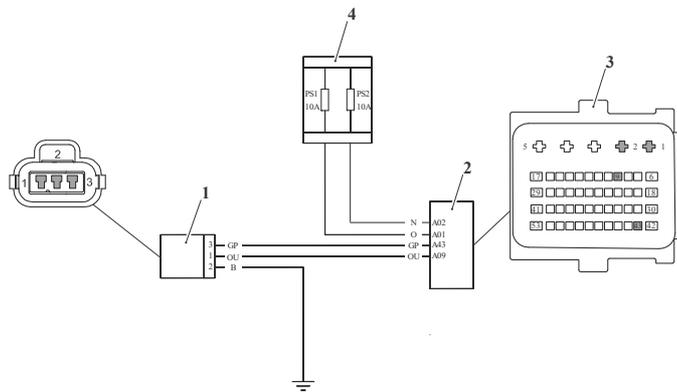
Fault Code	Possible Cause	Action
C1050	Brake light undercurrent	Ensure all connectors are secure Proceed to pinpoint test 1:
C1051	Brake light overcurrent	Disconnect chassis ECM and rear light connectors Proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 2 (PS2)	OK	Disconnect chassis ECM and rear light connectors. Proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin A09 - Chassis ECM pin A02	OK	Proceed to test 3

Test	Result	Action
- Rear light connector pin 1 - Rear light connector pin 2	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin A09 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin A09 to rear light connector pin 1 - Main fusebox fuse 2 (PS2) to Chassis ECM pin A02 - Rear light connector pin 2 to ground	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Rear Light Unit
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector A
4. Main Fuse Box

Direction Indicators Undercurrent/Overcurrent

Fault Code	Possible Cause	Action
C1052	Left front direction indicator undercurrent	Ensure direction indicator connectors are secure Proceed to pinpoint test 1:
C1056	Right front direction indicator undercurrent	

Fault Code	Possible Cause	Action
C1054	Left rear direction indicator undercurrent	
C1058	Right rear direction indicator undercurrent	
C1053	Left front direction indicator overcurrent	Disconnect chassis ECM and relevant direction indicator connectors Proceed to pinpoint test 3:
C1057	Right front direction indicator overcurrent	
C1055	Left rear direction indicator overcurrent	
C1059	Right rear direction indicator overcurrent	

Pinpoint Tests

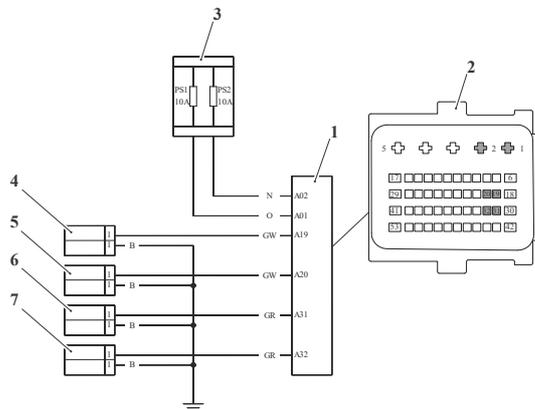
Test	Result	Action	
1	Check relevant direction indicator bulb integrity (non LED direction indicators only)	OK	Proceed to test 2
		Faulty	Replace bulb, proceed to test 6
2	Check fuse integrity: - Main fusebox, fuse 1 (PS1) - Main Fusebox, fuse 2 (PS2)	OK	Disconnect relevant direction indicator and chassis ECM connectors Proceed to test 3
		Faulty	Replace fuse, proceed to test 6
3	Check cable continuity: - Chassis ECM pin A19 to right front indicator positive connector - Chassis ECM pin A20 to right rear indicator positive connector - Chassis ECM pin A31 to left front indicator positive connector - Chassis ECM pin A32 to left rear indicator positive connector - Right front indicator ground to battery negative terminal - Right rear indicator ground to battery negative terminal - left front indicator ground to battery negative terminal - left rear indicator ground to battery negative terminal - Main fusebox fuse 1 to Chassis ECM pin A01	OK	Proceed to test 4
		Faulty	Rectify fault, proceed to test 6

- Main Fusebox fuse 2 to Chassis ECM pin A02

Check cable and terminal integrity:		
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4	Check cable and terminal integrity. - Chassis ECM pin A19	OK	Proceed to test 5
	- Chassis ECM pin A20 - Chassis ECM pin A31 - Chassis ECM pin A32 - Chassis ECM pin A01 - Chassis ECM pin A02 - All relevant direction indicator terminals	Faulty	Rectify fault, proceed to test 6
5	Check cable for short circuit: - Chassis ECM pin A19 to ground - Chassis ECM pin A20 to ground - Chassis ECM pin A31 to ground - Chassis ECM pin A32 to ground	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Main Fuse Box
4. Right Hand Front Direction Indicator
5. Right Hand Rear Direction Indicator
6. Left Hand Front Direction Indicator
7. Left Hand Rear Direction Indicator

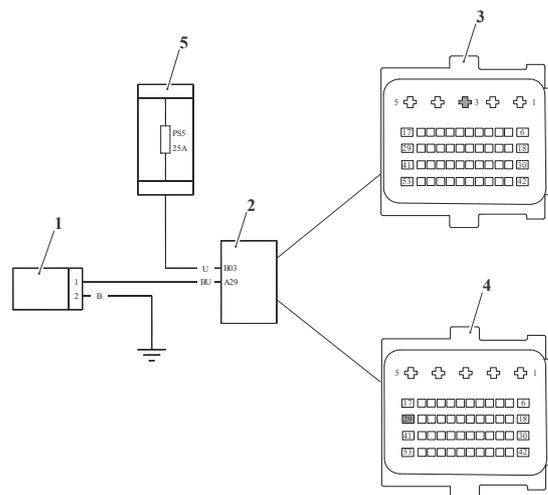
Horn Undercurrent/Overcurrent

Fault Code	Possible Cause	Action
C1060	Horn undercurrent	Ensure all connectors are secure Proceed to pinpoint test 1:
C1061	Horn overcurrent	

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 5 (PS5)	OK	Disconnect chassis ECM and horn connectors, proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin A29 - Chassis ECM pin B03 - Horn terminals	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin A29 to ground	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin A29 to horn positive connector - Horn negative connector to ground - Main fusebox fuse 5 (PS5) to Chassis ECM pin B03	OK	Proceed to test 5
	Open Circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



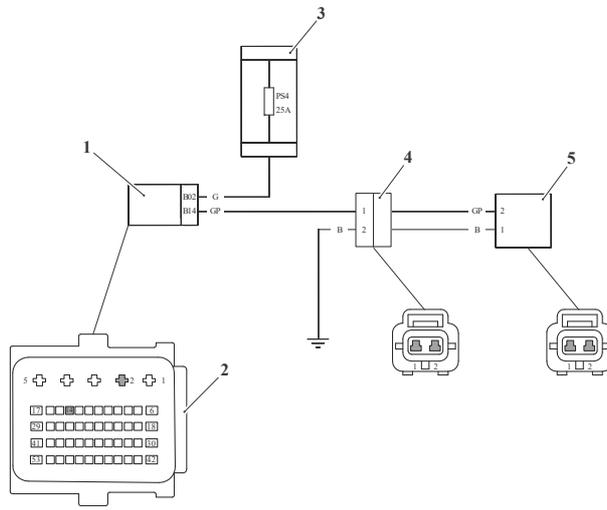
1. Horn
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B
4. Chassis Electronic Control Module - Connector A
5. Main Fuse Box

Fault Code	Possible Cause	Action
C1062	Rider heated seat undercurrent	Proceed to pinpoint test 1:
C1063	Rider heated seat overcurrent	

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 4 (PS4)	OK	Disconnect chassis ECM and rider heated seat connectors, proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin B14 - Chassis ECM pin B02 - Rider heated seat subharness pin 1 - Rider heated seat subharness pin 2 - Rider heated seat pin 1 - Rider heated seat pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin B14 to ground	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin B14 to rider heated seat pin 2 - Rider heated seat pin 1 to ground - Main fusebox fuse 4 (PS4) to Chassis ECM pin B02	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector B
3. Main Fuse Box
4. Rider's Heated Seat Subharness
5. Rider's Heated Seat

Passenger Heated Seat Undercurrent/Overcurrent

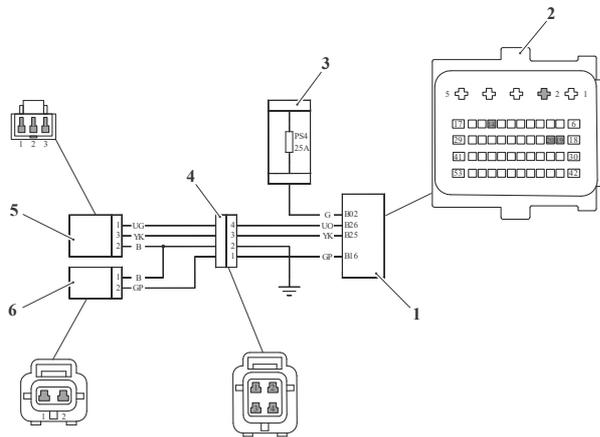
Fault Code	Possible Cause	Action
C1064	Passenger heated seat undercurrent	Proceed to pinpoint test 1:
C1065	Passenger heated seat overcurrent	

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 4 (PS4)	OK	Disconnect chassis ECM and passenger heated seat connectors, proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin B02 - Chassis ECM pin B16 - Passenger heated seat subharness pin 1 - Passenger heated seat subharness pin 2 - Passenger heated seat pin 1 - Passenger heated seat pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin B16 to ground	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5

Test	Result	Action
4 Check cable continuity: - Chassis ECM pin B16 to passenger heated seat pin 2 - Passenger heated seat pin 1 to ground - Main fusebox fuse 4 (PS4) to Chassis ECM pin B02	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector B
3. Main Fuse Box
4. Passenger Heated Seat Subharness
5. Passenger Heated Seat Switch
6. Passenger Heated Seat

Passenger Heated Seat Switch

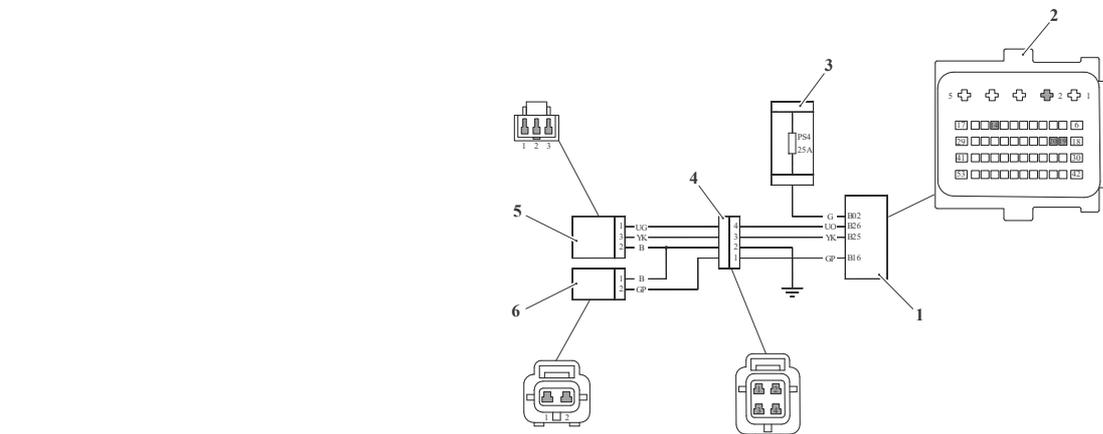
Fault Code	Possible Cause	Action
C1114	Passenger heated seat switch malfunction	Disconnect chassis ECM connectors and proceed to pinpoint test 1:
C1115	Passenger heated seat switch position one malfunction	
C1116	Passenger heated seat switch position two malfunction	

Pinpoint Tests

Test	Result	Action
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Test		Result	Action
1	Check switch integrity: - Check the switch for sticking	OK	Proceed to test 2
		Faulty	Rectify fault/replace switch unit as necessary, proceed to test 6
2	Check cable and terminal integrity: - Chassis ECM pin B25 - Chassis ECM pin B26 - Passenger heated seat subharness pin 2 - Passenger heated seat subharness pin 3 - Passenger heated seat subharness pin 4 - Passenger heated seat switch pin 1 - Passenger heated seat switch pin 2 - Passenger heated seat switch pin 3	OK	Disconnect passenger heated seat switch connector and proceed to test 3
		Faulty	Rectify fault, proceed to test 6
3	Check cable for short circuit: - Chassis ECM pin B25 to ground - Chassis ECM pin B26 to ground	OK	Proceed to test 4
		Short Circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable continuity: - Chassis ECM pin B25 to passenger heated seat switch pin 3 - Chassis ECM pin B26 to passenger heated seat switch pin 1 - Passenger heated seat switch pin 2 to ground	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
5	Check cable for short circuit: - Chassis ECM pin B25 to Chassis ECM pin B26	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector B
3. Main Fuse Box
4. Passenger Heated Seat Subharness
5. Passenger Heated Seat Switch
6. Passenger Heated Seat

Heated Grips Undercurrent/Overcurrent

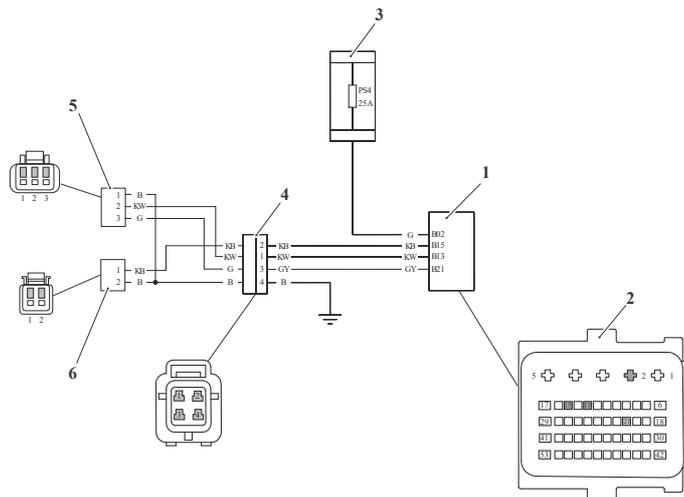
Fault Code	Possible Cause	Action
C1066	Right heated grip undercurrent	Ensure all connectors are secure Proceed to pinpoint test 1:
C1068	Left heated grip undercurrent	
C1067	Right heated grip overcurrent	Disconnect chassis ECM and heated grip connectors Proceed to pinpoint test 2:
C1069	Left heated grip overcurrent	

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 4 (PS4)	OK	Disconnect chassis ECM and heated grip connectors, proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin B13 - Chassis ECM pin B15 - Chassis ECM pin B21 - Chassis ECM pin B02 - Heated grip subharness connector pin 1 - Heated grip subharness connector pin 2 - Heated grip subharness connector pin 3	OK	Proceed to test 3

Test	Result	Action
<ul style="list-style-type: none"> - Heated grip subharness connector pin 4 - Left heated grip pin 1 - Left heated grip pin 2 - Left heated grip pin 3 - Heated twist grip pin 1 - Heated twist grip pin 2 	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: <ul style="list-style-type: none"> - Chassis ECM pin B13 to ground - Chassis ECM pin B15 to ground 	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5
4 Check cable continuity: <ul style="list-style-type: none"> - Chassis ECM pin B13 to left heated grip pin 2 - Chassis ECM pin B21 to left heated grip pin 3 - Chassis ECM pin B15 to heated twist grip pin 1 - Left heated grip pin 1 to ground - Heated twist grip pin 2 to ground - Main fusebox fuse 4 (PS4) to Chassis ECM pin B02 	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



- 1. Chassis Electronic Control Module**
- 2. Chassis Electronic Control Module - Connector B**
- 3. Main Fuse Box**
- 4. Heated Grips Suharness**
- 5. Left Heated Grip**
- 6. Heated Twist Grip**

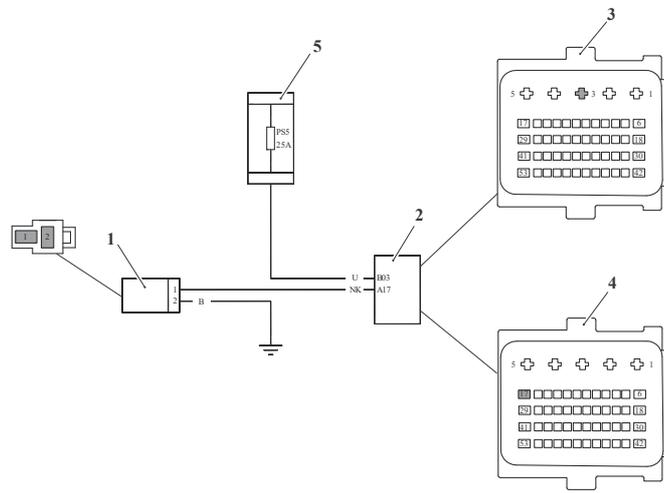
Cooling Fan Undercurrent/Overcurrent

Fault Code	Possible Cause	Action
C1070	Cooling fan undercurrent	Proceed to pinpoint test 1:
C1071	Cooling fan overcurrent	Disconnect chassis ECM and cooling fan connectors Proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1	Check fuse integrity: - Main fusebox, fuse 5 (PS5)	OK Disconnect chassis ECM and cooling fan connectors, proceed to test 2
		Faulty Replace fuse, proceed to test 5
2	Check cable and terminal integrity: - Chassis ECM pin A17 - Chassis ECM pin B03 - Cooling fan connector pin 1 - Cooling fan connector pin 2	OK Proceed to test 3
		Faulty Rectify fault, proceed to test 5
3	Check cable for short circuit: - Chassis ECM pin A17 to ground	OK Proceed to test 4
		Short circuit Rectify fault, proceed to test 5
4	Check cable continuity: - Chassis ECM pin A17 to cooling fan pin 1 - Cooling fan pin 2 to ground - Main fusebox fuse 5 (PS5) to Chassis ECM pin B03	OK Proceed to test 5
		Open circuit Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK Action complete - quit test
		Fault still present Contact Triumph service

Circuit Diagram



1. Cooling Fan
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B
4. Chassis Electronic Control Module - Connector A
5. Main Fuse Box

Fuel Pump Undercurrent/Overcurrent

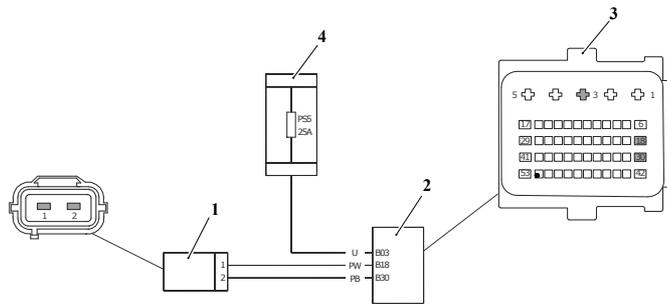
Fault Code	Possible Cause	Action
C1072	Fuel pump undercurrent	Proceed to pinpoint test 1
C1073	Fuel pump overcurrent	Disconnect chassis ECM and fuel pump connectors Proceed to pinpoint test 2

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 5 (PS5)	OK	Disconnect chassis ECM and fuel pump connectors, proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin B18 - Chassis ECM pin B30 - Chassis ECM pin B03 - Fuel pump connector pin 1 - Fuel pump connector pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin B18 to ground - Chassis ECM pin B30 to ground	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin B18 to fuel pump pin 1	OK	Proceed to test 5

Test	Result	Action
- Chassis ECM pin B30 to fuel pump pin 2 - Main fusebox fuse 5 (PS5) to Chassis ECM pin B03	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Fuel Pump
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B
4. Main Fuse Box

Universal Serial Bus (USB) Power Socket Overcurrent

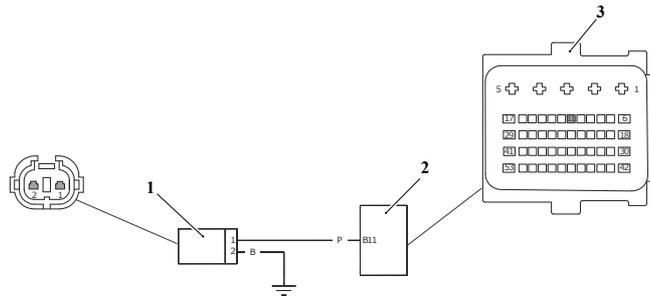
Fault Code	Possible Cause	Action
C1074	Universal Serial Bus (USB) power socket overcurrent	Remove any device connected Disconnect chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable for short circuit: - Chassis ECM pin B11 to ground	OK	Proceed to test 2
	Short circuit	Locate and rectify wiring fault, proceed to test 3
2 Check cable continuity: - Chassis ECM pin B11 to USB socket pin 1 - USB socket pin 2 to ground	OK	Replace USB socket, proceed to test 3
	Open circuit	Locate and rectify wiring fault, proceed to test 3

Test	Result	Action	
3	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



1. USB Socket
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B

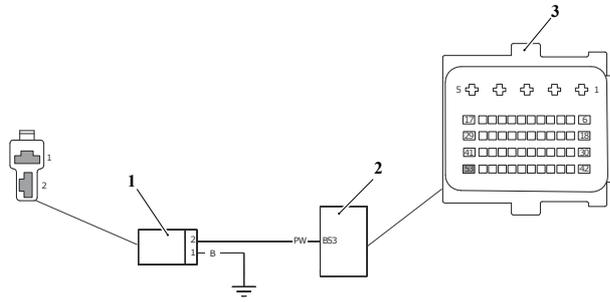
Passenger Accessory Power Socket Overcurrent

Fault Code	Possible Cause	Action
C1075	Passenger accessory power socket overcurrent	Remove any device connected Disconnect chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action	
1	Check cable for short circuit: - Chassis ECM pin B53 to ground	OK	Proceed to test 2
	Short circuit	Locate and rectify wiring fault, proceed to test 3	
2	Check cable continuity: - Chassis ECM pin B53 to power socket pin 2 - Power socket pin 1 to ground	OK	Replace power socket, proceed to test 3
	Open circuit	Locate and rectify wiring fault, proceed to test 3	
3	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



1. Passenger Heated Seat
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B

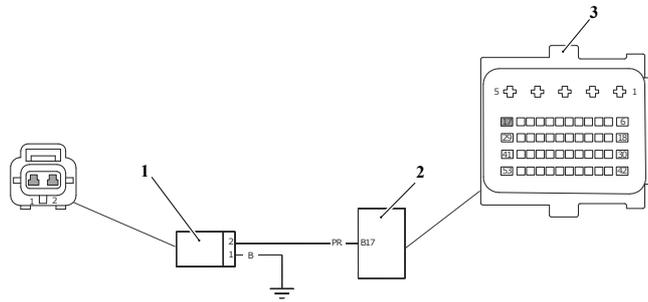
Top Box Accessory Power Socket Overcurrent

Fault Code	Possible Cause	Action
C1076	Top box accessory power socket overcurrent	Remove any device connected Disconnect chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable for short circuit: - Chassis ECM pin B17 to ground	OK	Proceed to test 2
	Short circuit	Locate and rectify wiring fault, proceed to test 3
2 Check cable continuity: - Chassis ECM pin B17 to power socket pin 2 - Top box power socket pin 1 to ground	OK	Replace power socket, proceed to test 3
	Open circuit	Locate and rectify wiring fault, proceed to test 3
3 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Top Box Accessory Power Socket
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B

Starter Motor Solenoid Undercurrent/Overcurrent

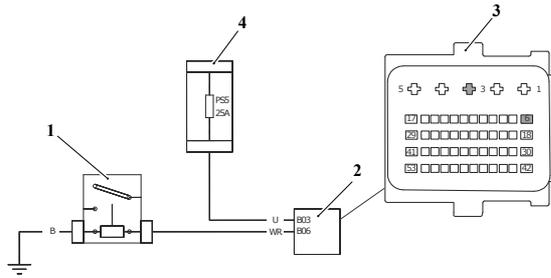
Fault Code	Possible Cause	Action
C1077	Starter motor solenoid undercurrent	Proceed to pinpoint test 1:
C1078	Starter motor solenoid overcurrent	Disconnect chassis ECM and proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 5 (PS5)	OK	Disconnect chassis ECM and proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin B06 - Chassis ECM pin B03 - Starter solenoid pin 2 - Starter solenoid pin 1	OK	Disconnect starter solenoid connectors and proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin B06 to ground	OK	Proceed to test 4
	Short circuit	Rectify fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin B06 to starter solenoid pin 1 - Starter solenoid pin 2 to ground - Main fusebox fuse 5 (PS5) to Chassis ECM pin B03	OK	Replace starter solenoid, proceed to test 5

Test	Result	Action	
	Open circuit	Locate and rectify wiring fault, proceed to test 5	
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



1. Starter Motor Solenoid
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector B
4. Main Fuse Box

TSAS Error

Fault Code	Possible Cause	Action
C1079	TSAS - Solenoid valves implausible signal	Contact Triumph service
C1110	TSAS general error	Download latest chassis ECM software If fault still present, contact Triumph service

Instrument Communication (CAN)

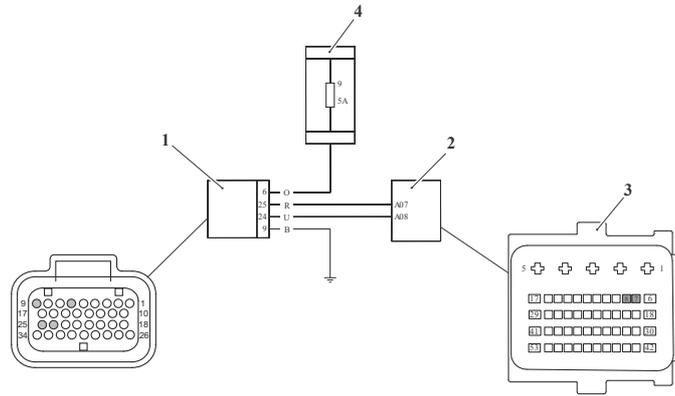
Fault Code	Possible Cause	Action
C1087	CAN fault - lost communication with instruments	Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
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Test		Result	Action
1	Verify instrument panel is operating. Turn the ignition to the ON position	OK	Disconnect chassis ECM and instrument connectors and proceed to test 3
		Faulty	Proceed to test 2
2	Check fuse integrity: - Main fusebox, fuse 9	OK	Disconnect chassis ECM and instrument connectors and proceed to test 3
		Faulty	Replace blown fuse, proceed to test 8
3	Check cable continuity: - Instruments pin 6 to battery positive terminal - Instruments pin 9 to ground	OK	Proceed to test 4
		Faulty	Rectify fault, proceed to test 8
4	Check cable and terminal integrity: - Chassis ECM pin A07 - Chassis ECM pin A08 - Instruments pin 25 - Instruments pin 24	OK	Proceed to test 5
		Faulty	Rectify fault, proceed to test 8
5	Check cable for short circuit: - Chassis ECM pin A07 to ground - Chassis ECM pin A08 to ground	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 8
6	Check cable continuity: - Chassis ECM pin A07 to instrument pin 25 - Chassis ECM pin A08 to instrument pin 24	OK	Proceed to test 7
		Open circuit	Locate and rectify wiring fault, proceed to test 8
7	Check cable for short circuit: - Chassis ECM pin A07 to Chassis ECM pin A08	OK	Proceed to test 8
		Short circuit	Locate and rectify wiring fault, proceed to test 8
8	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Instruments
2. Chassis Electronic Control Module
3. Chassis Electronic Control Module - Connector A
4. Main Fuse Box

ABS Communication (CAN)

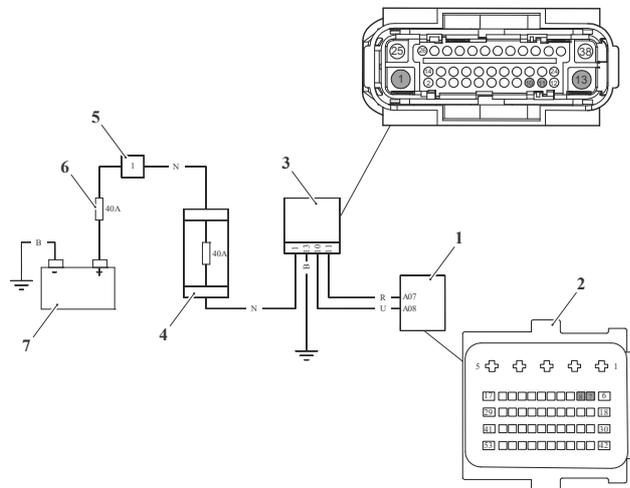
Fault Code	Possible cause	Action
C1088	CAN fault - lost communication with ABS module	Disconnect Chassis ECM connectors and proceed to pinpoint test 1:
C1108	TSAS - ABS implausible signal	Disconnect Chassis ECM connectors and proceed to pinpoint test 3:

Pinpoint Tests

Test	Result	Action	
1	Check ABS fuse integrity:	OK	Proceed to test 2
	Faulty	Replace blown fuse, proceed to test 7	
2	Check cable continuity: - ABS ECM pin 1 to battery positive terminal - ABS ECM pin 13 to ground	OK	Proceed to test 3
	Open circuit	Locate and rectify wiring fault, proceed to test 7	
3	Check cable and terminal integrity: - Chassis ECM pin A07 - Chassis ECM pin A08 - ABS ECM pin 10 - ABS ECM pin 11	OK	Disconnect ABS ECM connector, proceed to test 4
	Faulty	Locate and rectify wiring fault, proceed to test 7	
4	Check cable for short circuit: - Chassis ECM pin A07 to ground - Chassis ECM pin A08 to ground	OK	Proceed to test 5

Test	Result	Action	
	Short circuit	Locate and rectify wiring fault, proceed to test 7	
5	Check cable continuity: - Chassis ECM pin A07 to ABS ECM pin 11 - Chassis ECM pin A08 to ABS ECM pin 10	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7	
6	Check cable for short circuit: - Chassis ECM pin A07 to Chassis ECM pin A08	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7	
7	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. ABS Control Module
4. ABS Fuse Box
5. Alternator
6. Main Fuse
7. Battery

Inertial Measurement Unit (IMU) ID Incompatible

Fault Code	Possible Cause	Action
C1089	Inertial Measurement Unit (IMU) ID incompatible	Proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check IMU part number is correct for the motorcycle	OK	Proceed to test 2
		Incorrect	Replace IMU with correct part and proceed to test 3
2	Check that the engine ECM and chassis ECM tunes are correct for the motorcycle, using the diagnostic software	OK	Proceed to test 3
		Incorrect	Update the tunes using the diagnostic software, proceed to test 3
3	Clear fault code, check for normal operation	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Inertial Measurement Unit (IMU) Signal (CAN)

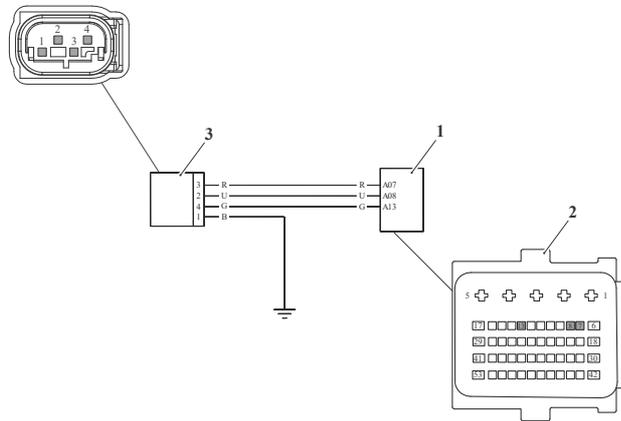
Fault Code	Possible Cause	Action
C1107	TSAS - Inertial Measurement Unit (IMU) implausible signal	Ensure IMU is fixed in its proper location Disconnect chassis ECM and proceed to pinpoint test 1:
C1090	CAN fault - lost communication with Inertial Measurement Unit (IMU)	
C1092	Inertial Measurement Unit (IMU) malfunction	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Chassis ECM pin A07 - Chassis ECM pin A08 - Chassis ECM pin A13 - IMU pin 3 - IMU pin 2 - IMU pin 4 - IMU pin 1	OK	Disconnect IMU connector and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Chassis ECM pin A07 to ground - Chassis ECM pin A08 to ground - Chassis ECM pin A13 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Chassis ECM pin A07 to IMU pin 3 - Chassis ECM pin A08 to IMU pin 2 - IMU pin 1 to ground - IMU pin 4 to chassis ECM pin A13 (with the engine stop switch in the	OK	Proceed to test 4

Test	Result	Action
RUN position	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Chassis ECM pin A07 to pin A08	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Replace IMU If fault still present, contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Inertial Measurement Unit

Engine ECM Communication (CAN)

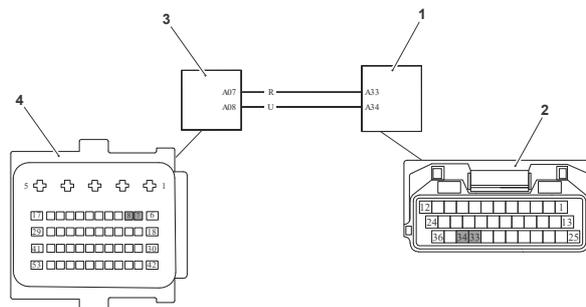
Fault Code	Possible cause	Action
C1091	CAN fault - lost communication with Engine ECM	Disconnect Chassis ECM and Engine ECM connectors and proceed to pinpoint test 1:
C1106	No Engine ECM immobiliser communication	
C1109	TSAS - Engine ECM implausible signal	

Pinpoint Tests

Test	Result	Action
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Test	Result	Action
1 Check cable and terminal integrity: - Engine ECM pin A33 - Engine ECM pin A34 - Chassis ECM pin A07 - Chassis ECM pin A08	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Engine ECM pin A33 to ground - Engine ECM pin A34 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Engine ECM pin A33 to Chassis ECM pin A07 - Engine ECM pin A34 to Chassis ECM pin A08	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Engine ECM pin A33 to Engine ECM pin A34	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Electronic Control Module
2. Engine Electronic Control Module - Connector A
3. Chassis Electronic Control Module
4. Chassis Electronic Control Module - Connector A

Tyre Pressure Monitoring System (TPMS) Wheel Sensors

Fault Code	Possible cause	Action
C1097	Front wheel sensor unit battery alert	Replace the relevant wheel pressure sensor following the procedure described in the Triumph Diagnostic Tool User Guide Record the new sensor's ID number into the Owner Handbook before fitting
C1098	Rear wheel sensor unit battery alert	
C1099	Front wheel sensor unit fault alert	If the problem persists: Replace the relevant wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner handbook before fitting
C1100	Rear wheel sensor unit fault alert	
C1101	Front wheel sensor unit loss of communication error	If the problem persists: Using the Triumph diagnostic tool, check that the correct ID number for the relevant wheel pressure sensor is registered to the Chassis ECM Replace the relevant wheel pressure sensor following the procedure described in the Triumph Diagnostic Tool User Guide Record the new sensor's ID number into the Owner Handbook before fitting
C1102	Rear wheel sensor unit loss of communication error	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Chassis ECM pin B52	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 2
2 Reconnect harness, clear fault code and run engine to verify fault cleared	Ok	Action complete - quit test
	Fault still present	Contact Triumph service

Immobiliser Antenna

Fault Code	Possible Cause	Action
C1103	Immobiliser antenna - loss of communication with key	Check that the key has been registered with the chassis ECM, if it is a new key or an additional key Check that there are no additional keys with a transponder chip fitted
C1104	Invalid key: Key authentication unsuccessful	

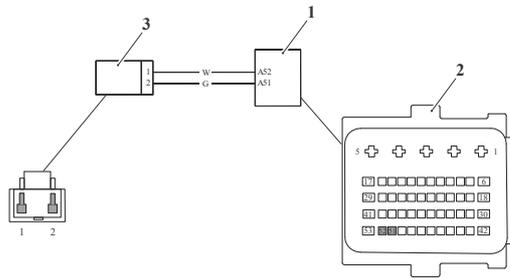
Fault Code	Possible Cause	Action
C1105	Immobiliser antenna internal error	close to the ignition key and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 If available, try to start the motorcycle with another registered key	OK	Transponder chip in the key not functioning correctly Register a new key using the Triumph Diagnostic Tool, proceed to test 7
	Faulty	Proceed to test 2
2 Check cable and terminal integrity: - Chassis ECM pin A51 - Chassis ECM pin A52 - Chassis ECM pin A50 - LF antenna pin 1 - LF antenna pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 7
3 Check cable for short circuit: - Chassis ECM pin A51 to ground - Chassis ECM pin A52 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check antenna coil resistance: - LF antenna pin 1 to pin 2	0.70 to 0.85 Ohms*	Proceed to test 5
	Faulty	Replace the LF antenna, register new keys and proceed to test 7
5 Check cable continuity: - Chassis ECM pin A51 to LF antenna pin 2 - Chassis ECM pin A52 to LF antenna pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
6 Check cable for short circuit: - Chassis ECM pin A51 to Chassis ECM pin A52	OK	Proceed to test 7
	Short Circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

* It may not be possible to accurately measure 0.70 to 0.85 Ohms using standard workshop equipment. When measuring the resistance, a reading of 0 to 3 Ohms should indicate a normally functioning LF antenna coil.

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. LF Antenna

Left Fork Stepper Motor (Compression Damping)

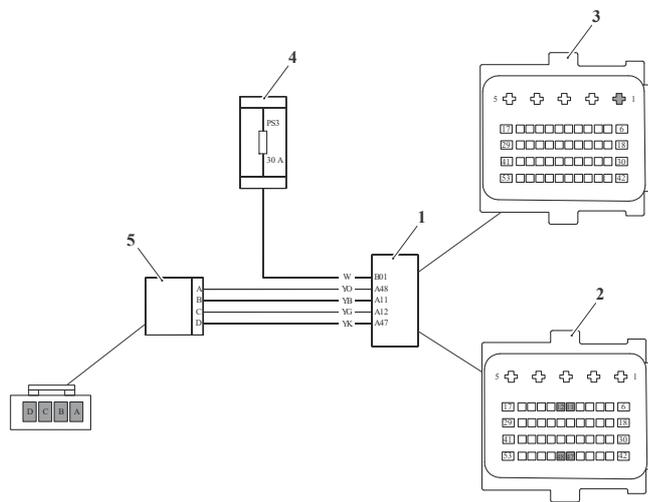
Fault Code	Possible Cause	Action
C1117	Left fork stepper motor undercurrent	Disconnect chassis ECM and proceed to pinpoint test 1:
C1119	Left fork stepper motor (compression) driver error	
C1118	Left fork stepper motor overcurrent	Disconnect chassis ECM and proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fuse box, fuse 3 (PS3)	OK	Proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin A11 - Chassis ECM pin A12 - Chassis ECM pin A47 - Chassis ECM pin A48 - Chassis ECM pin B01	OK	Disconnect left fork stepper motor. Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin A11 to ground - Chassis ECM pin A12 to ground - Chassis ECM pin A47 to ground - Chassis ECM pin A48 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5

Test	Result	Action
4 Check cable continuity:	OK	Proceed to test 5
<ul style="list-style-type: none"> - Chassis ECM pin A11 to left fork stepper motor pin B - Chassis ECM pin A12 to left fork stepper motor pin C - Chassis ECM pin A47 to left fork stepper motor pin D - Chassis ECM pin A48 to left fork stepper motor pin A 	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Chassis Electronic Control Module - Connector B
4. Fuse Box
5. Left Fork Stepper Motor

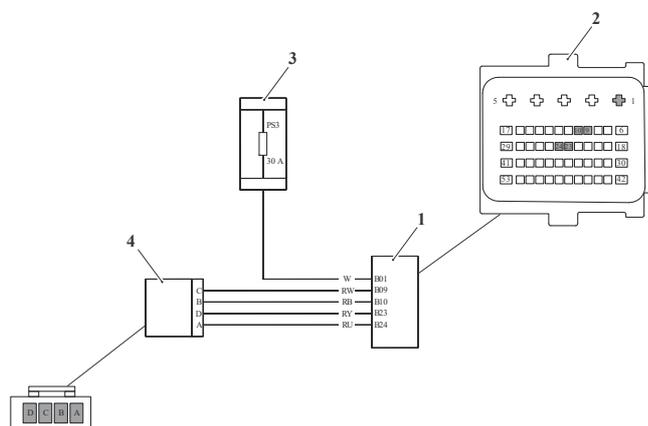
Right Fork Stepper Motor (Rebound Damping)

Fault Code	Possible Cause	Action
C1120	Right fork stepper motor undercurrent	Disconnect chassis ECM and proceed to pinpoint test 1:
C1122	Right fork stepper motor (rebound) driver error	
C1121	Right fork stepper motor overcurrent	Disconnect chassis ECM and proceed to pinpoint test 2:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fuse box, fuse 3 (PS3)	OK	Proceed to test 2
	Faulty	Replace fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin B09 - Chassis ECM pin B10 - Chassis ECM pin B23 - Chassis ECM pin B24 - Chassis ECM pin B01	OK	Disconnect right fork stepper motor. Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin B09 to ground - Chassis ECM pin B10 to ground - Chassis ECM pin B23 to ground - Chassis ECM pin B24 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable continuity: - Chassis ECM pin B09 to right fork stepper motor pin C - Chassis ECM pin B10 to right fork stepper motor pin B - Chassis ECM pin B23 to right fork stepper motor pin D - Chassis ECM pin B24 to right fork stepper motor pin A	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector B
3. Fuse Box
4. Right Fork Stepper Motor

Chassis ECM Internal Error

Fault Code	Possible Cause	Action
C1095	Chassis ECM internal error	Note and investigate any other stored DTCs Erase DTC and monitor for further issues If the fault fails to clear, contact Triumph service

Chassis ECM Restarted Due to Process Time Out During Normal Operation

Fault Code	Possible Cause	Action
C1124	Chassis ECM restarted due to process time out during normal operation	Note and investigate any other stored DTCs Contact Triumph service
C1125		
C1126		

Chassis ECM Restarted due to Calibration Download

Fault Code	Possible Cause	Action
C1127	Chassis ECM restarted due to calibration download	Erase DTC No further action required

Unexpected Chassis ECM Restart

Fault Code	Possible Cause	Action
C1128	Unexpected chassis ECM restart	Note and investigate any other stored DTCs Erase DTC and monitor for further issues If the fault fails to clear or reoccurs, contact Triumph service

Chassis ECM Power Supply Interrupted

Fault Code	Possible Cause	Action
C1129	Chassis ECM power supply interrupted	Ensure voltage across battery is acceptable. Note Voltage

Pinpoint Tests

Test	Result	Action	
1	Has the battery been disconnected?	Yes	Proceed to test 5

Test	Result	Action	
	No	Disconnect Chassis ECM and proceed to test 2	
2	Check cable and terminal integrity: - Battery terminals - Chassis ECM pin A01 - Chassis ECM pin B01 - Alternator cable	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5	
3	Check fuse integrity - Main fusebox, fuse 1 (PS1) - Main fuse box, fuse 3 (PS3)	OK	Proceed to test 4
	Faulty	Replace fuse(s), proceed to test 4	
4	With Ignition 'ON', check Voltage at: - Chassis ECM pin A01 - Chassis ECM pin B01	Same as 'across battery' Voltage	Proceed to test 5
	Less than 'across battery' Voltage	Locate and rectify wiring fault, proceed to test 5	
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
	Fault still present	Contact Triumph service	

Circuit Diagram



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Chassis Electronic Control Module - Connector B
4. Fuse Box
5. Alternator
6. Main Fuse
7. Battery

Chassis ECM Parameters Reset to Default

Fault Code	Possible Cause	Action
C1130	Chassis ECM parameters reset to default	Download the latest chassis ECM calibration to ensure correct model specific configuration Erase stored DTCs from all ECMs

Rear Preload Motor Maximum/Minimum End Stop Detection Error

Fault Code	Possible Cause	Action
C1131	Rear preload motor minimum end stop detection error -preload motor not inhibited	Rear preload motor calibration is started automatically after next ignition cycle

Fault Code	Possible Cause	Action
C1132	Rear preload motor minimum end stop detection error - preload motor inhibited.	Allow rear preload motor to calibrate, see Rear Suspension Unit Preload Motor - Calibration
C1133	Rear preload motor maximum end stop detection error - preload motor not inhibited.	
C1134	Rear preload motor maximum end stop detection error -preload motor inhibited.	

Electronic Steering Lock Internal Faults

Fault Code	Possible Cause	Action
C1136	Electronic steering lock ID incompatible Electronic steering lock not paired to chassis ECM	Pair the electronic steering lock to the chassis ECM (see Pairing the Electronic Steering Lock)
C1137	Electronic steering lock internal Error	Erase DTC Turn the ignition Off then On Repeat if fault reoccurs If the fault fails to clear after repeated attempts, replace the electronic steering lock
C1138	Electronic steering lock motor fault	
C1140	Electronic steering lock Intermediate stop	
C1141	Electronic steering lock operation time out	
C1144	Electronic steering lock software fault	
C1142	Electronic steering lock internal switch fault - both switches ON Electronic steering lock has not fully engaged or disengaged	Erase DTC Turn the ignition Off then On Ensure steering is positioned at left hand full lock, such that it is not obstructing or restricting movement of the steering lock pin Attempt to lock and unlock the electronic steering lock If the fault fails to clear after repeated attempts, replace the electronic steering lock
C1143	Electronic steering lock internal switch fault - both switches OFF Electronic steering lock has not fully engaged or disengaged	
C1145	Incorrect chassis ECM calibration - electronic steering lock detected but not expected	Download the correct chassis ECM calibration to ensure correct model specific configuration

Fault Code	Possible Cause	Action
C1146	Electronic steering lock - lock conditions not correct, ABS message missing ABS fault CAN communication fault	Check ABS DTCs and rectify as necessary

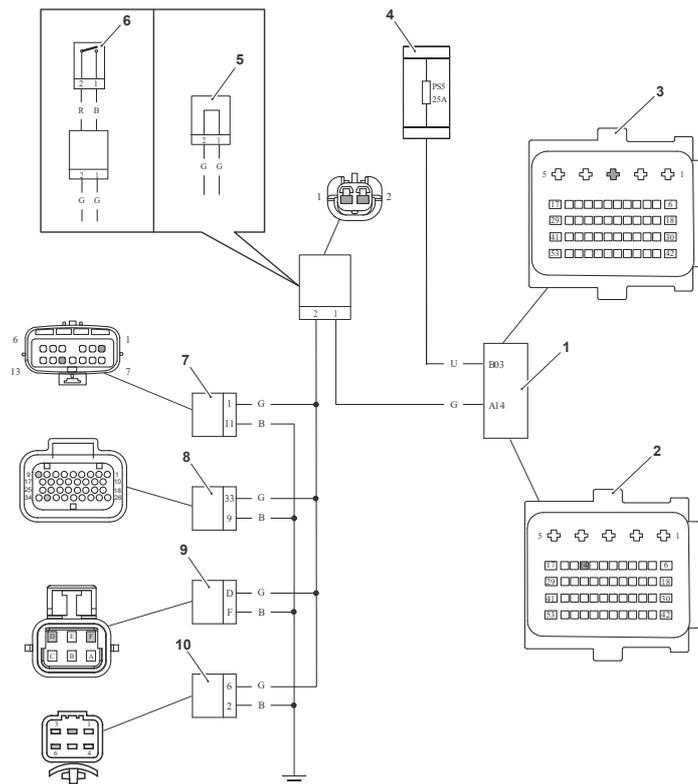
Chassis ECM Ignition Fault - Output 1

Fault Code	Possible Cause	Action
C1147	Chassis ECM ignition output 1 over current	Disconnect chassis ECM, handle bar switches subharness, instruments, headlight and reserved connector blanking plug. Proceed to pinpoint test 2:
C1148	Chassis ECM ignition output 1 under current	Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check fuse integrity: - Main fusebox, fuse 5 (PS5)	OK	Disconnect chassis ECM, handle bar switches subharness, instruments, headlight and reserved connector blanking plug. Proceed to pinpoint test 2:
	Faulty	Replace blown fuse, proceed to test 5
2 Check cable and terminal integrity: - Chassis ECM pin A14 - Chassis ECM pin B03 - Ignition master switch link connector pin 1 - Ignition master switch link connector pin 2 - Switch housing subharness pin 1 - Switch housing subharness pin 2 - Instruments pin 33 - Instruments pin 9 - Headlights pin D - Headlights pin F - Reserved connector pin 6 - Reserved connector pin 2	OK	Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3 Check cable for short circuit: - Chassis ECM pin A14 to ground	OK	Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable continuity:	OK	Proceed to test 5

Test	Result	Action	
<ul style="list-style-type: none"> - Main fuse box fuse 5 (PS5) to chassis ECM pin B03 - Switch housing subharness pin 11 to ground - Instruments pin 9 to ground - headlights pin F to ground - Reserved connector pin 2 to ground <p>Note:</p> <p>For all markets except US, the ignition master switch link connector must be fitted</p> <p>For US markets only, the ignition master switch must be in the ON position</p> <p>Check cable continuity:</p> <ul style="list-style-type: none"> - Chassis ECM pin A14 to switch housing sub harness pin 1 - Chassis ECM pin A14 instruments pin 33 - Chassis ECM pin A14 to headlights pin D - Chassis ECM pin A14 to reserved connector pin 6 	Open circuit	Locate and rectify wiring fault, proceed to test 5	
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service	



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Chassis Electronic Control Module - Connector B
4. Main Fuse Box

5. Ignition Master Switch Link Connector (all markets except US)
6. Ignition Master Switch (US Markets Only)
7. Switch Housing Subharness
8. Instruments
9. Headlight
10. Reserved Connector

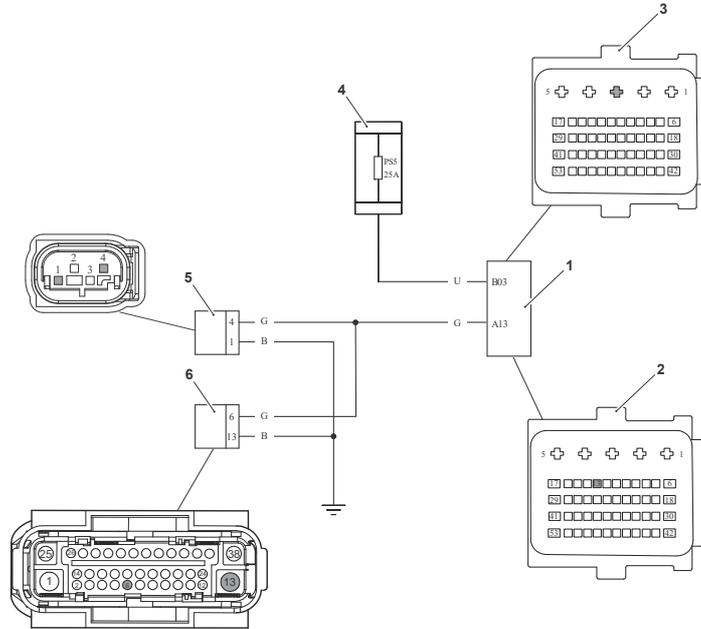
Chassis ECM Ignition Fault - Output 2

Fault Code	Possible Cause	Action
C1152	Chassis ECM ignition output 2 over current	Disconnect chassis ECM, inertial measurement unit and ABS modulator. Proceed to pinpoint test 2:
C1153	Chassis ECM ignition output 2 under current	Proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check fuse integrity: - Main fusebox, fuse 5 (PS5)	OK Disconnect chassis ECM, inertial measurement unit and ABS modulator. Proceed to pinpoint test 2:
	Faulty	Replace blown fuse, proceed to test 5
2	Check cable and terminal integrity: - Chassis ECM pin A13 - Chassis ECM pin B03 - Inertial measurement unit pin 4 - Inertial measurement unit pin 1 - ABS modulator pin 6 - ABS modulator pin 13	OK Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3	Check cable for short circuit: - Chassis ECM pin A13 to ground	OK Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable continuity: - Chassis ECM pin A13 to inertial measurement unit pin 4 - Chassis ECM pin A13 to ABS modulator pin 6 - Main fuse box fuse 5 (PS5) to chassis ECM pin B03 - inertial measurement unit pin 1 to ground - ABS modulator pin 13 to ground	OK Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code	OK Action complete - quit test

Test and run engine to verify fault cleared	Result	Action
	Fault still present	Contact Triumph service



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Chassis Electronic Control Module - Connector B
4. Main Fuse Box
5. Inertial Measurement Unit
6. ABS Control Module

Key Missing During Riding

Fault Code	Possible Cause	Action
C1149	Key missing during riding Smart key flat battery	Ensure smart key is kept in range (1 meter/3 feet) of LF antenna during riding Replace smart key battery

Ignition ON Requested With No Key in Range

Fault Code	Possible Cause	Action
C1151	Ignition ON requested with no key in range	Erase DTC Ensure a paired key is in range of the LF antenna when turning the ignition ON No further action required

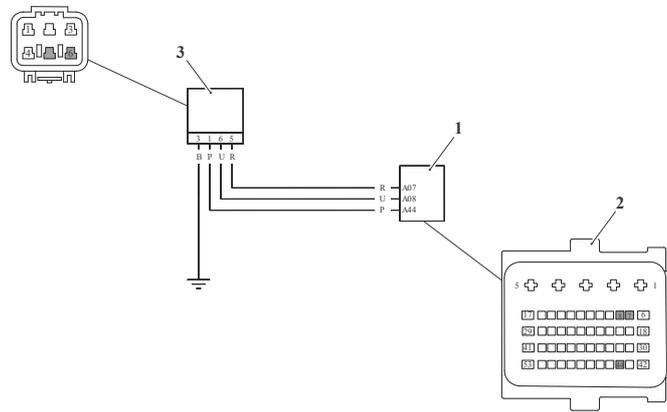
Electronic Steering Lock Communication

Fault Code	Possible Cause	Action
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Fault Code	Possible Cause	Action
C1150	CAN fault - lost communication with electronic steering lock	Disconnect chassis ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - Chassis ECM pin A44 - Chassis ECM pin A07 - Chassis ECM pin A08 - Electronic steering lock pin 1 - Electronic steering lock pin 5 - Electronic steering lock pin 6 - Electronic steering lock pin 3	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - Chassis ECM pin A44 to ground - Chassis ECM pin A07 to ground	OK	Proceed to test 3
	Short circuit	Rectify fault, proceed to test 5
3 Check cable continuity: - Chassis ECM pin A44 to electronic steering lock pin 1 - Chassis ECM pin A07 to electronic steering lock pin 5 - Chassis ECM pin A08 to electronic steering lock pin 6 - Electronic steering lock pin 3 to ground	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - Chassis ECM pin A07 to pin A08	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service



1. Chassis Electronic Control Module
2. Chassis Electronic Control Module - Connector A
3. Electronic Steering Lock

Engine Stop Switch Lock

Fault Code	Possible Cause	Action
C1154	<p>Engine stop switch lock enabled</p> <p>Motorcycle not commissioned</p> <p>In this condition the engine can only be started once</p> <p>After the engine is turned Off, DTC C1155 will be stored and the engine will no longer start</p>	<p>Commission the motorcycle as follows:</p> <p>Download the latest instrument calibration</p> <p>Download the latest chassis ECM calibration</p> <p>Download the latest Engine ECM Calibration</p> <p>Unlock the engine ECM as described in the Triumph Diagnostic Tool User Guide</p>
C1155	<p>Engine stop switch lock active</p> <p>Motorcycle not commissioned</p> <p>In this condition the engine will not start</p>	<p>The unlock code can be found on www.triumphonline</p> <p>Start the engine and ensure neither fault codes are present</p> <p>If either fault code reoccurs, contact Triumph Service</p>

Lighting Adjustment and Bulb Replacement

Headlight

WARNING

Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated. Make sure that the head light beam is adjusted to illuminate the road surface sufficiently far ahead without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing an accident.

WARNING

WARNING

Never attempt to adjust a headlight beam when the motorcycle is in motion.

Any attempt to adjust a headlight beam when the motorcycle is in motion may result in loss of control and an accident.

CAUTION

Do not cover the headlight or lens with any item likely to obstruct air flow to, or prevent heat escaping from, the headlight lens.

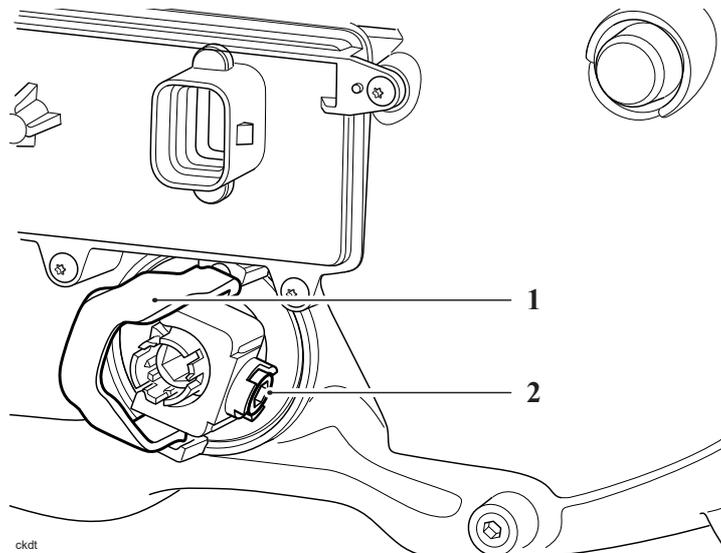
Covering the headlight lens during operation with items of clothing, luggage, adhesive tape, devices intended to alter or adjust the headlight beam or non genuine headlight lens covers will cause the headlight lens to overheat and distort, causing irreparable damage to the headlight assembly.

Damage caused by overheating is not considered a manufacturing defect and will not be covered under warranty.

If the headlight must be covered during use - such as taping of the headlight lens required during closed-course conditions - the headlight must be disconnected.

Headlight Adjustment

The headlight can be adjusted by means of a vertical adjustment screw located on the rear of the headlight unit. There is no horizontal adjustment. In addition, the headlight is equipped with an easily accessible adjuster to allow the vertical adjustment to be corrected when the motorcycle is fully loaded.



- 1. Headlight adjuster lever for loaded conditions**
- 2. Vertical adjustment screw**

To adjust the headlight:

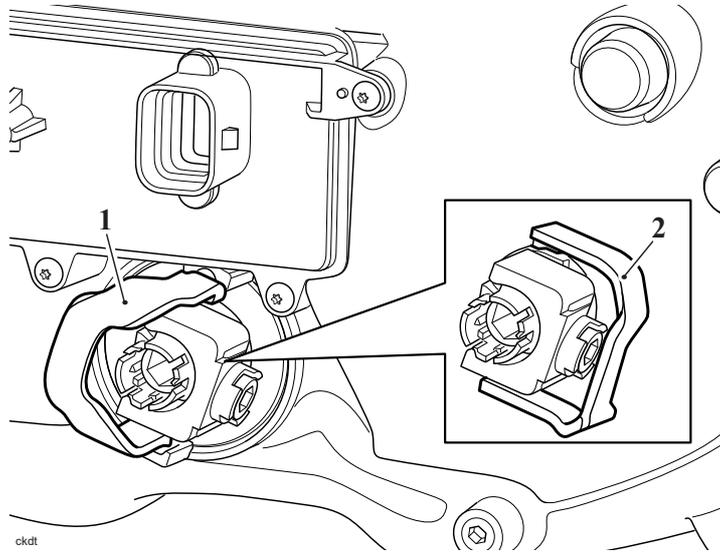
1. Switch the headlight dipped beam on.
2. Turn the vertical adjustment screw on the headlight unit clockwise to raise the beam or anticlockwise to lower the beam.

Note

- **There is a small triangle marking on each side of the headlight unit which indicates the height of the light within the headlight unit for adjustment purposes.**
3. Switch the headlights off when the beam settings are satisfactory.

Headlight Adjustment for Loaded Conditions

The headlight unit is equipped with an adjuster lever to allow the vertical adjustment to be corrected when the motorcycle is fully loaded.



1. Headlight adjuster lever (unloaded position)
2. Headlight adjuster lever (loaded position)

For normal (unloaded) conditions, the headlight adjuster lever should be set in the horizontal position (1). For loaded conditions, move the headlight adjuster lever until it is in position (2). This will lower the headlight beams by approximately 2°.

Headlight Bulb Replacement

This model is fitted with light emitting diodes (LED) headlights. The headlights, DRL or LED position light are situated within the headlight assembly and are sealed, maintenance free LED units. The headlight unit must be replaced in the event of failure of the headlights, DRL or LED position lights.

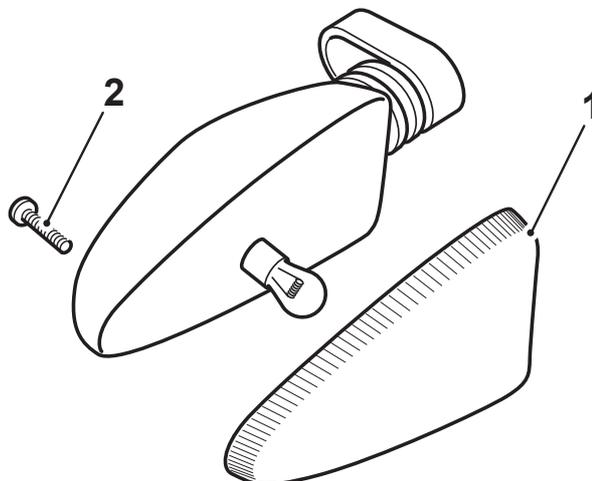
Rear Light/Licence Plate Light

The rear light unit is a sealed, maintenance-free LED unit. The licence plate light is integral to the rear light unit.

Direction Indicators - Bulb Replacement

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.



1. **Direction indicator lens**
2. **Fixing**

1. Release the fixing and remove the lens to gain access to the bulb for replacement.

LED Direction Indicators

The LED direction indicators are sealed for life units and must be replaced in the event of a failure.

Removal and Installation - Electrical Components

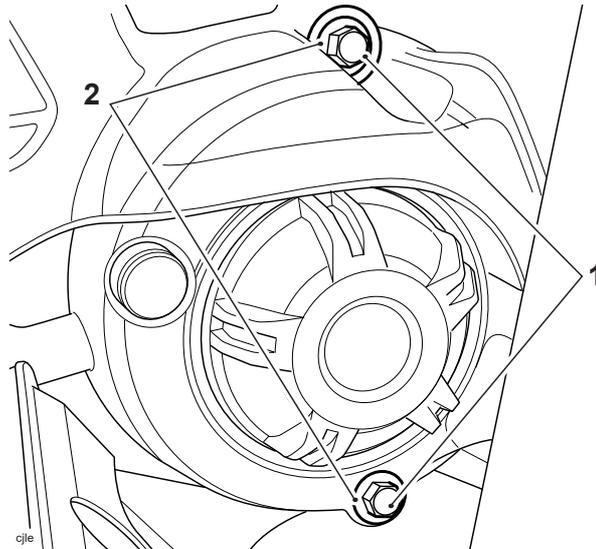
Headlight Assembly - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Cockpit Panels - Removal
 - High Level Mudguard - Removal
1. Release the four fixings and washers securing the headlight to the front subframe.



1. **Fixings (left hand shown)**
2. **Washers**

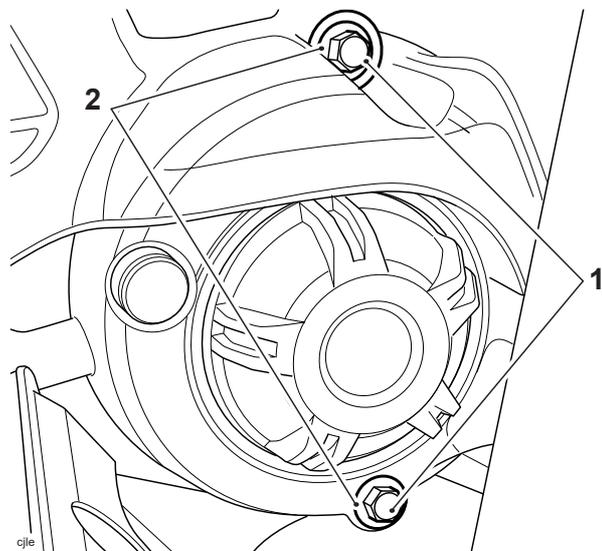
2. Ease the headlight away from the cockpit subframe and disconnect the electrical connector for complete removal.

Headlight Assembly - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Connect the electrical connector and align the four mountings on the headlight to their rubber grommets on the cockpit subframe.
2. Carefully and evenly, push the headlight into its four mounting grommets. Fit the fixings and washers and tighten to **4 Nm**.



1. **Fixings (left hand shown)**
2. **Washers**

Perform the following operations:

- High Level Mudguard - Installation
- Cockpit Panels - Installation
- Battery - Installation
- Rider's Seat - Installation

Rear Light - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **The rear light is a sealed for life unit and must be replaced in the event of a failure.**

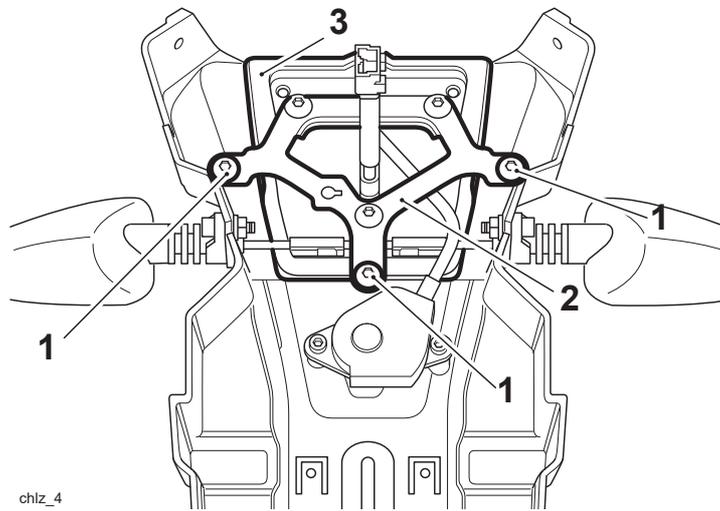
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Rear Mudguard - Removal

Note

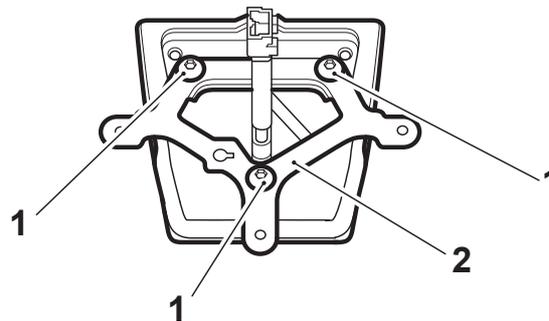
- **Note the routing of the seat lock cable for installation.**

1. Release the three fixings shown below and remove the rear light and bracket assembly.



1. Fixings
2. Bracket
3. Rear light

2. If necessary, release the fixings and remove the bracket.



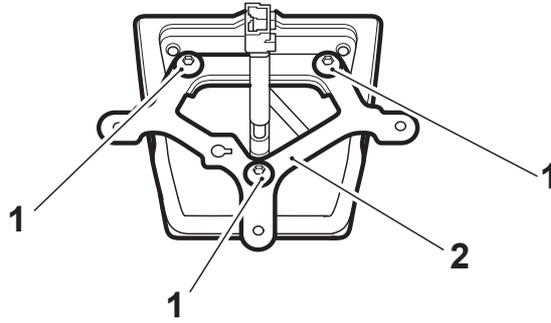
1. Fixings
2. Bracket

Rear Light - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

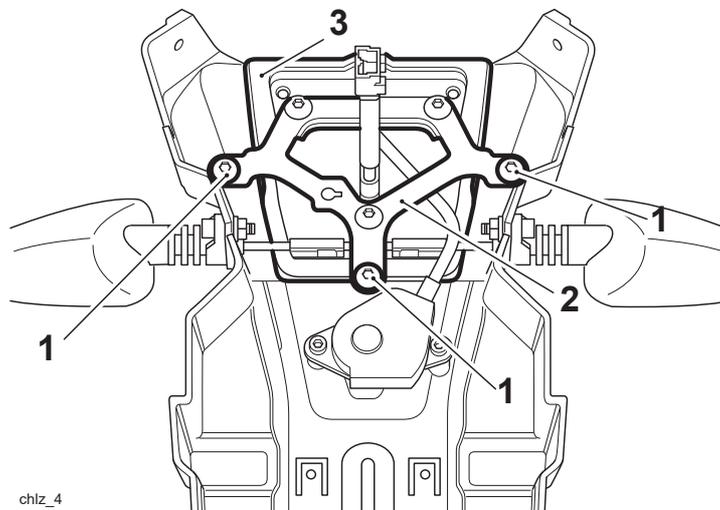
1. Refit the bracket to the rear light and tighten the fixings to **4 Nm**.



chlz_2

1. **Fixings**
2. **Bracket**

2. Refit the bracket and rear light assembly to the rear mudguard ensuring that the seat lock cable is routed as noted during removal. Tighten the fixings to **4 Nm**.



chlz_4

1. **Fixings**
2. **Bracket**
3. **Rear light**

Perform the following operations:

- Rear Mudguard - Installation
- Battery - Installation
- Rider's Seat - Installation

Front Direction Indicator - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

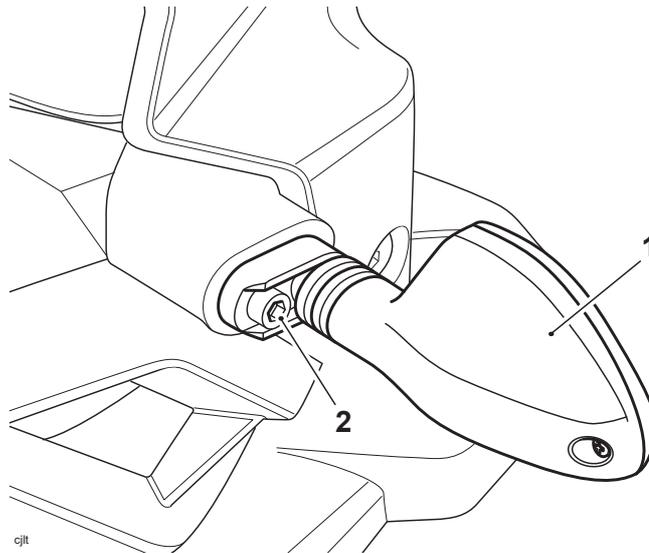
Perform the following operations:

- Rider's Seat - Removal

- Battery - Removal
- Headlight Assembly - Removal

Note

- **Note the routing of the indicator harness prior to removal.**
1. Disconnect the indicator and release its harness from the clips on the cockpit subframe.
 2. Release the fixing securing the direction indicator to the cockpit subframe and remove the unit.



1. **Direction indicator (right hand shown)**
2. **Fixing**

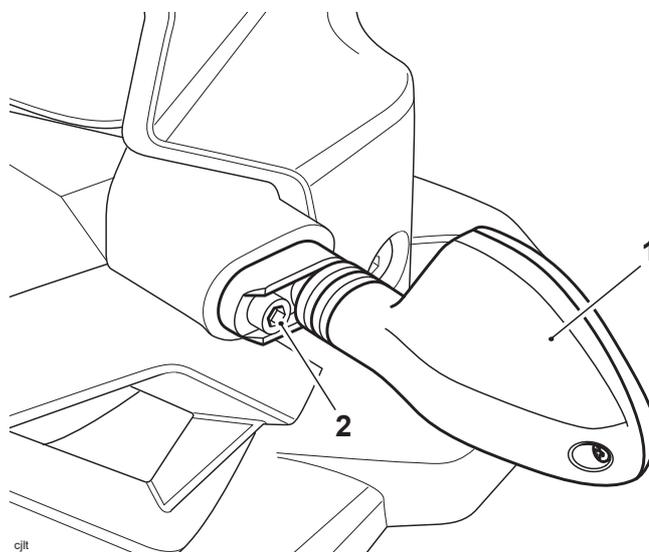
Front Direction Indicator - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **Ensure that the drain hole in the indicator lens is at the bottom.**
1. Position the direction indicator to the cockpit subframe and secure with the fixing. Tighten the fixing to **5 Nm**.



1. Direction indicator (right hand shown)

2. Fixing

2. Route the direction indicator harness as noted during removal and secure into the clips on the cockpit subframe.

Note

- **The main harness for the right hand direction indicator is marked with red tape to aid correct connection.**

3. Connect the direction indicator to the main harness.

Perform the following operations:

- Headlight Assembly - Installation
- Battery - Installation
- Rider's Seat - Installation
- Check the operation of the direction indicators, rectify as necessary.

Rear Direction Indicator - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

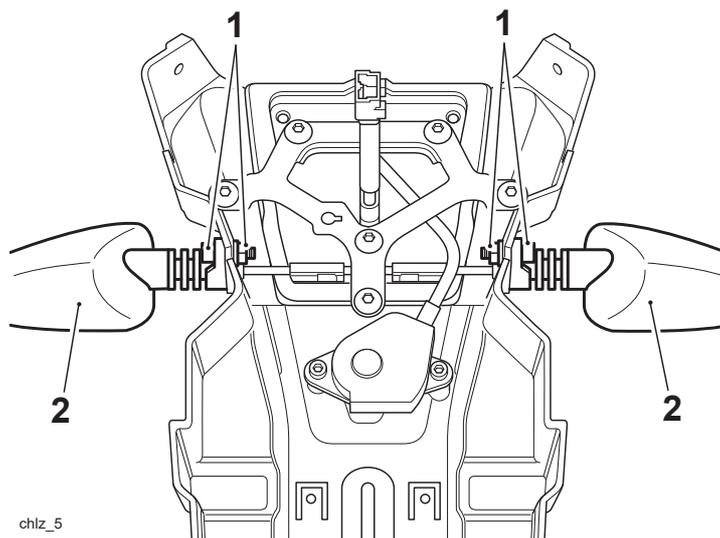
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Rear Mudguard - Removal

Note

- **Note the routing of the indicator harnesses for installation.**

1. Release the fixings securing direction indicators to the rear mudguard.



1. Fixings

2. Direction indicators

2. Remove the direction indicators.

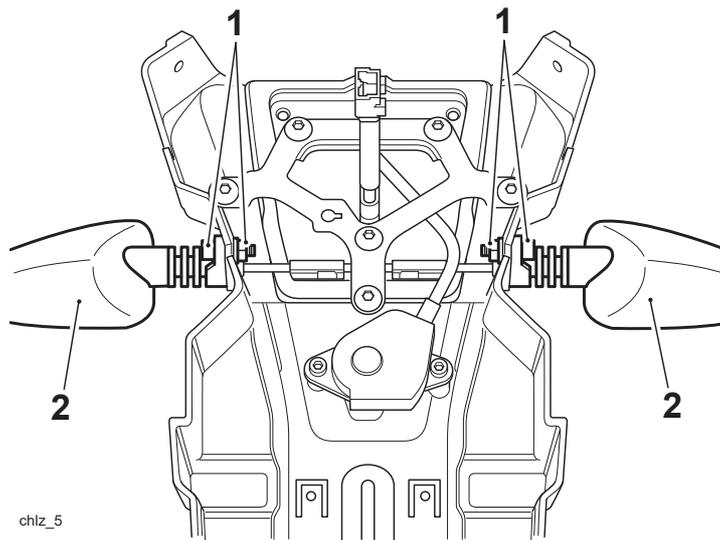
Rear Direction Indicator - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- **Ensure that the drain hole in the indicator lens is at the bottom.**
1. Refit the direction indicators to the rear mudguard.
 2. Secure with the fixings and tighten to **5 Nm**.
 3. Route the indicator harnesses as noted during removal.



1. **Fixings**
2. **Direction indicators**

Perform the following operations:

- Rear Mudguard - Installation
- Battery - Installation
- Rider's Seat - Installation

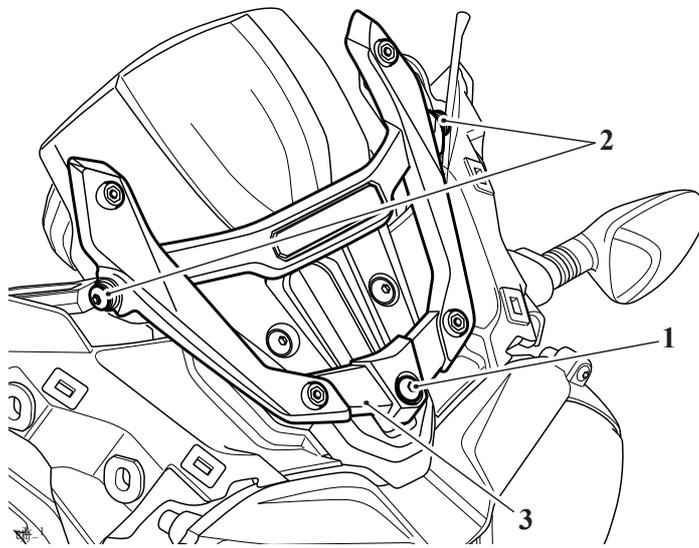
Windscreen Motor - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

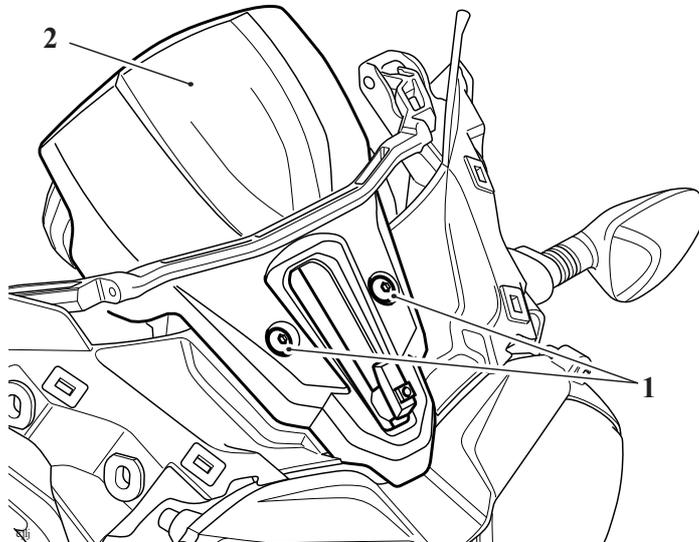
Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Windscreen - Removal
 - Cockpit Panels - Removal
1. Release the three fixings and remove the windscreen support bracket. Collect the flanged sleeves from the upper fixings.



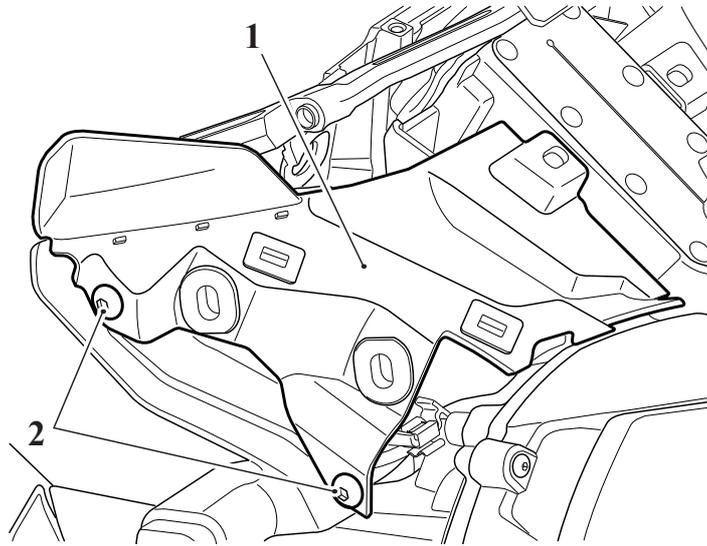
1. Lower fixing
2. Upper fixings
3. Windscreen support bracket

2. Release the fixings and remove the windscreen motor cover.



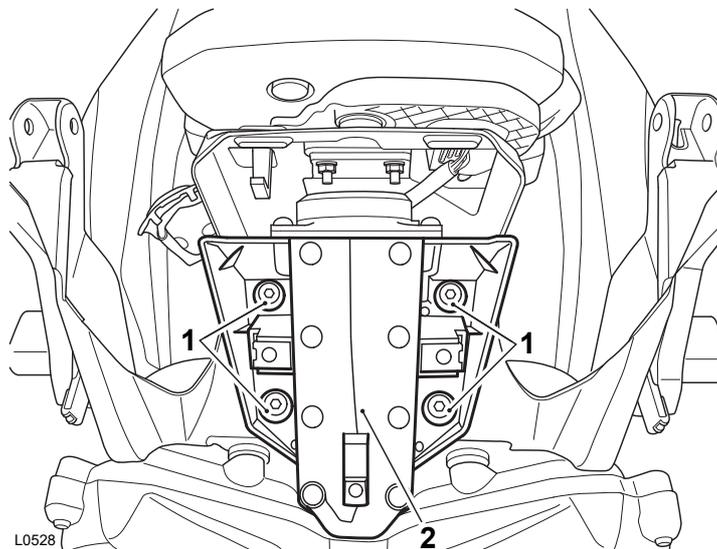
1. Fixings
2. Windscreen motor cover

3. Release the fixings and remove the clear wind deflector panels.



1. Wind deflector panel (right hand shown)
2. Fixings

4. Release the four windscreen motor fixings.



1. Fixings
2. Windscreen motor

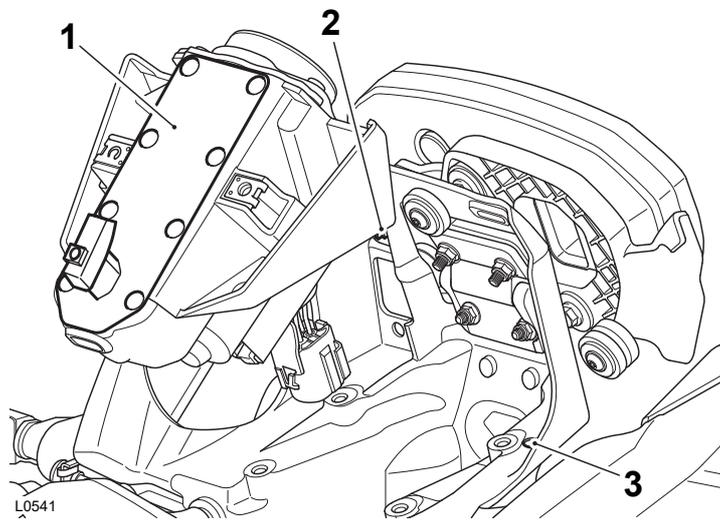
5. Carefully lift the windscreen motor away from the front subframe. Disconnect the electrical connector and remove the motor.

Windscreen Motor - Installation

WARNING

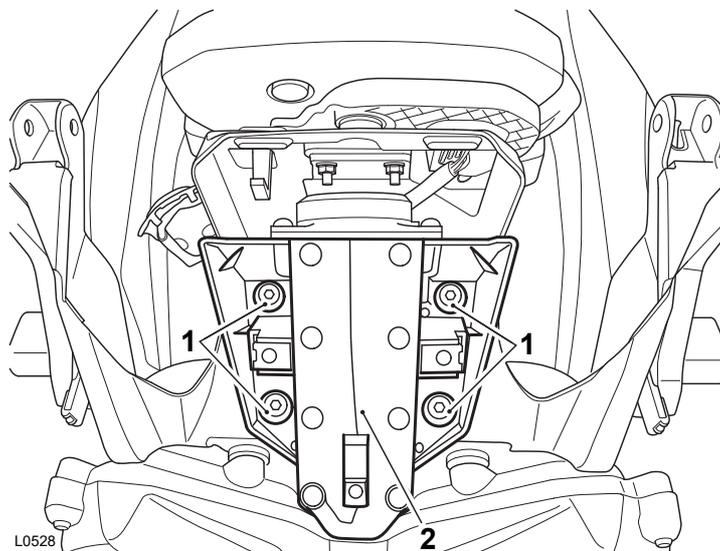
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the windscreen motor to the front subframe and reconnect the electrical connector. Ensure the lugs on the underside of the motor locate into the holes on the front subframe.



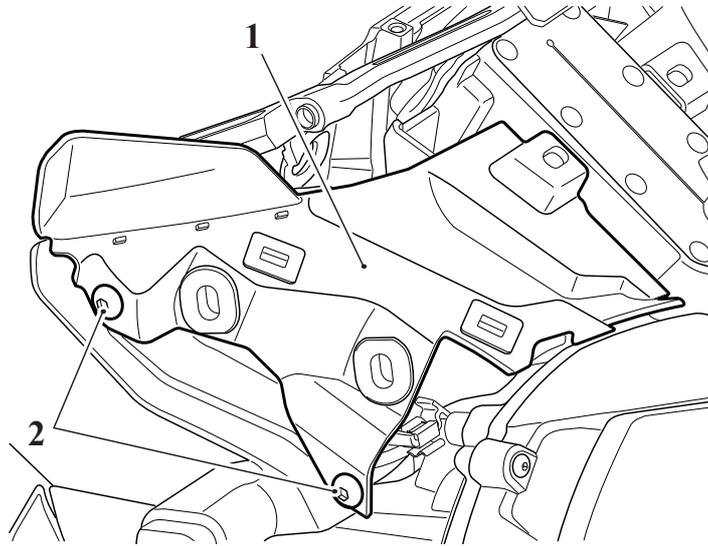
1. Windscreen motor
2. Locating lug (left hand shown, right hand similar)
3. Front subframe holes

2. Refit the four windscreen motor fixings and tighten to **12 Nm**.



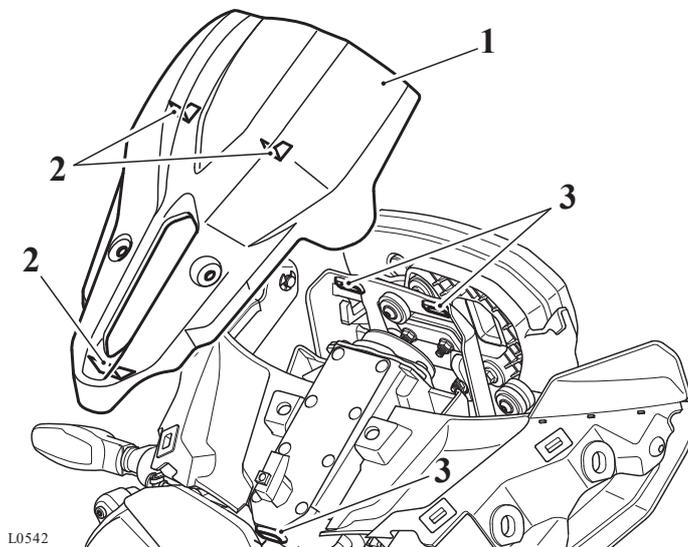
1. Fixings
2. Windscreen motor

3. Refit the wind deflector panels and tighten the fixings to **3 Nm**.



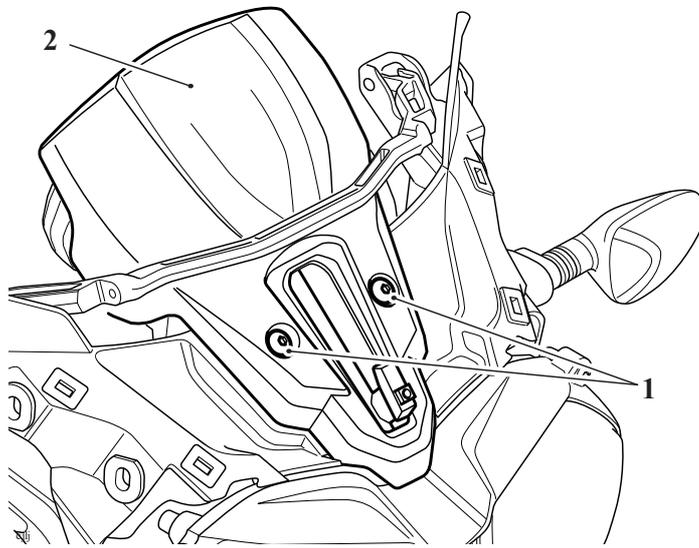
1. Wind deflector panel (right hand shown)
2. Fixings

4. Refit the windscreen motor cover ensuring that the locating tangs locate into the rubber grommets on the front subframe and windscreen motor.



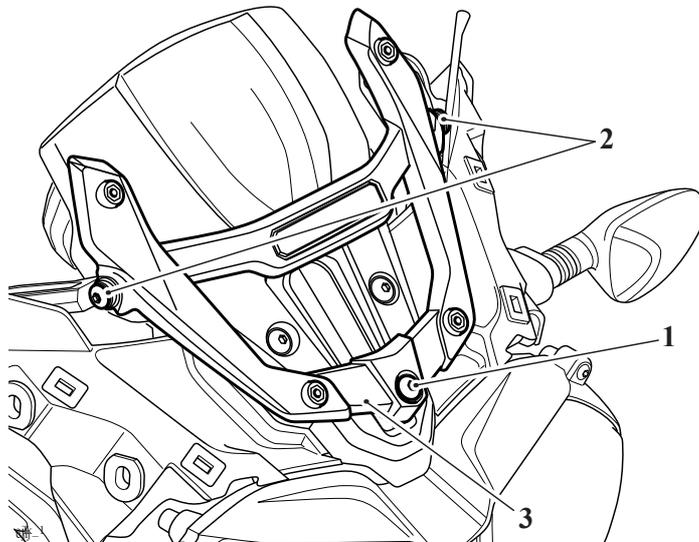
1. Windscreen motor cover
2. Locating tangs
3. Rubber grommets

5. Tighten the windscreen motor cover fixings to **3 Nm**.



1. **Fixings**
2. **Windscreen motor cover**

6. Position the windscreen support bracket upper mountings to the windscreen pivot bar and secure with the two fixings and flanged sleeves. Do not fully tighten at this stage.
7. Position the windscreen support bracket lower mounting to the windscreen motor and secure with the fixing. Tighten the fixing to **5 Nm**.
8. Tighten the windscreen support upper mountings to **4 Nm**.



1. **Lower mounting fixing**
2. **Upper mounting fixings**
3. **Windscreen support bracket**

Perform the following operations:

- Cockpit Panels - Installation
- Windscreen - Installation
- Battery - Installation
- Rider's Seat - Installation

Ignition Master Switch (US Markets Only) - Removal



WARNING

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

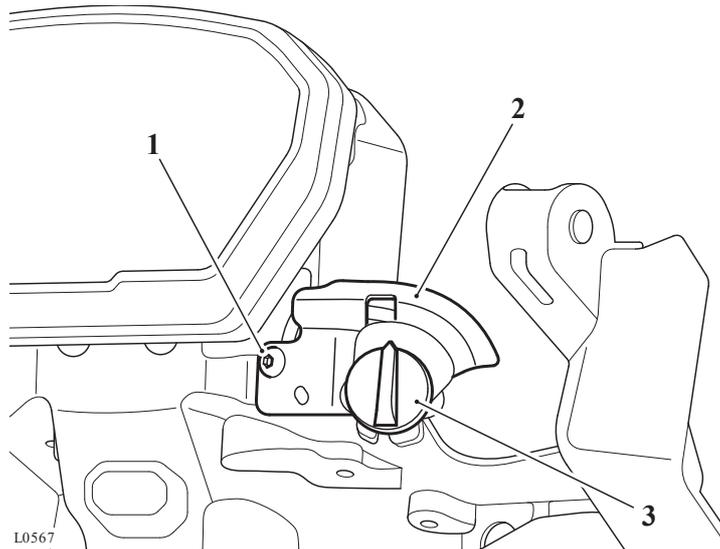
Perform the following operations:

- Windscreen Motor - Removal

Note

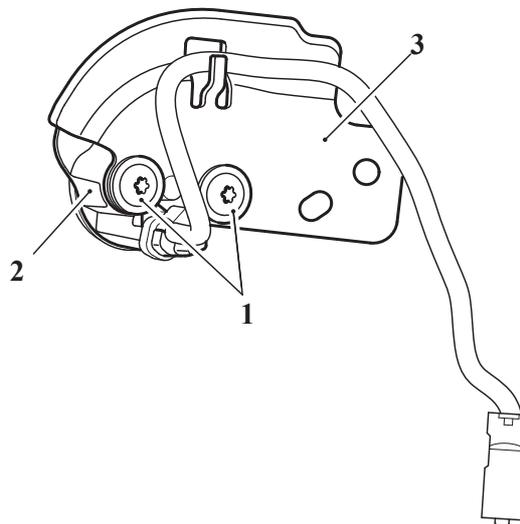
- **Note the routing of the master switch harness for installation.**

1. Disconnect the master switch electrical connector and feed the harness up to the master switch.
2. Remove the fixing and remove the master switch and bracket assembly from the front subframe.



1. **Fixing**
2. **Bracket**
3. **Master switch**

3. Remove the fixings and detach the master switch from its bracket.



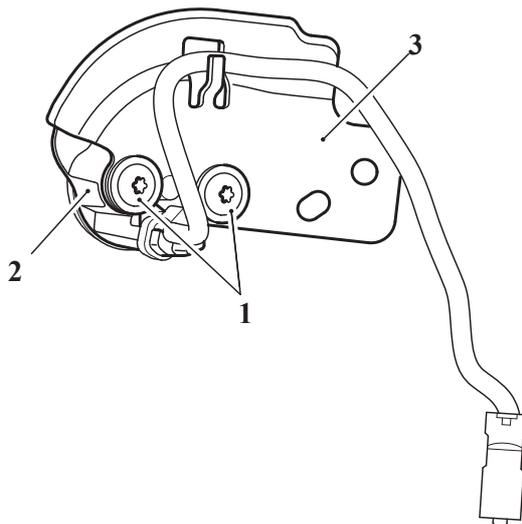
1. **Fixings**
2. **Master switch**
3. **Bracket**

Ignition Master Switch (US Markets Only) - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

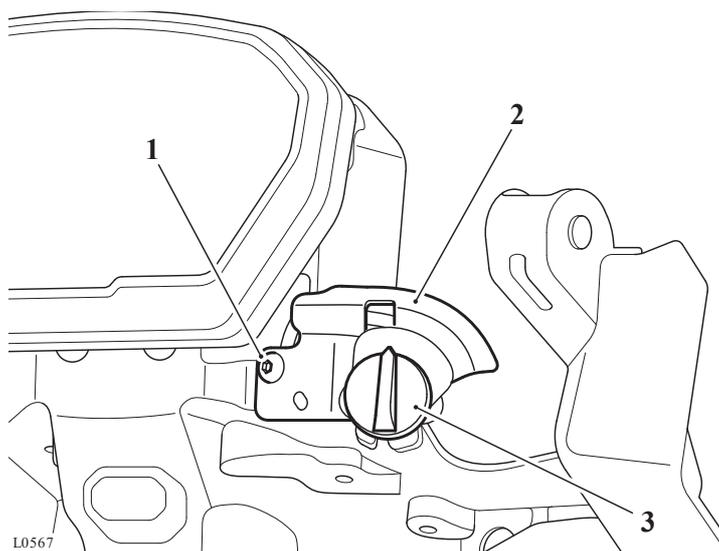
1. Position the master switch to its bracket and secure with the fixings. Tighten to **1.5 Nm**.



L0560

1. **Fixings**
2. **Master switch**
3. **Bracket**

2. Position the master switch and bracket assembly to the front subframe. Ensure the bracket is positioned onto the front subframe locating lug.
3. Secure with the fixing and tighten to **3 Nm**.



L0567

1. **Fixing**
2. **Bracket**
3. **Master switch**

4. Route the master switch as noted during removal and connect to the main harness.
Perform the following operations:

- Windscreen Motor - Installation

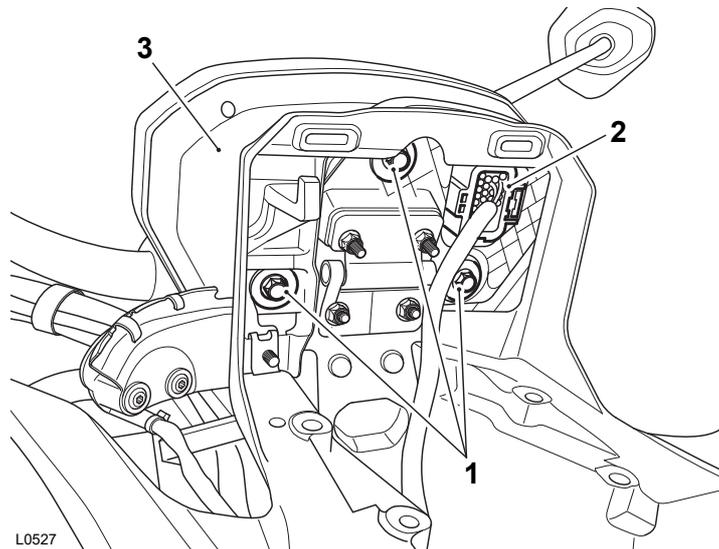
Instruments - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
 - Windscreen Motor - Removal
1. Disconnect the electrical connector from the instruments.
 2. Remove the three fixings and release the instruments from the bracket bayonet fixings. Collect the washers.



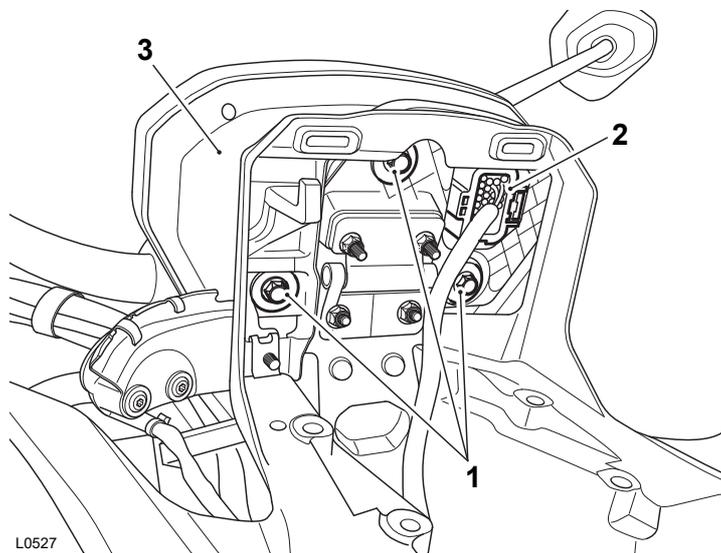
1. **Fixings**
2. **Electrical connector**
3. **Instruments**

Instruments - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Position the instruments to the bracket.
2. Insert the bayonet fixings into the grommets. Fit the washers and fixings and tighten to **3.5 Nm**.
3. Connect the electrical connector to the instruments.



L0527

1. **Fixings**
2. **Electrical connector**
3. **Instruments**

Perform the following operations:

- Windscreen Motor - Installation
- Battery - Installation
- Rider's Seat - Installation

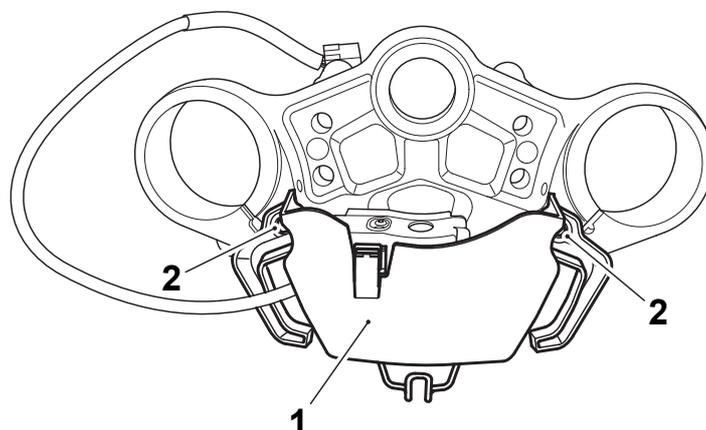
Electronic Steering Lock (ESL) - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

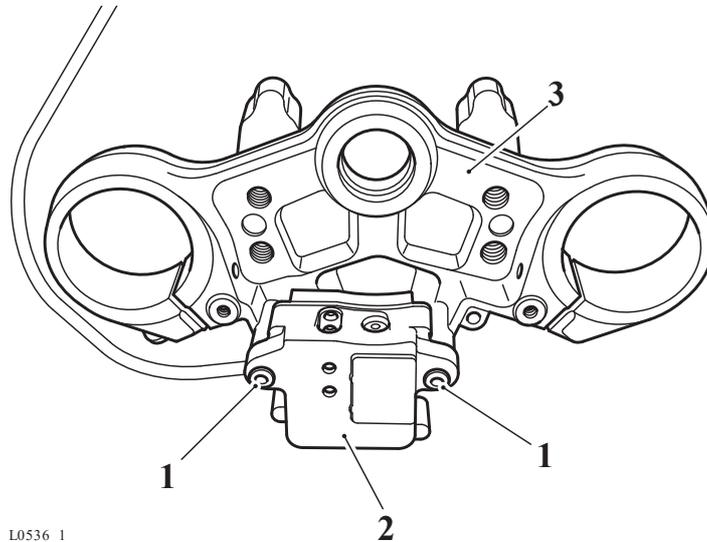
- Rider's Seat - Removal
 - Battery - Removal
 - Upper Yoke - Removal
1. Remove the two steering lock cover fixings.



L0535

1. **Steering lock cover**
2. **Fixings**

2. Carefully separate and remove the upper and lower steering lock covers.
3. Remove the sheared bolts then remove the electronic steering lock.



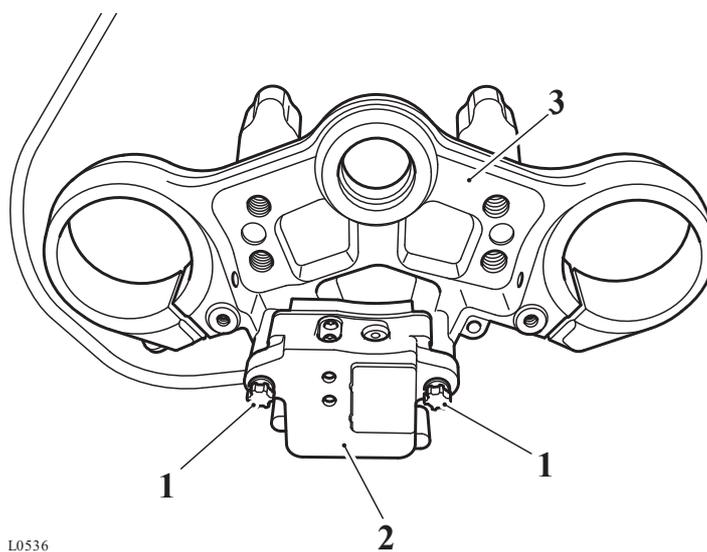
1. Sheared bolts
2. Electronic steering lock
3. Upper yoke

Electronic Steering Lock - Installation

WARNING

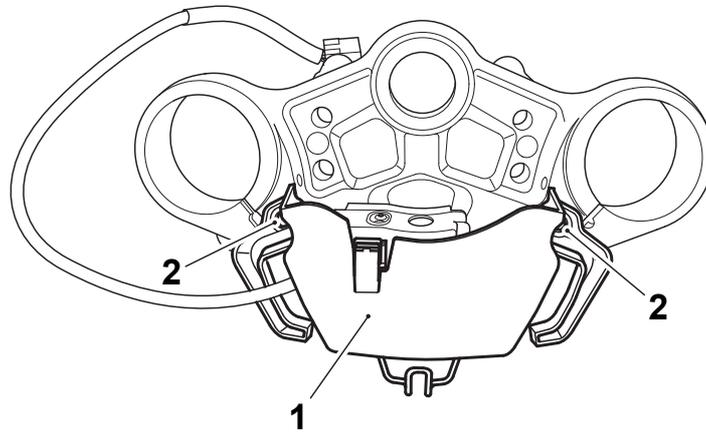
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the electronic steering lock to the upper yoke.
2. Fit new shear bolts and tighten to **16 Nm**.



1. Shear bolts
2. Electronic steering lock

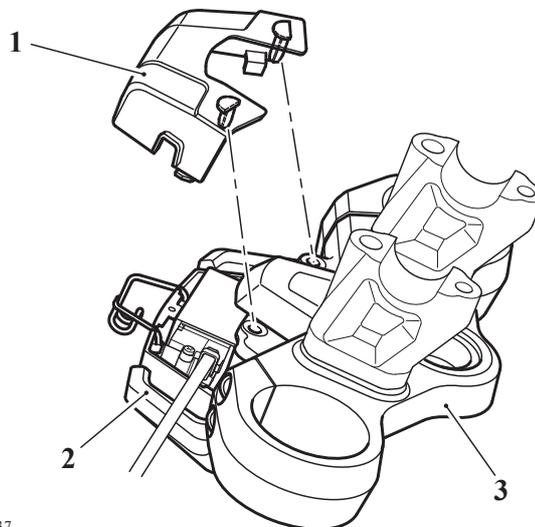
3. Fit the lower steering lock cover to the upper yoke and secure with the fixings. Do not fully tighten at this stage.



L0535

1. Lower cover
2. Fixings

4. Position the upper steering lock cover to the upper yoke and lower steering lock cover. Ensure the steering lock harness is located into the opening on the upper cover.
5. Press the upper cover down onto the lower cover to engage its clips. Ensure that the locating pins on the upper cover locate correctly into the holes on the upper yoke.



L0537

1. Upper cover
2. Lower cover
3. Upper yoke

6. Tighten the lower cover fixings to **3 Nm**.

Perform the following operations:

- Upper Yoke - Installation
- Battery - Installation
- Rider's Seat - Installation

Note

- Replacement electronic steering lock units must be paired to the chassis ECM (see Pairing the Electronic Steering Lock).

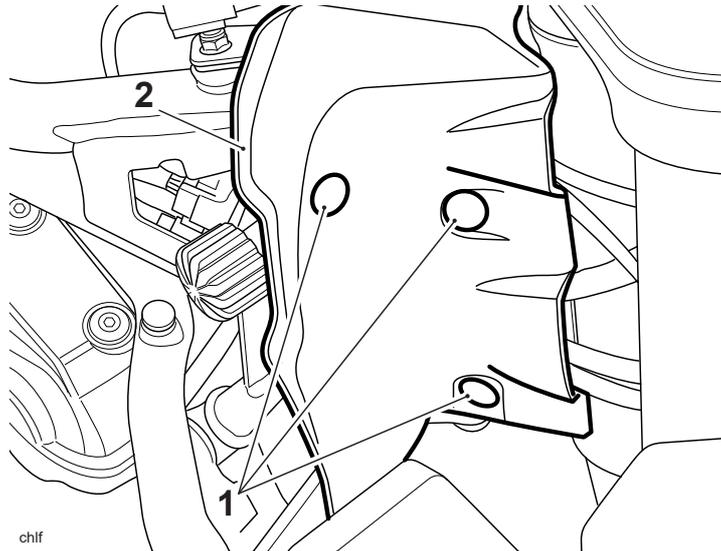
Left Hand Heated Grip and Switch - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

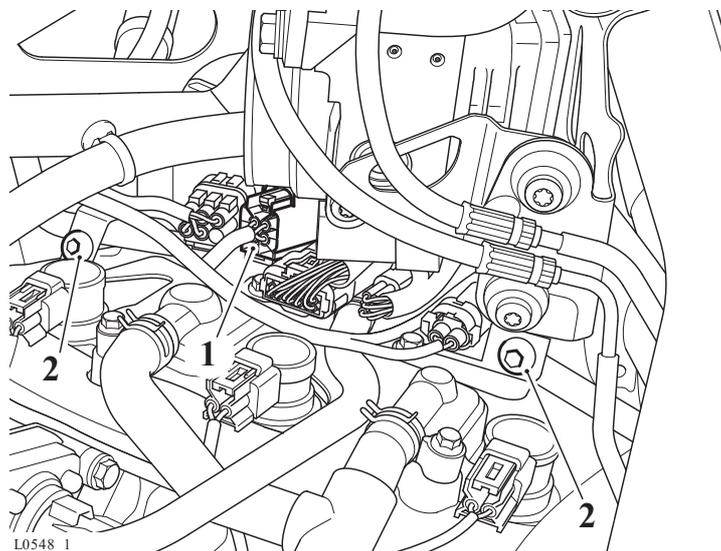
- Rider's Seat - Removal
 - Battery - Removal
 - Fuel Tank - Removal
 - Airbox - Removal
 - Remove the left hand handguard (see Handguards - Removal)
1. Remove the Scrivets and detach the headstock infill panel from the frame.



1. Scrivets
2. Infill panel

Note

- The connector bracket fixings may be removed to allow movement of the bracket for improved access.
2. Detach the heated grip subharness connector from the bracket and disconnect from the main harness.

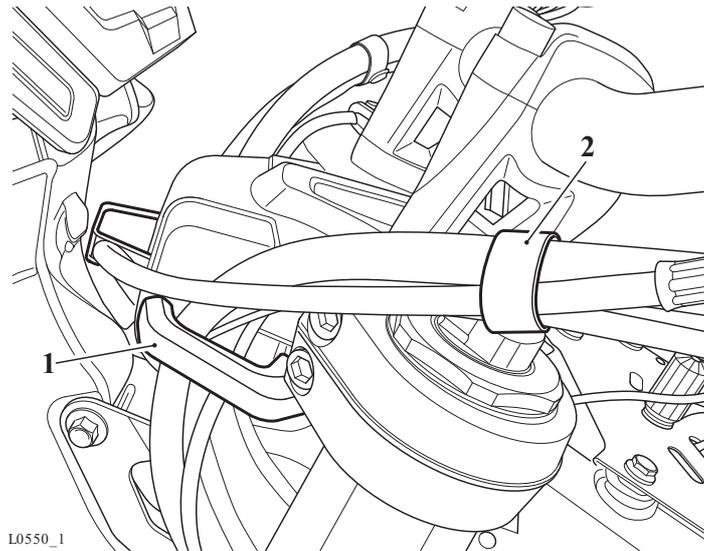


1. Heated grips subharness connector
2. Bracket fixings

Note

- Note the routing of the heated grip subharness for installation.
- Note the routing of the harnesses around the left hand side of the headstock for installation.
- Note the position of the harnesses in the left hand upper yoke harness guide.

3. Route the heated grip subharness out of the frame to the upper yoke harness guide.
4. Detach the heated grip subharness from the harness guide and remove the rubber band.

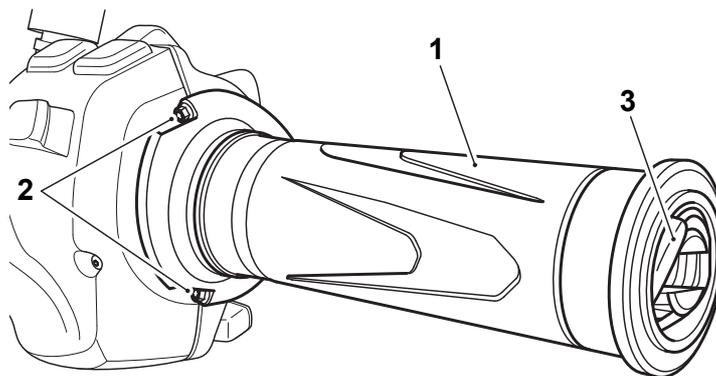


1. Left hand top yoke harness guide
2. Rubber band

Note

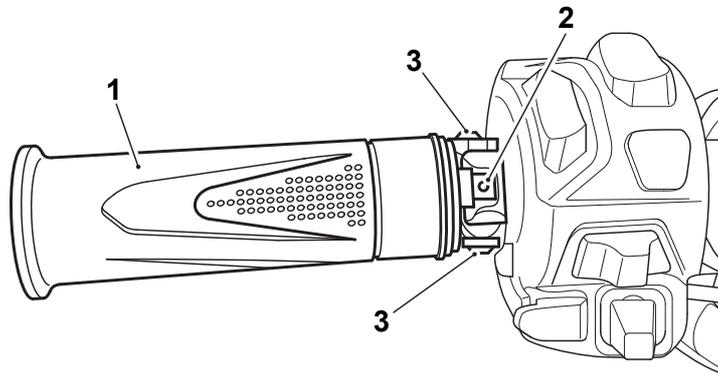
- Note the orientation of the heated grip wires prior to removal of the heated grip.

5. Release the two fixings and remove the heated grip switch housing cover from the left hand grip. Collect the two fixings.



1. Left hand handlebar grip
2. Fixings
3. Heated grip wire

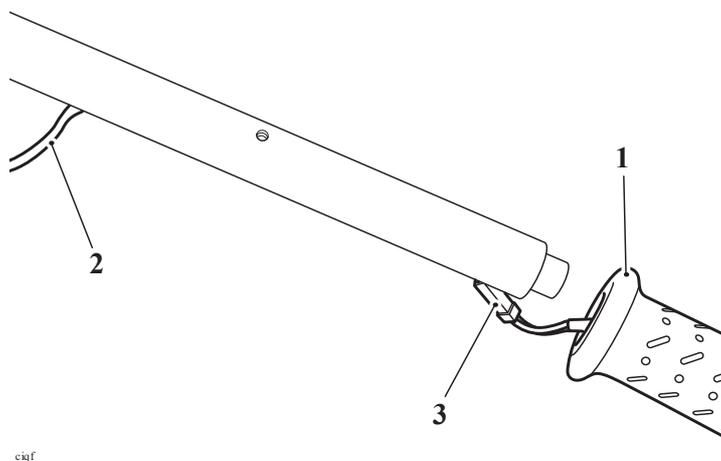
6. Release the two fixings securing the left hand heated grip to the handlebar and collect the two washers.



L0518

1. Heated grip
2. Heated grip switch
3. Fixings

7. Slide the heated grip off the handlebar while carefully feeding the subharness into the handlebar.
8. Disconnect the electrical connector and remove the heated grip.



cigf

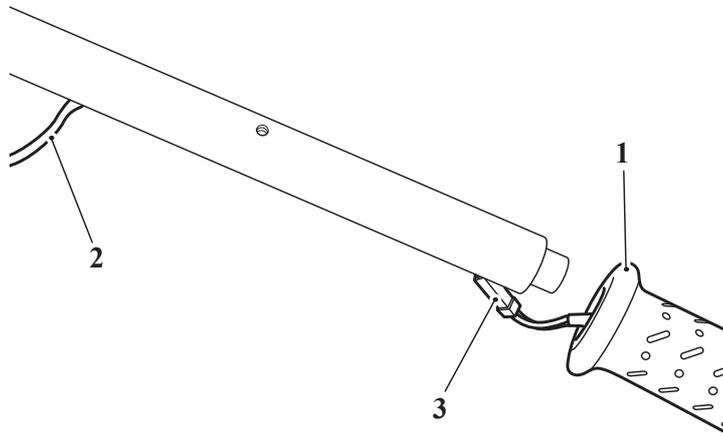
1. Heated grip (left hand)
2. Harness
3. Electrical connector

Left Hand Heated Grip and Switch - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

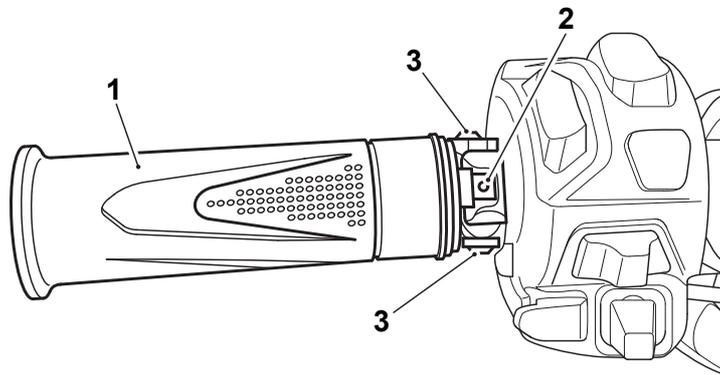
1. Connect the heated grip harness connector to the main harness.
2. Carefully fit the left hand heated grip while pulling the subharness out of the handlebar.



c44f

1. Heated grip (left hand)
2. Harness
3. Electrical connector

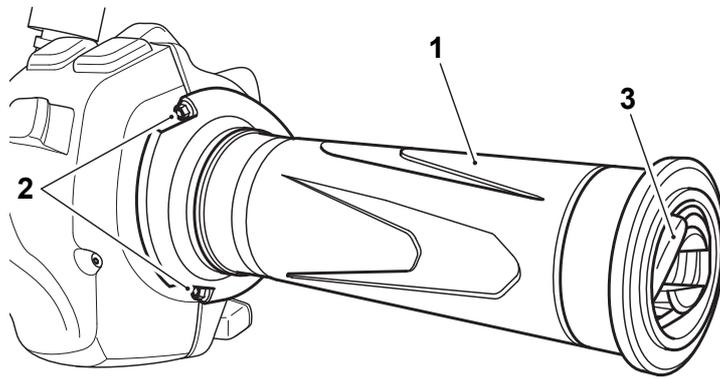
3. Fit the two fixings and washers. Tighten the fixings to **3 Nm**.



L0518

1. Heated grip
2. Heated grip switch
3. Fixings

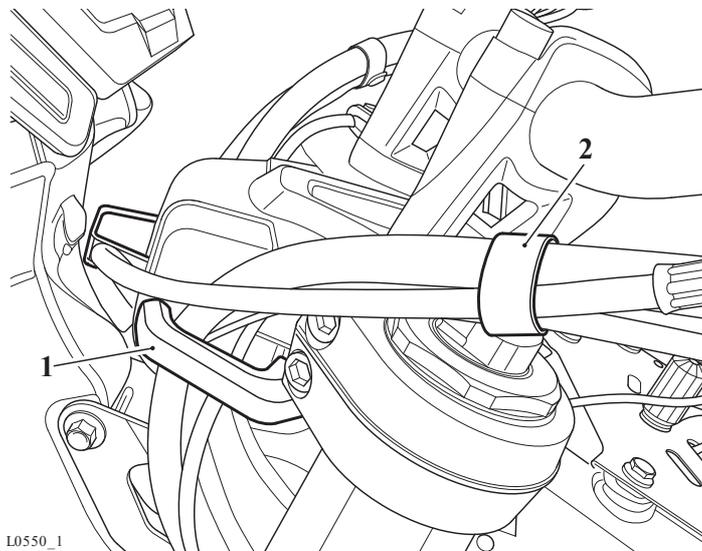
4. Refit the heated grips switch housing covers. Tighten the fixings to **0.5 Nm**.



L0517

- 1. Left hand handlebar grip**
- 2. Fixings**
- 3. Heated grip wire**

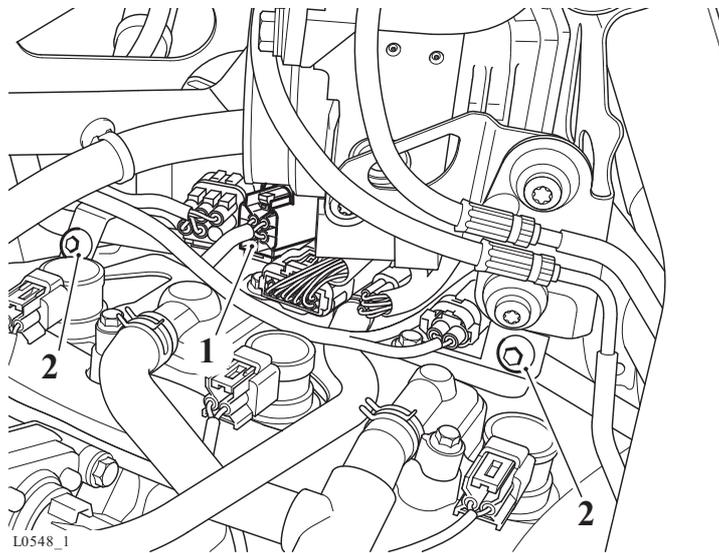
5. Position the heated grip wires as noted during removal.
6. Position the heated grip subharness into the upper yoke harness guide as noted for removal and fit the rubber band.



L0550_1

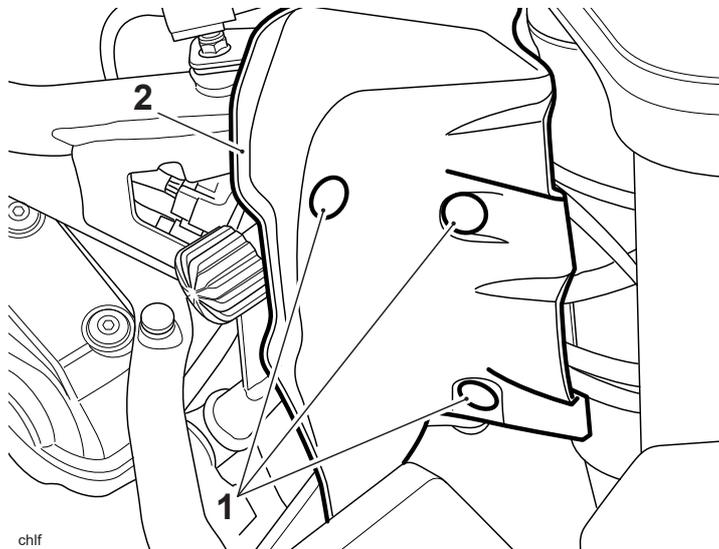
- 1. Harness guide**
- 2. Rubber band**

7. Route the heated grip subharness to the main harness as noted for removal.
8. Connect to the main harness then attach the connector to the bracket.



1. Heated grip subharness connector
2. Bracket fixings

9. If removed, refit the connector bracket fixings and tighten to **3 Nm**.
10. Refit the headstock infill panel and secure with the Scrivets.



1. Scrivets
2. Infill panel

Perform the following operations:

- Handguards - Installation
- Airbox - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Left Hand Switch Housing - Removal



WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

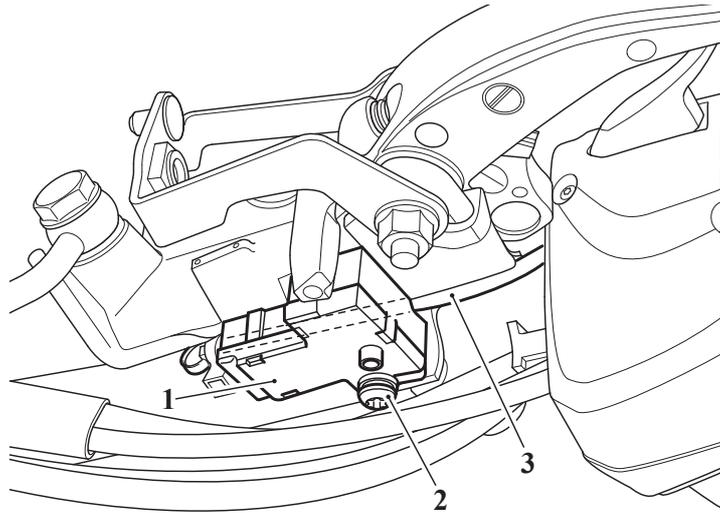
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Left Hand Heated Grip and Switch - Removal

Note

- **Note the routing of the clutch switch harness for installation.**

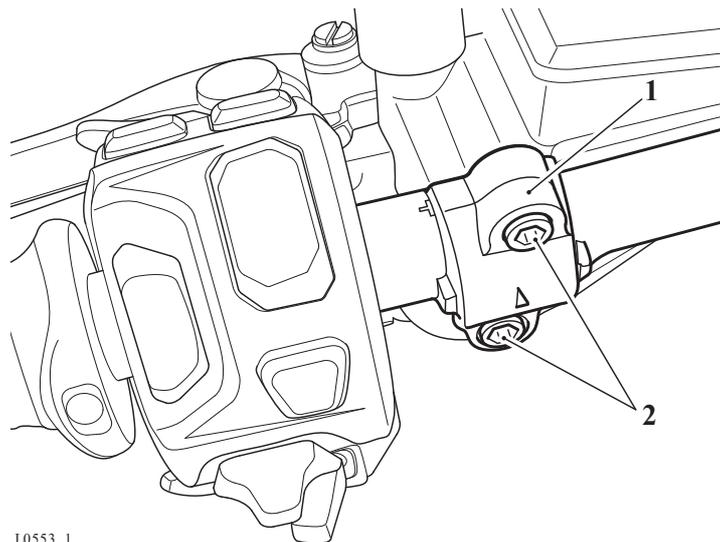
1. Release the fixing and detach the clutch switch from the master cylinder.



L0546

- 1. Clutch switch**
- 2. Fixing**
- 3. Harness**

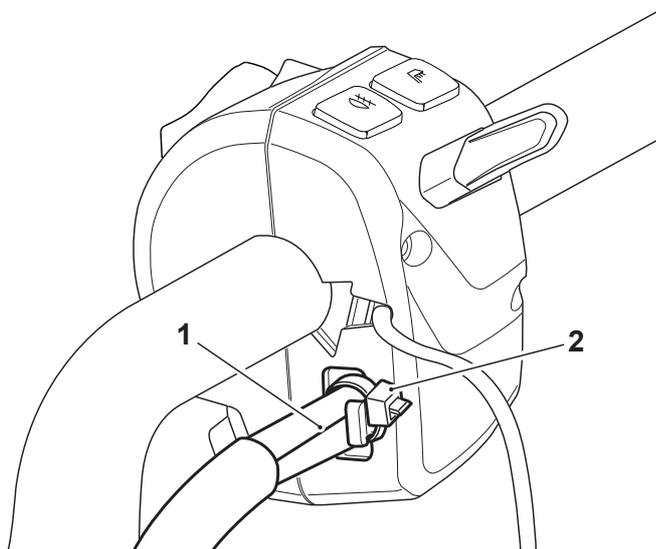
2. Release the handlebar clamp screws and remove the clamp from the clutch master cylinder. Taking care to not invert the clutch fluid reservoir, lay the assembly aside.



L0553_1

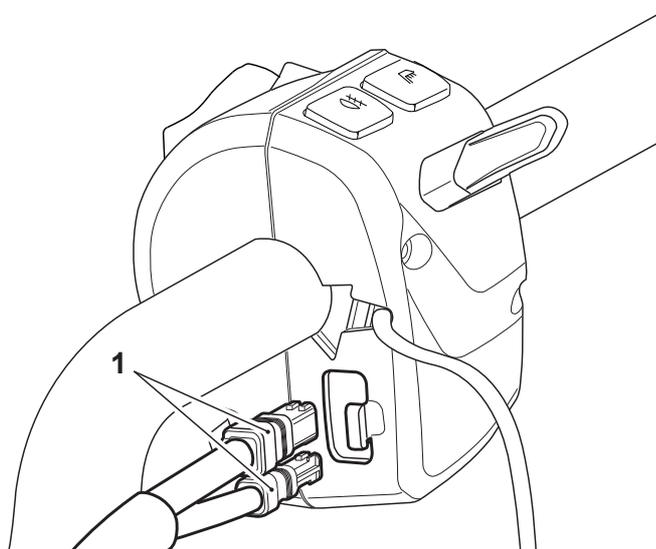
- 1. Clamp**
- 2. Fixings**

3. Remove the cable tie securing the switch housing wiring harness to the left hand switch housing.



1. Wiring harness
2. Cable tie

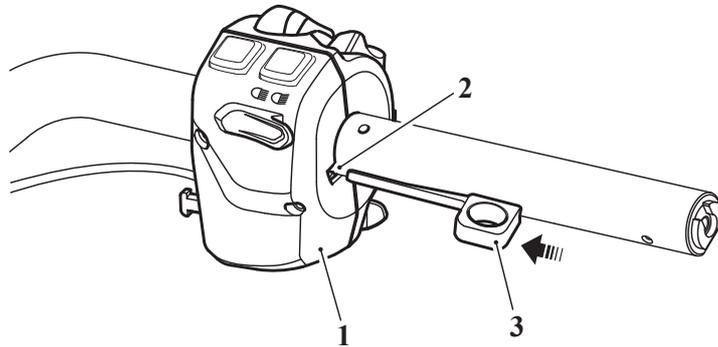
4. Gently pull on the wiring harness to disconnect the switch housing connectors.



1. Switch housing connectors

Note

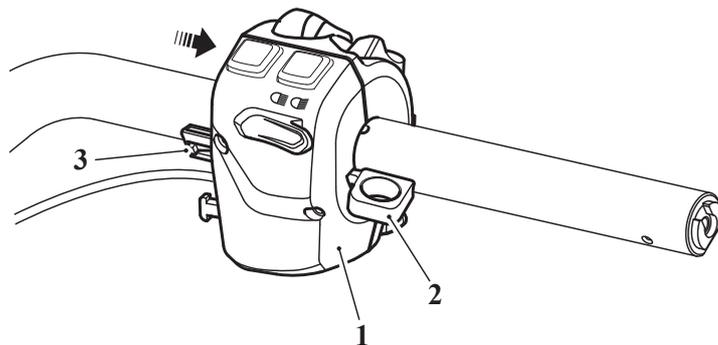
- The T3880369 - Switch Housing Removal Tool is required to release the handlebar switch housings from their retaining clips.
 - When inserting T3880369 - Switch Housing Removal Tool into the switch housing, a click can be felt/heard as the retaining clip is released.
 - The retaining clip will remain in position on the handle bar as the switch housing is removed. Note the position and orientation of the clip for installation.
5. Insert T3880369 - Switch Housing Removal Tool into the opening on the left hand switch housing until a click is felt/heard.



L0386_1

1. **Left hand switch housing**
2. **Opening**
3. **T3880369 - Switch Housing Removal Tool**

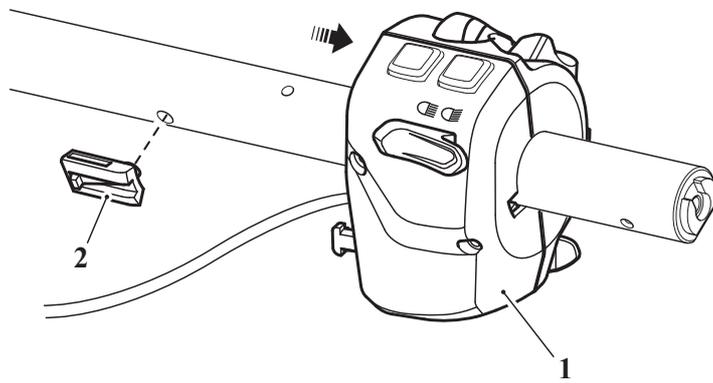
6. Slide the switch housing towards the end of the handlebar to free it from the retaining clip.
7. Withdraw T3880369 - Switch Housing Removal Tool from the switch housing.



L0386_2

1. **Left hand switch housing**
2. **T3880369 - Switch Housing Removal Tool**
3. **Retaining clip**

8. Slide the switch housing off the handlebar and collect the retaining clip.



L0385

1. Switch housing
2. Retaining clip

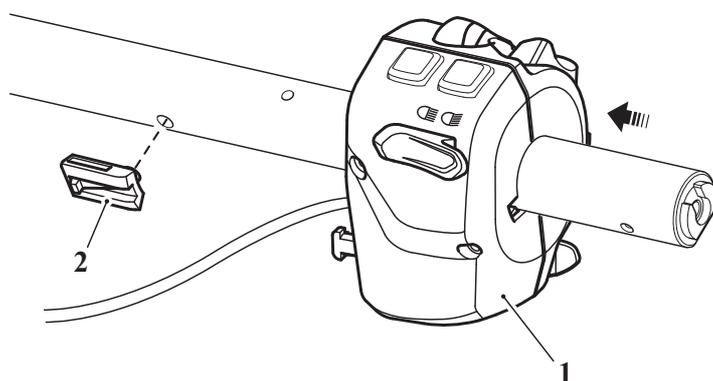
Left Hand Switch Housing - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- During installation make sure the damper rubber remains seated in the groove of the switch housing.
1. Position a new retaining clip into the handlebar in the orientation noted during removal and slide the switch housing onto the handlebar.
 2. Slide over the retaining clip until it locks into position.



L0385

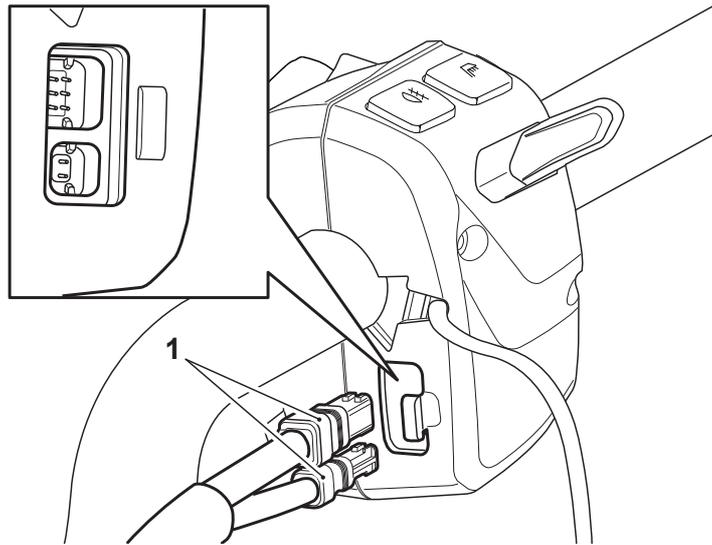
1. Switch housing
2. Retaining clip

Note

Note

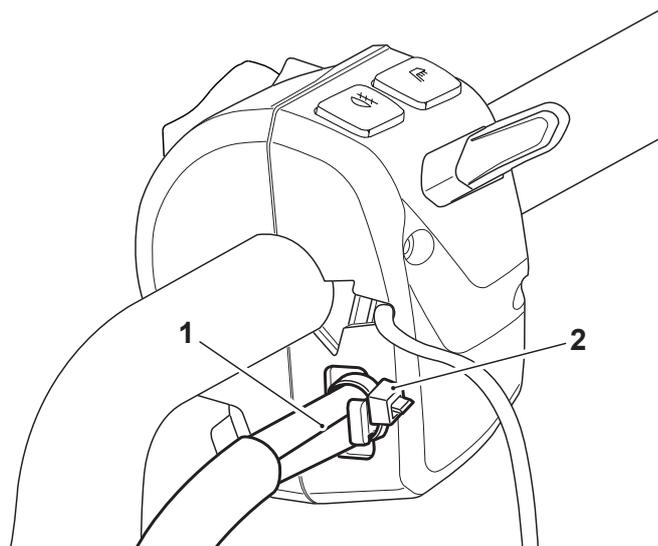
- The switch housing electrical connections are recessed into the switch housing body.
- To aid orientation, there are coloured dots on each connector. The coloured dots identify the bottom face of the connector.
- When inserting the connectors, carefully locate the connectors into their sockets, then use a suitable tool to push the connectors fully home. An audible click can be heard when the connectors are fully inserted.
- Do not use sharp tools, such as a flat bladed screw driver, to insert the connectors.

3. Fit the switch housing connectors.



1. Switch housing connectors

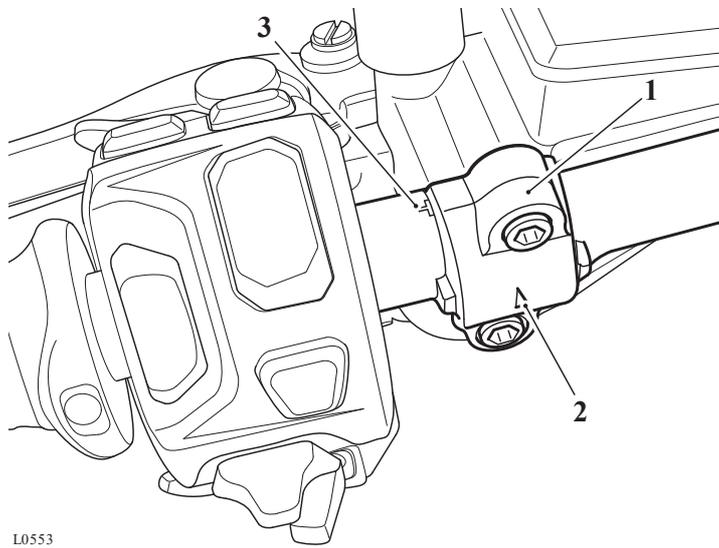
4. Using a new cable tie, secure the switch housing wiring harness to the left hand switch housing.



1. Wiring harness

2. Cable tie

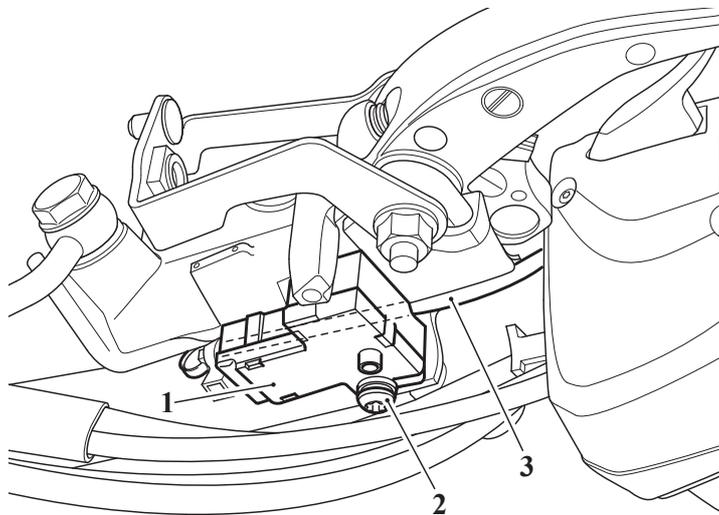
5. Locate the clutch master cylinder to the handlebars and position the clamp with the 'UP' arrow pointing upwards. Align the master cylinder/clamp split line with the alignment mark on the handlebar.
6. Tighten the clamp bolts, upper first and then lower, to **12 Nm**.



L0553

1. **Clamp**
2. **'UP' arrow**
3. **Alignment mark**

7. Position the clutch switch to the master cylinder, routing the harness as noted during removal. Secure with the fixing and tighten to **2 Nm**.



L0546

1. **Clutch switch**
2. **Fixing**
3. **Harness**

Perform the following operations:

- Left Hand Heated Grip and Switch - Installation
- Battery - Installation
- Rider's Seat - Installation
- Check for correct operation of the handlebar switches. Rectify if necessary.

 **WARNING**

WARNING

Move the handlebars to left and right full lock while checking that the brake hose, clutch hose and electrical harnesses do not bind or that the steering feels tight or difficult to turn. A hose, cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

Check for correct operation of the front brake, clutch and twist grip. Check that the brake hose, clutch hose and electrical harnesses do not bind or restrict the steering when the handlebars are turned from lock-to-lock. Rectify as necessary.

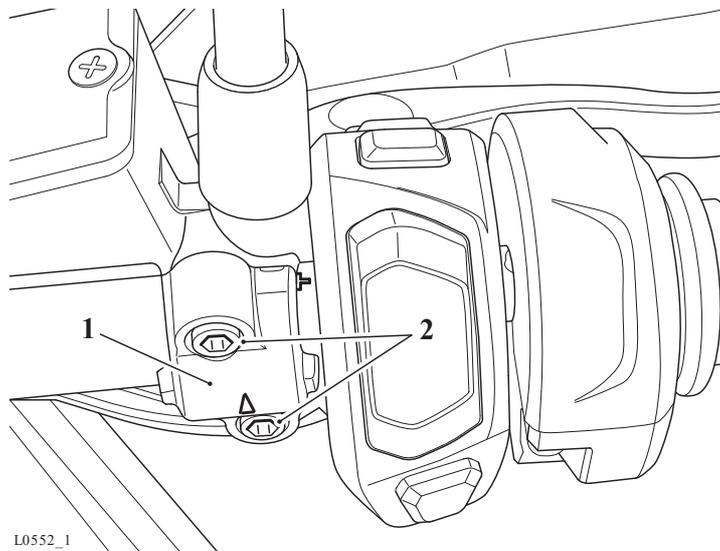
Right Hand Switch Housing - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Twist Grip Position Sensor - Removal
- Release the bolts and remove the clamp from the front brake master cylinder. Taking care to not invert the brake fluid reservoir, lay the assembly aside.

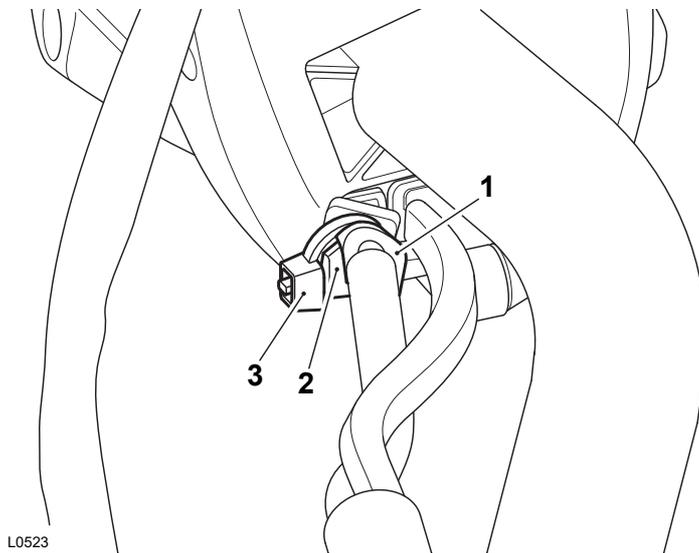


1. Clamp
2. Fixings

Note

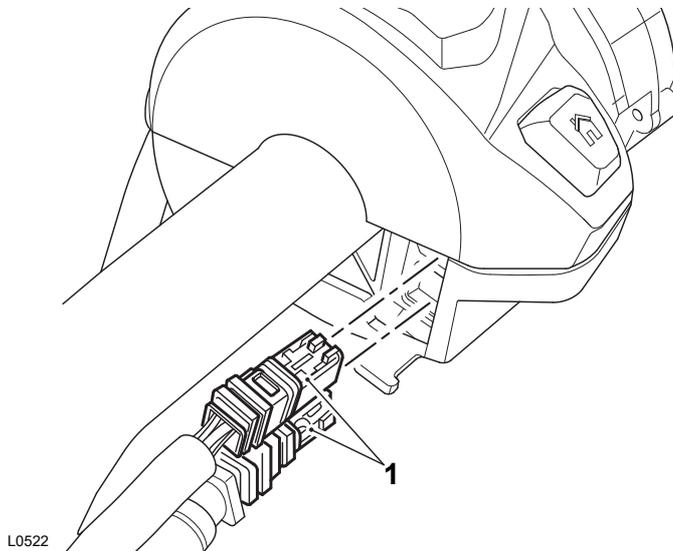
- The harness with the grey connector and the rubber harness shroud is secured with a cable tie.
- The harness with the black connector and no rubber shroud is not be secured to the switch housing with the cable tie.

1. Remove the cable tie securing the wiring harness to the switch housing.



1. Rubber shroud
2. Switch housing
3. Cable tie

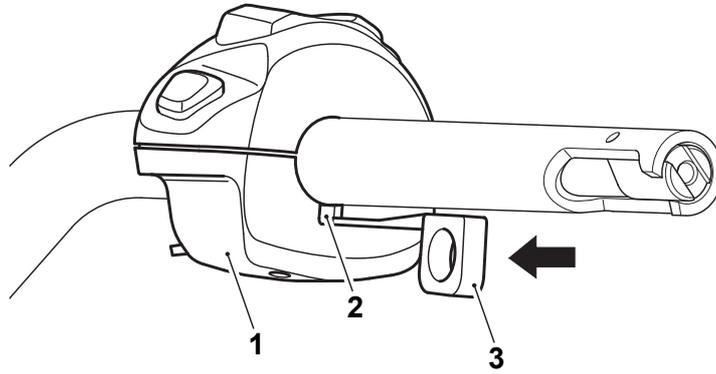
2. Gently pull on the wiring harness to disconnect the switch housing connectors.



1. Switch housing connectors

Note

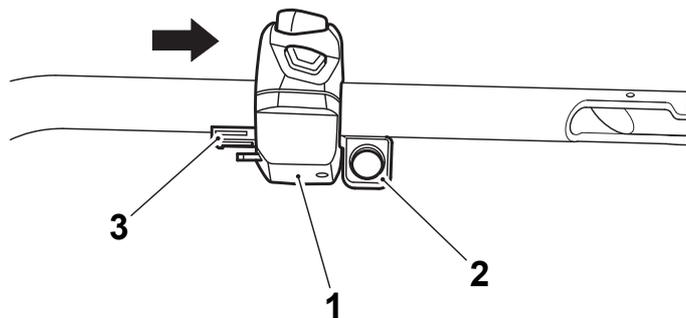
- The T3880369 - Switch Housing Removal Tool is required to release the Switch housings from their retaining clips.
 - When inserting T3880369 - Switch Housing Removal Tool into the switch housing, a click can be felt/heard as the retaining clip is released.
 - The retaining clip will remain in position on the handle bar as the switch housing is removed. Note the position and orientation of the clip for installation.
3. Insert T3880369 - Switch Housing Removal Tool into the opening on the switch housing until a click is felt/heard.



L0519

1. **Switch housing**
2. **Opening**
3. **T3880369 - Switch Housing Removal Tool**

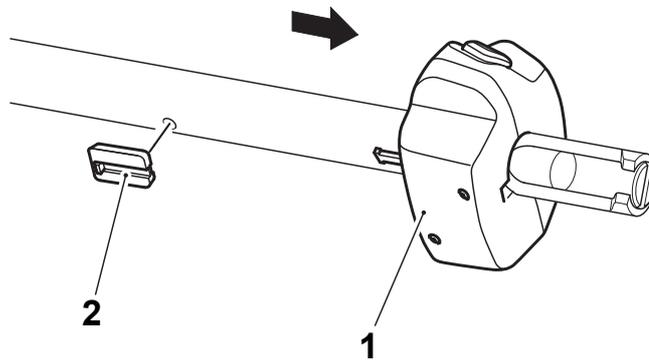
4. Slide the switch housing towards the end of the handlebar to free it from the retaining clip.
5. Withdraw T3880369 - Switch Housing Removal Tool from the switch housing.



L0520

1. **Switch housing**
2. **T3880369 - Switch Housing Removal Tool**
3. **Retaining clip**

6. Slide the switch housing off the handlebar and collect the retaining clip.



L0521

1. Switch housing
2. Retaining clip

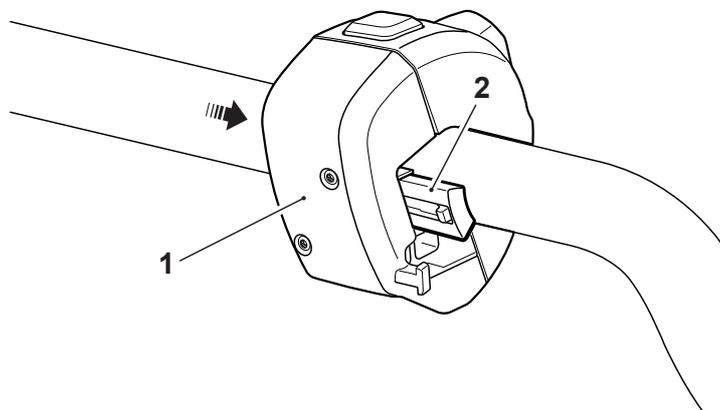
Right Hand Switch Housing - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- During installation make sure the damper rubber remains seated in the groove of the switch housing.
1. Position a new retaining clip into the handlebar in the orientation noted during removal and slide the switch housing onto the handlebar.
 2. Slide over the retaining clip until it locks into position.

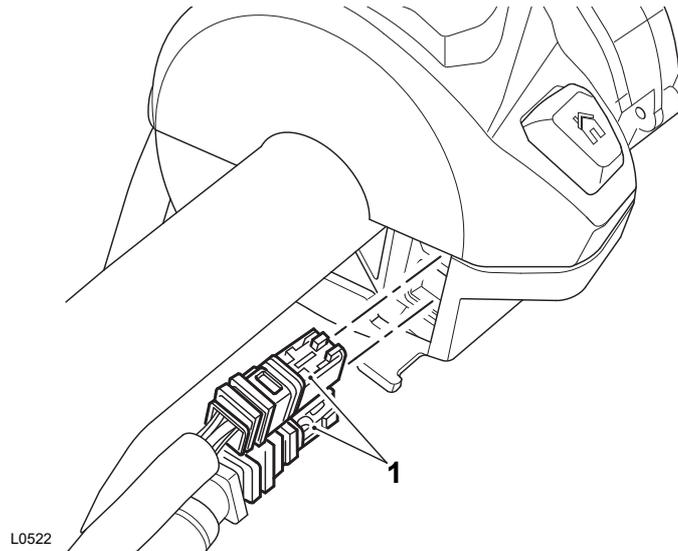


1. Right hand switch housing
2. Retaining clip

Note

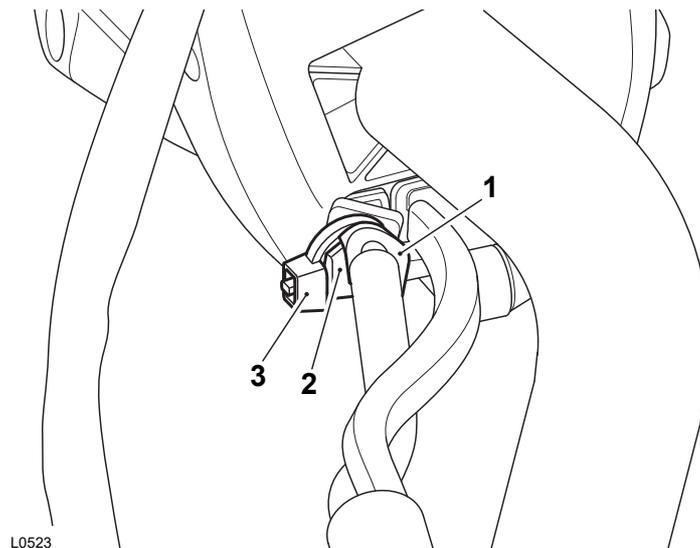
Note

- To aid orientation, there are coloured dots on each connector. The coloured dots identify the bottom face of the connector.
 - When inserting the connectors, carefully locate the connectors into their sockets, then use a suitable tool to push the connectors fully home. An audible click can be heard when the connectors are fully inserted.
 - Do not use sharp tools, such as a flat bladed screw driver to insert the connectors.
3. Fit the switch housing connectors.



1. Switch housing connectors

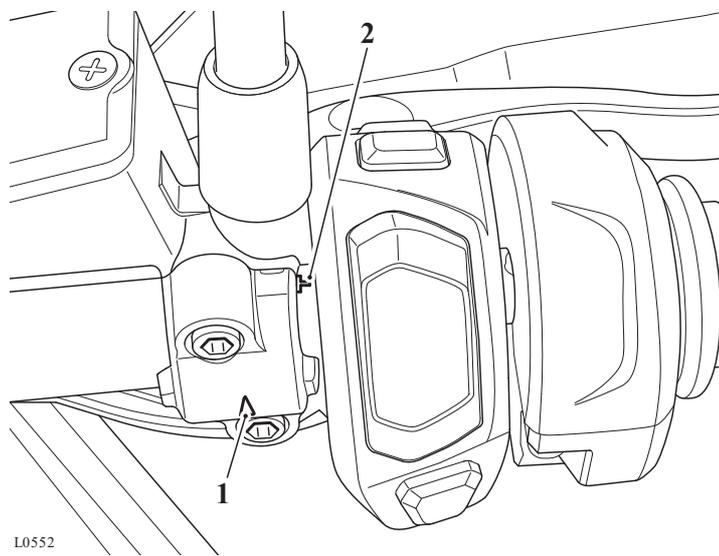
4. Using a new cable tie, secure the wiring harness with the rubber shroud only to the switch housing.



1. Rubber shroud
2. Switch housing
3. Cable tie

Perform the following operations:

- Locate the front brake master cylinder to the handlebars and position the clamp with the 'UP' arrow pointing upwards. Align the master cylinder/clamp split line with the alignment mark on the handlebar.
- Tighten the clamp fixings, upper first and then lower to **12 Nm**.



L0552

1. 'UP' arrow
2. Alignment mark

- Twist Grip Position Sensor - Installation
- Battery - Installation
- Rider's Seat - Installation
- Check for correct operation of the handlebar switches. Rectify if necessary.

WARNING

Move the handlebars to left and right full lock while checking that the brake hose, clutch hose and electrical harnesses do not bind or that the steering feels tight or difficult to turn. A hose, cable or harness that binds, or steering that is tight/difficult to turn will restrict the steering and may cause loss of control and an accident.

Check for correct operation of the front brake, clutch and twist grip. Check that the brake hose, clutch hose and electrical harnesses do not bind or restrict the steering when the handlebars are turned from lock-to-lock. Rectify as necessary.

Inertial Measurement Unit (IMU) - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Fuel Tank - Removal
- Seat Bridge - Removal

CAUTION

CAUTION

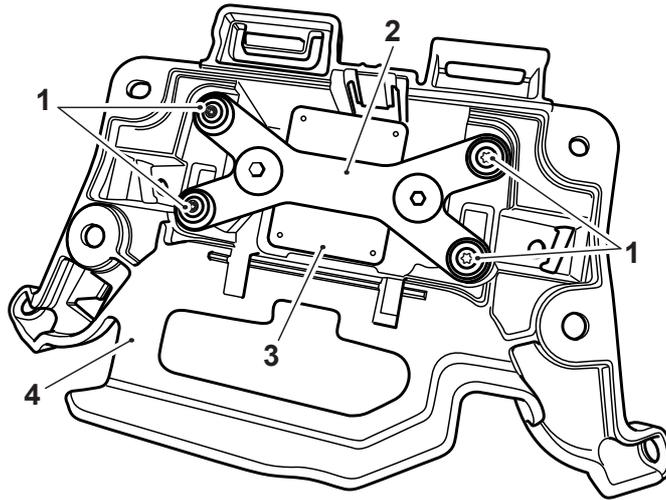
The Inertial Measurement Unit (IMU) is a highly sensitive device. Exposure to excessive shock and vibration can cause permanent damage to IMU internal components.

Care must be taken when removing or installing the IMU, not to expose it to excessive shock or vibration. When releasing or tightening fixings, use suitable hand tools only. Do not use air or battery powered tools.

When removed from the motorcycle, place the IMU on a flat surface in a location that is isolated from shock and vibrations caused by other workshop processes.

Do not drop the IMU. An IMU that has been dropped will be irreparably damaged and must be replaced.

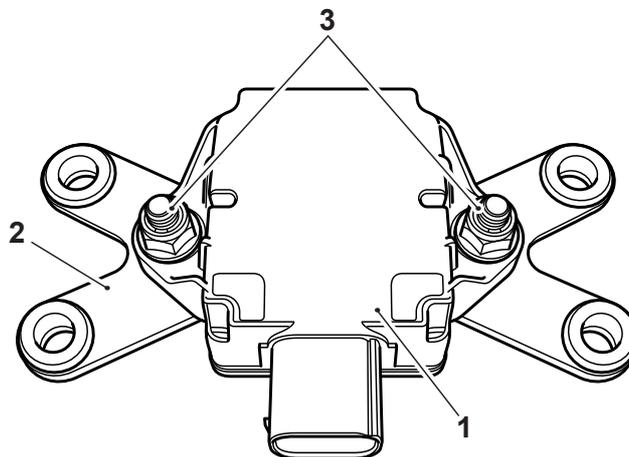
1. Using a suitable hand tool, release the fixings and remove the IMU and bracket assembly from the seat bridge.



cju

1. **Fixings**
2. **Bracket**
3. **Inertial measurement unit (IMU)**
4. **Seat bridge**

2. Release the fixings and remove the bracket from the IMU.



cjv

1. **Inertial measurement unit (IMU)**
2. **Bracket**
3. **Fixings**

Inertial Measurement Unit (IMU) - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

CAUTION

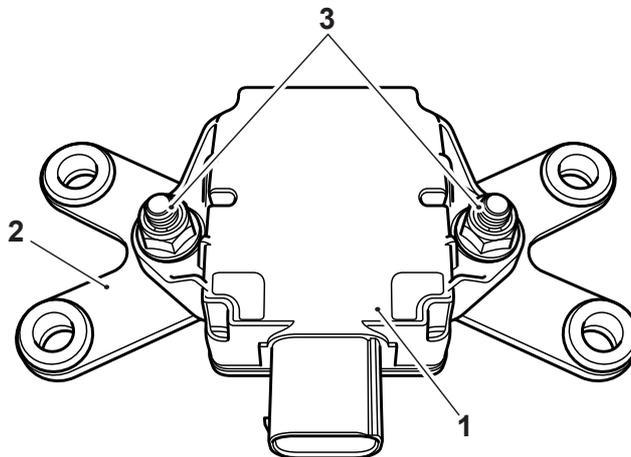
The Inertial Measurement Unit (IMU) is a highly sensitive device. Exposure to excessive shock and vibration can cause permanent damage to IMU internal components.

Care must be taken when removing or installing the IMU, not to expose it to excessive shock or vibration. When releasing or tightening fixings, use suitable hand tools only. Do not use air or battery powered tools.

When removed from the motorcycle, place the IMU on a flat surface in a location that is isolated from shock and vibrations caused by other workshop processes.

Do not drop the IMU. An IMU that has been dropped will be irreparably damaged and must be replaced.

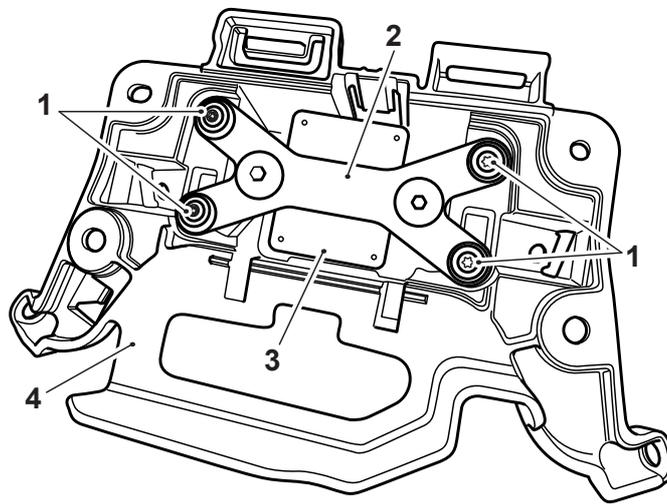
1. Refit the bracket to the Inertial Measurement Unit (IMU) and secure with the fixings. Using a suitable hand tool, tighten the fixings to **8 Nm**.



cjiv

1. **Inertial measurement unit (IMU)**
2. **Bracket**
3. **Fixings**

2. Carefully position the IMU and bracket assembly to the seat bridge, ensuring that the grommets on the IMU bracket locate correctly onto the mountings on the seat bridge.
3. Secure with the fixings and using a suitable hand tool, tighten to **1.5 Nm**.



cju

1. **Fixings**
2. **Bracket**
3. **Inertial measurement unit (IMU)**
4. **Seat bridge**

Perform the following operations:

- Seat Bridge - Installation
- Fuel Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Chassis Electronic Control Module (ECM) - Removal

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Disconnect the chassis ECM connectors (see Chassis ECM Connectors).
 2. Remove the chassis ECM from the under seat tray.

Chassis Electronic Control Module (ECM) - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Refit the chassis ECM to the under seat tray.
2. Reconnect the chassis ECM connectors (see Chassis ECM Connectors).

Perform the following operations:

- Battery - Installation
- Rider's Seat - Installation

Note

Note

- If a replacement chassis ECM is fitted, it must be setup as described in Replacement Chassis ECM - Setup Flow Chart

Swinging Arm Position Sensor - Removal

WARNING

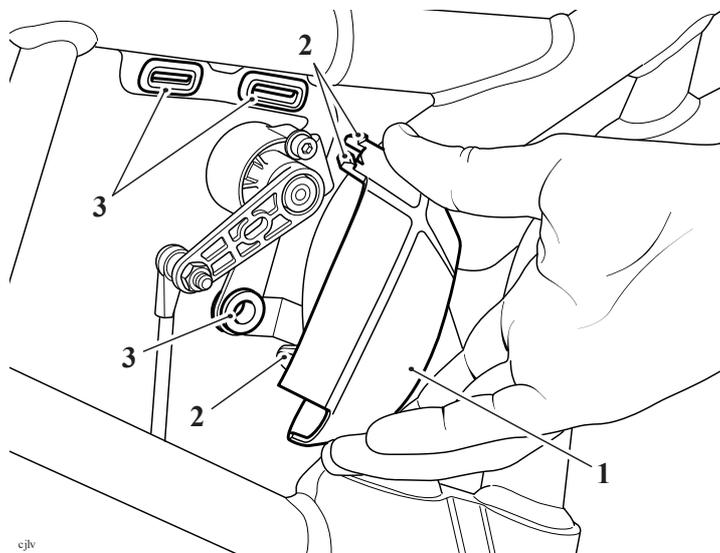
If the engine has recently been running, the exhaust components may be hot to the touch. Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
 - Battery - Removal
1. Release the tangs from the grommets and remove the sensor cover.



1. Sensor cover
2. Tangs
3. Grommets

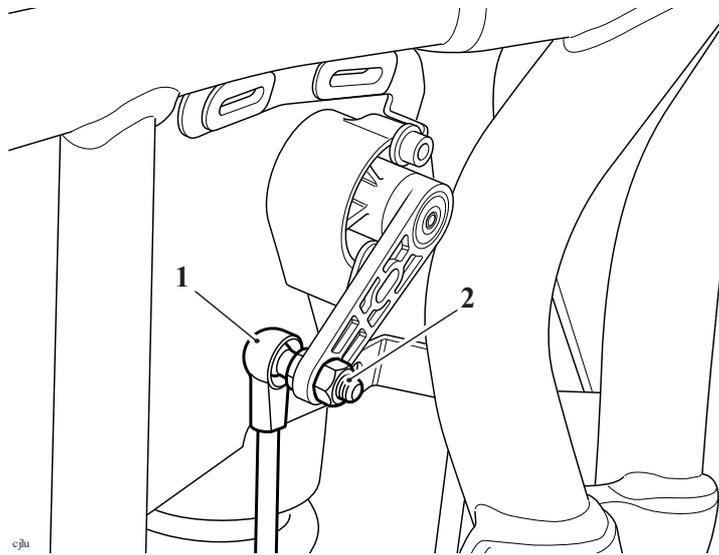
CAUTION

The swinging arm position sensor's actuator arm operates vertically.

Do not allow the actuator arm to twist or bend during removal of the ball stud.

Twisting or bending the actuator arm may cause damage to the actuator arm or the internal components of the swinging arm position sensor.

2. Release the link rod from the ball stud.

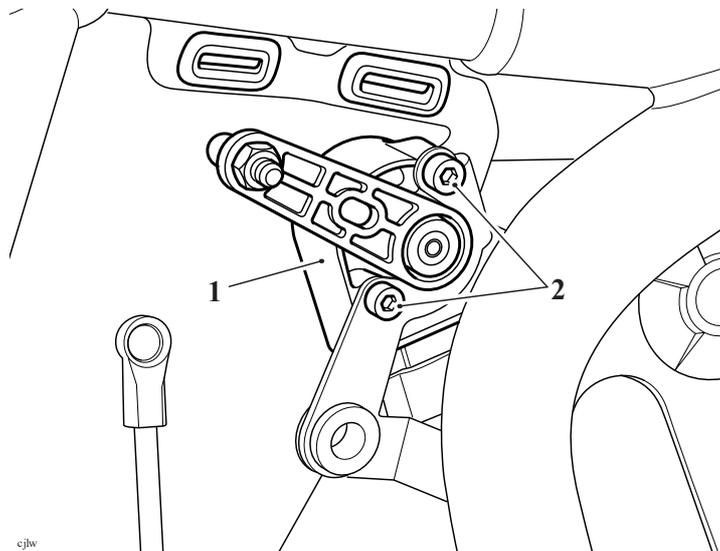


1. Link rod
2. Ball stud

Note

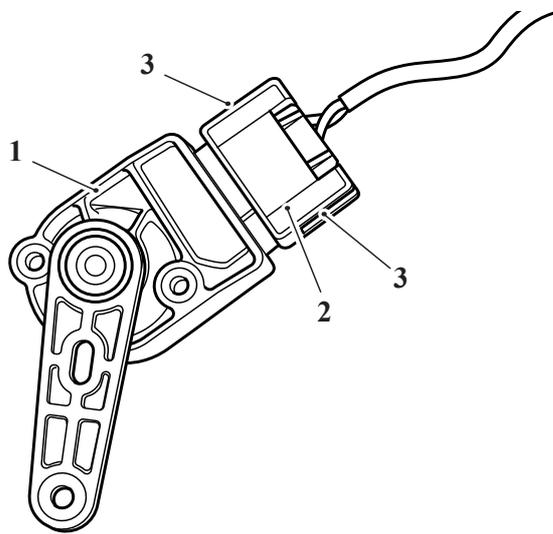
- To gain access to the electrical connector the position sensor must first be released from its fixings.

3. Release the fixings and remove the position sensor.



1. Position sensor
2. Fixings

4. Release the tangs and disconnect the position sensor from its electrical connector.



ejks

1. Position sensor
2. Electrical connector
3. Tangs

Swinging Arm Position Sensor - Installation

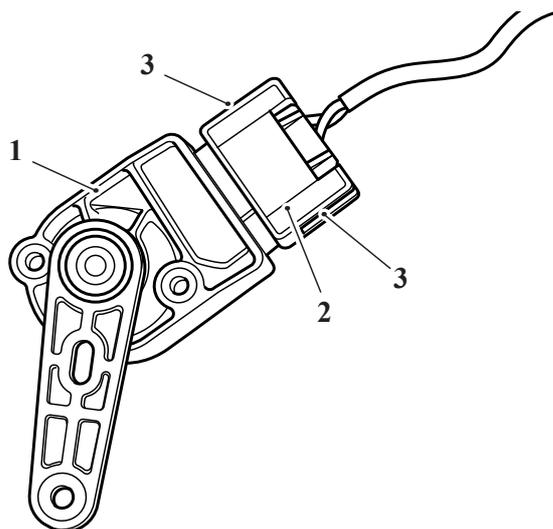
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Note

- Prior to installing the position sensor the electrical connector must first be connected.

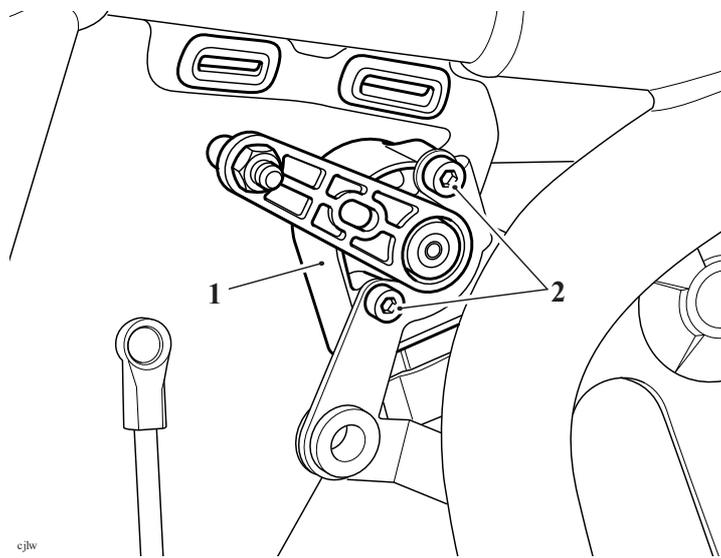
1. Connect the position sensor to its electrical connector.



ejks

1. Position sensor
2. Electrical connector
3. Tangs

2. Align the position sensor to the frame and tighten the fixings to **4 Nm**.



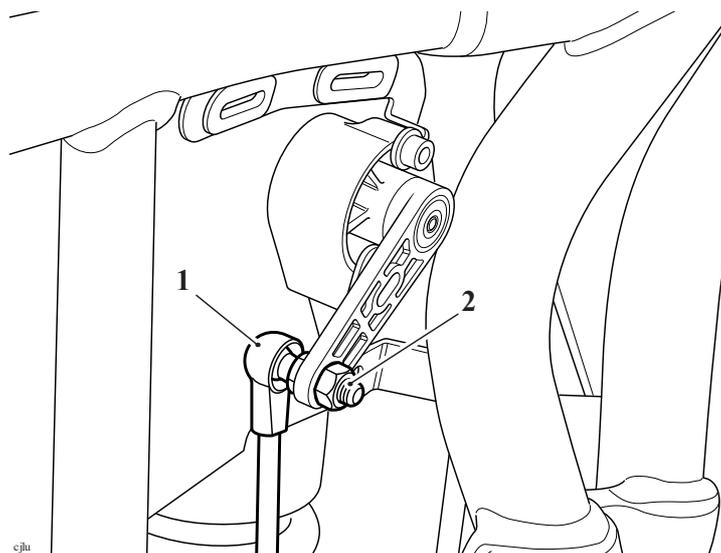
1. Position sensor
2. Fixings

⚠ CAUTION

The swinging arm position sensor's actuator arm operates vertically. Care should be taken to not allow the actuator arm to twist or bend during removal of the ball stud. Twisting or bending the actuator arm may cause damage to the actuator arm or the internal components of the swinging arm position sensor.

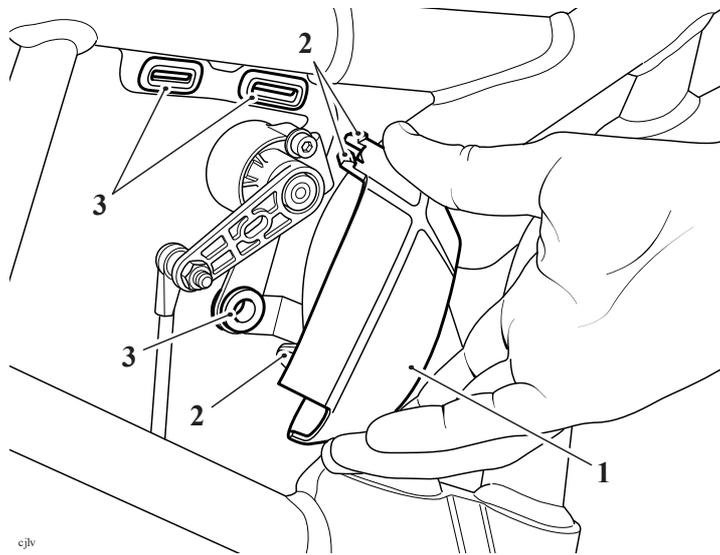
Note

- Apply a smear of proprietary general purpose grease to NLGI 2 standard to the ball stud.
 - If the ball stud is removed from the sensor for any reason a new ball stud must be fitted.
3. Position the ball stud to the link rod socket as noted during removal.



1. Link rod socket
2. Ball stud

4. Refit the sensor cover.



1. **Sensor cover**
2. **Tangs**
3. **Grommets**

Perform the following operations:

- Battery - Installation
- Rear Suspension Unit Preload Motor - Calibration
- Swinging Arm Position Sensor - Calibration
- Rider's Seat - Installation

Side Stand Switch - Removal

 **WARNING**

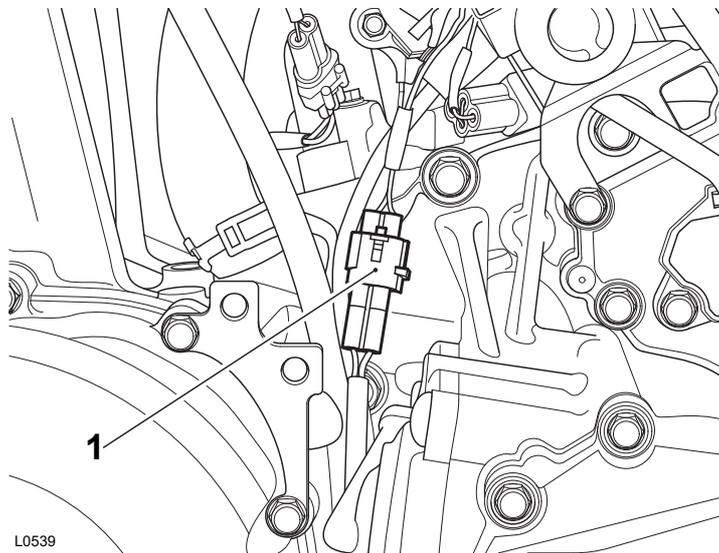
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Expansion Tank - Removal

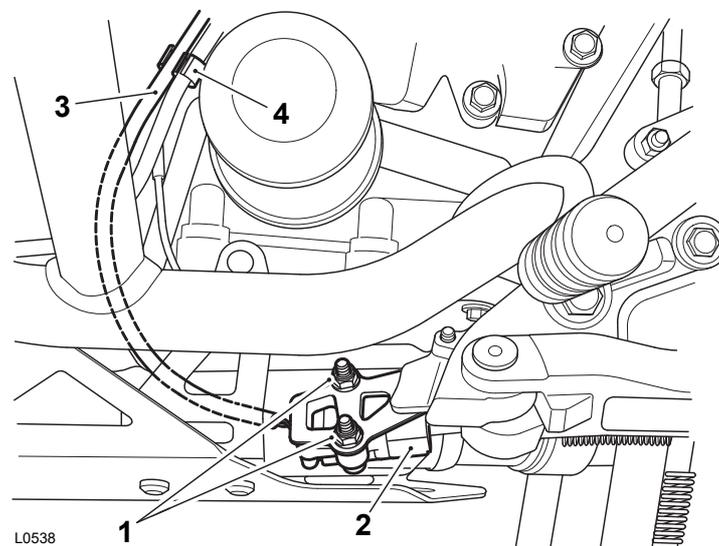
Note

- **Note the routing of the side stand switch harness for installation.**
1. Disconnect the side stand switch electrical connector from the main harness and feed it down to the side stand switch.



1. Side stand switch electrical connector

2. Free the side stand switch harness from its clip on the starter motor power lead.
3. Remove the fixings and remove the side stand switch. Discard the lock nuts.



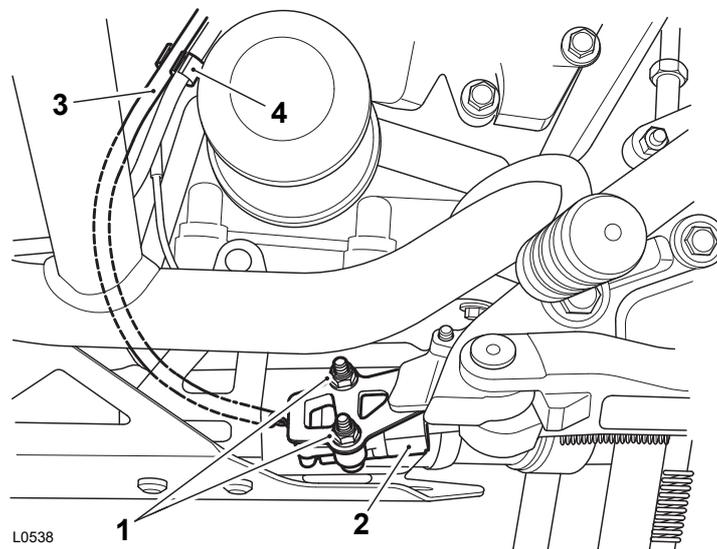
1. Fixings
2. Side stand switch
3. Side stand switch harness
4. Clip

Side Stand Switch - Installation



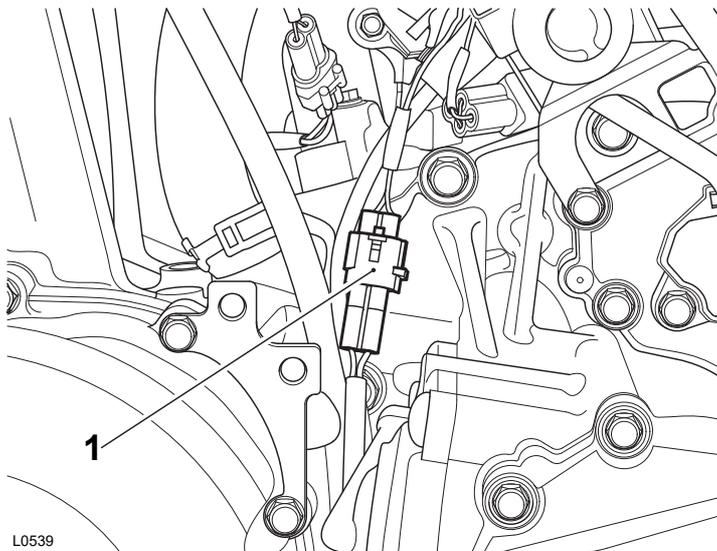
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Refit the side stand switch and secure with the fixings and new lock nuts. Tighten the fixings to **7 Nm**.



1. Side stand switch
2. Fixings
3. Fly lead
4. Clip

2. Route the side stand switch harness as noted during removal and secure to the clip on the starter motor power lead.
3. Connect the side stand switch electrical connector to the main harness.



1. Side stand switch electrical connector

Perform the following operations:

- Expansion Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Low Frequency (LF) Antenna - Removal



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

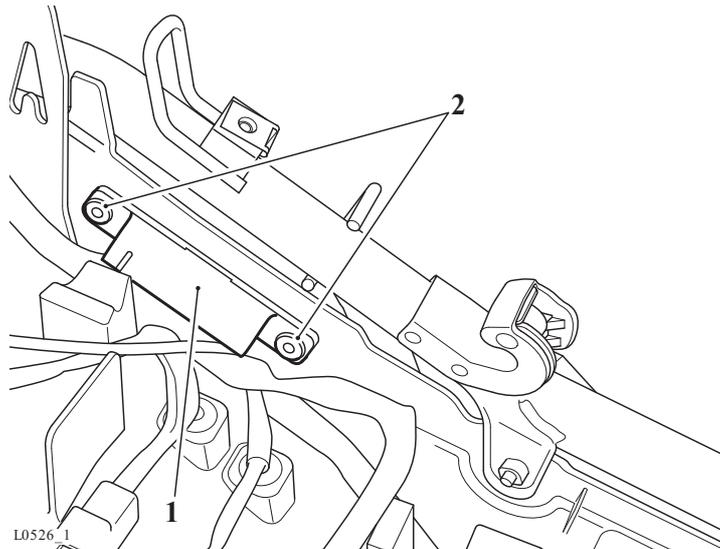
Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal

Note

- Note the routing of the LF antenna harness for installation.
- Note the orientation of the LF antenna for installation.

1. Disconnect the LF antenna electrical connector from the main harness.
2. Remove the clips and remove the LF antenna.



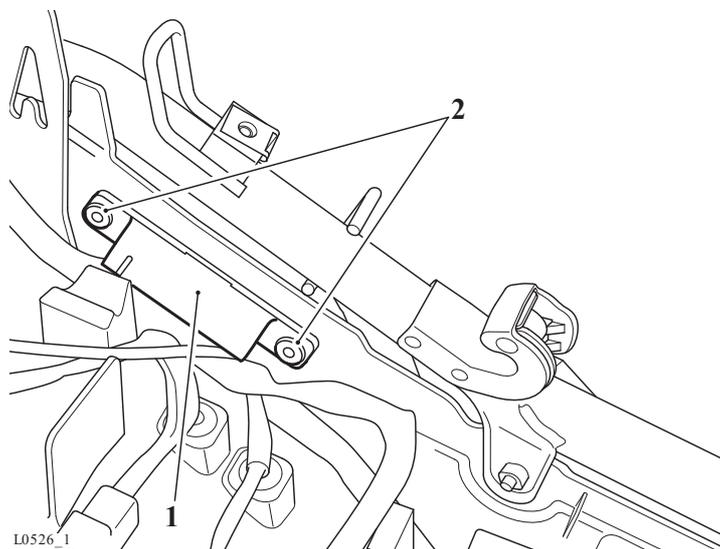
1. LF Antenna
2. Clips

Low Frequency (LF) Antenna - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit the LF antenna as noted during removal and secure with the clips.



1. LF Antenna
2. Clips

2. Route the LF antenna harness as noted during removal and connect the electrical connector to the main harness.

Perform the following operations:

- Battery - Installation
- Rider's Seat - Installation

Starter Motor - Removal

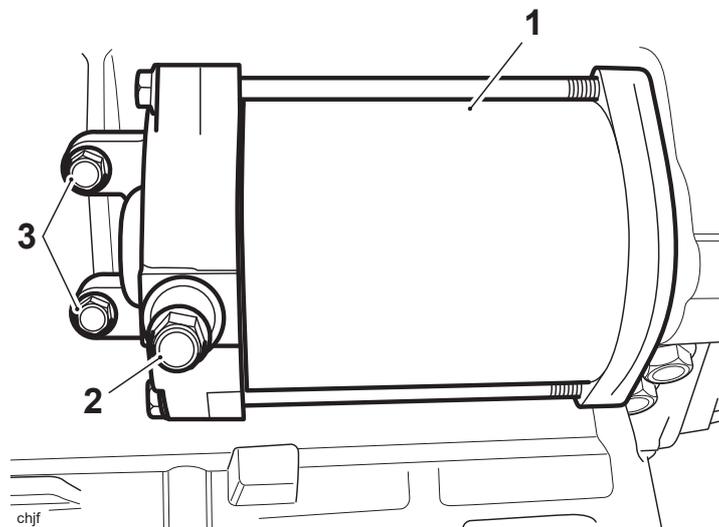
WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Rider's Seat - Removal
- Battery - Removal
- Sump Guard - Removal

1. Remove the fixings and remove the starter motor cover, located at the front of the engine.
2. Ease the boot from the starter cable terminal and then release the cable nut.
3. Detach the cable.
4. Release the fixings securing the starter motor to the crankcase.



1. **Starter motor**
2. **Starter cable fixing**
3. **Fixings**

5. Ease the starter motor from the lower crankcase.

Starter Motor - Inspection

1. Ensure the starter turns freely and without binding.
2. Check the starter O-ring for damage and deterioration. Replace as necessary.

Starter Motor - Installation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Lubricate the starter motor O-ring with a small amount of petroleum jelly.
2. Fit the starter motor to the lower crankcase ensuring that the O-ring does not become damaged during installation.
3. Fit and tighten the starter bolts to **9 Nm**.
4. Refit the starter cable and secure with the nut. Tighten to **5 Nm**.
5. Refit the starter cable boot.
6. Refit the starter motor cover and secure with the four fixings. Tighten to **4 Nm**.

Perform the following operations:

- Sump Guard - Installation
- Battery - Installation
- Rider's Seat - Installation

Alternator

The high output alternator is externally mounted to the engine, and is gear driven from the clutch primary gear. The regulator/rectifier is integral to the alternator and does not contain any serviceable parts.

The alternator features a decoupler mounted to the drive gear, which disengages the alternator from the engine in certain conditions. This removes shock loading from the alternator which would otherwise cause premature wear or damage to various alternator components.

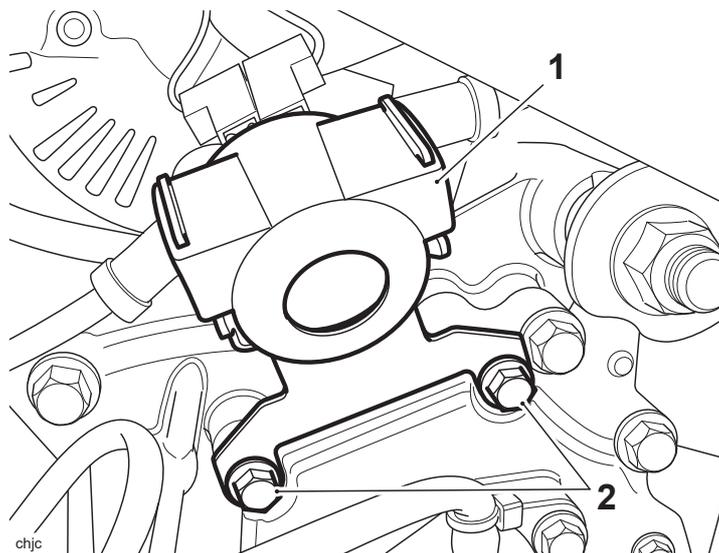
Alternator - Removal

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Perform the following operations:

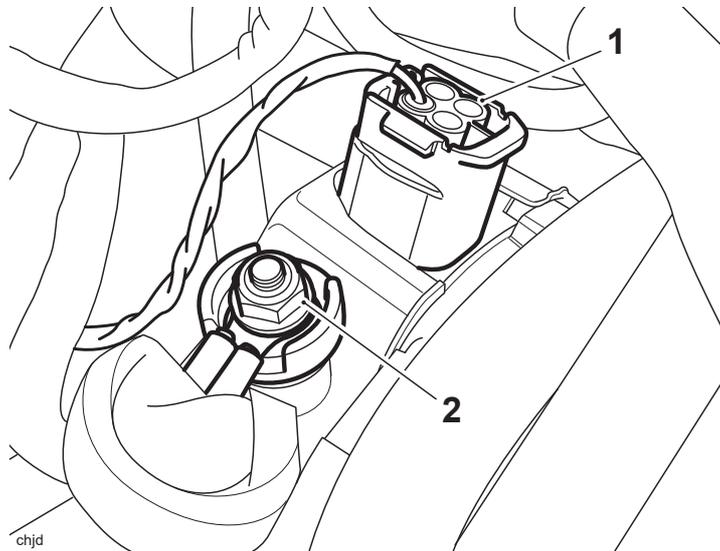
- Rider's Seat - Removal
 - Battery - Removal
 - Expansion Tank - Removal
 - Throttle Bodies/Injectors - Removal
 - Battery Tray - Removal
1. Remove the two upper selector cover fixings and detach the starter solenoid and bracket. Position the starter solenoid aside.



1. **Starter solenoid**
2. **Fixings**

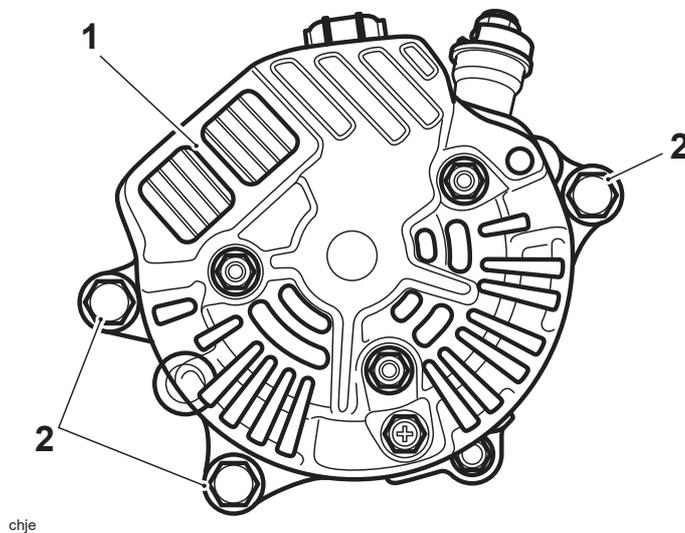
2. Disconnect the alternator multiplug.

3. Ease the boot from the alternator cable terminal and then release the cable nut.



1. Alternator multiplug
2. Cable nut

4. Release the fixings securing the alternator to the crankcase.

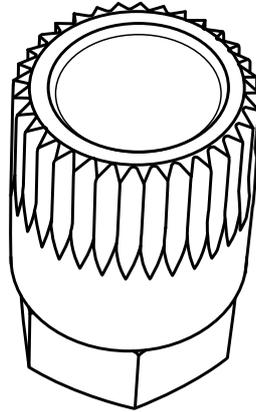


1. Alternator
2. Fixings

5. Withdraw the alternator from the crankcase and remove from the motorcycle in an upwards direction.

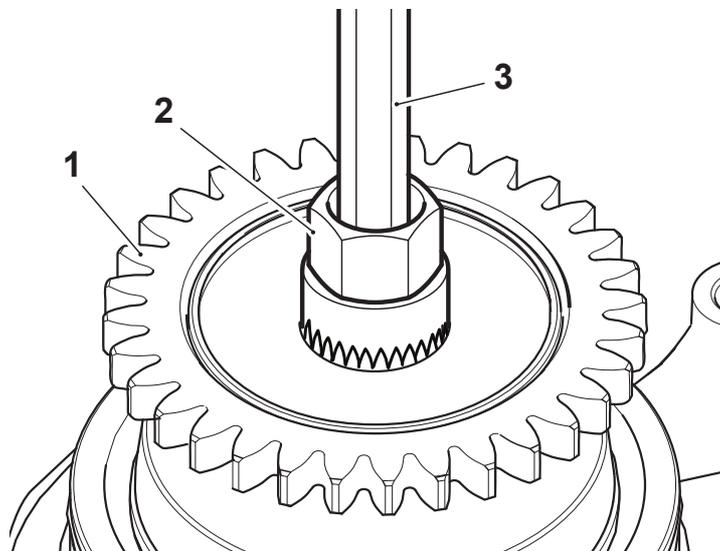
Alternator - Disassembly

1. Remove and discard the rubber cap from the alternator decoupler and drive gear assembly.
2. Fit T3880602 - Alternator Wrench to the splines of the alternator decoupler and drive gear assembly.



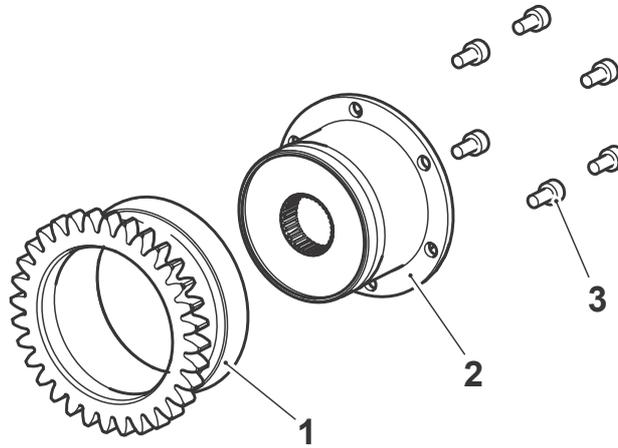
T3880602 - Alternator Wrench

3. Prevent the alternator from turning using a spanner on T3880602 - Alternator Wrench, and loosen the decoupler and drive gear assembly nut using an 8 mm Allen key.



1. **Alternator decoupler**
2. **T3880602 - Alternator Wrench**
3. **8 mm Allen key**

4. Remove T3880602 - Alternator Wrench and fully remove the nut. Discard the nut.
5. Remove the decoupler and drive gear assembly from the alternator spline.
6. Release the fixings and remove the drive gear from the decoupler.



1. Drive gear
2. De-coupler
3. Fixings

Alternator - Assembly

Assembly is the reverse of Alternator - Disassembly, noting the following:

Note

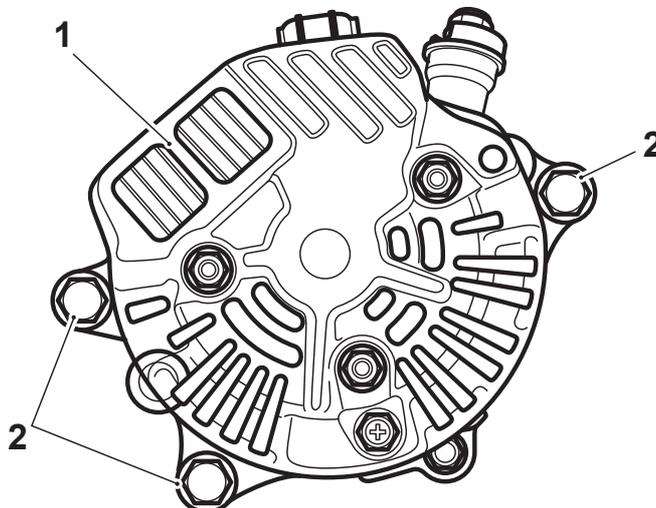
- Tighten the drive gear to decoupler fixings to 3 Nm.
- Always fit a new nut when refitting the decoupler and drive gear assembly.
- Tighten the decoupler and drive gear assembly nut to 54 Nm.

Alternator - Installation

! WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Fit a new O-ring to the alternator body.
2. Refit the alternator to the crankcase and align the three fixing holes. Fit and tighten the fixings to **28 Nm**.

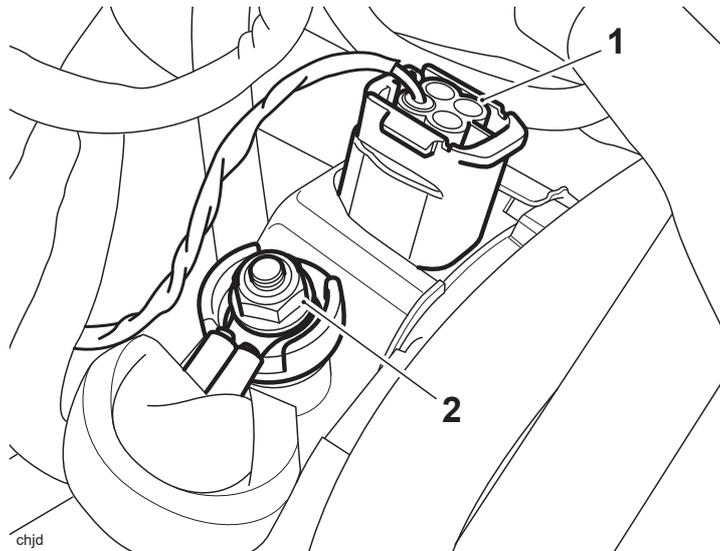


chje

1. Alternator

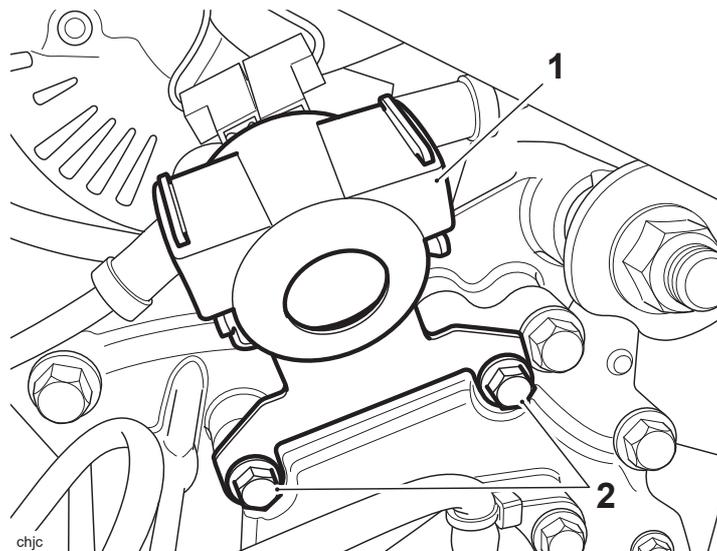
2. Fixings

3. Refit the alternator cable and secure with the nut. Tighten to **12 Nm**.
4. Refit the alternator cable boot.
5. Reconnect the alternator multiplug.



1. Alternator multiplug
2. Cable nut

6. Reposition the starter solenoid to the selector cover and secure with the two fixings. Tighten to **11 Nm**.



1. Starter solenoid
2. Fixings

Perform the following operations:

- Battery Tray - Installation
- Throttle Bodies/Injectors - Installation
- Expansion Tank - Installation
- Battery - Installation
- Rider's Seat - Installation

Circuit Diagrams

Key to Lighting and Accessories Circuit Diagram

Key to Circuit Diagram

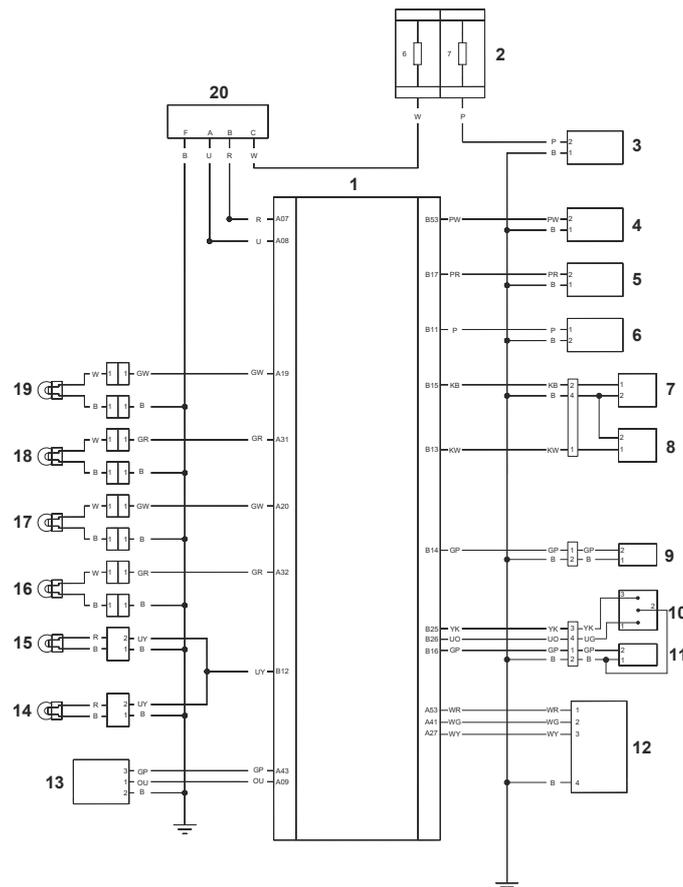
Key	Item Description
1	Chassis ECM
2	Main Fuse Box
3	Front Electrical Accessory Socket
4	Rear Electrical Accessory Socket
5	Top Box Power
6	USB Socket
7	Right Heated Grip
8	Left Heated Grip
9	Heated Seat - Rider
10	Heated Seat Switch - Passenger
11	Heated Seat - Passenger
12	Windscreen Motor
13	Rear Light
14	Left Fog Light
15	Right Fog Light
16	Left Rear Indicator
17	Right Rear Indicator
18	Left Front Indicator
19	Right Front Indicator
20	Headlight

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue

Code	Wiring Colour
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Lighting and Accessories Circuit Diagram



Key to Starting and Charging Circuit Diagram

Key to Circuit Diagram

Key	Item Description
1	Battery
2	Starter Solenoid
3	Starter Motor
4	Chassis ECM
5	Engine ECM - Connector B
6	Alternator Control
7	Alarm
8	Electronic Steering Lock
9	Right Hand Switch Housing
10	Starter Switch
11	Engine Stop Switch
12	Inertial Measurement Unit (IMU) - if fitted
13	ABS ECM
14	Instruments
15	Reserved Connector
16	Headlight
17	Chassis ECM
18	Master Ignition Switch Link Connector (all markets except US)
19	Master Ignition Switch (US markets only)
20	Ignition Switch
21	Main Fuse Box
22	Alternator

Key To Wiring Colour Codes

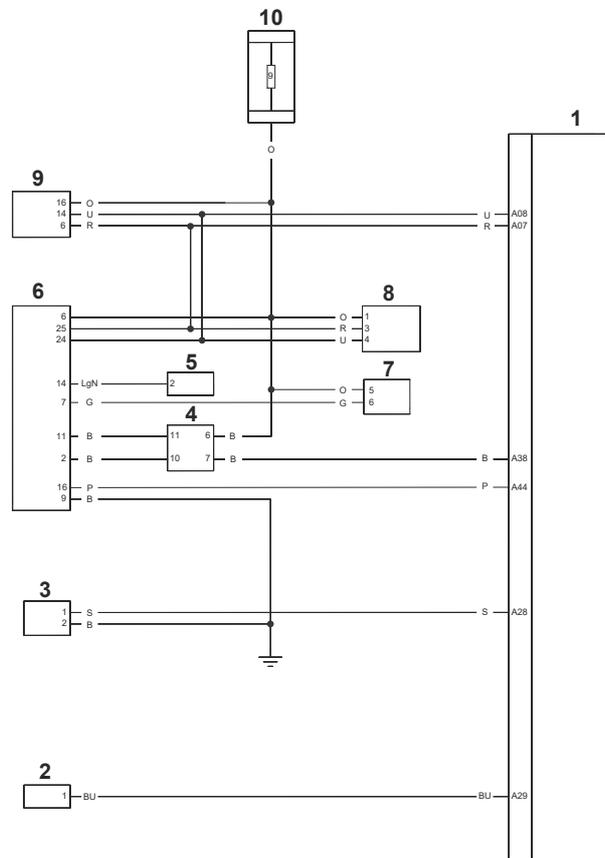
Code	Wiring Colour
-------------	----------------------

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Starting and Charging Circuit Diagram

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Instruments Circuit Diagram



Key to Switch Housing Subharness Circuit Diagram

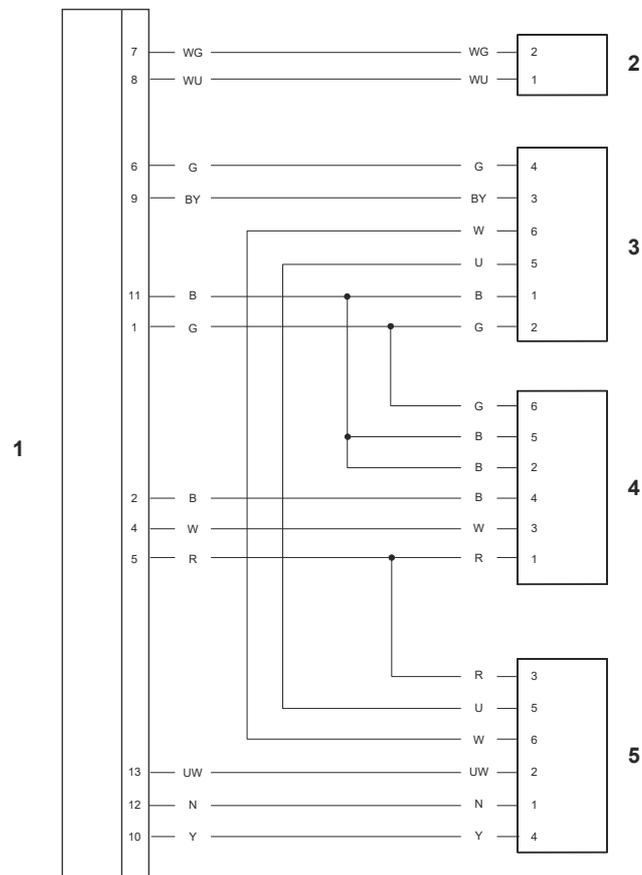
Key	Item Description
1	Main Harness Connector
2	Left Hand Switch Housing 2 Way Connector
3	Left Hand Switch Housing 6 Way Connector
4	Right Hand Switch Housing 6 Way Black Connector
5	Right Hand Switch Housing 6 Way Grey Connector

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey

Code	Wiring Colour
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Switch Housing Subharness Circuit Diagram



Key to Switch Housing Circuit Diagram

Key	Item Description
1	Left Hand Switch Housing
2	Left Hand Switch Housing 2 Way Connector

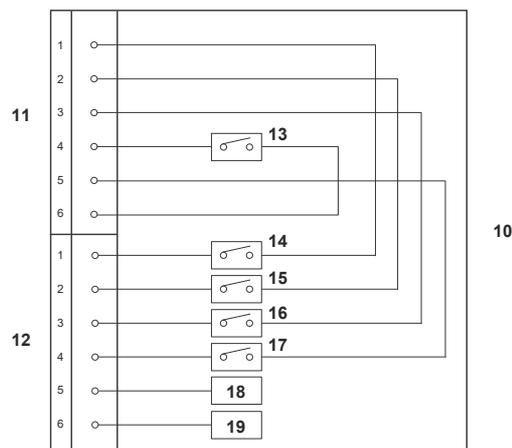
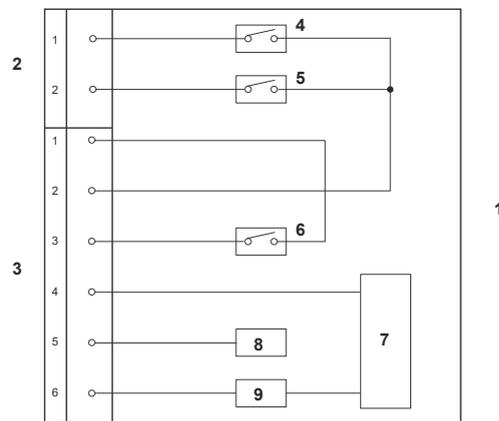
Key	Item Description
3	Left Hand Switch Housing 6 Way Connector
4	Cruise Control SET - Switch
5	Cruise Control RES + Switch
6	Clutch Switch
7	LIN Controller
8	Switch Illumination
9	Mode Button
10	Right Hand Switch Housing
11	Right Hand Switch Housing 6 Way Black Connector
12	Right Hand Switch Housing 6 Way Grey Connector
13	Engine STOP Switch
14	Power Switch
15	Steering Lock Switch
16	Engine Start Switch
17	Hazard Warning Light Switch
18	Switch Illumination
19	Home Button

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange

Code	Wiring Colour
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Switch Housing Circuit Diagram



Key to TSAS Circuit Diagram

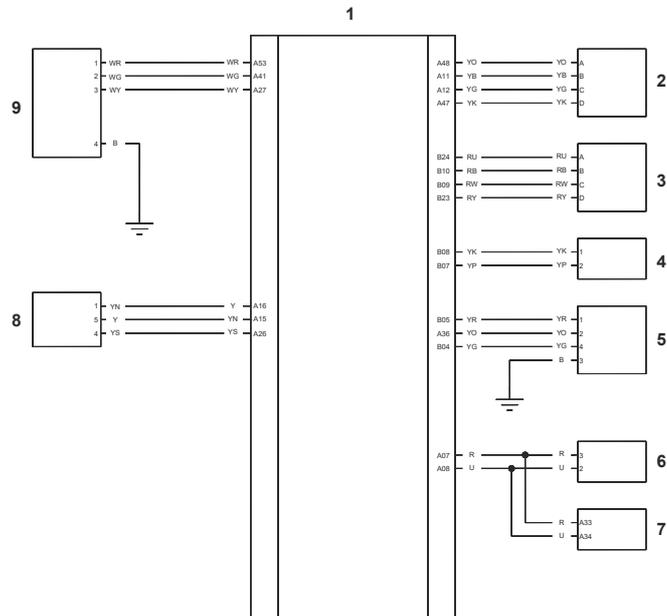
Key	Item Description
1	Chassis ECM
2	Left Hand Fork - Compression Damping Motor
3	Right Hand Fork - Rebound Damping Motor

Key	Item Description
4	Rear Suspension Unit Damping Valve
5	Rear Suspension Unit Preload Motor
6	Inertial Measurement Unit
7	Engine ECM
8	Swinging Arm Position Sensor
9	Windscreen Motor

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

TSAS Circuit Diagram



Key to ABS System Circuit Diagram

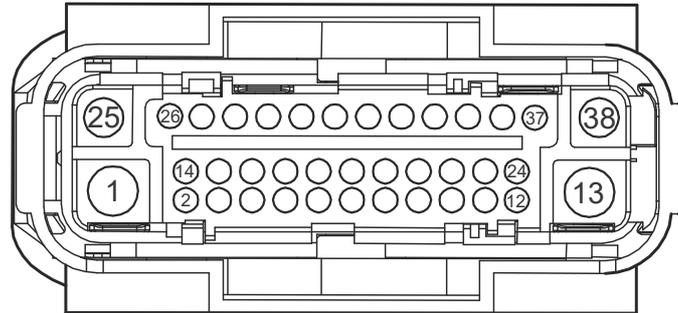
Key	Item Description
1	ABS Modulator
2	Diagnostic Connector
3	Rear Wheel Speed Sensor
4	Front Wheel Speed Sensor
5	Engine ECM
6	ABS Fuse Box

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green

Code	Wiring Colour
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

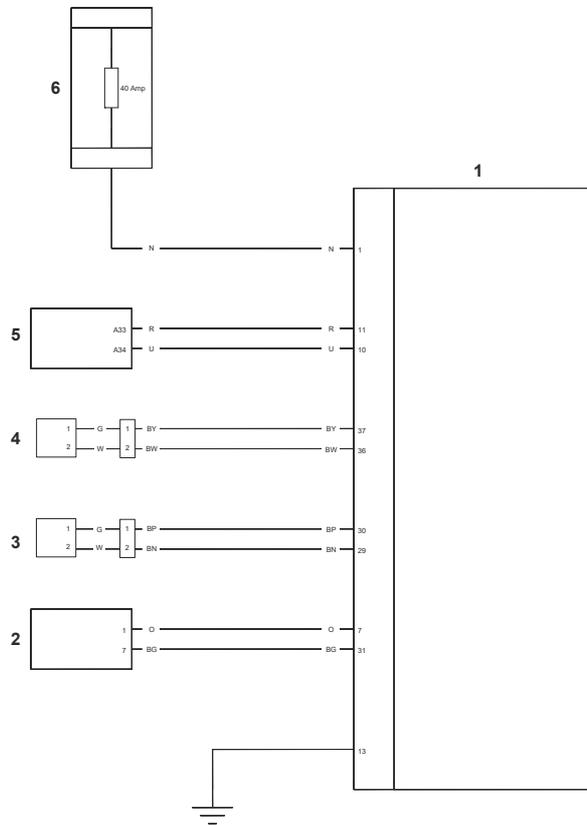
ABS ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from left to right with number one in the bottom left hand corner.

ABS System Circuit Diagram



Key to Engine Management Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Shift Force Sensor
3	Manifold Absolute Pressure Sensor
4	Ambient Air Pressure Sensor
5	Gear Position Sensor
6	Throttle Position Sensor
7	Accelerator Position Sensor
8	Fuel Level Sender
9	Intake Air Temperature Sensor
10	Clutch Switch
11	Side Stand Switch
12	Throttle Actuator Motor

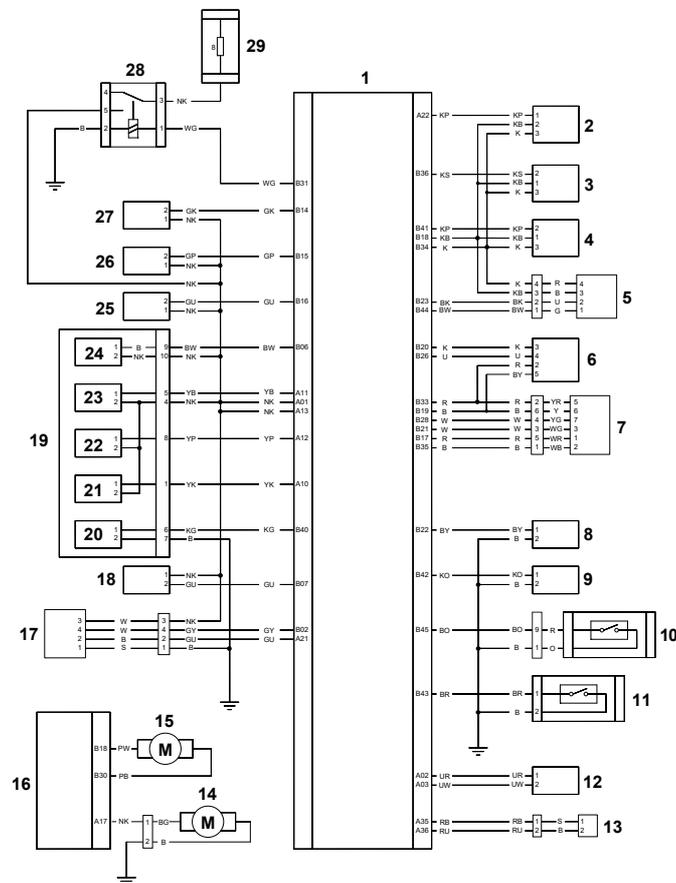
Key	Item Description
13	Crankshaft Position Sensor
14	Cooling Fan
15	Fuel Pump
16	Chassis ECM
17	Oxygen Sensor
18	Secondary Air Injection Solenoid
19	Engine Sub Harness
20	Coolant Temperature Sensor
21	Injector 1
22	Injector 3
23	Injector 2
24	Purge Valve
25	Coil 3
26	Coil 2
27	Coil 1
28	Engine Management Relay
29	Main Fuse Box

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange

Code	Wiring Colour
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

Engine Management Circuit Diagram



Key to Complete System Circuit Diagram

Key	Item Description
1	Chassis ECM
2	Rear Suspension Unit Damping Valve
3	Right Hand Front Fork Rebound Damping Motor

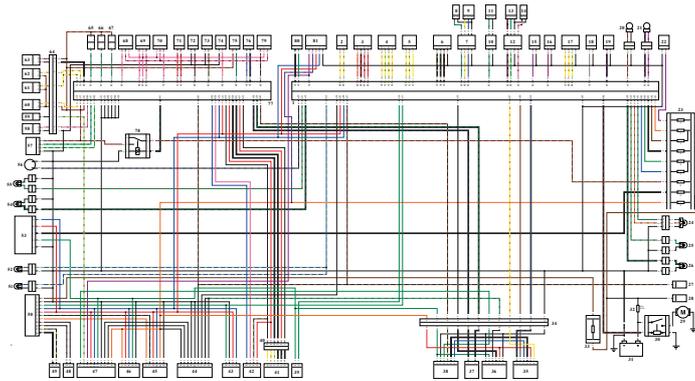
Key	Item Description
4	Left Hand Front Fork Compression Damping Motor
5	Swinging Arm Position Sensor
6	Windscreen Motor
7	Heated Seat Subharness - Passenger
8	Heated Seat - Passenger
9	Heated Seat Switch - Passenger
10	Heated Seat Subharness - Rider
11	Heated Seat - Rider
12	Heated Grips Subharness
13	Left Hand Heated Grip
14	Right Hand Heated Grip
15	USB Socket
16	Top Box Power
17	Rear Suspension Unit Preload Motor
18	Ambient Air Temperature Sensor
19	Rear Electrical Accessory Socket
20	Cooling Fan
21	Fuel Pump
22	Front Electrical Accessory Socket
23	Fusebox 1
24	Rear Light
25	Left Rear Indicator
26	Right Rear Indicator
27	Alternator Control
28	Alternator Power

Key	Item Description
29	Starter Motor
30	Starter Solenoid
31	Battery
32	40 Amp Main Fuse
33	Fuse Box 2 (ABS)
34	Switch Housing Subharness
35	Right Hand Switch Housing 6 way Grey Connector
36	Right Hand Switch Housing 6 way Black Connector
37	Left Hand Switch Housing 2 way Connector
38	Left Hand Switch Housing 6 way Connector
39	Ignition Master Switch Link Connector
40	Twist Grip Position Sensor Connector
41	Twist Grip Position Sensor
42	Throttle Position Sensor
43	Inertial Measurement Unit
44	Alarm Connector
45	Diagnostic Connector
46	Reserved Connector
47	Instruments
48	Rear Wheel Speed Sensor
49	Front Wheel Speed Sensor
50	ABS Modulator
51	Right Fog Light
52	Left Fog Light
53	Front Light Unit

Key	Item Description
54	Right Front Indicator
55	Left Front Indicator
56	Horn
57	Heated Oxygen Sensor
58	Coolant Temperature Sensor
59	Oil Pressure Sensor
60	Injector 1
61	Injector 2
62	Injector 3
63	Purge Valve
64	Engine Subharness Connector
65	Coil 3
66	Coil 2
67	Coil 1
68	Manifold Absolute Pressure Sensor
69	Ambient Pressure Sensor
70	Shift Force Sensor
71	Crank Position Sensor
72	Side Stand Switch
73	Fuel Level Sender
74	Intake Air Temperature Sensor
75	Secondary Air Injection Solenoid
76	Throttle Control
77	Engine ECM
78	Engine Management System Relay

Key	Item Description
79	Gear Position Sensor
80	LF Antenna
81	Electronic Steering Lock

Complete System Circuit Diagram



Electronic Systems Configuration and Setup

General Information

Calibration Downloading General Information

! CAUTION

The calibration download procedures detailed in the flow charts provided in the following chapters must be followed precisely. Failure to precisely follow the procedures may result in permanent damage to the component receiving the calibration download.

! CAUTION

When downloading a calibration, always ensure the calibration selected is correct for your model and region. Failure to select the correct calibration may result in permanent damage to the component receiving the calibration download.

! CAUTION

When downloading an engine ECM calibration, always ensure the correct calibration is selected for your fuel type. Engine damage may result if a calibration for an incorrect fuel type is installed.

Note

Note

- Some calibration downloads can take up to 20 minutes to complete. Before starting a download, ensure the battery voltage is at least 12.8 Volts.
- The headlight fuse may be removed prior to starting a download to prevent the headlight draining the battery. Refer to the label on the fuse box cover for the fuse location.
- Ensure the ignition and engine Start/Stop switches are set to the positions detailed at the beginning of each download process flowchart.
- Once the calibration download has been started, do not switch the ignition or engine Start/Stop switches to a different position unless instructed to do so by the Triumph Diagnostic Tool/download process flow chart.
- Do not disconnect the diagnostic interface during the calibration download.
- During a calibration download, multiple files are downloaded and the progress bar displayed will repeatedly rise from 0% to 100% as each file is downloaded. Always wait for the Verifying Download screen to appear to confirm that the full calibration has downloaded successfully and click the Finish button to end the process. Do not click the Cancel button while the download is still in progress.

Instrument Calibration Downloads

Following an instrument calibration download, the following items (if fitted) may return to their factory default settings. Before starting an instrument calibration download, record the settings of each item where applicable so that the settings can be restored after the download has finished.

- Time/date
- Distance/time to next service
- TPMS instrument display (enabled/disabled)
- All riding mode settings
- Self cancelling indicators (enabled/disabled).

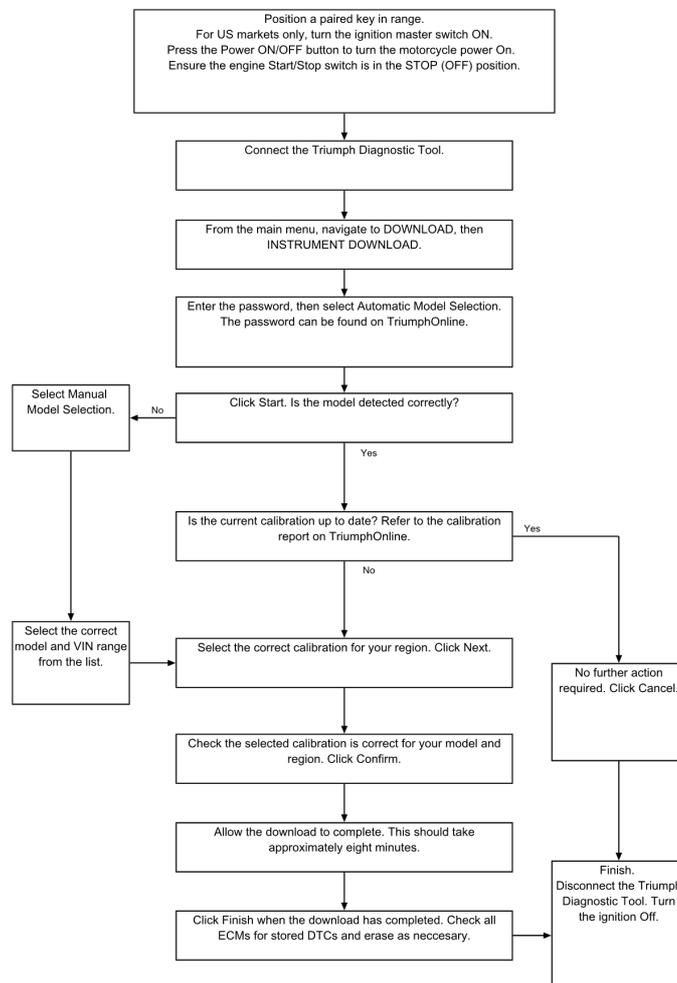
Downloading Sequence - Calibration Downloads to Multiple ECMs

When planning to download a calibration, check each of the motorcycle's ECMs for out of date calibrations and ensure all ECMs are updated as necessary. Where calibration updates are available for more than one ECM, the ECMs should be updated in the following order.

1. Instruments
2. Chassis ECM (if fitted)
3. Engine ECM

Instruments

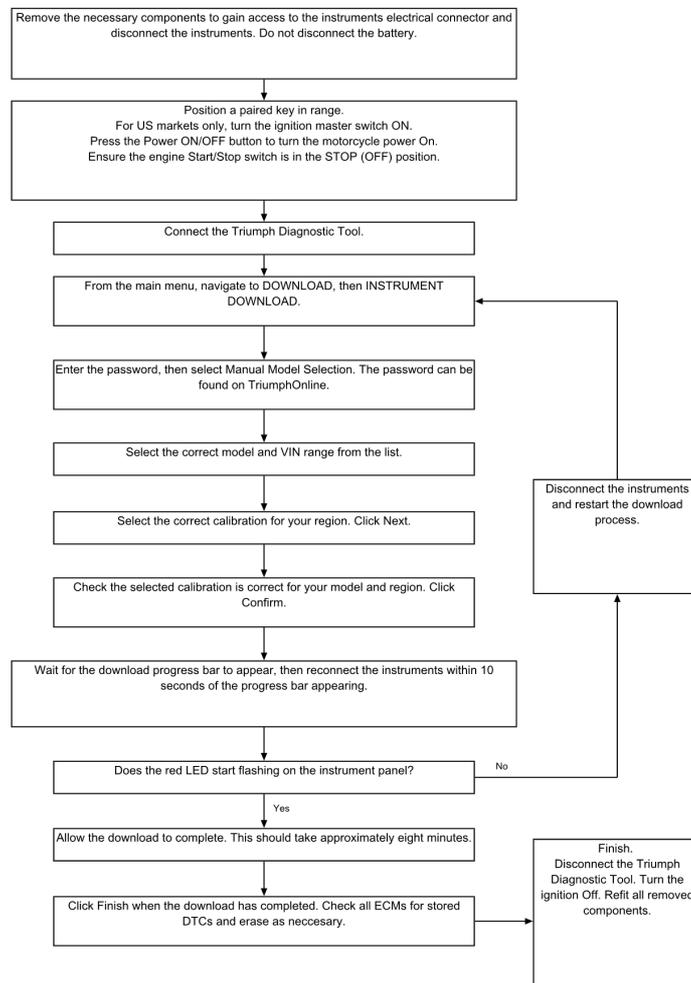
Instrument Calibration Download Flow Chart



Note

- If the download fails to complete, turn the ignition Off and allow the motorcycle to power down (approximately one minute) before restarting the download. If the download continues to fail, see Instrument Calibration - Failed Download Recovery Flow Chart.

Instrument Calibration - Failed Download Recovery Flow Chart



Note

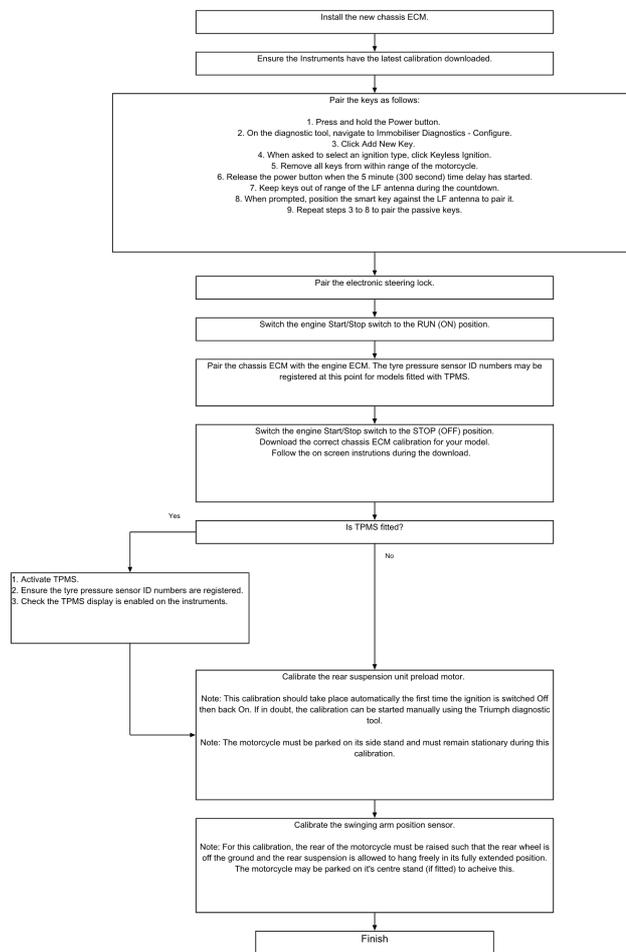
- If the instruments fail to recover after repeated attempts, contact Triumph Service.

Chassis ECM

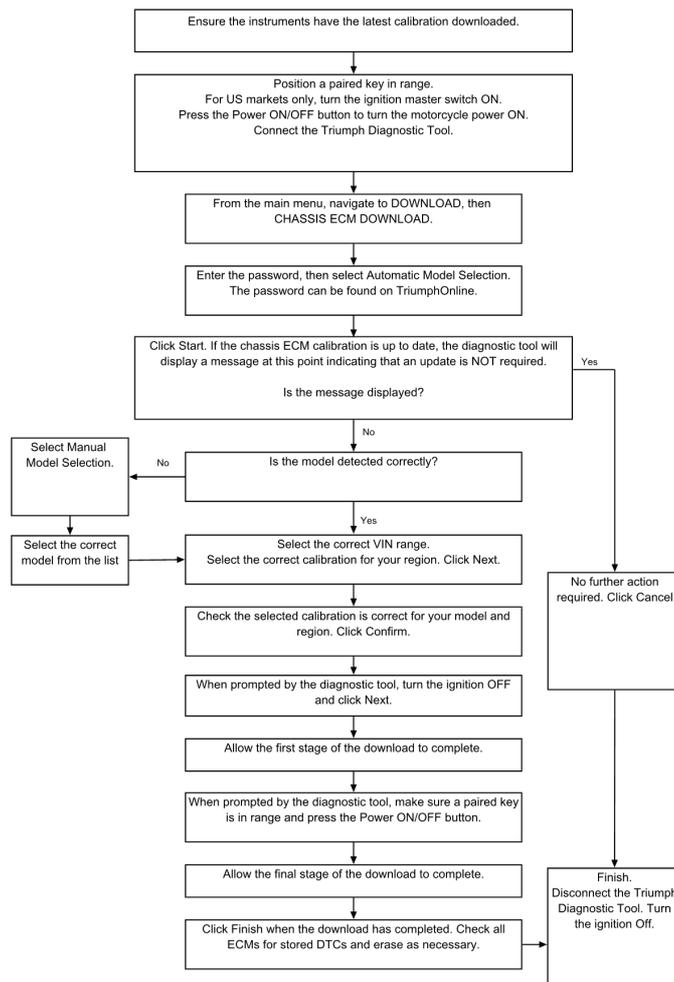
Replacement Chassis ECM - Setup Flow Chart

Note

- It can take up to one hour to complete the system pairings, downloads and calibrations necessary for correct chassis ECM setup.
- Before starting the setup procedure, ensure the battery voltage is at least 12.8 Volts.
- An approved battery charger suitable for use with maintenance free batteries, may be used to maintain battery charge during the setup process.



Chassis ECM Calibration Download Flow Chart



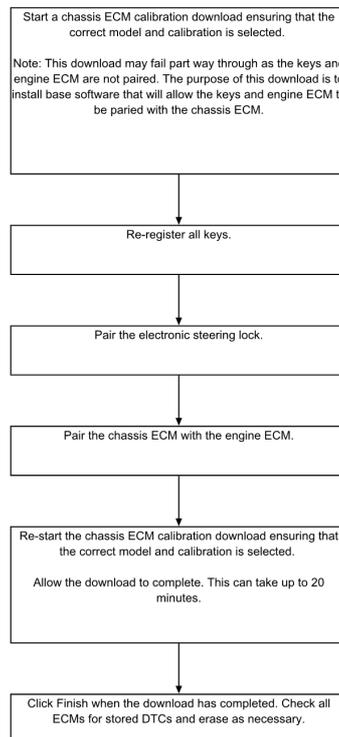
Note

- If the download fails to complete, turn the ignition Off, disconnect the diagnostic tool and allow the motorcycle to power down (approximately one minute) before restarting the download. If the download continues to fail, see Chassis ECM Calibration - Failed Download Recovery Flow Chart

Chassis ECM Calibration - Failed Download Recovery Flow Chart

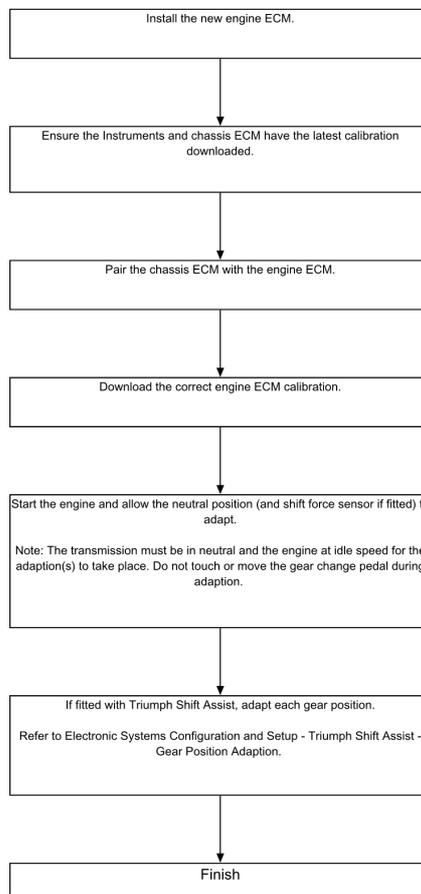
Note

- If a chassis ECM calibration download fails for any reason, it is possible that any existing software and immobiliser system pairings may have been erased from the chassis ECM's memory. Where this is the case, the chassis ECM can be recovered as described below.
- If after completing this procedure, the download continues to fail, contact Triumph Service.

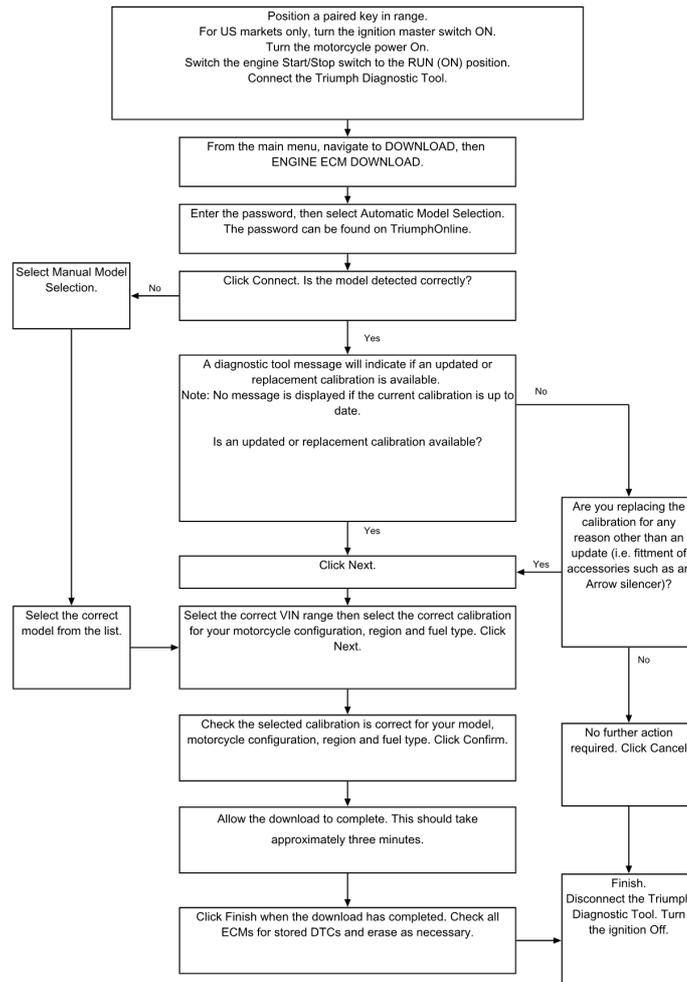


Engine ECM

Replacement Engine ECM Setup



Engine ECM Calibration Download Flow Chart



Note

- **If the download fails to complete, turn the ignition Off and allow the motorcycle to power down (approximately one minute) before restarting the download.**

Immobiliser System

Immobiliser and Keyless Ignition System

System Description

This model is fitted with an electronic immobiliser and keyless ignition system to help protect it against theft. The immobiliser and keyless ignition system is incorporated in the chassis ECM. The chassis ECM has to be paired with the engine ECM, Electronic Steering Lock (ESL) and the ignition keys which each contain a transponder chip. If all the components are correctly paired, the immobiliser will allow the engine to start. The Triumph diagnostic tool is the only way these components can be paired.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the immobiliser system, a malfunction code is stored in the chassis ECM memory. This stored data can then be recovered using the Triumph diagnostic tool (see Triumph Diagnostic Software).

System Components and Operation

- **Transponder chip** - situated inside the ignition key. The chip is activated when requested by the chassis ECM, providing the key is in range of the LF antenna (within one meter/three feet for smart keys, within 50 mm for passive keys).
- **Low Frequency (LF) Antenna** - situated on the left hand side of the motorcycle under the passenger seat. The transponder chip in the ignition key is activated when it is in range of the LF antenna. The signal from the chip is interpreted by the chassis ECM.
- **Chassis ECM** - situated beneath the rider's seat. This control module communicates with the transponder chip in the key via the LF antenna, and with the engine ECM. The chassis ECM will only allow the motorcycle's electronic systems to turn on and the engine to start if a matching signal is received.
- **Alarm/immobiliser warning indicator light** - situated in the instrument pack. The light will flash on and off for 24 hours to show that the engine immobiliser is on. When the ignition switch is turned to the ON position the immobiliser and the indicator light will be off. If the indicator light remains on it indicates that the immobiliser has a malfunction that requires investigation. If an accessory alarm is fitted, the immobiliser indicator light will only illuminate when the conditions described in the accessory alarm instructions are met.
- **Electronic Steering Lock (ESL)** - Situated on the upper yoke. The ESL will activate to lock the steering when requested, provided that the motorcycle is stationary and the steering is positioned correctly to enable locking.

Keys

When the motorcycle is delivered from the factory it is supplied with two passive keys and one smart key.

Note

- **An additional smart key can be purchased from your Triumph dealer. However, only three keys can be programmed to the motorcycle. This can be any combination of smart keys and standard keys.**

Keys can be deleted or added to the immobiliser system using the Triumph diagnostic tool.

To ensure the immobiliser system functions correctly note the following:

- Do not put any magnetic materials on the same key ring as the motorcycle key.
- Do not put any other ignition key with a transponder chip fitted near the motorcycle key when in use.
- Do not modify the immobiliser system.
- Do not submerge the key in water or any other fluid.
- Do not drop or strike the key against hard material.

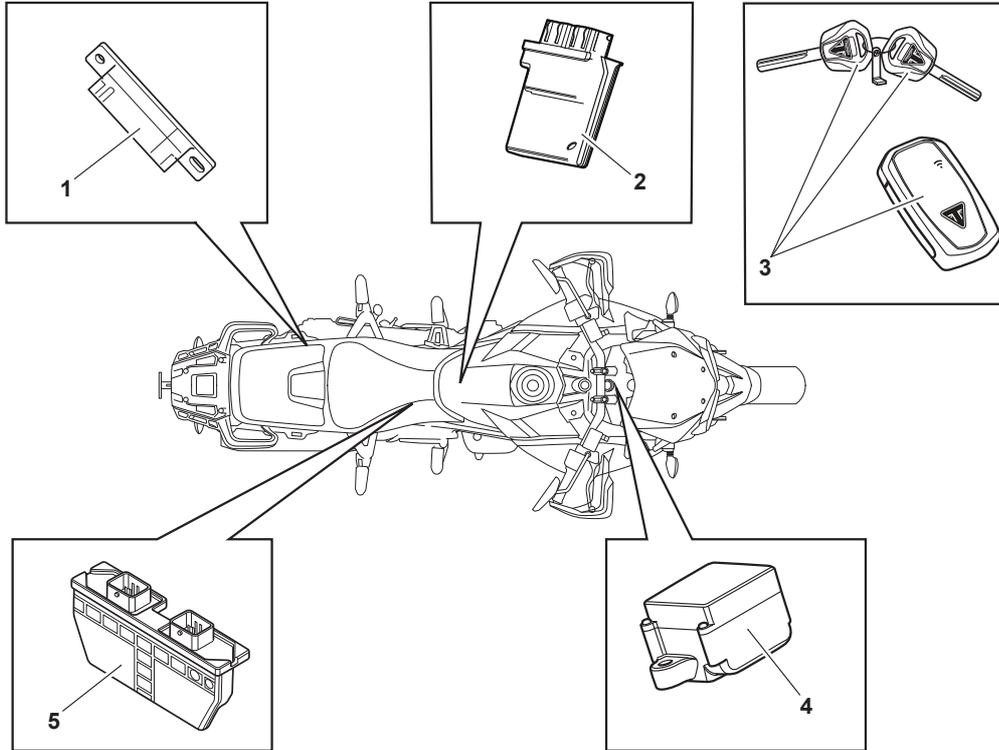
Diagnostics

To fully diagnose the immobiliser system it is necessary to check for fault codes in the chassis ECM using the Triumph diagnostic tool (see System Diagnosis).

Further Diagnosis

The diagnostic trouble code tables, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored (see Chassis ECM Diagnostic Trouble Codes).

Immobiliser and Keyless Ignition System Components Location



1. LF Antenna
2. Engine ECM
3. Transponder chip
4. Electronic steering lock
5. Chassis ECM

Keyless Ignition Keys

The keyless ignition system allows the motorcycle to be started without the use of a mechanical key. There are three keys supplied with the motorcycle. One smart key and two passive keys.

To turn the motorcycle on, ensure a key is positioned in range of the LF antenna as described below and press either the Power button or Engine Start button on the Engine Start/Stop switch.

CAUTION

All keys supplied are locked to the chassis ECM. They cannot be used with any other motorcycle or chassis ECM.

If all keys are lost, misplaced or damaged, then the chassis ECM will need to be replaced.

To avoid unnecessary cost and time, make sure that all spare keys are kept in a secure location.

Note

- An additional smart key can be purchased from your Triumph dealer. However, only three keys can be programmed to the motorcycle. This can be a combination of smart keys and standard keys.

Smart Key Operation



Smart Key

The smart key has two modes, active mode and passive mode.

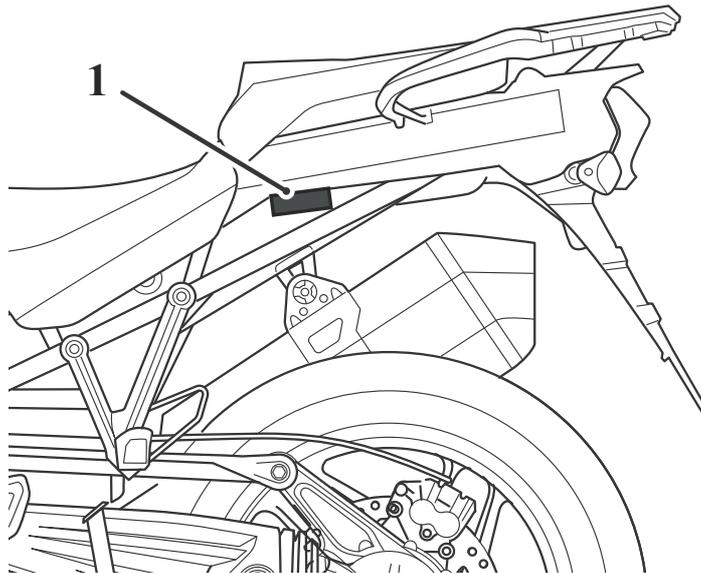
A short press on the smart key button shows the current status of the key. The smart key LED will flash:

- Green when the key is in active mode.
- Red when the key is in passive mode.

To switch modes, press and hold the smart key button until the LED changes colour from green to red or vice versa.

In active mode, the smart key must be within (one metre/three feet) of the LF antenna to allow the motorcycle to be powered on and started. If the smart key is out of range of the LF antenna then it will be unresponsive and the keyless ignition cannot be activated.

In passive mode (or if the smart key battery is flat) the smart key must be held against the LF antenna to allow the motorcycle to be powered on and started.



1. LF antenna location

Passive Key Operation

The passive key must be held against the LF antenna to allow the motorcycle to be powered on and started.

Keyless Ignition - Key Reception Function Test

1. Connect the Triumph diagnostic tool.
2. Navigate to CHASSIS DIAGNOSTICS - CHASSIS ECM DIAGNOSTICS - FUNCTION TESTS and select Key Reception.

3. Click Start.

Note

- **Smart keys can be tested in active or passive mode.**
 - **In active mode, the diagnostic tool should detect the smart key ranges of up to one meter (three feet) from the LF antenna.**
 - **Passive keys should be detected when placed against the LF antenna.**
4. Test each key in turn by bringing them into range of the LF antenna as described above. The diagnostic tool display will turn green if the key is detected but will remain red if the key is not detected.

Smart Key Battery Replacement

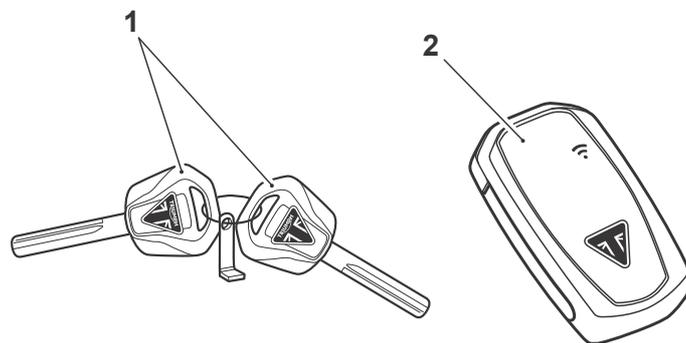
1. Ensure the smart key is turned to its passive mode (red LED).
2. Remove the fixing and remove the battery cover.
3. Noting its orientation, remove the battery.

Installation is the reversal of removal, noting the following.

- A CR2032 battery is required.
- Tighten the fixing to **0.3 Nm**.

Keyless Ignition System - Key Pairing General Information

The motorcycle is delivered from the factory with three keys, two passive keys and one smart key.



1. **Passive keys**
2. **Smart Key**

CAUTION

All of the motorcycle's available keys should be obtained before performing any key pairing operations. Starting a key pairing operation without having obtained all of the motorcycle's keys will render any spare keys inactive. In some circumstances, absent spare keys may also be rendered permanently unusable.

- Lost or unwanted keys can be erased, and additional/replacement keys added using the Triumph diagnostic tool.
- A maximum of three keys can be paired to the chassis ECM at any one time. This can be any combination of smart keys and passive keys. It is not possible to pair further keys when the maximum of three paired keys is reached.
- When pairing a combination of smart keys and passive keys, it is recommended that any smart keys are paired first, followed by the passive keys.
- A paired key can have three different states, active, inactive and erased.

- Once a key is paired it is regarded as active. At this point the key is locked to its paired chassis ECM for life and cannot be paired to any other chassis ECM.
- A paired key is required to allow the motorcycle to power ON in order to perform key pairing operations. All available paired keys should be obtained before starting these operations.
- Paired keys can be erased using the Re-Register All Keys function on the Triumph diagnostic tool. When this function is used, the key being used to power the motorcycle will remain paired and active. Any other paired keys will be registered as inactive.
- When using the Re-Register All Keys function, a ten minute (600 second) security time delay is applied to the first key pairing. Further key pairings are subject to a five minute (300 second) time delay.
- Inactive keys can be either paired and reactivated, or replaced by new keys and overwritten.
- Any inactive keys that are overwritten are then stored as erased in the chassis ECM memory. A maximum of three erased keys can be stored.
- Erasing more keys after the maximum of three erased keys has been reached, will result in the erased keys being overwritten. Erased keys that are overwritten are then rendered permanently unusable.
- Stored erased keys can be paired and reactivated providing that the maximum number of three paired keys has not been reached. When a key is reactivated, it is moved from its 'erased' memory slot to a vacant 'active' memory slot.

Pairing New or Replacement Keys

1. Obtain all available motorcycle keys from the owner.
2. Ensure all smart keys are set to passive mode (see Keyless Ignition Keys).
3. Remove the rider's seat.
4. Power the motorcycle ON using a paired key.

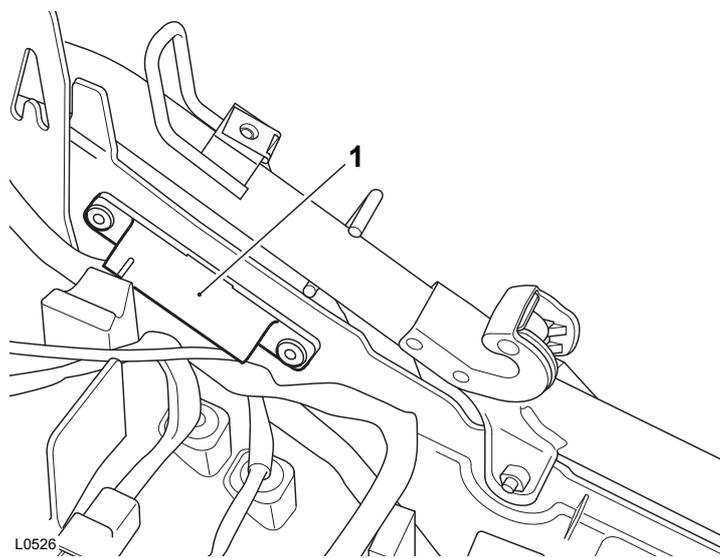
Note

- **Refer to the following guidelines for advice on which key to use to power the motorcycle ON:**
- **Guidelines - Replacing a Lost Smart Key**
- **Guidelines - Adding a Second Smart Key**

5. Connect the Triumph diagnostic tool.
6. Navigate to CHASSIS DIAGNOSTICS - IMMOBILISER DIAGNOSTICS - Configure.

Note

- **Before clicking Re-Register All Keys, ensure that you have all keys being paired to hand.**
- **Upon clicking Re-Register All Keys, You will be asked to identify the motorcycle ignition type (key ignition/keyless ignition). Select Keyless Ignition.**
- **You will be instructed to remove all keys from within range of the motorcycle. Make sure all smart keys are in passive mode and that no keys are left within 10 mm of the LF antenna.**
- **A ten minute (600 second) security time delay is then initiated for the first key pairing. Do not leave the motorcycle unattended during this time.**
- **During the ten minute (600 second) time delay, the pairing of the key used to power the motorcycle ON is retained. It is therefore not necessary to re-pair this key. All other paired keys are registered as inactive.**
- **After the ten minute (600 second) time delay has elapsed, a pairing command is transmitted by the Low Frequency (LF) antenna for a period of 30 seconds. The Triumph diagnostic tool will prompt you to position the key being paired against the LF antenna.**
- **Only allow one key to be brought into close proximity of the LF antenna during each key pairing.**
- **If a key is not positioned against the LF antenna during the 30 second period, the process will be aborted. In this situation, the key used to power the motorcycle ON remains paired but all other keys are registered as inactive. The inactive keys can be paired using the Add New Key function.**
- **Further keys can be paired by clicking Add. A five minute (300 second) time delay is applied to each subsequent key pairing.**

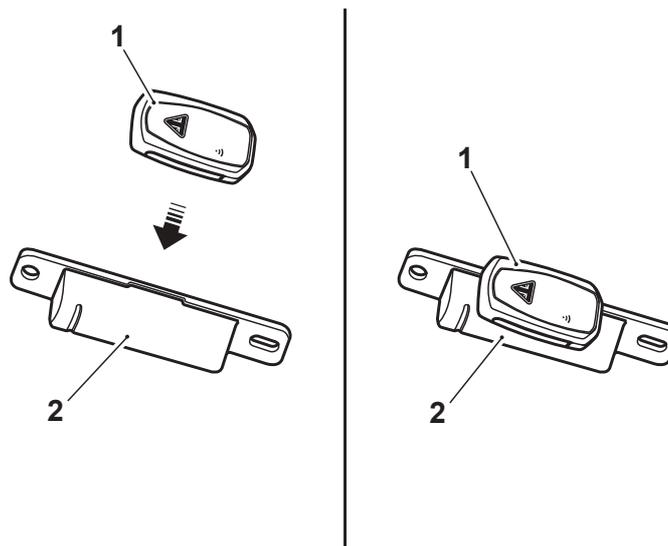


1. LF antenna

7. Click Re-Register All Keys.
8. When asked to identify the ignition type, click Keyless Ignition.
9. Remove all keys from within range of the motorcycle.
10. A ten minute (600 second) security time delay will begin.
11. When the time delay has elapsed, place the key against the LF antenna as prompted by the Triumph diagnostic tool. This must be done within 30 seconds of the time delay elapsing.

Note

- **Smart keys should be positioned so that the side with the logo/button is facing away from the LF antenna.**



1. Key (smart key shown)
2. LF antenna

12. Hold the key against the LF antenna until the Triumph diagnostic tool reports the key has been successfully paired.

Note

- **If pairing does not occur immediately, slowly adjust the position of the key to the LF antenna (keeping it in close proximity) until the pairing is achieved.**

13. Click Add to pair another key in the same way or click Finish to end the process.

Guidelines - Replacing a Lost Smart Key

This instruction provides a brief outline of the process for pairing a replacement smart key, in the event that the original smart key has been lost. The instruction assumes the motorcycle is in its delivered condition, with one smart key and two passive keys paired.

1. Obtain all available motorcycle keys from the owner.
2. Power the motorcycle ON using one of the passive keys.
3. Connect the Triumph diagnostic tool.
4. Select Re-Resister All keys.

Note

- **The pairing of the passive key used to power the motorcycle ON is retained.**
- **The other two keys are registered as inactive.**

5. Pair the replacement smart key.
6. Pair the passive key that was NOT used to power the motorcycle ON.

Note

- **The motorcycle now has two passive keys and the replacement smart key paired.**
- **The original smart key is stored as an erased key in the chassis ECM memory. If the original smart key is later found, it can be paired and reactivated by following the 'Adding a Second Smart Key' procedure (see Guidelines - Adding a Second Smart Key).**

Guidelines - Adding a Second Smart Key

This instruction provides a brief outline of the process for pairing a second smart key. The instruction assumes the motorcycle is in its delivered condition, with one smart key and two passive keys paired.

1. Obtain all available motorcycle keys from the owner.
2. Power the motorcycle ON using the original smart key.
3. Connect the Triumph diagnostic tool.
4. Select Re-Register All Keys.

Note

- **The pairing of the smart key used to power the motorcycle ON is retained.**
- **The two passive keys are registered as inactive.**

5. Pair the additional smart key.
6. Pair a passive key.

Note

- **The motorcycle now has two smart keys and one passive key paired.**
- **The second passive key is stored as an erased key in the chassis ECM memory.**
- **The erased passive key can be later paired and reactivated, in the event that one of the paired keys is lost.**

7. Attach a suitable label or key fob to the erased passive key to aid future identification.

All Keys Lost

CAUTION

Always store spare keys and the key number tag in a safe place away from the motorcycle.
At least one paired key is required to start any key pairing operations. If all keys have been lost, it will not be possible to pair any replacement keys.
In this situation the chassis ECM and all keys must be replaced.
If the tag bearing the key number is also lost, the lock set (fuel tank cap, seat lock etc.) must also be replaced.

For details of the replacement chassis ECM setup process, refer to the Replacement Chassis ECM - Setup Flow Chart

Pairing the Electronic Steering Lock

Note

- **There must be at least one key registered before the electronic steering lock can be paired to the chassis ECM.**
1. Remove the rider's seat.
 2. Power the motorcycle ON using a paired key.
 3. Connect the Triumph diagnostic tool.
 4. Navigate to CHASSIS DIAGNOSTICS - IMMOBILISER DIAGNOSTICS - Configure.

Note

- **Upon clicking start, a five minute (300 second) security time delay will be initiated. Do not leave the motorcycle unattended during this time.**
5. Click Pair Electronic Steering Lock. The five minute (300 second) security time delay will begin.
 6. The pairing will completed after the time delay has elapsed. The Triumph diagnostic tool will report if the pairing has been successful.

Pairing the Engine ECM

Note

- **There must be at least one key registered before the engine ECM can be paired to the chassis ECM.**
1. Remove the rider's seat.
 2. Power the motorcycle ON using a paired key.
 3. Switch the engine Start/Stop switch to the ON (RUN) position.
 4. Connect the Triumph diagnostic tool.
 5. Navigate to CHASSIS DIAGNOSTICS - IMMOBILISER DIAGNOSTICS - Configure - Pair ECM and Immobiliser.

Note

- **The tyre pressure sensor ID numbers may be registered at this point for models fitted with TPMS.**
 - **Upon clicking Pair, a five minute (300 second) security time delay will be initiated. Do not leave the motorcycle unattended during this time.**
6. **Models fitted with TPMS only** - Enter the front and rear tyre pressure sensor ID numbers in the spaces provided.
 7. Click Pair. The five minute (300 second) security time delay will begin.
 8. The pairing will completed after the time delay has elapsed. The Triumph diagnostic tool will report if the pairing has been successful.

Trouble Shooting

Key Pairing

The following table lists possible causes of a key pairing failure along with remedial actions.

Key Pairing Failure - Possible Causes	Remedial Actions
Maximum number of 3 keys reached	Erase paired keys Pair the required keys
Key not positioned correctly to LF antenna after security time delay	Restart key pairing function. Ensure the key is correctly positioned to the LF antenna within 30 seconds of the security time delay elapsing
Smart key flat battery	Replace battery
Key is locked to another chassis ECM	Replace key

Key Pairing Failure - Possible Causes	Remedial Actions
Key has been erased then overwritten by another erased key.	Replace key
Key transponder not functioning due to damage, water ingress, etc.	Replace key
LF antenna not functioning	Check LF antenna for damage Check LF antenna is securely connected Check stored DTC's. rectify as necessary
Chassis ECM not configured	Download the correct chassis ECM calibration for your motorcycle

Further Immobiliser System Diagnostics Using the Instrument Panel Alarm/Immobiliser LED

The table below lists immobiliser system faults that can be diagnosed In the event that the motorcycle cannot be powered ON. The faults can be diagnosed by observing the behavior of red alarm/immobiliser LED. Depending on the fault present, the LED will display a sequence of long and short flashes as follows.

Fault	LED Operation	Possible Causes	Remedial Action
Key authentication fault	1 long flash	Key out of range Key inactive or erased No keys paired	<ol style="list-style-type: none"> 1. Bring an active paired key in range of the LF antenna 2. Obtain all available paired keys then pair any inactive or erased keys as necessary 3. Pair new keys
Electronic steering lock disengagement fault	2 long flashes	Steering position preventing steering lock pin from retracting Electronic steering lock pin seized	<ol style="list-style-type: none"> 1. Position steering to ensure there is no load on the steering lock pin and attempt to unlock the electronic steering lock 2. If the steering lock pin fails to disengage, replace the electronic steering lock
Electronic steering lock engagement fault (when locking the motorcycle only)	1 long flash + 1 short flash	Steering position preventing steering lock pin from engaging Electronic steering lock pin seized	<ol style="list-style-type: none"> 1. Position steering at left hand full lock and attempt to lock the electronic steering lock 2. If the steering lock pin fails to engage, replace the electronic steering lock
Electronic steering lock ID mismatch	1 long flash + 2 short flashes	Electronic steering lock not paired to chassis ECM	<ol style="list-style-type: none"> 1. Pair electronic steering lock to chassis ECM
Electronic steering lock - no response	1 long flash + 3 short flashes	Electronic steering lock disconnected or not communicating	<ol style="list-style-type: none"> 1. Reconnect the electronic steering lock 2. Check/investigate any stored DTCs

Spares Kits Matrix - Keyless Ignition System

Spares Kits Matrix - Keyless Ignition System							
Spares Item	Scenario:						
	Lost keys (still have other keys or smart key)	Lost smart key	Non-functional smart key (still have blade)	Non-functional chassis ECM	Lost all keys and tag	Damaged/faulty lock set (still have keys)	Lost all keys (still have tag)
Standard lock set						•	
Spare keys (cut)	•						
Spare keys (uncut)	•						
Spare smart key, roll pin and blade (cut) [Japan]		•					
Spare smart key, roll pin and blade (cut) [Rest of world]		•					
Spare smart key, roll pin and blade (uncut) [Japan]		•	•				
Spare smart key, roll pin and blade (uncut) [Rest of world]		•	•				
Chassis ECM kit (ECM, smart key without blade, 2 keys) [cut, Japan]				•	•		•
Chassis ECM kit (ECM, smart key without blade, 2 keys) [cut, rest of world]				•	•		•
Chassis ECM kit (ECM, smart key without blade, 2 keys) [uncut, Japan]				•	•		•
Chassis ECM kit (ECM, smart key without blade, 2 keys) [uncut, rest of world]				•	•		•

Triumph Semi Active Suspension

Rear Preload Motor Up/Down Function Tests

The Rear Preload Motor Up/Down function tests provided in the Triumph Diagnostic Tool may be used as follows:

- Test rear preload motor operation.

- Free the rear preload motor if it is stuck at an end stop.

Test Rear Preload Motor Operation

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Connect the Triumph diagnostic tool and switch the ignition on.
2. Navigate to CHASSIS DIAGNOSTICS - CHASSIS ECM DIAGNOSTICS and select FUNCTION TESTS.

CAUTION

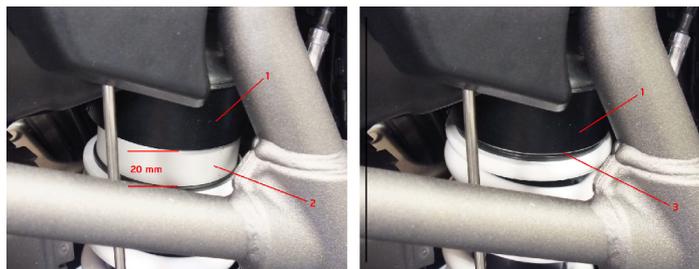
If the rear preload motor adjustment position reaches its maximum or minimum adjustment end stop, do not continue to drive the motor towards the end stop.

Select the test direction that will drive motor away from the end stop as described later in this procedure.

Repeatedly driving the rear preload motor against an end stop may cause the motor to overheat, which can result in permanent damage.

Note

- The position of the rear preload motor adjustment can be checked visually as follows:
- At the maximum preload end stop, the preload adjustment collar is fully extended from the base of the motor housing. Approximately 20 mm of the adjustment collar is visible as shown below.
- At intermediate preload adjustment positions, less of the adjustment collar will be visible as the adjustment position moves closer to the minimum preload end stop.
- At the minimum preload end stop, the preload adjustment collar is fully retracted into the motor housing.



1. Rear preload motor housing
2. Adjustment collar (maximum preload position - fully extended)
3. Adjustment collar (minimum preload position - fully retracted)

3. Visually Check the position of the rear preload motor.

Note

- If the rear preload motor is positioned at or near the minimum or maximum adjustment end stop, the motor must first be driven away from the end stop, before testing the motor in the opposite direction.
- Motor at or near maximum preload - select the rear preload motor down test first.
- Motor at or near minimum preload - select the rear preload motor up test first.
- Motor at intermediate position - select either test direction.

4. Select the appropriate rear preload motor test direction.

WARNING

 **WARNING**

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

5. Start the engine.

Note

- **Upon clicking start, the rear preload motor adjustment collar will move approximately 0.5 mm in the selected direction.**
 - **It will take approximately 38 repeated tests to operate the preload motor through its full adjustment range from end stop to end stop, however It is not necessary to do this to verify correct motor operation. Three to five repeated tests are sufficient to verify motor operation.**
 - **If the preload motor is operated through its full adjustment range (38 repeated tests), allow the motor to cool for five minutes before running further tests.**
6. Click start and observe the rear preload motor adjustment collar movement. Repeat the test as necessary to verify correct motor operation.
 7. Repeat the test in the opposite direction to verify correct motor operation in both directions.

Note

- **If no adjustment collar movement can be observed, check for any stored DTCs, rectify as necessary and repeat the rear preload motor test. If the rear preload motor still doesn't function correctly, contact Triumph service.**
8. Turn the ignition off and disconnect the Triumph diagnostic tool. Allow 15 seconds for the chassis ECM to power down.

Note

- **With the ignition switch turned off, the Triumph diagnostic tool will prevent the chassis ECM from powering down if it is left connected to the motorcycle.**
 - **To enable the chassis ECM to power down, disconnect the diagnostic tool from the motorcycle.**
 - **After running the rear preload motor up/down tests, the rear preload motor will automatically recalibrate the next time the ignition switch is turned on, provided the chassis ECM is first allowed to power down.**
9. Turn the ignition switch On and allow the rear preload motor to calibrate, see Rear Suspension Unit Preload Motor - Calibration.

Free the Rear Preload Motor

If the rear preload motor appears to be stuck at the maximum or minimum adjustment end stop, the rear preload motor up/down function tests can be used to attempt to free the motor as follows.

 **WARNING**

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Connect the Triumph diagnostic tool as described in the Service Manual and switch the ignition on.
2. Navigate to CHASSIS DIAGNOSTICS - CHASSIS ECM DIAGNOSTICS and select FUNCTION TESTS.

 **CAUTION**

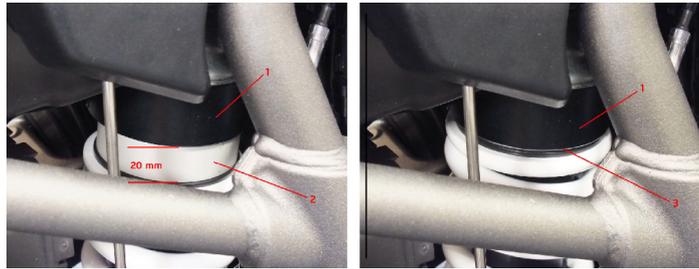
If the rear preload motor adjustment position reaches its maximum or minimum adjustment end stop, do not continue to drive the motor towards the end stop.

Select the test direction that will drive motor away from the end stop as described later in this procedure.

Repeatedly driving the rear preload motor against an end stop may cause the motor to overheat, which can result in permanent damage.

Note

- The position of the rear preload motor adjustment can be checked visually as follows:
- At the maximum preload end stop, the preload adjustment collar is fully extended from the base of the motor housing. Approximately 20 mm of the adjustment collar is visible as shown below.
- At the minimum preload end stop, the preload adjustment collar is fully retracted into the motor housing.



1. Rear preload motor housing
2. Adjustment collar (maximum preload position - fully extended)
3. Adjustment collar (minimum preload position - fully retracted)

3. Visually Check the position of the rear preload motor.

Note

- If the rear preload motor appears to be stuck at the minimum or maximum adjustment end stop, drive the motor away from the end stop using the appropriate test direction as follows.
- Motor stuck at maximum preload - select the rear preload motor down test.
- Motor stuck at minimum preload - select the rear preload motor up test.

4. Select the appropriate rear preload motor test direction.

! WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open air or in an area with adequate ventilation.

5. Start the engine.

! CAUTION

Do not make more than three attempts to free the rear preload motor.
Making more than three attempts to free the rear preload motor may cause the motor to overheat, which can result in permanent damage.

Note

- Upon clicking start, the rear preload motor adjustment collar will move approximately 0.5 mm in the selected direction.
6. Click start and check for rear preload motor adjustment collar movement. A maximum of three attempts may be made to free the motor from an end stop. The attempt to free the motor is successful if adjustment collar movement is observed.

Note

- If after three attempts to free the motor no adjustment collar movement can be observed, check for any stored DTCs, rectify as necessary and repeat the rear preload motor test. If the rear preload motor still doesn't function correctly, contact Triumph service.
7. Turn the ignition off and disconnect the Triumph diagnostic tool. Allow 15 seconds for the chassis ECM to power down.

Note

- With the ignition switch turned off, the Triumph diagnostic tool will prevent the chassis ECM from powering down if it is left connected to the motorcycle.
 - To enable the chassis ECM to power down, disconnect the diagnostic tool from the motorcycle.
 - After running the rear preload motor up/down tests, the rear preload motor will automatically recalibrate the next time the ignition switch is turned on, provided the chassis ECM is first allowed to power down.
8. Turn the ignition switch on and allow the rear preload motor to calibrate, see Rear Suspension Unit Preload Motor - Calibration. During calibration, observe the rear preload motor adjustment collar moving through its full adjustment range to verify correct motor operation.

Rear Suspension Unit Preload Motor - Calibration



Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Conditions Requiring Rear Suspension Unit Preload Motor Calibration

The Rear Suspension Unit (RSU) preload motor must be calibrated:

- After installation and setup of a new chassis ECM.
- After performing the Rear Preload Motor Up/Down function tests using the Triumph Diagnostic Tool.
- After removal/installation of the RSU.
- Before calibration of the swinging arm position sensor.

Note

- **The RSU preload calibration is started automatically after an ignition cycle, under the following conditions:**
 - If a new chassis ECM has been installed.
 - If the Rear Preload Motor function tests have been performed using the Triumph diagnostic tool.
 - For all other conditions listed above, the RSU preload motor calibration must be started manually using the Triumph diagnostic tool.

Procedure

Note

- **During calibration, the RSU preload motor is driven to its maximum and minimum preload settings. Check that the battery is fully charged before starting the calibration.**

1. Remove the rider's seat (see Rider's Seat - Removal).
2. Connect the Triumph Diagnostic Tool (see Linked procedure not present at the moment.) and turn the ignition switch On.
3. Navigate to CHASSIS - CHASSIS DIAGNOSTICS - FUNCTION TESTS and select CALIBRATE REAR PRELOAD MOTOR. The message 'Refer to Service Manual' is displayed.

Note

- **Upon clicking START, the diagnostic tool will send a command to the chassis ECM to perform an RSU preload motor calibration the next time the ignition is switched On.**
4. Click start, then disconnect the Triumph Diagnostic Tool from the motorcycle.
 5. Turn the ignition switch Off and allow the chassis ECM to power down. This should take approximately 10 seconds.
 6. Turn the ignition switch On. The RSU preload motor calibration will start automatically. Do not start the engine at this stage.

Note

Note

- The motorcycle must remain stationary during calibration. If the motorcycle is moved or ridden, this will halt the calibration and cause the TSAS warning light to become illuminated. In this situation, calibration will be restarted the next time the ignition switch is turned Off then On again.
 - During calibration, the TSAS warning light will flash and a message will be displayed in the instrument display.
 - Calibration is complete when the instrument message clears and the TSAS warning light stops flashing.
7. Wait for the TSAS warning light to stop flashing, indicating that the RSU preload motor calibration is complete.

WARNING

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

8. Start the engine and check that the TSAS warning light remains off. If the warning light resumes flashing, the RSU preload motor is being recalibrated due to low battery voltage. Wait for the warning light to stop flashing before turning the engine off.
9. When the calibration has successfully completed, reconnect the Triumph Diagnostic Tool and check for any stored DTCs. Rectify as necessary.
10. Disconnect the Triumph Diagnostic Tool.
11. Refit the rider's seat (see Rider's Seat - Installation).

Swinging Arm Position Sensor - Calibration

WARNING

Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Conditions Requiring Swinging Arm Position Sensor Calibration

The swinging arm position sensor must be calibrated after:

- Installation and setup of a new chassis ECM.
- Installation of a new swinging arm position sensor.
- Removal of the swinging arm position sensor or any disconnection of its mechanical linkage.

Procedure

1. Remove the rider's seat (see Rider's Seat - Removal).

WARNING

The rear suspension unit preload motor **MUST** be calibrated before attempting to calibrate the swinging arm position sensor. Failure to calibrate the rear suspension unit preload motor first, may result in incorrect calibration of the swinging arm position sensor.

Before calibrating the swinging arm position sensor, first calibrate the rear suspension unit preload motor as described in Rear Suspension Unit Preload Motor - Calibration.

Incorrect calibration of the swinging arm position sensor may cause an unsafe riding condition resulting in loss of motorcycle control and an accident.

2. Calibrate the rear suspension unit preload motor (see Rear Suspension Unit Preload Motor - Calibration).

WARNING

WARNING

Before calibrating the swinging arm position sensor, the motorcycle must be raised and supported such that the rear wheel is off the ground and the rear suspension is allowed to hang freely.

Failure to raise and support the motorcycle as described above will result in incorrect calibration of the swinging arm position sensor.

Incorrect calibration of the swinging arm position sensor may cause an unsafe riding condition resulting in loss of motorcycle control and an accident.

3. Raise and support the rear of the motorcycle so that the rear wheel is off the ground and the rear suspension is allowed to hang freely.
4. Connect the Triumph Diagnostic Tool (see Linked procedure not present at the moment.) and turn the ignition On.
5. Navigate to CHASSIS DIAGNOSTICS - CHASSIS ECM DIAGNOSTICS - FUNCTION TEST and select CALIBRATE SWINGING ARM POSITION SENSOR. The message 'Refer to Service Manual' will be displayed.

Note

- **Upon clicking start, a command will be sent to the chassis ECM to read the output from the swinging arm position sensor and register this reading as position zero (rear suspension at full extension). This calibration occurs instantaneously.**
6. Click start. The calibration will be completed instantaneously as described above.
 7. Disconnect the Triumph Diagnostic Tool and turn the ignition Off.
 8. Lower the motorcycle and park on its stand.
 9. Refit the rider's seat (see Rider's Seat - Installation).

Triumph Shift Assist

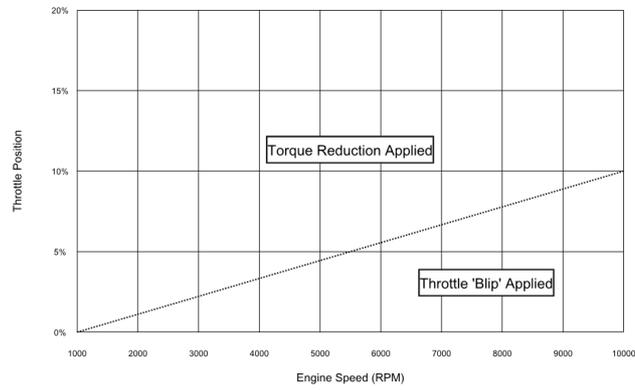
Triumph Shift Assist System

System Description

The Triumph Shift Assist (TSA) system enables the rider to change gears without the use of the clutch. The system uses signals from the Shift Force Sensor (located on the gear change linkage) and the Gear Position Sensor to detect when a shift force is applied to the gear change pedal. Engine torque is then adjusted to facilitate a smooth, clutch free gear change.

System Operation

- The Triumph shift assist system allows clutch free shifts for the majority of gear changes. However, it is recommended that the clutch is used for gear changes at slow riding speeds, or when riding in slow traffic.
- The clutch must be used when selecting any gear from neutral, and also when selecting neutral from any other gear.
- To ensure a smooth gear change, use a positive pedal force to select the next gear then release the pedal. Do not hold the pedal in its upper or lower positions.
- Clutch free Up shifts are disabled by the system at engine speeds lower than 1,500 revolutions per minute (rpm) to prevent stalling.
- At maximum engine speeds, clutch free up shifts are allowed by the system, but clutch free down shifts are disabled to prevent engine over speed.
- The Triumph shift assist system is disabled if the motorcycle is traveling at its limited top speed. The system is automatically re-enabled when the motorcycle slows down from its limited top speed.
- Engine torque is reduced when changing gear at high engine loads.
- A throttle 'blip' is applied when changing gear at low engine loads.
- Engine torque is returned to normal control when the gear change is complete.



Malfunction Action

- If a Triumph shift assist malfunction occurs, the system will be inhibited and the Transmission Warning symbol will be illuminated on the instrument panel.
- All Triumph shift assist related malfunctions must be rectified before the system can be re-enabled.
- If the malfunction is related to the gear position sensor, the neutral position and gear position adaption must be reset and re-adapted before the system can enabled.
- If the malfunction is related to the shift force sensor, the shift force sensor adaption must be reset and re-adapted before the system can enabled.
- The Transmission Warning symbol will continue to be displayed until each adaption is completed successfully.

Shift Force Sensor

The shift force sensor is used to detect when a force is applied to the gear change pedal.

Voltage Characteristics

The sensor output voltage changes as follows during normal operation:

Sensor State	Voltage
At rest	2.6 V
In compression (up shift)	1.6 V
In tension (down shift)	3.6 V

The sensor voltage can be read using the Triumph diagnostic tool.

Further diagnostics

Refer to Shift Force Sensor Circuit for details of pinpoint tests relating to diagnostic trouble codes P1702 and P1703.

Adaption

The motorcycle is delivered from the factory with the shift force sensor fully adapted.

The shift force sensor adaption must be reset and the sensor re-adapted under the following conditions:

- If a shift force sensor malfunction occurs (DTC P1702 and P1703, see Shift Force Sensor Circuit).
- The sensor has been removed or disconnected for any reason.

Refer to Shift Force Sensor Adaption.

Gear Position Sensor

This model is fitted with a hall effect gear position sensor that provides a constant voltage output ranging from 0.5 to 4.5 Volts. The output voltage is used to determine which gear is currently engaged.

Voltage Characteristics

The gear position is determined by the following voltage ranges:

Gear	Minimum Voltage	Maximum Voltage
1	0.5 V	0.7 V
N	0.9 V	1.1 V
2	1.3 V	1.5 V
3	2.0 V	2.2 V
4	2.8 V	3.0 V
5	3.5 V	3.7 V
6	4.3 V	4.5 V

The sensor voltage can be read using the Triumph diagnostic tool.

Further Diagnostics

Refer to Gear Position Sensor Circuit for details of pinpoint tests relating to diagnostic trouble codes P0914 and P0917.

Neutral Position Adaption

The motorcycle is delivered from the factory with the neutral position fully adapted.

The neutral position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see Gear Position Sensor Circuit).
- The sensor has been removed or disconnected for any reason.

Refer to Neutral Position Adaption.

Gear Position Adaption - Models Fitted with Triumph Shift Assist Only

The motorcycle is delivered from the factory with the each gear position fully adapted.

The gear position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see Gear Position Sensor Circuit).
- The sensor has been removed or disconnected for any reason.

Refer to Gear Position Adaption.

Neutral Position Adaption

The neutral position adaption is required to allow for manufacturing tolerances of the gearbox and gear position sensor. The motorcycle is delivered from the factory with the neutral position fully adapted.

The neutral position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see Gear Position Sensor Circuit).
- If the gear position sensor has been removed or disconnected for any reason.

Adaption Reset

To reset the neutral position adaption:

1. Connect the Triumph diagnostic tool and turn the ignition ON.

2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Gear Position/Neutral Position Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.

Re-Adaption

WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

To re-adapt the neutral position:

1. Ensure the transmission is in neutral.
2. Start the engine.

Note

- **For successful and accurate adaption, The engine must be at normal idle speed and the gear change pedal must be in its normal rested position.**
 - **During adaption, do not raise the engine speed and do not touch or move the gear change pedal.**
3. The neutral position will adapt shortly after engine start provided the above conditions are met.
 4. The adaption status can be confirmed by selecting GEAR POSITION ADAPTION STATUS on the Triumph diagnostic tool.

Shift Force Sensor Adaption

The shift force sensor adaption is required to allow for manufacturing tolerances of the shift force sensor. The motorcycle is delivered from the factory with the shift force sensor fully adapted.

The shift force sensor adaption must be reset and re-adapted under the following conditions:

- If a shift force sensor malfunction occurs (DTC P1702 and P1703, see Shift Force Sensor Circuit).
- If the shift force sensor has been removed or disconnected for any reason.

Adaption Reset

To reset the shift force sensor adaption:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Shift Force Sensor Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.

Re-Adaption

WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

Note

- **If necessary, the neutral position can be re-adapted simultaneously with the shift force sensor re-adaption (see Neutral Position Adaption).**

To re-adapt the shift force sensor:

1. Ensure the transmission is in neutral.
2. Start the engine.

Note

- **For successful and accurate adaption, The engine must be at normal idle speed and the gear change pedal must be in its normal rested position.**
 - **During adaption, do not raise the engine speed and do not touch or move the gear change pedal.**
3. The shift force sensor will adapt shortly after engine start provided the above conditions are met.
 4. The adaption status can be confirmed by selecting TRIUMPH SHIFT ASSIST ADAPTION STATUS on the Triumph diagnostic tool.

Gear Position Adaption

Gear position adaption is required to allow for manufacturing tolerances of the gearbox and gear position sensor. The motorcycle is delivered from the factory with the gear positions fully adapted.

Gear position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see Gear Position Sensor Circuit).
- If the gear position sensor has been removed or disconnected for any reason.

Adaption Reset

To reset gear position adaption:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Gear Position/Neutral Position Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.

Re-Adaption

WARNING

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open air or in an area with adequate ventilation.

WARNING

Do not start the motorcycle and engage gears while it is parked on its centre stand. Do not attempt to adapt the gear positions with the motorcycle parked on its centre stand.

Should the motorcycle fall off its centre stand while the rear wheel is in motion, the motorcycle would accelerate rapidly. This could result in serious injury or death as well as causing damage to the motorcycle and other property.

To re-adapt the gear positions:

1. Ensure the transmission is in neutral.
2. Start the engine and allow the neutral position to adapt (see Neutral Position Adaption).

WARNING

When riding the motorcycle the rider must always wear a safety helmet, eye protection, gloves, boots, trousers (close fitting around the knee and ankle) and a brightly coloured jacket. Brightly coloured clothing will considerably increase a rider's visibility to other operators of road vehicles. Although full protection is not possible, wearing correct protective clothing can reduce the risk of injury when riding.

Note

- **A suitable safe place should be found to carry out the road test.**
 - **The Transmission Warning symbol is illuminated on the instrument display.**
3. Road test the motorcycle as follows:
- Ride the motorcycle smoothly at low engine speeds, changing up through each gear in turn.
 - Fully close the throttle and use the clutch at each gear change.
 - As soon as each gear engages, allow the gear change pedal to return to its normal resting position. Do not rest your foot on the pedal as any movement of the pedal can cause incorrect adaption.
 - When each gear change is complete, release the clutch and ride normally using gentle acceleration. Avoid rapid acceleration or deceleration as this will prevent adaption.
 - The gear position will adapt a few seconds after each gear change is completed.
 - When all gear positions have successfully adapted, the Transmission Warning symbol will turn off.
 - After completing the road test, the gear position adaption status can be confirmed using the Triumph diagnostic tool.