TRIUMPH

T595 DAYTONA

T509 SPEED TRIPLE

DAYTONA 955i

SPEED TRIPLE (955cc)

SERVICE MANUAL

INSPEKTIONSHANDBUCH

MANUEL D'ENTRETIEN

TRIUMPH

T595 Daytona
Daytona 955i
T509 Speed Triple (885 cc)
Speed Triple (955cc)

Motorcycle Service Manual

Part Number 3850570 issue 2, 9.98

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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 his ability to do the work, all adjustments, maintenance, and repair work must be undertaken by an authorised Triumph Dealer.

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, all repairs and scheduled maintenance must be performed by an authorised Triumph Dealer.

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 parts catalogue/parts microfiche.
- 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.

Warning, Caution and Note

Particularly important information is presented in the following form:

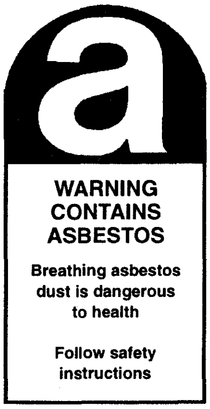
WARNING: This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION: 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.**

ASBESTOS



This warning may apply to any of the following components or any assembly containing one or more of these components:–

Gaskets

Insulators

SAFETY INSTRUCTIONS

- **Operate if possible out of doors or in a well ventilated place.**
- **Preferably use hand tools or low speed tools equipped with an appropriate dust extraction facility.**
- **Dampen dust and place in a properly closed receptacle. Dispose of the closed receptacle safely.**
- **Never use an airline to blow dust from components**

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Owners are warned that the law may prohibit:

(a) 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

(b) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

REFERENCES

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 lifting the engine or turning it over.

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 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 causing gas or oil leakage. Conversely, bolts, nuts, or screws, should all be loosened (in sequence if specified) by about a quarter of 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.

GENERAL INFORMATION

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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, anti-freeze, 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!

Fluoroelastomers

WARNING: Flouroelastomer 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 flouride, carbonyl flouride, 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 flouride 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.

ENGINE OILS

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

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, de-grease 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 the Local Authority for advice on disposal facilities.

BRAKES

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 which 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 D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.

SAFETY INSTRUCTIONS

Jacking and lifting

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, and during lifting or jacking.

Never rely on a single means of support when working with the motorcycle. Use additional safety supports.

Do not leave tools, lifting equipment, spilt 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.

Engine Coolant

WARNING: Coolant mixture which is blended with anti–freeze and corrosion inhibitors contains toxic chemicals which are harmful to the human body. Never swallow anti-freeze, 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 anti–freeze 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 anti–freeze as specified in the Owner's Handbook. Never use a methanol based anti-freeze as this does not contain the required corrosion inhibition properties.

CAUTION: Distilled water must be used with the anti–freeze (see specification for anti–freeze) 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 suffering severe damage.

Cleaning components

A high flash-point 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

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. This is because used lubricants will have lost some lubricative 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 re-use 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 slackened 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 overtightening 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 re-use 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 slacken back castle nuts when fitting split pin.

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 re-used, providing resistance can be felt when the locking portion passes over the thread of the bolt or stud.

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

Encapsulated bolt

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.

WARNING: 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 re-used, 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 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 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.

Press or drift seals to the depth of its housing, with the sealing lip facing the lubricant to be retained if the housing is shouldered, or flush with the face of the housing where no shoulder is provided.

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 of 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 a workshop 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, CO^2, 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 or 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 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 gasses 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.

Inspection

Disassembled parts should be visually inspected and replaced with new ones if there are any signs of the following:

Abrasions, cracks, hardening, warping, bending, dents, scratches, colour changes, deterioration, seizure or damage of any nature.

Replacement Parts

WARNING: Only Triumph approved parts should be used to service, repair or convert Triumph motorcycles. To ensure that Triumph approved parts are used, always order parts, accessories and conversions from an authorised Triumph dealer. The fitting of non-approved parts, accessories or conversions may adversely affect the handling, stability or other aspects of the motorcycle operation which may result in an accident causing serious injury or death.

WARNING: Always have Triumph approved parts, accessories and conversions fitted by an authorised Triumph dealer. The fitment of parts, accessories and conversions by a dealer who is not an authorised Triumph dealer may affect the handling, stability or other aspects of the motorcycle operation which may result in an accident causing serious injury or death.

WARNING: Always have Triumph approved parts, accessories and conversions fitted by a trained technician. To ensure that a trained technician is used, have an authorised Triumph dealer fit the parts. The fitment of parts, accessories and conversions by personnel other than a trained technician at an authorised Triumph dealer may affect the handling, stability or other aspects of the motorcycle operation which may result in an accident causing serious injury or death.

Service data

The service data listed in this manual gives dimensions and specifications for brand new, original parts. Where it is permissible to allow a part to exceed these figures, then the service limit is given.

The terms of the motorcycle warranty will be invalidated by the fitting of other than genuine Triumph parts.

All genuine Triumph parts have the full backing of the motorcycle warranty. Triumph dealers are obliged to supply only genuine Triumph recommended parts.

Specification

Triumph are constantly seeking to improve the specification, design and production of their motorcycles and alterations take place accordingly.

While every effort has been made to ensure the accuracy of this Manual, it should not be regarded as an infallible guide to current specifications of any particular motorcycle.

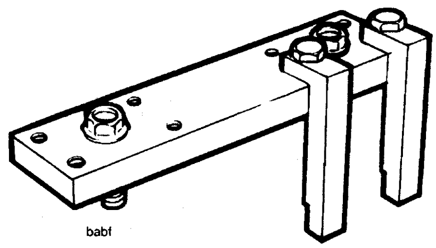
Authorised Triumph Dealers are not agents of Triumph and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

Service tools and garage equipment

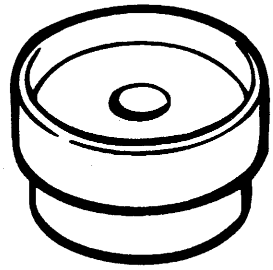
Special service tools have been developed to facilitate removal, dismantling and assembly of certain mechanical components in a practical manner without causing damage. Some operations in this Service Manual cannot be carried out without the aid of the relevant service tools. Where this is the case,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

Special service tools:–

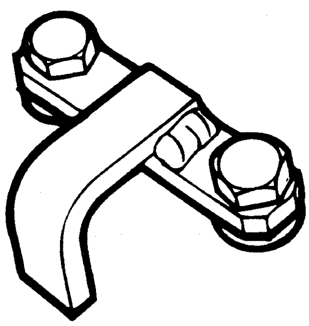
T3880012 – Valve Shim Removal Tool



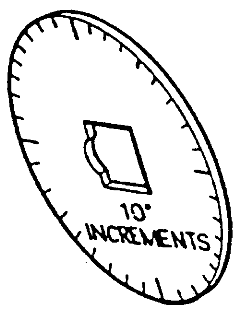
3880075-T0301 – Wheel Bearing Fitment



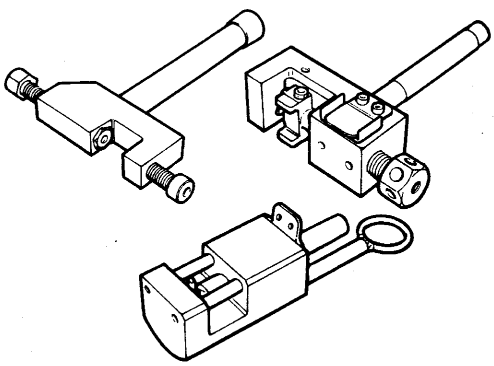
3880040-T0301 – Alternator Shaft Locking Jig



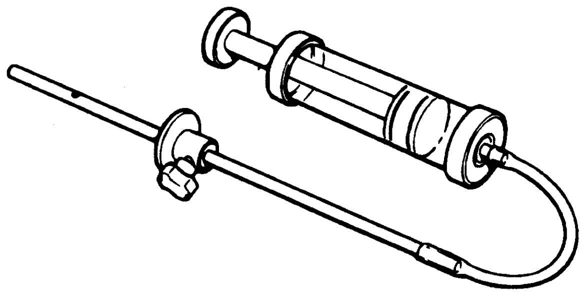
T3880105 – Angular Torque Gauge



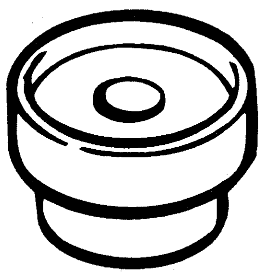
3880205 – Drive Chain Service (3 tools)



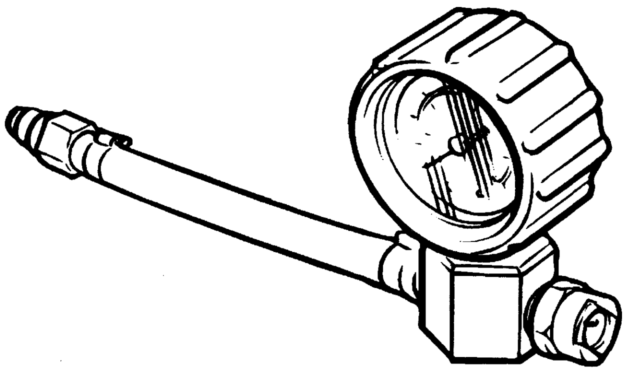
3880160–T0301 – Fork Filler/Evacuator



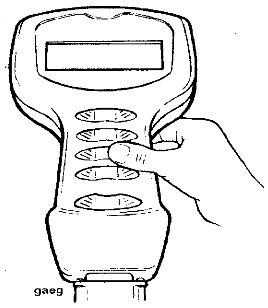
3880070-T0301 – Wheel Bearing Fitment



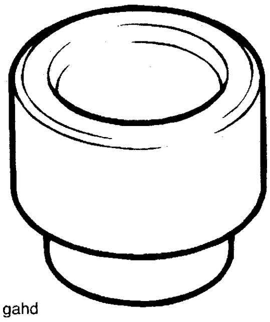
T3880048 – Fuel Pressure Gauge



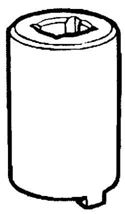
T3880250 – Engine Management Diagnostics



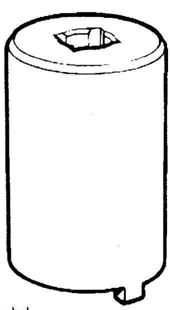
T3880285 – Fork Seal/Bearing Drift



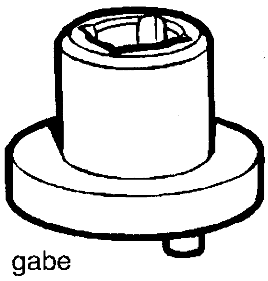
T3880290 – Wrench, Swinging Arm Clamp



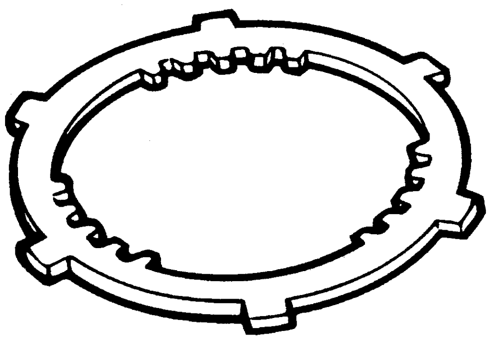
T3880295 – Wrench, Swinging Arm Lock



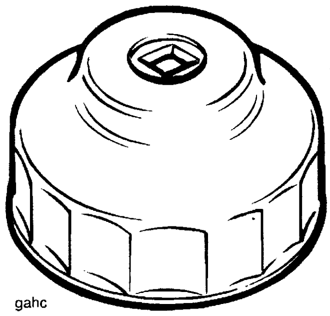
T3880300 – Wrench, Yoke Upper Nut



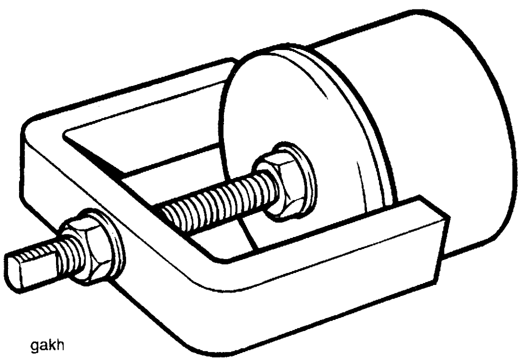
T3880305 – Clutch Anti–rotation Tool



T3880311 – Oil Filter Wrench



T3880315 – Extractor – Cylinder Liners



Full Specification		T509 Speed Triple	T595 Daytona
Engine		3 Cylinder 12 Valve DOHC	3 Cylinder 12 Valve DOHC
Arrangement		Transverse In-line	Transverse In-line
Displacement		885 cc	955 cc
Bore x Stroke		76.0 mm x 65 mm	79.0 mm x 65 mm
Compression Ratio		11.0 : 1	11.2 : 1
Cylinder Numbering		Left to Right (No.3 adjacent to camchain)	Left to Right (No.3 adjacent to camchain)
Firing order		1–2–3	1–2–3
Max. Power		108 PS @ 9100 RPM	130 PS @ 10200 RPM
Max. Torque		85 Nm @ 7500 RPM	100 Nm @ 8500 RPM
Cylinder Head			
Valve Head Dia.	In.	30.0 mm	32.5 mm
	Ex.	26.0 mm	28.0 mm
Valve Lift	In.	8.9 mm	9.35 mm
	Ex.	8.6 mm	9.30 mm
Valve Stem Dia.	In.	5.490 mm/5.475 mm (5.47 mm min.)	5.490 mm/5.475 mm (5.47 mm min.)
	Ex.	5.470 mm/5.455 mm (5.45 mm min.)	5.470 mm/5.455 mm (5.45 mm min.)
Valve Guide Bore Dia.		5.515 mm/5.500 mm	5.515 mm/5.500 mm
Valve Stem to Guide Clearance	In.	0.04 mm/0.01 mm (0.07 mm max.)	0.04 mm/0.01 mm (0.07 mm max.)
	Ex.	0.06 mm/0.03 mm (0.09 mm max.)	0.06 mm/0.03 mm (0.09 mm max.)
Valve Seat Width (in head)		1.1 mm/0.9 mm (1.5 mm max.)	1.1 mm/0.9 mm (1.5 mm max.)
Valve Seat Width (valve)		2.5 mm/1.8 mm	2.5 mm/1.8 mm
Valve Seat Angle		45°	45°
Valve Spring 'Load at Length'	Inner	15 kg min. at 24.0 mm	15 kg min. at 24.0 mm
	Outer	41 kg min. at 26.5 mm	41 kg min. at 26.5 mm
Valve Clearance	In.	0.15 mm/0.10 mm	0.15 mm/0.10 mm
	Ex.	0.20 mm/0.15 mm	0.20 mm/0.15 mm
Valve Bucket Dia.		27.993 mm/27.987 mm	27.993 mm/27.987 mm
Valve Bucket Bore Dia.		28.021 mm/28.000 mm	28.021 mm/28.000 mm
Valve Timing .... Inlet	Open	21° BTDC (@ 1.0 mm Lift)	30° BTDC (@ 1.0 mm Lift)
	Close	50° ABDC (@ 1.0 mm Lift)	41° ABDC (@ 1.0 mm Lift)
	Duration	251°	251°
Exhaust	Open	51° BBDC (@ 1.0 mm Lift)	39° BBDC (@ 1.0 mm Lift)
	Close	25° ATDC (@ 1.0 mm Lift)	30° ATDC (@ 1.0 mm Lift)
	Duration	256°	249°
Camshaft Journal Dia.		22.93 mm/22.90 mm	22.93 mm/22.90 mm
		22.936 mm/22.923 mm (Outrigger)	22.936 mm/22.923 mm (Outrigger)
Camshaft Journal Clearance		0.12 Max	0.12 Max
Camshaft Journal Bore Dia.		23.021 mm/23.000 mm	23.021 mm/23.000 mm
Camshaft End Float		0.13 mm/0.03 mm (0.2 mm max.)	0.13 mm/0.03 mm (0.2 mm max.)
Camshaft Run-out		0.05 mm max	0.05 mm max
Camchain Tensioner Spring Free Length		73.7 mm	73.7 mm
Clutch/Primary Drive			
Primary Drive	Type	Gear	Gear
	Reduction Ratio	1.75 (105/60)	1.75 (105/60)
Clutch	Type	Wet Multi-plate	Wet Multi-plate
No. of Friction Plates		9	9
Plate Flatness		0.15 mm (0.2 mm)	0.15 mm (0.2 mm)
Friction Plate Thickness (new)		3.80mm – 0 +0.80mm	3.80mm – 0 +0.80mm
Friction Plate Thickness (service limit)		3.60mm	3.60mm
Clutch Shim Clearance		0.125 mm/0.075 mm	0.125 mm/0.075 mm
Clutch Actuation Method		Cable	Cable
Cable Free Play (at lever)		0.4 mm/0.8 mm	0.4 mm/0.8 mm

Full Specification		T509 Speed Triple	T595 Daytona
Piston/Crankshaft			
Cylinder Bore Dia.		76.030 mm/75.985 mm	79.030 mm/78.985 mm
Piston Dia. (at 90° to gudgeon pin)		75.980 mm/75.960 mm Cyl. Nos. 1 & 3 75.970 mm/75.960 mm Cyl. No. 2	78.980 mm/78.960 mm Cyl. Nos 1 & 3 78.970 mm/78.960 mm Cyl. No 2
Piston Ring to Groove Clearance	Top	0.02 mm/0.06 mm	0.02 mm/0.06 mm
	Second	0.02 mm/0.06 mm	0.02 mm/0.06 mm
Piston Ring Groove Width	Top	1.03 mm/1.01 mm	0.83 mm/0.81 mm
	Second	1.03 mm/1.01 mm	0.83 mm/0.81 mm
	Oil	2.03 mm/2.01 mm	1.53 mm/1.51 mm
Piston Ring End Gap	Top	0.15 mm/0.30 mm	0.15 mm/0.30 mm
(new ring when fitted in bore)	Second	0.26 mm/0.41 mm	0.30 mm/0.45 mm
	Oil	0.20 mm/0.70 mm	0.20 mm/0.70 mm
Gudgeon Pin Bore Dia. In Piston		19.008 mm/19.002 mm	19.008 mm/19.002 mm
Gudgeon Pin Dia.		19.000 mm/18.995 mm	19.000 mm/18.995 mm
Connecting Rod Small End Dia.		19.034 mm/19.016 mm	19.034 mm/19.016 mm
Connecting Rod Big End Side Clearance		0.3 mm/0.15 mm (0.5 mm max.)	0.3 mm/0.15 mm (0.5 mm max.)
Crankshaft Big End Journal Dia.		40.960 mm/40.946 mm (40.932 mm min.)	40.960 mm/40.946 mm (40.932 mm min.)
Crankshaft Big End Bearing Clearance		0.066 mm/0.036 mm (0.1 mm max.)	0.066 mm/0.036 mm (0.1 mm max.)
Crankshaft Main Journal Dia.		37.976 mm/37.960 mm (37.936 mm min.)	37.976 mm/37.960 mm (37.936 mm min.)
Crankshaft Main Bearing Clearance		0.044 mm/0.020 mm (0.1 mm max.)	0.044 mm/0.020 mm (0.1 mm max.)
Crankshaft End Float		0.20 mm/0.05 mm (0.4 mm max.)	0.20 mm/0.05 mm (0.4 mm max.)
Transmission			
Type		6 Speed Constant Mesh	6 Speed Constant Mesh
Gear Ratios	1st	2.733 (41/15)	2.733 (41/15)
	2nd	1.947 (37/19)	1.947 (37/19)
	3rd	1.545 (34/22)	1.545 (34/22)
	4th	1.291 (31/24)	1.291 (31/24)
	5th	1.154 (30/26)	1.154 (30/26)
	6th	1.074 (29/27)	1.074 (29/27)
Gear Selector Fork Thickness		5.9 mm/5.8 mm (5.7 mm min.)	5.9 mm/5.8 mm (5.7 mm min.)
Gear Selector Groove Width		6.1 mm/6.0 mm (6.25 mm max.)	6.1 mm/6.0 mm (6.25 mm max.)
Gear Selector Fork to Groove Clearance		0.55 mm max.	0.55 mm max.
Final Drive		Chain	Chain
Final Drive Ratio		2.388 (18/43)	2.388 (18/43)
Chain Type		Regina 136 ORP	Regina 136 ORP
No. of Links		108	108
20 Link Length		321 mm	321 mm
Drive Chain Slack		35–40 mm	35–40 mm
Chain lubrication		Mobil chain spray	Mobil chain spray
Lubrication			
Pressure Lubrication, Wet Sump			
Oil Capacity (incl. filter)		4.00 litres	4.00 litres
Recommended Oil		Fully synthetic 15w/40 oil meeting specification API/SH	Fully synthetic 15w/40 oil meeting specification API/SH
Oil Pressure (in main gallery)		40.0 lb/in^2 min. (@ 80°C Oil Temp.) (@ 5000 rpm)	40.0 lb/in^2 min. (@ 80°C Oil Temp.) (@ 5000 rpm)
Oil Pump Rotor Tip Clearance		0.15 mm (0.2 mm max.)	0.15 mm (0.2 mm max.)
Oil Pump Body Clearance		0.22 mm/0.15 mm (0.35 mm max.)	0.22 mm/0.15 mm (0.35 mm max.)
Oil Pump Rotor End Float		0.02 mm/0.007 (0.1 mm max.)	0.02 mm/0.007 (0.1 mm max.)
Ignition System			
Type		Digital Inductive	Digital Inductive
Electronic Rev-Limiter		9700 rpm	10800 rpm
Pick up Coil Air Gap		1.00 mm ± 0.2 mm	1.00 mm ± 0.2 mm
Pick up Coil Resistance		1.3 KΩ ± 10% @ 20°C	1.3 KΩ ± 10% @ 20°C
Ignition Coil Type		Plug-top	Plug-top
Spark Plug Type		NGK-DPR8EA–9	NGK-DPR8EA–9
Spark Plug Gap		0.9 mm	0.9 mm

Full Specification	T509 Speed Triple	T595 Daytona
Fuel System		
Fuel Type	Unleaded, 95 RON (U.S. 89 CLC/AKI)	Unleaded, 95 RON (U.S. 89 CLC/AKI)
Fuel Tank Capacity	18 Litres	18 Litres
Low Level Warning Lamp	3.5 litres remaining	3.5 litres remaining
Fuel Pump Type	Submerged	Submerged
Fuel Pressure (nominal)	3 .0 Bar	3.0 Bar
Purge control system	Electronic via fuel system ECU	Electronic via fuel system ECU
Fuel Injection System		
Type	Electronic, sequential	Electronic, sequential
Idle Speed	1100 RPM	1100 RPM
Injector Type	Twin pencil, solenoid operated plate valve	Twin pencil, solenoid operated plate valve
Throttle	Cable/twist grip/electronic throttle potentiometer	Cable/twist grip/electronic throttle potentiometer
Control Sensors	Road Speed, Barometric Pressure Throttle Position, Camshaft Position Crankshaft Position, Coolant Temperature Induction air temperature	Road Speed, Barometric Pressure Throttle Position, Camshaft Position Crankshaft Position, Coolant Temperature Induction air temperature
Cooling System		
Coolant Mixture	50/50 Distilled Water/Anti-Freeze	50/50 Distilled Water/Anti-Freeze
Anti-Freeze Type	Mobil Antifreeze	Mobil Antifreeze
Freezing Point	–35°C	–35°C
Cooling System Capacity	2.8 Litres	2.8 Litres
Radiator Cap Opening Pressure	1.1 Bar	1.1 Bar
Thermostat Opening Temperature	85°C (nominal)	85°C (nominal)
Cooling Fan Switch On Temperature	95°C	95°C
Temperature Gauge Sensor Resistance	2.9 – 3.3KΩ @ 15°C	2.9 – 3.3KΩ @ 15°C
Suspension		
Front Fork Travel	120 mm	120 mm
Recommended Fork Oil Grade	Showa SS8	Showa SS8
Oil Level (fork fully compressed)	76 mm	76 mm
Oil Volume (dry fill)	589cc	589cc
Front Fork Pull Through	Flush with top yoke upper face	Flush with top yoke upper face
Rear Wheel Travel	140 mm	140 mm
Rear Suspension Bearing Grease	Mobil Grease HP 222	Mobil Grease HP 222
Brakes		
Front type	Two Hydraulically Actuated Four Piston Calipers acting on twin discs	Two Hydraulically Actuated Four Piston Calipers acting on twin discs
Caliper Piston Dia.	33.96 mm/30.23 mm	33.96 mm/30.23 mm
Disc Dia.	320 mm	320 mm
Disc Thickness	4 mm (3.5 mm minimum)	4 mm (3.5 mm minimum)
Disc Run-out Max.	0.3 mm (0.1 mm standard)	0.3 mm (0.1 mm standard)
Master Cylinder Diameter	14mm	14 mm
Recommended Fluid	Mobil Universal Brake and Clutch Fluid DOT4	Mobil Universal Brake and Clutch Fluid DOT4
Rear Type	Hydraulically Actuated 2 Piston Caliper Single disc	Hydraulically Actuated 2 Piston Caliper Single disc
Caliper Piston Dia.	27 mm	27 mm
Disc Dia.	220 mm	220 mm
Disc Thickness	5 mm (4.5 mm minimum)	5 mm (4.5 mm minimum)
Disc Run-out Max.	0.3 mm (0.1 mm standard)	0.3 mm (0.1 mm standard)
Master Cylinder Diameter	14mm	14 mm
Recommended Fluid	Mobil Universal Brake and Clutch Fluid DOT4	Mobil Universal Brake and Clutch Fluid DOT4

Full Specification	T509 Speed Triple	T595 Daytona
Wheels and Tyres		
Front Wheel Rim Axial Run-out	0.5 mm	0.5 mm
Front Wheel Rim Radial Run-out	0.5 mm	0.5 mm
Front Tyres	See owner's handbook	See owner's handbook
Front Tyre Pressure (cold)	2.5 kg/cm^2	2.5 kg/cm^2
Front Tyre Tread Depth min.	2.0 mm	2.0 mm
Rear Wheel Rim Axial Run-out	0.5 mm	0.5 mm
Rear Wheel Rim Radial Run-out	0.5 mm	0.5 mm
Rear Tyres	See owner's handbook	See owner's handbook
Rear Tyre Pressure (cold)	2.9 kg/cm^2	2.9 kg/cm^2
Rear Tyre Tread Depth min.	2.0 mm – up to 80 mph (130 km/h) 3.0 mm – over 80 mph (130 km/h)	2.0 mm – up to 80 mph (130 km/h) 3.0 mm – over 80 mph (130 km/h)

WARNING: Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed course conditions.

Frame		
Frame Type	Twin-spar aluminium	Twin-spar aluminium
Overall Length	2115 mm	2115 mm
Overall Width (to mirrors)	860 mm	800 mm
Overall Height	1170 mm	1230 mm
Wheelbase	1440 mm	1440 mm
Seat Height	800 mm	800 mm
Castor	24 °	24 °
Trail	86 mm	86 mm
Dry Weight	196 kg	198 kg
Max. Payload (rider, passenger, luggage & accessories)	185 kg	185 kg
Electrical Equipment		
Battery Type	Yuasa YB14L-A2	Yuasa YB14L-A2
Battery Rating	12V – 14 Amp. hour	12V – 14 Amp. hour
Alternator Rating	40A	40A
Fuses #1	Ignition control	Ignition control
#2	Headlight cut–out	Headlight cut–out
#3	Side and rear lights	Side and rear lights
#4	Indicators and stop light	Indicators and stop light
#5	Cooling fan	Cooling fan
#6	Headlight dip and main beam	Headlight dip and main beam
#7	Main fuse	Main fuse
#8	Fuel pump, engine management ECM	Fuel pump, engine management ECM
#9	Ignition switch	Ignition switch
#10	Spare	Spare
In-line	Instruments	Instruments
Clutch Actuation Method	Cable	Cable
Cable Free Play (at lever)	0.4 mm/0.8 mm	0.4 mm/0.8 mm

Full Specification		Speed Triple 955cc	Daytona 955i
Engine		3 Cylinder 12 Valve DOHC	3 Cylinder 12 Valve DOHC
Arrangement		Transverse In-line	Transverse In-line
Displacement		955 cc	955 cc
Bore x Stroke		79.0 mm x 65 mm	79.0 mm x 65 mm
Compression Ratio		11.2 : 1	11.2 : 1
Cylinder Numbering		Left to Right (No.3 adjacent to camchain)	Left to Right (No.3 adjacent to camchain)
Firing order		1–2–3	1–2–3
Max. Power		110 PS @ 9200 RPM	130 PS @ 9900 RPM
Max. Torque		97 Nm @ 5800 RPM	100 Nm @ 7600 RPM
Cylinder Head			
Valve Head Dia.	In.	32.5 mm	32.5 mm
	Ex.	26.0 mm	28.0 mm
Valve Lift	In.	9.35 mm	9.35 mm
	Ex.	9..30 mm	9.30 mm
Valve Stem Dia.	In.	5.490 mm/5.475 mm (5.47 mm min.)	5.490 mm/5.475 mm (5.47 mm min.)
	Ex.	5.470 mm/5.455 mm (5.45 mm min.)	5.470 mm/5.455 mm (5.45 mm min.)
Valve Guide Bore Dia.		5.515 mm/5.500 mm	5.515 mm/5.500 mm
Valve Stem to Guide Clearance	In.	0.04 mm/0.01 mm (0.07 mm max.)	0.04 mm/0.01 mm (0.07 mm max.)
	Ex.	0.06 mm/0.03 mm (0.09 mm max.)	0.06 mm/0.03 mm (0.09 mm max.)
Valve Seat Width (in head)		1.1 mm/0.9 mm (1.5 mm max.)	1.1 mm/0.9 mm (1.5 mm max.)
Valve Seat Width (valve)		2.5 mm/1.8 mm	2.5 mm/1.8 mm
Valve Seat Angle		45°	45°
Valve Spring 'Load at Length'	Inner	15 kg min. at 24.0 mm	15 kg min. at 24.0 mm
	Outer	41 kg min. at 26.5 mm	41 kg min. at 26.5 mm
Valve Clearance	In.	0.15 mm/0.10 mm	0.15 mm/0.10 mm
	Ex.	0.20 mm/0.15 mm	0.20 mm/0.15 mm
Valve Bucket Dia.		27.993 mm/27.987 mm	27.993 mm/27.987 mm
Valve Bucket Bore Dia.		28.021 mm/28.000 mm	28.021 mm/28.000 mm
Valve Timing .... Inlet	Open	25° BTDC (@ 1.0 mm Lift)	30° BTDC (@ 1.0 mm Lift)
	Close	36° ABDC (@ 1.0 mm Lift)	43° ABDC (@ 1.0 mm Lift)
	Duration	241°	253°
Exhaust	Open	34° BBDC (@ 1.0 mm Lift)	45° BBDC (@ 1.0 mm Lift)
	Close	25° ATDC (@ 1.0 mm Lift)	26° ATDC (@ 1.0 mm Lift)
	Duration	237°	251°
Camshaft Journal Dia.		22.93 mm/22.90 mm 22.936 mm/22.923 mm (Outrigger)	22.93 mm/22.90 mm 22.936 mm/22.923 mm (Outrigger)
Camshaft Journal Clearance		0.12 Max	0.12 Max
Camshaft Journal Bore Dia.		23.021 mm/23.000 mm	23.021 mm/23.000 mm
Camshaft End Float		0.13 mm/0.03 mm (0.2 mm max.)	0.13 mm/0.03 mm (0.2 mm max.)
Camshaft Run-out		0.05 mm max	0.05 mm max
Camchain Tensioner Spring Free Length		73.7 mm	73.7 mm
Clutch/Primary Drive			
Primary Drive ...... Type		Gear	Gear
	Reduction Ratio	1.75 (105/60)	1.75 (105/60)
Clutch ...... Type		Wet Multi-plate	Wet Multi-plate
No. of Friction Plates		9	9
Plate Flatness		0.15 mm (0.2 mm)	0.15 mm (0.2 mm)
Friction Plate Thickness (new)		3.80mm – 0 +0.80mm	3.80mm – 0 +0.80mm
Friction Plate Thickness (service limit)		3.60mm	3.60mm
Clutch Shim Clearance		0.125 mm/0.075 mm	0.125 mm/0.075 mm
Clutch Actuation Method		Cable	Cable
Cable Free Play (at lever)		0.4 mm/0.8 mm	0.4 mm/0.8 mm

Full Specification		Speed Triple 955cc	Daytona 955i
Piston/Crankshaft			
Cylinder Bore Dia.		79.030 mm/78.985 mm	79.030 mm/78.985 mm
Piston Dia. (at 90° to gudgeon pin)		78.975 mm/78.960 mm Cyl. Nos. 1 & 3 78.970 mm/78.960 mm Cyl. No. 2	78.975 mm/78.960 mm Cyl. Nos 1 & 3 78.970 mm/78.960 mm Cyl. No 2
Piston Ring to Groove Clearance	Top	0.02 mm/0.06 mm	0.02 mm/0.06 mm
	Second	0.02 mm/0.06 mm	0.02 mm/0.06 mm
Piston Ring Groove Width	Top	0.83 mm/0.81 mm	0.83 mm/0.81 mm
	Second	0.83 mm/0.81 mm	0.83 mm/0.81 mm
	Oil	1.53 mm/1.51 mm	1.53 mm/1.51 mm
Piston Ring End Gap	Top	0.15 mm/0.30 mm	0.15 mm/0.30 mm
(new ring when fitted in bore)	Second	0.30 mm/0.45 mm	0.30 mm/0.45 mm
	Oil	0.20 mm/0.70 mm	0.20 mm/0.70 mm
Gudgeon Pin Bore Dia. In Piston		19.008 mm/19.002 mm	19.008 mm/19.002 mm
Gudgeon Pin Dia.		19.000 mm/18.995 mm	19.000 mm/18.995 mm
Connecting Rod Small End Dia.		19.034 mm/19.016 mm	19.034 mm/19.016 mm
Connecting Rod Big End Side Clearance		0.3 mm/0.15 mm (0.5 mm max.)	0.3 mm/0.15 mm (0.5 mm max.)
Crankshaft Big End Journal Dia.		40.960 mm/40.946 mm (40.932 mm min.)	40.960 mm/40.946 mm (40.932 mm min.)
Crankshaft Big End Bearing Clearance		0.066 mm/0.036 mm (0.1 mm max.)	0.066 mm/0.036 mm (0.1 mm max.)
Crankshaft Main Journal Dia.		37.976 mm/37.960 mm (37.936 mm min.)	37.976 mm/37.960 mm (37.936 mm min.)
Crankshaft Main Bearing Clearance		0.044 mm/0.020 mm (0.1 mm max.)	0.044 mm/0.020 mm (0.1 mm max.)
Crankshaft End Float		0.20 mm/0.05 mm (0.4 mm max.)	0.20 mm/0.05 mm (0.4 mm max.)
Transmission			
Type		6 Speed Constant Mesh	6 Speed Constant Mesh
Gear Ratios	1st	2.733 (41/15)	2.733 (41/15)
	2nd	1.947 (37/19)	1.947 (37/19)
	3rd	1.545 (34/22)	1.545 (34/22)
	4th	1.291 (31/24)	1.291 (31/24)
	5th	1.154 (30/26)	1.154 (30/26)
	6th	1.074 (29/27)	1.074 (29/27)
Gear Selector Fork Thickness		5.9 mm/5.8 mm (5.7 mm min.)	5.9 mm/5.8 mm (5.7 mm min.)
Gear Selector Groove Width		6.1 mm/6.0 mm (6.25 mm max.)	6.1 mm/6.0 mm (6.25 mm max.)
Gear Selector Fork to Groove Clearance		0.55 mm max.	0.55 mm max.
Final Drive		Chain	Chain
Final Drive Ratio		2.388 (18/43)	2.388 (18/43)
Chain Type		Regina 136 ORP	Regina 136 ORP
No. of Links		108	108
20 Link Length		321 mm	321 mm
Drive Chain Slack		35–40 mm	35–40 mm
Chain lubrication		Mobil chain spray	Mobil chain spray
Lubrication			
Pressure Lubrication, Wet Sump			
Oil Capacity (incl. filter)		4.00 litres	4.00 litres
Recommended Oil		Fully synthetic 15w/40 oil meeting specification API/SH	Fully synthetic 15w/40 oil meeting specification API/SH
Oil Pressure (in main gallery)		40.0 lb/in^2 min. (@ 80°C Oil Temp.) (@ 5000 rpm)	40.0 lb/in^2 min. (@ 80°C Oil Temp.) (@ 5000 rpm)
Oil Pump Rotor Tip Clearance		0.15 mm (0.2 mm max.)	0.15 mm (0.2 mm max.)
Oil Pump Body Clearance		0.22 mm/0.15 mm (0.35 mm max.)	0.22 mm/0.15 mm (0.35 mm max.)
Oil Pump Rotor End Float		0.02 mm/0.007 (0.1 mm max.)	0.02 mm/0.007 (0.1 mm max.)
Ignition System			
Type		Digital Inductive	Digital Inductive
Electronic Rev-Limiter		9700 rpm	10800 rpm
Pick up Coil Air Gap		1.00 mm $\pm$ 0.2 mm	1.00 mm $\pm$ 0.2 mm
Pick up Coil Resistance		1.3 KΩ $\pm$ 10% @ 20°C	1.3 KΩ $\pm$ 10% @ 20°C
Ignition Coil Type		Plug-top	Plug-top
Spark Plug Type		NGK-DPR8EA–9	NGK-DPR8EA–9
Spark Plug Gap		0.9 mm	0.9 mm

Full Specification	Speed Triple 955cc	Daytona 955i
Fuel System		
Fuel Type	Unleaded, 95 RON (U.S. 89 CLC/AKI)	Unleaded, 95 RON (U.S. 89 CLC/AKI)
Fuel Tank Capacity	18 Litres	18 Litres
Low Level Warning Lamp	3.5 litres remaining	3.5 litres remaining
Fuel Pump Type	Submerged	Submerged
Fuel Pressure (nominal)	3 .0 Bar	3.0 Bar
Purge control system	Electronic via fuel system ECU	Electronic via fuel system ECU
Fuel Injection System		
Type	Electronic, sequential	Electronic, sequential
Idle Speed	1100 RPM	1100 RPM
Injector Type	Twin jet, solenoid operated plate valve	Twin jet, solenoid operated plate valve
Throttle	Cable/twist grip/electronic throttle potentiometer	Cable/twist grip/electronic throttle potentiometer
Control Sensors	Barometric Pressure Throttle Position, Coolant Temperature Crankshaft Position, Induction air temperature	Barometric Pressure Throttle Position, Coolant Temperature Crankshaft Position, Induction air temperature
Cooling System		
Coolant Mixture	50/50 Distilled Water/Anti-Freeze	50/50 Distilled Water/Anti-Freeze
Anti-Freeze Type	Mobil Antifreeze	Mobil Antifreeze
Freezing Point	–35°C	–35°C
Cooling System Capacity	2.8 Litres	2.8 Litres
Radiator Cap Opening Pressure	1.1 Bar	1.1 Bar
Thermostat Opening Temperature	85°C (nominal)	85°C (nominal)
Cooling Fan Switch On Temperature	95°C	95°C
Temperature Gauge Sensor Resistance	2.9 – 3.3KΩ @ 15°C	2.9 – 3.3KΩ @ 15°C
Suspension		
Front Fork Travel	120 mm	120 mm
Recommended Fork Oil Grade	Showa SS8	Showa SS8
Oil Level (fork fully compressed)	76 mm	76 mm
Oil Volume (dry fill)	589cc	589cc
Front Fork Pull Through	Flush with top yoke upper face	Flush with top yoke upper face
Rear Wheel Travel	140 mm	140 mm
Rear Suspension Bearing Grease	Mobil Grease HP 222	Mobil Grease HP 222
Brakes		
Front type	Two Hydraulically Actuated Four Piston Calipers acting on twin discs	Two Hydraulically Actuated Four Piston Calipers acting on twin discs
Caliper Piston Dia.	33.96 mm/30.23 mm	33.96 mm/30.23 mm
Disc Dia.	320 mm	320 mm
Disc Thickness	4 mm (3.5 mm minimum)	4 mm (3.5 mm minimum)
Disc Run-out Max.	0.3 mm (0.1 mm standard)	0.3 mm (0.1 mm standard)
Master Cylinder Diameter	14mm	14 mm
Recommended Fluid	Mobil Universal Brake and Clutch Fluid DOT4	Mobil Universal Brake and Clutch Fluid DOT4
Rear Type	Hydraulically Actuated 2 Piston Caliper Single disc	Hydraulically Actuated 2 Piston Caliper Single disc
Caliper Piston Dia.	27 mm	27 mm
Disc Dia.	220 mm	220 mm
Disc Thickness	5 mm (4.5 mm minimum)	5 mm (4.5 mm minimum)
Disc Run-out Max.	0.3 mm (0.1 mm standard)	0.3 mm (0.1 mm standard)
Master Cylinder Diameter	14mm	14 mm
Recommended Fluid	Mobil Universal Brake and Clutch Fluid DOT4	Mobil Universal Brake and Clutch Fluid DOT4

Full Specification	Speed Triple 955cc	Daytona 955i
Wheels and Tyres		
Front Wheel Rim Axial Run-out	0.5 mm	0.5 mm
Front Wheel Rim Radial Run-out	0.5 mm	0.5 mm
Front Tyres	See owner's handbook	See owner's handbook
Front Tyre Pressure (cold)	2.5 kg/cm^2	2.5 kg/cm^2
Front Tyre Tread Depth min.	2.0 mm	2.0 mm
Rear Wheel Rim Axial Run-out	0.5 mm	0.5 mm
Rear Wheel Rim Radial Run-out	0.5 mm	0.5 mm
Rear Tyres	See owner's handbook	See owner's handbook
Rear Tyre Pressure (cold)	2.9 kg/cm^2	2.9 kg/cm^2
Rear Tyre Tread Depth min.	2.0 mm – up to 80 mph (130 km/h) 3.0 mm – over 80 mph (130 km/h)	2.0 mm – up to 80 mph (130 km/h) 3.0 mm – over 80 mph (130 km/h)

WARNING: Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed course conditions.

Frame		
Frame Type	Twin-spar aluminium	Twin-spar aluminium
Overall Length	2115 mm	2115 mm
Overall Width (to mirrors)	860 mm	800 mm
Overall Height	1170 mm	1230 mm
Wheelbase	1440 mm	1440 mm
Seat Height	800 mm	800 mm
Castor	24 °	24 °
Trail	86 mm	86 mm
Dry Weight	196 kg	198 kg
Max. Payload (rider, passenger, luggage & accessories)	185 kg	185 kg
Electrical Equipment		
Battery Type	GS GTX12–BS	GS GTX12–BS
Battery Rating	12V – 12 Amp. hour	12V – 12 Amp. hour
Alternator Rating	40A	40A
Fuses #1	Ignition control	Ignition control
#2	Headlight cut–out	Headlight cut–out
#3	Side and rear lights	Side and rear lights
#4	Indicators and stop light	Indicators and stop light
#5	Cooling fan	Cooling fan
#6	Headlight dip and main beam	Headlight dip and main beam
#7	Main fuse	Main fuse
#8	Fuel pump, engine management ECM	Fuel pump, engine management ECM
#9	Ignition switch	Ignition switch
#10	Spare	Spare
In-line	Instruments	Instruments

Torque Wrench Settings

Cylinder Head Area

Application	Torque(Nm)	Notes
Cam cover to cylinder head	15	Short bolts
Cam cover to cylinder head	25	Long bolts
Cam chain tensioner to crankcase	9	
Cam chain tensioner centre bolt	23	
Camshaft bearing caps to head	10	Lubricate threads
Camshaft sprocket to camshaft	15	Encapsulated fixing
Cam chain tensioner blade to crankcase	18	Encapsulated fixing
Cam chain top pad to head	10	Encapsulated fixing
Cylinder head to crankcase (M6 screws)	12	
Cylinder head to crankcase bolts	See section 3	
Camshaft position sensor to cam cover	10	

Clutch

Application	Torque(Nm)	Notes
Clutch cover to crankcase	9	
Clutch centre nut	105	
Clutch pressure plate to centre	10	
Clutch cover sound suppression plate to cover	12	

Balancer, Crankshaft and Crankcase

Application	Torque(Nm)	Notes
Crankcase upper to lower (M8 fixings)	See section 6	
Crankcase upper to lower (M6 fixings)	See section 6	
Balancer bearing caps	32	Lubricate threads
Balancer retaining bolt	40	Apply 'Loctite 270'
Connecting rod big end nut	See section 6	
Crankshaft sensor disc to crankshaft	40	Encapsulated fixing
Crankshaft sensor mounting plate to crankcase	10	
Breather disc to crankshaft	12	Encapsulated fixing

Engine Covers

Application	Torque(Nm)	Notes
Crankshaft cover to crankcase	9	
Sprocket cover to crankcase	9	
Clutch cover to crankcase	9	
Oil sight glass to clutch cover	5	
Oil filler plug to clutch cover	Hand tight	
Clutch cover sound suppression plate to cover	12	
Water outlet cover to cylinder head	9	

Transmission

Application	Torque (Nm)	Notes
Output sprocket to output shaft	132	Use new tab washer
Detent wheel to selector drum	12	Encapsulated fixing
Detent arm stud	9	Encapsulated fixing
Detent arm nut	9	
Selector drum bearing retaining screw	12	
Stop plate to crankcase	9	
Selector shaft retainer	6	
Spring abutment bolt	28	
Alternator drive gear/housing to spindle	40	Encapsulated fixing

Lubrication System

Application	Torque (Nm)	Notes
Sump to crankcase	12	
Sump drain plug to sump	25	Use a new washer
Oil pressure relief valve to crankcase	15	Apply 'Loctite 270'
Low oil pressure warning light switch to crankcase	13	Use new washers
Oil filter to adapter	10	
Oil feed pipe to cylinder head	25	Use new washers
Oil cooler connections to sump	25	Use new washers
Oil cooler connections to cooler	25	Use new washers
Oil cooler to radiator mountings	9	
Oil pump to crankcase	12	

Final Drive

Application	Torque (Nm)	Notes
Rear sprocket to cush drive	33	
Chain guard to swinging arm	9	
Chain rubbing strip to swinging arm	9	
Cush drive housing to shaft	146	Use a new nut

Cooling System

Application	Torque (Nm)	Notes
Water pump to crankcase	10	
Thermostat housing to airbox	5	
Thermostat front housing to rear	7	
Radiator to frame	9	
Oil cooler connections to sump	25	Use new washers
Oil cooler connections to cooler	25	Use new washers
Oil cooler to engine bracket	9	
Water elbow to cylinder head	12	
Coolant Drain Plug	13	Use a new washer

Fuel System and Airbox

Application	Torque(Nm)	Notes
Fuel tank to frame	12	
Fuel cap to fuel tank	3	
Fuel pump mounting plate to fuel tank	6	
Fuel pump clamp screw	3	
Fuel filter clamp screw	3	
Throttle body to cylinder head	12	
Fuel rail bracket to fuel rail	5	
Fuel rail bracket to throttle body	5	
Throttle potentiometer to throttle body	2	
Fuel feed/return pipe connections to fuel rail	20	Use new washers
Exhaust downpipe clamp to cylinder head	See section 9	
Exhaust silencer to silencer mounting bracket	15	
Exhaust mounting bracket to frame	12	
Airbox to cam cover	10	

Wheels

Application	Torque(Nm)	Notes
Front wheel spindle/axle bolt	60	
Front wheel spindle pinch bolts	20	
Rear wheel to stub axle	146	

Rear Suspension

Application	Torque(Nm)	Notes
Swinging arm spindle bolts	60	
Swinging arm rubbing strip bolts	4.5	
Caliper carrier location peg	40	
Rear hub/eccentric adjuster clamp bolt	55	
Chain guard bolts	4.5	
Rear wheel drive pin to axle	9	
Rear suspension unit upper mounting bolt	48	
Rear suspension unit lower mounting bolt/drop to drag link pivot	100	
Drag link pivot at frame	95	

Front Suspension

Application	Torque(Nm)	Notes
Upper yoke pinch bolt	20	
Lower yoke pinch bolt	20	
Fork top cap to inner tube	22	
Fork to wheel spindle pinch bolts	20	
Upper yoke centre nut	40	
Damping cylinder bolt	35	Use a new washer

Front Suspension Cont'd

Handlebar clamp to top yoke (low bars only)	20	M6 screws only
Handlebar clamp to top yoke (low bars only)	35	M8 screws only

Brakes

Application	Torque (Nm)	Notes
Front brake caliper to fork	40	
Front brake pad retaining pin	25	
Front brake caliper bleed screw	7	
Front brake hose to caliper	25	
Front brake master cylinder to handlebar	15	
Front brake master cylinder reservoir to bracket	12	
Front brake hose to master cylinder	25	
Front brake disc to wheel	22	Use new fixings
Rear brake caliper to carrier	40	
Rear brake pad retaining pin	20	
Rear brake caliper bleed screw	7	
Rear brake hose to caliper	25	
Rear brake master cylinder to frame	30	Encapsulated fixing
Rear brake master cylinder reservoir to battery box	5	
Rear brake hose to master cylinder	25	
Rear brake disc to axle shaft	22	Use new fixings

Footrests, Control Plates and Engine Mountings

Application	Torque (Nm)	Notes
Upper crankcase to frame	95	
Lower crankcase to frame	95	
Cylinder head to frame	95	
Mounting bracket, frame to cylinder head, left hand	95	
Mounting bracket, bracket to frame, left hand	30	
Control plate to frame	30	Encapsulated fixing
Rear footrest hanger to frame	30	
Side stand mounting bracket	40	
Side stand pivot bolt	20	
Front footrest to control plate	40	Encapsulated fixing

Electrical

Application	Torque (Nm)	Notes
Alternator to crankcase	20	
Alternator drive to alternator	44	
Starter motor to crankcase	10	
Side stand switch to bracket	5	
Instruments to housing	6	

Bodywork

Application	Torque (Nm)	Notes
Front mudguard to fork	9	
Side panels to frame	9	
Front seat to frame	9	
Cockpit to headlamp casting	5	
Belly panel to bracket	8	
Side panel to bracket	8	

MAINTENANCE

CONTENTS

INTRODUCTION

This maintenance schedule given overleaf describes the maintenance requirements for the Sprint ST model. The right hand column of the table shows which section of this manual to refer to for information on how to carry out each maintenance activity.

WARNING: The importance of good maintenance cannot be overestimated. The tasks described will help to ensure the safe and reliable operation of your Triumph motorcycle. Never attempt to cut costs by neglecting the maintenance requirements of your machine as this will result in the premature failure of the component(s) concerned and may lead to an unsafe riding condition and an accident.

Service Check Sheets

Triumph are pleased to be able to offer pads of service check sheets to aid technicians during servicing of Triumph motorcycles. Each pad has 50 single sided service sheets which have tick boxes to indicate the correct maintenance requirement at each mileage interval.

The pads are available from your Triumph parts department under the following part numbers:

T3854095 – Service Sheet Pad, English Language

T3854096 – Service Sheet Pad, French Language

T3854097 – Service Sheet Pad, German Language

TRIUMPH **SCHEDULED MAINTENANCE CHECK SHEET – EFI MODELS**

Customer Name	Mileage:	Model:	Technician Name:
Job No:	V.I.N.:	Date in:	Work completed (signature)
Registration No:	Under Warranty: Yes/No	Date req'd:	

Carry out all the operations specified below at the required intervals. Additional operations must be carried at the specified time/mileage interval whichever comes first.
IMPORTANT: under severe operating conditions, certain items require more frequent servicing, refer to the Owner's handbook for further information.

☑ = Complete

* Whichever comes first

First 500 Miles/800 Kms/1 Month*	Every 6000 miles/10000 Kms/1 Year*	Every 12000 miles/20000 Kms/2 Years*	Every 18000 miles/30000 Kms/3 Years*	Every 24000 miles/40000 Kms/4 Years*	No.	Operation
☐	☐	☐	☐	☐	1.	Position motorcycle in a position for repair. Ensure that the motorcycle is safely supported on/by any lifting equipment used.
☐	☐	☐	☐	☐	2.	Check lights, horn, indicators, instrument warning lights, brake lights and instruments for correct operation.
☐	☐	☐	☐	☐	3.	Check engine management system for stored diagnostic trouble codes.
		☐		☐	4.	Disconnect battery, negative (black) lead first. Remove bodywork, fuel tank and airbox as necessary. Always store displaced bodywork safely to prevent accidental damage and observe the fuel handling precautions in the service manual.
☐	☐	☐	☐	☐	5.	Check/adjust battery electrolyte level (Yuasa batteries only).
☐	☐	☐	☐	☐	6.	Inspect fuel system and hoses for leaks damage, cracks, deterioration and chafing.
☐	☐	☐	☐	☐	7.	Inspect cooling system and hoses for signs of leaks, damage, chafing, cracks and deterioration. Visually inspect hose clips for security.
☐	☐	☐	☐	☐	8.	Add 50% coolant mixture to the expansion tank as necessary. Do not overfill.
☐	☐	☐	☐	☐	9.	Inspect throttle cable for damage, fraying and for correct level of free play. Adjust if necessary.†
☐	☐	☐	☐	☐	10.	Inspect brake pads for wear.
☐	☐	☐	☐	☐	11.	Check and top up both brake master cylinders.
☐	☐	☐	☐	☐	12.	Check and adjust clutch cable.
		☐		☐	13.	Renew air cleaner element.
☐	☐	☐	☐	☐	14.	Inspect wheels for cracks, kerb damage etc.
☐	☐	☐	☐	☐	15.	Inspect tyres for damage, tread wear, bulges, cuts and splits. Check/adjust tyre inflation pressures.
☐	☐	☐	☐	☐	16.	Inspect for oil leaks from all areas including oil cooler, oil cooler pipes and engine area.
☐	☐	☐	☐	☐	17.	Remove sump plug and allow oil to drain out.
☐	☐	☐	☐	☐	18.	Renew the sump plug washer and refit sump plug.
☐	☐	☐	☐	☐	19.	Renew the engine oil filter.
☐	☐	☐	☐	☐	20.	Refill the engine with correct specification engine oil.
		☐			21.	Adjust spark plug gaps.
				☐	22.	Renew spark plugs.
		☐		☐	23.	Check all valve clearances, adjust as necessary.†
☐	☐	☐	☐	☐	24.	Inspect drive chain for wear.††
		☐		☐	25.	Renew fuel filter.
☐	☐	☐	☐	☐	26.	Inspect drive chain for correct adjustment. (also to be checked every 500 miles)
☐	☐	☐	☐	☐	27.	Lubricate drive chain. (also to be checked every 200 miles)
		☐		☐	28.	Lubricate rear wheel bearing
		☐		☐	29.	Raise front wheel off the ground and inspect steering head (headstock) bearings for free play. Lower the front wheels to the ground when complete.
☐	☐	☐	☐	☐	30.	Check steering for free operation.
☐	☐	☐	☐	☐	31.	Inspect front forks for oil leaks/damage/smooth operation.
		☐		☐	32.	Lubricate the headstock bearing.
		☐		☐	33.	Renew fork oil.
		☐			34.	Temporarily fit slave fuel supply.
		☐		☐	35.	Attach exhaust extraction equipment, refit the battery and start the engine. Check that low oil pressure warning light extinguishes. Stop the engine. Check and adjust the engine oil level.
		☐		☐	36.	Attach vacuum gauges to each throttle body. Start the engine and allow to reach normal operating temperature. Check/adjust the throttle body vacuum synchronisation.
☐	☐	☐	☐	☐	37.	Visually inspect all fixings for security. Tighten to the correct torque as necessary.
		☐		☐	38.	Refit all items removed during operation 4. Reconnect the battery, positive (red) lead first.
☐	☐	☐	☐	☐	39.	Carry out road test (minimum 15 km/10 miles).

Additional Operations

The following additional operations must be carried out at the specified time/mileage interval whichever comes first.

Every 2 years/12,000 miles/20,000 Km

☐ 1. Renew all brake master cylinder, and brake caliper pressure and dust seals.

☐ 2. Renew brake fluid.

☐ 3. Renew coolant. Ensure 50% coolant mixture is maintained.

Every 3 years

☐ 1. Lubricate the swinging arm bearings.

Every 4 years/24,000 miles/40,000Km

☐ 1. Renew all brake hoses.

Report Additional Work Carried Out:

† Adjustments subject to additional charge above basic cost of servicing.
†† Renew drive chain if worn to or above the service limit..

Scheduled Maintenance Chart

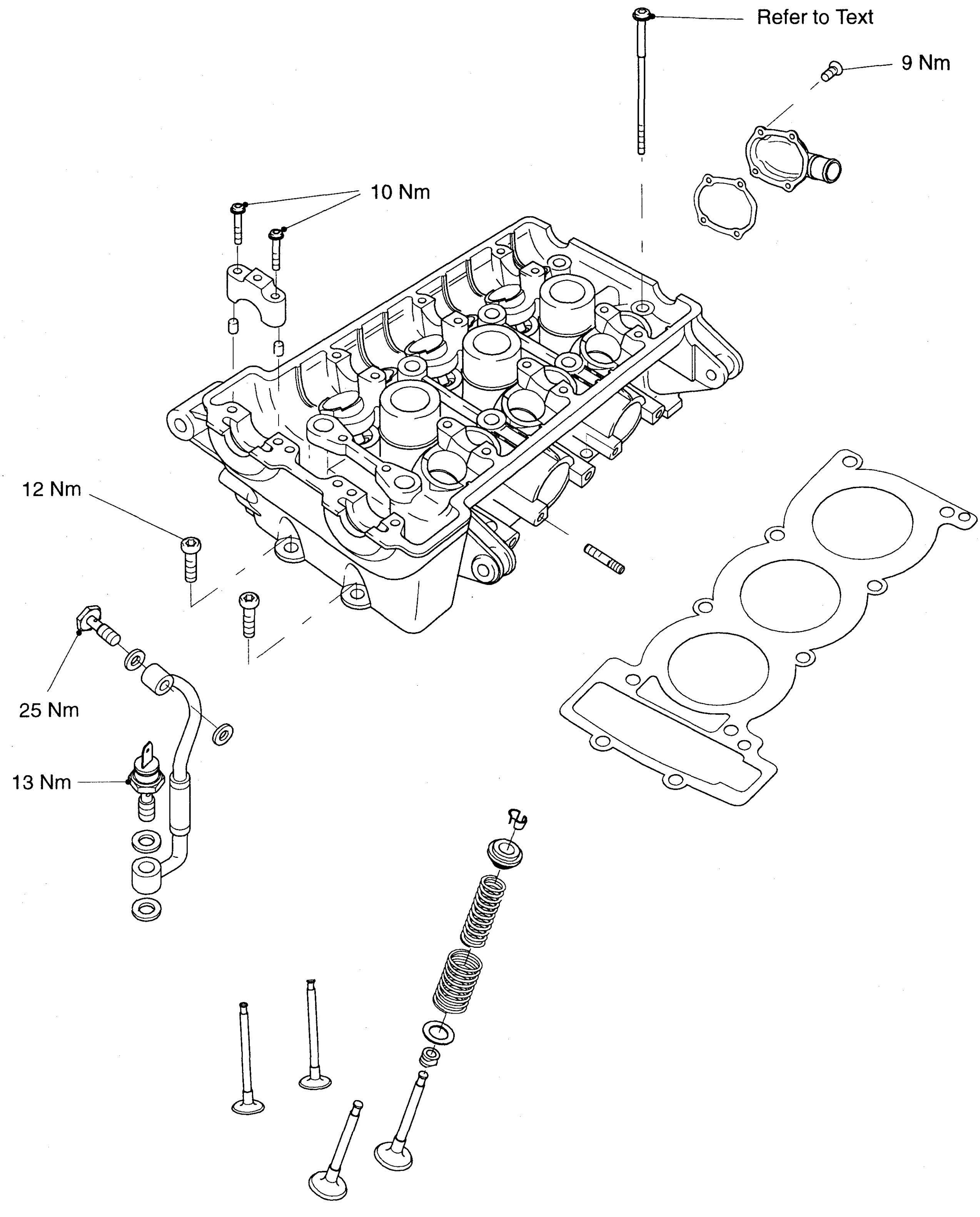
Operation Description	Odometer Reading in Miles (Kms) or time period, whichever comes first							
	Every	500 (800) 1 month	6000 (10000) 1 year	12000 (20000) 2 years	18000 (30000) 3 years	24000 (40000) 4 years	30000 (50000) 5 years	Section
Engine oil – renew	–	●	●	●	●	●	●	8
Engine oil filter – renew	–	●	●	●	●	●	●	8
Valve clearances – check/adjust	–			●		●		3
Air cleaner element – renew	–			●		●		9
Engine ECM – check for stored DTCs	–	●	●	●	●	●	●	9
Spark plugs – check	–			●				9
Spark plugs – renew	–					●		9
Throttle bodies – balance	–			●		●		9
Throttle cable – check/adjust	–	●	●	●	●	●	●	9
Coolant level – check/adjust	–	●	●	●	●	●	●	10
Coolant – renew	Every 2 years							10
Cooling system – check for leaks	Day	●	●	●	●	●	●	10
Fuel system – check for leaks	Day	●	●	●	●	●	●	9
Fuel Filter – renew	–			●		●		9
Steering – check for free operation	Day	●	●	●	●	●	●	12
Headstock bearing – check/adjust	–			●		●		12
Headstock bearing – lubricate	–			●		●		12
Rear wheel bearing – lubricate				●		●		11
Forks – check for leaks/smooth operation	Day	●	●	●	●	●	●	12
Fork oil – renew	–			●		●		12
Brake fluid levels – check	Month	●	●	●	●	●	●	13
Brake fluid – renew	Every 2 years							13
Brake hoses – renew	Every 4 years							13
Brake light – check operation	Day	●	●	●	●	●	●	13
Brake pads – check wear levels	–	●	●	●	●	●	●	13
Brake master cylinder – renew seals	Every 2 years							13
Brake calipers – renew seals	Every 2 years							13
Drive chain – lubricate	Every 200 miles (300 kms)							11
Drive chain – wear check	Every 500 miles (800 kms)							11
Drive chain slack – check/adjust	–	●	●	●	●	●	●	11
Rear suspension – lubricate	3 years/24000 miles (40000 kms)							11
Fasteners – inspect visually for security	Day	●	●	●	●	●	●	–
Wheels – inspect for damage	Day	●	●	●	●	●	●	14
Tyre wear/tyre damage – check	Day	●	●	●	●	●	●	14
Tyre pressures – check/adjust	Day	●	●	●	●	●	●	14
Clutch cable – check/adjust	Day	●	●	●	●	●	●	4

CYLINDER HEAD

CONTENTS

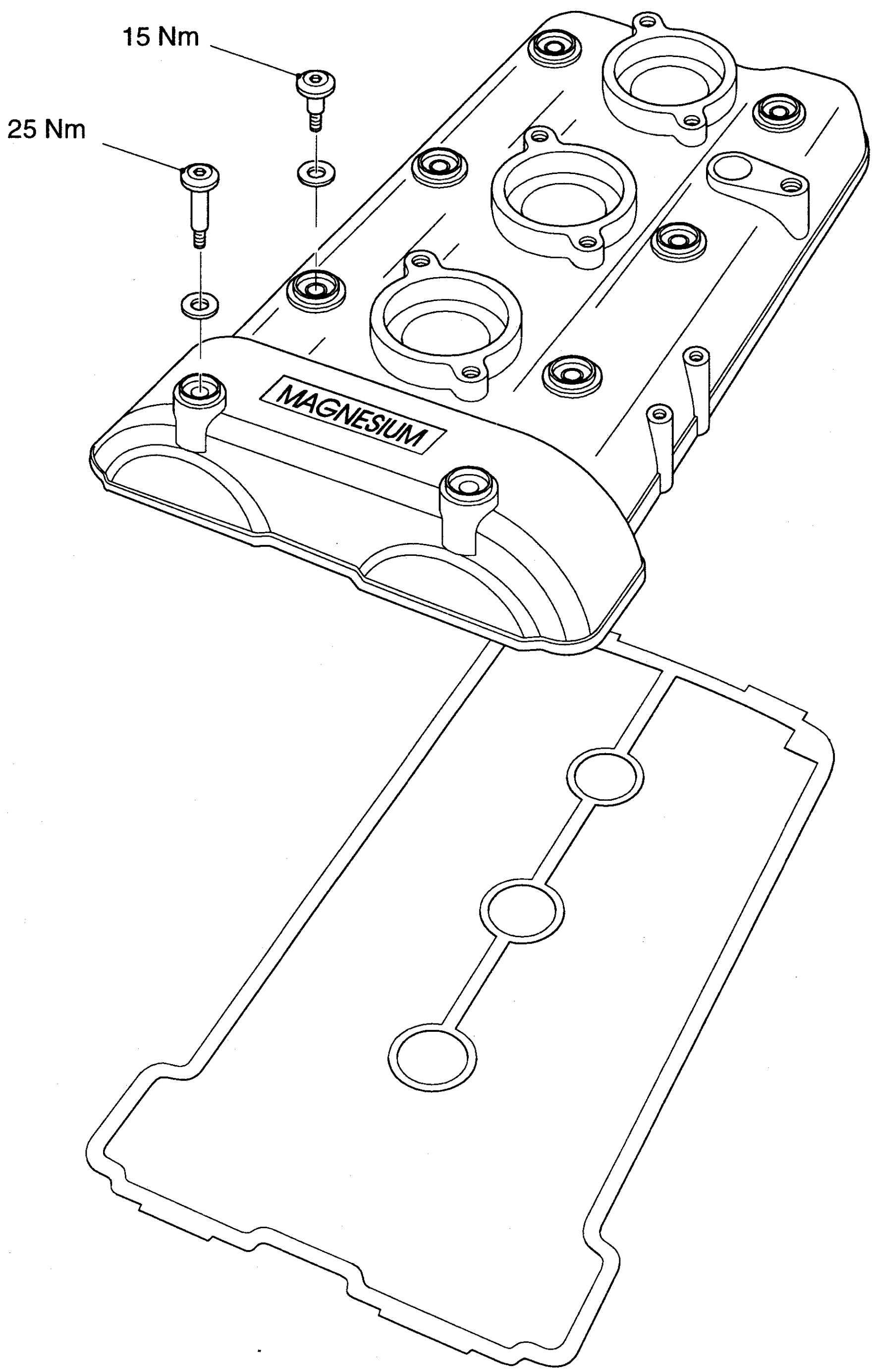
Exploded View

Cylinder Head and Valves



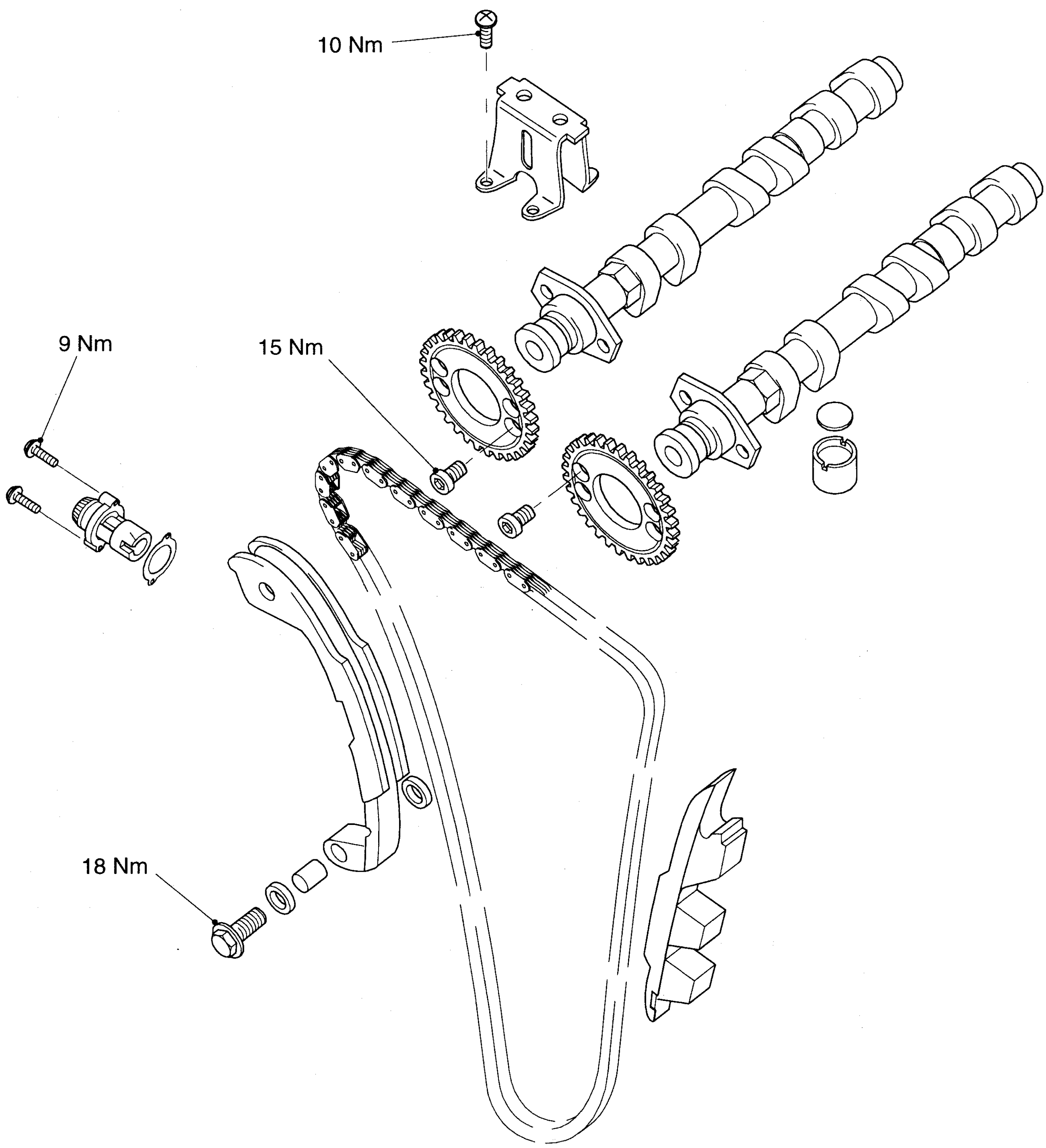
Exploded View

Cam Cover



Exploded View

Camshaft and Camshaft Drive



CYLINDER HEAD DESCRIPTION

All engines are fitted with an aluminium alloy cylinder head which carries the camshaft, 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 head without additional bearings. Valve clearances are adjusted by changing variable thickness shims which sit between the valve tappet and the camshaft. Various different camshaft profiles are used depending upon engine configuration, model type and final market destination.
The camshafts are driven by a silent-type chain.
The chain is tensioned by a spring loaded device fitted in the upper crankcase, and is guided by two rubber blades.

Oil is supplied to the head by an external feed pipe which is situated at the right hand rear side of the head. Once supplied to the head, the oil is distributed along internal drillings within the head casting and camshaft.

Dual valve springs are used to close the inlet 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.

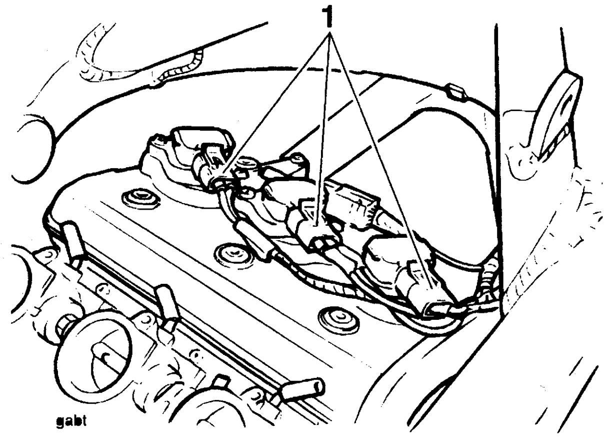
Due to the methods used to assemble the valve seats and valve guides to the head, these parts cannot be replaced.

CAUTION: In any of the following operations which necessitate the removal or disconnection of the cam chain, NEVER turn the engine without the cam 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.

CAM COVER

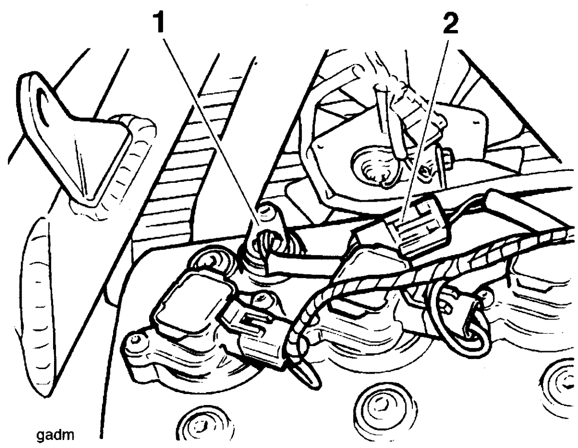
Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the side panel assembly as detailed in the body section.
3. Remove both lower fairings (where fitted).
4. Remove the fuel tank and airbox as detailed in the fuel system section.
5. Disconnect the electrical connections to the ignition coils, then remove the coils from the cam cover.



1. Coil Connections

6. Disconnect and remove the camshaft position sensor (if fitted).



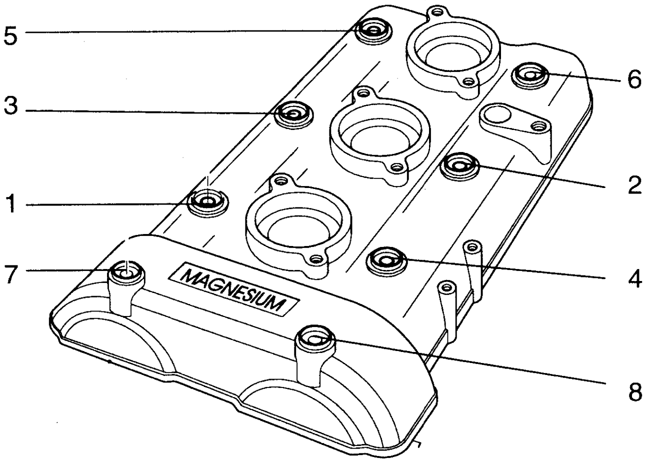
1. Camshaft Position Sensor (where fitted)

2. Sensor Connection

7. Progressively release the cam cover bolts in the sequence shown below.

NOTE:

- **Two longer bolts are fitted at the right hand end adjacent to the cam chain.**



Cam Cover Bolt Release Sequence

8. Ease the water hoses to allow the cover to be removed from the left hand side of the motorcycle.

> **CAUTION: Never use a lever to remove the camshaft cover from the head.**
>
> **Using a lever will cause damage to the head and cam cover which could lead to an oil leak.**

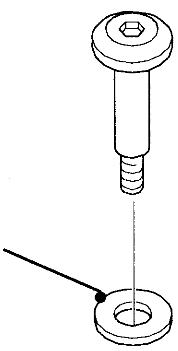
9. Remove the cam cover gasket.

10. Remove any residual oil from the front of the head using a syringe or lint free cloth.

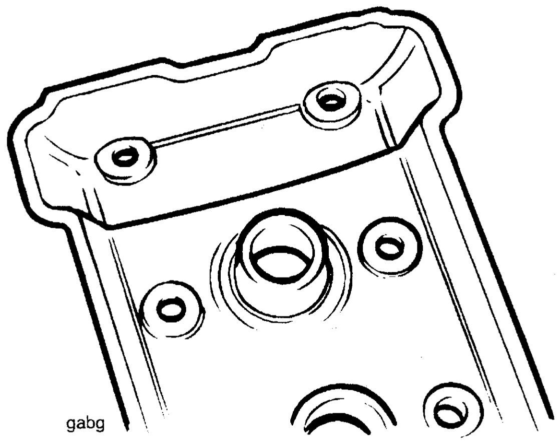
Installation

1. Check the condition of the cam cover seal. Refit/replace as necessary.

2. Check the condition of the cam cover bolt seals. Refit/replace as necessary.



3. Apply silicone sealer to the areas shown in the diagram below.



Silicone Sealer Areas

4. Fit the cam cover, ensuring that the gasket remains in the correct position. Pay particular attention to the spark plug tower areas.

5. Fit the cam cover screws and screw seals, then tighten until finger tight.

6. Finally, tighten the cam cover screws, in same order as for removal, to **15 Nm** (short bolts) **25 Nm** (long bolts).

7. Fit the camshaft position sensor (if fitted) and tighten the fixing to **10 Nm**. No adjustment is necessary.

8. Fit the ignition coils and tighten the coil fixings to **10 Nm.**

9. Reconnect the ignition coils.

10. Refit the fuel tank and airbox as described in the fuel system section.

11. Refit the lower fairings (if previously removed) as described in the body section.

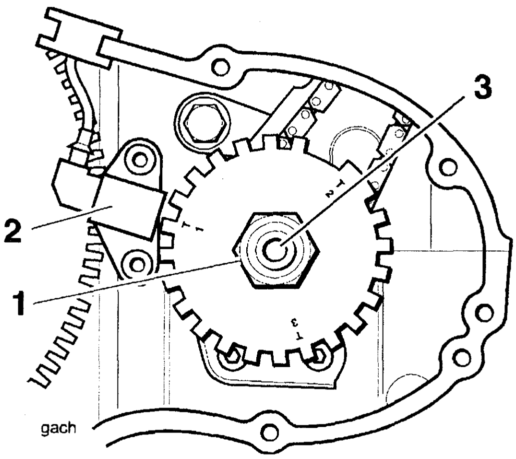
12. Refit the side panel assembly.

13. Reconnect the battery positive (red) lead first.

CAM CHAIN TENSIONER

Removal

1. Remove the cam cover as described earlier in this section.
2. Drain the engine oil into a suitable container.
3. Remove the clutch cover to give access to the ignition rotor.

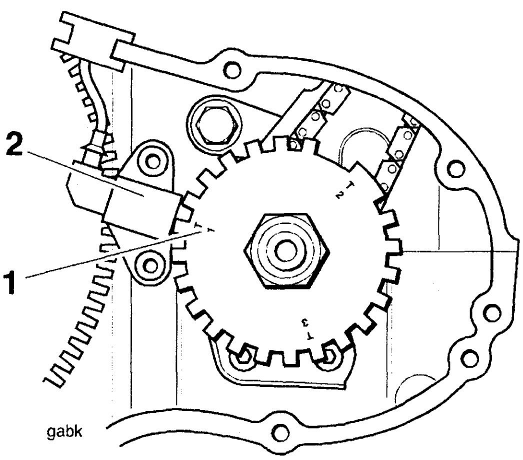


1. Crankshaft Rotor Clamp Nut

2. Crankshaft Position Sensor

3. Centre Bolt

4. Rotate the crankshaft clockwise (the normal direction of rotation), using the nut fitted to the end of the crankshaft. Stop rotation when number 1 cylinder is at top dead centre (TDC), that is when the 'T1' mark on the crankshaft rotor aligns with the crankshaft position sensor.

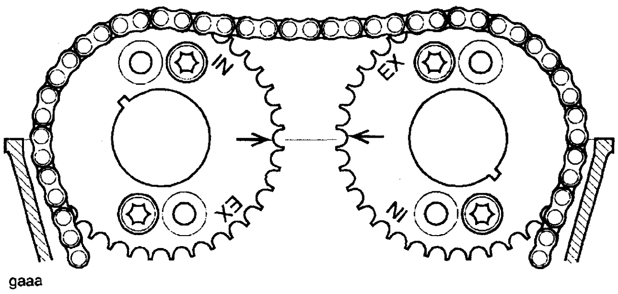


1. 'T1' Mark

2. Crankshaft Position Sensor

NOTE:

- **In addition to the crank sensor/wheel alignment, at TDC, the alignment marks on the camshaft sprockets will point inwards at a point level with the joint face.**



Camshaft to Cylinder Head Alignment Marks

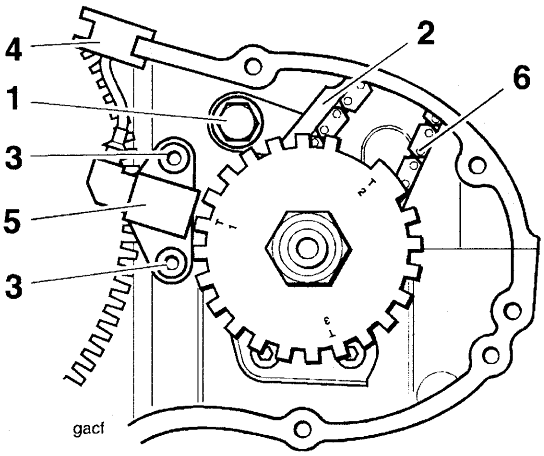
5. Place a suitable wedge between the tensioner blade and crankcase, to hold the cam chain taut during removal of the tensioner.
6. Carefully remove the centre nut from the tensioner and withdraw the tensioner spring.

> **WARNING: The tensioner centre nut is under spring tension. Always wear hand, eye and face protection when withdrawing the centre nut and take great care in order to minimise the risk of injury and loss of components.**

7. Remove the bolts securing the tensioner to the upper crankcase and remove the tensioner and gasket.

Installation

1. Check that number 1 cylinder is still at top dead centre (TDC).
2. Ensure that the wedge fitted earlier is still holding the tensioner blade in contact with the timing chain. Check that the camshaft timing marks point inwards and are level with the line of the head.



1. Tensioner Blade Retaining Bolt

2. Tensioner Blade

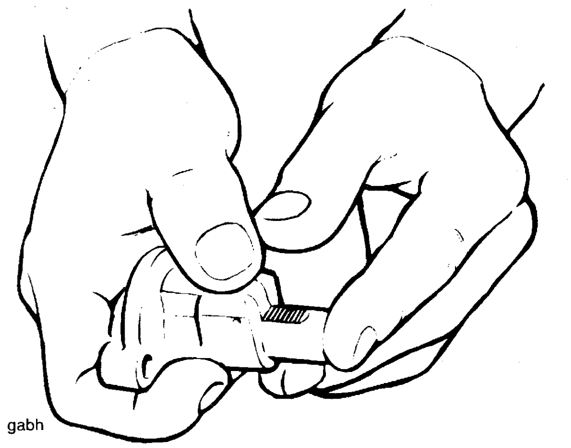
3. Sensor Screws

4. Grommet

5. Crankshaft Position Sensor

6. Cam Chain

3. Set the tensioner plunger onto the first tooth of the ratchet (i.e. minimum extension) by manually lifting the tensioner pawl.



Tensioner Plunger Set–up

4. Fit the tensioner, complete with a new gasket, to the upper crankcase and tighten the retaining bolts to **9 Nm**.

5. Remove the tensioner blade wedge, taking care not to move or damage the tensioner blade.

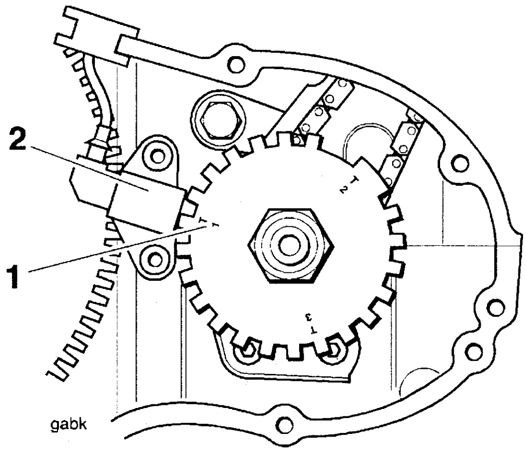
6. Fit a new sealing washer to the centre nut. Using finger pressure only, push the ratchet section of the tensioner into firm contact with the tensioner blade. Carefully refit the spring and centre nut to the tensioner. Tighten the centre nut to **23 Nm**.

7. Check that the tensioner plunger is correctly located in the middle of tensioner blade when viewed from above.

8. Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC. Ensure that the 'T1' mark on the crankshaft rotor is aligned with the crankshaft position sensor.

NOTE:

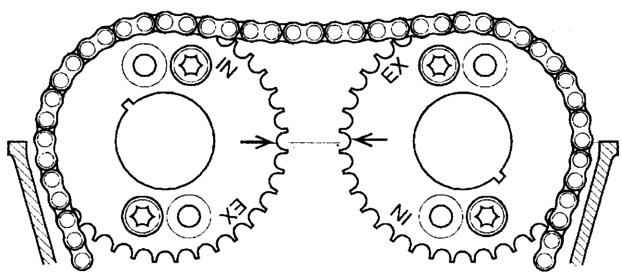
- **The crankshaft sensor will automatically align correctly with the front , back or centre of the T1 tooth depending on the camshaft version. If the valve timing is incorrect the T1 mark will not align with the crank at all.**



1. Ignition Rotor

2. Crankshaft Position Sensor

9. Re-check that the camshaft timing marks align as illustrated below.



Camshaft to Cylinder Head Alignment Marks

NOTE:

- **Depending on the engine variant, with the camshaft arrows aligned as shown, the 'T1' mark on the crankshaft may align with the crankshaft position sensor at either the rear, centre or front edge of the gear tooth. Any of those alignment positions can be considered to be correct.**

10. Re-check tensioner plunger location against the tensioner blade.

11. Refit the cam and clutch covers.

12. Refill/adjust the engine oil level.

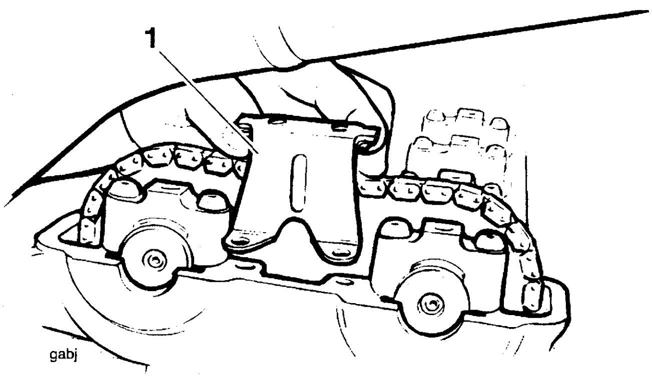
CAMSHAFTS

Removal

NOTE:

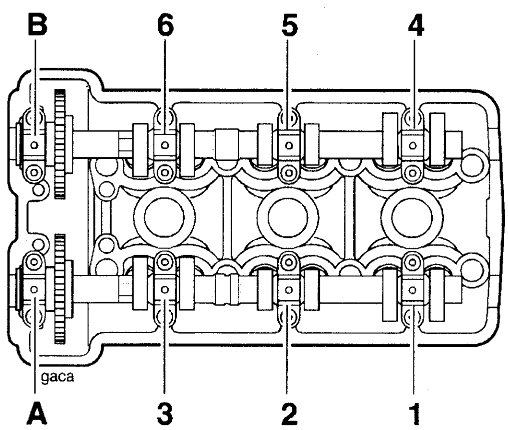
- **The camshafts can be removed from the head without the complete removal of the timing chain. However, the chain must first be detached from the camshafts. The camshafts and sprockets are removed as an assembly.**

1. Remove the cam cover and cam chain tensioner as described earlier in this section.
2. Remove the cam chain top pad from the cam chain side of the cylinder head.



1. Cam Chain Top Pad

3. To ensure that the camshaft caps are refitted in the same positions as prior to removal, mark the position of each camshaft cap in relation to the head. A laundry marker or similar may be used to mark the cap positions.



Camshaft Cap Numbering

NOTE:

- **The caps are numbered sequentially and must not be interchanged for a different position on the head. The camshaft caps on the outside of the timing chain (known as outriggers) are marked 'A' for the exhaust and 'B' for the inlet.**

4. Progressively release each of the fasteners securing the camshaft caps of the inlet camshaft to the cylinder head.
5. Release the caps for the exhaust camshaft.

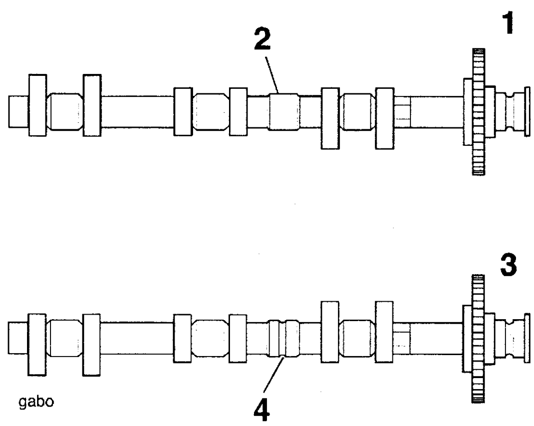
CAUTION: Never completely release one camshaft cap in isolation from the others as this may cause the caps to crack.

Always progressively release all the camshaft caps of one camshaft before final removal.

CAUTION: Always completely release and remove one camshaft before starting to release the other. If both camshafts are progressively released at the same time, the valves may contact each other and cause damage to the valve head areas and valve stems.

NOTE:

- **The inlet and exhaust camshafts are different. They can be identified by a plain area in the centre of the exhaust cam and a groove in the same place on the inlet cam.**



1. Exhaust Camshaft

2. Plain Section

3. Inlet Camshaft

4. Grooved section

6. Once the pressure on all the camshaft caps has been released, remove the fasteners and caps complete with dowels.

NOTE:

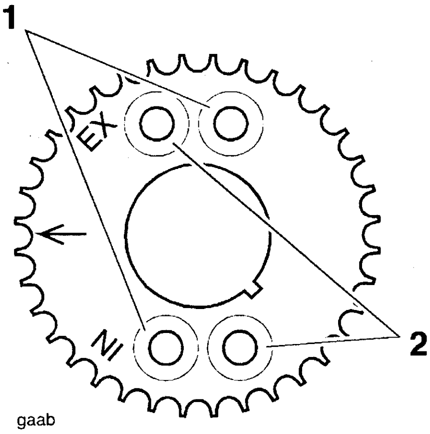
- **Each cap is located by two dowels which align the cap to the head. If the caps cannot be removed using hand pressure, gently tap each cap with a soft faced tool to release.**

7. Lift the cam chain from the exhaust camshaft sprocket and remove the exhaust camshaft.
8. Repeat the procedure for the inlet camshaft.

Camshaft and Bearing Cap Inspection

1. Inspect the camshaft sprockets for damaged and worn teeth. Replace as necessary.

> **CAUTION: The same sprocket is used for both inlet and exhaust camshafts. To attach the sprocket to the different camshafts, different bolt holes are used.**
>
> **Never fit a camshaft sprocket to a camshaft using incorrectly identified bolt holes. Severe engine damage will result from incorrect attachment.**



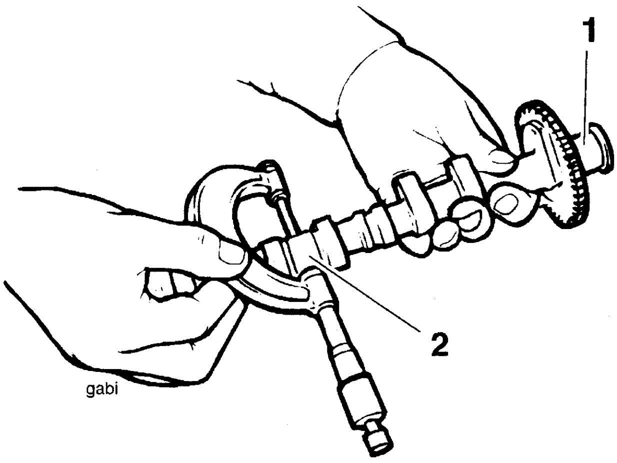
1. Inlet Camshaft Bolt Holes

2. Exhaust Camshaft Bolt Holes

2. Measure the camshaft journals with a micrometer or vernier. If any journal is outside the specified tolerance, replace the camshaft.

Outrigger Journal Diameter
Standard: 22.923 – 22.936 mm

Standard Journal Diameters
Standard: 22.93 mm



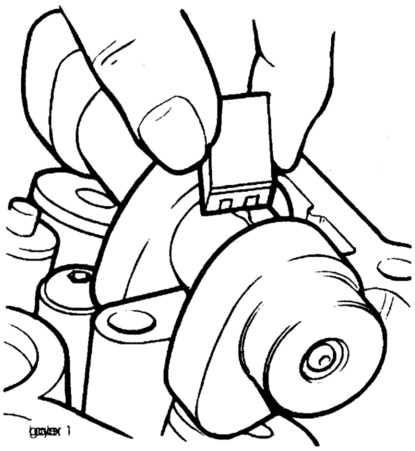
1. Outrigger Journal

2. Standard Journal

3. Examine all camshaft and camshaft bearing caps for excessive wear and damage, paying particular attention to the outrigger caps.
4. Check the journal-to-head clearances, using 'Plastigauge' (Triumph part number 3880150-T0301) as follows:
   - Ensuring that the camshaft sprocket alignment marking is located as for removal, assemble one camshaft to the head and progressively tighten the bearing caps to **10 Nm.**
   - Remove one bearing cap only and wipe the exposed areas of both the camshaft journal and cap.
   - Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the cap.
   - Size a length of the Plastigauge to fit across the camshaft journal. Fit the Plastigauge to the journal using the grease to hold the strip in place.
   - Refit the cap and evenly and progressively tighten all the camshaft cap bolts to **10 Nm.**
   - Release the cap bolts and remove the cap. Using the gauge provided with the Plastigauge kit, measure the width of the now compressed Plastigauge.

NOTE:

- **The camshaft caps are unique to each cylinder head and are, therefore, not available individually. If a camshaft cap is worn or damaged, the complete cylinder head must be replaced.**



Measuring The Compressed Plastigauge.

5. Calculate the journal clearance using the Plastigauge chart supplied with the Plastigauge kit.

6. If the clearance measured is within the specified tolerance, remove the cap and clean off all traces of Plastigauge. Assemble the camshafts as described in this section.

NOTE:

- **If the measured clearance is outside the tolerance, and the camshaft journals are within tolerance, the cylinder head must be replaced.**

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.

Installation

1. 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 head.

2. Locate each camshaft to the head ensuring the camshafts are correctly identified (inlet and exhaust) and also correctly located over their respective valve banks.

3. Working on one camshaft at a time, locate the cam chain over the cam sprocket. Position the camshaft in the same position as for removal **before attempting to fit the caps** (that is, with the timing marks on the camshaft sprockets level and pointing inwards, and with the crankshaft position sensor in line with the 'T1' mark on the crank rotor.

4. Repeat the procedure for the other camshaft.

CAUTION: If the camshafts and caps are fitted without first aligning the timing marks on both the crankshaft and camshaft sprockets, or if both camshafts are fitted at the same time, the inlet and exhaust valves will contact each other causing damage to both the head and the valves.

5. Lubricate the threads of the camshaft cap screws with engine oil and evenly and progressively tighten to **10 Nm**.

6. Before fitting the cam chain tensioner, ensure that each camshaft rotates freely. **Do not rotate either camshaft by more than 5°.**

CAUTION: If any components have been renewed, the valve clearances must be checked and adjusted. Running with incorrectly adjusted valve clearances may cause excess engine noise, rough running and engine damage.

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

8. Assemble the cam chain tensioner using the instructions given earlier in this section.

9. Check the valve clearances. Adjust as necessary.

10. Refit the engine covers, coils, airbox, fuel tank and bodywork as described earlier in this section.

VALVE CLEARANCES

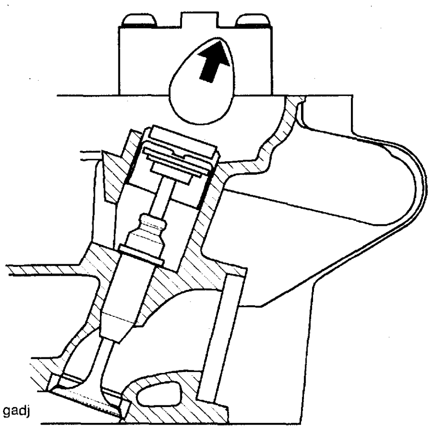
Camshaft, valve, valve shim and valve seat wear affects the valve clearances. The effect of this wear is to change the gap between the camshaft and valve shim, causing engine noise and improper running. If the valve clearances become too small, permanent damage to the valve and valve seat will take place. 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.**

1. Remove the cam cover as previously described in this section.
2. Remove the spark plugs to reduce compression resistance when turning the engine.
3. Select a high gear and, using the rear wheel, turn the engine until a pair of camshaft lobes are positioned pointing away from the valves.



Cam Lobe Pointing Away From Valve

4. Using feeler gauges, measure and record the clearances **for this pair of valves only.**
5. 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.**

NOTE:

- **The correct valve clearances are in the range given below.**

INLET 0.10 – 0.15 mm

EXHAUST 0.15 – 0.20 mm

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 below.

NOTE:

- **Number 1 valve is situated on the left hand side of the motorcycle.**

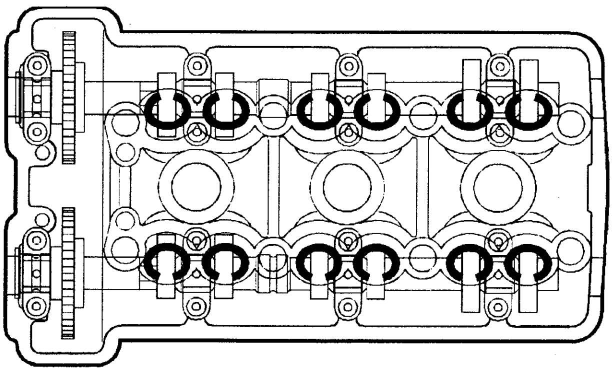
Typical Valve Clearance Chart

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

Valves are adjusted, in pairs, using tool T3880012 to hold the valve open during shim removal and replacement.

1. Rotate each tappet bucket until the slots in the buckets are positioned such that they are pointing to the outside of the head.



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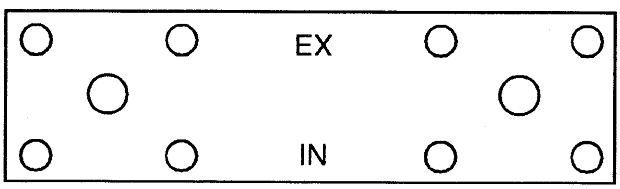
Buckets Positioned to outside of head

2. Remove the spark plugs to reduce compression resistance. Engage a high gear and, with the aid of an assistant, rotate the engine by turning the rear wheel forward until the pair of valves to be adjusted are fully open. Take care to ensure that the tappet buckets do not turn during opening.

NOTE:

- **The tool mounting plate is marked 'IN' and 'EX' denoting which are the inlet and exhaust sides of the tool. Always ensure that the tool assembly instructions are closely followed to ensure correct tool operation.**



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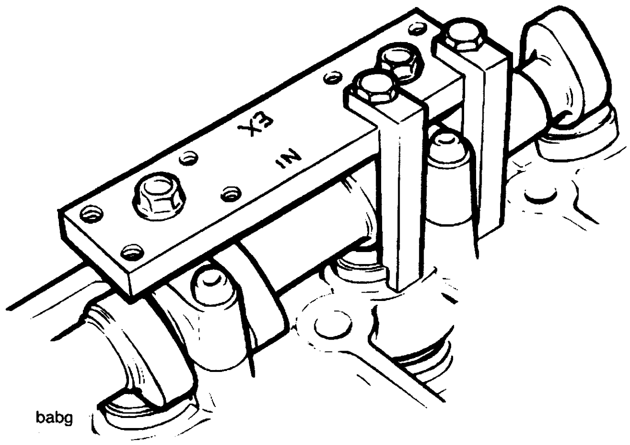
Tool Mounting Plate Markings

3. Loosely assemble the tool legs to the mounting plate ensuring that the legs are assembled to the correct side of the mounting plate for the valve shims being changed. For example, if changing inlet valve shims, the legs must be fitted to the side marked 'IN'.

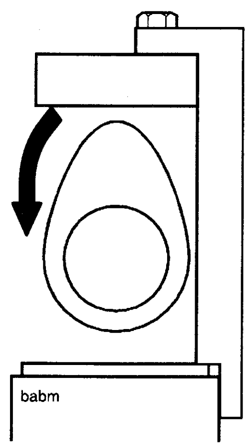
4. Locate the mounting plate to the camshaft caps above the valves to be adjusted. The tool legs must face towards the spark plug tubes. Tighten the mounting plate fixings to **7 Nm.**



Tool in Position on Inlet Camshaft

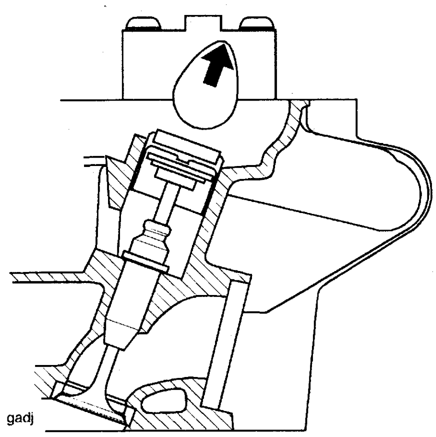
5. Hold the tool legs firmly against the mounting plate and tighten the leg to mounting plate fixings to **7 Nm**.

CAUTION: With the tool fitted, full 360° rotation of the engine/camshaft is not possible. The engine must be turned such that the camshaft lobes turn within the available free space allowed by the tool. Severe tool and camshaft damage will result from camshaft contact with the tool.



Rotate in direction of arrow, not towards tool.

6. Turn the engine over until the camshaft lobes for the valves to be adjusted point directly away from the valves.

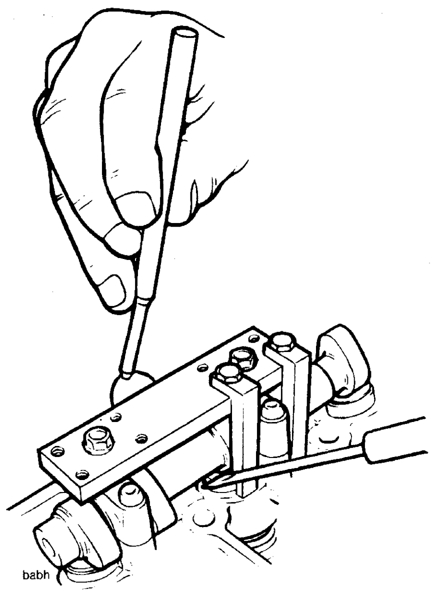


Cam Lobe Pointing Away From Valve

7. As the valves begin to close, the tool legs will prevent the valves from rising, allowing the shims to be removed using a soft faced lever and a magnet.

NOTE:

- **The shim is often a tight fit in the tappet. Use a suitable soft faced lever and a magnet to remove the shim from the tappet.**



Removing/Replacing The Shim

8. Select a new shim using the charts shown overpage.

9. Take the selected replacement shim and lubricate with engine oil. Fit the shim to the top of the tappet by reversing the removal procedure.

10. Turn the engine over until the camshaft fully opens the valves being adjusted. Remove the tool when the valve is fully open. Check that the shim has seated correctly and adjust, if necessary, before proceeding.

NOTE:

- **The tool is designed to allow adjustment of 2 pairs of valves without moving the mounting plate. This is achieved by moving the tool legs to a new location once one pair has been adjusted.**

11. Repeat the procedure until all valves have been adjusted.

NOTE:

- **A shim selection chart can be found on the following two pages.**

Exhaust Valve Clearance Adjustment Chart

MEASURED EXHAUST VALVE CLEARANCE	MEASURED THICKNESS OF FITTED SHIM																								
	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20
0.00–0.04				2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.05–0.09			2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.10–0.14		2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15
0.15–0.20	CORRECT CLEARANCE. NO CHANGE OF SHIM REQUIRED																								
0.21–0.25	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	
0.26–0.30	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20		
0.31–0.35	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20			
0.36–0.40	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20				
0.41–0.45	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20					
0.46–0.50	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20						
0.51–0.55	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20							
0.56–0.60	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20								
0.61–0.65	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20									
0.66–0.70	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20										
0.71–0.75	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20											
0.76–0.80	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20												
0.81–0.85	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20													
0.86–0.90	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20														
0.91–0.95	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20															
0.96–1.00	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
1.01–1.05	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
1.06–1.10	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
1.11–1.15	2.95	3.00	3.05	3.10	3.15	3.20																			
1.16–1.20	3.00	3.05	3.10	3.15	3.20																				
1.21–1.25	3.05	3.10	3.15	3.20																					
1.26–1.30	3.10	3.15	3.20																						
1.31–1.35	3.15	3.20																							
1.36–1.40	3.20																								

SHIM SIZE REQUIRED

EXHAUST VALVE

1. Measure valve clearance (with engine cold).
2. Remove shim and measure thickness with a micrometer.
3. Match measured valve clearance from the left hand vertical column with measured thickness of fitted shim.
4. The shim size specified where the lines intersect will give correct clearance.

NOTE: If there is no clearance fit a shim several sizes smaller and re-measure.

Inlet Valve Clearance Adjustment Chart

MEASURED INLET VALVE CLEARANCE	MEASURED THICKNESS OF FITTED SHIM																								
	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20
0.00–0.04			2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.05–0.09		2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15
0.10–0.15	CORRECT CLEARANCE. NO CHANGE OF SHIM REQUIRED																								
0.16–0.20	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	
0.21–0.25	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20		
0.26–0.30	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20			
0.31–0.35	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20				
0.36–0.40	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20					
0.41–0.45	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20						
0.46–0.50	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20							
0.51–0.55	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20								
0.56–0.60	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20									
0.61–0.65	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20										
0.66–0.70	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20											
0.71–0.75	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20												
0.76–0.80	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20													
0.81–0.85	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20														
0.86–0.90	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20															
0.91–0.95	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																
0.96–1.00	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20																	
1.01–1.05	2.90	2.95	3.00	3.05	3.10	3.15	3.20																		
1.06–1.10	2.95	3.00	3.05	3.10	3.15	3.20																			
1.11–1.15	3.00	3.05	3.10	3.15	3.20																				
1.16–1.20	3.05	3.10	3.15	3.20																					
1.21–1.25	3.10	3.15	3.20																						
1.26–1.30	3.15	3.20																							
1.31–1.35	3.20																								

SHIM SIZE REQUIRED

INLET VALVE

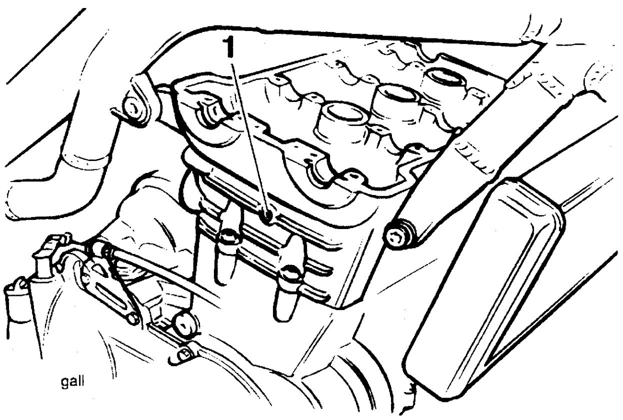
1. Measure valve clearance (with engine cold).
2. Remove shim and measure thickness with a micrometer.
3. Match measured valve clearance from the left hand vertical column with measured thickness of fitted shim.
4. The shim size specified where the lines intersect will give correct clearance.

NOTE: If there is no clearance fit a shim several sizes smaller and re-measure.

CAM CHAIN

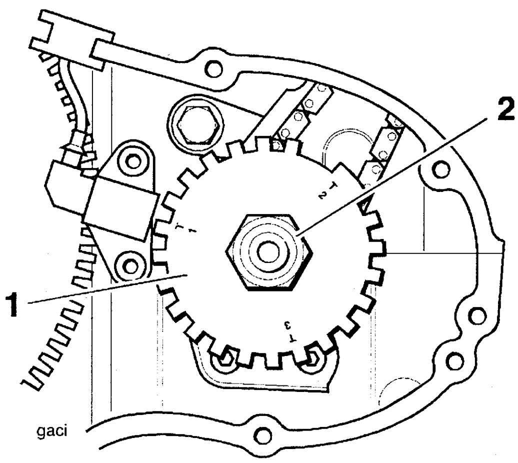
Removal

1. Remove the camshafts as detailed earlier in this section.
2. Release the screws securing the crankshaft position sensor to the crankcase. Slide the sensor grommet out from the crankcase and remove the sensor.
3. Remove the bolt from the centre of the cam chain housing, in the cylinder head.



1. Centre Bolt

4. Remove the crankshaft rotor.



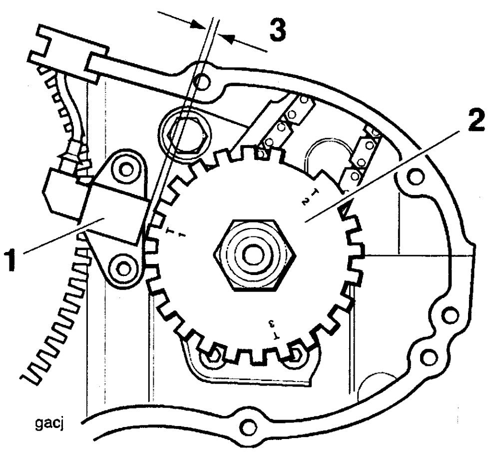
1. Crankshaft Rotor

2. Rotor Retaining Bolt

5. The timing chain is removed from inside the head or through the crankcase, after first detaching the chain from the crankshaft gear.

Installation

1. Refit the cam chain and locate the lower end around the crankshaft gear.
2. Fit the crankshaft position sensor.
3. Refit the crankshaft rotor.
4. Adjust the crankshaft position sensor to give an air gap of 1.00 mm $\pm$ 0.20 mm between the crankshaft rotor and the sensor.



1. Crankshaft Position Sensor

2. Crankshaft Rotor

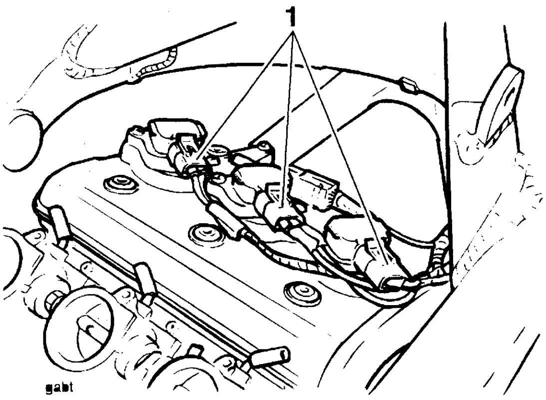
3. 1.00 mm $\pm$ 0.20 mm

5. Apply Triumph silicone grease to the grommet on the crankshaft position sensor and refit the grommet to the crankcase.
6. Refit the camshafts etc. as described earlier in this section.
7. Refit the bolt to the centre of the cam chain housing in the cylinder head, tightening to **10 Nm.**

CYLINDER HEAD

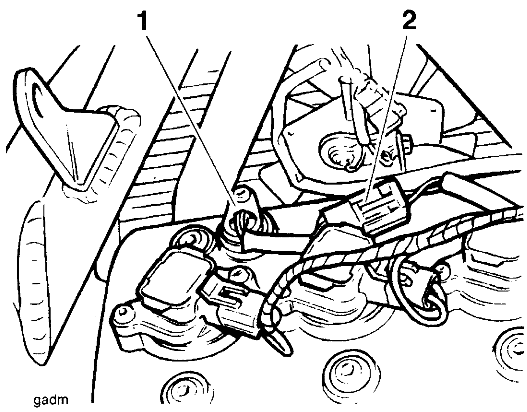
Removal

1. Remove the seat and disconnect the battery negative (black) lead first then the positive (red) lead.
2. Remove the side panel assembly as detailed in the body section.
3. Remove both lower fairings (where fitted) as described in the body section.
4. Remove the fuel tank and airbox assembly as detailed in the fuel system section.
5. Disconnect the electrical connections to the ignition coils, then remove the coils from the cam cover.



1. Coil Connections

6. Disconnect and remove the camshaft position sensor (if fitted).



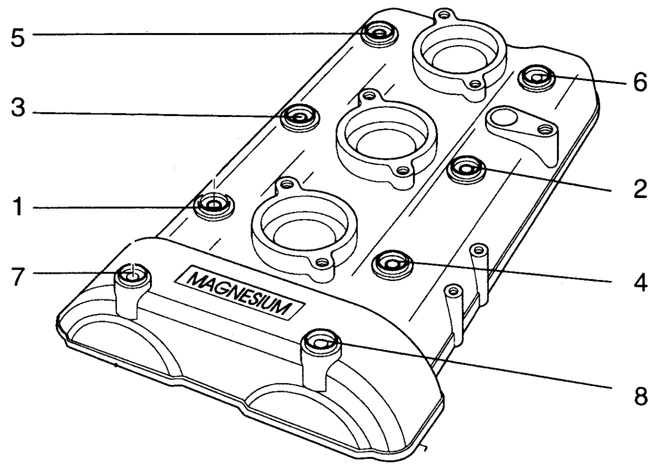
1. Camshaft Position Sensor (if fitted)

2. Sensor Connection

7. Progressively release the camshaft bolts in the sequence shown above right.

NOTE:

- **Two longer bolts are fitted at the right hand end adjacent to the cam chain.**



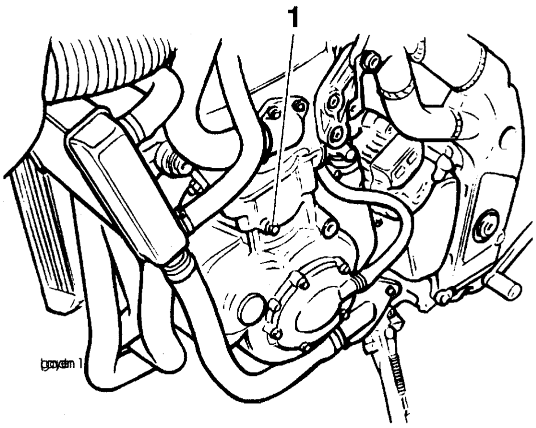
Cam Cover Bolt Release Sequence

8. Ease the water hoses to allow the cover to be removed from the left hand side of the motorcycle.

> **CAUTION: Never use a lever to remove the camshaft cover from the head.**
>
> **Using a lever will cause damage to the head and cam cover which could lead to an oil leak.**

9. Remove the cam cover gasket.
10. Remove any residual oil from the front of the head using a syringe or lint free cloth.
11. Release the coolant drain plug and drain the coolant into a clean receptacle. Retain the coolant for re-use unless contaminated or due for replacement.

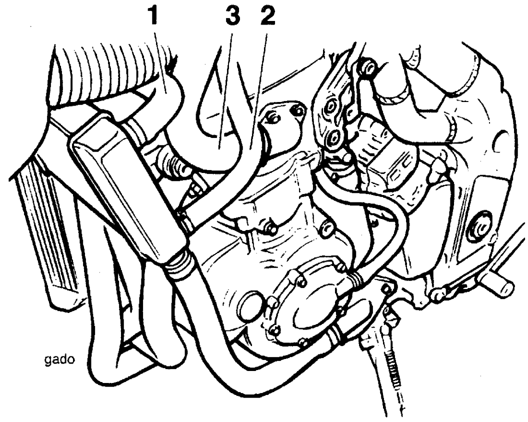
> **WARNING: Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.**



1. Coolant Drain Point

12. Disconnect the top and bypass hoses at the radiator end.

13. Disconnect the hose from the cylinder head side cover to the thermostat housing at the cylinder head end.



1. Radiator Top Hose

2. Radiator Bypass Hose

3. Cylinder Head to Thermostat Housing Hose

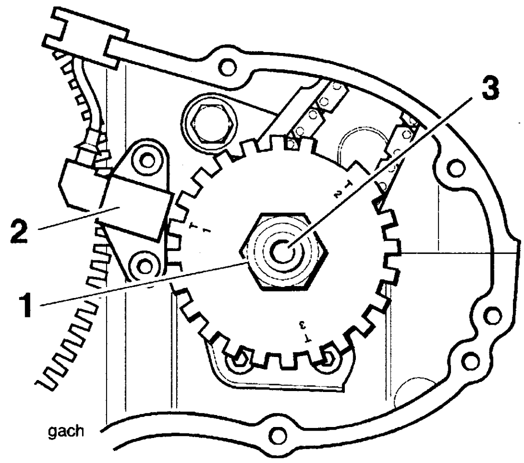
14. Disconnect the electrical connector from the water temperature sensor in the thermostat housing.

15. Remove the thermostat housing leaving the hoses attached to the housing.

16. Drain the engine oil as described in the lubrication section.

17. Disconnect the clutch cable as detailed in the clutch section.

18. Remove the clutch cover to give access to the crankshaft rotor.

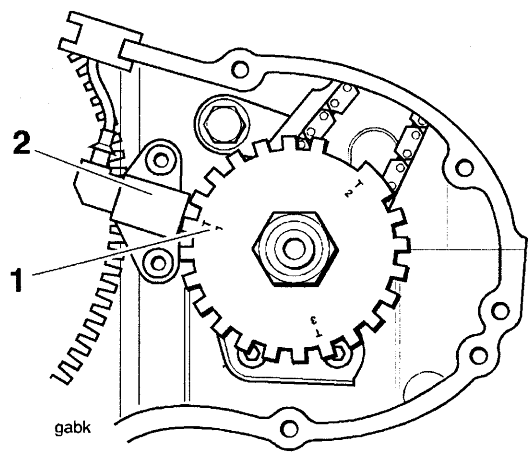


1. Crankshaft Rotor Clamp Nut

2. Crankshaft Position Sensor

3. Centre Bolt

19. Rotate the crankshaft clockwise (the normal direction of rotation), using the nut fitted to the end of the crankshaft. Stop rotation when number 1 cylinder is at top dead centre (TDC), that is when the 'T1' mark on the crankshaft rotor aligns with the crankshaft position sensor.

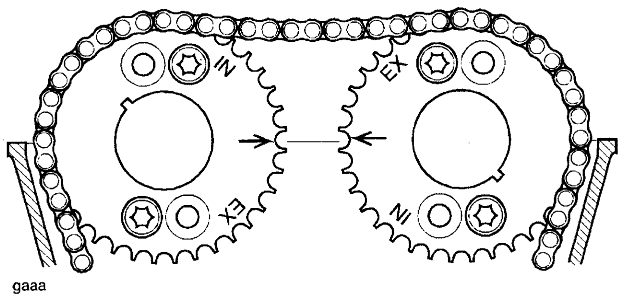


1. 'T1' Mark

2. Crankshaft Position Sensor

NOTE:

- **In addition to the crankshaft alignment described above, at TDC the alignment marks on the camshaft sprockets will point inwards at a point level with the joint face.**

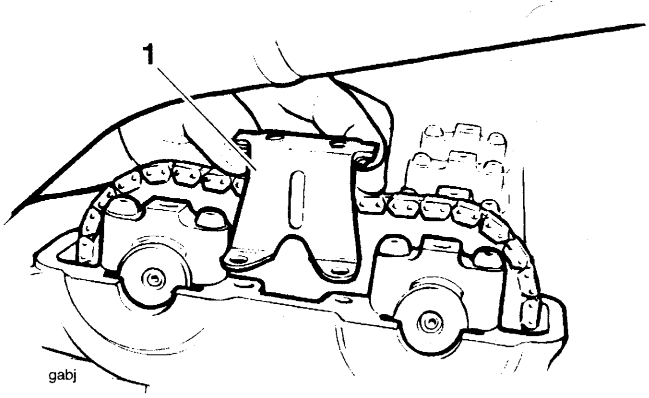


Camshaft to Cylinder Head Alignment Marks

20. Place a suitable wedge between the tensioner blade and crankcase, to hold the cam chain taut during removal of the tensioner.
21. Carefully remove the centre nut from the tensioner and withdraw the tensioner spring.

> **WARNING: The tensioner centre nut is under spring tension. Always wear hand, eye and face protection when withdrawing the centre nut and take great care in order to minimise the risk of injury and the loss of components.**

22. Remove the bolts securing the tensioner to the upper crankcase and remove the tensioner and gasket.
23. Remove the cam chain top pad from the cam chain side of the cylinder head.



1. Cam Chain Top Pad

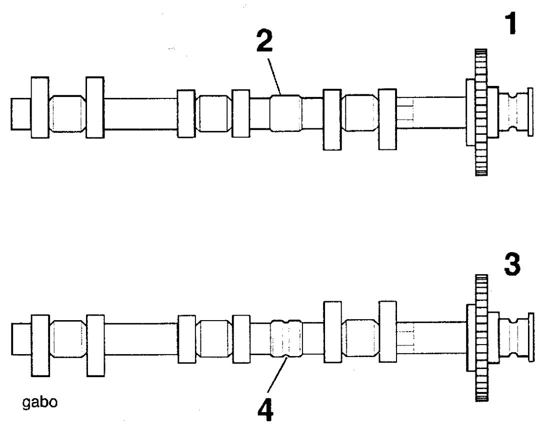
24. To ensure that the camshaft caps are refitted in the same positions as prior to removal, mark the position of each camshaft cap in relation to the head. A laundry marker or similar may be used to mark the cap positions.
25. Progressively release each of the fasteners securing the camshaft caps of the inlet camshaft to the cylinder head.
26. Release the caps for the exhaust camshaft.

> **CAUTION: Never release one camshaft cap in isolation from the others as this may cause the caps to crack.**
>
> **Always progressively release all the camshaft caps of one camshaft before final removal.**

> **CAUTION: Always completely release and remove one camshaft before starting to release the other. If both camshafts are progressively released at the same time, the valves may contact each other and cause damage to the valve head areas and valve stems.**

NOTE:

- **The inlet and exhaust camshafts are different. They can be identified by a plain area in the centre of the exhaust cam and a groove in the same place on the inlet cam.**



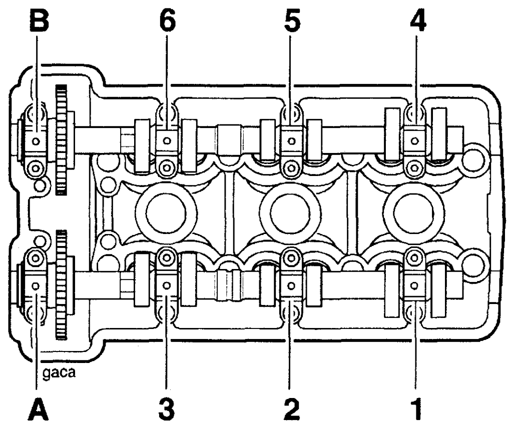
1. Exhaust Camshaft

2. Plain Section

3. Inlet Camshaft

4. Grooved section

27. Once the pressure on all the camshaft caps has been released, remove the fasteners and caps complete with dowels.



Camshaft Cap Numbering

NOTE:

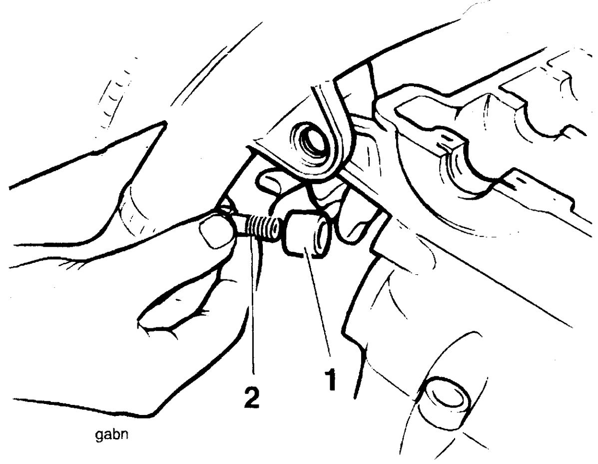
- **The caps are numbered sequentially and must not be interchanged for a different position on the head. The camshaft caps on the outside of the timing chain (known as outriggers) are marked 'A' for the exhaust and 'B' for the inlet.**
- **Each cap is located by two dowels which align the cap to the head. If the caps cannot be removed using hand pressure, gently tap each cap with a soft faced tool to release.**

28. Lift the cam chain from the exhaust camshaft sprocket and remove the exhaust camshaft.

29. Repeat the procedure for the inlet camshaft.

30. Remove the bolt from the centre of the cam chain housing, in the cylinder head.

31. Remove the banjo bolt securing the oil feed pipe to the head. Discard the copper washers.

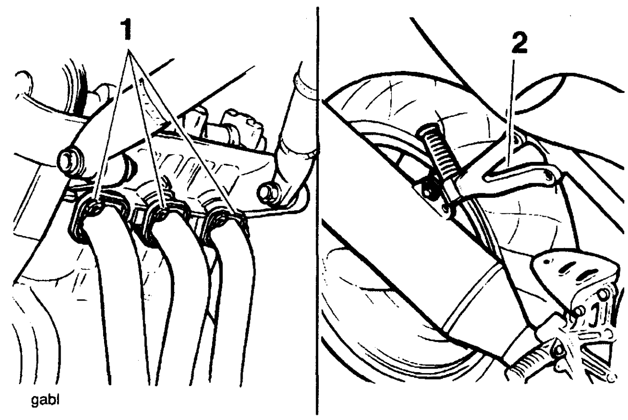


1. Oil Feed Pipe

3. Banjo Bolt

32. Remove the radiator and oil cooler as described in the cooling system section.

33. Remove the exhaust downpipes and silencer as detailed in the fuel system section.



1. Downpipe to Head Fixings

2. Silencer Mounting

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

NOTE:

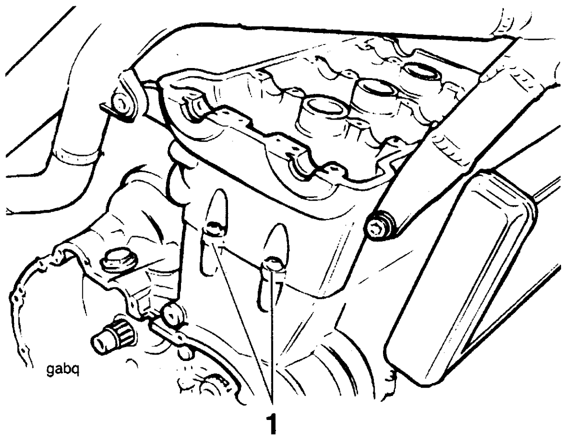
- **To prevent the tappets and shims from becoming mixed, place the shim and tappet together in a marked container. The marked components must be refitted in their original positions.**

35. Release the screws securing the fuel injection throttle bodies to the head. Place the displaced throttle bodies and idle air control valve on the crankcase. Discard the gasket.

NOTE:

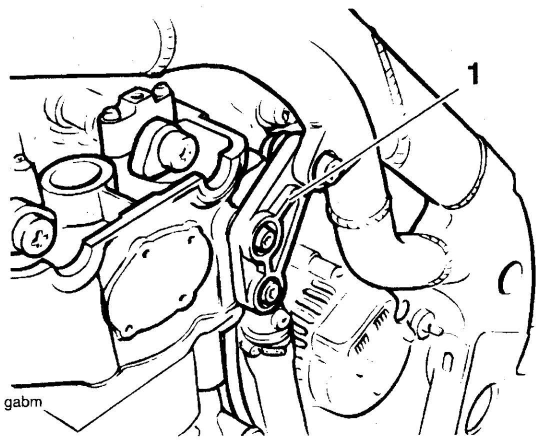
- **It is not necessary to disconnect the throttle cable from the throttle bodies when removing the cylinder head.**

36. Release the screws securing the side of the cylinder head to the upper crankcase.



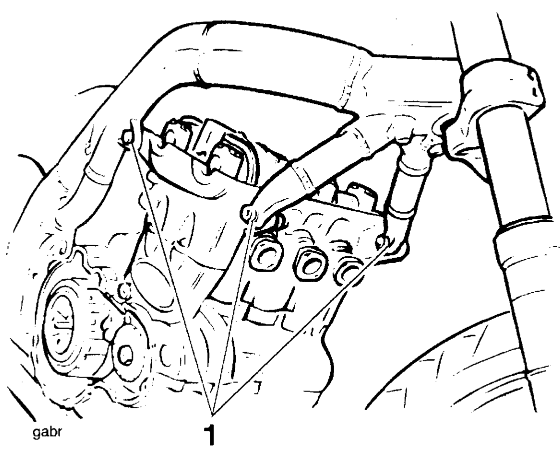
1. Cylinder Head to Upper Crankcase Screws

37. Support the engine beneath the sump and remove the frame to cylinder head mounting bracket from the left hand side of the motorcycle.



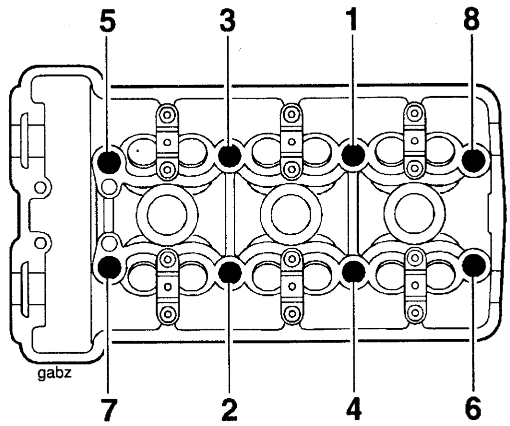
1. Frame to Cylinder Head Mounting Bracket

38. Release the frame to cylinder head bolts.



1. Frame to Cylinder Head Bolts

39. Progressively release the cylinder head bolts in the order shown below.



Cylinder Head Bolt Release Sequence

40. Lightly tap the cylinder head with a rubber mallet to break the seal of the gasket. Remove the cylinder head.

41. Remove and discard the cylinder head gasket.

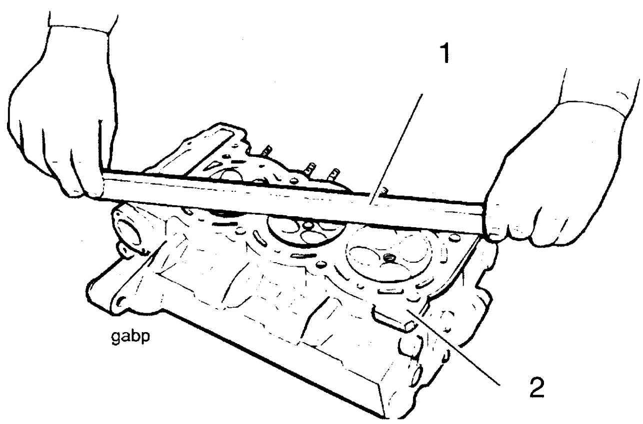
42. Collect the cam chain rubbing blade from the crankcase.

43. Remove the cylinder liners.

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

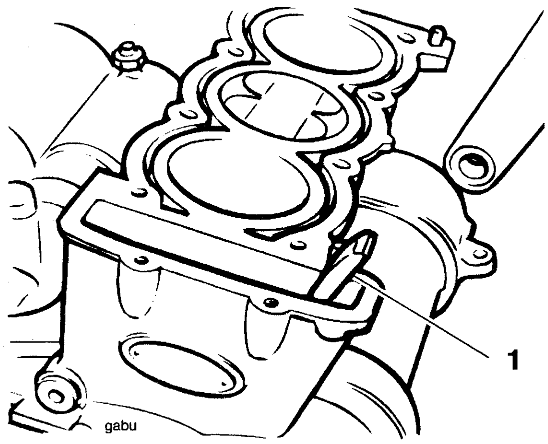
3. Check the cam chain rubbing blade. Renew if worn or damaged.

Installation

NOTE:

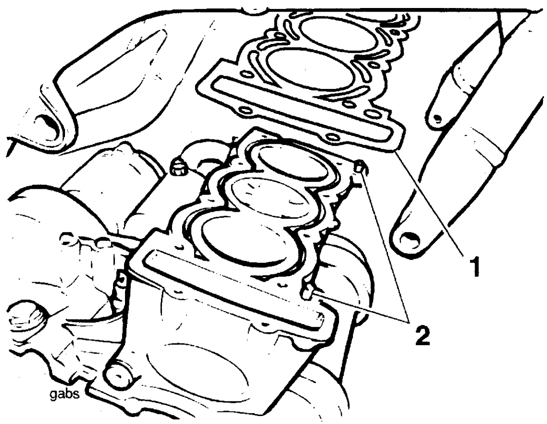
- **On all engines, the cylinder liners must be resealed prior to refitting the cylinder head. Refer to the crankshaft, pistons and liners section for details.**

1. Position the cam chain rubbing blade to the left hand side of the upper crankcase. When correctly fitted, the blade positively locates at the lower end on a web. The upper section will then fit snugly into the recess in the top of the crankcase.



1. Cam Chain Rubbing Blade

2. Thoroughly clean the upper faces of the crankcase taking care not to damage the mating surfaces. 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. Dowels

3. Ensure that the cylinder head face is completely clean.

4. Carefully lower the cylinder head over the rubbing blade and locate the head 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 lead to engine damage through a damaged head gasket.

5. Fit the bolts to the head and tighten until finger tight. The head bolts are finally tightened in 3 stages. This is to ensure that the cylinder head gasket seals correctly to the head and crankcase. The 3 stages are as follows:

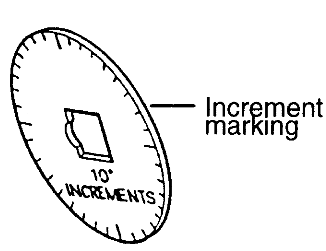
NOTE:

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

A Tighten the head bolts, in the same numerical sequence used to release the bolts, to **20 Nm**.

B Tighten the head bolts in the same numerical sequence used to release the bolts, to **27 Nm**.

C For the final torque operation, which again is carried out in the same numerical sequence used to release the bolts, a 'torque turn' method is used. The bolts must be turned through 90^{o} to reach the final setting. To accurately gauge the 90^{o} turn, use service tool 3880105-T0301 as follows:
Fit the tool 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 9 of the 10^{o} gauge increments have rotated past the chosen point on the head.



Tool 3880105-T0301

6. Fit the screws securing the side of the cylinder head to the crankcase and tighten to **12 Nm**.

7. Refit and tighten the frame to cylinder head bolts to **95 Nm.**

8. Refit the frame to cylinder head mounting bracket onto the left hand side of the frame. Tighten the frame to bracket bolt to **95 Nm** and the bracket to cylinder head bolts to **30 Nm**.

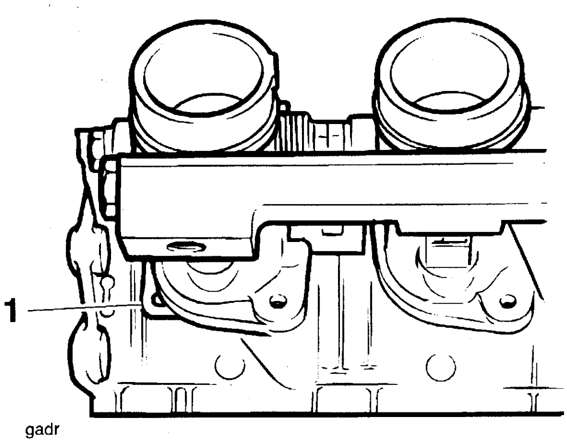
9. Remove the support from beneath the engine.

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

11. Fit a new gasket over the throttle body locating dowels ensuring that the gasket tab is positioned to the left hand side.

NOTE:

- **There are two different throttle body gaskets which are selected according to engine size. The gasket for the 955cc engine has a hole in the tab whereas the gasket for the 885cc engine has a plain tab.**



1. Identification Hole (955 cc Engine Only)

12. Refit the throttle bodies and idle air control valve bracket. Tighten the fixings to **12 Nm**.

13. Check that there is 2–3 mm of free play at the throttle twist grip. Adjust as necessary.

WARNING: Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.

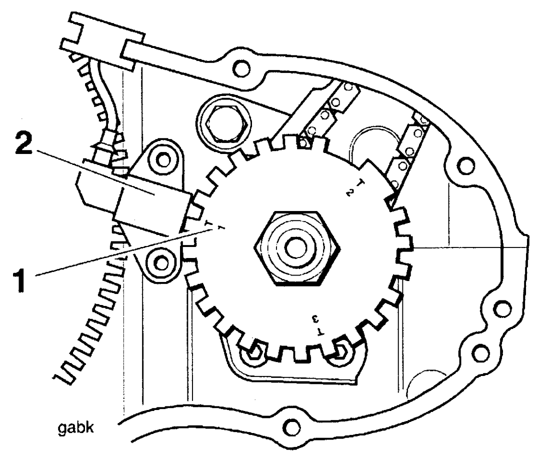
WARNING: Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.

14. Refit the oil feed pipe to the head using new sealing washers to the banjo bolt. Tighten the banjo bolt to **20 Nm**. Ensure that the oil feed pipe is not distorted during the tightening.

15. 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 head.

16. Locate each camshaft to the head ensuring the camshafts are correctly identified (inlet and exhaust) and also correctly located over their respective valve banks.

17. Check that the crankshaft sensor remains aligned with the 'T1' mark on the crankshaft rotor.

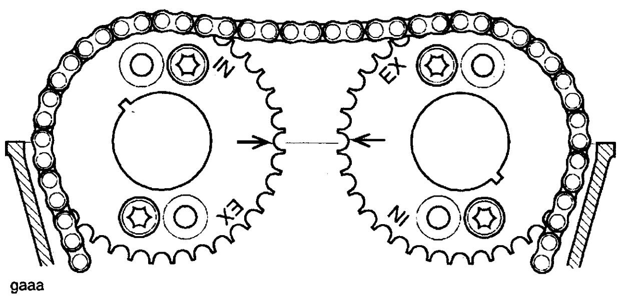


1. 'T1' Mark

2. Crankshaft Position Sensor

18. Working on one camshaft at a time, locate the cam chain over the cam sprockets. Position the camshaft in the same position as for removal **before attempting to fit the caps** (that is, with the timing marks on the camshaft sprockets level and pointing inwards, and with the crankshaft position sensor in line with the 'T1' mark on the crank rotor.

19. Repeat the procedure for the other camshaft.



Camshaft to Cylinder Head Alignment Marks

> **CAUTION: If the camshafts and caps are fitted without first aligning the timing marks on both the crankshaft and camshaft sprockets, or if both camshafts are fitted at the same time, the inlet and exhaust valves will contact each other causing damage to both the head and the valves.**

20. Lubricate the threads of the camshaft cap screws and evenly and progressively tighten to **10 Nm**.

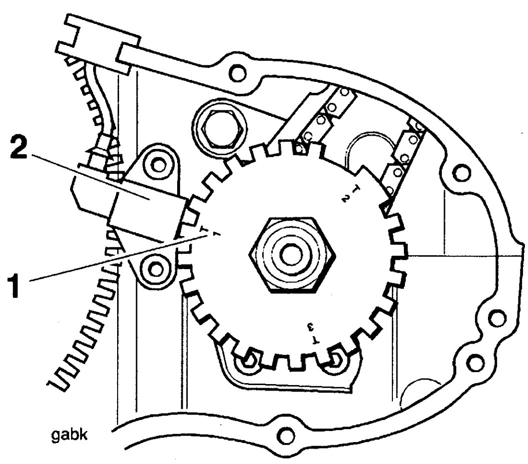
21. Before fitting the cam chain tensioner, ensure that each camshaft rotates freely. Do not rotate either camshaft by more than 5°.

> **CAUTION: If any components have been renewed, the valve clearances must be checked and adjusted. Running with incorrectly adjusted valve clearances may cause excess engine noise, rough running and engine damage.**

22. Recheck that the crankshaft rotor 'T1' mark aligns with the crankshaft position sensor when the timing marks on both camshaft sprockets are level with the cylinder head and point inwards,

23. Assemble the cam chain tensioner using the instructions given earlier in this section.

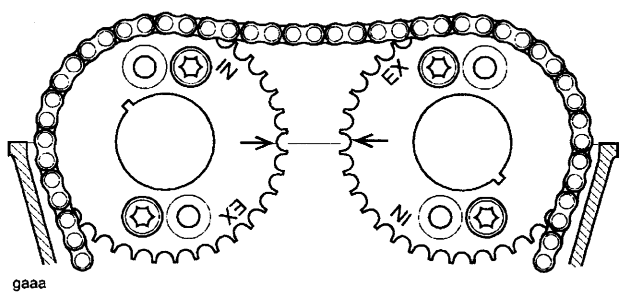
24. Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC. Ensure that the 'T1' mark on the crankshaft rotor is aligned with the crankshaft position sensor.



1. Ignition Rotor

2. Crankshaft Position Sensor

25. Re-check that the camshaft timing marks align as illustrated below.



Camshaft to Cylinder Head Alignment Marks

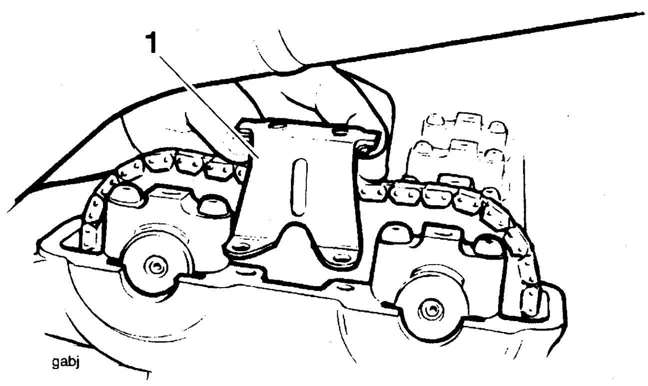
NOTE:

- **Depending on the engine variant, with the camshaft arrows aligned as shown, the 'T1' mark on the crankshaft may align with the crankshaft position sensor at either the rear, centre or front edge of the gear tooth. Any of those alignment positions can be considered to be correct.**

26. Re-check tensioner plunger location against the tensioner blade.

27. Check the valve clearances. Adjust as necessary

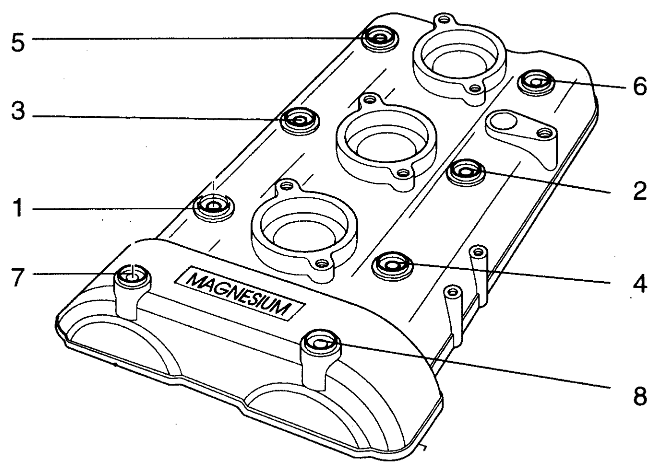
28. Refit the cam chain top pad and tighten the fixings to **10 Nm.**



1. Cam Chain Top Pad

29. Refit the bolt to the centre of the cam chain housing in the cylinder head, tightening to **10 Nm.**

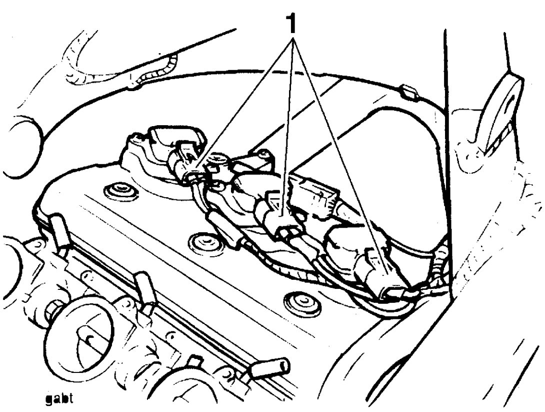
30. Refit the cam cover and tighten the cam cover fixings to **15 Nm** (short bolts) **25 Nm** (long bolts). Tighten the fixings in the order shown below.



Cam Cover Bolt Tightening Sequence

31. Refit the camshaft position sensor (if fitted) and tighten the fixing to **10 Nm.**

32. Refit and reconnect the ignition coils.



1. Coil Connections

33. Refit the exhaust system.

34. Refit the radiator and oil cooler as described in the cooling system section.

35. Refit the clutch cover incorporating a new gasket. Tighten the clutch cover fixings to **9 Nm**.

36. Refit the clutch cable and adjust as described in the clutch section.

37. Inspect all coolant hoses and refit the hoses and thermostat housing in their original positions.

38. Reconnect the coolant temperature sensor.

39. Refit the coolant drain plug and tighten to **13 Nm.**

40. Refit the airbox assembly as described in the fuel system section. Assemble the thermostat housing to the airbox.

41. Refill the cooling system as described in the cooling system section.

42. Refit the fuel tank as described in the fuel system section.

43. Refit both lower fairings (if removed) as described in the body section.

44. Refit the body side panel assembly as described in the body section.

45. Reconnect the battery positive (red) lead first, then the negative (black) lead.

46. Fit a new sealing washer to the sump plug, refit the plug and tighten to **25 Nm.**

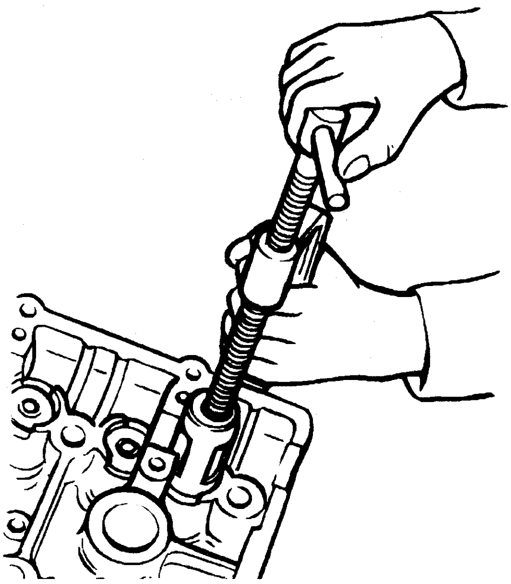
47. Refill the engine with the correct grade of oil.

48. Start the engine and check for oil, fuel and water leaks.

VALVES AND VALVE STEM SEALS

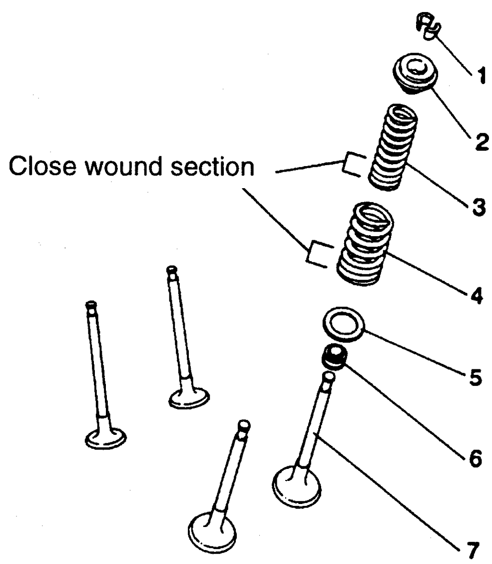
Removal from the cylinder head

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.



1. Valve Removal

2. Once the collets are released, remove the following items:
   - collets
   - valve spring cap
   - valve springs
   - valve stem seal
   - thrust washer
   - valve (de-burr before removal)



1. Collets

2. Valve Spring Cap

3. Inner Valve Spring

4. Outer Valve Spring

5. Thrust Washer

6. Stem Oil Seal

7. Valve

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 thrust washer to the valve spring recess (if removed).

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 springs over the valve stem ensuring that the close wound coil end faces towards the cylinder head.
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 cap 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.

VALVE TO VALVE GUIDE CLEARANCE

If the valve guides are worn beyond the service limit given below, the cylinder head must be replaced.

Valve to valve guide clearance

	Standard	Service Limit
Inlet	**0.01 – 0.04 mm**	**0.07 mm max**
Exhaust	**0.03 – 0.06 mm**	**0.09 mm max**

VALVE GUIDES

If a valve guide is found to be worn beyond the service limit, the complete cylinder head must be renewed.

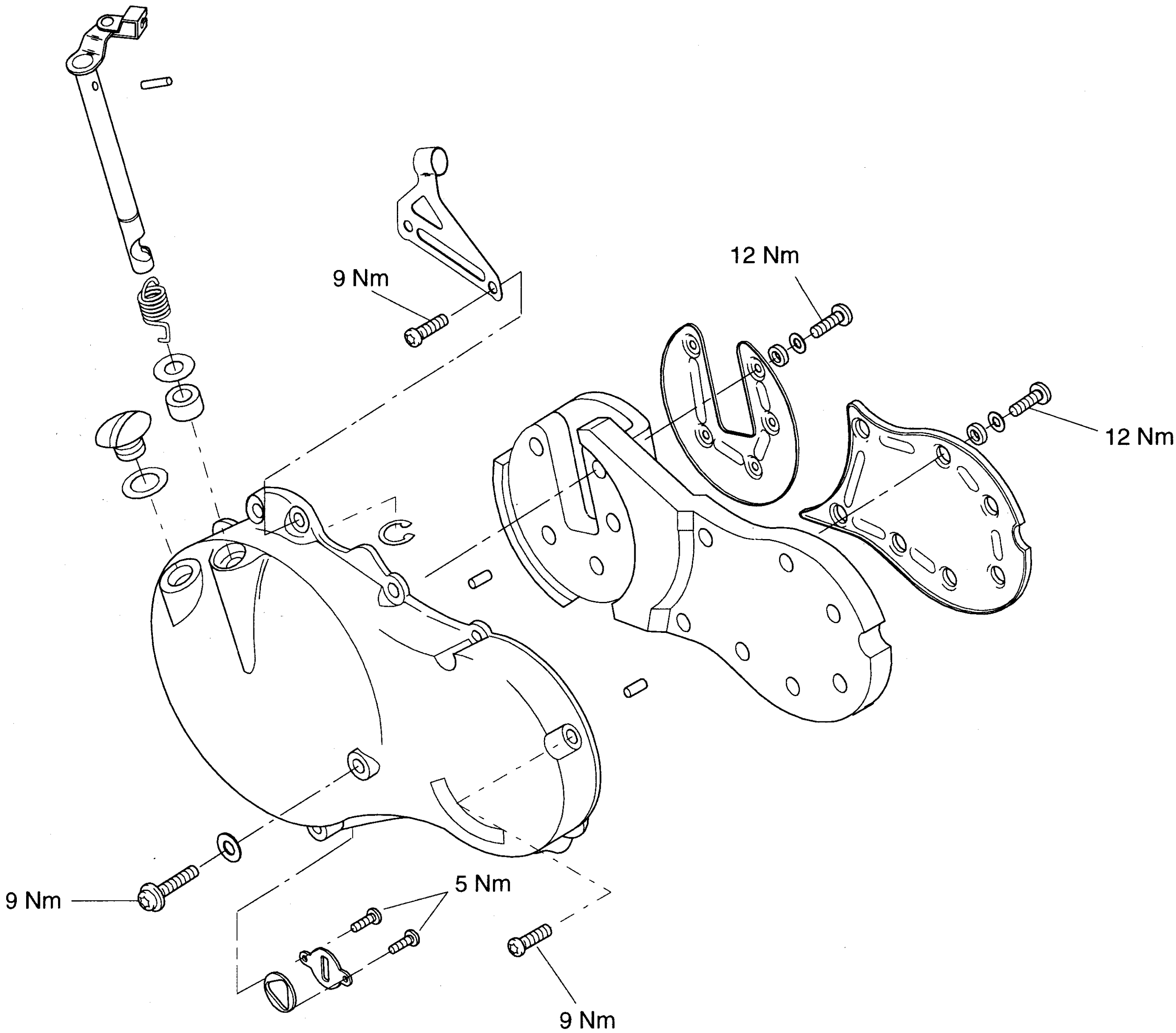
VALVE FACE INSPECTION

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.

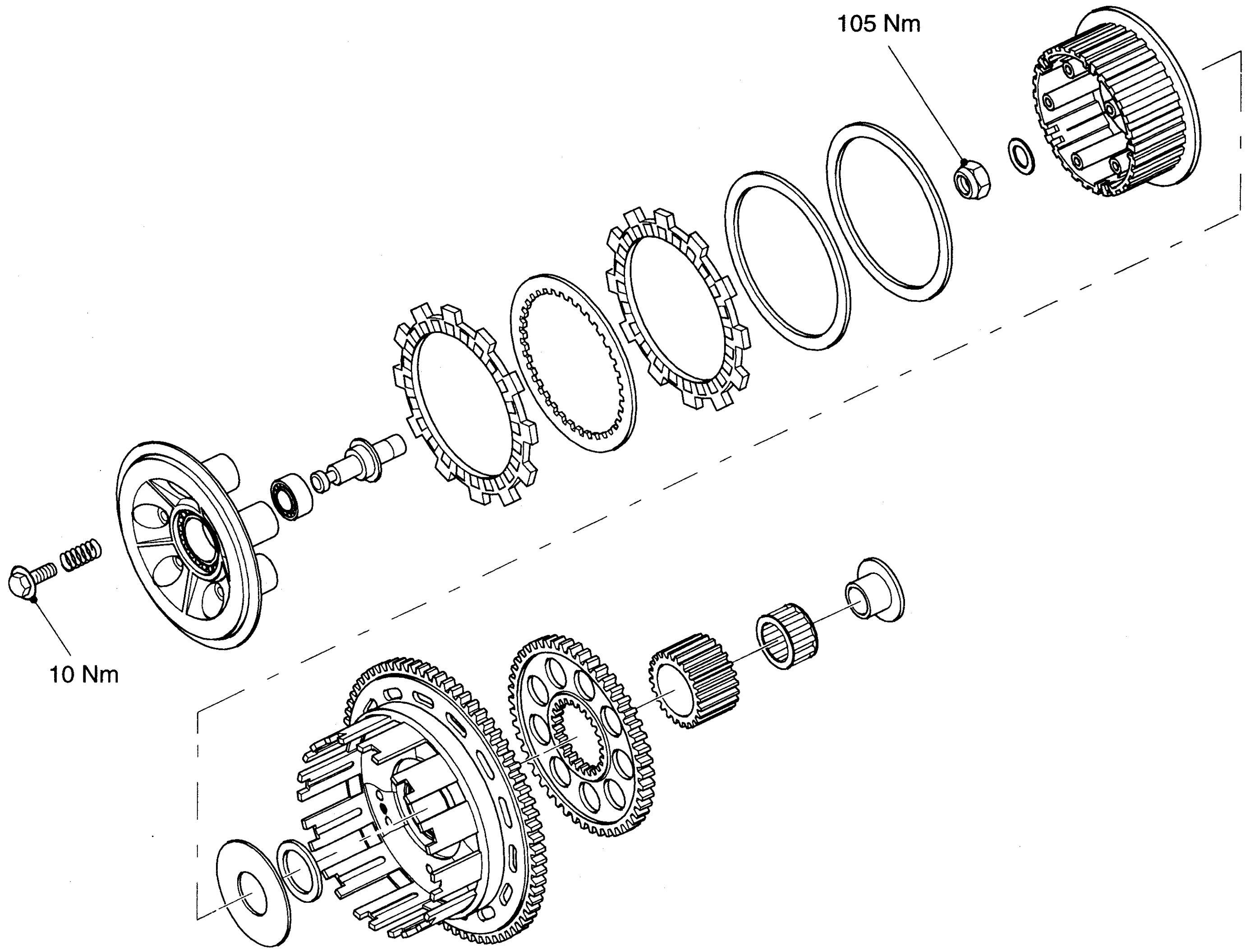
CLUTCH

CONTENTS

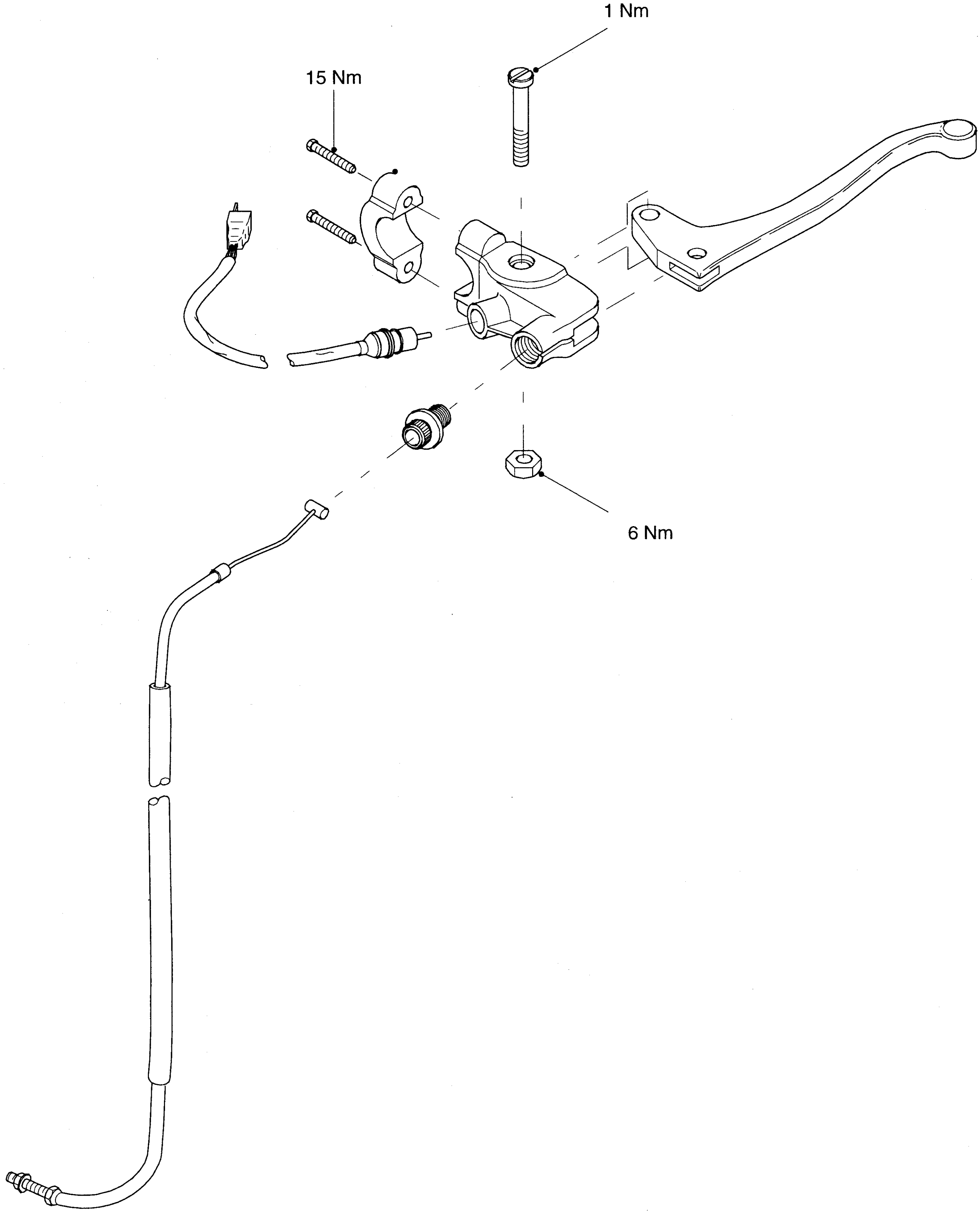
Exploded View – Clutch Cover



Exploded View – Clutch Assembly



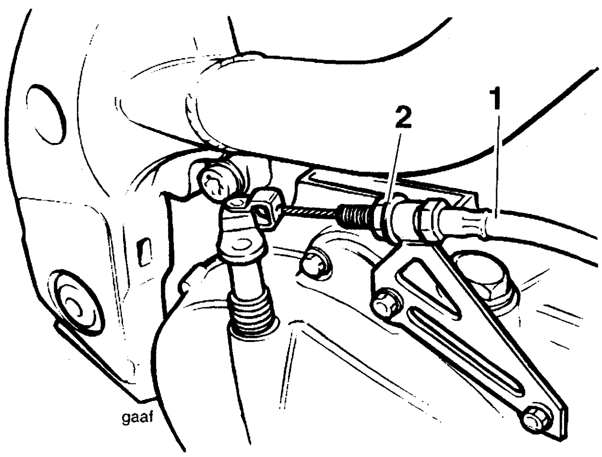
Exploded View – Clutch Controls



CLUTCH CABLE

Removal

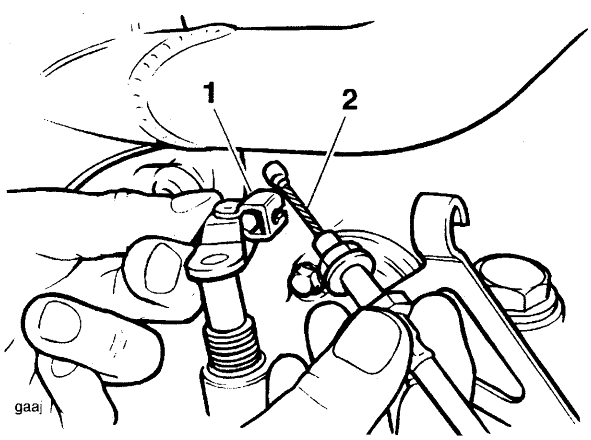
1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the belly panel and right hand lower fairing (where fitted).
3. Slacken the cable locknut and release the adjuster at the clutch cover end to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

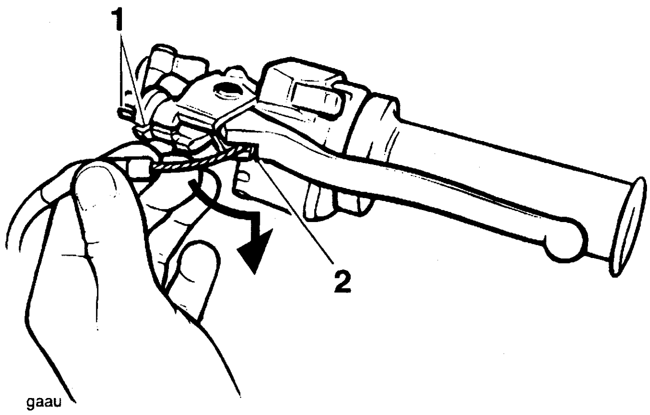
4. Release the clutch cable from the actuating arm by pushing the inner cable nipple through the arm and sliding the cable out of the slot. Detach the cable from the bracket.



1. Actuating Arm

2. Inner Cable

5. At the clutch lever end, align the adjuster and locknut slots.
6. Pull in the clutch lever and turn the inner cable, anti-clockwise through the slots in the adjuster and locknut, until the cable can be detached from the lever by pushing downwards.



1. Nut/locknut Slots

2. Cable Release Point

7. Remove the cable from the motorcycle noting the cable routing.

Examination

1. Check the inner cable for free movement through the outer cable.
2. Examine the inner cable for frayed strands.
3. Examine the two inner cable nipples for signs of looseness and damage.

Assembly

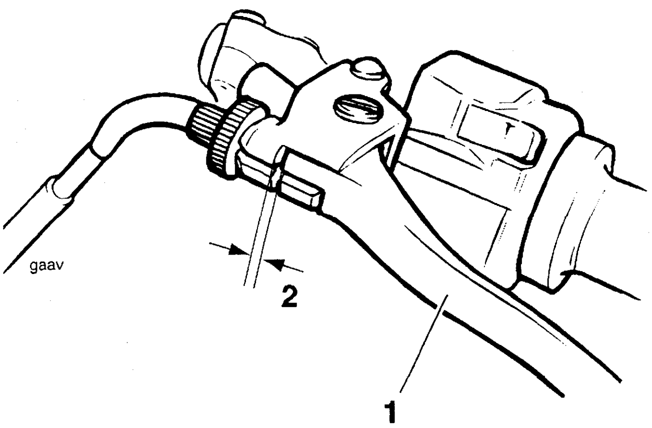
1. Position the cable to the motorcycle using the same routing as noted during removal.
2. Attach the inner cable to the clutch lever and actuating arm using a reversal of the removal process.
3. Refit the outer cable to the adjuster bracket at the clutch end.

NOTE:

- **Ensure that the two adjuster nuts are positioned, one either side of the bracket.**

4. Set the lever adjuster to a point where an equal adjustment is possible in both directions.

5. Set the adjuster at the clutch end to give a preliminary setting of 2–3 mm of free play as measured at the lever.
6. Operate the clutch lever several times and recheck the amount of free-play present.
7. Set the final adjustment of the cable to give 0.4–0.8 mm of free-play at the lever by turning the adjuster nut and locknut at the lever end. Secure the setting with the knurled locknut.



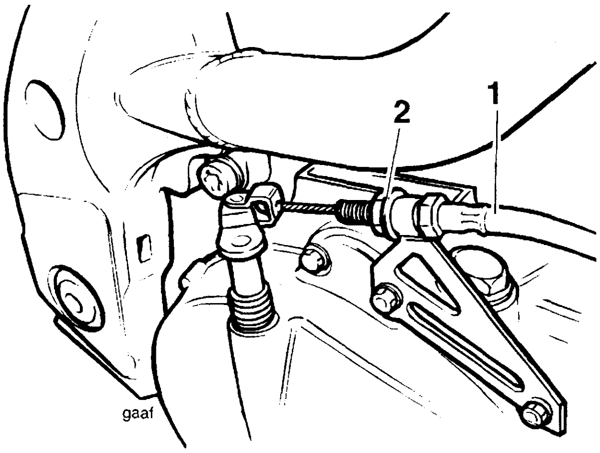
1. Clutch Lever

2. Correct Setting, 0.4–0.8 mm

CLUTCH

Disassembly

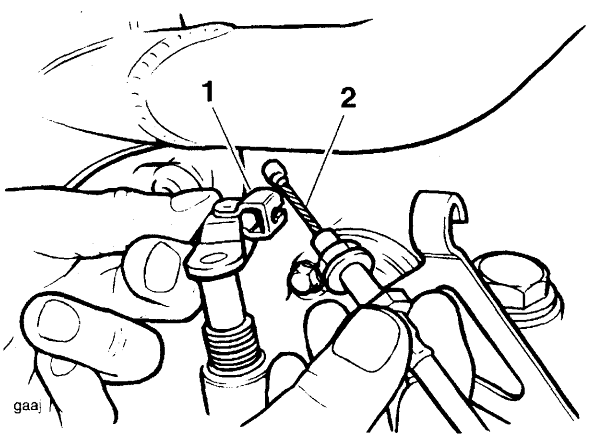
1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the belly panel and right hand lower fairing (where fitted).
3. Slacken the cable locknut and release the adjuster at the clutch cover end, to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

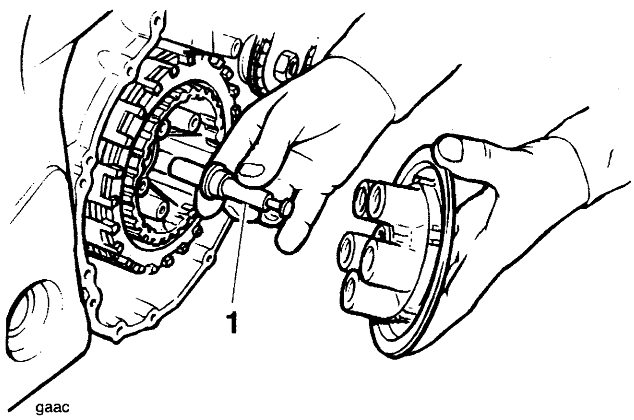
4. Release the clutch cable from the actuating arm by pushing the inner cable nipple through the arm and sliding the cable out of the slot.



1. Actuating Arm

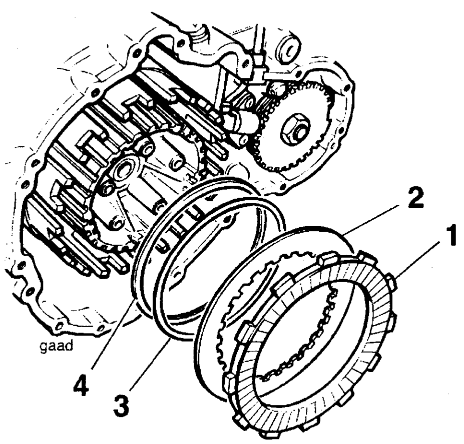
2. Inner Cable

5. Drain the engine oil as described in the lubrication section.
6. Remove the clutch cover.
7. Undo the bolts and springs and remove the clutch pressure plate.
8. Remove clutch pull rod.



1. Clutch pull rod

9. Remove all the clutch friction plates and steel plates together with the anti-judder spring and anti-judder seat washer. Note the orientation of all components as they are removed.



1. Friction Plates

2. Steel Plate

3. Anti-judder Spring

4. Anti-judder Seat Washer

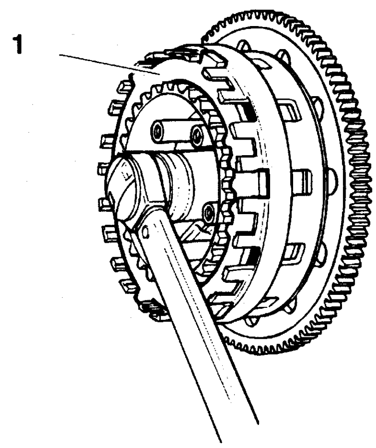
NOTE:

- **The outermost and innermost friction plates differ from all others and must not be fitted in any other positions. They are also darker in colour.**

NOTE:

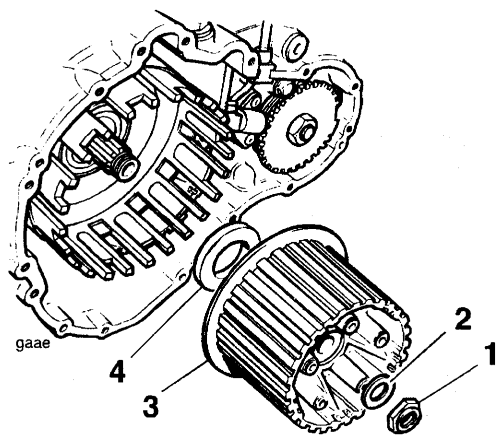
- **It is not normally necessary to disassemble the clutch further, but if the clutch inner and outer drums are to be removed, proceed as follows:**

10. Engage first gear and lock the inner and outer clutch drums together using service tool T3880305.



1. Service Tool T3880305

11. Depress the rear brake pedal to prevent the engine from turning, then loosen the clutch centre nut.
12. Remove the centre nut, belleville washer, clutch inner drum and spacer.



1. Centre Nut

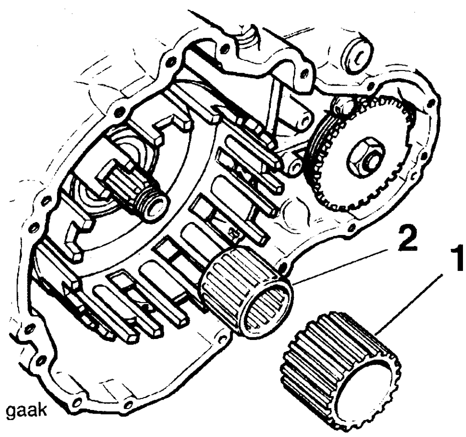
2. Belleville Washer

3. Inner Drum

4. Spacer

13. Remove the shim from the input shaft.
14. Remove the crankshaft position sensor.

15. Slide the clutch outer drum gently backwards and forwards to dislodge the splined bearing sleeve. Carefully remove the splined sleeve and needle roller bearing while supporting clutch drum.



1. Splined Sleeve

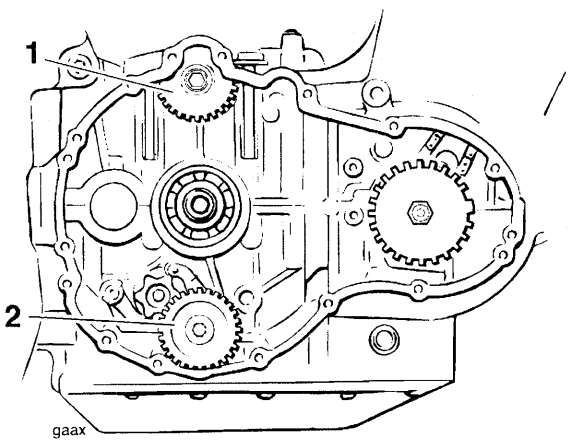
2. Needle Roller Bearing

16. Remove clutch outer drum by easing out of the crankcase, left-hand side first.

17. Remove the auxiliary drive gear and plain sleeve.

Assembly

1. Position the auxiliary gear (with the deeper dish side towards the crankcase) between the oil pump drive gear and alternator drive gear. Ensure full engagement of the auxiliary gear with the alternator gear.

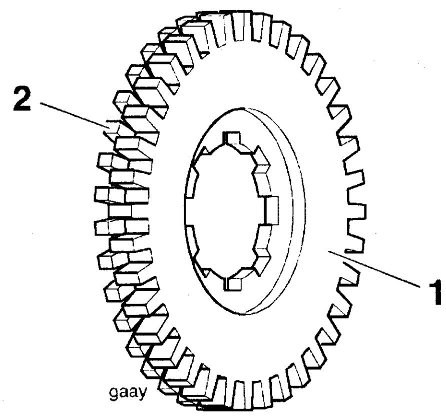


1. Alternator Drive Gear

2. Oil Pump Drive Gear

NOTE:

- **The alternator drive gear is fitted with a backlash eliminator gear. The backlash eliminator is a parallel thinner gear, which follows the main alternator drive gear. To ensure correct engagement of the auxiliary gear with the alternator drive gear, align the teeth of the alternator drive gear and backlash eliminator gears.**



1. Alternator Drive Gear

2. Backlash Eliminator

2. Temporarily fit the plain sleeve, needle roller bearing and splined sleeve to locate the auxiliary gear centrally.

3. Carefully remove the splined sleeve and needle roller bearing while holding the auxiliary gear in place. Leave the plain sleeve in place.

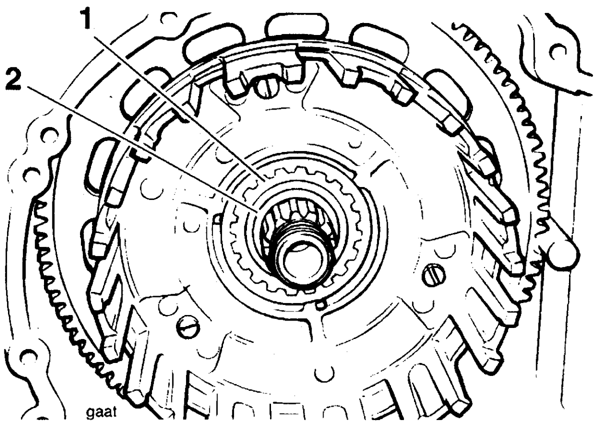
4. Fit the clutch outer drum.

5. Align the splines of the outer drum with the splines on the auxiliary gear (it may be necessary to remove clutch outer drum and rotate by one tooth to align the splines).

6. While holding the clutch outer drum in position, refit the splined sleeve and needle roller bearing.

NOTE:

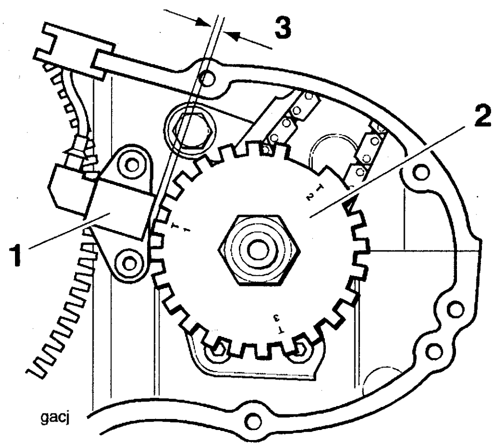
- **When the sleeve is correctly fitted, it will be a flush fit with clutch drum face.**



1. Splined Sleeve

2. Needle Roller Bearing

7. Refit the crankshaft position sensor and adjust the air gap to 1 mm.



1. Crankshaft Position Sensor

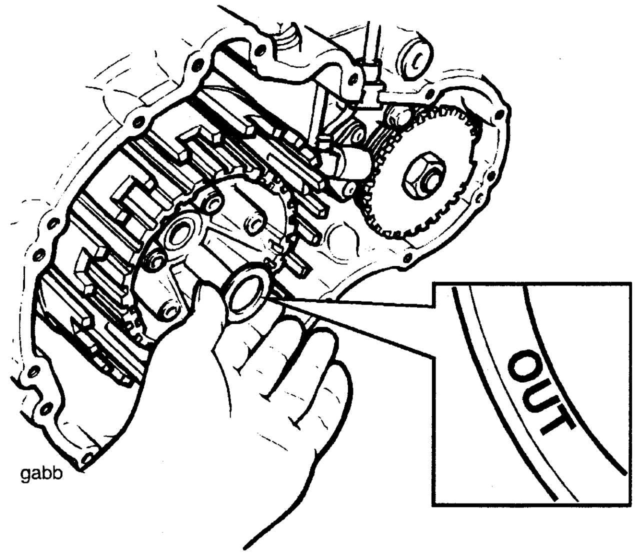
2. Crankshaft Rotor

3. 1.00 mm ± 0.20 mm

8. Fit the shim and spacer to the shaft.

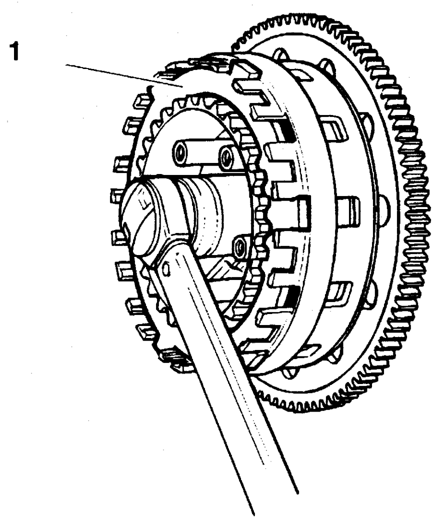
9. Fit the clutch inner drum.

10. Fit a new belleville washer ('out' mark facing outwards), and refit the centre nut.



Belleville Washer 'Out' Mark

11. Lock the inner and outer drums together using service tool T3880305. Depress the rear brake pedal to prevent the engine from turning, and tighten the clutch centre nut to **105 Nm**. Remove the service tool.

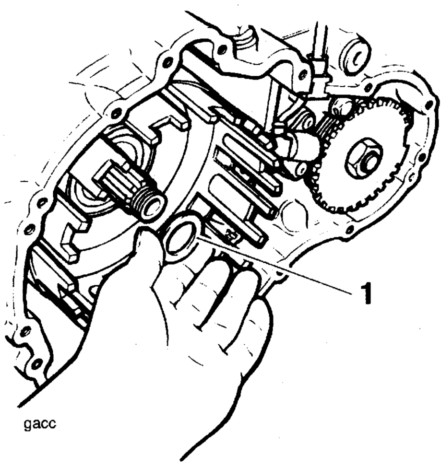


1. Service Tool T3880305

12. Disengage first gear and check for free rotation of the clutch inner drum.

NOTE:

- **If the drum does not rotate freely, or free play is present in the inner drum, the shim which controls the inner drum position must be changed for one of a different thickness. To reduce free play, fit a thinner shim and if the drum is too tight, a thicker shim must be fitted.**



1. Shim

NOTE:

- **The following size shims are available:– 0.10mm, 0.15mm, 0.20mm, 0.25mm, 0.30mm and 0.35mm.**

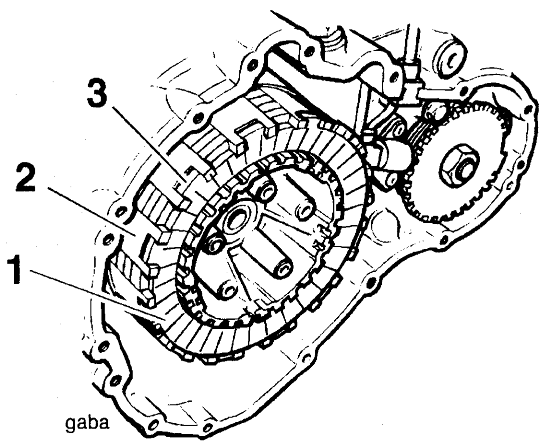
CAUTION: Severe engine damage will result from an incorrectly shimmed clutch drum.

13. Inspect all friction and steel plates for signs of wear, damage or distortion before re-use. Replace any that are not in a serviceable condition.

14. Soak all clutch friction plates in clean engine oil before fitting the friction plates, steel plates, anti-judder spring and anti-judder seat washer to the clutch basket in the same order and orientation as noted during removal.

NOTE:

- **The outermost clutch friction plate is fitted such that the outer tags of the plate are engaged with the corresponding individual tags in the clutch outer drum.**



1. Outer Clutch Friction Plate

2. Outer Drum

3. Individual Tags

15. Refit the clutch pullrod.

16. Refit the clutch pressure plate together with the springs and bolts. Tighten the bolts to **10 Nm.**

17. Clean and refit the clutch cover using a new gasket. Tighten the clutch cover bolts to **9 Nm.**

18. Refit the sump drain plug and tighten to **28 Nm.** Re-fill the engine with the correct grade and type of engine oil.

19. Refit the outer cable to the adjuster bracket at the clutch end.

NOTE:

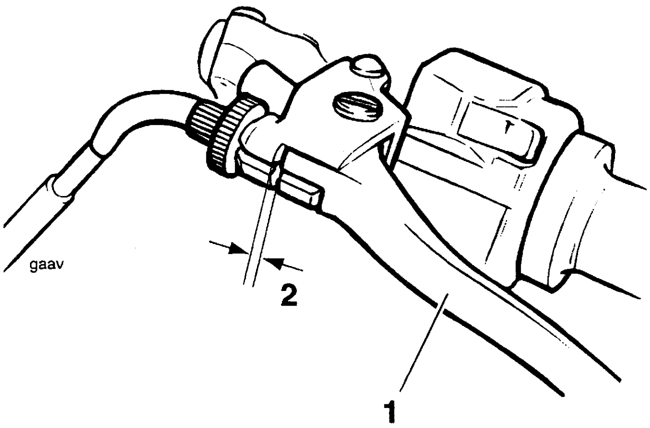
- **Ensure that the two adjuster nuts are positioned, one either side of the bracket.**

20. Set the lever adjuster to a point where an equal adjustment is possible in both directions.

21. Set the adjuster at the clutch end to give a preliminary setting of 2–3mm of free-play as measured at the lever.

22. Operate the clutch lever several times and recheck the amount of free-play present at the lever.

23. Set the final adjustment of the cable to give 0.4–0.8 mm of free-play at the lever by turning the adjuster nut and locknut at the lever end.



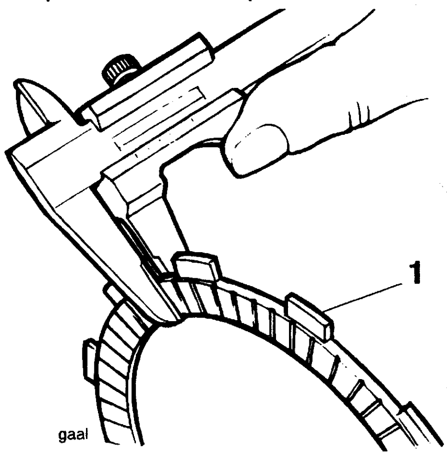
1. Clutch Lever

2. Correct Setting, 0.4–0.8 mm

24. Refit the bodywork removed earlier (if any).
25. Reconnect the battery positive (red) lead first then the negative (black) lead.
26. Refit the seat.

FRICTION PLATE INSPECTION

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

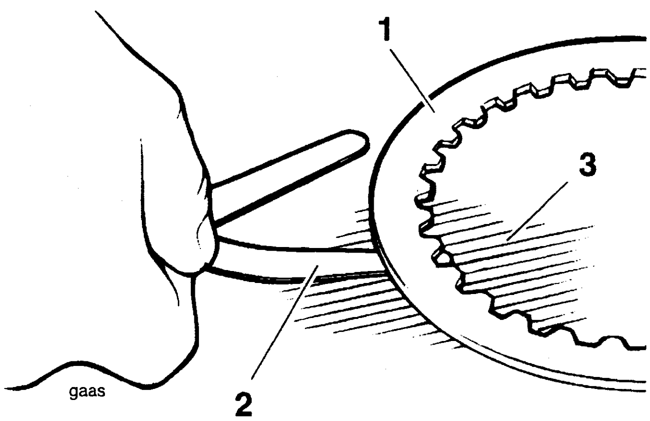


1. Clutch friction Plate

Friction plate thickness

Standard:	**3.80 mm – 0.00 + 0.08 mm**
Service limit:	**3.60 mm**

2. Check all plates for bend and warp as follows: Place the plate being checked on a clean surface plate and attempt to pass a feeler gauge of the maximum specified thickness between the friction plate and surface plate at several points around the plate. If the feeler gauge can be passed beneath the friction plate at any point, renew the plates as a set.



1. Friction Plate
2. Feeler Gauge
3. Surface Plate

Friction plate bend/warp

Standard:	**0.15 mm**
Service limit:	**0.20 mm**

BALANCER

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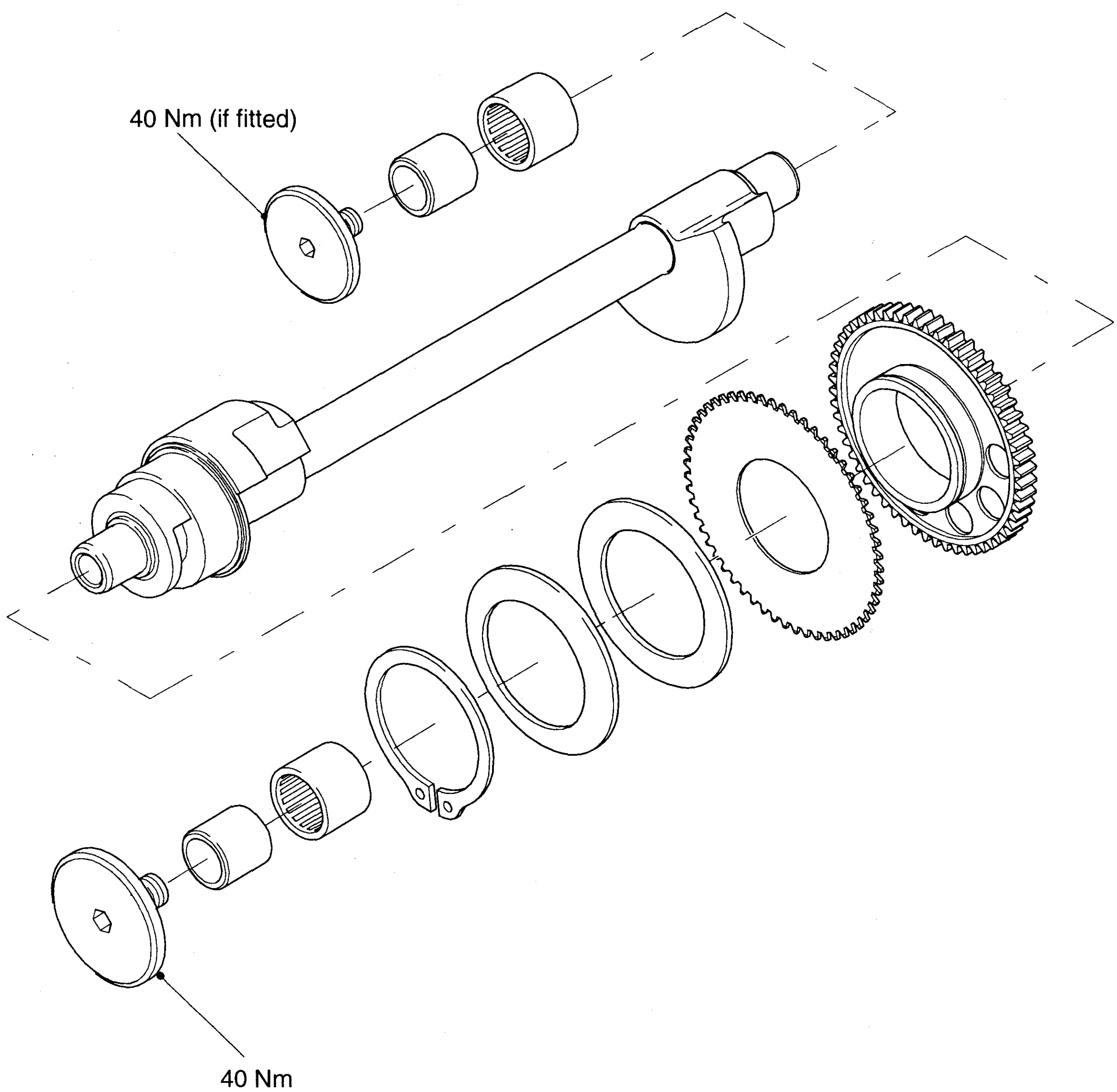
Page

Exploded View – Balancer Shaft



BALANCERS

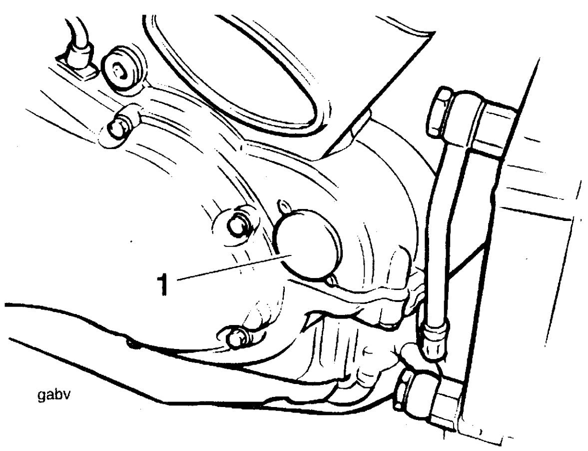
The balancer is fitted to control 'pulsing' within the engine. Without any form of balancer, the engine would 'pulse' each time the crankshaft rotated. This 'pulsing' would be felt as a vibration which would amplify as the engine speed was increased.

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.

Alignment Inspection

If the balancer is not correctly orientated in relation to the crankshaft, severe engine vibration will occur. In circumstances where severe engine vibration is experienced, the relationship of the balancer to the crankshaft must be checked.

1. Disconnect the battery, negative (black) lead first.
2. Drain the engine oil into a clean container.
3. Remove the clutch cover as described in the clutch section.
4. Lever out the plug shown in the illustration below from the right hand side of the crankcase. Take care not to mark or damage the case during removal.

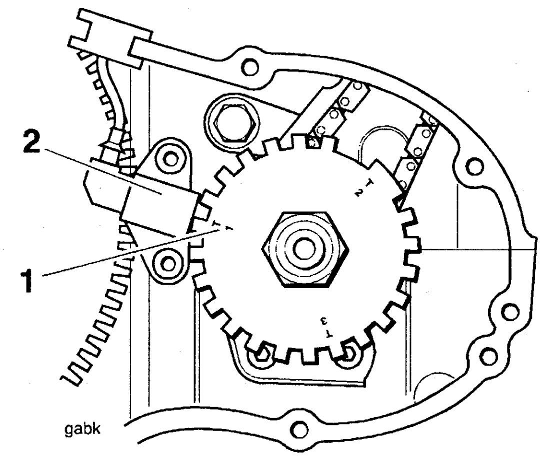


1. Crankcase Plug

NOTE:

- **The plug will be damaged during removal and must be discarded.**

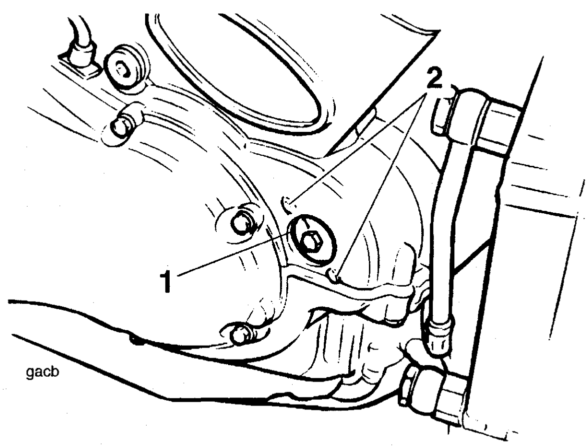
5. Turn the engine over until the 'T1' mark on the crankshaft rotor aligns with the centre of the crankshaft position sensor.



1. 'T1' Mark

2. Crankshaft Position Sensor

6. Examine the marking on the end of the balancer shaft and check that the markings align with the corresponding pointers on the outside of the crankcase. If the markings align as shown below, the balancer is correctly aligned.



1. Balancer Shaft Markings

2. Crankcase Pointers

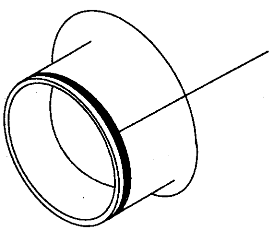
> **CAUTION: If the markings do not align as shown, the balancer must be removed, checked and refitted in the correct alignment position. Continued engine operation with an incorrectly aligned balancer will cause premature engine wear and permanent engine damage.**

7. Fit a new plug to the right hand side of the crankcase as described in 'balancer plug fitting'.
8. Refit the clutch cover as described in the clutch section.

9. Refill the engine with the correct grade engine oil.
10. Reconnect the battery, positive (red) lead first.

Balancer Plug Fitting

1. Thoroughly remove all traces of oil/grease and the previous bonding medium from the plug bores ensuring that no debris or swarf enter the crankcase.
2. Select new plugs and ensure that they are also free from all traces of oil/grease before proceeding.



3. Using a syringe, apply a bead of Scotchgrip 847 (1236) to the front edge of each plug as shown below. The adhesive is available from Triumph under part number T3450301. The adhesive must cover the complete circumference of the plug.

NOTE:

- **Ensure that the adhesive container is sealed correctly when not in use. This will prevent evaporation of the solvent which could adversely affect bonding efficiency.**
- **If used correctly, the quantity of sealer supplied will be sufficient for approximately 100 engines.**

4. Fit the plugs to the crankcase immediately after application of the adhesive. Ensure that the plugs are square to the crankcase and insert by applying a constant pressure with the palm of the hand.
5. Allow the adhesive to cure for at least one hour before starting the engine.

Balancer Shaft Removal

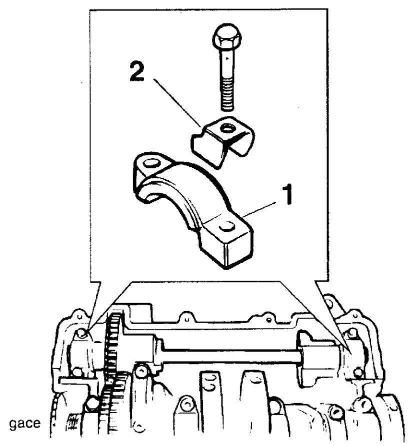
NOTE:

- **To remove the balancer, the engine must be removed from the frame and the two halves of the crankcase separated to allow removal of the crankshaft. For details of engine removal, crankcase separation and crankshaft removal, see the crankcase/crankshaft/piston and connecting rod section.**
- **Two balancer designs have been used. Early models were fitted with a large bearing retaining bolt at the left hand end and the balancer assembly end float was controlled by retaining brackets. On later models, the end float is controlled by circlips and the left hand bearing is retained by a circlip.**

1. Invert the upper crankcase ensuring that its weight is adequately supported.
2. Mark the balancer cap positions to ensure that they are refitted in their original orientation and positions in the crankcase.

> **CAUTION: The crankcase and balancer bearing caps are align bored during manufacture. Refitting the balancer bearing caps incorrectly may cause the shaft to seize or the caps to break resulting in severe engine damage.**

3. Remove the balancer cap bolts and bearing retaining brackets (if fitted) from the crankcase.



1. Balancer Caps

2. Bearing Retaining Brackets (Early models only)

4. Using hand pressure only, remove the bearing caps.

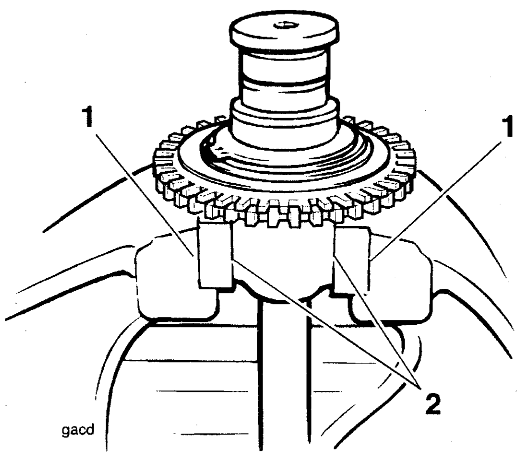
5. Withdraw the balancer assembly from the crankcase.

6. On later models, collect the bearing from the left hand end of the balancer shaft.

Disassembly

1. Locate the balancer assembly to a vice fitted with soft jaw-plates.

2. Close the vice such that the vice jaws grip the balancer across the flats on the balancer weight.



1. Vice Jaws

2. Balancer Weight Flats

NOTE:

- **The belleville washer, circlip and backlash eliminator gears are available as spare parts and can, therefore, be replaced. The drive gear and shaft are assembled using liquid oxygen and a press and cannot be replaced. If either of these parts become damaged, the complete shaft assembly must be replaced.**

3. Remove the circlip from the right hand (balancer gear) end of the shaft.

> **WARNING: Always wear eye protection when removing the circlip. The belleville washer below the circlip exerts considerable upward pressure and can cause the clip to jump off during release.**
>
> **Eye damage could result from contact with a displaced circlip.**

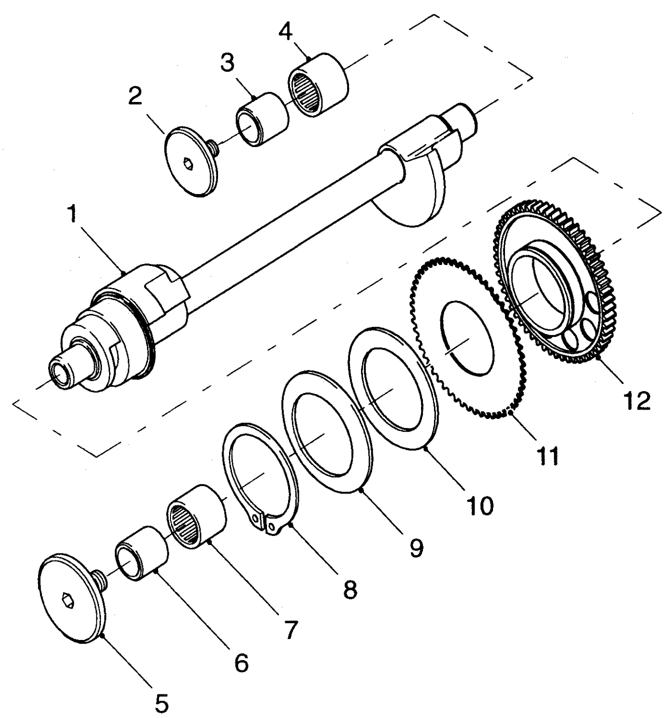
4. Collect the belleville washer, flat washer and backlash eliminator gear.

5. To remove the right hand bearing, undo the large-head capscrew from the end of the shaft and slide off the bearing and sleeve. Discard the capscrew.

NOTE:

- **The capscrew must not be re-used as its alignment marks will be incorrectly positioned when assembled.**

6. **Early models only:** To remove the left hand bearing, undo the large-head capscrew from the end of the shaft and slide off the bearing and sleeve. On later models, the bearing can be collected as the shaft is withdrawn from the crankcase.



1. **Balancer Shaft**
2. **Large-head Capscrew (early models only, replaced by a circlip on later models).**
3. **Sleeve, Left Hand**
4. **Bearing, Left Hand**
5. **Large-head Capscrew**
6. **Sleeve, Right Hand**
7. **Bearing, Right Hand**
8. **Circlip**
9. **Belleville Washer**
10. **Washer**
11. **Backlash Eliminator Gear**
12. **Balancer Drive Gear**

Examination

Before assembly, check the following items:

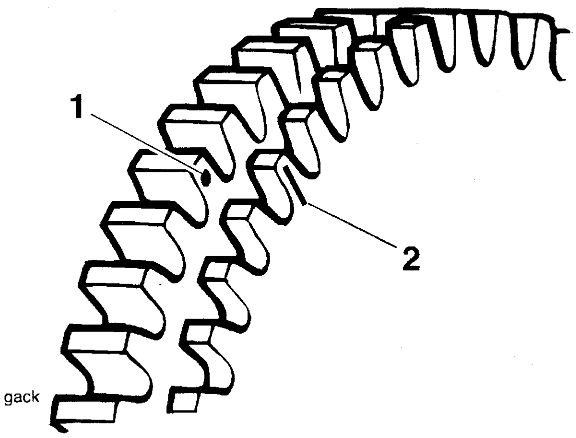
- Shaft bearings for overheating (blue coloured areas), loose or missing rollers etc.
- Shaft bearing areas and sleeves for overheating (blue coloured areas), grooving, scoring etc.
- Drive gear and backlash eliminator gears for tooth damage, overheating etc.
- Belleville washer for distortion.

Assembly

NOTE:

- **Prior to beginning the assembly process, locate the shaft to the vice in the same way as for disassembly.**

1. Locate the right hand bearing and sleeve to the shaft.
2. Apply 'Loctite 270' to the threads of a new large-head capscrew. Fit and tighten the capscrew to **40 Nm.**
3. Identify the balancer drive gear tooth marked with a dot. Fit the backlash eliminator gear such that the line marking on the backlash eliminator gear is in line with the dot marked balancer drive gear tooth.



1. Drive Gear Dot Marking

2. Backlash Eliminator Gear Line Marking

4. Fit the flat washer, belleville washer (dished face outwards) and circlip.

WARNING: Always wear eye protection when fitting the circlip. The belleville washer below the circlip exerts considerable upward pressure and can cause the clip to jump off during assembly.

Eye damage could result from contact with a displaced circlip.

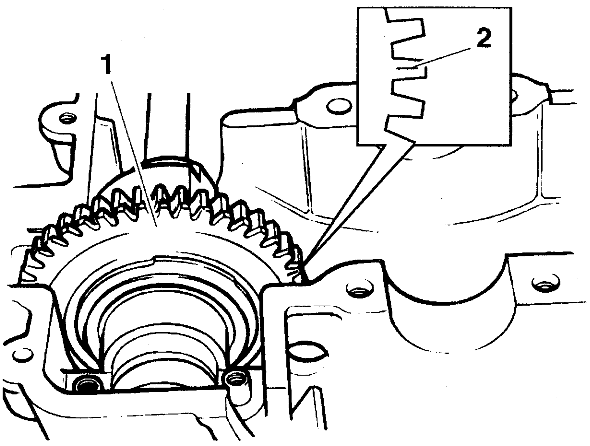
NOTE:

- **An assistant may be required to compress the belleville washer during fitment of the circlip.**

5. Fit the left hand bearing and sleeve.
6. **Early models only:** Apply 'Loctite 270' to the threads of the large-head capscrew. Fit and tighten the capscrew to **40 Nm.**
   Later models: Retain the left hand bearing with a new circlip.
7. Withdraw the shaft from the vice and check that the bearings rotate smoothly etc.

Installation

1. Check that the backlash eliminator gear tooth which is marked with a line is directly in front of the balancer drive gear marked with a dot.



1. Backlash Eliminator Gear

2. Backlash Eliminator Gear Line Marking

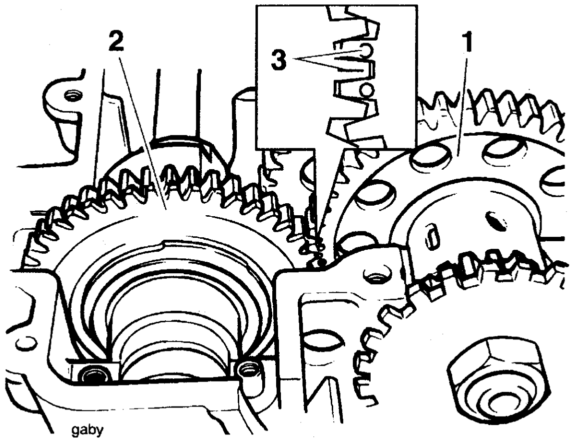
NOTE:

- **If the markings on the gears do not align at the same point, the backlash eliminator gear can be rotated by gently moving it against the teeth of the drive gear.**
- **For ease of identification during assembly, apply a small paint spot to the outside face of the dot marked balancer drive gear tooth.**

2. Apply 'Three Bond 1375B' high strength locking fluid (or a direct equivalent) to the balancer bearing locations in the upper crankcase.

3. Install the balancer assembly into the crankcase ensuring that the oil holes in the balancer bearings face away from the sealer area.

4. Fit the crankshaft to the crankcase aligning the two dot marked teeth on the crankshaft gear with the marked balancer driven gear.

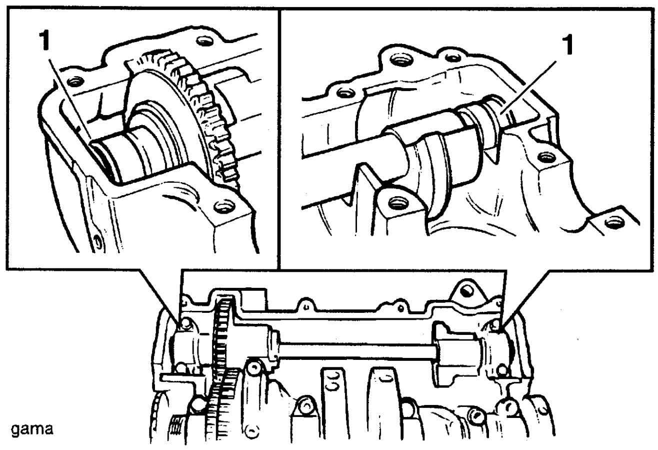


1. Crankshaft Drive Gear

2. Balancer Driven Gear

3. Alignment Marks

5. On all later models, align the circlips at either end of the balancer shaft with the corresponding grooves in the crankcase.

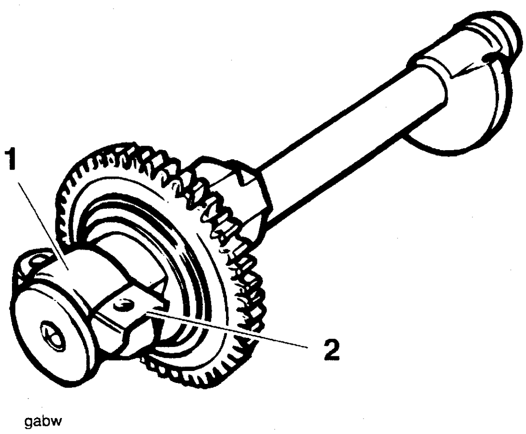


1. Circlips

2. Crankcase Circlip Grooves

6. Refit the bearing caps in the position and orientation noted during disassembly. It is not necessary to apply locking fluid to the bearing locations in the caps.

7. **Early Models Only:** Fit the bearing retaining brackets ensuring that they are correctly located around the balancer bearings.



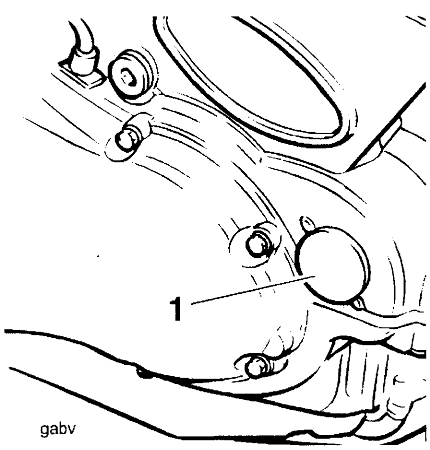
1. Balancer Bearing

2. Bearing Bracket

8. Lubricate the threads of the balancer cap bolts with engine oil and tighten to **32 Nm.**

9. Rebuild the engine to a point where the two halves of the crankcase are assembled together.

10. Lever out the plug, shown in the illustration below, from the right hand side of the crankcase. Take care not to mark or damage the case during removal.

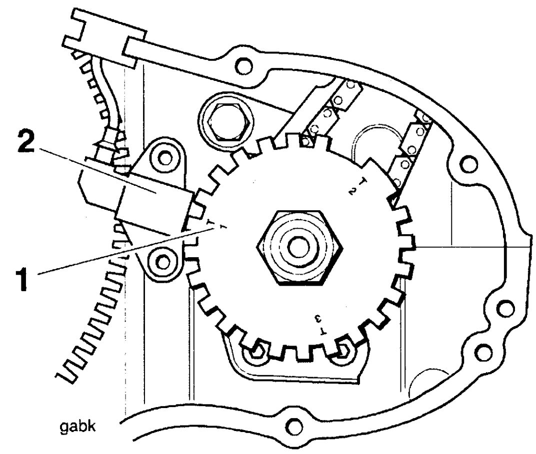


1. Crankcase Plug

NOTE:

- **The plug will be damaged during removal and must be discarded.**

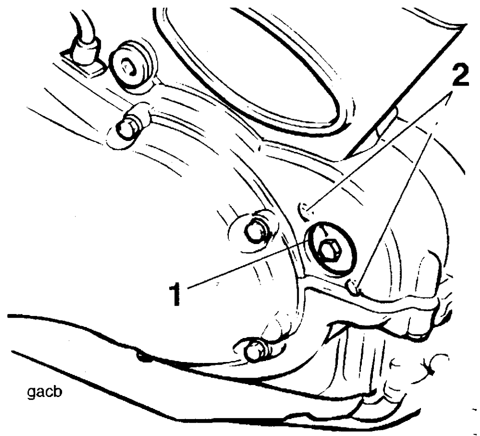
11. Turn the engine over until the 'T1' mark on the crankshaft rotor aligns with the centre of the crankshaft position sensor.



1. 'T1' Mark

2. Crankshaft Position Sensor

12. Make permanent marks on the bolt that accurately align with the two marks on the outside of the crankcase.



1. Balancer Shaft Bolt Marking

2. Crankcase Pointers

13. Fit a new plug to the right hand side of the crankcase (see balancer plug fitting earlier in this section).

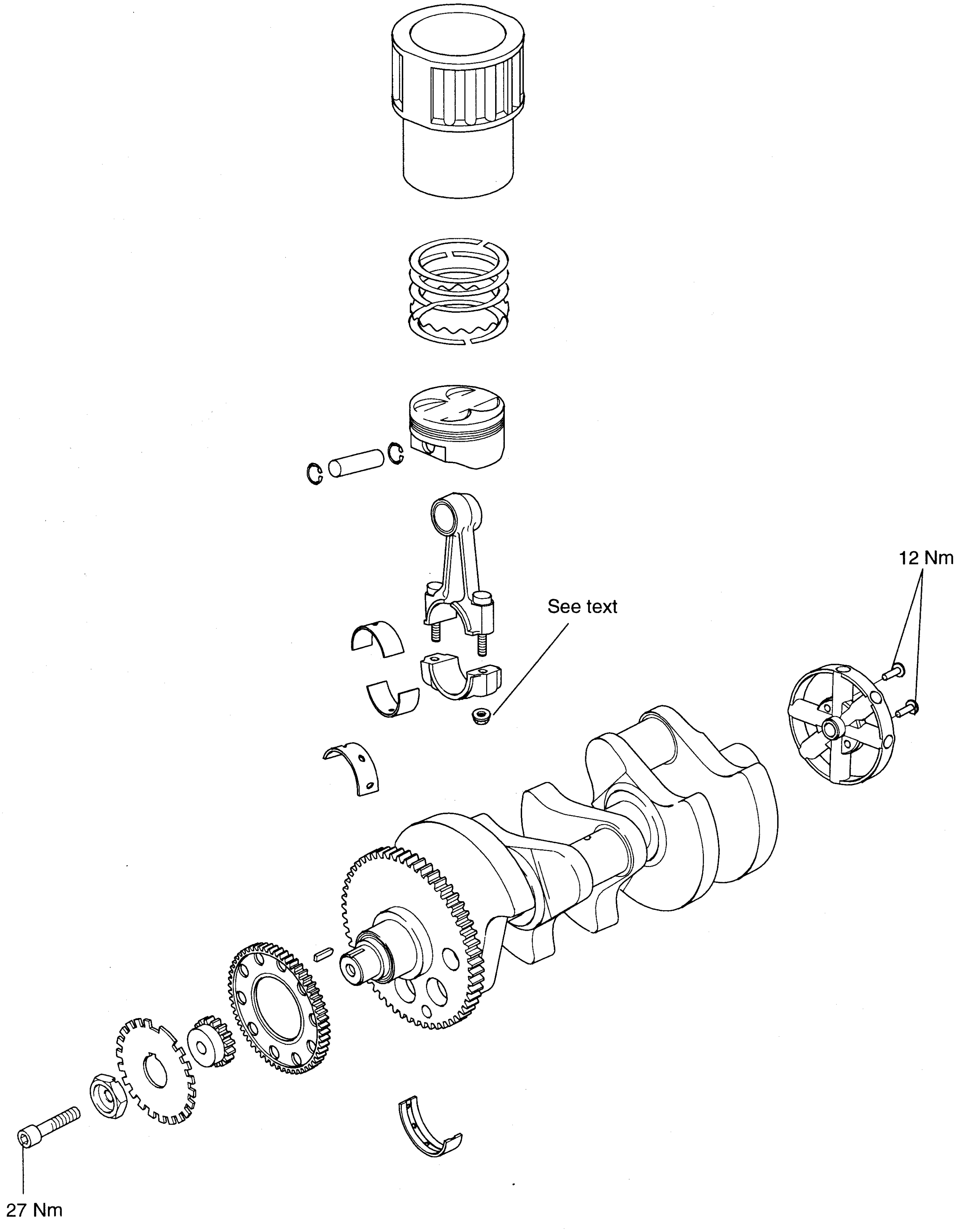
14. Continue to assemble and refit the engine as described in the crankcase/crankshaft/piston and connecting rod section.

CRANKSHAFT, RODS and PISTONS

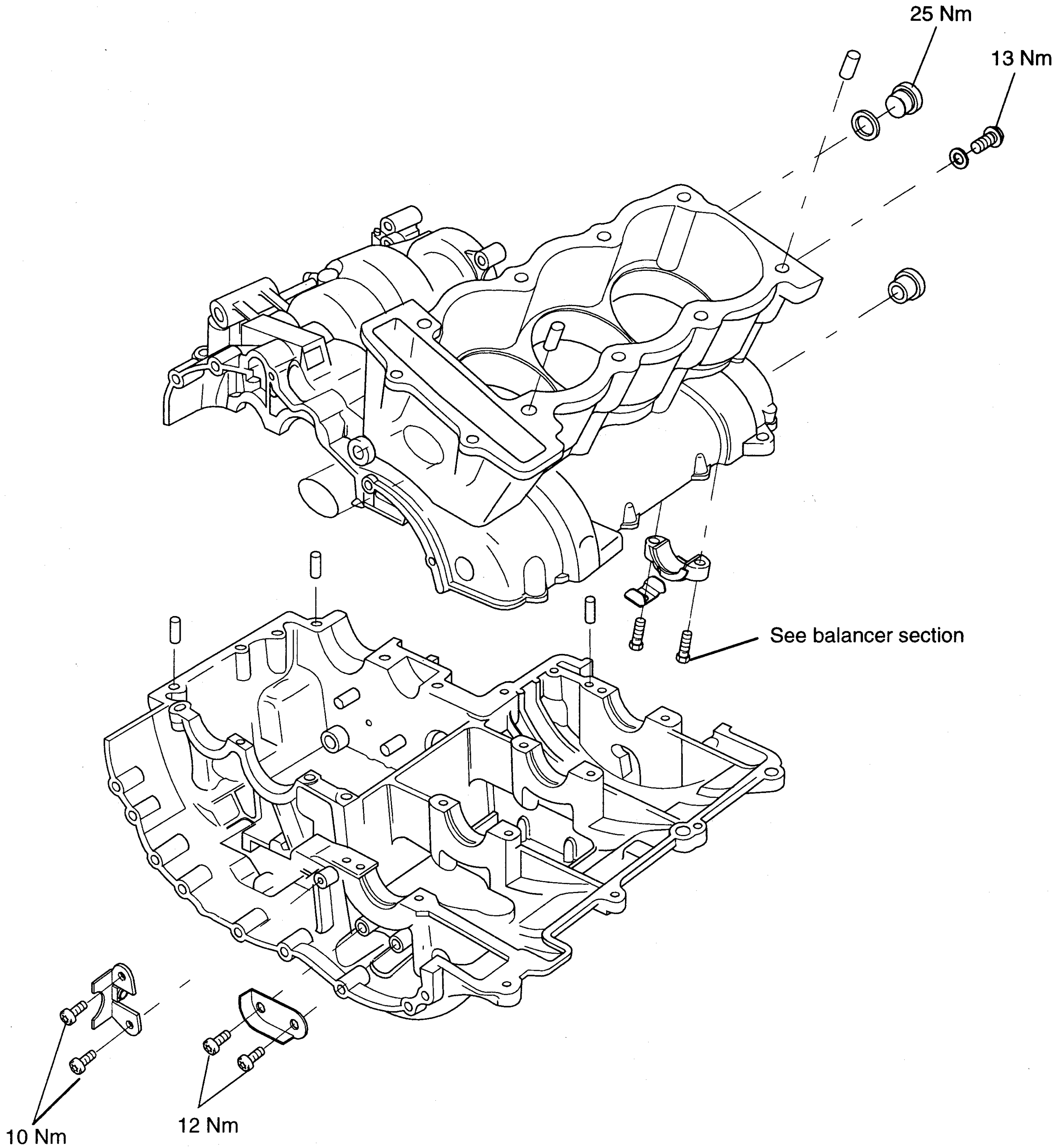
CONTENTS

Exploded View

Crankshaft, Connecting Rod, Piston and Liner



Exploded View – Crankcase



ENGINE REMOVAL/REFIT

Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the battery.
3. Place the motorcycle on a paddock stand.

> **WARNING: Ensure that the motorcycle is stabilised and adequately supported to prevent the risk of injury from the motorcycle falling.**

4. Remove the body side panels as described in the bodywork section.
5. Remove the belly panel and lower fairings (where fitted).
6. Remove the fuel tank and airbox as described in the fuel system section.
7. Drain the engine oil into a suitable container. Once all the oil has drained out, fit a new sealing washer to the sump plug and fit and tighten it to **25 Nm.**

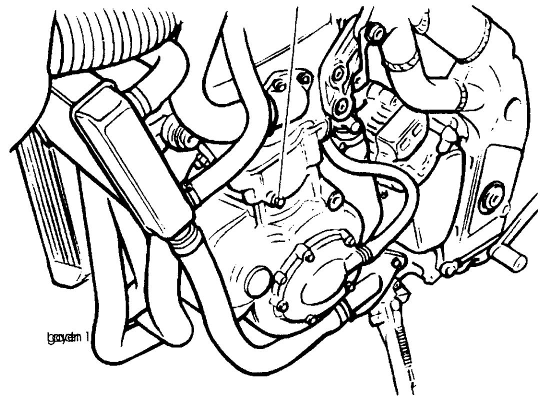
> **WARNING: The oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.**

> **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.**

> **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.**

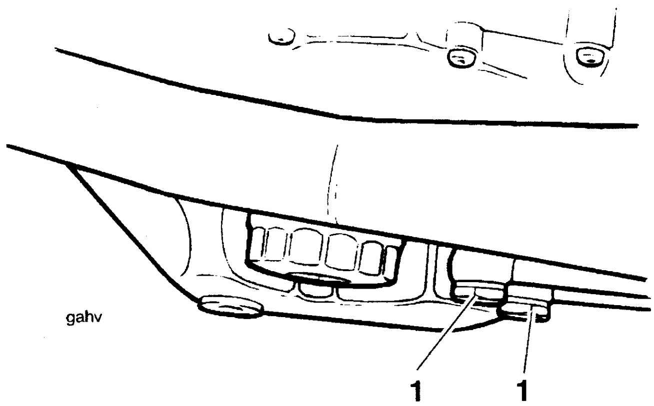
8. Drain the coolant as described in the cooling system section.

> **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.**



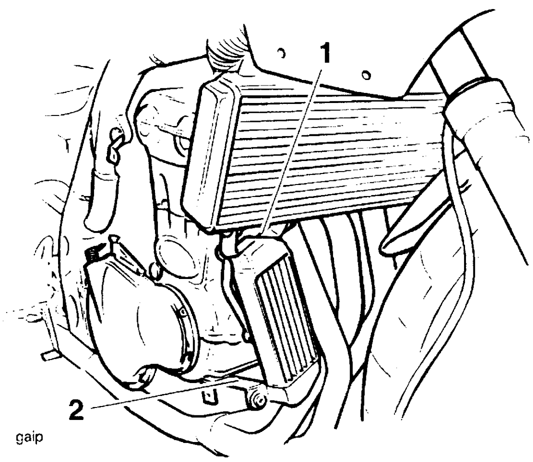
1. Coolant Drain Point

9. Release the oil cooler pipes at their connections with the sump.



1. Oil Cooler Pipe Connections

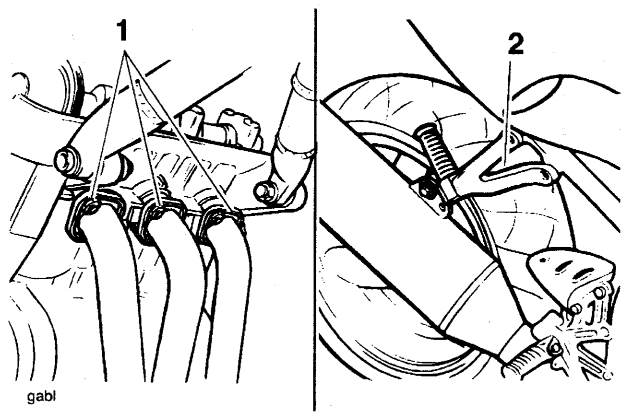
10. Remove the bolts securing the oil cooler to the radiator and release the lower oil cooler mounting bracket from the crankcase.



1. Oil Cooler to Radiator Mounting

2. Oil Cooler to Crankcase Bracket

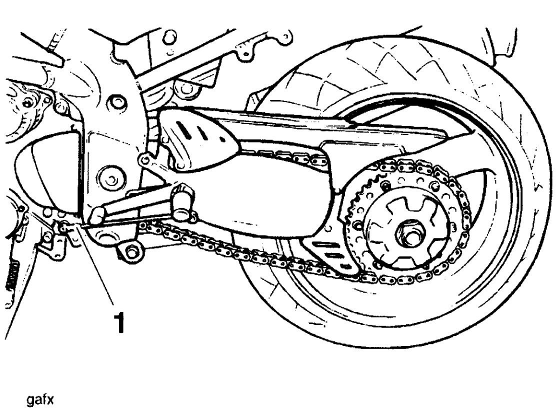
11. Remove the oil cooler assembly complete with the cooler pipes.
12. Detach the following coolant hoses;
    - radiator top hose at the radiator,
    - engine top hose at the engine,
    - bottom hose at the radiator and water pump, then remove the hose,
    - bypass hose at the radiator.
13. Once all the hoses have been detached, collect the thermostat housing from above the engine and place aside.
14. Remove the radiator as detailed in the cooling system section.
15. Remove the exhaust downpipes and silencer as detailed in the fuel system section.



1. Downpipe to Head Fixings

2. Silencer Mounting

16. Note the setting position of the gearchange adjuster rod. Slacken the locknuts securing the gearchange rod to the ball joints and turn the rod until it becomes detached at both ends.

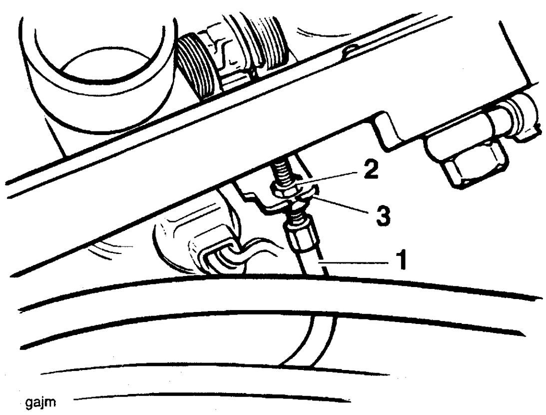


1. Gearchange Rod

17. Set the drive chain adjustment to allow maximum free play in the chain. Refer to the rear suspension/final drive section for chain adjustment information.
18. Remove the sprocket cover.
19. Detach the chain from the rear sprocket.

> ⚠ **CAUTION: To prevent chain damage, do not allow the chain to come into contact with dirt, road grit etc.**

20. Disconnect all electrical connections from the main harness to the engine.
21. Disconnect the throttle cable from the throttle bodies.

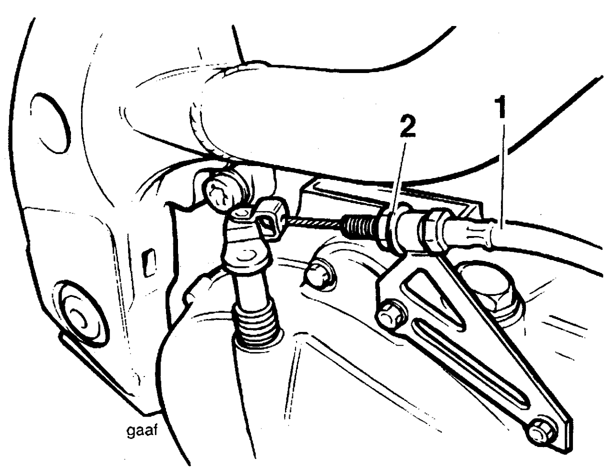


1. Outer Cable

2. Adjuster Locknut

3. Cable Bracket

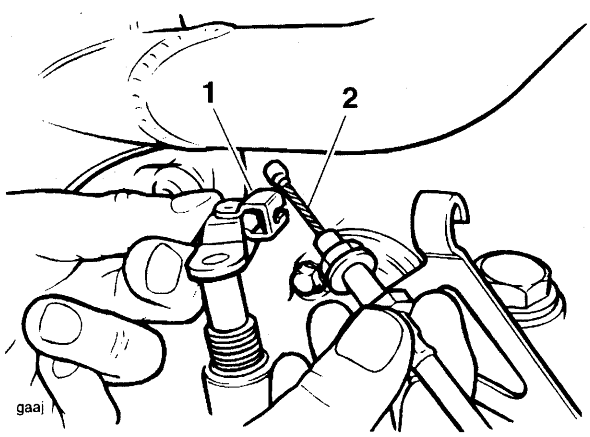
22. Slacken the clutch cable locknut and release the adjuster at the clutch cover end to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

23. Release the clutch cable from the actuating arm by pushing the inner cable nipple through the arm and sliding the cable out of the slot in the arm. Detach the cable from the bracket.

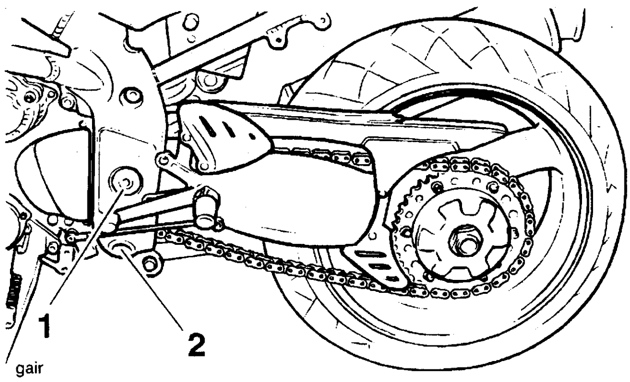


1. Actuating Arm

2. Inner Cable

24. Slacken the swinging arm pivot bolts.

25. Slacken the drag link pivot bolt.

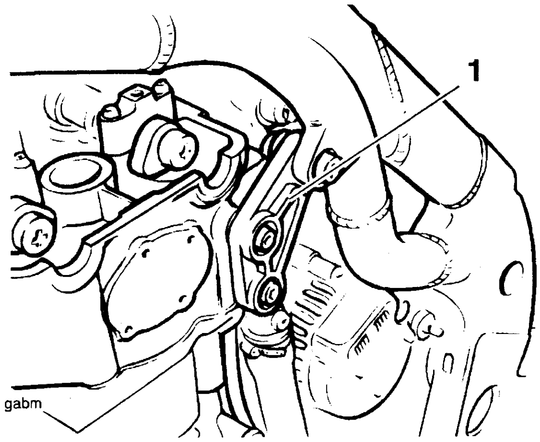


1. Swinging Arm Pivot Bolt

2. Drag Link Pivot Bolt

26. Place a support beneath the engine and ensure that the frame is adequately and securely supported.

27. Remove the frame to head bracket from the left hand side of the motorcycle.



1. Frame to Cylinder Head Mounting Bracket

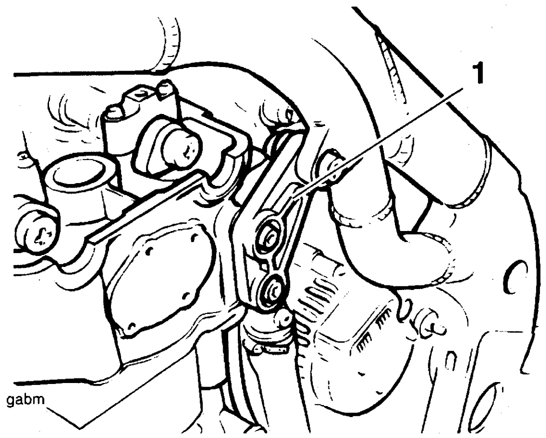
28. Remove the remaining engine mounting bolts and lower the engine to allow the drive chain to be detached from the output sprocket.

29. Remove the engine from the frame.

⚠ CAUTION: To prevent damage to components, lower the engine very carefully. Particularly vulnerable items include the throttle position sensor, cam sensor and radiator.

Engine Installation

1. Position the engine beneath the frame.
2. Raise the engine and loop the drive chain over the output sprocket.
3. Align the engine to the frame and refit the engine mounting bolts to support the engine.
4. Slacken the inner lock/adjuster rings for the swinging arm.
5. Remove the support from beneath the engine.
6. Refit the frame to cylinder head bracket to the left hand side of the motorcycle. Tighten the bracket to cylinder head bolts to **30 Nm. DO NOT TIGHTEN THE BRACKET TO FRAME BOLT UNTIL INSTRUCTED TO DO SO.**



1. Frame to Cylinder Head Mounting Bracket

> **CAUTION: Unless the following engine mounting bolt tightening sequence is precisely followed, severe frame damage can occur.**

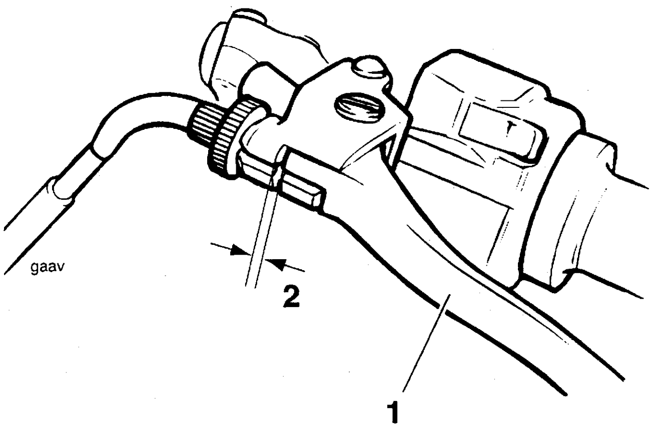
7. Tighten the front left hand frame to cylinder head bolt to **80 Nm.**
8. Tighten the rear left hand frame to cylinder head bolt to **80 Nm.**
9. Tighten the upper left hand frame to engine bolt to **80 Nm.**
10. Tighten the lower left hand frame to engine bolt to **80 Nm.**
11. Check the gap between the frame and engine at all right hand engine mounting locations. If any gap is found to be greater than 1 mm, add spacer (part number 3550220–T0301) to reduce the gap below 1 mm.

NOTE:

- **If a spacer is needed for the lower right hand rear engine mounting bolt, an equivalent sized spacer must also be fitted to the drag link to frame bolt on the right hand side.**
- **If a gap larger than 1 mm exists between the frame and drag link, but no shim was found to be necessary for the lower right hand engine mounting bolt, the drag link spacer must not be used.**

12. Once all the necessary shims have been added, tighten the right hand frame to engine bolts to **80 Nm** in the same sequence as was used to tighten the left hand bolts.
13. Tighten the left hand frame to engine bolts to **95 Nm** using the sequence used for initial tightening.
14. Tighten the right hand frame to engine bolts to **95 Nm** using the sequence used for initial tightening.
15. Tighten the swinging arm spindle inner adjustment ring to **18 Nm** and the outer locking ring to **32 Nm** using service tool part numbers T3880290 and T3880295 respectively.
16. Tighten the swinging arm spindle bolt to **60 Nm.**
17. Tighten the drag link spindle bolt to **95 Nm.**
18. Refit the clutch cable and set the adjuster at the clutch end to give a preliminary setting of 2–3 mm of free–play as measured at the lever.
19. Operate the clutch lever several times and recheck the amount of free-play present.

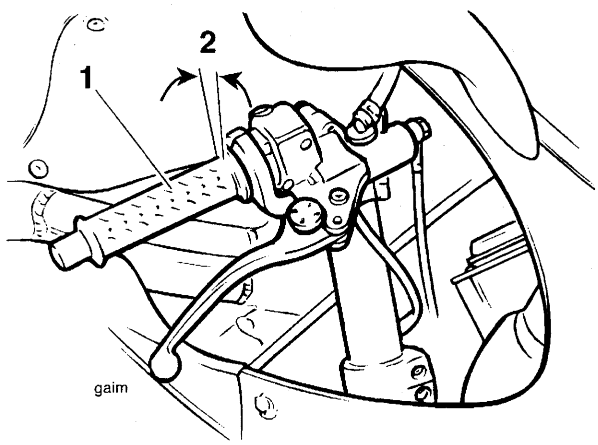
20. Set the final adjustment of the cable to give 0.4–0.8 mm of free-play at the lever by turning the adjuster nut and locknut at the lever end. Tighten the lock ring.



1. Clutch Lever

2. Correct Setting, 0.4–0.8 mm

21. Refit the throttle cable to the throttle bodies. When correctly set, the throttle must have 2-3 mm of free play at the throttle twist grip. If there is more or less than 2–3 mm of free–play present, the throttle cable must be adjusted. **To adjust the cable, follow instructions 13 to 15.**

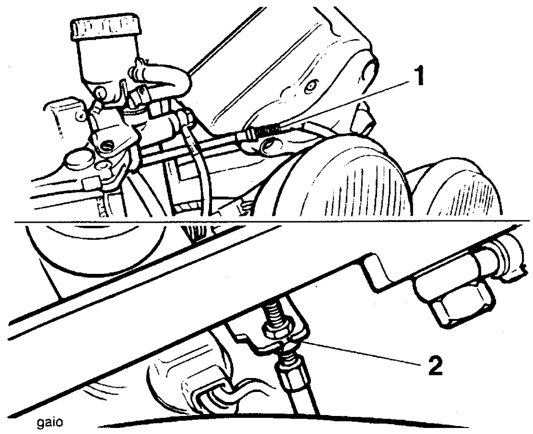


1. Throttle Twist Grip

2. 2–3 mm

WARNING: Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.

WARNING: Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.



1. Adjuster – Twist Grip End

2. Adjuster – Throttle Body End

22. Set the cable adjuster at the twist grip end such that it has an equal amount of adjustment in each direction.

23. Set the adjuster at the throttle body end of the cable to give 2–3mm of play at the throttle twist grip. Tighten the locknut.

24. Make any minor adjustments as necessary to give 2-3 mm of play using the adjuster at the twist grip end of the cable. Tighten the locknut.

WARNING: Ensure that the adjuster locknuts are tightened. A loose throttle cable adjuster could cause the throttle to stick leading to loss of control and an accident.

25. Reconnect all electrical connections to the engine.

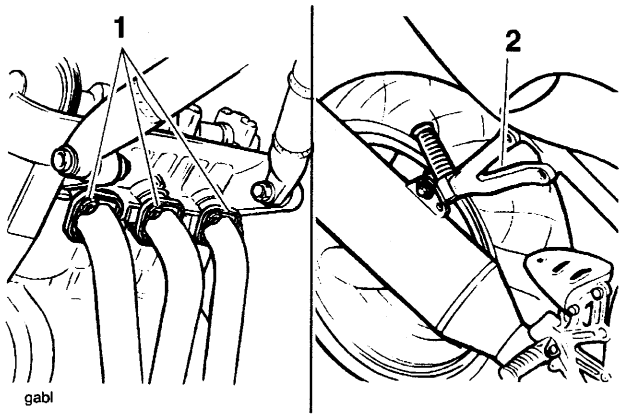
26. Refit the chain to the rear sprocket.

27. Allow the swinging arm to hang free, and set the chain adjustment as described in the rear suspension/final drive section.

28. Refit the sprocket cover and tighten the bolts to **9 Nm.**

29. Refit the gearchange rod and adjust to the same setting as noted during strip-down. Tighten the locknuts.

30. Using new seals at the cylinder head end, refit the exhaust system as described in the fuel system section.

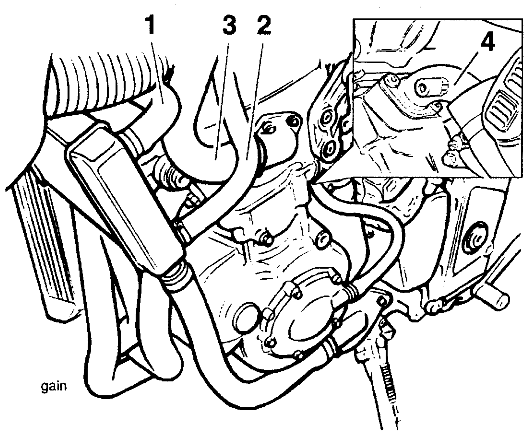


1. Downpipe to Head Fixings

2. Silencer Mounting

31. Refit the radiator as described in the cooling system section.

32. Align the thermostat housing to the engine, connect and secure hoses as follows;
    - radiator top hose at the radiator,
    - engine top hose at the engine,
    - bottom hose at the radiator and water pump,
    - bypass hose at the radiator.



1. Radiator Top Hose

2. Bypass Hose

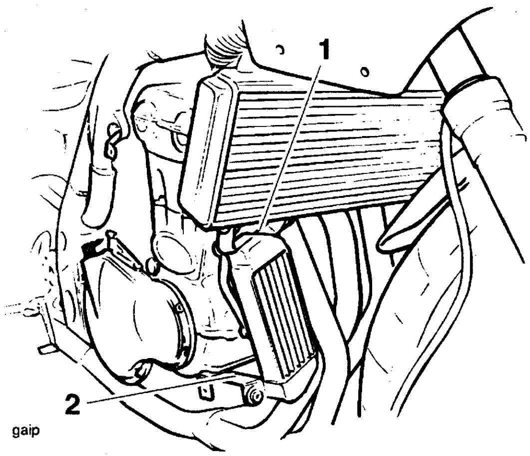
3. Engine Top Hose

4. Bypass Hose (rear)

33. Refit the coolant drain plug and tighten to **13 Nm.**

34. Refit the oil cooler to the radiator and tighten the fixings to **9 Nm.**

35. Align the oil cooler bracket to the crankcase and tighten the fixing to **9 Nm.**



1. Oil Cooler to Radiator Mounting

2. Oil Cooler to Crankcase Bracket

36. Using new washers, on both sides of both banjo bolts, refit the oil cooler pipes to the sump. Tighten the banjo bolts to **25 Nm.**

37. Fill the engine with oil of the correct grade and viscosity. (See specification section for details).

38. Refit the airbox as described in the fuel system section, and secure the thermostat housing to the airbox.

39. Refill the cooling system as described in the cooling system section.

40. Refit the fuel tank as described in the fuel system section.

41. Refit the battery to the battery box.

42. Reconnect the battery positive (red) lead first.

43. Refit any bodywork previously removed.

44. Remove the motorcycle from the paddock stand and place on the side stand.

CRANKCASES

The upper and lower crankcases are machined as a matched set and must never be assembled to non-matching halves.

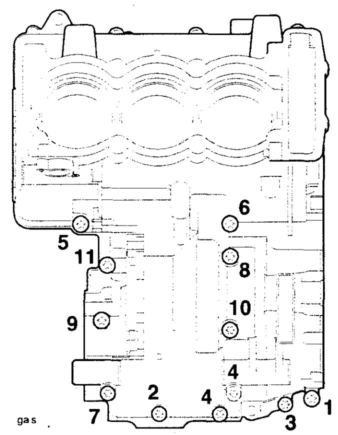
Before the crankcase halves can be separated, the engine must be removed from the frame and the following items must also be removed

1. Sump.
2. Engine covers
3. Alternator.
4. Starter motor.
5. Crankshaft position sensor.

Disassembly

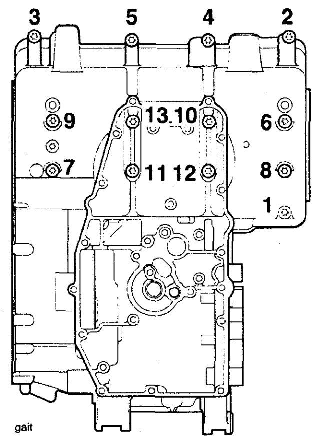
> **CAUTION: Failure to follow the correct screw release sequence may result in permanent crankcase damage.**

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 3 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.**

NOTE:

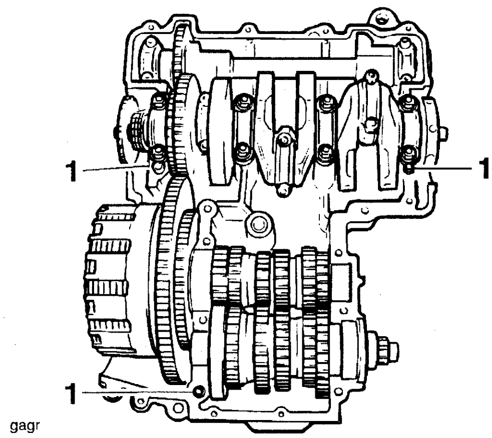
- **At this point the transmission shafts, crankshaft bearings etc. can be removed.**

Assembly

1. Apply Loctite 648 to the outer races of the gearbox bearings. Fit the gearbox shafts (if removed), ensuring the locating ring on the input shaft is in position in the circlip groove on the crankcase. Engage the clutch primary gear with crankshaft gear.

2. Ensure that the transmission is in neutral.

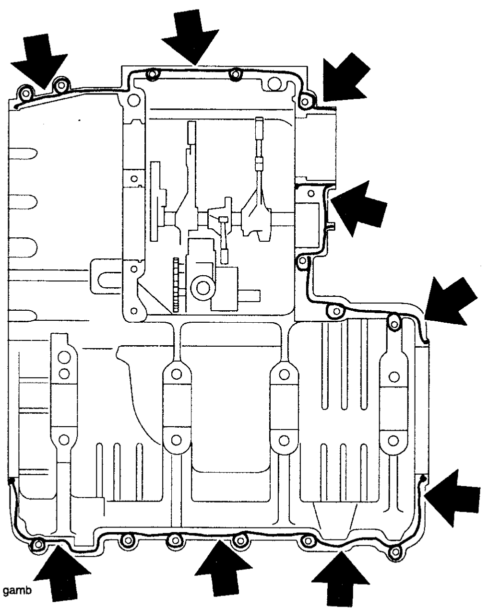
3. Ensure that the 3 locating dowels are in position in the upper crankcase.



1. Locating dowels

4. Use high flash-point solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.

5. Apply a thin bead of silicone sealant (Three-bond 1215 liquid gasket is used at the factory) to the lower crankcase mating faces as shown in the diagram below.



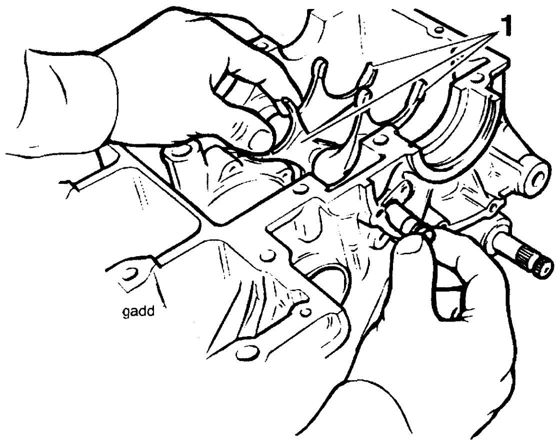
> **CAUTION: Do not use excessive amounts of sealer. The extra sealer may become dislodged and could block the oil passages in the crankcases causing severe engine damage.**

6. Fit a new 'O' ring to the oil pump outlet.

7. Install and lubricate the crankshaft bearing shells with clean engine oil.

8. Lubricate the crankshaft journals with clean engine oil.

9. Position the lower crankcase to the upper, ensuring that all selectors engage correctly. An assistant may be required to support the crankcase during alignment.



Selector Forks

10. Fit the screws into the lower crankcase and hand tighten.

11. Invert the engine.

12. Fit the screws into the upper crankcase and hand tighten.

NOTE:

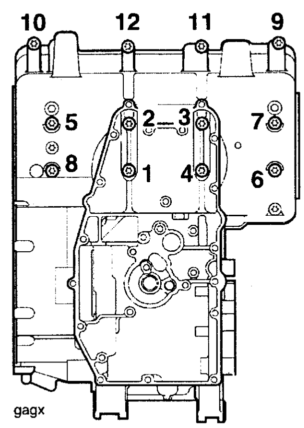
- **The crankcase screws are tightened in stages, in the same sequences used during strip down.**
- **Two different sizes of crankcase screw are used. All screws are tightened through the first two stages of the tightening procedure but only the M8 size screws are tightened at the third stage.**

> **CAUTION: Failure to follow the correct screw tightening sequence may result in permanent crankcase damage.**

Stage 1 – all screws

13. Invert the engine.

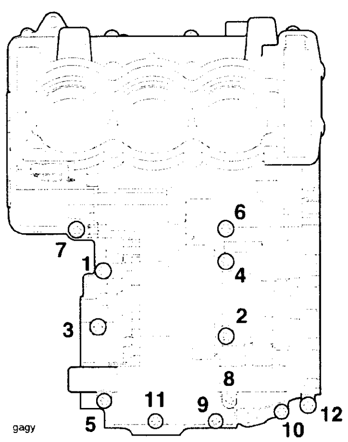
    In the correct sequence, tighten all lower crankcase screws to **10 Nm**.



Lower Crankcase Bolt Tightening Sequence

14. Invert the engine.

    In the correct sequence, tighten all upper crankcase screws to **10 Nm**.



Upper Crankcase Bolt Tightening Sequence

Stage 2 – all screws

15. Invert the engine.

    In the correct sequence, tighten all lower crankcase screws to **12 Nm.**

16. Invert the engine.

    In the correct sequence, tighten all upper crankcase screws to **12 Nm.**

Stage 3 – M8 screws only

17. Invert the engine.

    In the correct sequence, tighten only the **M8** size lower crankcase screws to **28 Nm.**

18. Invert the engine.

    In the correct sequence, tighten only the **M8** size upper crankcase screws to **28 Nm.**

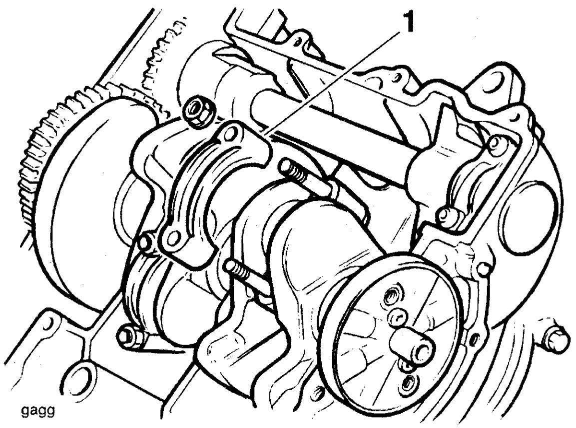
19. Rotate the crankshaft clockwise. Check for tight spots and rectify as necessary.

CONNECTING RODS

Removal

Connecting rods may be removed from the engine after first removing it from the frame. The cylinder head must be removed and the crankcase halves separated.

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



1. Big End Cap

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 liner and collect the piston and connecting rod from the top.
4. Label the assembly to identify the cylinder from which it was removed.

> **CAUTION: Never re-use connecting rod bolts or nuts. If the connecting rod cap is disturbed, always renew the bolts and nuts. Using the original nuts and bolts may lead to severe engine damage.**

5. Remove the liner using tool T3880315 as described later in this section.

Installation

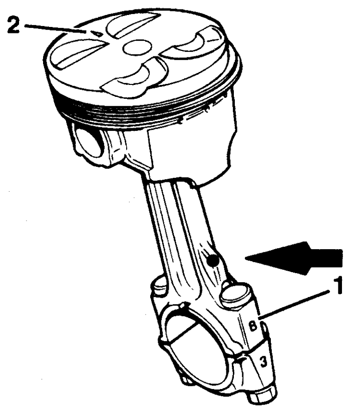
NOTE:

- **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.**

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

NOTE:

- **Ensure the piston is fitted correctly to the connecting rod, (that is with the oil hole in the connecting rod on the opposite side from the arrow on the piston crown).**
- **A small number of engines were built without piston orientation arrows. In such cases, mark the piston crown before removing from the connecting rod.**



1. Connecting Rod with Oil Hole Arrowed

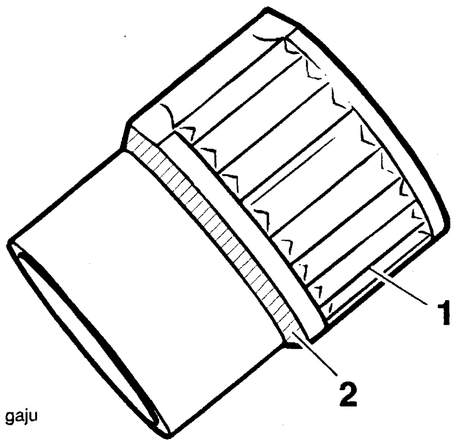
2. Piston Arrow

2. Apply molybdenum disulphide grease to the upper inner surface of the connecting rod big end.

NOTE:

- **Avoid touching any bearing surfaces of the bearing shells with the hand.**

3. Apply silicone sealer to the liner to crankcase mating face.



1. Liner

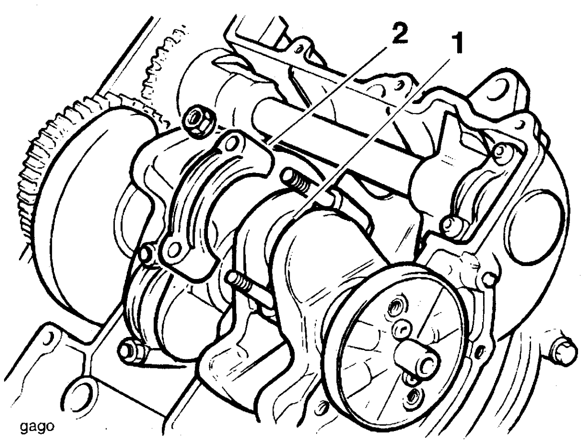
2. Sealer Area

4. Fit the piston and connecting rod assembly into the liner.

5. Fit the liner into the crankcase ensuring that the arrow on the piston faces forward, and the oil hole in the connecting rod faces rearward.

NOTE:

- **Ensure that the piston/liner/connecting rod assembly aligns correctly with the crankpin during assembly into the crankcase.**



1. Crankpin

2. Big End

6. Select big end bearing shells using the selection process elsewhere in this section.

7. Lubricate both surfaces of the bearing shells with engine oil and fit to the connecting rod and big end cap.

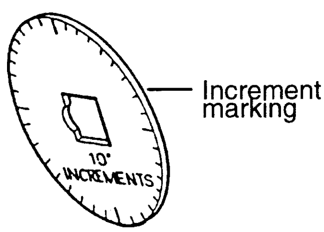
8. Align the connecting rod to the crankshaft and fit the big end cap. Tighten the cap (using new nuts and bolts) as follows:
Lubricate the threads of the bolt and the face of the nut with molybdenum disulphide grease.
Tighten the nuts progressively in 2 stages;–

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.

firstly to **14 Nm**

then through 120° of nut rotation as measured using the Triumph torque turn gauge 3880105-T0301.

To accurately gauge the 120° turn, fit the tool between the socket and the drive handle and locate the socket to the big end nut. Pick an increment point on the torque turn gauge which aligns with a suitable reference point. Tighten the bolts until 12 of the 10° gauge increments have rotated past the chosen point.



Service Tool 3880105-T0301

CRANKSHAFT

NOTE:

- **Before the crankshaft can be removed, the two halves of the crankcase must first be separated.**

Removal

1. Remove the connecting rods as described in the previous section.
2. Remove the breather disc from the crankshaft.
3. Remove the cam chain as described in the cylinder head section.
4. Release and remove the crankshaft from the upper crankcase.

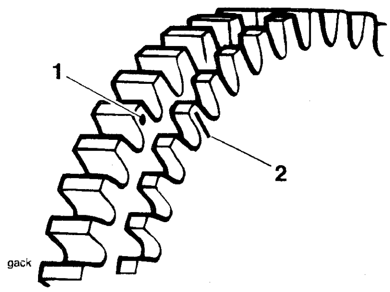
NOTE:

- **Remove all bearings and inspect for damage, wear, overheating (blueing) and any other signs of deterioration. Replace the bearings as a set if necessary.**

Installation

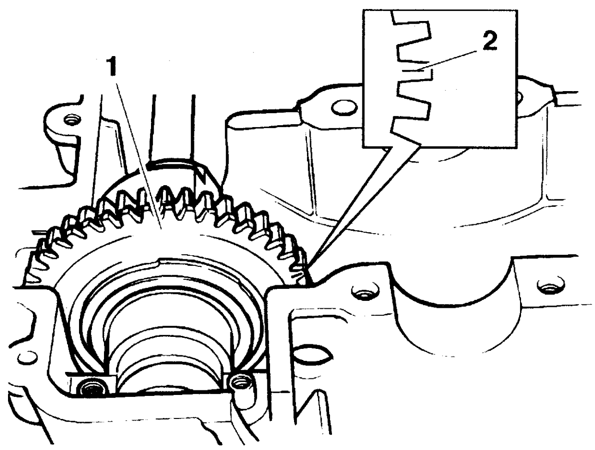
> ⚠ **CAUTION: Always check the bearing journal clearance, as described in the following pages, before final assembly of the crankshaft. Failure to correctly select crankshaft bearings will result in severe engine damage.**

1. Select and fit new main and big end bearings using the selection processes detailed later in this section.
2. Lubricate all bearings with engine oil.
3. Ensure that the crankshaft is clean, and that the oilways within the crank are free from blockages and debris.
4. Before fitting the crankshaft, check that the balancer backlash eliminator gear tooth which is marked with a line is directly in front of the balancer drive gear marked with a dot.



1. Drive Gear Dot Marking

2. Backlash Eliminator Gear Line Marking



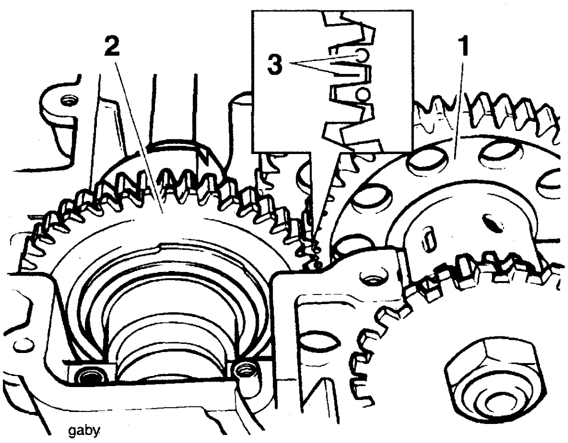
1. Balancer Drive Gear Assembly

2. Backlash Eliminator Gear Marking

NOTE:

- **If the markings on the balancer gears do not align at the same point, the backlash eliminator gear can be rotated independently of the drive gear by gently moving it against the drive gear teeth.**
- **For ease of identification during assembly, apply a small paint spot to the outside face of the dot marked balancer drive gear tooth.**

5. Fit the crankshaft to the crankcase aligning the two dot marked teeth on the crankshaft gear with the marked balancer driven gear.



1. Crankshaft Drive Gear

2. Balancer Driven Gear

3. Alignment Marks

6. Refit the connecting rods as described earlier in this section.

7. Assemble the crankcases as described earlier in this section.

CONNECTING ROD BIG END BEARING SELECTION/CRANKPIN WEAR CHECK

1. Measure the bearing and crankpin clearance as follows.

NOTE:

- **Do not turn the connecting rod and crankshaft during the clearance measurement as this will damage the plastigauge. The crankpin clearances are measured using 'Plastigauge' (Triumph part number 3880150-T0301).**

2. Remove the big end cap from the journal to be checked.

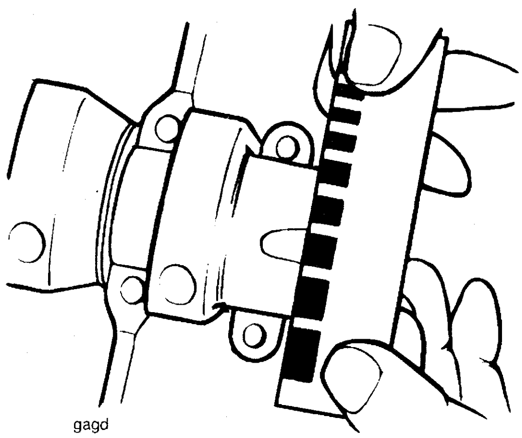
3. Wipe the exposed areas of the crankpin, and the bearing face inside the cap.

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 and cap and tighten the big end nuts as described earlier.

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.



gagd

Checking the Measured Clearance

Con rod big end bearing/crankpin clearance

- **Standard:** **0.036 – 0.066 mm**
- **Service limit:** **0.1 mm**

NOTE:

- **If the measured clearance exceeds the service limit, measure the crankpin diameter.**

Crankpin diameter

Standard:	**40.946 – 40.960 mm**
Service limit:	**40.932 mm**

NOTE:

- **If any crankpin 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 microfiche.

1. Select the correct big end bearing shell as follows:
   - Measure each crankpin diameter.
   - Check connecting rod for either an A or B mark.

2. Select the correct bearings by matching the information found with the chart below.

Big end bearing selection chart

Shell Colour	White	Red	Red	Blue
Rod Marking	A	A	B	B
Crankpin Dia	40.960 40.954	40.953 40.946	40.960 40.954	40.953 40.946
Running Clearance: 0.036 – 0.0666				

For instance:

Con-rod Mark	**A**
Crankpin Diameter	**40.951**
Required Bearing	**Red**

NOTE:

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

3. Install the new bearings in the connecting rod.

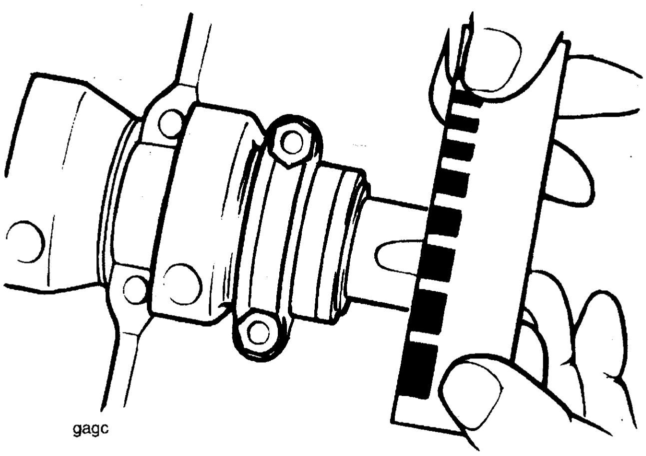
CAUTION: Always confirm, using the plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance.

CRANKSHAFT MAIN BEARING/JOURNAL WEAR

Main Bearing Selection Chart (all dimensions in mm's)						
Shell Colour	White	Red	Red	Blue	Blue	Green
Crankcase Bore	41.126 41.118	41.126 41.118	41.135 41.127	41.135 41.127	41.144 41.136	41.144 41.136
Journal Dia'	37.976 37.969	37.968 37.960	37.976 37.969	37.968 37.960	37.976 37.969	37.968 37.960
Running Clearance	All types 0.044 – 0.020					

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

1. Measure the bearing to crankshaft main journal clearance using plastigauge (Triumph part number 3880150-T0301). Use the method described in connecting rod clearance measurement.



Checking crankpin clearance using plastigauge

Crankshaft main bearing/journal clearance

Standard:	**0.020 – 0.044 mm**
Service limit:	**0.08 mm max.**

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

Crankshaft main journal diameter

Standard:	**37.960 – 37.976 mm**
Service limit:	**37.936 mm**

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).

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

For example:

Crankshaft Journal diameter	**37.972 mm**
Crankcase Bore	**41.130 mm**
Bearing Required	**RED**

NOTE:

- **It is normal for the bearings selected to differ from one journal to another.**

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

Standard	**0.05 – 0.20 mm**
Service Limit	**0.4 mm max**

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

NOTE:

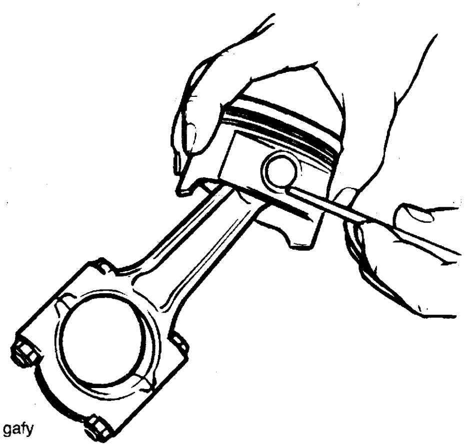
- **The pistons and connecting rods can be separated after removing the cylinder head and liners. It is not necessary to remove the connecting rods from the crankshaft.**

1. Remove the liner, using tool T3880315, as described later in this section.

NOTE:

- **A small number of engines were built without piston orientation arrows. In such cases, mark the piston crown before removing from the connecting rod.**

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



Removing the Gudgeon Pin Circlip

3. Remove the gudgeon pin by pushing the pin through the piston and rod toward the side from which the circlip was removed.

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

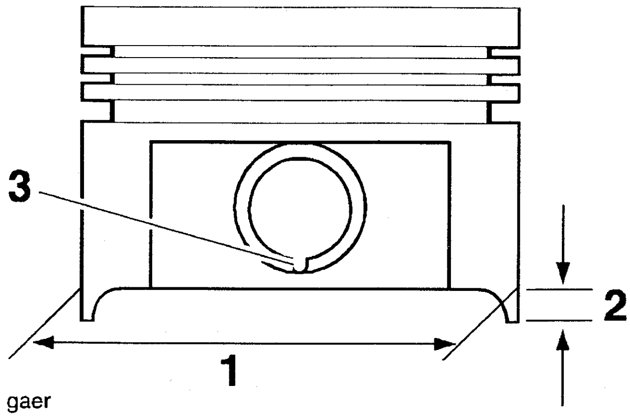
NOTE:

- **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.**

4. Piston rings must be removed from the piston using hand pressure only.

Piston Wear Check

1. Measure the piston outside diameter, 5 mm up from the bottom of the piston and at 90° to the direction of the gudgeon pin.



1. Piston Outside Diameter

2. Measurement Point (5mm Up The Piston Skirt)

3. Circlip Removal Groove

Piston outside diameter – 885cc engine

Cylinders 1 & 3:	**75.96 – 75.98 mm**
Cylinder 2:	**75.97 – 75.96**

Piston outside diameter – 955cc engine

Cylinders 1 & 3:	**78.96 – 78.98 mm**
Cylinder 2:	**78.97 – 78.96**

Replace the piston if the measured diameter falls outside the specified limit.

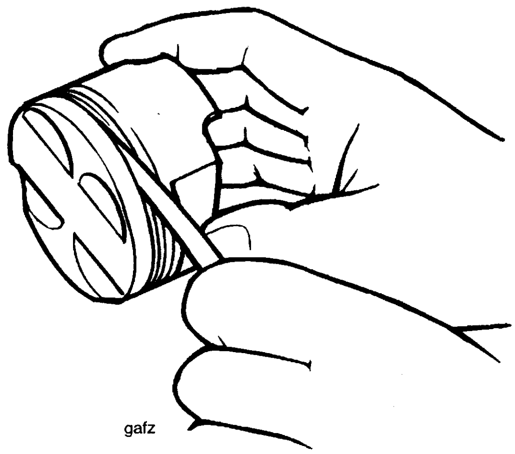
Piston Rings/Ring Grooves

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.



Piston Ring to Ring Groove Clearance Check

Piston ring/Groove Clearance – both engines

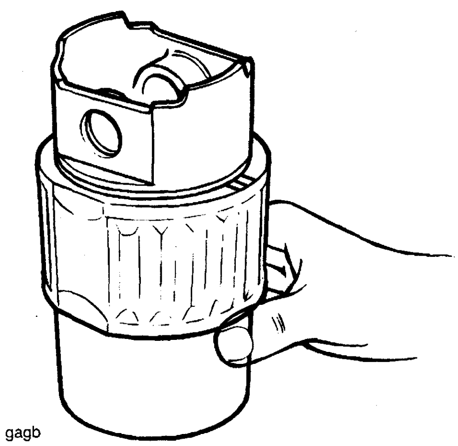
Top	**0.02 – 0.06 mm**
Second	**0.02 – 0.06 mm**

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 full circumference of cylinder.



Aligning Piston Rings using the Piston

3. Remove the piston and measure the gap between the ends of the piston ring using feeler gauges.

Piston Ring End Gap Tolerances – 885cc engine

Top	**0.15 – 0.30 mm**
Second	**0.26 – 0.41 mm**
Oil Control	**0.20 – 0.70 mm**

Piston Ring End Gap Tolerances – 955cc engine

Top	**0.15 – 0.30 mm**
Second	**0.30 – 0.45 mm**
Oil Control	**0.20 – 0.70 mm**

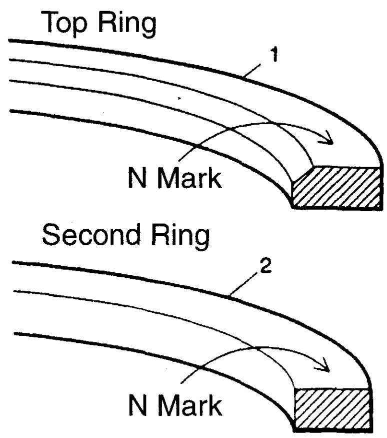
4. If the ring gap is found to be too small, the ring end must be carefully filed until the correct gap is achieved. If the gap is too large, replace the rings with a new set. If the gap remains too large with new rings fitted, both the piston and liner must be replaced.

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 top ring has a shiny grey appearance.**
- **The second ring upper surface is also marked 'N' 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

2. Fit the piston onto the connecting rod with the arrow on the piston crown facing AWAY from the oil hole in the connecting rod.

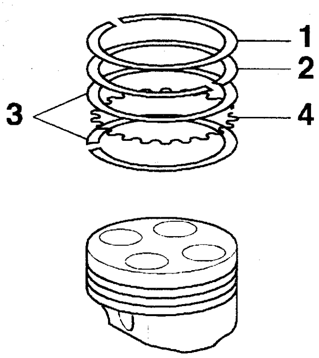
3. Align the small end in the connecting rod with the gudgeon pin hole in the piston.

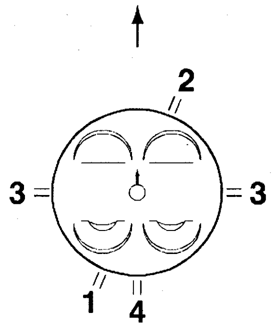
4. Lubricate the piston, small end and gudgeon pin with clean engine oil and fit the gudgeon pin.

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





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 & 3 o'clock positions (one in each position).**

7. Fit the piston into the liner using a gentle rocking motion to engage the rings in the bore.

Cylinder Wear

Measure the inside diameter of each cylinder using an internal micrometer or similar accurate measuring equipment.

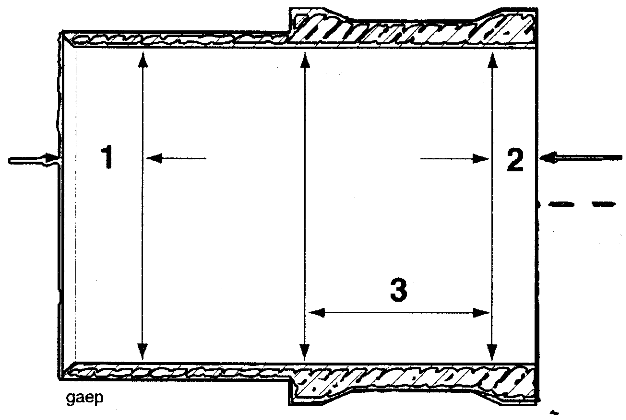
Cylinder bore diameter – 885cc engine

Standard:	**75.985 – 76.030 mm**
Service limit:	**76.050 mm**

Cylinder bore diameter – 955cc engine

Standard:	**78.985 – 79.030 mm**
Service limit:	**79.050 mm**

1. Check the diameter at points 1, 2 and 3.



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

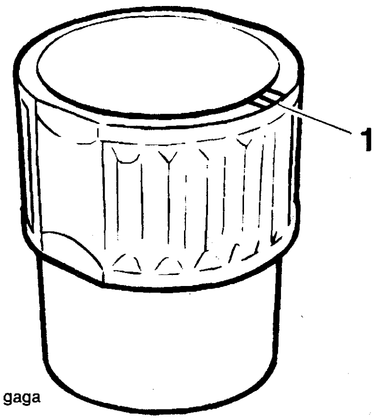
2. If any reading is outside the specified limits, replace the liner and piston as an assembly.

CYLINDER LINERS

Removal (Engine In Or Out Of The Frame)

NOTE:

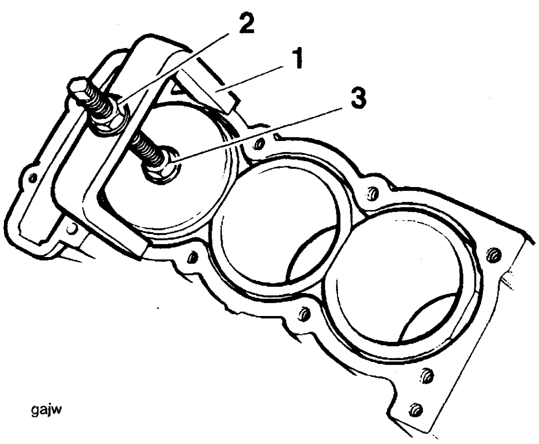
- **Cylinder liners can be removed with engine in the frame, after the cylinder head has been removed.**



Paint Mark

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

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



1. Tool T3880315

2. Extraction nut

3. Locking nut

3. Check that the locking nut on tool T3880315 is loose, then fully unscrew the extraction nut.

CAUTION: The cylinder liners are made of aluminium alloy and therefore can be easily damaged. Handle with care, ensuring the cylinder bore is not scratched.

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.

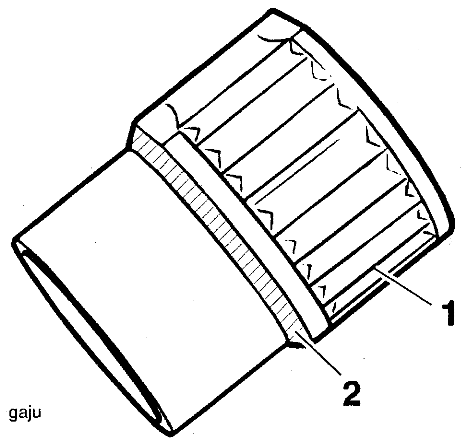
6. Turn the locking nut anticlockwise to release the liner.

NOTE:

- **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.**

Installation

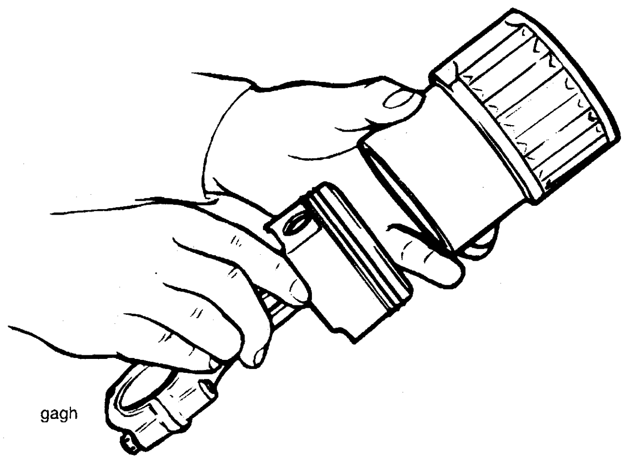
1. Thoroughly clean the liner removing all traces of old silicone sealer.
2. Remove all traces of sealer from the crankcase bores.
3. Apply silicone sealer to the liner to crankcase mating face.



1. Liner

2. Sealer Area

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



1. Piston

2. Liner

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.

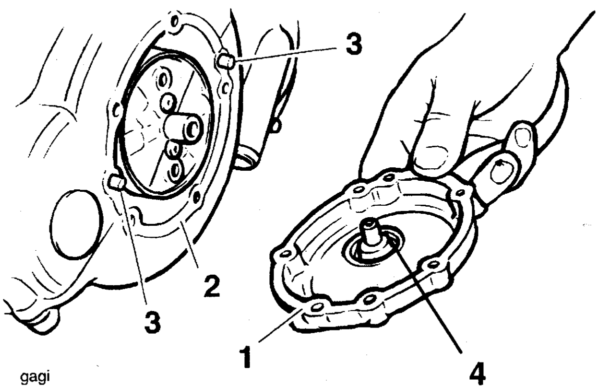
NOTE:

- **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 re-applied.**

LEFT HAND CRANKSHAFT COVER

The left hand crankshaft cover is fitted, on the inside face, with a lip type seal. The lip seal prevents oil from entering the outlet port for the crankcase gases.

Under normal circumstances it should not be necessary to disturb the cover or the seal. However, should the cover require removal, the following procedure must be used.



1. Left Hand Engine Cover

2. Gasket face

3. Dowels

4. Mandrel

Cover Removal/Refit

1. If the cover and seal are to be replaced without renewing either component, a mandrel **MUST** be inserted into the seal to prevent seal distortion.

NOTE:

- **The mandrel must remain in the seal from immediately after removal until the point where the cover is to be fitted.**

2. When refitting the cover, remove the mandrel only at the point when the cover assembly is to be refitted and ensure that the seal and breather shaft are clean and dry.

3. Fit the cover assembly taking great care not to damage the seal during fitment and alignment of the cover.

> **CAUTION: If the seal is damaged or is suspected of becoming damaged, it must be replaced.**
> **Failure to replace a damaged seal will result in high engine oil consumption, smoke emissions and possible engine damage.**

> **CAUTION: The engine must not be started or turned over for a minimum of 15 minutes after assembly to allow the seal to fully expand onto the breather shaft.**
> **Failure to allow time for seal expansion will result in high engine oil consumption, smoke emissions and possible engine damage.**

Seal/Cover Replacement

1. Remove the cover and carefully lever the seal from the cover.

NOTE:

- **A new seal is supplied with a mandrel already fitted.**

2. Without removing the mandrel supplied with the seal, press the new seal into the seal recess in the cover to a point where it is just below the face of the recess.

> **CAUTION: The seal must be kept level during and after fitment. A non-level seal will cause high engine oil consumption, smoke emissions and possible engine damage.**

3. When refitting the cover, remove the mandrel only at the point when the cover assembly is to be refitted, and ensure that the seal and breather shaft are clean and dry.

4. Fit the cover assembly taking great care not to damage the seal during fitment and alignment of the cover.

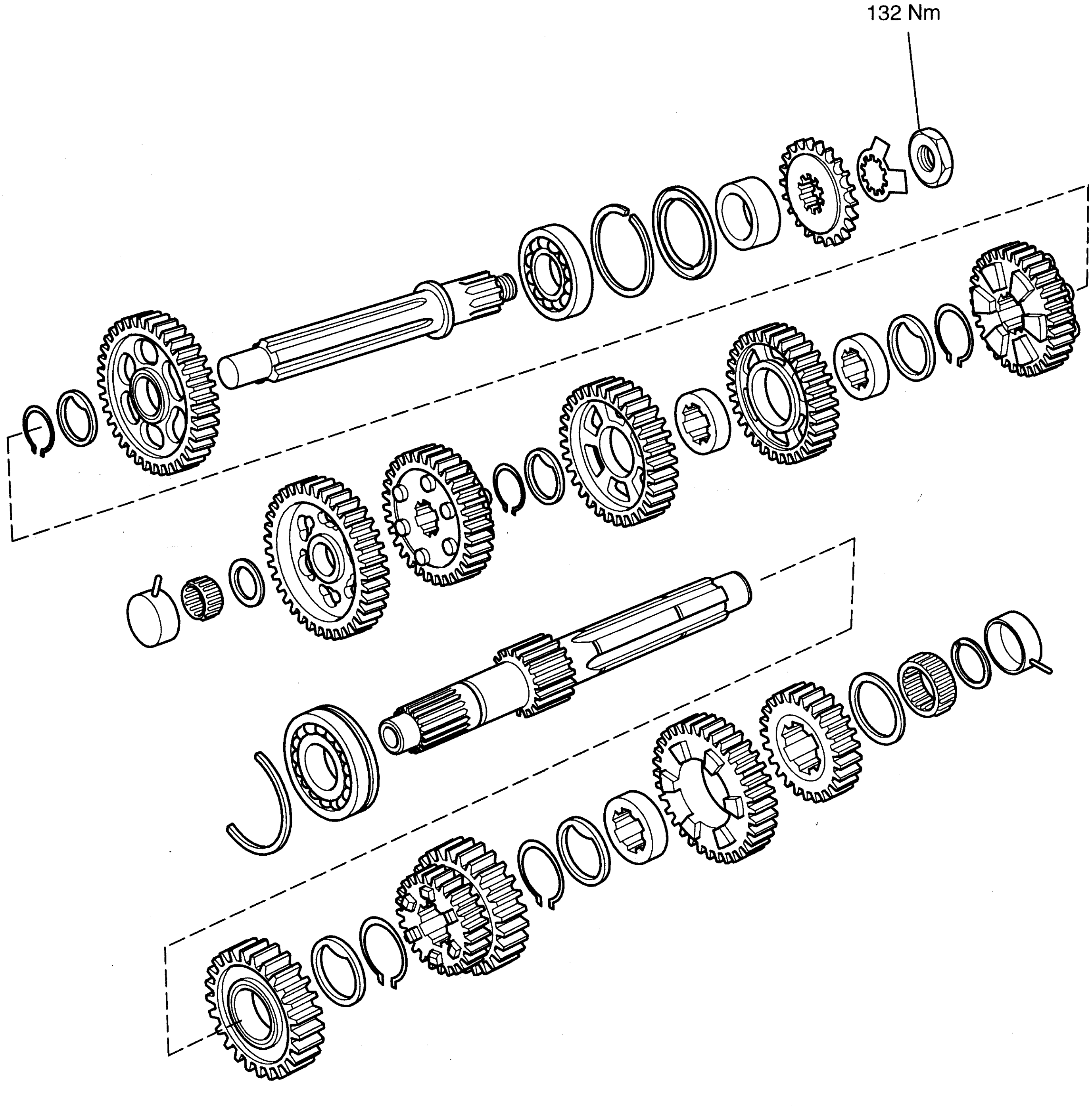
> **CAUTION: If the seal is damaged or is suspected of becoming damaged, it must be replaced.**
> **Failure to replace a damaged seal will result in high engine oil consumption, smoke emissions and possible engine damage.**

> **CAUTION: The engine must not be started or turned over for a minimum of 15 minutes after assembly to allow the seal to fully expand onto the breather shaft.**
> **Failure to allow time for seal expansion will result in high engine oil consumption, smoke emissions and possible engine damage.**

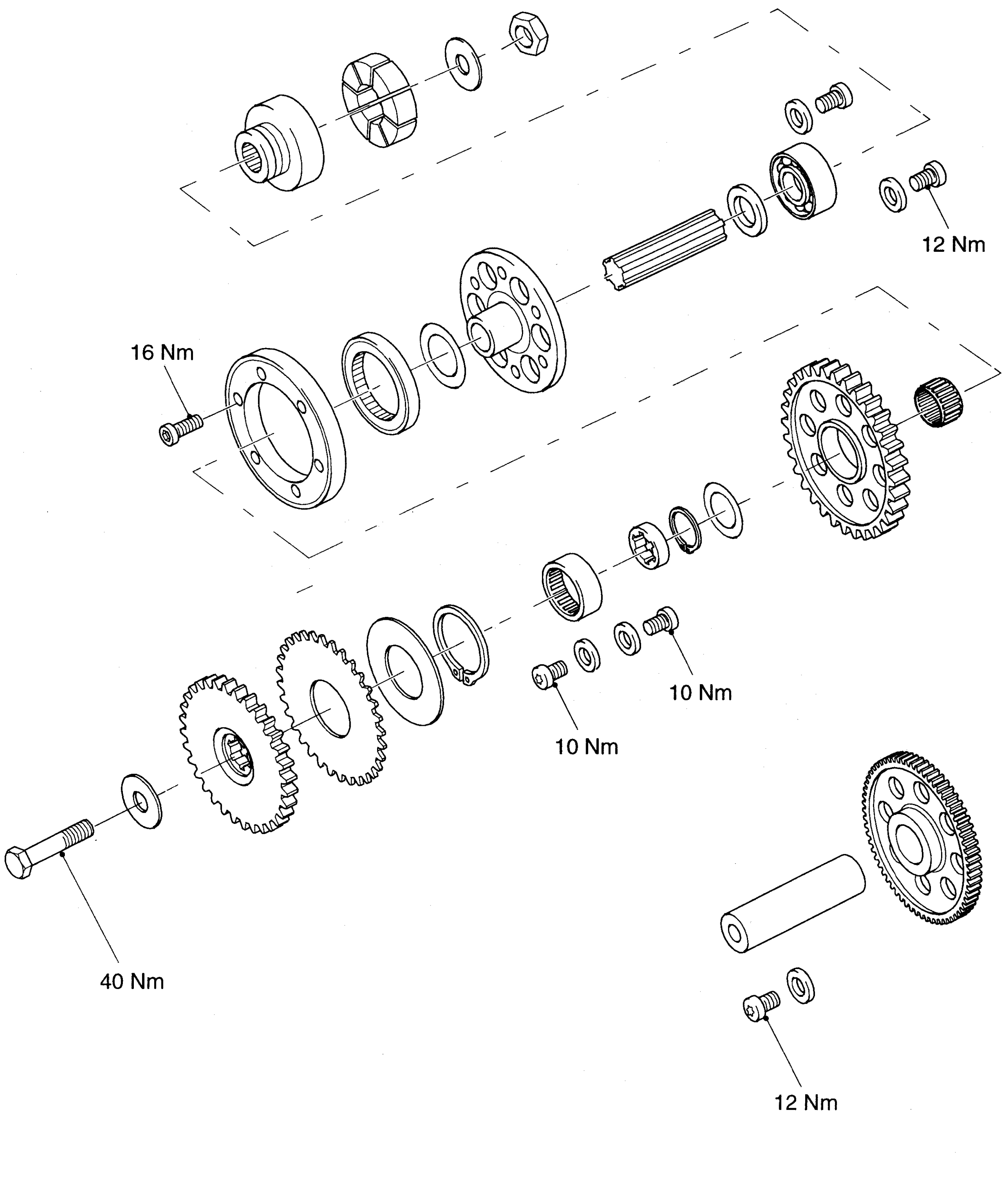
TRANSMISSION

CONTENTS

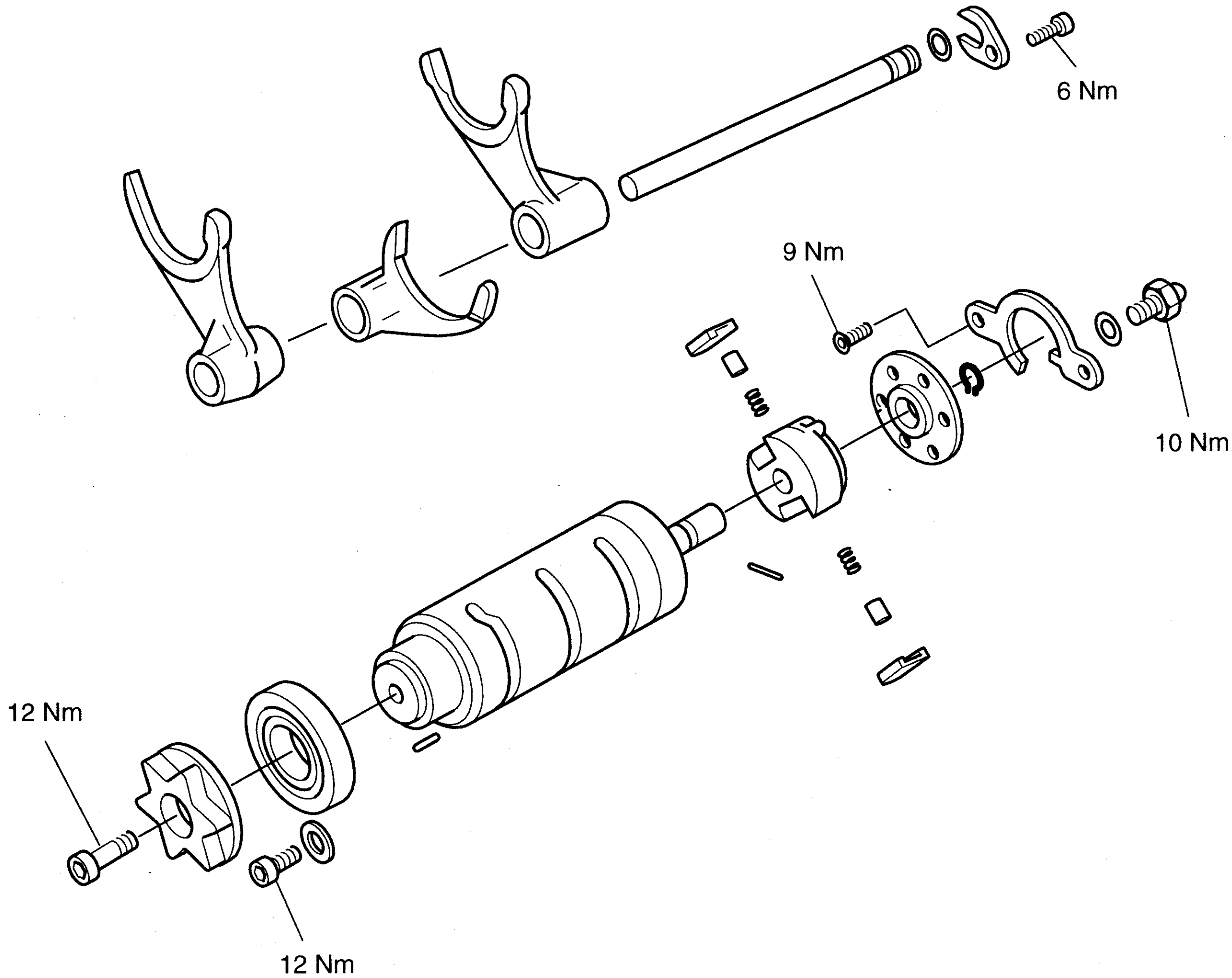
Exploded View, Input and Output Shafts



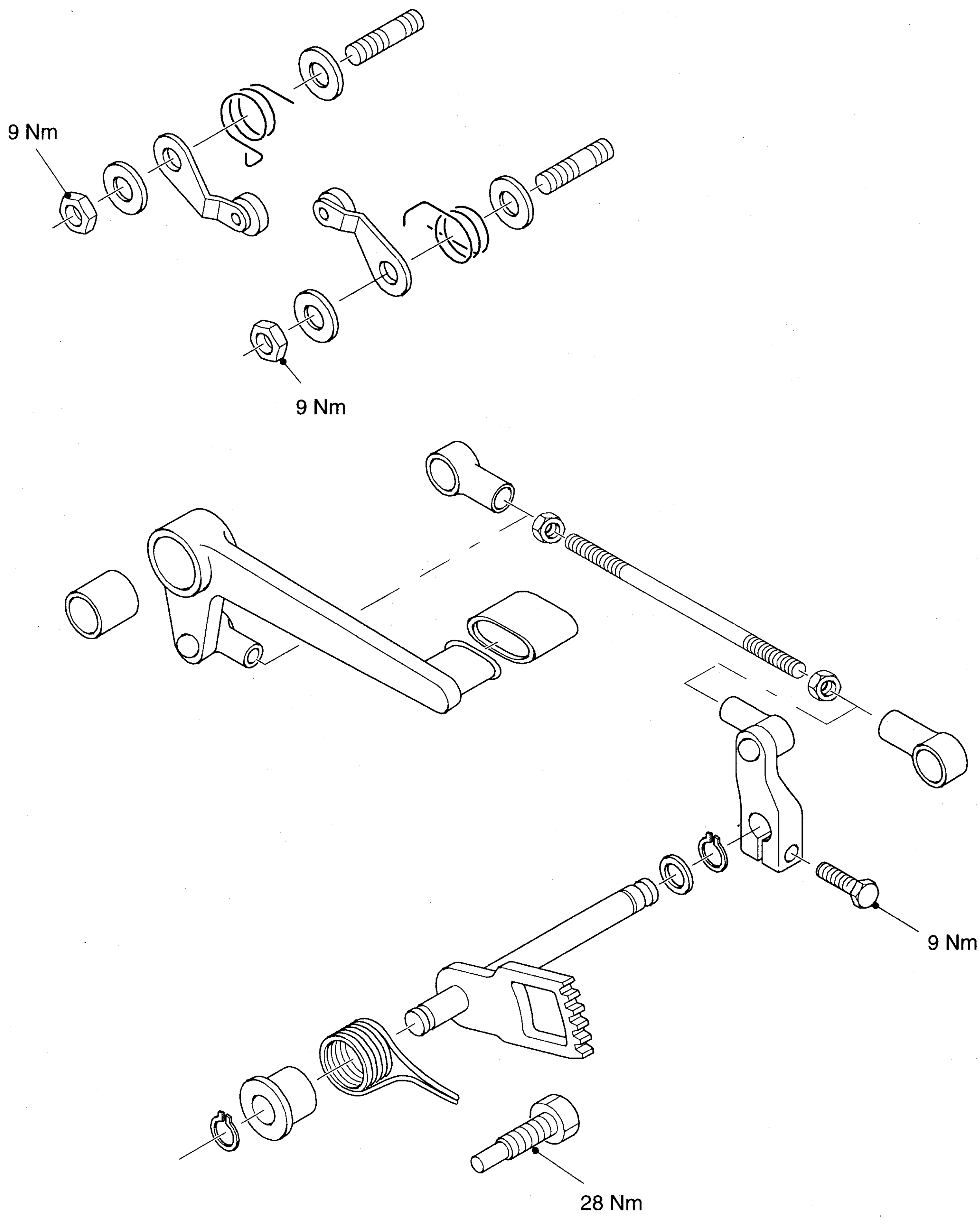
Exploded View, Auxiliary Gears



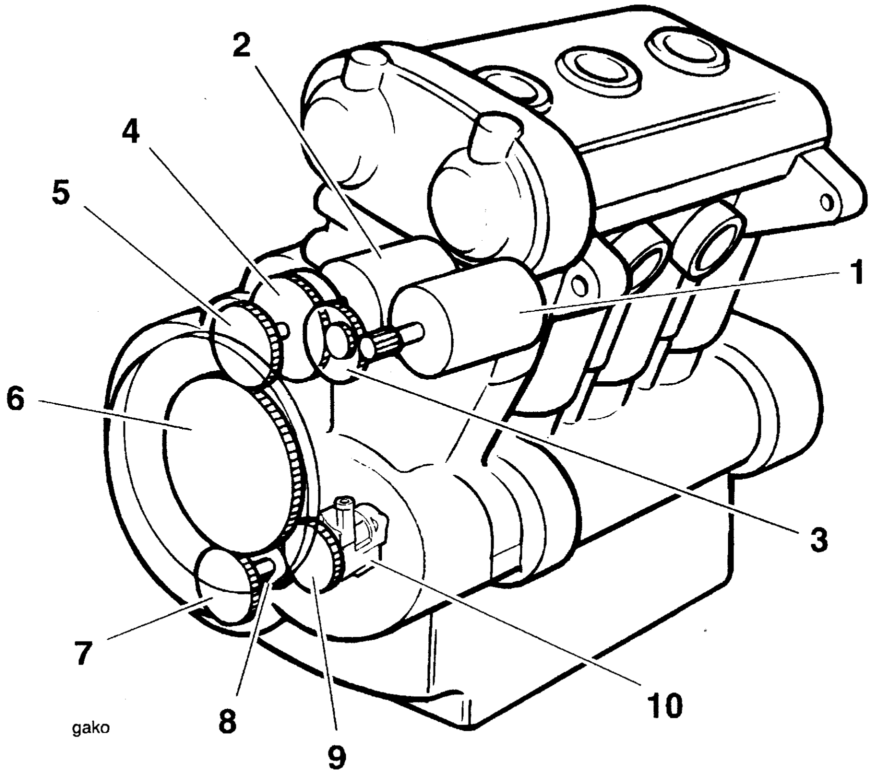
Exploded View, Selector Mechanism



Exploded View, Gear Pedal etc.



AUXILIARY GEARS



1. **Starter Motor**
2. **Alternator**
3. **Starter Idler Gear**
4. **Sprag Clutch**
5. **Alternator Drive Gear**
6. **Clutch Auxiliary Gear**
7. **Oil Pump Auxiliary Gear**
8. **Oil Pump Intermediate Gear**
9. **Oil Pump Drive Gear**
10. **Oil Pump**

TRANSMISSION DESCRIPTION

All models are fitted with a six speed, constant mesh transmission. All gears are straight cut and no synchromesh system is used. Selection of gears is via a grooved drum which actuates three selector forks within the transmission. The forks remain in constant contact with the gear hubs at all times. The final drive ratio, that is the ratio between the transmission output sprocket and the rear wheel sprocket, is variable. The change in ratio is brought about by selection of front and rear sprockets with different numbers of teeth.

An integral part of the transmission is the auxiliary gears which drive the following:

- Water pump
- Oil pump
- Alternator
- Starter Motor

Auxiliary Gears – Operation

Engine Cranking

The starter motor, which is fitted in the upper crankcase, drives an idler gear in constant mesh with the sprag clutch. The sprag clutch is mounted on the alternator shaft. When the starter is energised, the sprag clutch action allows the alternator shaft on which it is mounted to be driven by the starter idler gear. The alternator shaft transmits drive to the crankshaft via the alternator drive gear and clutch auxiliary drive gear.

Engine Started

When the engine starts, and the starter button is released, the crankshaft drives the clutch and alternator drive gears causing the alternator shaft to rotate.

Because the alternator shaft and alternator are now being driven, under engine power, by the alternator drive gear (as opposed to being driven by the starter idler gear), the sprag clutch free-wheels and the starter idler gear does not turn.

Oil and Water Pump Drives

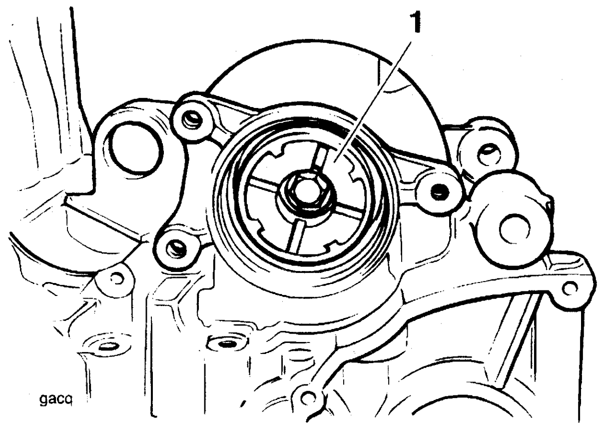
Drive to both the oil and water pumps is supplied by a gear and shaft in mesh with the clutch auxiliary gear.

The oil pump auxiliary gear is connected to the oil pump by a shaft, to which an intermediate gear is fitted. The intermediate gear drives the oil pump drive gear thus driving the oil pump. At the other side of the oil pump, a slotted shaft extends, from which the water pump is directly driven.

ALTERNATOR SPINDLE

Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the lower fairings (if fitted).
3. Remove the body side panels.
4. Remove the three bolts securing the alternator to the crankcase noting the position of the earth lead under one of the alternator bolt holes.
5. Disconnect and remove the alternator.
6. Remove the alternator rubber shock absorbers from the alternator drive housing.



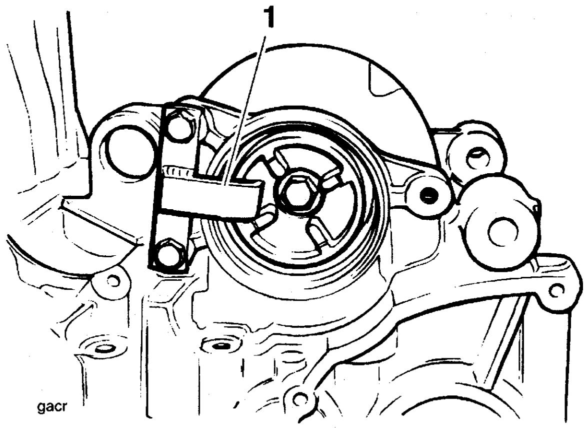
1. Alternator Drive Rubber Shock Absorbers

7. Position a suitable container beneath the clutch cover to collect engine oil. Remove the clutch cover and the complete clutch assembly as described in the clutch section.

> **WARNING: The oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.**

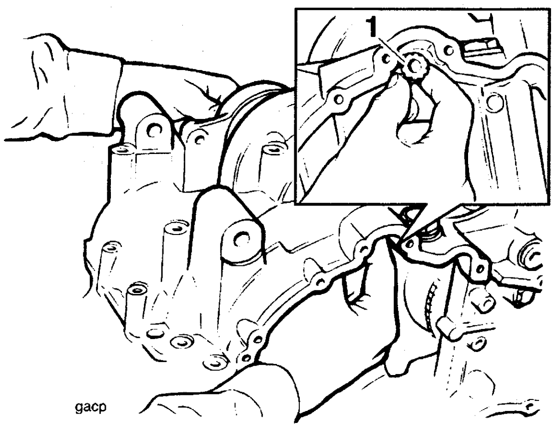
> **WARNING: Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.**

8. Drain the coolant as described in the cooling section then remove the water elbow from the rear of the upper crankcase.
9. Remove the starter motor.
10. Prevent the alternator shaft from turning by fitting service tool 3880040-T0301 to the front alternator mounting-bolt holes.



1. Service Tool 3880040-T0301

11. Hold the nut in the alternator drive housing and remove the bolt securing the alternator drive gear (in the clutch housing) to the alternator spindle. Remove the gear.
12. Collect the nut from the drive housing end and remove the service tool.
13. Using a new spindle, and keeping the new spindle in constant contact with the original, push the spindle out of the crankcase in the direction of the alternator side. **Leave the new spindle in place.**



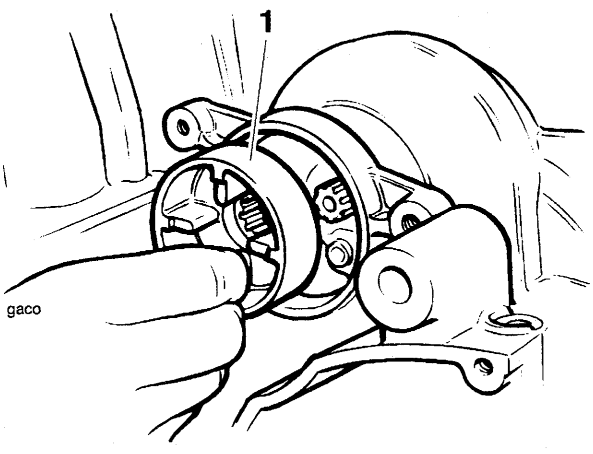
1. New Spindle

> **CAUTION: Ensure that the new spindle is kept in constant contact with the old item during the removal process.**
>
> **If constant contact is not maintained, internal components may become displaced and it may become necessary to strip the engine to recover them.**

14. Remove the alternator drive housing from the old spindle.

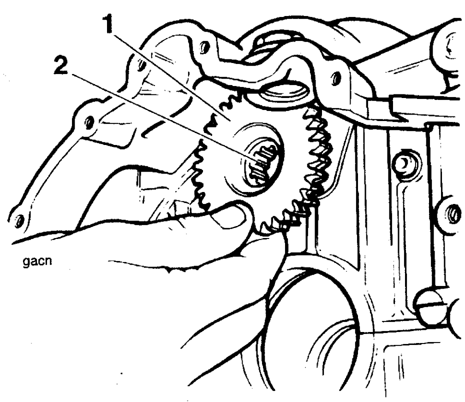
Installation

1. Assemble the alternator drive housing to the alternator end of the new spindle.



1. Alternator Housing

2. Check that the splined spacer is in place on the clutch side and assemble the alternator drive gear to the clutch housing end of the spindle. Fit a new bolt ***from the clutch side***.



1. Alternator Drive Gear
2. Splined Spacer

NOTE:

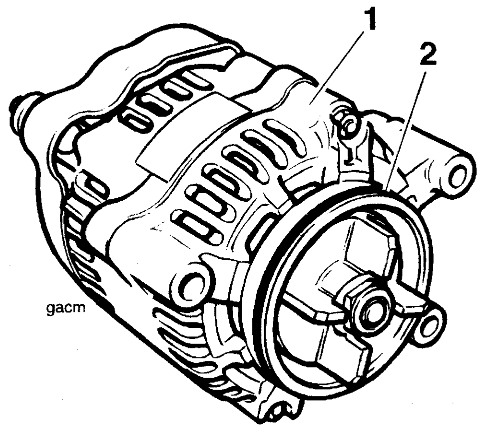
- **The alternator drive gear must be fitted with the backlash eliminator gear facing inwards.**

3. Fit tool 3880040-T0301 to the front alternator mounting-bolt holes.

4. Fit a new nut to the alternator drive housing end where the bolt head extends through. Hold the nut and tighten the bolt to **40 Nm.**

5. Remove tool 3880040-T0301 and refit the rubber shock absorbers to the alternator drive housing.

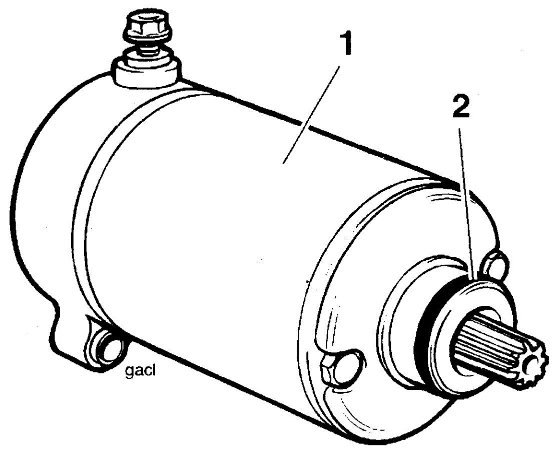
6. Check the alternator 'O' ring for damage and distortion. Replace as necessary.



1. Alternator
2. 'O' ring

7. Refit the alternator and ensure that the earth strap is correctly located under the alternator bolt. Tighten the alternator bolts to **20 Nm.**

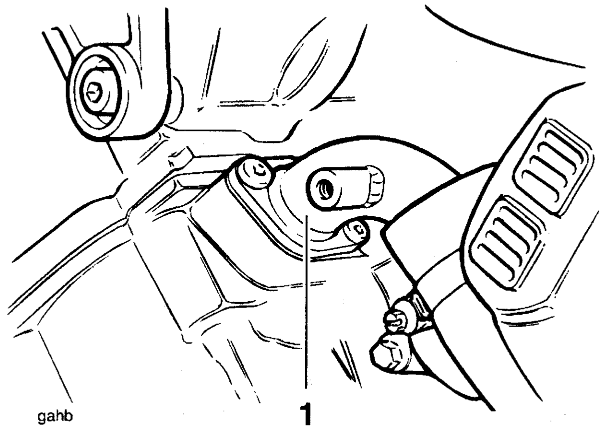
8. Check the starter motor 'O' ring for damage. Replace as necessary.



1. Starter
2. 'O' ring

9. Refit the starter motor tightening the starter bolts to **10 Nm.**

10. Refit the water elbow to the upper crankcase using a new gasket. Tighten the water elbow bolts to **12 Nm.**



1. Water Elbow

11. Refill the cooling system as described in the cooling section.
12. Refit the clutch and clutch cover as detailed in the clutch section.
13. Top up the engine with the correct grade of engine oil.
14. Reconnect the alternator multi-plug.
15. Refit any bodywork previously removed.
16. Reconnect the battery, positive (red) lead first.
17. Refit the seat.

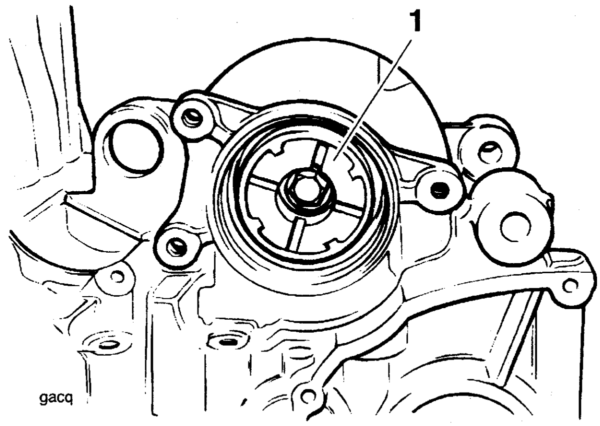
SPRAG CLUTCH

NOTE:

- **In order to remove the sprag clutch, the engine must first be removed from the frame and the two halves of the crankcase separated.**

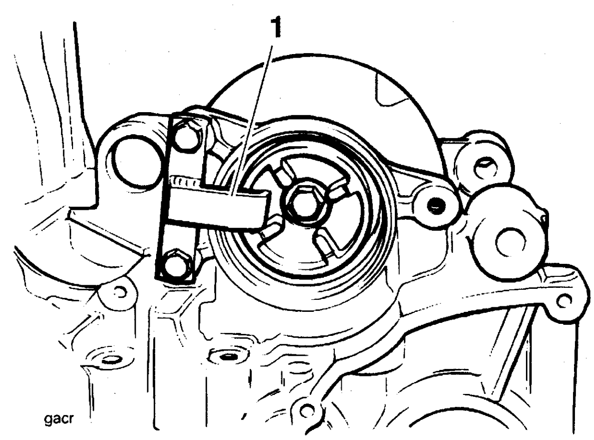
Removal

1. Remove the water elbow from the rear of the upper crankcase.
2. Remove the starter motor.
3. Remove the input and output shafts from the crankcase.
4. Remove the alternator.
5. Remove the alternator rubber shock absorbers from the alternator drive housing.



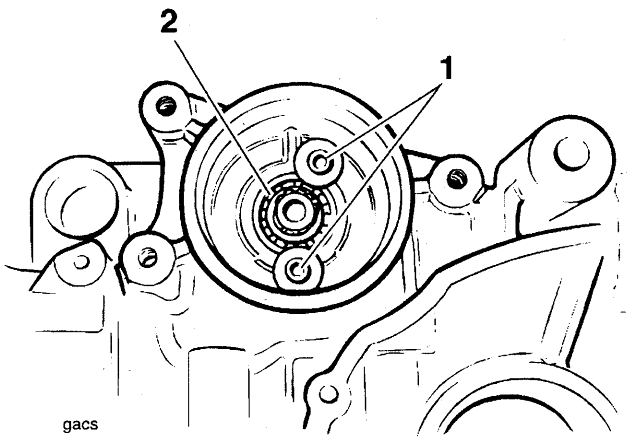
1. Alternator Drive Rubber Shock Absorbers

6. Prevent the alternator shaft from turning by fitting service tool 3880040-T0301 to the front alternator mounting bolt holes.



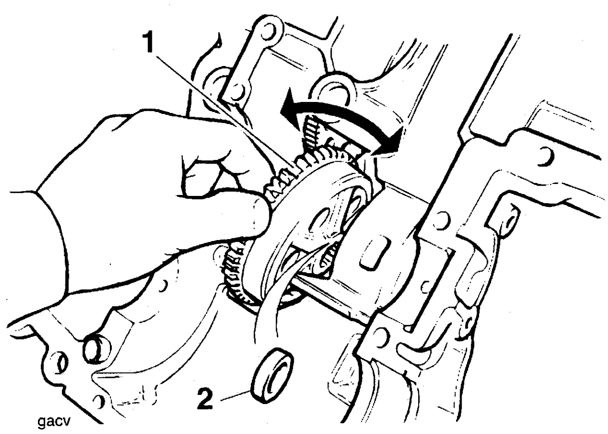
1. Service Tool 3880040-T0301

7. Hold the nut at the drive housing end and remove the bolt securing the alternator drive gear (in the clutch housing) to the alternator spindle.
8. Remove the gear.
9. Remove service tool 3880040-T0301.
10. Remove the alternator spindle, drive and nut from the alternator side of the crankcase.
11. Working from the alternator side of the crankcase, release the two bolts and washers which secure the alternator shaft bearing to the crankcase.



1. Bearing Retaining Bolts
2. Bearing

12. Gently move the sprag clutch from side to side to displace the alternator shaft bearing. Remove the sprag clutch and collect the spacer from inside the crankcase.

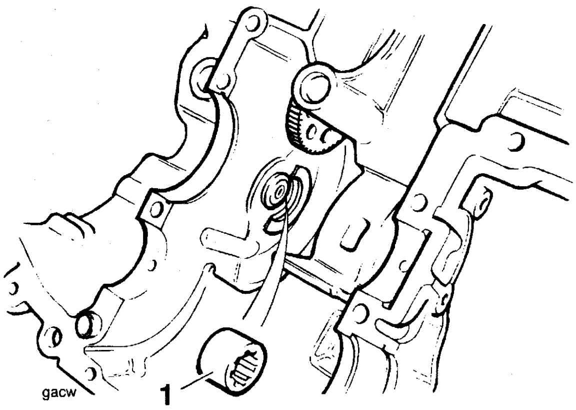


1. Sprag Clutch
2. Spacer

NOTE:

- **The bearing is not an interference fit, no force is required to move the bearing within the crankcase.**

13. Remove the splined spacer from the clutch side of the crankcase.



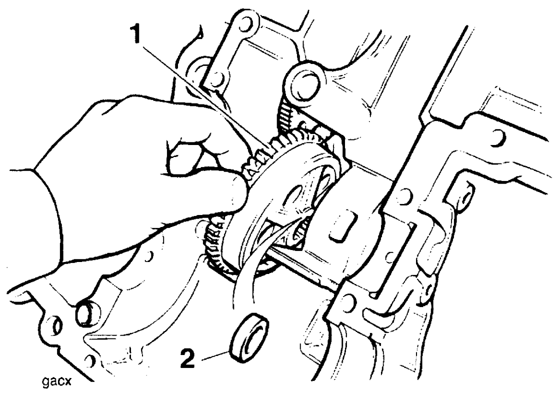
1. Splined Spacer

Inspection

1. Check all bearings for overheating (blue areas), wear and non-smooth operation. Replace any suspect components.
2. Check the sprag clutch for smooth, free movement in one direction only. Check the sprag gear for damaged or broken teeth. Replace if necessary.
3. Check the spindle for damage, pitting etc. Replace if necessary.

Assembly

1. Refit the splined sleeve to the alternator spindle bearing on the clutch side of the crankcase.
2. Refit the spacer (alternator side) and sprag clutch assembly.



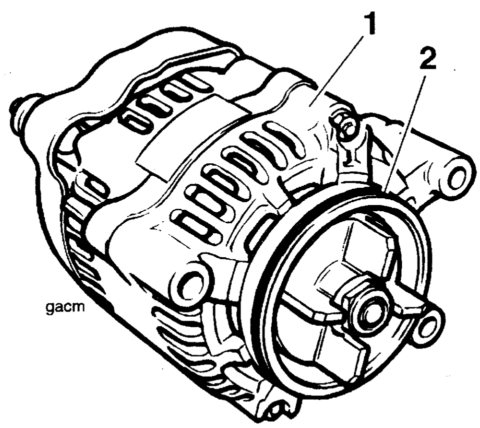
1. Sprag Clutch
2. Spacer

3. Refit the bearing to the alternator side of the crankcase and tighten the two retaining screws to **12 Nm.**
4. Refit the alternator spindle and drive taking care to align all components during installation.
5. Fit service tool 3880040-T0301 to the front alternator mounting bolt holes.
6. Fit the alternator drive gear to the clutch side of the alternator spindle. Use a new bolt ***fitted from the clutch side.***

NOTE:

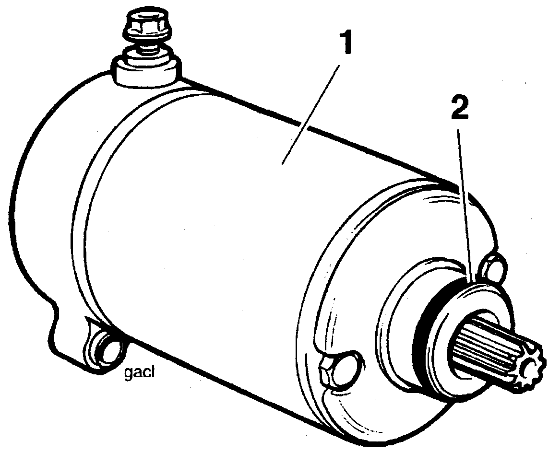
- **The alternator drive gear must be fitted with the backlash eliminator gear facing inwards.**

7. Fit a new nut to the alternator drive housing end where the bolt head extends through. Hold the nut and tighten the bolt to **40 Nm.**
8. Remove tool 3880040-T0301.
9. Check the alternator 'O' ring for damage and distortion. Replace as necessary.



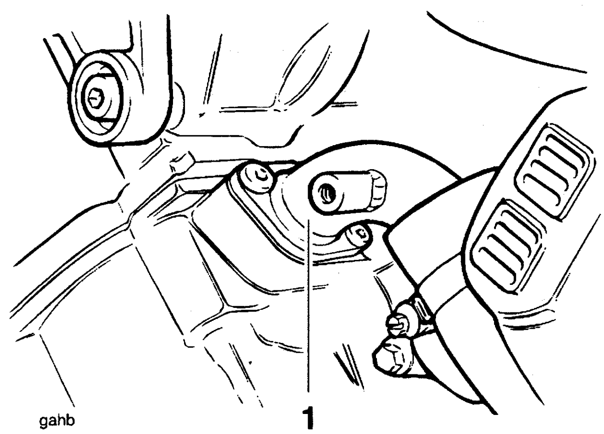
1. Alternator
2. 'O' ring

10. Refit the alternator and ensure that the earth strap is correctly located under the alternator bolt. Tighten the alternator retaining bolts to **20 Nm.**
11. Check the starter motor 'O' ring for damage. Replace as necessary.



1. Starter
2. 'O' ring

12. Refit the starter motor tightening the starter bolts to **10 Nm.**
13. Refit the water elbow to the upper crankcase using a new gasket. Tighten the water elbow bolts to **12 Nm.**

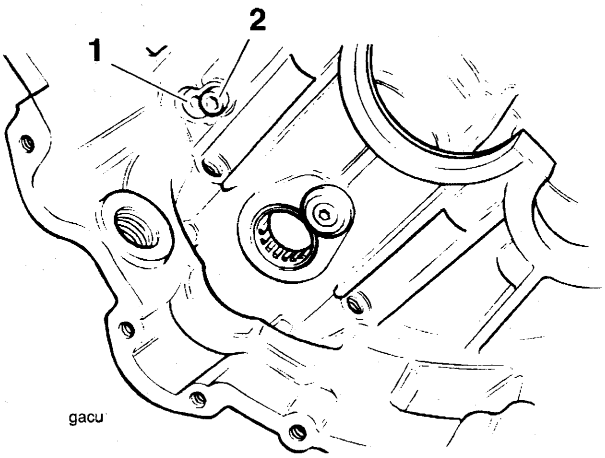


1. Water Elbow

STARTER IDLER GEAR

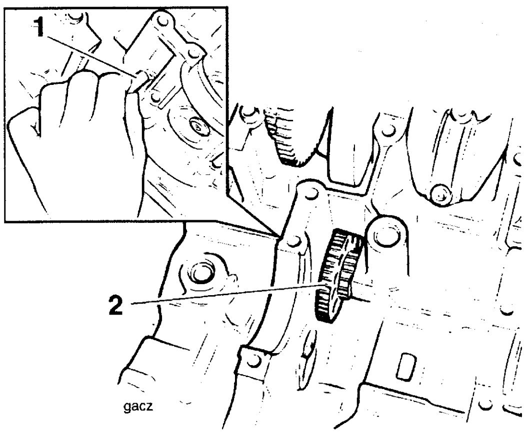
Removal

1. Remove the sprag clutch as described earlier in this section.
2. Remove the screw and washer securing the starter idler gear shaft to the crankcase.



1. Idler Gear Shaft
2. Retaining Screw and Washer

3. Slide the shaft from the crankcase and collect the idler gear.



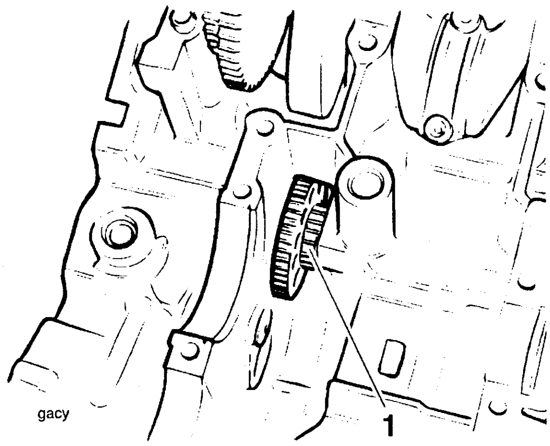
1. Shaft
2. Gear

Inspection

1. Check the spindle for damage, pitting etc. Replace if necessary.
2. Check the gear for broken or damaged teeth, overheating (blue areas) etc. Replace if necessary.

Assembly

1. Position the gear into the crankcase with the smaller gear (which meshes with the sprag clutch) facing inwards.



1. Smaller Gear Facing Inwards

2. Support the gear and install the shaft.
3. Fit the shaft retaining bolt and washer. Tighten the bolt to **12 Nm.**
4. Install the sprag clutch as described earlier in this section.

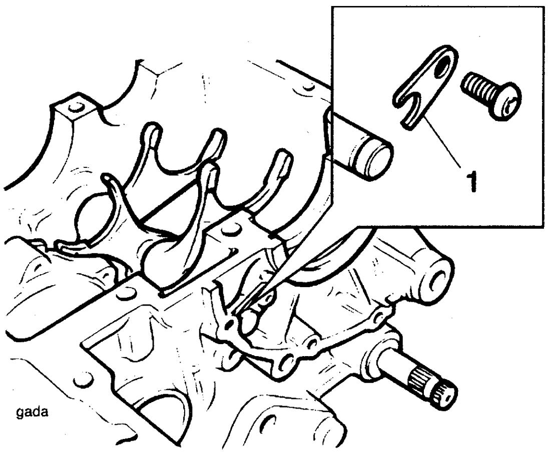
SELECTORS, SELECTOR SHAFT & DRUM

Removal

NOTE:

- **In order to remove the selector mechanism, the engine must first be removed from the frame and the two halves of the crankcase separated.**

1. Remove both the input and output shafts.
2. Remove the capscrew and take out the 'U' shaped keeper plate from the selector shaft.

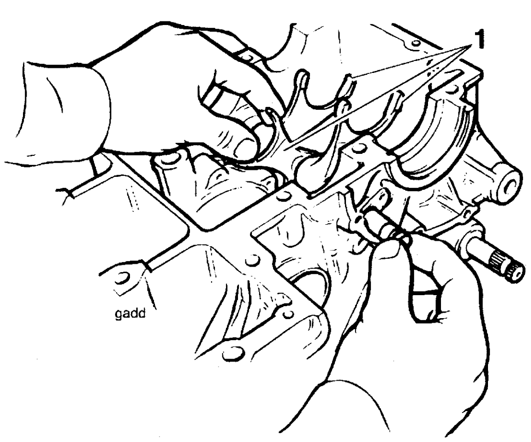


1. Selector Shaft Keeper Plate

NOTE:

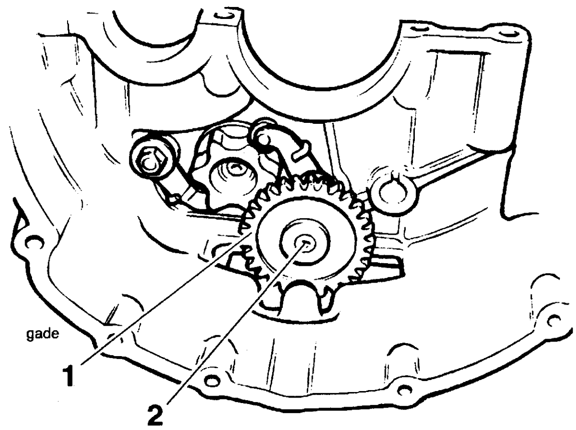
- **To ensure that the selector fork positions are maintained on assembly, mark each fork with felt pen or similar to denote their relative positions.**

3. Using finger pressure, push the selector shaft out of the crankcase in the direction of the keeper plate. Collect each selector fork from the lower crankcase as they are released from the selector shaft.



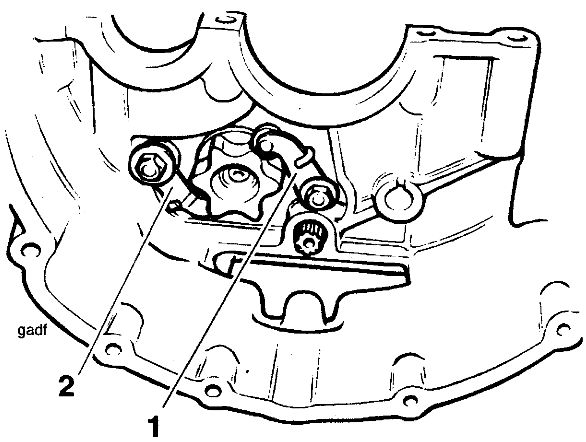
1. Selector Forks

4. Remove the screw securing the oil pump auxiliary gear. Remove the gear from the shaft.



1. Oil Pump Drive Gear
2. Gear Retaining Screw

5. Remove the nuts and washers securing both the neutral and gear detent arms to the lower crankcase.



1. Gear Detent Arm
2. Neutral Detent Arm

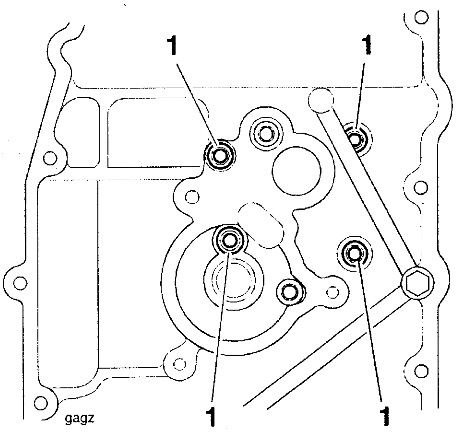
6. Remove the detent arms and springs noting the colour of the detent springs and the position of each component.

NOTE:

- **Detent springs MUST NOT be interchanged. The NEUTRAL spring has a white mark and is fitted rearmost in the crankcase.**

7. Invert the crankcase.

8. Release the screws securing the oil pump to the lower crankcase.



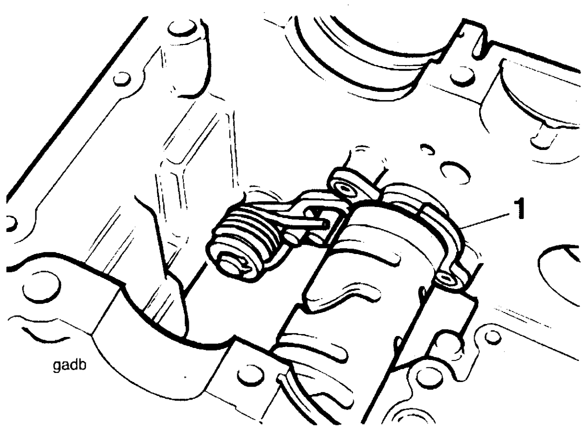
1. Oil Pump Retaining Screws

9. Invert the crankcase.

10. Remove the oil pump from inside the lower crankcase.

11. Remove the oil pressure relief valve.

12. Remove the 2 screws securing the selector drum stop plate to the crankcase. Remove the stop plate.



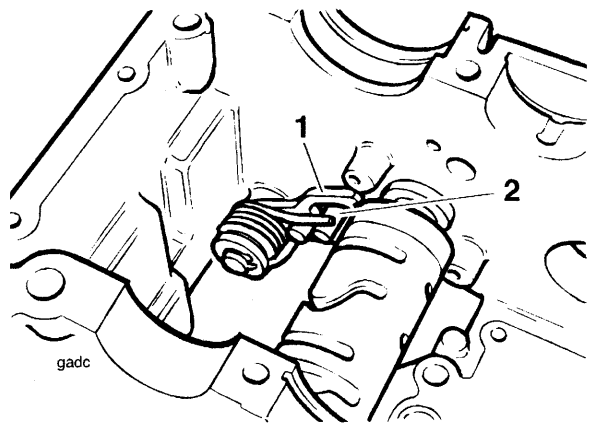
1. Selector Drum Stop Plate

13. Remove the screw securing the detent wheel to the selector drum. Remove the detent wheel.

NOTE:

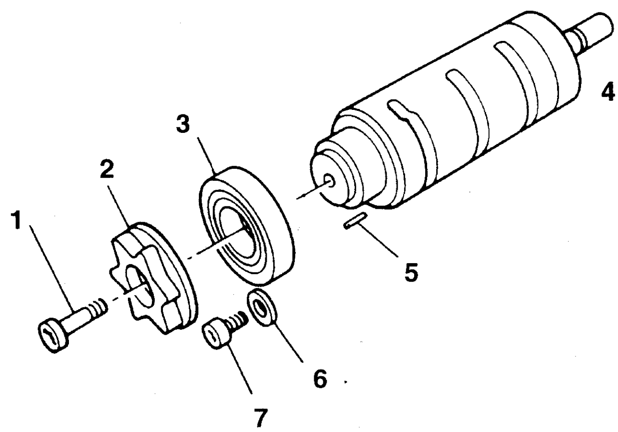
- **The selector drum will not turn through 360° provided the stop plate has been removed.**

14. Remove the spring abutment bolt from the gear quadrant and slide the quadrant out of mesh.



1. Quadrant
2. Abutment Bolt

15. Remove the capscrew from the bearing lock (detent end of the selector drum).



1. Detent Wheel Bolt
2. Detent Wheel
3. Selector Drum Bearing
4. Selector Drum
5. Dowel
6. Bearing Lock
7. Capscrew

16. Remove the selector drum bearing by pushing through from inside the crankcase to outside using hand pressure only.

17. Lift out the selector drum.

Inspection

Examine all components for damage or wear paying particular attention to selector drum and selector forks. Replace any suspect parts.

Gear selector fork thickness:

Standard:	**5.85 mm ± 0.05 mm**
Service Limit:	**5.70 mm ± 0.00 mm**

Gear selector groove width:

Standard:	**6.05 mm ± 0.05 mm**
Service Limit:	**6.25 mm ± 0.00 mm**

Selector fork to groove clearance:

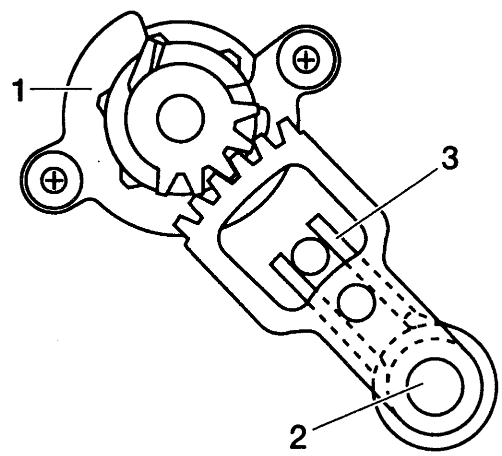
0.55mm max

Installation

1. Locate the selector drum into the crankcase.
2. Lubricate the selector drum bearing with clean engine oil.
3. Support the drum and refit the selector drum bearing. Retain with the bearing lock and capscrew. Tighten the capscrew to **12 Nm.**
4. Align the quadrant with the selector drum.

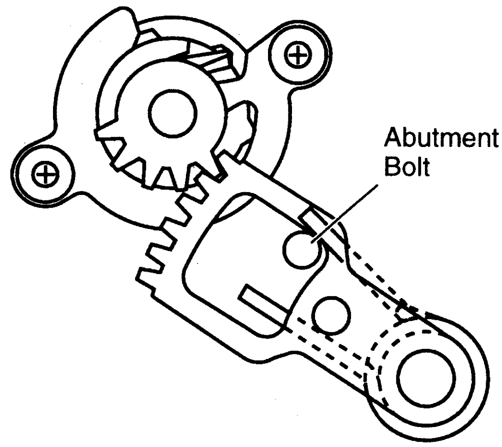
NOTE:

- **Align the gear centre tooth on the selector drum between the centre gear teeth on the gear quadrant.**



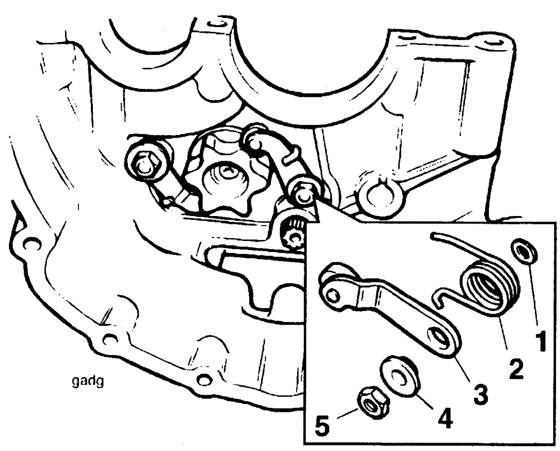
1. Stop Plate
2. Quadrant Shaft
3. Return Spring

5. Fit a new sealing washer to the gearchange abutment bolt and refit it to the lower crankcase. Tighten the bolt to **28 Nm.**
6. Push the mechanism down until the quadrant contacts the abutment bolt (arrowed below). Check that the gear teeth mesh as shown below. Rectify if incorrect by removing and re-engaging the gear quadrant.



Correct Gear Position at Maximum Extension

7. Refit the detent wheel and tighten the centre bolt to **12 Nm.**
8. Apply 'Loctite 242' to the stop plate fixings. Refit the stop plate and tighten the fixings to **9 Nm.**
9. Refit to the studs, the detent arms, springs etc. Ensure that the springs are re-fitted in the same positions as noted during removal. Tighten the nuts to **9 Nm.**

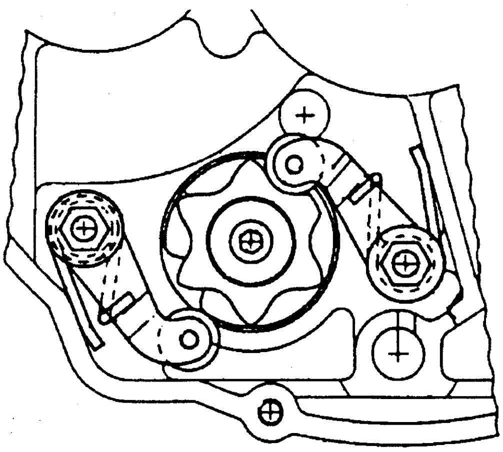


1. Washer
2. Spring
3. Detent Arm
4. Flanged Washer
5. Nut

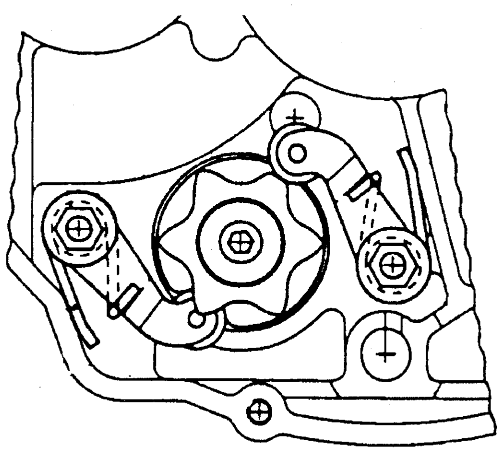
NOTE:

- **Detent springs MUST NOT be interchanged. The NEUTRAL spring has a white mark and is fitted rearmost in the crankcase.**
- **The neutral detent arm is angled in toward the crankcase whereas the gearchange detent arm is angled out towards the detent wheel.**

10. Check that the detent arms correctly align when neutral and all gears are selected. Also check that there is no binding of the arms during operation.

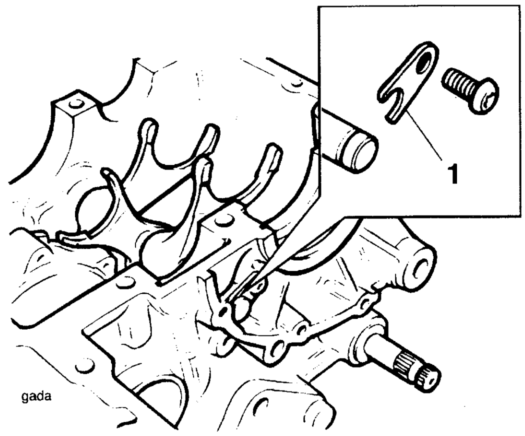


Detent Position 1st. Gear



Detent Position Neutral

11. Apply 'Loctite 270' to the oil pressure relief valve threads and tighten the valve to **15 Nm.**
12. Refit the oil pump and tighten the pump fixings to **12 Nm.**
13. Position the selector forks to the selector drum, in the order noted during removal.
14. Support the selectors and feed the selector shaft through the crankcase and selectors. Fit the shaft keeper plate and tighten the retaining bolt to **6 Nm.**



1. Selector Shaft Keeper Plate

INPUT AND OUTPUT SHAFT ASSEMBLIES

Removal

The input and output shafts can be lifted out of the lower crankcase after the crankcase halves have been separated. For details of crankcase separation, refer to the crankcase section.

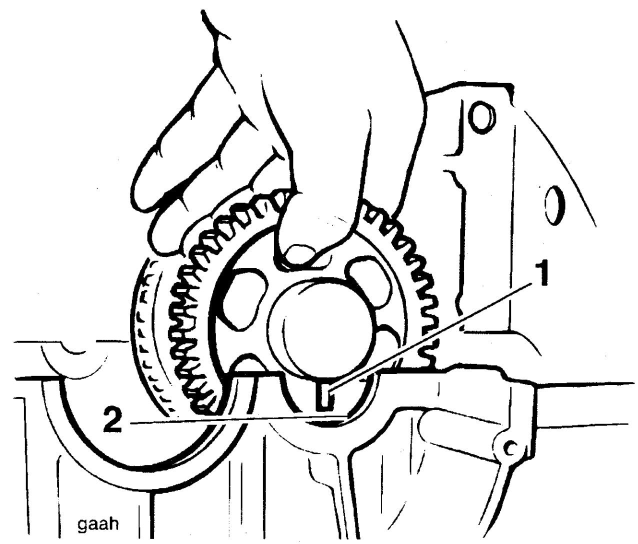
Installation

Ensure the bearing sleeve dowels, oil seal and retaining rings are correctly located when refitting both shafts.

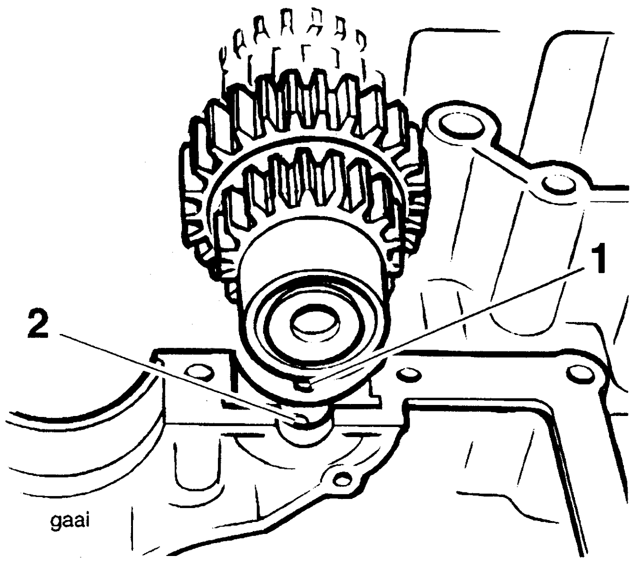
NOTE:

- **Apply a small amount of 'Loctite 648' to the bearing locations in the upper crankcase before fitting the assembled transmission shafts.**

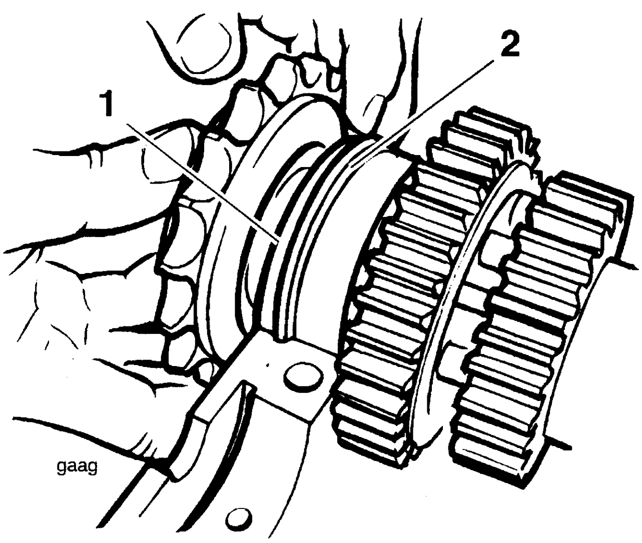
Ensure that all gears are correctly meshed.



1. Output Shaft Dowel (Clutch Side)
2. Crankcase Location



1. Input Shaft Dowel (drive sprocket side)
2. Crankcase Location



1. Oil seal
2. Semi-circular Retaining Ring
(Output Shaft Illustrated)

NOTE:

- **It is recommended that the semi-circular input shaft retaining ring (adjacent to the clutch) is positioned to engage an equal amount in the upper and lower crankcases.**

INPUT SHAFT

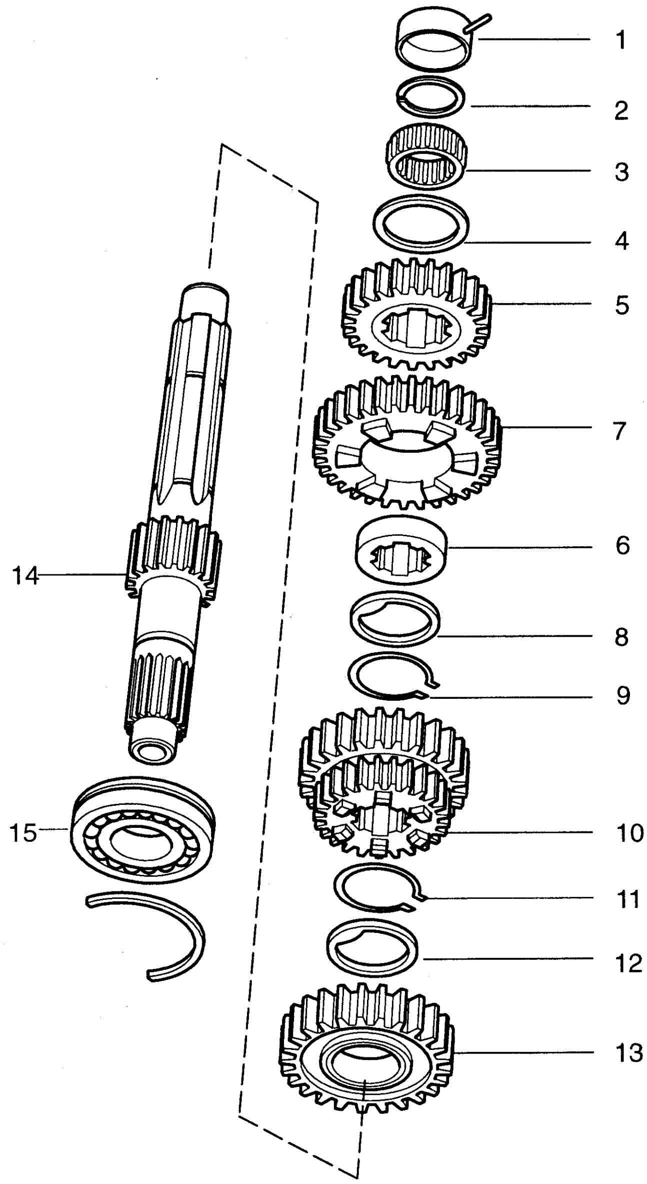
Disassembly

Remove the clutch assembly from the shaft (if not already removed). Working from the opposite end to where the clutch assembly is fitted, dismantle the input shaft as follows:

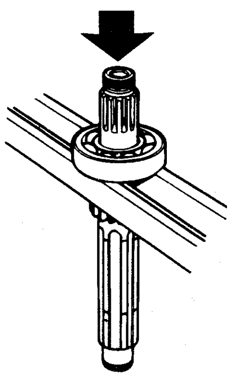
1. Remove the pegged bearing sleeve (1) from the end of the shaft.
2. Detach the circlip (2) from the circlip groove.
3. Slide off the needle bearing (3) and thrust washer (4).
4. Remove second gear (5).
5. Remove sixth gear (7), complete with the splined bush (6) which runs inside the gear.
6. Remove the lipped thrust washer (8) from in front of the circlip between sixth and third/fourth gear.
7. Remove the circlip (9) from the shaft.
8. Slide off the combined third/fourth gear (10).
9. Remove the circlip (11) from in front of fifth gear.
10. Remove the lipped thrust washer (12) adjacent to fifth gear.
11. Remove fifth gear (13).
12. Place the shaft in a press with the input shaft bearing supported on press bars and the clutch end of the shaft facing the press ram. Protect the shaft thread with a thread protector or similar and press the shaft through the bearing.

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. **Bearing Sleeve**
2. **Circlip**
3. **Needle Roller Bearing**
4. **Thrust Washer**
5. **Second Gear**
6. **Splined Bush**
7. **Sixth Gear**
8. **Thrust Washer**
9. **Circlip**
10. **Third/Fourth Gear**
11. **Circlip**
12. **Thrust Washer**
13. **Fifth Gear**
14. **Input Shaft**
15. **Input Shaft Bearing**



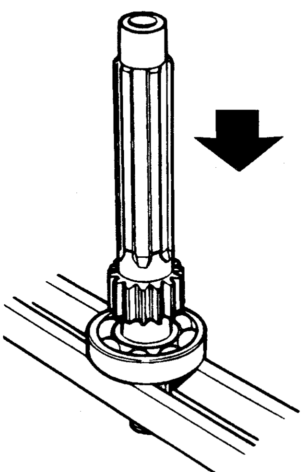
1. Pressing Off The Input Shaft Bearing

Assembly

NOTE:

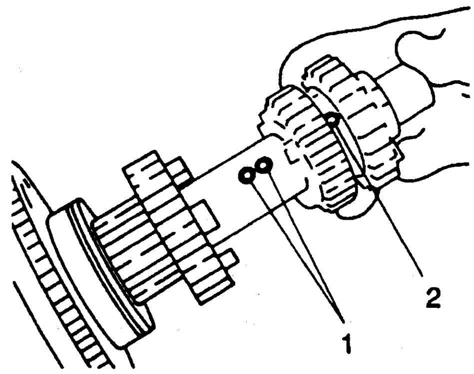
- **Lubricate each gear and bush with clean engine oil during assembly.**
  Examine all gears, bearings and sleeves for damage, chipped teeth and wear beyond the service limits. Replace all suspect components and always use new circlips to assemble the shaft.

1. Place the input shaft bearing on press bars ensuring the **inner** race of the bearing is supported by the bars and the circlip groove is pointing **upwards**. Position the mainshaft to the bearing with the **clutch end pointing downwards** through the bearing. Press the shaft through the bearing until the bearing comes into contact with the fixed gear on the shaft. <u>OBSERVE THE WARNING FOLLOWING PARAGRAPH 12 ON THE PREVIOUS PAGE REGARDING THE DANGERS OF USING A PRESS</u>



Pressing On the Input Shaft Bearing

2. Fit fifth gear (13) to the input shaft with the dog teeth pointing away from the input shaft bearing.
3. Slide on the thrust washer (12).
4. Fit a new circlip (11) to the input shaft ensuring that the clip is correctly located in the circlip groove.
5. Fit the combined third/fourth gear (10) with the smaller gear facing toward fifth gear. Ensure that the double oil hole in the mainshaft aligns with the oil hole in the gear.



1. Input Shaft Double Oil Hole
2. Third/Fourth Gear Oil Hole

6. Fit a new circlip (9) to the input shaft ensuring that the clip is correctly located in the circlip groove.
7. Fit the thrust washer (8) to the input shaft and slide up the shaft until in contact with the circlip.
8. Fit the splined bush (6) from sixth gear ensuring that the oil hole in the input shaft aligns with the oil hole in the bush.
9. Fit sixth gear (7) with the dog teeth facing third/fourth gear.
10. Fit second gear (5) with the stepped side facing away from the clutch end of the input shaft.
11. Fit the thrust washer (4) adjacent to second gear and slide on the needle roller bearing (3). Retain all with a new circlip (2).
12. Finally, fit the bearing sleeve (1) to the needle roller bearing.

OUTPUT SHAFT

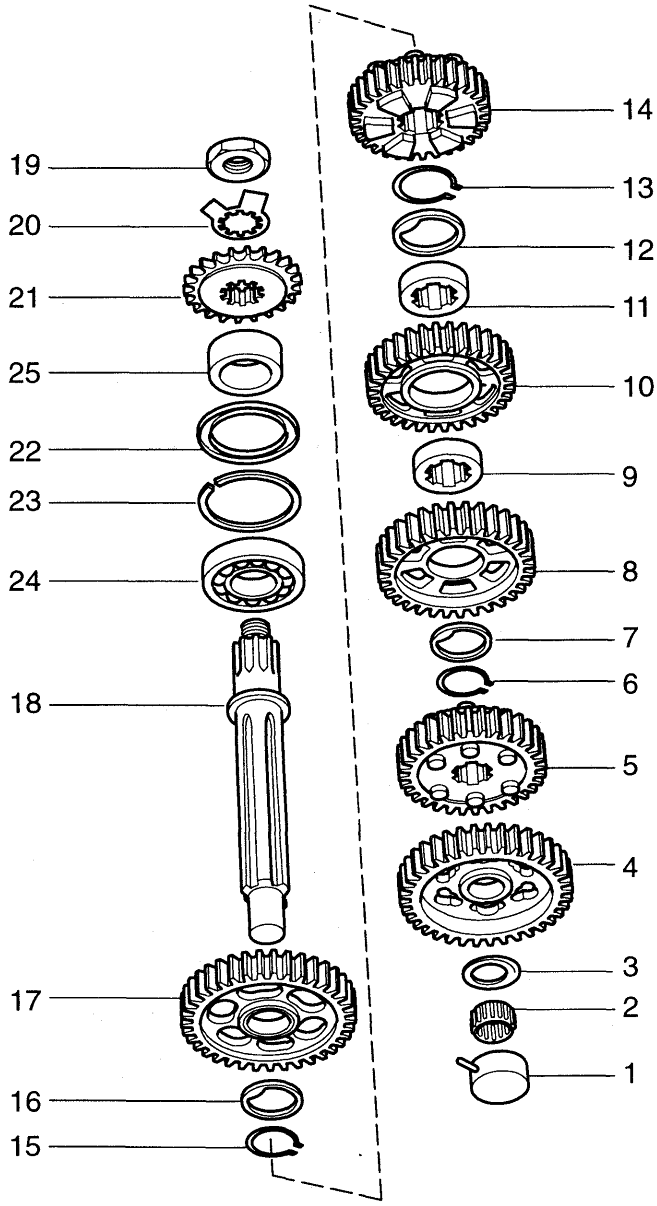
Working from the opposite end to the drive sprocket, dismantle the output shaft as follows.

Disassembly

1. Remove the output bearing sleeve (1), needle roller bearing (2) and hardened thrust washer (3).
2. Mark one side of first gear to denote its correct orientation. Remove first gear (4) from the shaft.
3. Slide fifth gear (5) from the shaft.
4. Remove the circlip (6) from in front of the third gear.
5. Remove the lipped thrust washer (7) from the shaft.
6. Remove the third gear (8) together with the inner splined bush (9).
7. Slide fourth gear (10) off the shaft and also remove the splined bush (11) and thrust washer (12).
8. Remove the circlip (13) from in front of sixth gear.
9. Remove sixth gear (14) from the shaft.
10. Remove the circlip (15) from in front of second gear.
11. Remove thrust washer (16) and slide off second gear (17).
12. Position the output shaft (18) in a vice with soft jaws fitted. Tighten the vice to prevent the shaft from turning and release the lock tab (20) from the output sprocket nut (19), then release the nut.
13. Remove the transmission sprocket nut (19), locktab (20), sprocket (21) and sleeve (25).
14. Collect the oil seal (22) and retaining ring (23).
15. If it is found necessary to replace the large bearing (24) at the end of the shaft, remove the outer race and detach the inner section from the shaft by splitting.

WARNING: When removing the output shaft bearing, always wear overalls, eye, face and hand protection. The bearing races are hardened and are liable to splinter if broken. Debris from broken bearings could cause injury to eyes, face and any unprotected parts of the body.

CAUTION: The bearing cannot be removed intact. If the bearing is removed from the shaft, the complete bearing will be damaged and must be renewed.



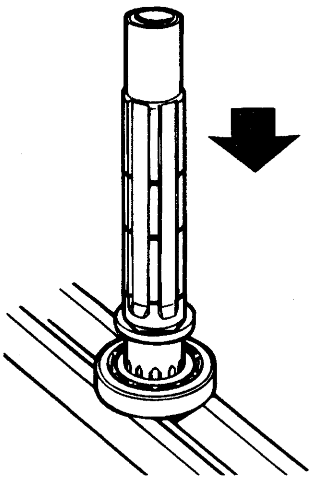
1. Bearing Sleeve
2. Needle Roller Bearing
3. Thrust Washer
4. First Gear
5. Fifth Gear
6. Circlip
7. Thrust Washer
8. Third Gear
9. Third Gear Bush
10. Fourth Gear
11. Fourth Gear Bush
12. Thrust Washer
13. Circlip
14. Sixth Gear
15. Circlip
16. Thrust washer
17. Second Gear
18. Output Shaft
19. Nut
20. Locktab
21. Output Sprocket
22. Oil Seal
23. Retaining Ring
24. Bearing
25. Sleeve

Assembly

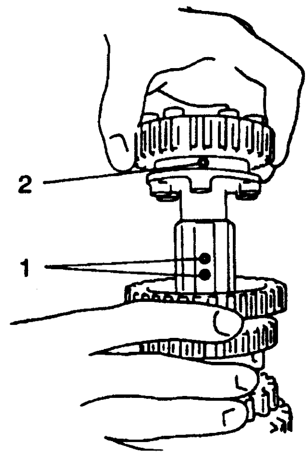
NOTE:

- **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

1. Working from the output sprocket end of the shaft, fit a new bearing (24) to the shaft using a press and press bars.



2. Fit the retaining ring (23) to the shaft. Lubricate and fit a new oil seal (22) and fit the sprocket sleeve (25).
3. Transfer the shaft to the vice and secure between soft jaws. Fit the sprocket (21), locktab (20) and nut (19). Tighten the nut to **132 Nm.** Close the lock tab.
4. Withdraw the shaft from the vice and continue to assemble from the opposite end to the output sprocket.
5. Locate the second gear (17) to the shaft with the large step side facing away from the output sprocket end. Fit the thrust washer (16) and retain with a new circlip (15).
6. Fit sixth gear (14) with the selector fork groove facing away from the output sprocket end. Ensure that the oil hole in the gear aligns with the double oil hole in the output shaft.



1. Double Oil Hole
2. Gear Oil Hole

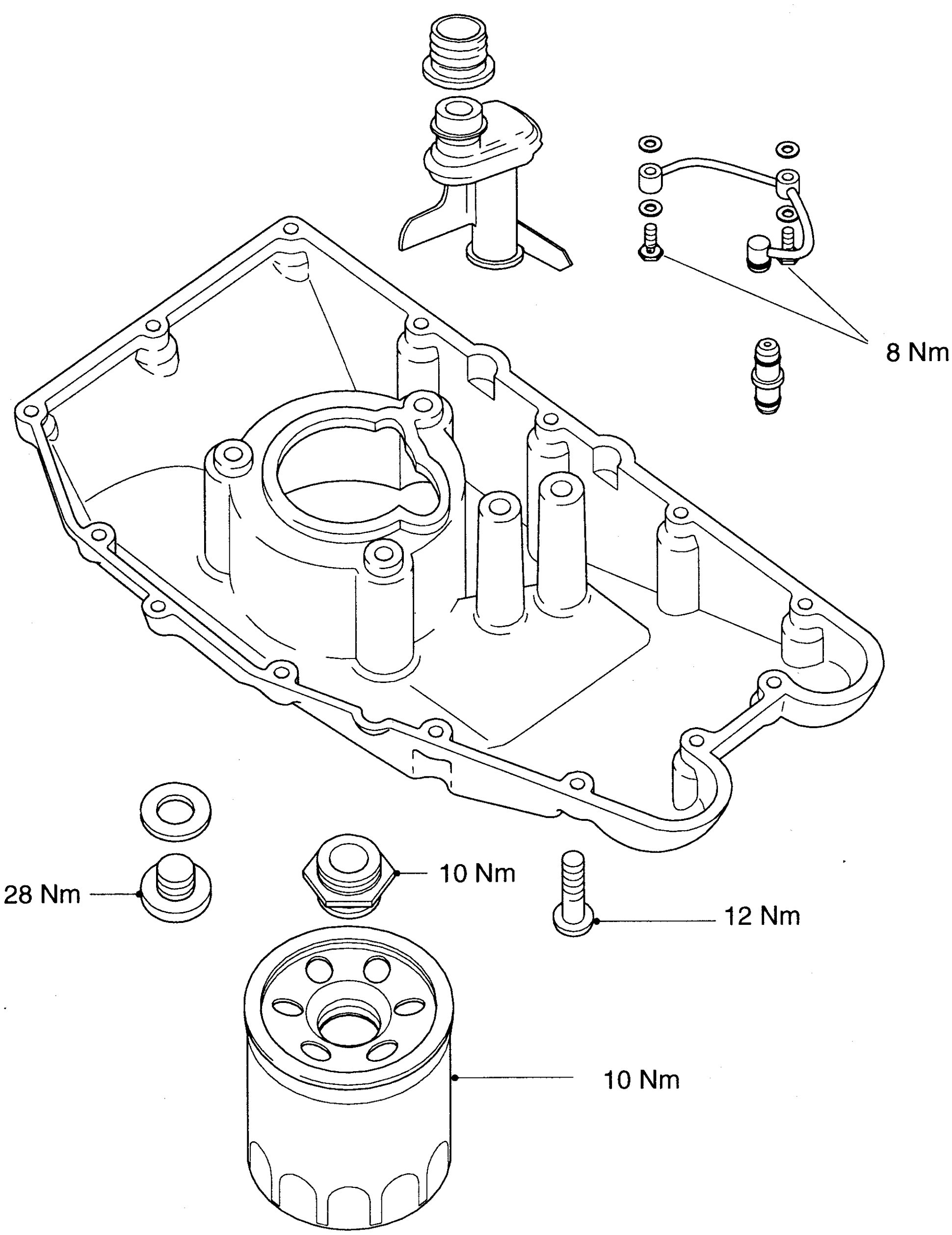
> **CAUTION: Incorrect alignment of the oil holes will result in severe damage to the gears and gear selectors.**

7. Fit a new circlip (13) to retain sixth gear.
8. Fit the thrust washer (12) to the rear of fourth gear and fit the splined sleeve (11) for fourth gear. Ensure correct alignment of the oil hole in the shaft with the oil hole in the sleeve. Fit fourth gear (10) to the shaft with the large step side facing away from the output sprocket.
9. Fit the splined bush (9) for third gear taking care to align the oil hole in the shaft with the corresponding hole in the bush. Fit third gear (8) with the larger step side facing the output sprocket.
10. Fit the thrust washer (7) and retain with a new circlip (6).
11. Fit the fifth gear (5) to the shaft with the circular dog teeth facing away from the output sprocket.
12. Fit first gear (4) to the shaft as marked during disassembly.
13. Finally fit the thrust washer (3), needle roller bearing (2) and bearing cap (1) to the end of the shaft.

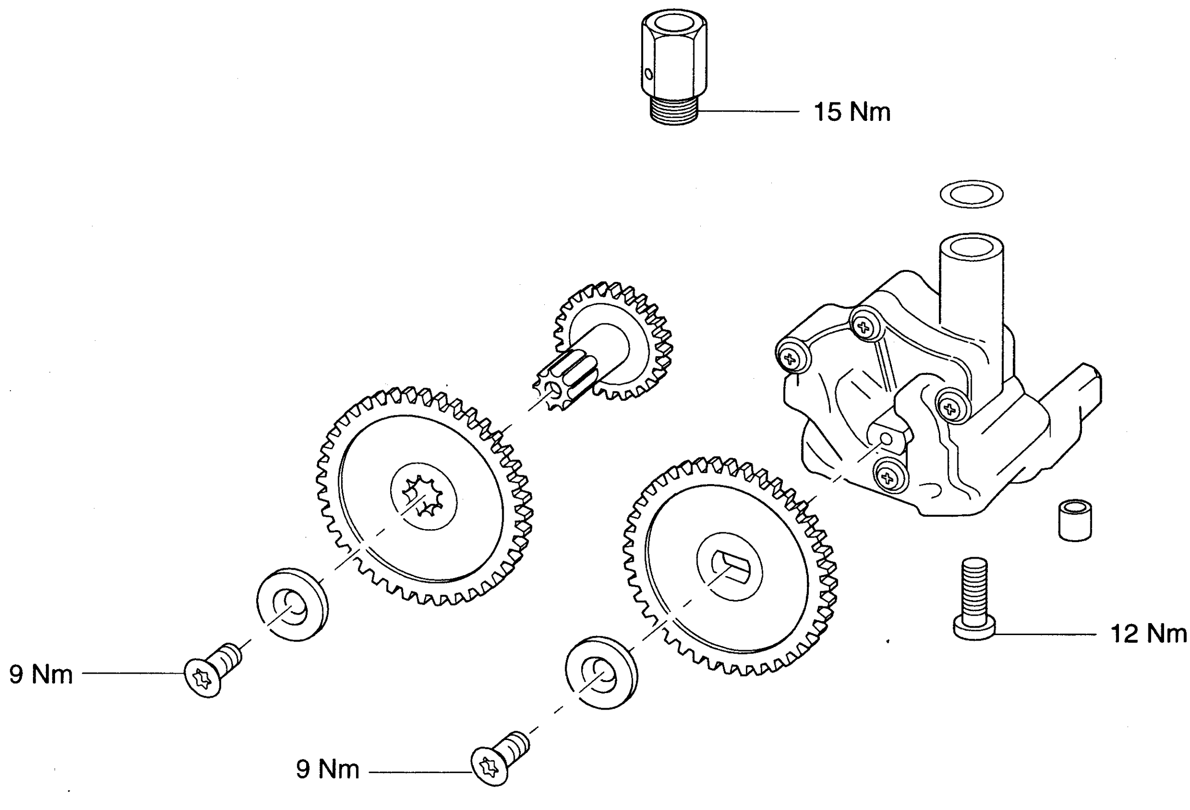
LUBRICATION SYSTEM

CONTENTS

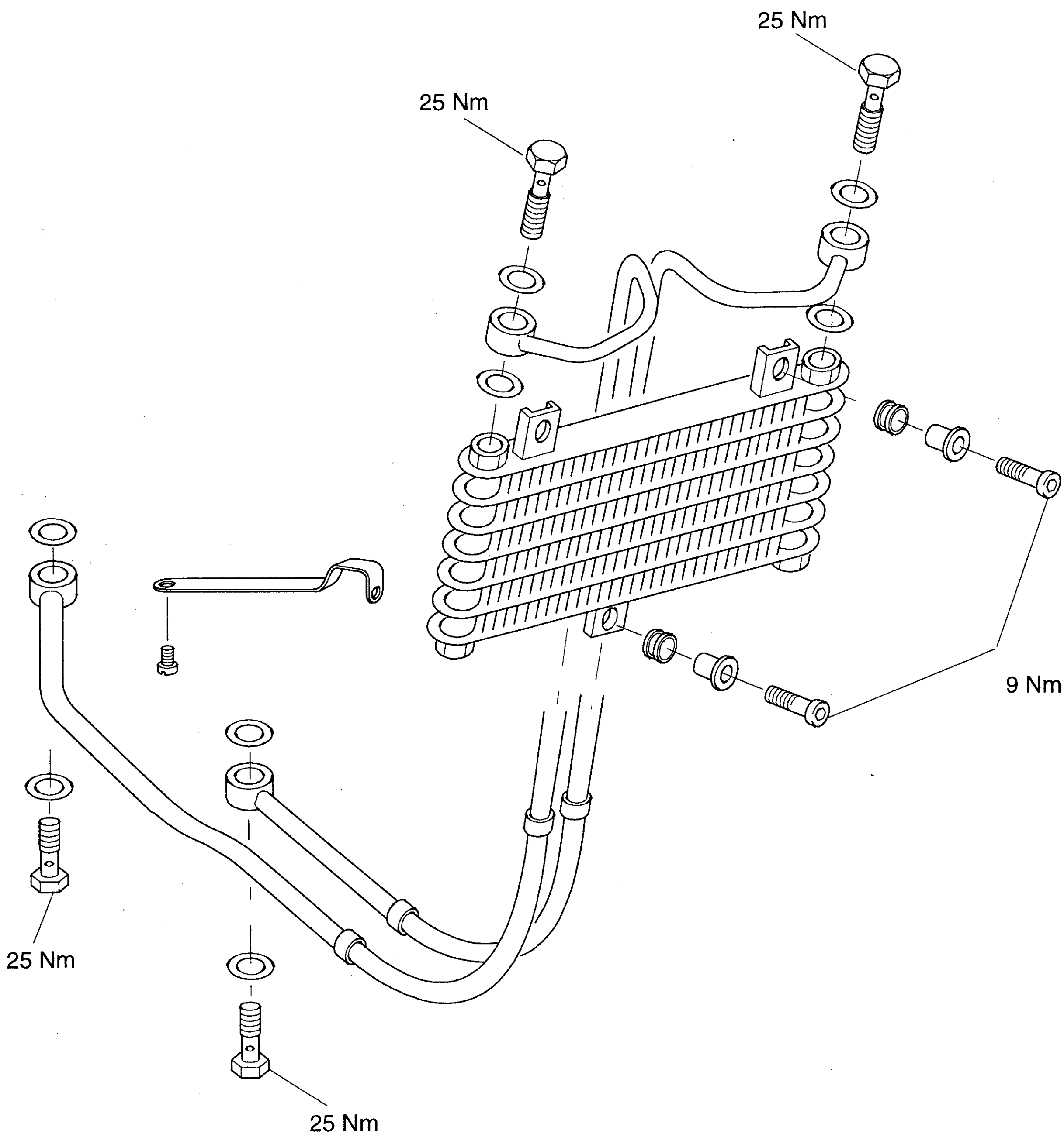
Exploded View – Sump



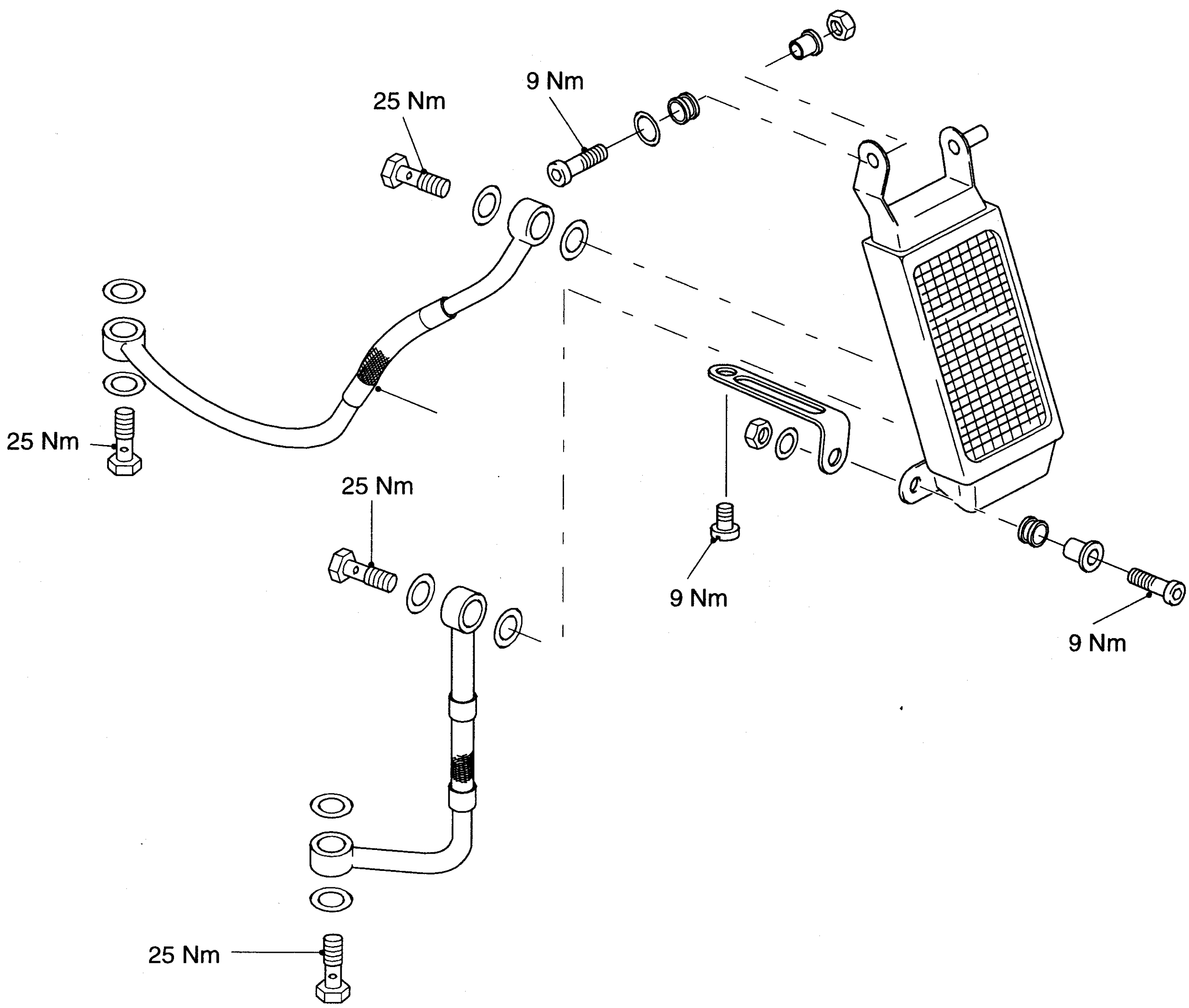
Exploded View – Oil Pump and Gears



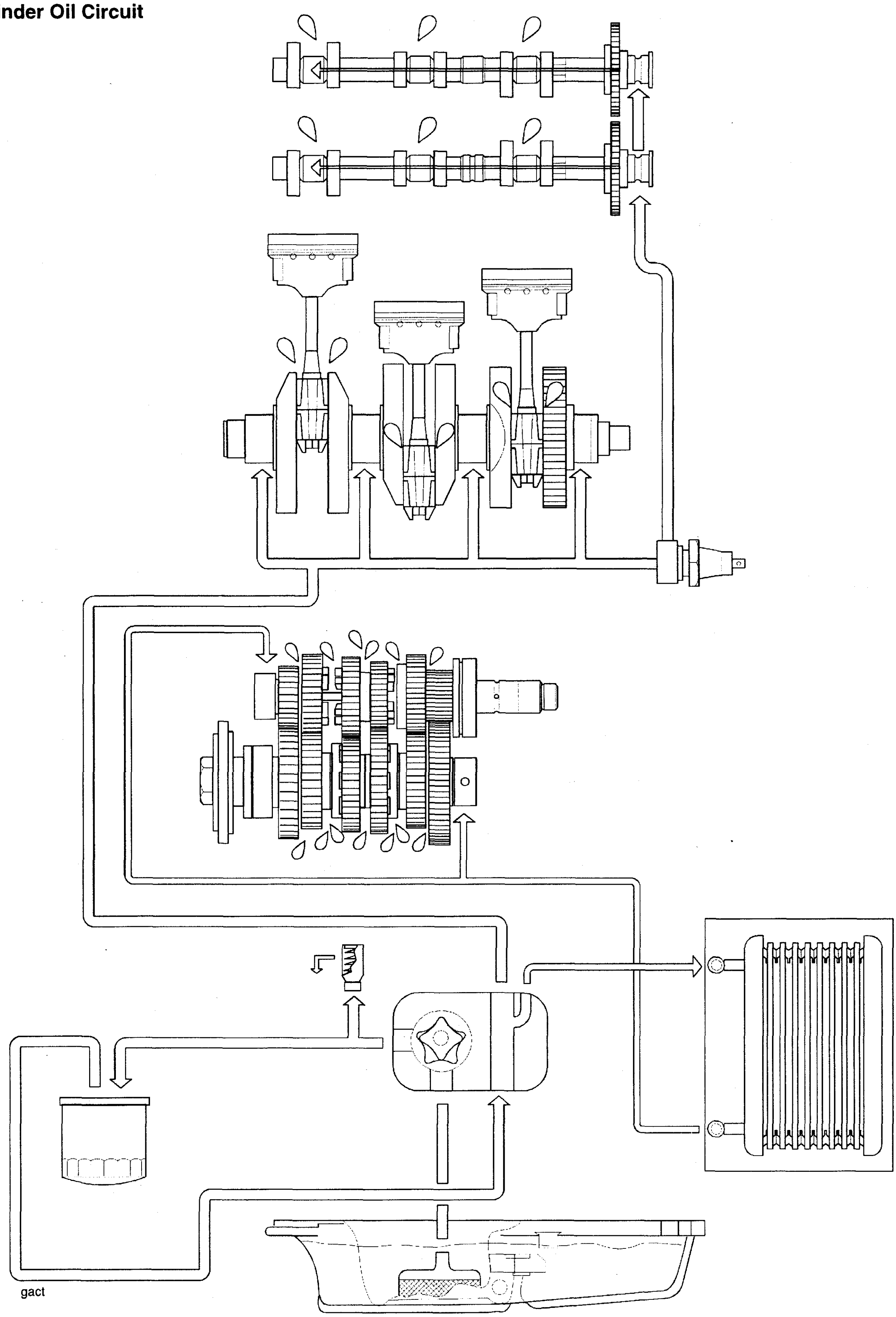
Exploded View – Daytona Oil Cooler



Exploded View – Speed Triple Oil Cooler



3 Cylinder Oil Circuit



3 CYLINDER OIL CIRCUIT DESCRIPTION

Oil is collected from the sump and is drawn through a mesh strainer into the oil pump rotor. Pressurised oil is then delivered to the outside of the oil filter where the oil pressure relief valve is fitted. The relief valve is set to open at 75 lb/in^2 and when open, returns high pressure oil direct to the sump.

The oil pump is fitted with a single pumping rotor which supplies pressurised oil to the lubrication circuit and the oil cooler.

Filtered oil is drawn from the centre of the oil filter along the oil filter retaining tube. Part of this filtered oil is supplied, through a non-pumping passage in the oil pump, to a horizontal gallery at the rear of the upper crankcase.

Once received in the upper crankcase gallery, the oil is delivered to the crankshaft main bearings and, via drillings in the crankshaft, to the big end bearings. Oil exits from the big ends through holes in the connecting rods and then splash lubricates the bores and pistons.

The remainder of the filtered oil is passed through an oil cooler and is supplied to drillings in the lower crankcase by internal, detachable pipes. These lower crankcase drillings deliver oil directly to the end of each gearbox shaft. Oil is circulated along the inside of the gearbox shafts to exit holes which feed directly onto the selectors, bearings and gears.

The same upper crankcase gallery which feeds the crankshaft also feeds the cylinder head and camshafts through an external link pipe. The pipe, located at the rear of the engine, links a drilling in the head to the oil gallery in the upper crankcase. The low oil pressure warning light switch is located at the base of this pipe.

The head drilling supplies oil to the front camshaft bearings which, in turn, deliver oil through the hollow camshafts to the other camshaft bearings, the tappet buckets and the valves.

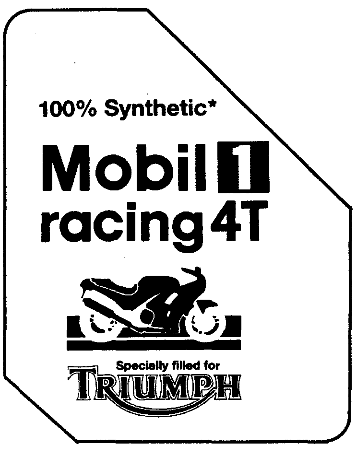
ENGINE OIL

Specification

All Triumph fuel injected engines must be filled with 10W-40, 15W-40 or 15W-50 fully synthetic motorcycle engine oil which meets API-SG or API-SH specification. Mobil 1 Racing 4T specially filled for Triumph is an oil which meets the above requirements.

> ⚠ **CAUTION: Do not use oils which do not meet API-SG or API-SH specification.**
>
> **Do not use 10W rated oils with a hot viscosity rating greater than 40. For example, DO NOT use an oil with a viscosity rating of 10W-50.**
>
> **Do not use oils with a cold viscosity rating of 0W or 5W.**
>
> **Engine damage may result from using any engine oil which does not meet the required specification or does not fall into the correct viscosity band.**

Triumph Engine Oil



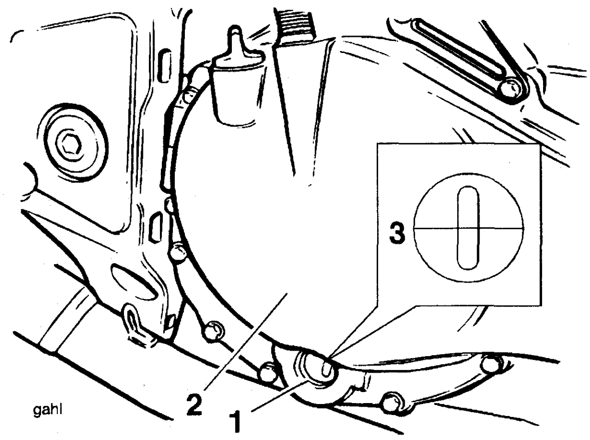
Your Triumph Motorcycle is a quality engineered product which has been carefully built and tested to exacting standards. Triumph Motorcycles are keen to ensure that you enjoy optimum performance from your machine and with this objective in mind have tested many of the engine lubricants currently available to the limits of their performance.

Mobil 1 Racing 4T consistently performed well during our tests and has become our primary recommendation for the lubrication of all current Triumph motorcycle engines.

Mobil 1 Racing 4T, specially filled for Triumph, is available from your authorised Triumph dealer.

Oil Level Inspection

1. If the engine has been running, allow it to stand for at least 10 minutes before checking the oil level.
2. Check the oil level visible in the sight glass situated at the lower end of the clutch cover on the right hand side of the motorcycle. When correct, the level of oil should be half way up the sight glass.



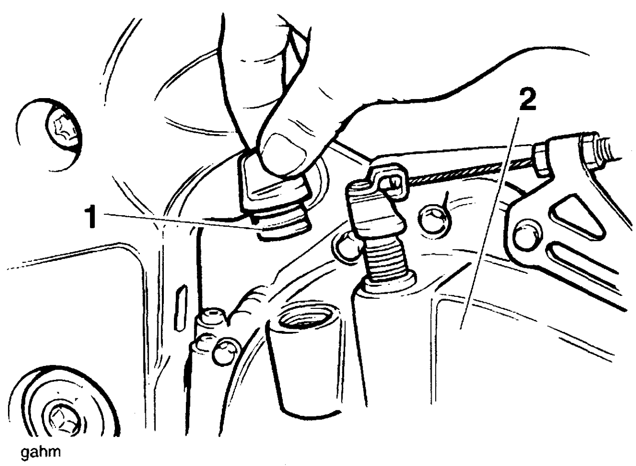
1. Clutch Cover

2. Sight Glass

3. Oil Level (correct level shown)

NOTE:
- **Accurate determination of the true oil level is only possible when the motorcycle is level and upright, not when it is on the side stand.**

3. If the oil level requires adjustment, remove the filler plug from the clutch cover and add oil, a little at a time, until the correct level is reached.



1. Clutch Cover

2. Filler Plug

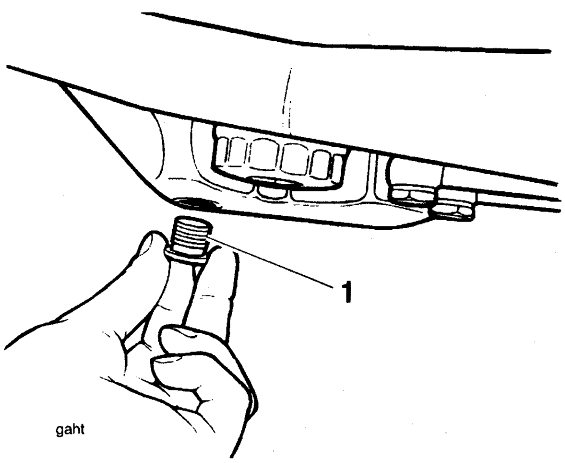
4. Refit the filler plug.

Engine Oil and Filter Change

> **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.**

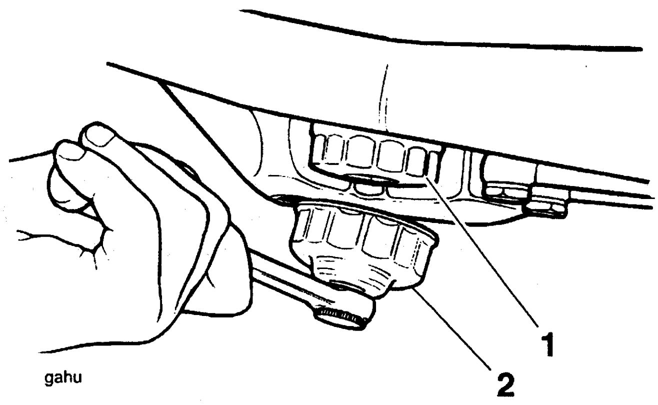
1. Position the motorcycle on level ground and in an upright position.
2. Start the engine and allow it to reach normal operating temperature.
3. Stop the engine and place a container beneath the sump to collect the displaced oil.
4. Remove the sump drain plug and allow the oil to drain out completely.

> **WARNING: The oil may be hot to the touch. Contact with hot engine oil may cause skin to be scalded or burnt.**



1. Sump Drain Plug

5. When the oil has completely drained out, fit a new sealing washer to the sump plug and refit the plug tightening it to **28 Nm.**
6. Move the container to a point below the oil filter.
7. Using tool T3880311 to release the filter cartridge, unscrew and remove the oil filter.



1. Oil Filter

2. Tool T3880311

8. Apply a smear of clean engine oil to the seal of the new filter.
9. Fit the filter and tighten, using tool T3880311, to **10 Nm.**
10. Fill the engine with oil of the correct specification and viscosity.

NOTE:

- **Add oil slowly to avoid overfilling or spillage over the outside of the engine.**

11. Start the engine and allow it to run for a short time at idle. Check that the low oil pressure warning light extinguishes shortly after starting.

> **CAUTION: Stop the engine if the low oil pressure warning light fails to extinguish.**
>
> **Investigate and rectify the cause before restarting the engine. Running the engine with the low oil pressure warning light illuminated will cause engine damage.**

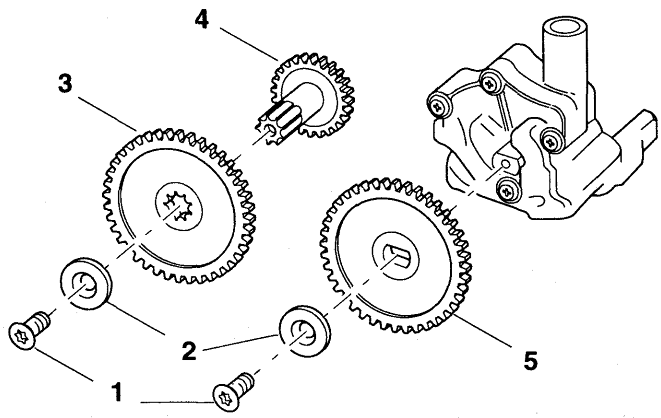
12. While the engine is running, check for oil leaks.
13. Stop the engine and adjust the oil level if necessary.

OIL PUMP AND GEARS

Removal

NOTE:

- **The oil pump is located in the lower crankcase. In order to remove the oil pump, the engine must be removed from the frame and the crankcase halves separated.**



1. Gear Screws

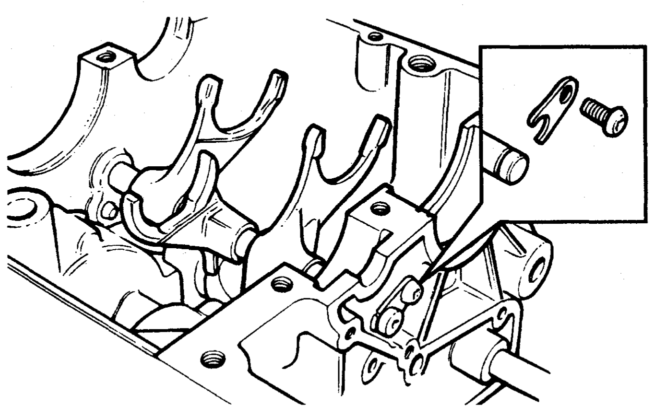
2. Washers

3. Auxiliary Gear

4. Intermediate Gear And Shaft

5. Oil Pump Gear

1. Remove both the input and output shafts.
2. Remove the capscrew and take out the 'U' shaped keeper plate from the selector shaft.

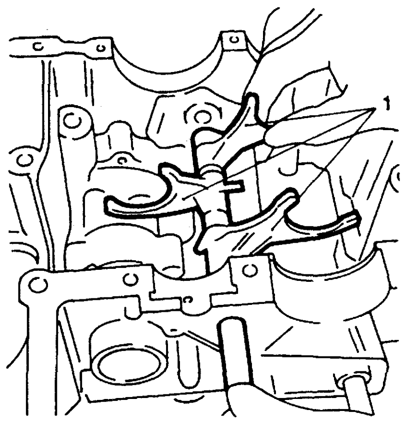


Inset:– Selector Shaft Keeper Plate

NOTE:

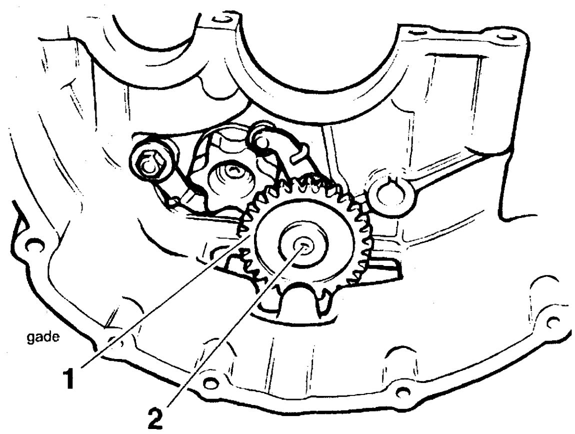
- **To ensure that the selector fork positions are maintained on assembly, mark each fork with felt pen or similar to denote their relative positions.**

3. Using finger pressure, push the selector shaft out of crankcase in the direction of the keeper plate. Collect each selector fork from the lower crankcase as they are released from the selector shaft.



Selector Forks

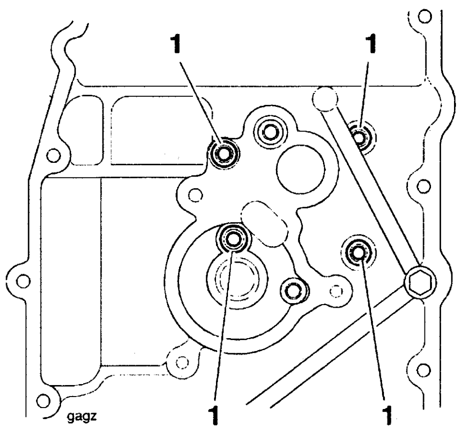
4. Remove the screw securing the oil pump auxiliary gear. Remove the gear from the shaft.



1. Oil Pump Auxiliary Gear

2. Gear Retaining Screw

5. Invert the crankcase.
6. Release the screws securing the oil pump to the lower crankcase.
7. Invert the crankcase.

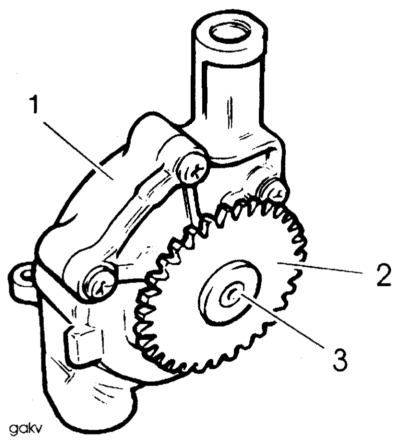


1. Oil Pump Retaining Screws

8. Remove the oil pump from inside the lower crankcase.

9. Withdraw the oil pump intermediate gear by sliding through the crankcase from outside to in.

10. To remove the oil pump gear from the pump, release the securing screw and remove from the shaft.



1. Oil Pump

2. Gear

3. Screw

Inspection

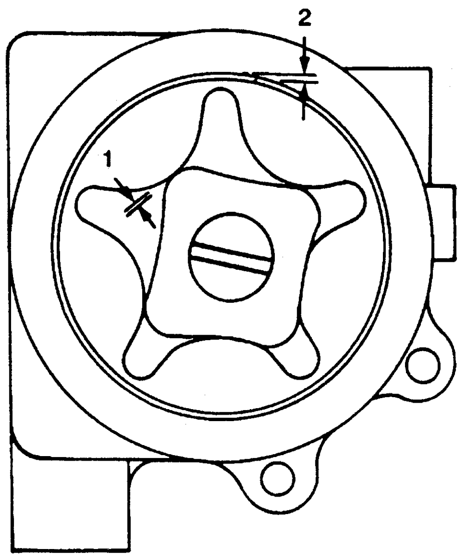
1. Remove the oil pump end cover.

2. Measure the rotor tip clearance using feeler gauges.

Standard:	**0.15 mm**
Service Limit:	**0.20 mm max.**

2. Measure the pump body clearance using feeler gauges.

Standard:	**0.22 – 0.15 mm**
Service Limit:	**0.35 mm max.**



1. Rotor Tip Clearance

2. Pump Body Clearance

CAUTION: If any part of the oil pump is found to be outside the service limit, the complete pump must be renewed. Severe engine damage may result from the continued use of a faulty oil pump.

3. Refit the end cover if all clearances are within the service limits. Renew the complete pump if outside the service limit.

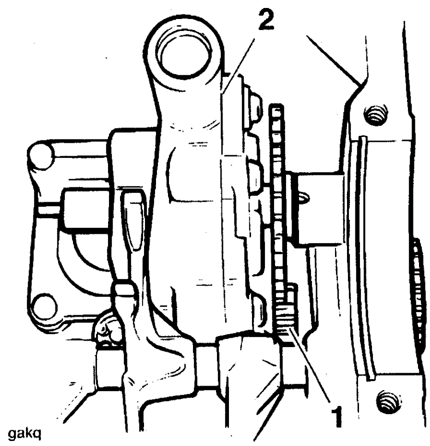
4. Inspect all gears for damage, pitting etc. Renew as necessary.

Installation

1. Locate the oil pump gear to the pump and tighten the retaining screw to **9 Nm**.

2. Fit the oil pump intermediate gear and shaft to the crankcase.

3. Locate the oil pump into the lower crankcase.



1. Oil Pump Intermediate Gear

2. Oil Pump

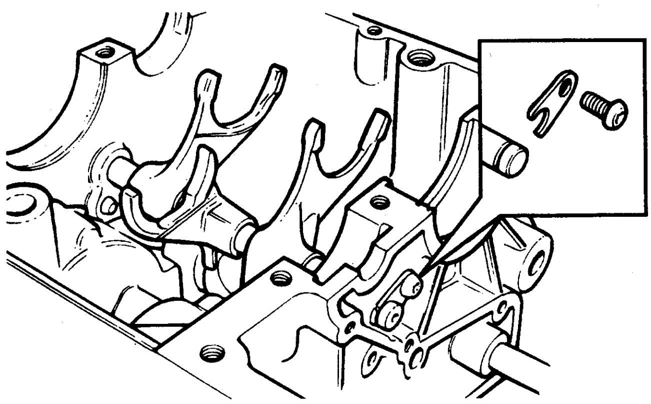
4. Invert the crankcase and support the pump in position.

5. Fit and tighten the oil pump screws to **12 Nm.**

6. Refit the oil pump auxiliary gear and tighten the gear fixing to **9 Nm.**

7. Position the selector forks to the selector drum, in the order noted during removal.

8. Support the selectors and feed the selector shaft through the crankcase and selectors. Fit the shaft keeper plate and tighten the retaining bolt to **6 Nm.**

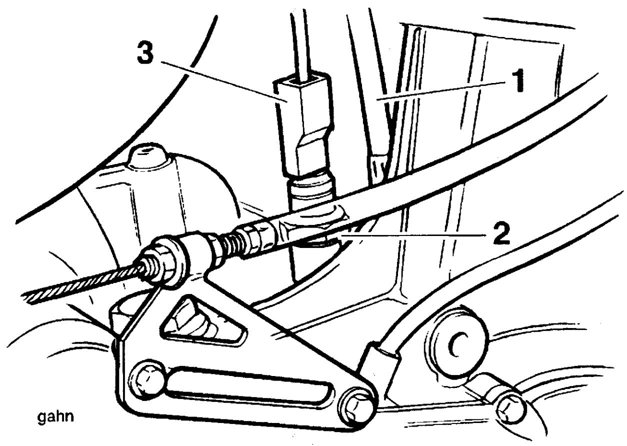


Inset:– Selector Shaft Keeper Plate

9. Refit the input and output shafts.

Low Oil Pressure Warning Light Switch

The low oil pressure warning light switch is located at the lower end of the camshaft oil feed pipe.



1. Oil Feed Pipe

2. Low Oil Pressure Warning Light Switch

3. Electrical Connection

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Disconnect the electrical connection to the switch.

3. Remove the switch and collect the copper washers.

Installation

1. Using new copper washers, fit the switch and tighten to **13 Nm.**

2. Refit the electrical connection.

3. Reconnect the battery, positive (red) lead first.

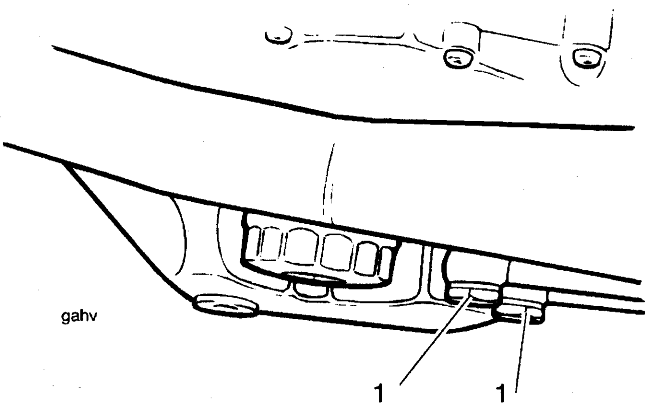
SUMP

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the belly panel and both lower fairings (where fitted).

3. Note the position of the oil cooler pipes prior to disconnecting the pipes from the sump.



1. Oil Cooler Pipes

4. Remove the exhaust system completely.

> **WARNING: The exhaust system will be hot if the engine has recently been running. Always allow sufficient time for the exhaust to cool before working on or near the exhaust system.**
>
> **Contact with a hot exhaust could result in burn injuries.**

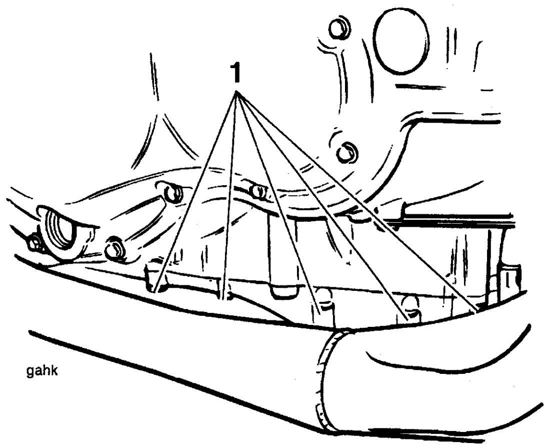
5. Position a container beneath the sump, release the sump plug and drain the engine oil from the sump.

> **WARNING: The oil may be hot to the touch. Contact with hot oil may cause the skin to be scalded or burned.**

> **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.**

6. Remove the oil filter.

7. Release the bolts securing the sump to the lower crankcase.

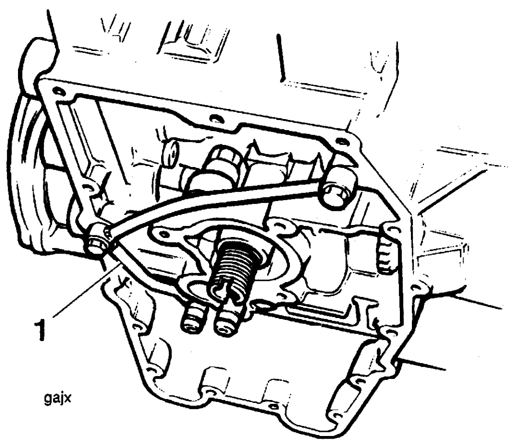


1. Sump to Lower Crankcase Fixings

8. Detach the sump and collect the oil transfer tube.

NOTE:

- **The oil transfer tube may remain in the crankcase or become detached with the sump.**



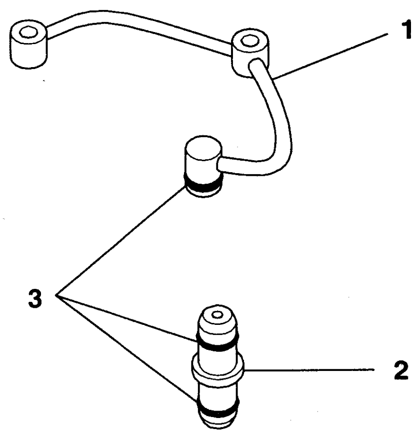
1. Oil Transfer Tube

9. Remove the sump gasket.

Inspection

1. Inspect the oil transfer tube 'O' rings for damage and swelling. Renew as necessary.

2. Inspect the gearbox oil feed pipe 'O' ring for damage and swelling. Renew as necessary.



1. Oil Transfer Tube

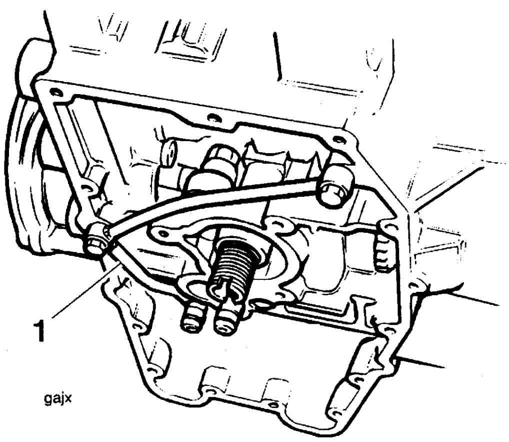
2. Gearbox Oil Feed Pipe

3. 'O' rings

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

Installation

1. Fit the oil transfer tube to the crankcase.



1. Transfer Tube Location

2. Using a new sump gasket, position the sump to the lower crankcase and locate to the oil transfer tube and gearbox oil transfer pipe.
3. Tighten the sump fixings to **12 Nm**.
4. Using new sealing washers, reconnect the oil cooler pipes. Tighten the cooler pipe banjo bolts to **25 Nm.**
5. Apply a smear of clean engine oil to the seal of a new oil filter.
6. Fit the oil filter and tighten to **10 Nm**.
7. Refit the exhaust system as described in the fuel system section.

NOTE:

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

8. Fill the engine with the correct grade of engine oil
9. Refit the belly panel and lower fairings (if removed).
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.

OIL COOLER

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the belly panel and right hand lower fairing (if fitted).
3. Position a suitable container beneath the oil cooler to catch any oil spillages.
4. Drain the engine oil as described elsewhere in this section.

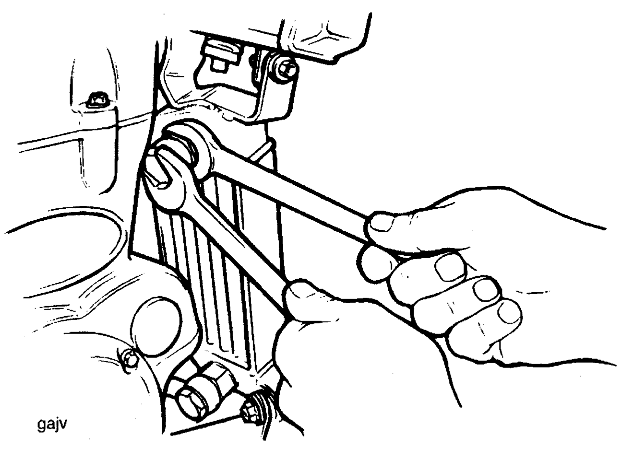
WARNING: The oil may be hot to the touch. Contact with hot engine oil may cause skin to be scalded or burnt.

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.

5. Using an open-ended spanner, support the oil cooler connection point and disconnect the feed hose.

CAUTION: If the cooler connection point is not supported, the oil cooler may become damaged during release of the hose connections. Always follow the above method to avoid oil cooler damage.

6. Using the same method, disconnect the return hose.



Oil Cooler Hose Disconnection

7. Release the oil cooler to bracket fixings noting the position of the rubber grommets and flanged sleeves.

Inspection

1. Inspect the cooler connection points for fractures and signs of oil leakage.
2. Check the cooler fins for damage and leaks.

Installation

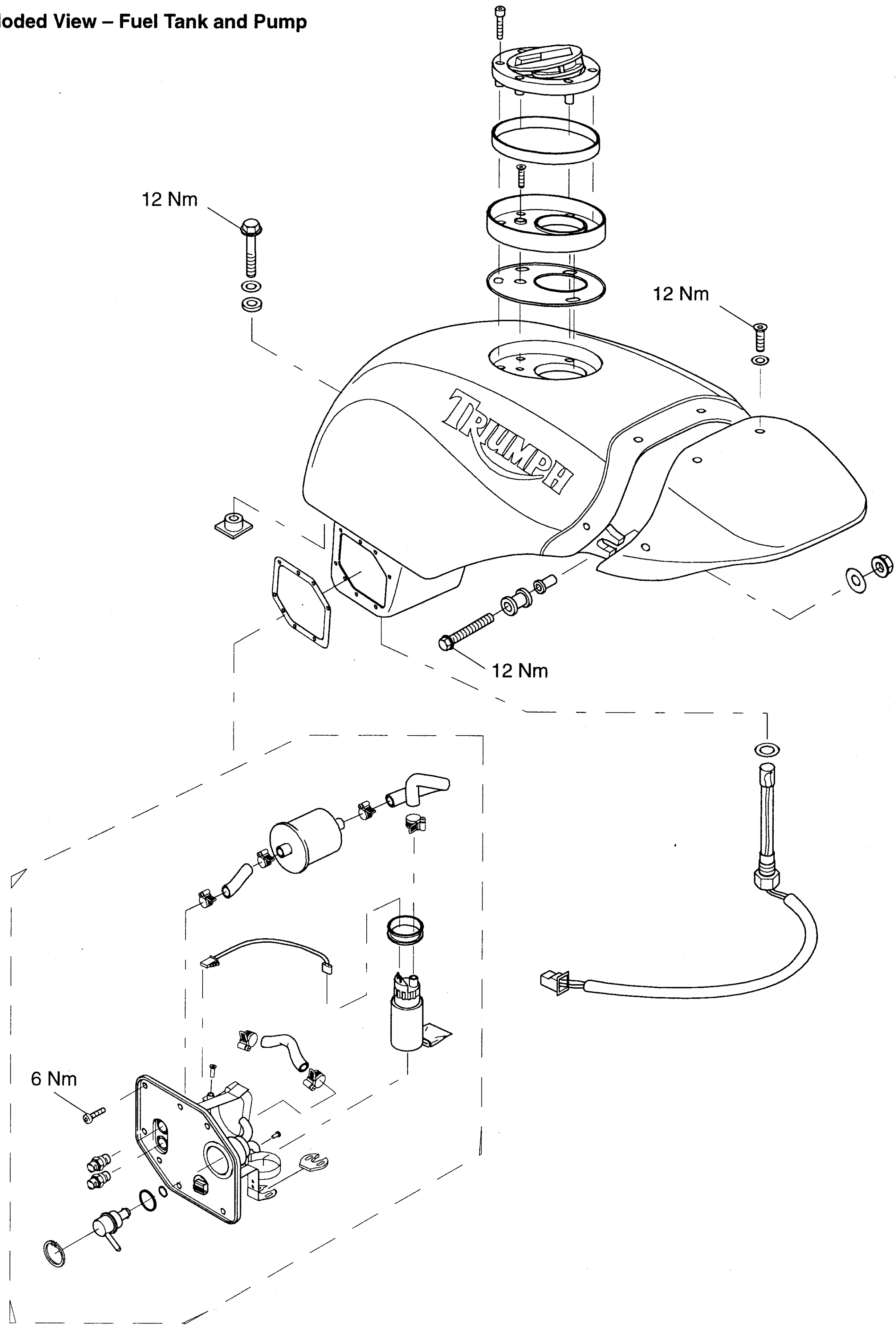
1. Locate the oil cooler to the brackets and retain as noted during removal.
2. Tighten the oil cooler fixings to **9 Nm**.
3. Align the oil cooler pipes to the cooler and, using new sealing washers on both sides of the banjo bolts, tighten to **25 Nm**.
4. Refill the engine with oil of the correct grade and viscosity.
5. 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.
6. Adjust the engine oil level.
7. Refit the right hand lower fairing and belly panel.
8. Reconnect the battery positive (red) lead first.
9. Refit the seat.

FUEL SYSTEM/ENGINE MANAGEMENT

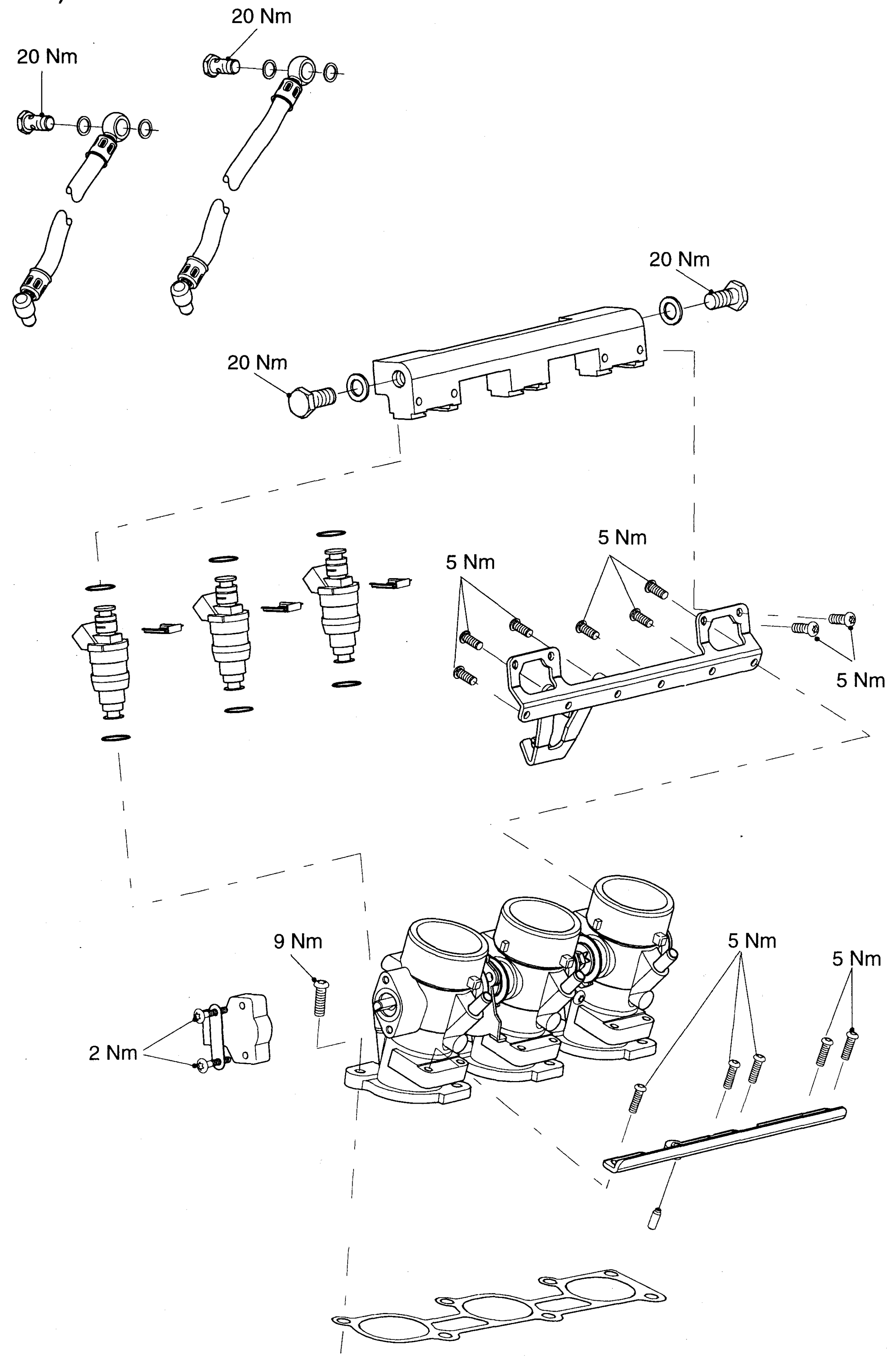
CONTENTS

CONTENTS cont'd

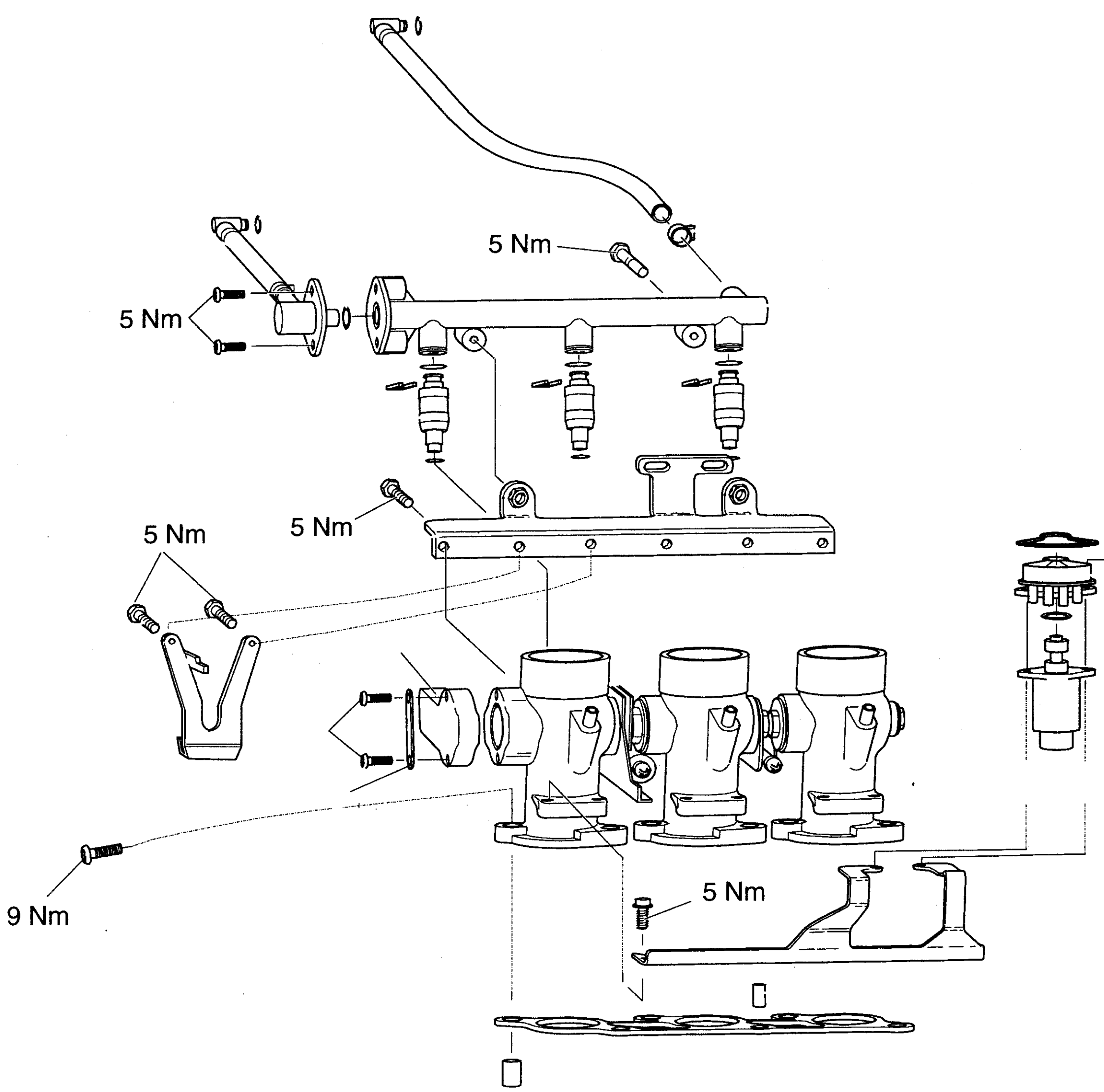
Exploded View – Fuel Tank and Pump



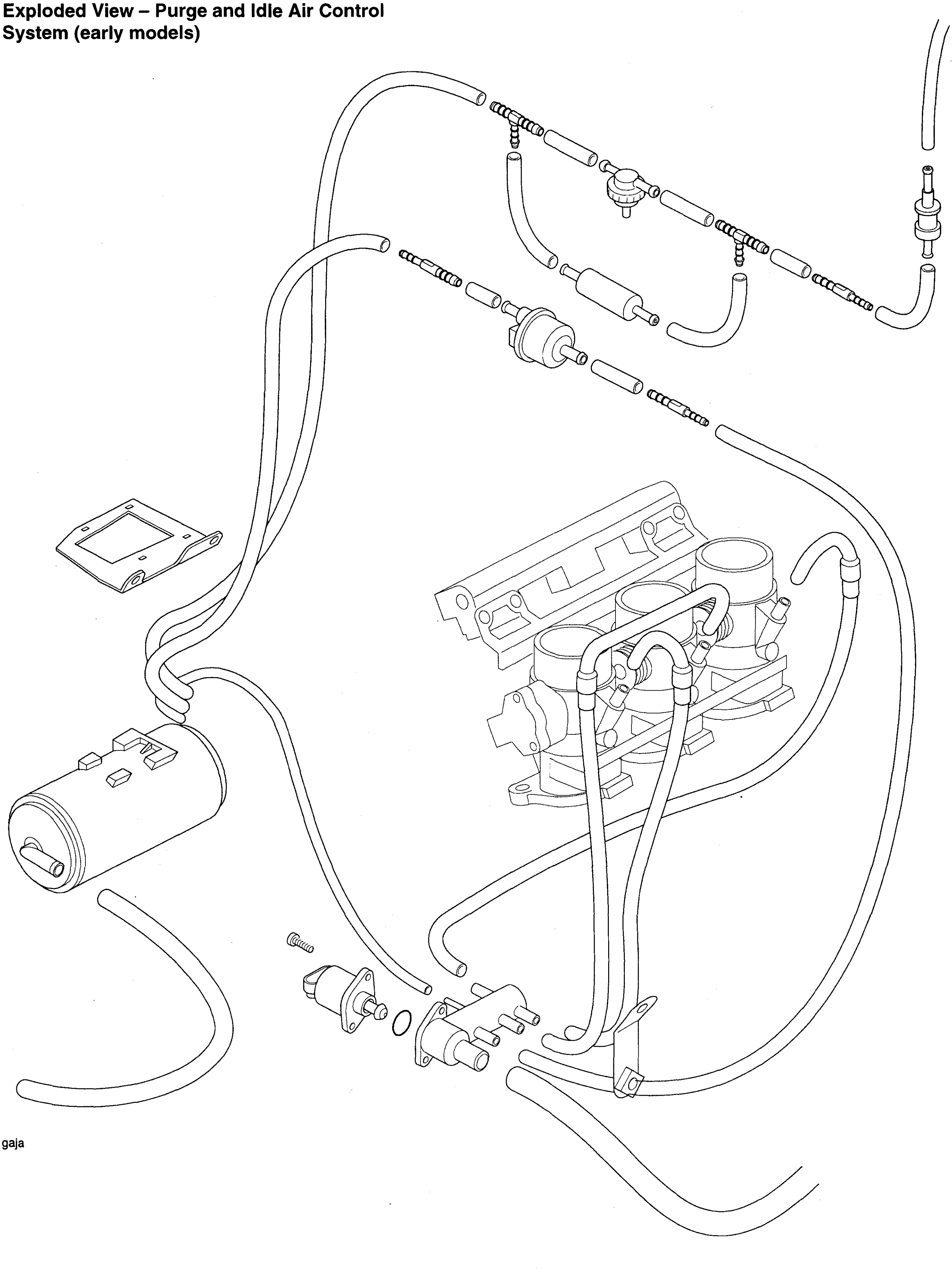
Exploded View – Fuel Rail, Throttles and Injectors (early models)



Exploded View – Fuel Rail, Throttles and Injectors (later models)



Exploded View – Purge and Idle Air Control System (early models)



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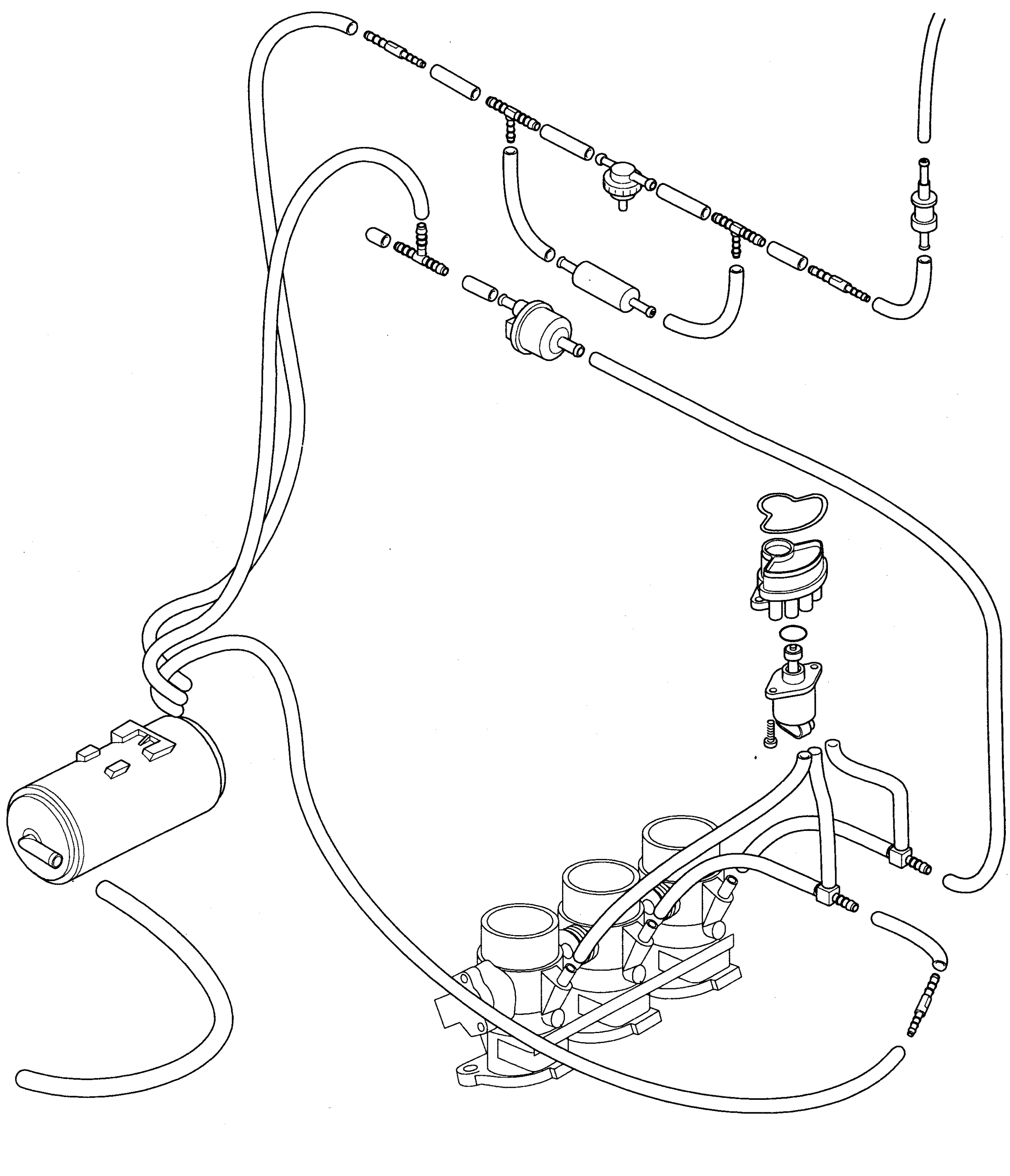
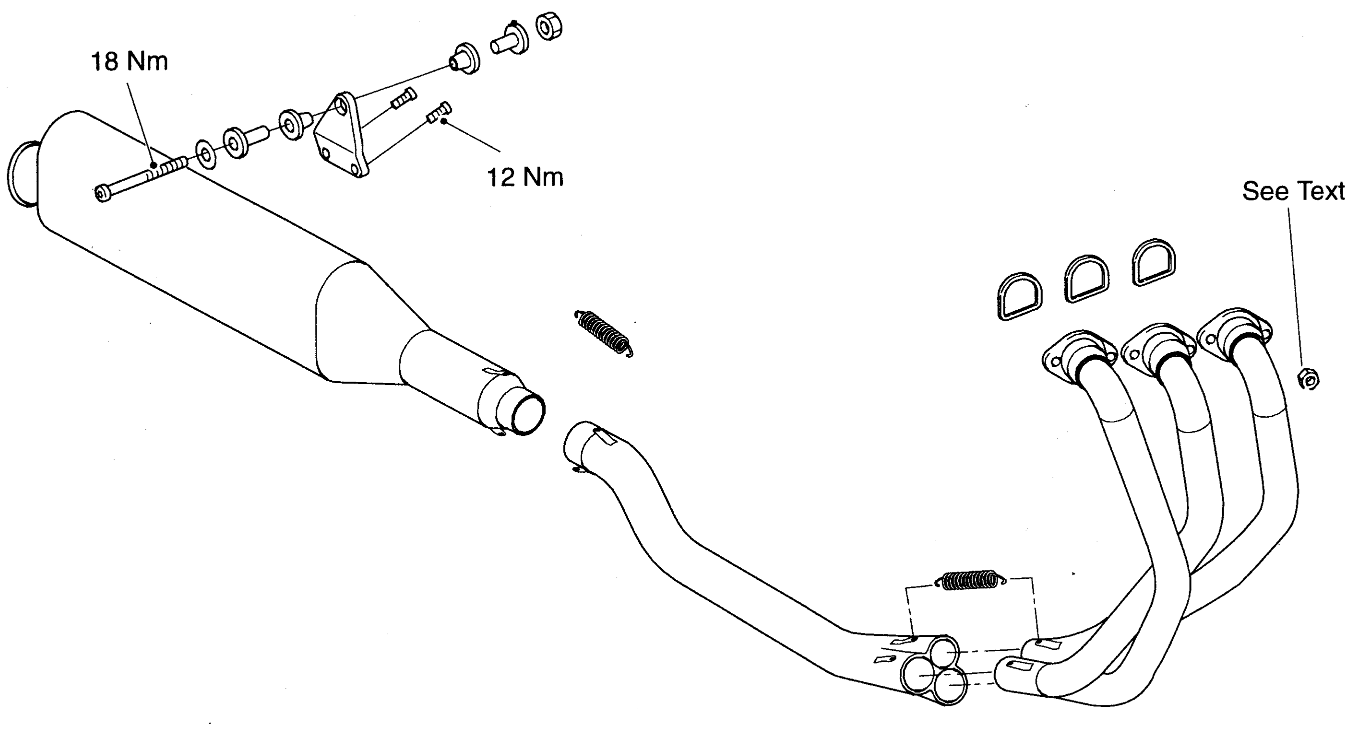
Exploded View – Purge and Idle Air Control System (late models)



Exploded View – Typical Exhaust System (T595 Daytona Illustrated)



FUEL REQUIREMENTS

Fuel Requirements – all countries except USA

Outside America, all motorcycles are designed to be run on 95 RON 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:

Triumph motorcycles are designed to run on unleaded gasoline with a CLC or AKI octane rating (R+M)/2 of 89 or higher. Federal regulations require that pumps delivering unleaded gasoline are marked 'UNLEADED' and that the Cost of Living Council (CLC) or Anti-Knock Index (AKI) octane rating is also displayed. These ratings are an average of the Research Octane Number (RON) and the Motor Octane Number (MON).

⚠ CAUTION: The use of leaded gasoline is illegal in some countries, states or territories. Check local regulations before using leaded gasoline.

Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. These gasolines are a blend of conventional gasoline and another compound such as alcohol. Triumph motorcycles 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. Below is given a brief explanation of what some of the more common terms and abbreviations mean.

Air temperature

The intake air temperature in the air box.

Air temperature sensor

Measurement in volts at the Electronic Control Module (ECM) of the air temperature in the air box as signalled by the air temperature sensor. Data is read out on the diagnostic tool in degrees Celsius

ATDC

After Top Dead Centre.

Barometric pressure

Pressure of the air in the air box.

Battery voltage

The voltage at the input to the Electronic Control Module (ECM).

BTDC

Before Top Dead Centre.

Calculated load

The actual volume of air per stroke flowing into the engine, expressed as a percentage of the maximum volume that can enter. Provides an indication of the percent engine capacity that is being used (100% = full throttle).

Closed throttle position

Throttle position at idle (i.e. against end stop), measured as a voltage and expressed as percentage.

0% = 0 volts

100% = 5 volts

Coolant temperature

The coolant temperature in the thermostat housing.

Coolant temperature sensor

Measurement in volts at the Electronic Control Module (ECM) of the coolant temperature in the thermostat housing as signalled by the coolant temperature sensor.

Cooling fan status

The 'on' or 'off' condition of the cooling fan.

Corrected Throttle Position

The electronic value of the throttle position corrected according to the closed value of the throttle potentiometer. The reading for corrected throttle position will be different to the actual throttle position.

DTC

Diagnostic Trouble Code.

ECM

Electronic Control Module.

Engine speed

The crankshaft revolutions per minute of the engine.

Freeze frame

A data set captured at the time a Diagnostic Trouble Code (DTC) is set.

IACV

Idle Air Control valve.

Idle air control valve stepper position

The position of the idle air control valve stepper motor;

0 = fully closed.

180 = fully open

Idle fuel trim

The percentage above or below the nominal fuel requirement for the volume of air entering at idle.

Idle fuelling

Adjustment of fuel at idle to suit the actual air inducted.

Idle reference speed

The target idle speed as determined by the Electronic Control Module (ECM). (It should be the same as the actual idle speed if the motorcycle is operating correctly.)

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'.

Injector pulse time

The time during which an injector remains open.

MIL

Malfunction Indicator Lamp.

Illuminates when Diagnostic Trouble Codes (DTC's) are set.

Neutral switch status

The 'neutral' or 'in gear' status of the gearchange.

Off idle fuel trim

The percentage above or below the nominal fuel requirement for the volume of air entering at engine speeds other than idle. This function is not currently used in the Triumph system.

Open circuit

A break in an electrical circuit – current cannot flow.

Over temp'

High temperature within the Electronic Control Module (ECM) caused by an internal or external failure.

Purge valve duty cycle

The time the purge valve is open in an open / close cycle, expressed as a percentage of the cycle time.

Sensor reference voltage

Supply voltage to certain sensors (nominally 5 volts).

Short circuit

A 'short cut' in an electrical circuit – current by–passes the intended circuit (usually to earth).

Sidestand status

The 'up' or 'down' position of the side stand.

Target dwell time

The actual time from coil 'on' to coil 'off'.

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%. Generally, fully open will be in the 70% range. (See also corrected throttle position).

Throttle voltage

Voltage at the throttle potentiometer.

Vbatt

Battery voltage.

Vehicle speed

The road speed of the motorcycle.

ENGINE MANAGEMENT SYSTEM

System Description

Each model is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The electronic control module (ECM) 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 hardware diagnostic functions similar to the US state of California requirements for on-board diagnostics (OBDII). This function ensures that, should a malfunction occur in the system, the malfunction type and engine data at the time the malfunction occurred are stored in the ECM memory. This stored data can then be recovered by a Triumph dealer 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.

System Sensors

- **Intake air temperature sensor** – situated in the airbox, between the air filter element and the Air intakes at the front of the airbox. Because 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.

- **Barometric pressure sensor** – situated in the airbox, between the air filter element and the throttle butterflies. The barometric pressure sensor measures the air pressure in the airbox. From this measurement the air density is calculated, and when added to other inputs to the ECM, the engine load is calculated. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.

- **Crankshaft position sensor** – situated inside the right hand engine cover. The crankshaft position sensor detects movement of a toothed wheel attached to the right hand end of the crankshaft. The wheel has 21 teeth which are evenly spaced, and one triple length tooth next to a triple length gap. The triple length tooth/gap gives a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the ECM to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the fuel occurs.

  Because each cylinder fires once per two revolutions of the crankshaft, it is not possible to determine by crankshaft position alone which cylinder is approaching top dead centre on a firing stroke and which is on an exhaust stroke. To do this, the ECM takes a further input from a camshaft position sensor.

- **Camshaft position sensor †** – situated in the cam cover. The sensor detects a feature on the camshaft which rotates once per engine firing stroke. The combination of crankshaft and camshaft position sensor inputs allows the ECM to determine which cylinder is on its firing stroke and which is on its exhaust stroke. In this way, the correct point of ignition for each cylinder is determined.

- **Engine coolant temperature sensor** – situated in the thermostat housing above the airbox. Coolant temperature information, received by the ECM, is used to optimise fuelling at all engine temperatures and to calculate hot and cold start fuelling requirements.

- **Throttle position sensor** – situated at the right hand end of the throttle spindle. The throttle position sensor gives a reading in the fully closed position and all other throttle opening angles are calculated using the fully closed position as a base. Throttle angle is used by the ECM to determine fuelling requirements for all throttle positions.

- **Vehicle speed sensor †** – situated at the rear wheel. The vehicle speed sensor detects movement of the rear disc bolts which rotate at the same speed as the rear wheel. By comparing engine speed (as measured by the crankshaft sensor) with the actual vehicle speed, a determination of which gear is selected can be made. Fuelling, air flow and ignition requirements are then adjusted according to gear position. In addition, the vehicle speed sensor input is also used as part of the mechanism which engages the idle speed control system.

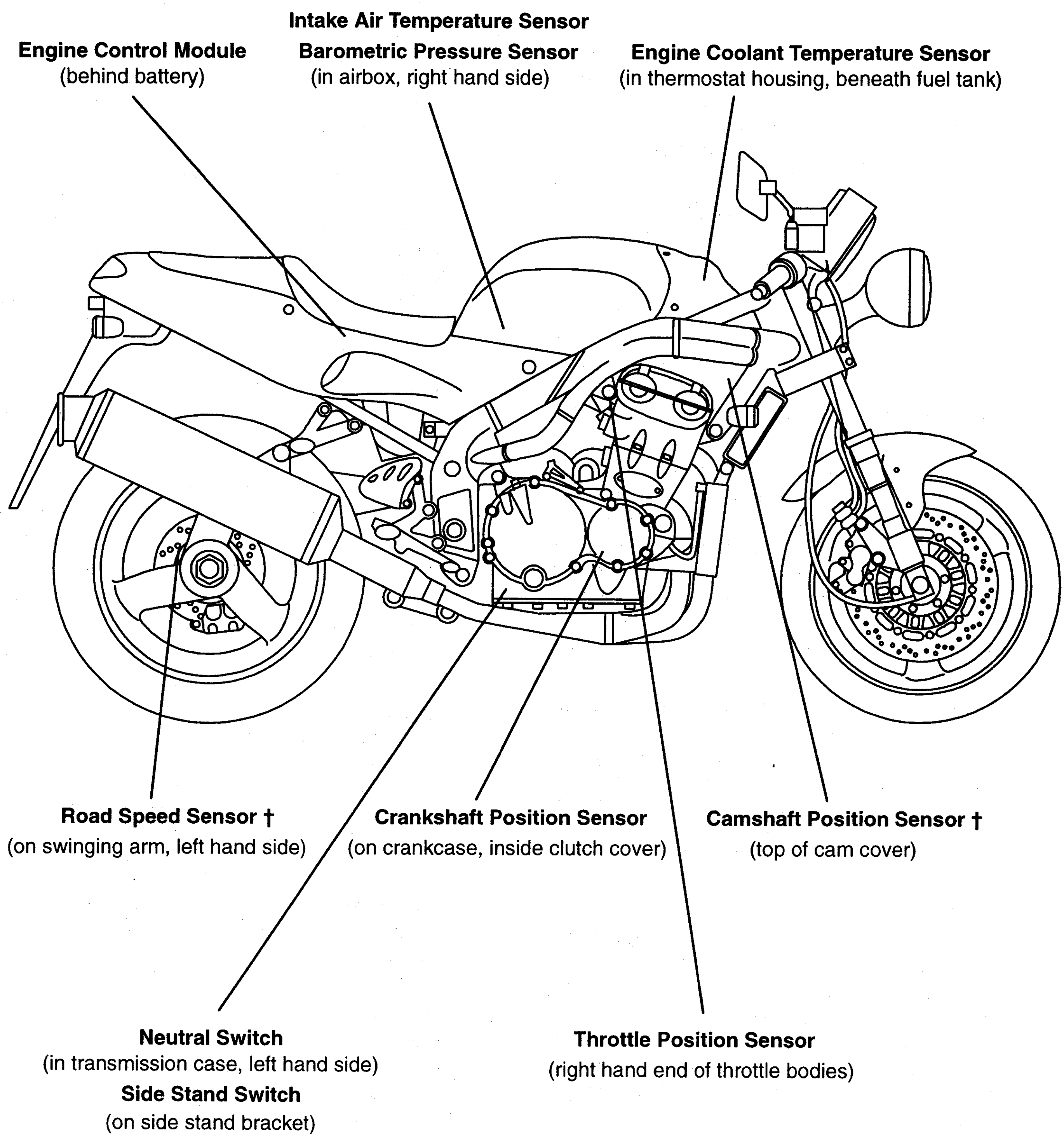
- **Neutral switch** – situated in the gearbox. The neutral switch indicates when the transmission is in neutral. In addition, the neutral switch provides an interlock facility preventing the rider from riding off with sidestand down. If a gear is selected with the sidestand down, the supply to the ECM is removed causing the engine to cut out.

- **Side stand switch** – situated at the top of the sidestand leg. If the sidestand is in the down position, the engine will not run unless the transmission is in neutral or the clutch lever, which also has a switch, is pulled to the handlebar.

† *Removed from later models and the system reconfigured to operate without these sensors*

Engine Management System

Sensor Locations



System Actuators

In response to signals received from the sensors, the ECM directs messages to a series of electronic and electro-mechanical actuators. The function and location of the actuators is given below.

- **Idle Air Control System** – located below the airbox adjacent to the throttle bodies or, on later models, inside the airbox. The system comprises an air control valve fitted with a stepper motor. The system has a controlling influence over the following:
  - Idling.
  - Induction air supply during engine overrun.
  - Air/fuel ratio correction when operating at altitudes above sea level.
  - Cold and hot start air/fuel ratio correction.

  When in operation, the stepper motor opens the air control valve by a variable distance, allowing a controlled supply of air to flow along a series of pipes, into the induction system. The air is fed to a point between the throttle plates and the inlet valves.

  Idling – When the engine is idling, the stepper motor opens the idle air control valve allowing air to be fed to the engine even though the throttles are closed. The distance that the idle air control valve is opened is controlled by the ECM using information received from the coolant temperature sensor, barometric pressure sensor etc. Idle air fuel ratio is adjusted by feeding more or less air to mix with the fuel supplied by the injectors.

  Overrun – During overrun conditions, where air flow into the cylinder is very low, the idle air control system feeds additional air to the induction system allowing normal air/fuel ratios to be maintained. Without the additional air flow, incomplete combustion may take place which could cause unburnt fuel to collect in the exhaust system resulting in backfiring when the throttle is re-opened.

  Altitude correction – If the vehicle is operated at high altitude, the reduced air density will be compensated for by varying the amount of air fed to the engine via the idle air control system. For example, at high altitudes, the idle air control system feeds a greater volume of air to the induction system to compensate for the air's reduced oxygen content.

  Cold and hot start – Except in very cold conditions where a small amount of throttle opening aids cold start performance, the engine is usually started with the throttle in the closed position. The idle air control system regulates the start-up air supply to the induction system.

- **Canister purge valve (California models only)** – situated in the vapour return line between the carbon canister and the throttle. 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 ECM to give control over the rate at which the canister is purged. If the valve was not pulsed, all the stored vapour would immediately be drawn into the engine briefly causing a rich mixture and very high emissions.

- **Injectors** – located in the throttle body assembly. The engine is fitted with 3 twin-jet injectors which are targeted as close as possible to the back face of the inlet valves. The spray pattern of the injectors is fixed but the length of time each injector remains open is variable. The duration of each injection is calculated by the ECM using data received from the various sensors in the system.

- **Plug top ignition coils** – mounted directly onto the top of each spark plug. The ECM controls the point at which the coils are switched on and off. In calculating the switch-on time, the 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.

  The coils may be operated in two modes. During normal operation (engine running) the coils spark once every 720° of crankshaft rotation (once every firing stroke).

  If the camshaft sensor were to fail, the crankshaft and camshaft signals would not synchronise. The ECM would not be able to resolve which was an ignition stroke and which was an exhaust stroke. To ensure continued engine operation with this fault, the coils are fired every 360° of crankshaft rotation (every firing and every exhaust stroke).

- **Main power relay** – situated adjacent to the ECM, beneath the motorcycle seat. When the ignition is switched on, the main power relay is powered up to provide a stable voltage supply for the ECM.

  When the ignition is switched off, the ECM holds the main power relay on so that it can carry out the power down procedure which includes;

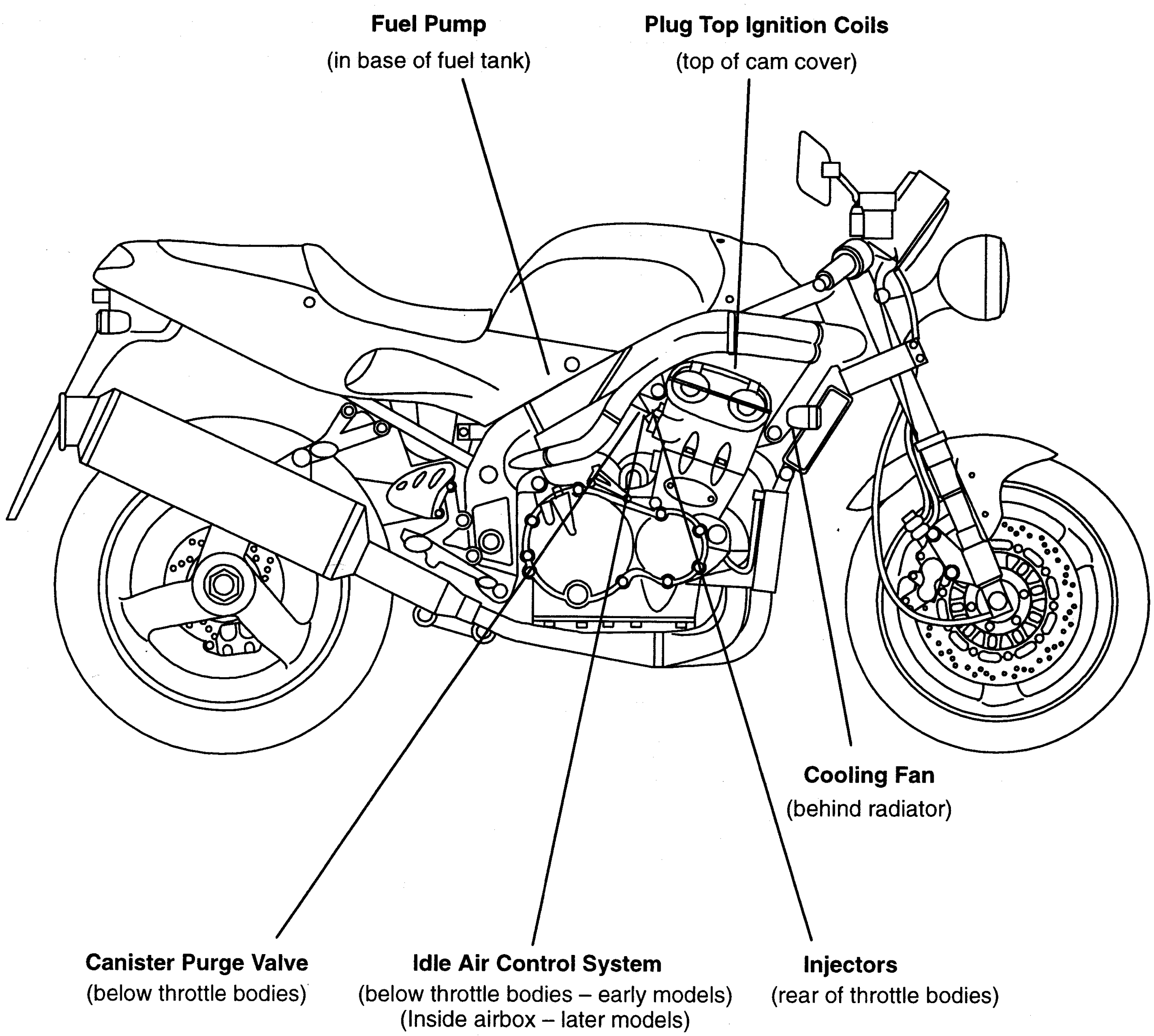
  - writing data to the ECM memory,
  - referencing the position of the idle air control valve stepper motor,
  - running the cooling fan until the engine is sufficiently cool.

  Once all the power down procedures have been carried out, the main power relay is turned off.

- **Fuel pump –** located inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant 3 bar pressure. The pump is run continuously when the engine is rotating and is also run briefly when the ignition is first switched on to ensure that 3 bar is available to the system as soon as the engine is cranked.
- **Cooling fan –** located in front of the radiator. The ECM controls switching on and off of the cooling fan 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 cooling fan is turned on by the ECM. When the coolant temperature falls sufficiently, the ECM turns the cooling fan off. If the engine is switched off when the fan is running, the fan will continue to run until the temperature has been reduced to a normal level.

Engine Management System

Actuator Locations



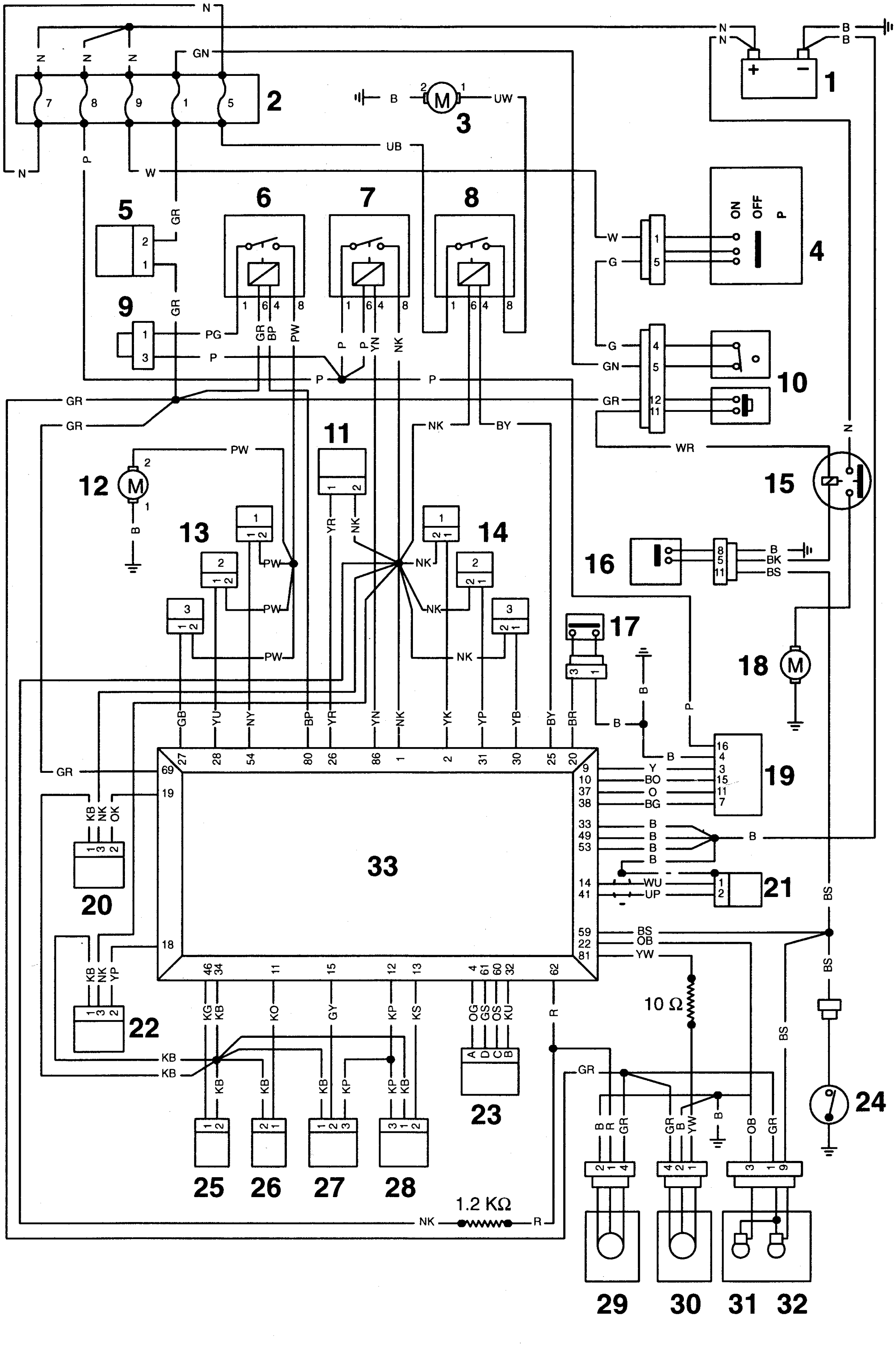
Key To Wiring Circuit Diagram

Key	Item
1	Battery
2	Fusebox
3	Cooling fan
4	Ignition switch
5	Alarm control unit (where fitted)
6	Fuel pump relay
7	ECM Main power relay
8	Cooling fan relay
9	Wire link
10	Engine start/stop switch
11	Purge valve (California models only)
12	Fuel pump
13	Ignition coils
14	Fuel injectors
15	Starter solenoid
16	Clutch lever switch
17	Sidestand switch
18	Starter motor
19	Diagnostic connector
20	Road speed sensor (early models only)
21	Crankshaft sensor
22	Camshaft sensor (early models only)
23	Idle air control valve stepper motor
24	Neutral switch
25	Coolant temperature sensor
26	Inlet air temperature sensor
27	Throttle position sensor
28	Barometric pressure sensor
29	Tachometer
30	Coolant temperature gauge
31	Malfunction indicator lamp (MIL lamp)
32	Neutral warning lamp
33	Engine control module

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Grey
O	Orange
K	Pink
LG	Light Green
R	Red
P	Purple
W	White
Y	Yellow

Circuit Diagram – Engine Management System up to VIN 71698



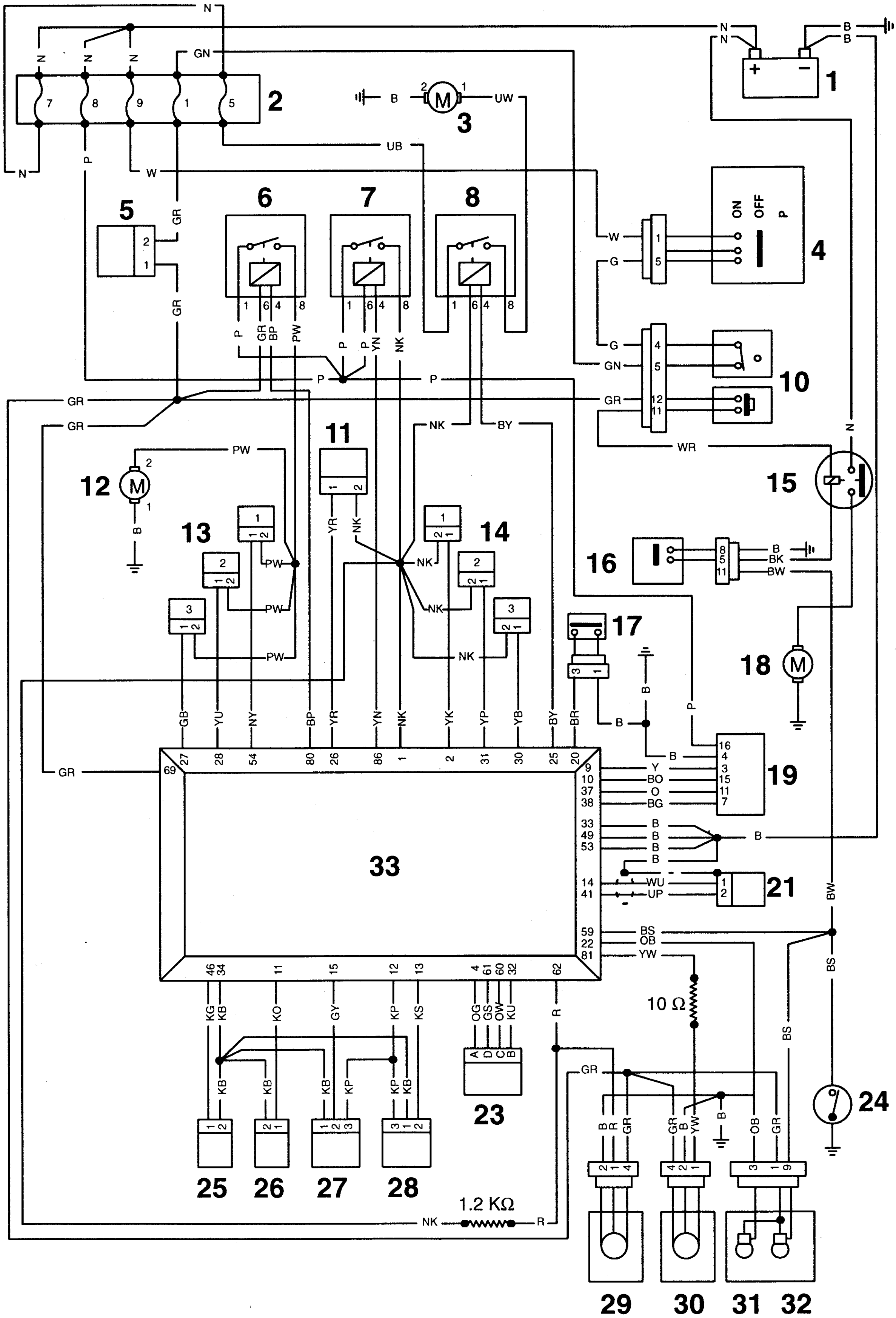
Key To Wiring Circuit Diagram

Key	Item
1	Battery
2	Fusebox
3	Cooling fan
4	Ignition switch
5	Alarm control unit (where fitted)
6	Fuel pump relay
7	ECM Main power relay
8	Cooling fan relay
9	Not applicable
10	Engine start/stop switch
11	Purge valve (California models only)
12	Fuel pump
13	Ignition coils
14	Fuel injectors
15	Starter solenoid
16	Clutch lever switch
17	Sidestand switch
18	Starter motor
19	Diagnostic connector
20	Not used
21	Crankshaft sensor
22	Not used
23	Idle air control valve stepper motor
24	Neutral switch
25	Coolant temperature sensor
26	Inlet air temperature sensor
27	Throttle position sensor
28	Barometric pressure sensor
29	Tachometer
30	Coolant temperature gauge
31	Malfunction indicator lamp (MIL lamp)
32	Neutral warning lamp
33	Engine control module

Key To Wiring Colour Codes

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Grey
O	Orange
K	Pink
LG	Light Green
R	Red
P	Purple
W	White
Y	Yellow

Circuit Diagram – Engine Management System from VIN 71699



System Diagnostics

As mentioned earlier, the engine management system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using a Triumph service tool. **Full details of the tool's operation and how to interpret the results are given elsewhere in this section.**

The tool is connected 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 tool 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 camshaft sensor, the counter will increment its count each time the camshaft 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 pre-determined 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 pre determined 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:

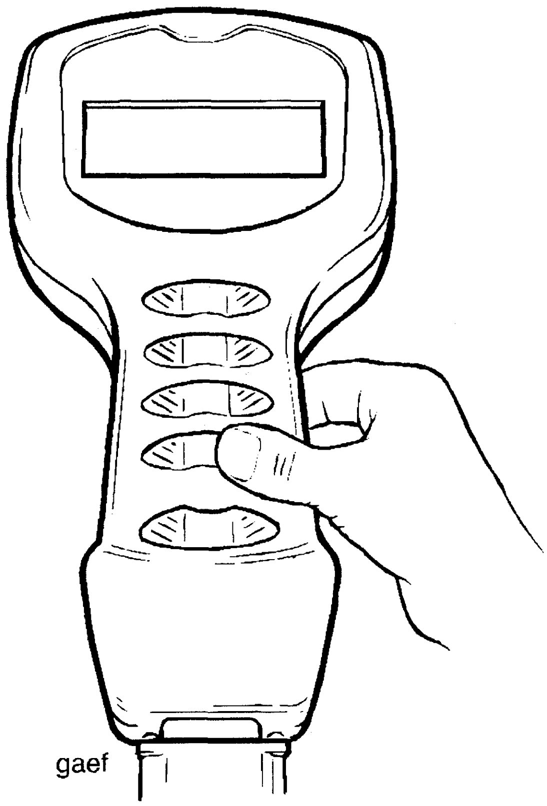
- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.
- A controlled power–down sequence must take place.

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 tool.**

NOTE:

- **In most 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 economy may be marginally affected. In some cases, the rider may not notice any appreciable difference from normal operation.**



Triumph Diagnostic Tool

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 service diagnostic tool.

The tables indicate which tests are performed by the on-board system and what information can be retrieved by the Triumph diagnostic tool.

Full details of how to operate the tool and how to interpret the data follow later in this section.

Current Data

By using the Triumph diagnostic tool, live engine data (engine running) can be recovered from the motorcycle. The data available is:–

Function Examined	Result Reported (Scale)
Calculated load	0–100%
Coolant temperature	–40– +215°C
Idle fuel trim	–100 – + 99.2%
Off idle fuel trim	Not Used
Engine speed	0 – 16,383 RPM
Air temperature	–40 – +215°C
Ignition Advance	–64° – +63.5°
Throttle Position	0–100%
Lambda Fuel Trim *	–100 – + 99%
Fuel system status *	Open or closed loop
Oxygen sensor voltage *	0 – 1.25 Volts.

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 Memorised	Result Reported (Scale)
Calculated load	0–100%
Coolant temperature	–40– +215°C
Idle fuel trim	–100 – + 99.2%
Off idle fuel trim	Not Used
Engine speed	0 – 16,383 RPM
Air temperature	–40 – +215°C
Ignition Advance	–64° – +63.5°
Throttle Position	0–100%
Barometric pressure	0 – 983 mm/Hg
Lambda Fuel Trim *	–100 – + 99%
Fuel system status *	Open or closed loop
Oxygen sensor voltage *	0 – 1.25 Volts.

* **These screen messages will not appear unless a closed loop catalyst system is fitted and a closed loop tune resident in the ECM.**

Function Tests

The system allows the diagnostic tool 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 other, if faults are present, DTCs will be logged.

The function tests available are:–

Function Examined	Result Reported
Fuel pump test	None (observation only)
Fuel pump priming	None (observation only)
Cooling fan	None (observation only)
Instrument panel	Observation/DTCs
Purge valve	DTCs
Idle Air Control Valve	Observation/DTCs

Checks/Adjustments

Adjustments

Using the Triumph diagnostic tool, it is possible to adjust the value of two items which affect the idle speed and idle emission settings of the system.

The tool allows adjustment of these items by making small changes to certain parts of the ECM software.

The values that can be adjusted are

Setting Adjusted	Setting Affected
Closed Throttle position	Voltage value of closed throttle threshold
Idle fuelling (not applicable on closed loop catalysts models)	Idle emissions
Adaptive stepper position	IACV start point
Long term fuel trim (applicable on closed loop catalysts models)	Fuel mixture

NOTE:

- **In special circumstances, Triumph will make available a password which can be keyed into the tool which will allow download of a completely new engine tune. This special facility will be made available only when necessary. For example, this may be necessary if a motorcycle is transferred to a country or area where legislation requires a different tune to the original version installed at the factory.**

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 tool as a four digit code, as required by California legislation.

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 tool

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
P0335	Crankshaft sensor circuit malfunction	3	40	Yes
P1335	Crankshaft sensor incorrect sequence pattern	3	40	Yes
P0340	Camshaft sensor malfunction	3	40	Yes
P0341	Camshaft sensor circuit fault	3	40	Yes
P1340	Camshaft sensor excessive electrical interference	3	40	Yes
P1341	Camshaft sensor incorrect sequence pattern	3	40	Yes
P0505	Idle air control valve system malfunction	3	40	Yes
P0201	Injector 1 circuit malfunction	3	40	Yes
P0202	Injector 2 circuit malfunction	3	40	Yes
P0203	Injector 3 circuit malfunction	3	40	Yes
P1201	Injector 1 open circuit/short to ground	3	40	Yes
P1202	Injector 2 open circuit/short to ground	3	40	Yes
P1203	Injector 3 open circuit/short to ground	3	40	Yes
P1205	Injector 1 short to battery voltage/over temperature	3	40	Yes
P1206	Injector 2 short to battery voltage/over temperature	3	40	Yes
P1207	Injector 3 short to battery voltage/over temperature	3	40	Yes
P0105	Barometric pressure sensor circuit malfunction	3	40	Yes
P0122	Throttle position sensor low input	3	40	Yes
P0123	Throttle Position sensor high input	3	40	Yes
P0444	Purge valve system open circuit/short circuit to ground	3	40	Yes
P0445	Purge valve system short circuit to battery voltage/ over temperature	3	40	Yes
P0351	Ignition coil 1 malfunction	3	40	Yes
P0352	Ignition coil 2 malfunction	3	40	Yes
P0353	Ignition coil 3 malfunction	3	40	Yes

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
P1351	Ignition coil 1 open circuit/short circuit to ground	3	40	Yes
P1352	Ignition coil 2 open circuit/short circuit to ground	3	40	Yes
P1353	Ignition coil 3 open circuit/short circuit to ground	3	40	Yes
P1355	Ignition coil 1 short to battery voltage/over temperature	3	40	Yes
P1356	Ignition coil 2 short to battery voltage/over temperature	3	40	Yes
P1357	Ignition coil 3 short to battery voltage/over temperature	3	40	Yes
P0117	Engine coolant temperature too high	3	40	Yes
P0118	Engine coolant temperature too low	3	40	Yes
P0119	Engine coolant sensor high voltage	3	40	Yes
P0110	Intake air temperature sensor circuit malfunction	3	40	Yes
P0112	Intake air temperature too high	3	40	Yes
P0113	Intake air temperature too low	3	40	Yes
P0230	Fuel pump relay fault	3	40	Yes
P1231	Fuel pump relay open circuit	3	40	Yes
P1232	Fuel pump relay short circuit	3	40	Yes
P0500	Vehicle speed sensor malfunction	3	40	Yes
P1560	Sensor supply voltage circuit fault	3	40	Yes
P0560	System voltage malfunction	3	40	Yes
P0562	System voltage low	3	40	Yes
P0563	System voltage high	3	40	Yes
P1601	MIL open circuit/short to ground	N/A	40	No
P1602	MIL short to battery voltage	N/A	40	No
P0131	Lambda sensor ground too high	3	40	Yes
P0132	Lambda sensor signal too high	3	40	Yes
P0133	Lambda sensor over voltage	3	40	Yes
P0135	Lambda sensor heater malfunction	3	40	Yes
P0170	Lambda feedback fuel trim malfunction	3	40	Yes
P1172	Lambda feedback maximum enleanment	3	40	Yes
P1171	Lambda feedback maximum enrichment	3	40	Yes
P1178	Lambda feedback reached maximum air leakage adaption	3	40	Yes
P1179	Lambda feedback reached minimum air leakage adaption	3	40	Yes

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
P1552	Cooling fan relay short circuit/open circuit	3	40	Yes
P1553	Cooling fan relay short to battery voltage/over temperature	3	40	Yes
P1116	Coolant temperature gauge short circuit/open circuit	N/A	40	No
P1117	Coolant temperature gauge short to battery voltage/over temperature	N/A	40	No
P1386	Tachometer short circuit/open circuit	N/A	40	No
P1387	Tachometer short to battery voltage/over temperature	N/A	40	No
P0462	Fuel sensor circuit low input	N/A	40	No
P0463	Fuel sensor circuit high input	N/A	40	No
P1611	Low fuel level indicator lamp short circuit to ground/open circuit	N/A	40	No
P1612	Low fuel level indicator lamp short to Vbatt	N/A	40	No
P1621	Fuel gauge short circuit to ground/open circuit	N/A	40	No
P1622	Fuel gauge short circuit to Vbatt	N/A	40	No

Checks

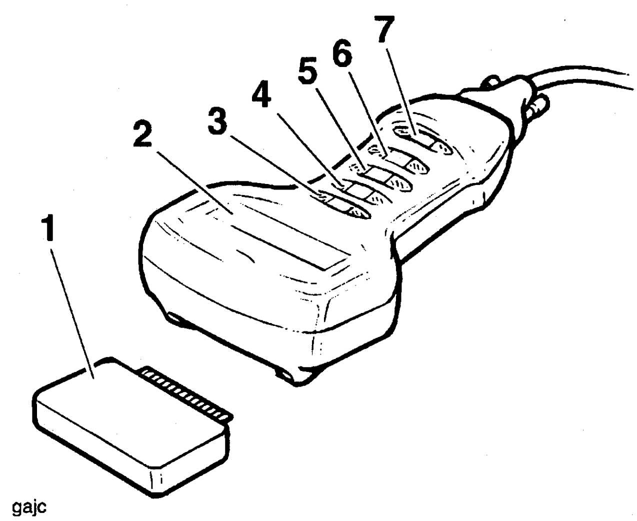
When using this function It is possible to check the status of various sensors and actuators and also check certain items of factory data logged during vehicle assembly.

It is also possible to check when the ECM was last interrogated for stored information and who the dealer was that did it.

The data available is:–

Item Checked	Result Unit
Air temperature sensor	Volts
Air temperature	Degrees Celsius
Coolant temperature sensor	Volts
Coolant temperature	Degrees Celsius
Engine speed	RPM
Idle reference speed	RPM
Battery voltage	Volts
Sensor reference voltage	Volts
Injector pulse time	Milliseconds
Barometric pressure	mm/Hg
Calculated load	Percentage
Target dwell time	Milliseconds
Ignition timing	Degrees BTDC/ATDC
Throttle voltage	Volts
Corrected Throttle position	Percentage
Purge valve duty cycle	Percentage
Idle air control valve stepper position	Incremental steps ranging from 0 to 255
Ignition switch position	On/Off
Cooling fan status	On/Off
Sidestand status	Up/Down
Neutral switch status	Neutral/In gear

Service Diagnostic Tool



1. Memory card

2. Screen

3. Return key

4. Up key

5. Down key

6. Validate key

7. Help key

The memory card (1) contains all the information necessary to allow the technician to follow a number of different paths to:

- Diagnose faults
- Obtain data
- Make checks / adjustments

It is removeable to allow replacement / update cards to be inserted.

The screen (2) comprises 4 horizontal lines and 20 vertical columns forming a series of boxes into which letters and numbers can be displayed to provide the necessary question, message, answer etc.

At the left of the screen, one or more symbols as detailed below may be displayed.

	D I A G N O S T I C S
	C U R R E N T D A T A
▶	R E A D S T O R E D D T C S
▼	F U N C T I O N T E S T S

Typical screen showing symbol examples

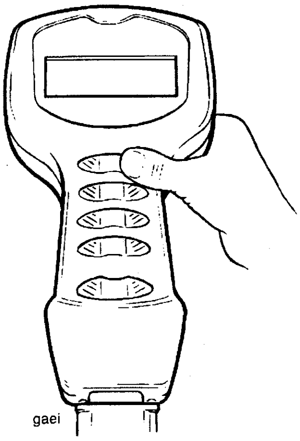
▲▼ Cursors to indicate that further lines of text are available to be seen above and/or below those already in view, by scrolling the text up or down using the 'Up' or 'Down' keys.

▶ Cursor to show which line of text is 'Active'.

? Indicates further help/guidance information available on that line by pressing the help key.

Tool Keys

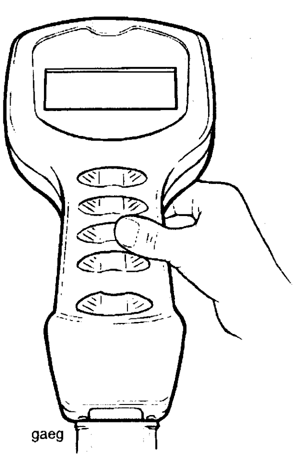
In most cases, the **Return** key (↵) enables the user to return to the screen last displayed.



gaei

Return key

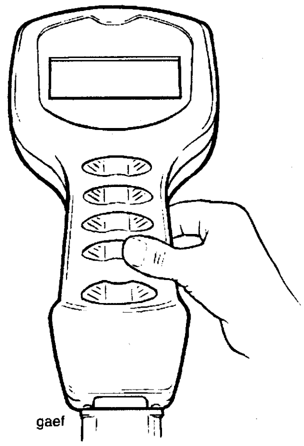
The **Up** and **Down** keys – press to move the lines of text up or down. They are also used to enter the Dealer number and the date.



gaeg

Up/down keys (2 separate keys)

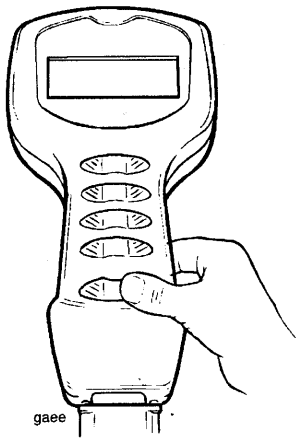
Press the **Validation** key (✱) to move on to the next message.



gaef

Validation key

The **Help** key can be used when the **'?'** symbol shows, to get more information about that line of text . To return to the diagnostic screen from the help area, press the help **'?'** button again.



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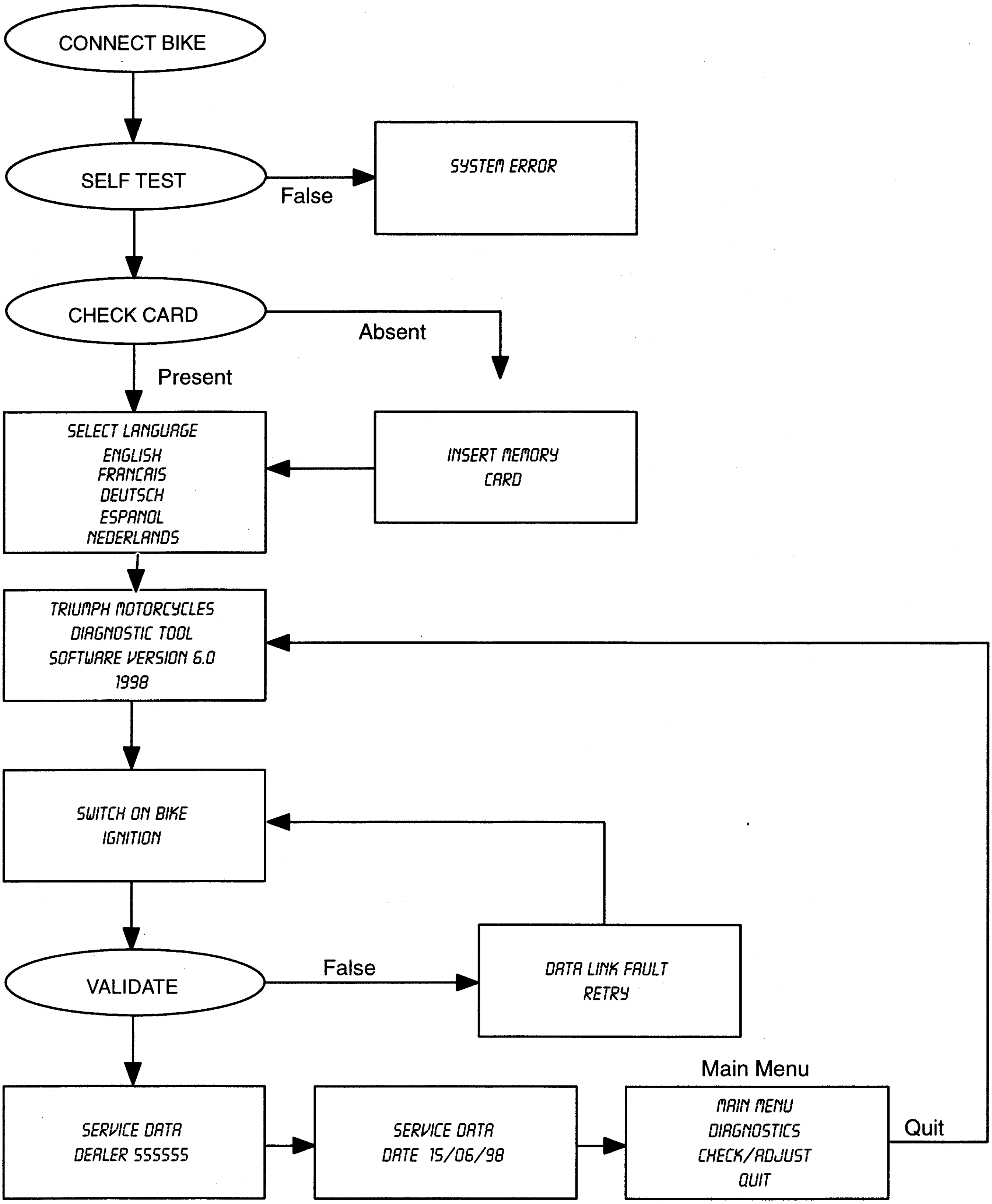
Help key

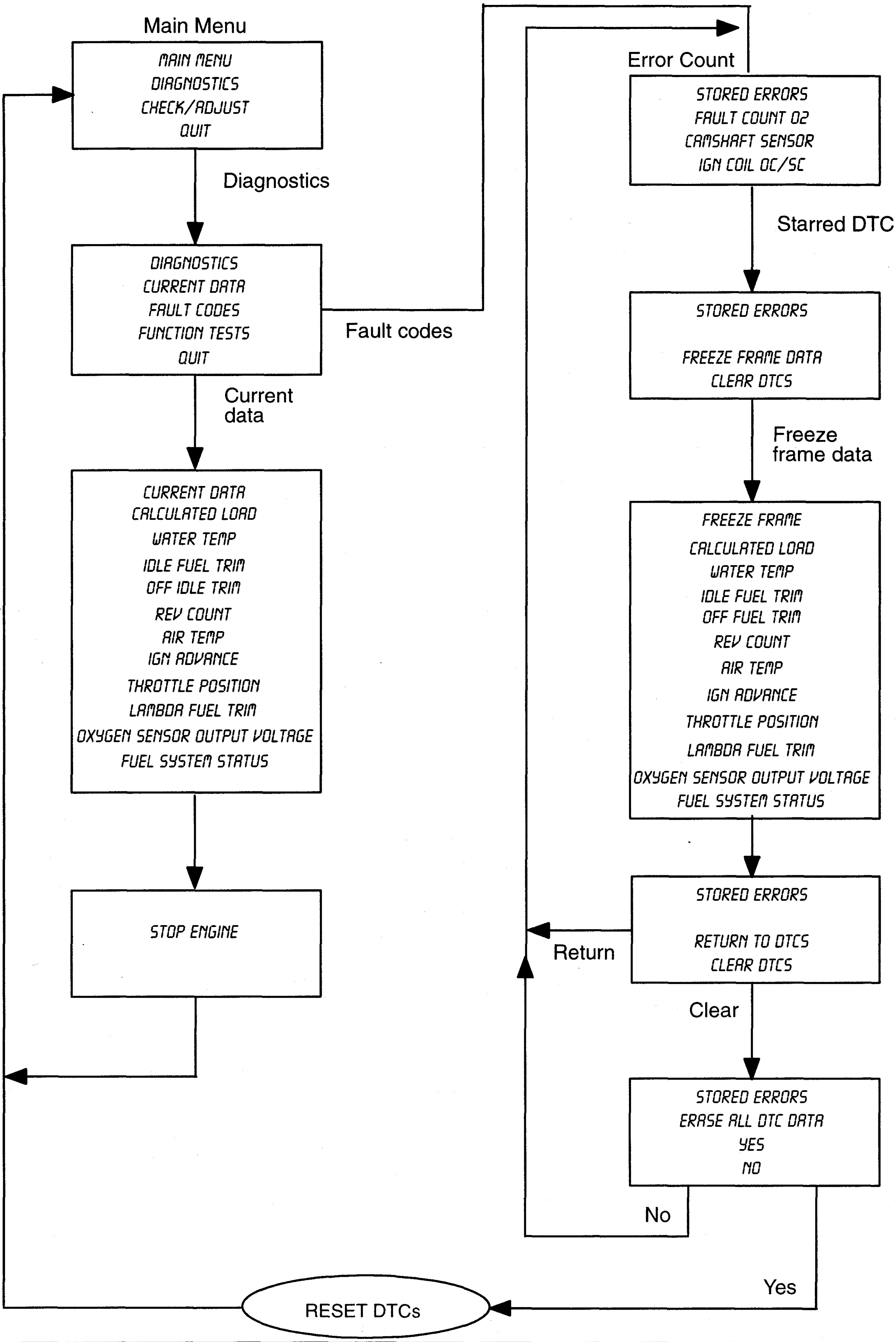
TEST PROCEDURE

The following describes the procedure to follow when using the service diagnostic tool. It does not cover the further diagnosis that must be carried out once a fault area has been identified. For details of the procedure to follow when a fault area or fault code has been identified, refer to the diagnosis details later in this section.

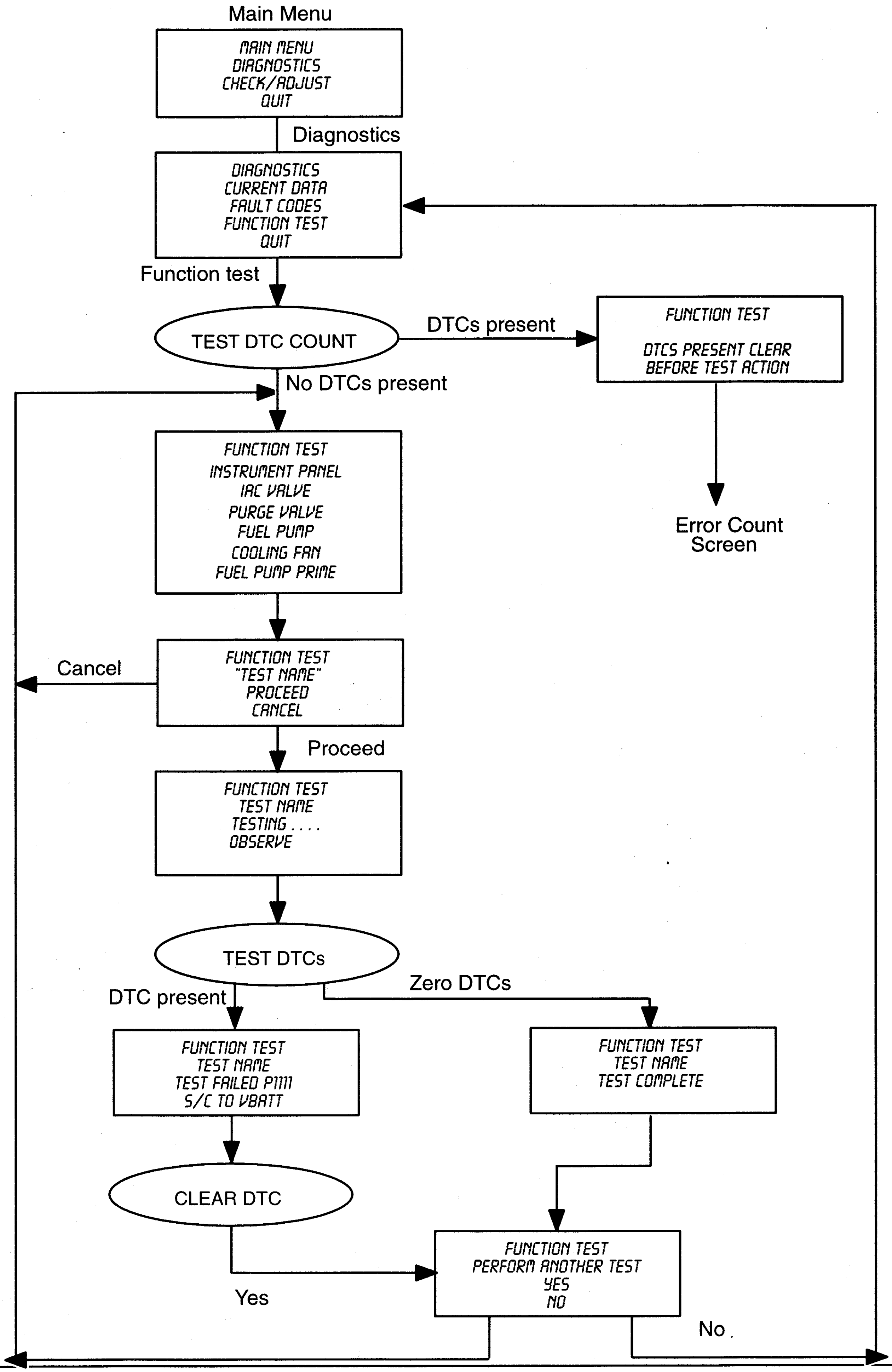
NOTE:

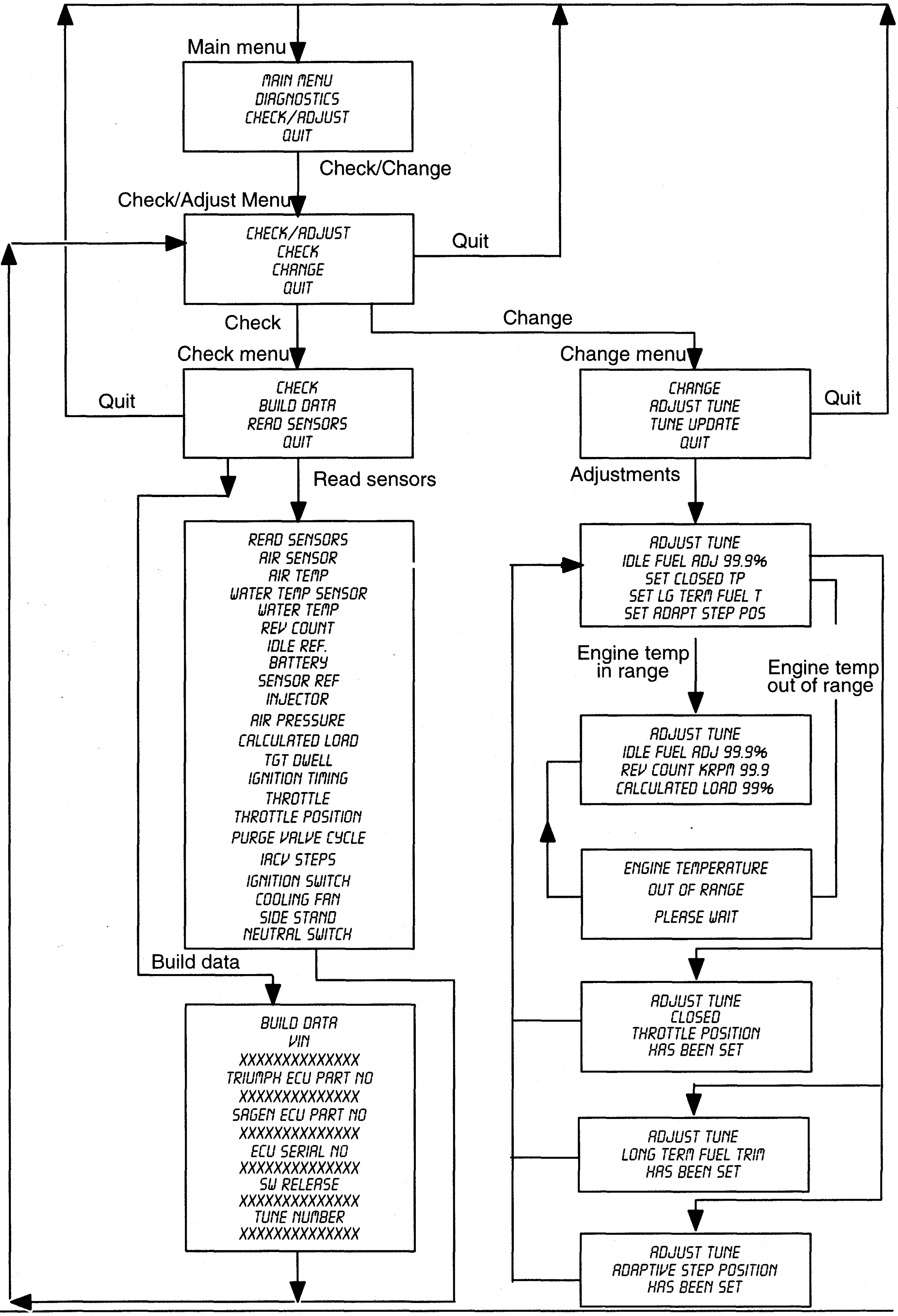
- **The tool does not retain any memory of faults, diagnosis etc. carried out on any particular motorcycle. Any such memory is only retained in the motorcycle's ECM.**
- **The following five pages describe the tool operations in flow chart form.**

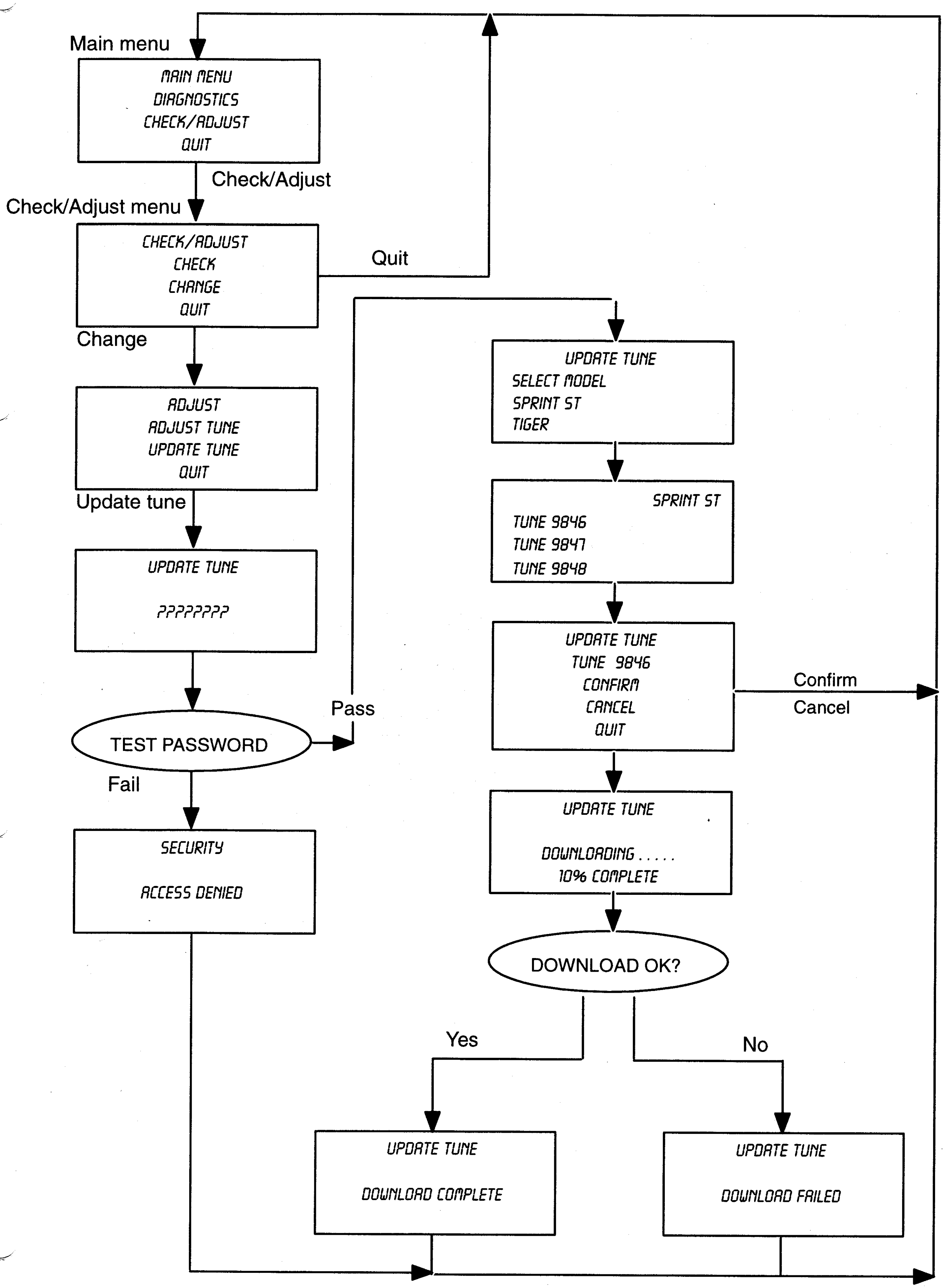

CONNECT BIKE
SELF TEST
False
SYSTEM ERROR
CHECK CARD
Absent
Present
SELECT LANGUAGE
ENGLISH
FRANCAIS
DEUTSCH
ESPANOL
NEDERLANDS
INSERT MEMORY
CARD
TRIUMPH MOTORCYCLES
DIAGNOSTIC TOOL
SOFTWARE VERSION 6.0
1998
SWITCH ON BIKE
IGNITION
VALIDATE
False
DATA LINK FAULT
RETRY
Main Menu
SERVICE DATA
DEALER 555555
SERVICE DATA
DATE 15/06/98
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Quit



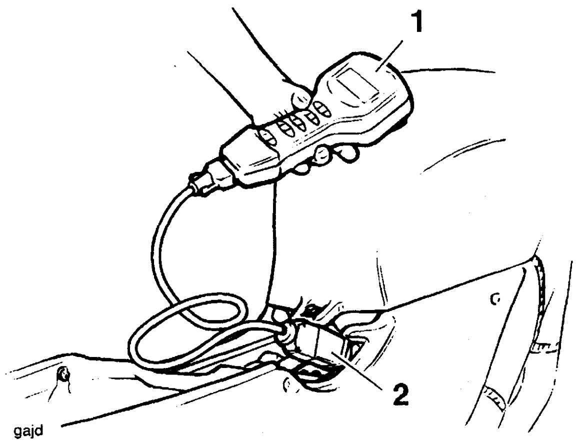
Main Menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Diagnostics
DIAGNOSTICS
CURRENT DATA
FAULT CODES
FUNCTION TESTS
QUIT
Fault codes
Current data
CURRENT DATA
CALCULATED LOAD
WATER TEMP
IDLE FUEL TRIM
OFF IDLE TRIM
REV COUNT
AIR TEMP
IGN ADVANCE
THROTTLE POSITION
LAMBDA FUEL TRIM
OXYGEN SENSOR OUTPUT VOLTAGE
FUEL SYSTEM STATUS
STOP ENGINE
Error Count
STORED ERRORS
FAULT COUNT 02
CAMSHAFT SENSOR
IGN COIL OC/SC
Starred DTC
STORED ERRORS
FREEZE FRAME DATA
CLEAR DTCS
Freeze frame data
FREEZE FRAME
CALCULATED LOAD
WATER TEMP
IDLE FUEL TRIM
OFF FUEL TRIM
REV COUNT
AIR TEMP
IGN ADVANCE
THROTTLE POSITION
LAMBDA FUEL TRIM
OXYGEN SENSOR OUTPUT VOLTAGE
FUEL SYSTEM STATUS
STORED ERRORS
RETURN TO DTCS
CLEAR DTCS
Return
Clear
STORED ERRORS
ERASE ALL DTC DATA
YES
NO
No
Yes
RESET DTCs


Main Menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Diagnostics
DIAGNOSTICS
CURRENT DATA
FAULT CODES
FUNCTION TEST
QUIT
Function test
TEST DTC COUNT
DTCs present
FUNCTION TEST
DTCS PRESENT CLEAR
BEFORE TEST ACTION
Error Count
Screen
No DTCs present
FUNCTION TEST
INSTRUMENT PANEL
IAC VALVE
PURGE VALVE
FUEL PUMP
COOLING FAN
FUEL PUMP PRIME
Cancel
FUNCTION TEST
"TEST NAME"
PROCEED
CANCEL
Proceed
FUNCTION TEST
TEST NAME
TESTING . . . .
OBSERVE
TEST DTCs
DTC present
Zero DTCs
FUNCTION TEST
TEST NAME
TEST FAILED P1111
S/C TO VBATT
FUNCTION TEST
TEST NAME
TEST COMPLETE
CLEAR DTC
Yes
FUNCTION TEST
PERFORM ANOTHER TEST
YES
NO
No


Main menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Check/Change
Check/Adjust Menu
CHECK/ADJUST
CHECK
CHANGE
QUIT
Quit
Check
Change
Check menu
Change menu
CHECK
BUILD DATA
READ SENSORS
QUIT
Quit
CHANGE
ADJUST TUNE
TUNE UPDATE
QUIT
Quit
Read sensors
Adjustments
READ SENSORS
AIR SENSOR
AIR TEMP
WATER TEMP SENSOR
WATER TEMP
REV COUNT
IDLE REF.
BATTERY
SENSOR REF
INJECTOR
AIR PRESSURE
CALCULATED LOAD
TGT DWELL
IGNITION TIMING
THROTTLE
THROTTLE POSITION
PURGE VALVE CYCLE
IACV STEPS
IGNITION SWITCH
COOLING FAN
SIDE STAND
NEUTRAL SWITCH
ADJUST TUNE
IDLE FUEL ADJ 99.9%
SET CLOSED TP
SET LG TERM FUEL T
SET ADAPT STEP POS
Engine temp in range
Engine temp out of range
ADJUST TUNE
IDLE FUEL ADJ 99.9%
REV COUNT KRPM 99.9
CALCULATED LOAD 99%
ENGINE TEMPERATURE
OUT OF RANGE
PLEASE WAIT
Build data
BUILD DATA
VIN
XXXXXXXXXXXXXX
TRIUMPH ECU PART NO
XXXXXXXXXXXXXX
SAGEN ECU PART NO
XXXXXXXXXXXXXX
ECU SERIAL NO
XXXXXXXXXXXXXX
SW RELEASE
XXXXXXXXXXXXXX
TUNE NUMBER
XXXXXXXXXXXXXX
ADJUST TUNE
CLOSED
THROTTLE POSITION
HAS BEEN SET
ADJUST TUNE
LONG TERM FUEL TRIM
HAS BEEN SET
ADJUST TUNE
ADAPTIVE STEP POSITION
HAS BEEN SET


Main menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Check/Adjust
Check/Adjust menu
CHECK/ADJUST
CHECK
CHANGE
QUIT
Quit
Change
ADJUST
ADJUST TUNE
UPDATE TUNE
QUIT
Update tune
UPDATE TUNE
????????
TEST PASSWORD
Pass
Fail
SECURITY
ACCESS DENIED
UPDATE TUNE
SELECT MODEL
SPRINT ST
TIGER
SPRINT ST
TUNE 9846
TUNE 9847
TUNE 9848
UPDATE TUNE
TUNE 9846
CONFIRM
CANCEL
QUIT
Confirm
Cancel
UPDATE TUNE
DOWNLOADING . . . . .
10% COMPLETE
DOWNLOAD OK?
Yes
No
UPDATE TUNE
DOWNLOAD COMPLETE
UPDATE TUNE
DOWNLOAD FAILED

1. CONNECTION AND POWER-UP



1. Tool

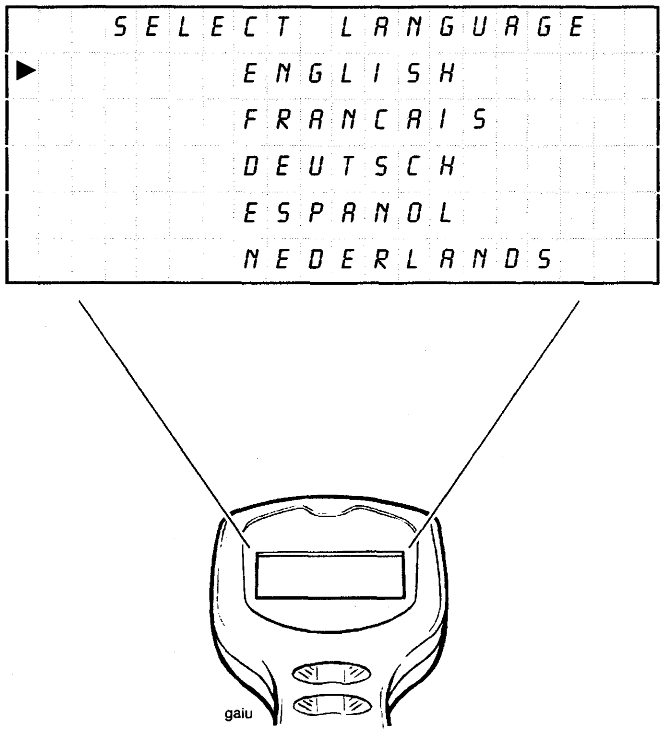
2. Connection to Main Harness

Connect the tool to the dedicated multiplug under the seat.

A message appears on the screen and certain checks are made automatically, e.g. Is the memory card fitted ?

'SELECT LANGUAGE' will then be displayed.

2. SELECT LANGUAGE



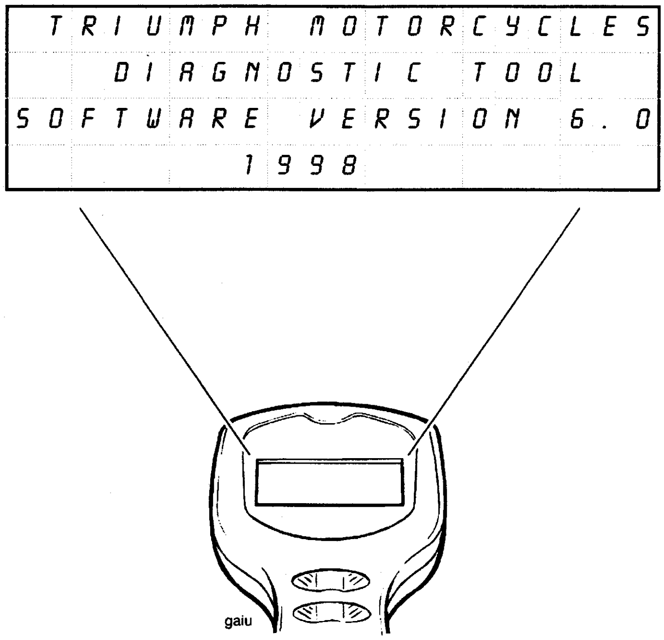
Use the 'Up' and 'Down' keys to move the cursor in column 1 and select the language required.

NOTE:

- **The tool will always select English as the default language, and it is only necessary to use the cursor to select one of the other languages. The entire diagnostic session will then continue in the chosen language.**

Press the validation key '✳' to move on.

3. TRIUMPH MOTORCYCLES

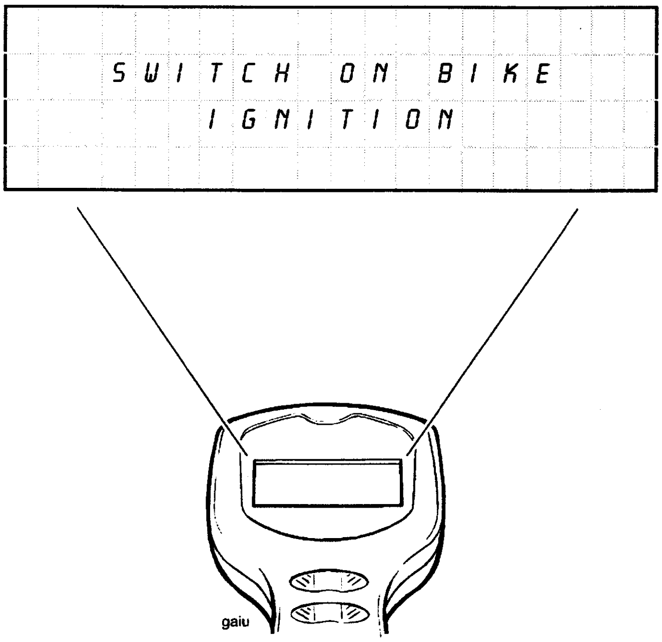


The screen will display the message 'Triumph Motorcycles Diagnostic Tool' and will also give the diagnostic software version and the software release year.

Press the validation key '✳' to move on.

If the Return key (↵) is pressed, the tool will return to the **'SELECT LANGUAGE'** display.

4. SWITCH ON BIKE IGNITION



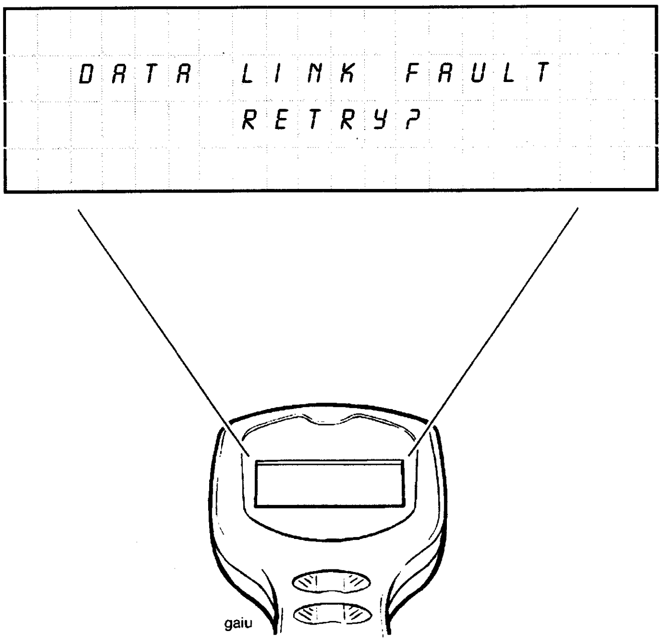
Switch on the ignition. Do NOT start the engine.

Press the validation key '✳'. During a short delay period the tool will carry out certain validation checks.

If it detects a problem which will invalidate the test, **'DATA LINK FAULT RETRY?'** will be displayed.

If all is OK, **'SERVICE DATA'** will appear on the screen.

5. DATA LINK FAULT RETRY?



If the above is displayed, check that the ignition is switched on.

If the ignition is already on, the problem may be caused by bad connections, faulty ignition switch, cable break, faulty ECM, flat battery etc.

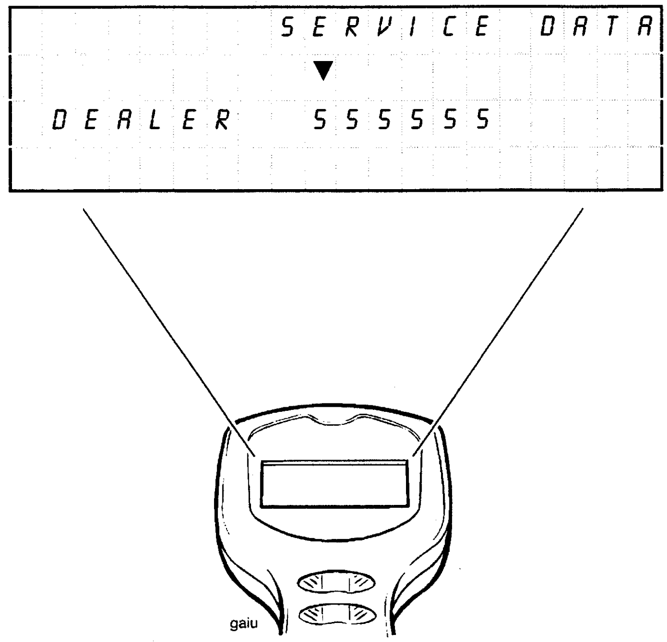
Press the **Help** key '**?**' for advice.

Rectify the problem and press the Validation key '✳' to return to **'SWITCH ON BIKE IGNITION'**.

Press the Validation key '✳' again. If the tool accepts that the problem has been rectified, **'SERVICE DATA'** will be displayed.

This is the first of 2 screens for which the operator has to input information, without which the testing cannot proceed further.

6. SERVICE DATA – DEALER



Enter your Dealer number as follows:

The number **'555555'** is displayed, with the cursor pointing down at the first digit.

Press the 'Up' or 'Down' keys to change this digit to the first digit of your dealer code.

Press the Validation key '✳'.

The cursor will now re-position over the second digit '5'. Enter the 2nd digit of your Dealer number in the same way.

Continue until all 5 digits of your dealer code have been entered.

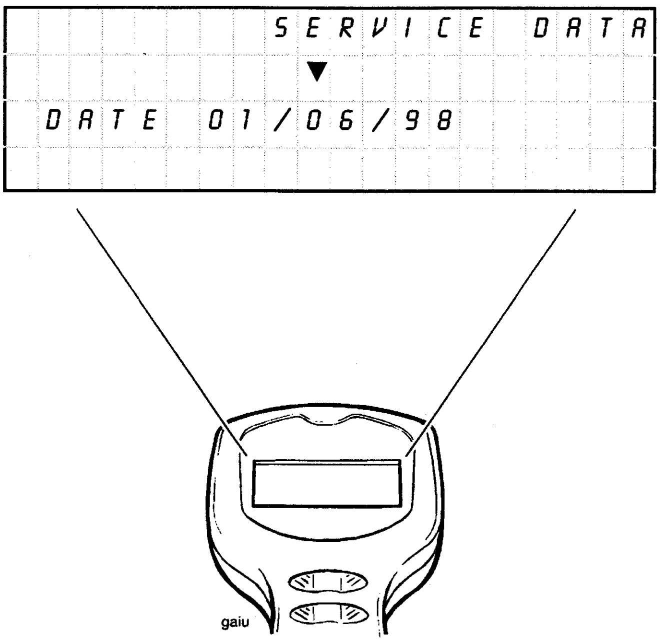
NOTE:

- **If any digit has been entered incorrectly, press the 'Return' key (↵) to start again.**

When all 5 digits have been entered correctly, press the Validation key '✳'.

You must enter a valid Dealer Number to continue. If you do not know your dealer number, contact Triumph or your importer for advice.

7. SERVICE DATA – DATE



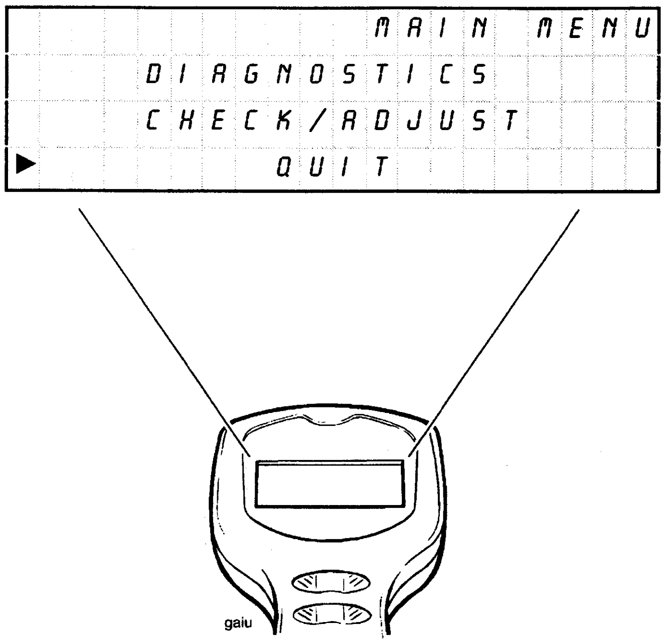
Enter the date using the 'Up' and 'Down' keys in the same way that the Dealer number was entered.

NOTE:

- **6 digits must always be entered, e.g. if it is the 7th month this must be entered as 07.**
- **The date must be entered in the order Day/Month / Year.**

When complete, press the Validation key '✱' to display – **'MAIN MENU'**.

8. MAIN MENU



When this screen is displayed, you have to decide whether to proceed along one of two routes:

– **'DIAGNOSTICS'**
– **'CHECK/ADJUST'**

The **'DIAGNOSTICS'** menu provides access to:

Current data e.g. actual engine temperature, engine speed etc.

Diagnostic Trouble Codes (DTC's) i.e. access to codes stored in the motor cycle ECM which indicate a confirmed fault(s) in the system.

Function tests e.g. of tachometer, water temperature gauge, fuel pump etc.

The **'CHECK/ADJUST'** menu provides:

Checks i.e. build information, system data.

Adjustments e.g. adjustment of idle fuel, RPM etc., and entry of software updates.

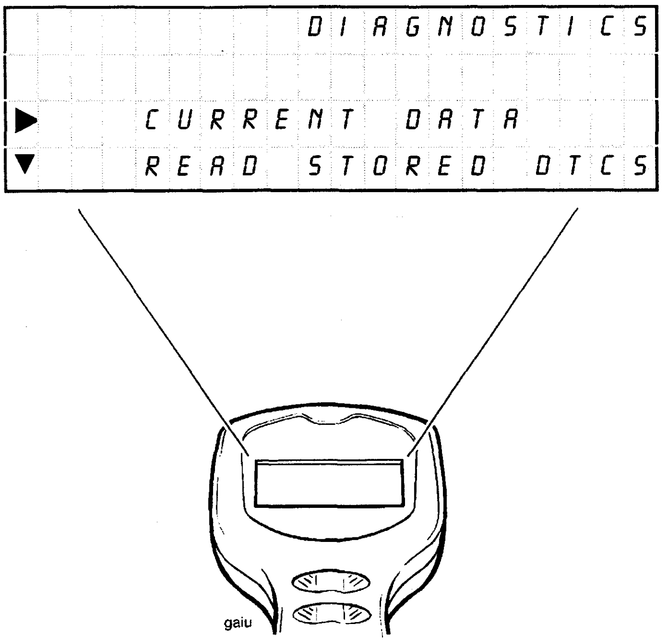
Use the 'Up and Down' keys to position the cursor opposite the desired choice, and press the Validation key '✱'.

Either **'DIAGNOSTICS'** (operation 9) or **'CHECK/ADJUST'** (operation 27) will be displayed, dependent on the selection.

NOTE:

- **If 'QUIT' is selected and the validation key '✱' pressed, the display will return to 'TRIUMPH MOTORCYCLES'.**

9. DIAGNOSTICS *(If 'DIAGNOSTICS' is selected)*



This display is the **'DIAGNOSTICS'** menu.

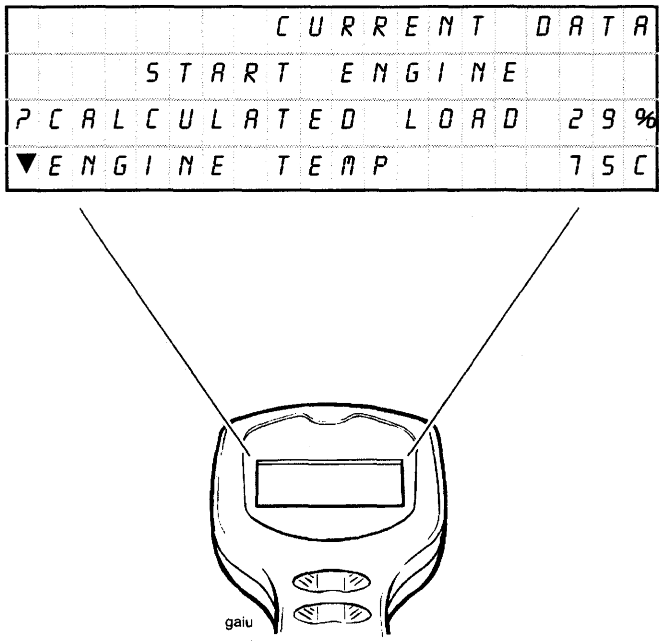
Use the 'Up' and 'Down' keys to scroll the text until the horizontal arrowhead is positioned opposite the desired choice, and press the Validation key '✳'.

The choices are:

- **'CURRENT DATA'** (see operation 10)
- **'READ STORED DTCS'** (see operation 12)
- **'FUNCTION TESTS'** (see operation 18)
- If **'QUIT'** is selected, the display will return to **'TRIUMPH MOTORCYCLES'**.

*** Closed loop models only.**

10. CURRENT DATA



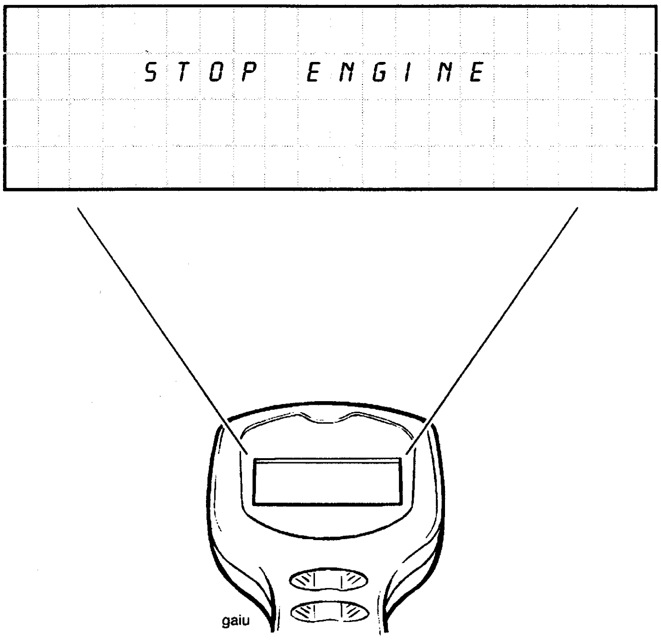
Start the engine. **'CURRENT DATA'** includes the information shown in the table below which can be accessed by scrolling, using the 'Up' and 'Down' keys. At the end of each line of text, the actual reading at that instant is provided to assist diagnosis e.g. **ENGINE TEMP 95C.**

CURRENT DATA AVAILABLE	
Function Examined	**Result Reported (Scale)**
Faults stored (quantity)	1–127
Calculated load	0–100%
Coolant temperature	–40– +215°C
Idle fuel trim	–100 – + 99.2%
Off idle fuel trim	Not used
Engine speed	0 – 16,383 RPM
Air temperature	–40 – +215°C
Ignition Advance	–64° – +63.5°
Throttle Position	0–100%
Lambda fuel trim *	–100 – + 99%
Fuel system status *	Open or closed loop
Oxygen sensor voltage *	0 – 1.25 Volts.

If further clarification of any line of displayed text is required, scroll that line opposite the '**?**' symbol in the left hand column and press the **Help** key (**?**). Limited information on the selected topic will then be displayed.

Press any key to return to the **'CURRENT DATA'** text. When all information has been noted, press either the Validation '✳' or Return (↵) keys.

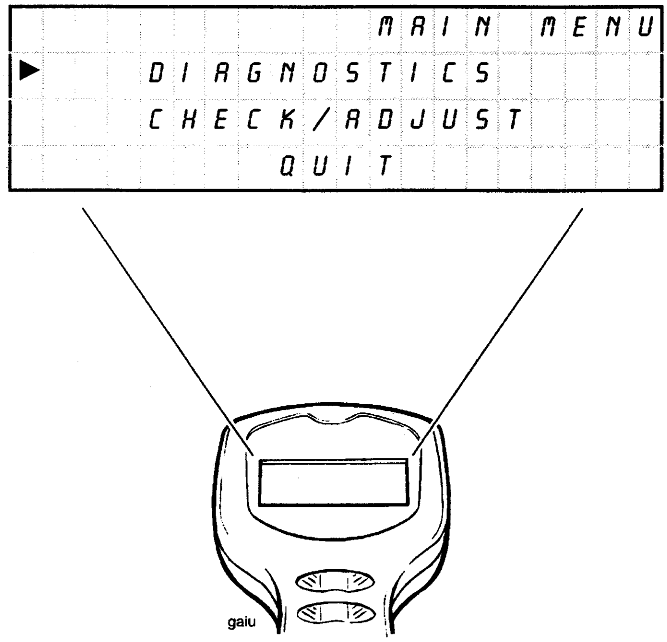
11. STOP ENGINE



Switch off the engine.

As the tool is powered from the motorcycle, this will end the diagnostic session. To continue, return to the power–up section and select tests as required.

12. To select 'READ STORED DTCS' (Diagnostic Trouble Codes) from the MAIN MENU:–



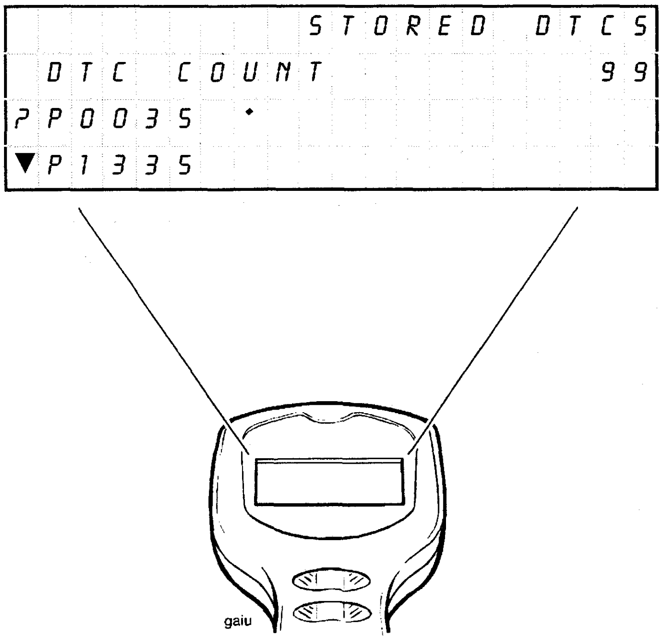
Use the 'Up' and 'Down' keys to position the cursor opposite **DIAGNOSTICS.**

Press the Validation key '✳' to display **'DIAGNOSTICS'** menu.

Select **'READ STORED DTCS'**, and press the Validation key '✳'.

'STORED DTCS' will be displayed.

13. STORED DTCS



The second line – **'DTC COUNT',** shows the number of DTC's stored in the ECM memory.

Lines 3 and 4 display up to two of the DTC'S stored (if any). If additional DTC'S are stored, this will be indicated by a downward pointing arrowhead, and it/they can be accessed using the 'Up' and 'Down' keys.

If there are no DTC's shown, press the Return key (↵) to return to **MAIN MENU**.

(If DTC's are present when the Return key is pressed, display will read **'STORED DTCS, ERASE ALL DTC DATA YES/NO'.**)

Information about each DTC can be obtained by scrolling the text until the appropriate code is opposite the '**?**' in line 3; then press the **Help** key (**?**).

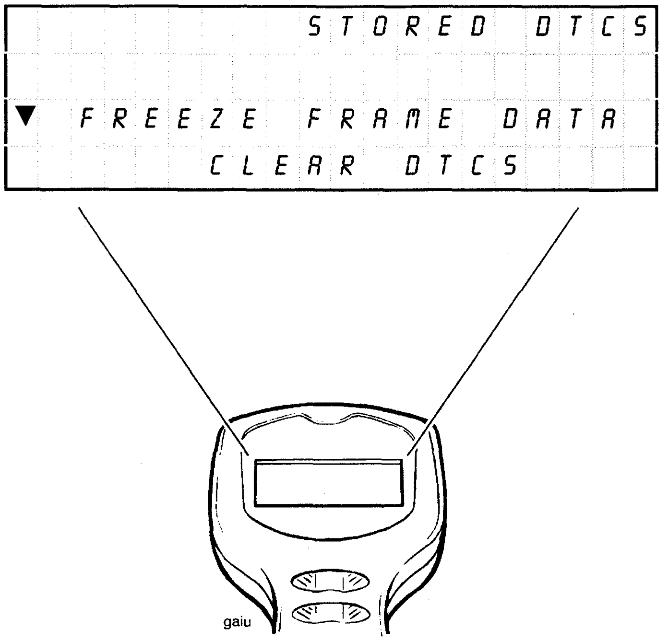
DTC example:	*P0035*
Help text	*CRANKSHAFT SENSOR CIRCUIT MALFUNCTION*

Press the Validation key '✳' to continue (operation 14).

IMPORTANT:

If a DTC has an asterisk (*) to its right, this indicates that a snap shot of engine data at the time the DTC was stored is available to aid your fault diagnosis. To access this information, press the Validation key '✳' to go to operation 14 and open **'FREEZE FRAME DATA'**.

14. Three options are now available:–

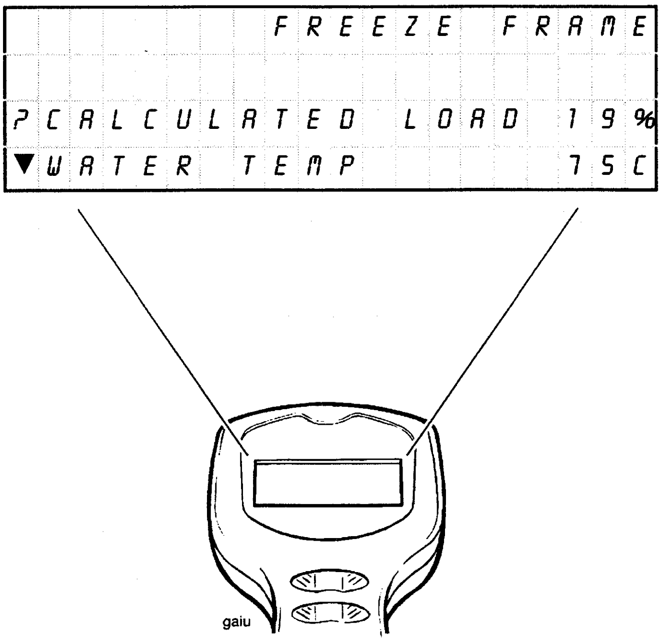


Align **'FREEZE FRAME DATA'** with the cursor, and press the validation key '✳' to display **'FREEZE FRAME'** (see 15).

Align **'CLEAR DTCS'** with the cursor, and press the validation key '✳' to display **'ERASE ALL DTC DATA'** (see 17).

Press the Return key (↵) to go back to '**STORED DTCS**' (operation 13).

15. FREEZE FRAME

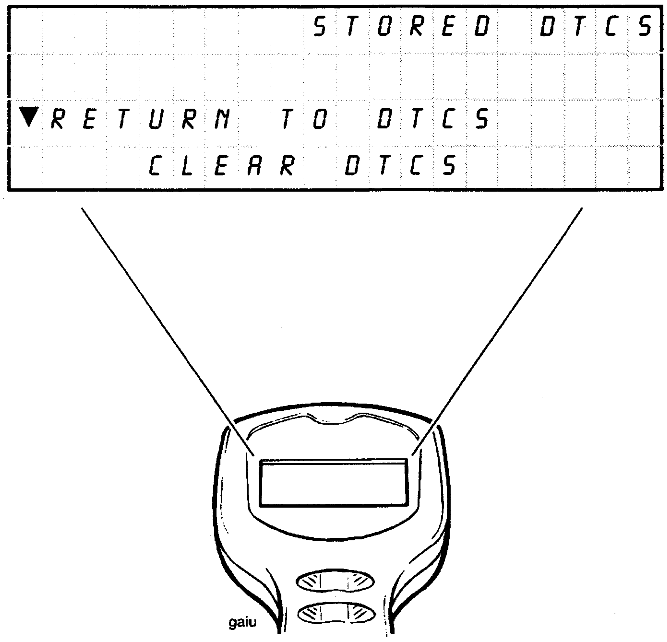


When a fault occurs which causes a DTC to be stored in the memory, the engine condition data at that instant is logged in the ECM. If another, more serious DTC is subsequently set, the original DTC data is automatically erased and new data associated with the latest DTC is logged in its place.

By selecting **'FREEZE FRAME'**, this information becomes available on the screen to aid diagnosis. Scroll the text up or down to view the data. More information can be gained by scrolling the text line in question to line 3 (**?**), then press the **Help** key (**?**) as before. Press the Validation key '⁎' to display **'STORED DTCS'** (operation 16).

FREEZE FRAME DATA AVAILABLE	
Function Memorised	**Result Reported (Scale)**
Calculated load	0–100%
Coolant temperature	–40– +215°C
Idle fuel trim	–100 – + 99.2%
Off idle fuel trim	Not used
Engine speed	0 – 16,383 RPM
Air temperature	–40 – +215°C
Ignition Advance	–64° – +63.5°
Throttle Position	0–100%
Barometric pressure	0 – 983 mm/Hg
Lambda fuel trim *	–100 – + 99%
Fuel system status *	Open or closed loop
Oxygen sensor voltage *	0 – 1.25 Volts.

16. STORED DTCS



2 options are now available:

Scroll to **'RETURN TO DTCS'** and press the Validate key '⁎' to return to operation 13.

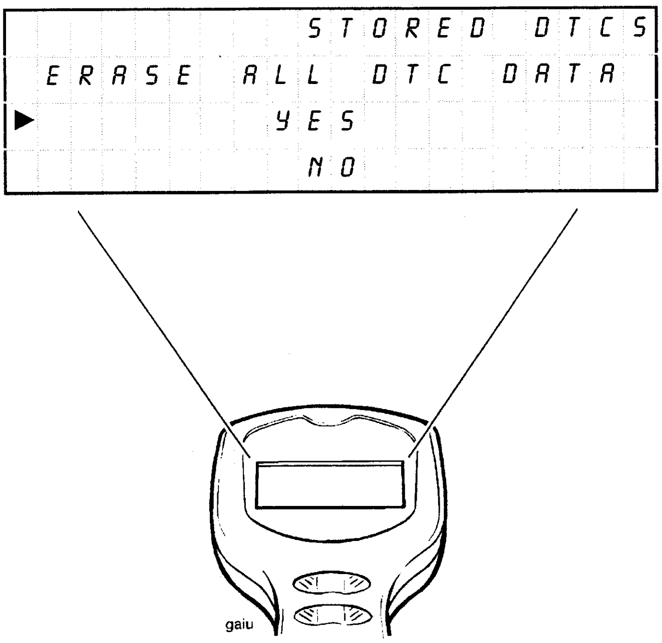
Scroll to **'CLEAR DTCS'** and press the Validation key '⁎' to go on to operation 17.

NOTE:

- **A full list of all the possible DTCs can be found earlier in this section.**

*** Closed loop models only.**

17. STORED DTCS, ERASE ALL DTC DATA



Scroll to position either **'YES'** or **'NO'** opposite the cursor.

If **'YES'** is selected, press the Validation key '✳' to erase all DTC data from the memory. **'MAIN MENU'** will then be displayed.

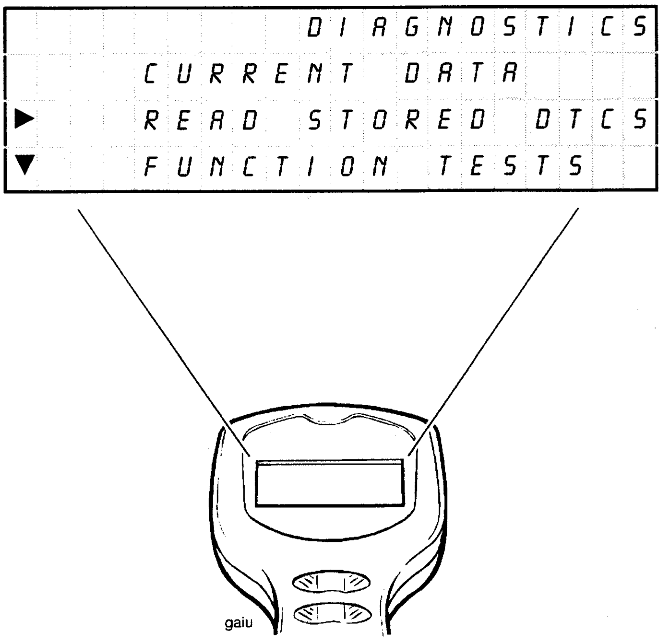
NOTE:

- **If you intend to examine the Function Tests, entry will be inhibited unless the DTC's have been erased.**

If **'NO'** is selected, press the Validation key '✳' to return to operation 13.

That completes the DTC cycle.

18. To select 'FUNCTION TESTS' from the MAIN MENU:



Use 'Up' and 'Down' keys to select **'DIAGNOSTICS'** menu**.**

The following choices are available.

Press the Validation key '✳'. **'DIAGNOSTICS'** will be displayed.

Select **'FUNCTION TESTS'**, and press the Validation key '✳'.

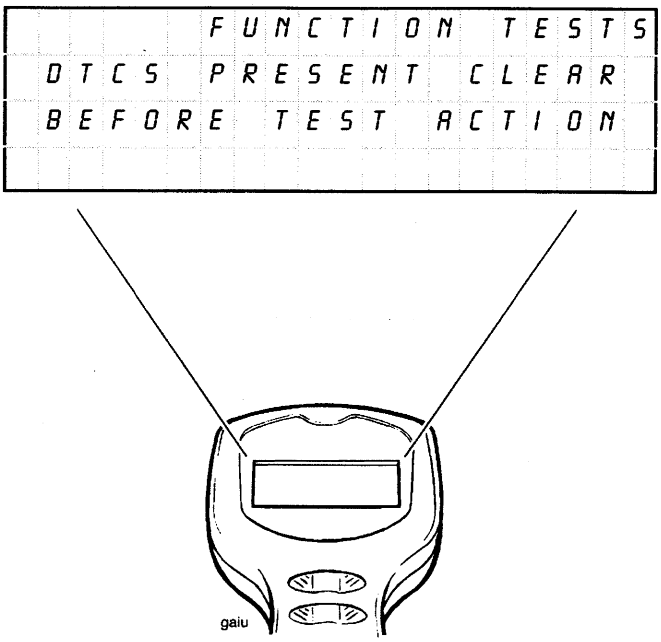
If no DTC'S are stored, **'FUNCTION TEST'** will be displayed (see operation 20).

If one or more DTC'S are stored, the message **'DTCS PRESENT CLEAR BEFORE TEST ACTION'** will be displayed (see operation 19).

NOTE:

- **The diagnostic tool will not allow Function Tests to be accessed until all DTC's in the memory are removed.**

19. FUNCTION TESTS



To clear the DTC's, press the Validation key '✻'. **'STORED DTCS'** will be displayed (see operation 13).

Proceed as before via operations 14 to 17. Scroll to **'YES'** and press the Validation key '✻' to erase all DTC data; the **MAIN MENU** will be displayed again.

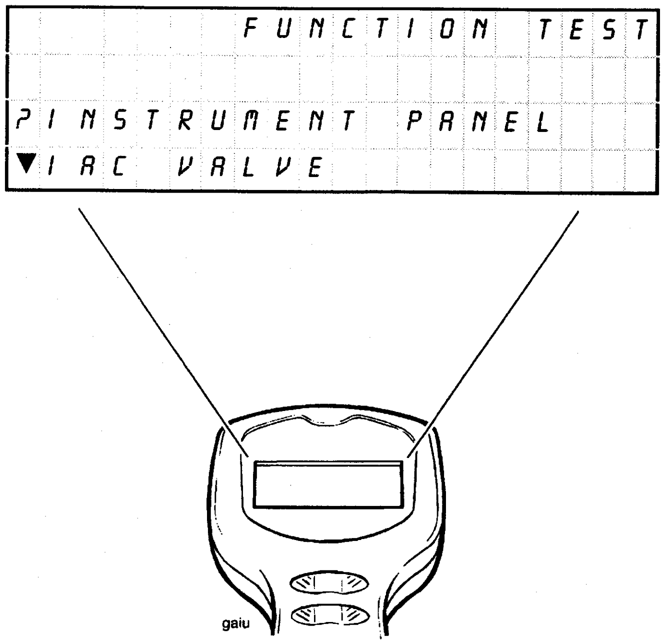
NOTE:

- **The fault(s) which caused the DTC's to be set must be rectified and cleared before continuing the Function Tests.**
- **A full list of all the possible DTCs can be found earlier in this section.**

Select **'DIAGNOSTICS'** menu and **'FUNCTION TESTS'** again pressing the Validation key '✻' each time.

Because the DTC's have now been erased, **'FUNCTION' TEST'** (operation 20) will now be displayed.

20. FUNCTION TEST



The following Function Tests can be made:

1 Instrument Panel
2 Idle air control valve (IACV) test
3 Purge valve test
4 Fuel pump test
5 Cooling fan test
6 Fuel pump priming test

If the fault is electrical, this will then be reported as a DTC.

Instrument Panel test: A signal is sent which should cause the tachometer to read approximately 7,500 RPM for 15 seconds, the water temperature gauge to show 100°C for 15 seconds and the fuel gauge (if fitted) to register 50% full (all simultaneously).

Idle air control valve (IACV) test: A signal is sent which should cause the valve to move through it's full range of step positions and then leave it in the park position. The signal will cause the valve to operate several times. To detect valve movement, use a stethoscope to listen for valve operation.

Fuel pump priming test: The fuel pump is run for a specific time to check for satisfactory priming. A message will then be displayed to that effect.

Fuel pump test: This test provides you with the means to physically check the pump operation.

Cooling fan test: A signal is sent which should cause the fan to operate for a 10 second period.

Purge valve test: (California models only) This test allows you to check operation of the valve. To detect valve movement, use a stethoscope to listen for valve operation.

Use the 'Up' and 'Down' keys to scroll the text lines, and position the function for which you wish to obtain information opposite the **'?'**.

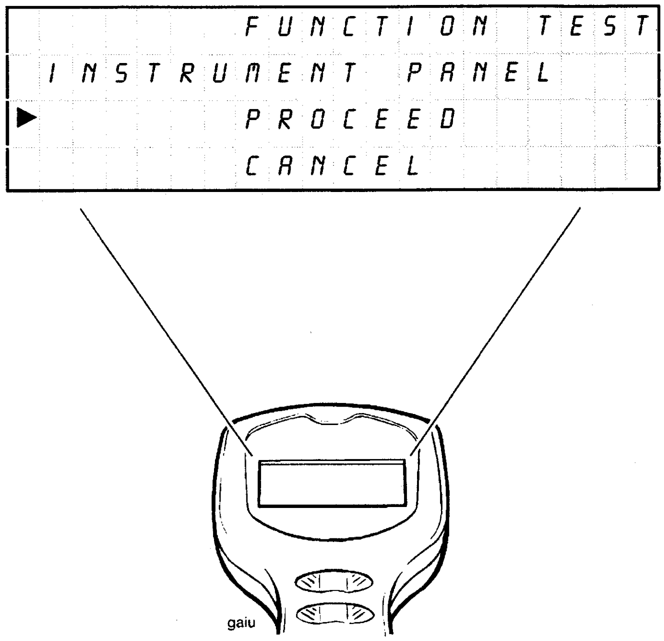
By pressing the Validation key '*', your selection will be noted and **'FUNCTION TEST'** (operation 21) will be displayed.

Press the **Help** key (**?**) for more information.

NOTE:

- **If the Return key (↵) is pressed, the tool will return to 'DIAGNOSTICS' menu (operation 9).**

21. FUNCTION TEST



The function selected at operation 20 will now show on line 2. To show an example of this, we have chosen the **'INSTRUMENT PANEL'** test.

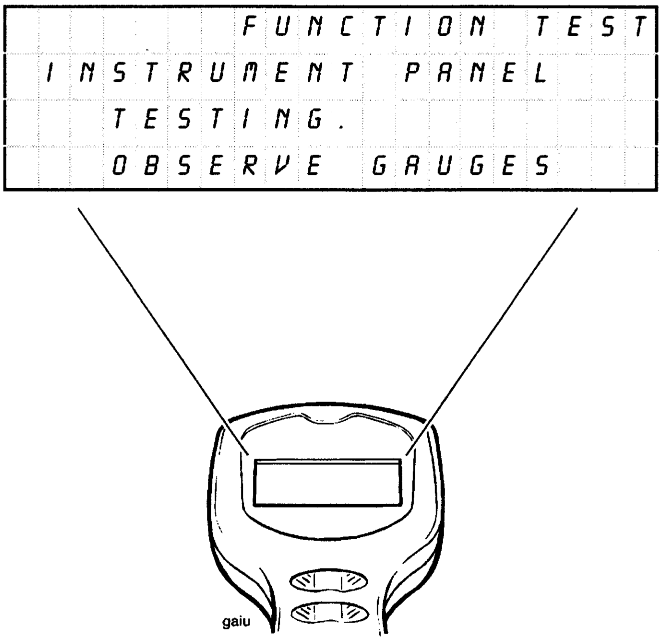
If you press the **Help** key (**?**). help relating to the specific test will be given. In this example, the screen will now read

TACHOMETER – 7500 RPM
TEMP GAUGE – 100 °C
FUEL GAUGE – 50%

If you wish to cancel that selection, scroll to **'CANCEL'** and press the Validation key '*'. The display will return to operation 20.

If you wish to test the component selected, scroll to **'PROCEED'** and press the Validation key '*'.

22. FUNCTION TEST

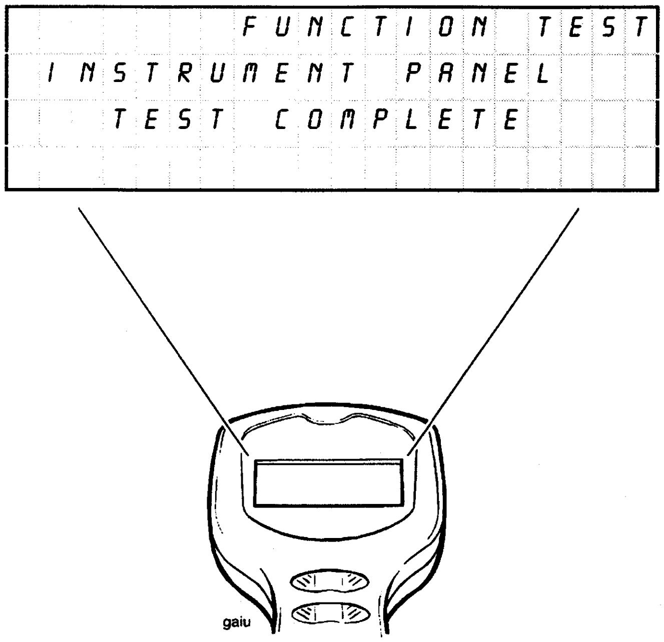


The screen now displayed will be specific to the component being tested:

In the example selected – **'INSTRUMENT PANEL'**, the instruction is to observe the gauges.

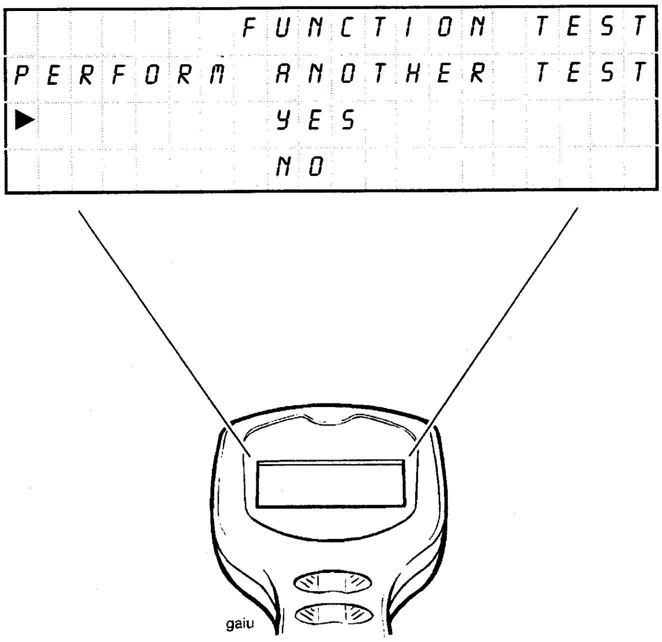
After a period of time, the screen will automatically change to either **'TEST COMPLETE'** (see operation 23) which will indicate a satisfactory completion, or to **'TEST FAILED'** (see operation 25) which will indicate failure.

23. FUNCTION TEST



If the test is satisfactory the display will read **'TEST COMPLETE'**. Press the Validation key '✳' to display **'FUNCTION TEST'** (operation 24).

24. FUNCTION TEST

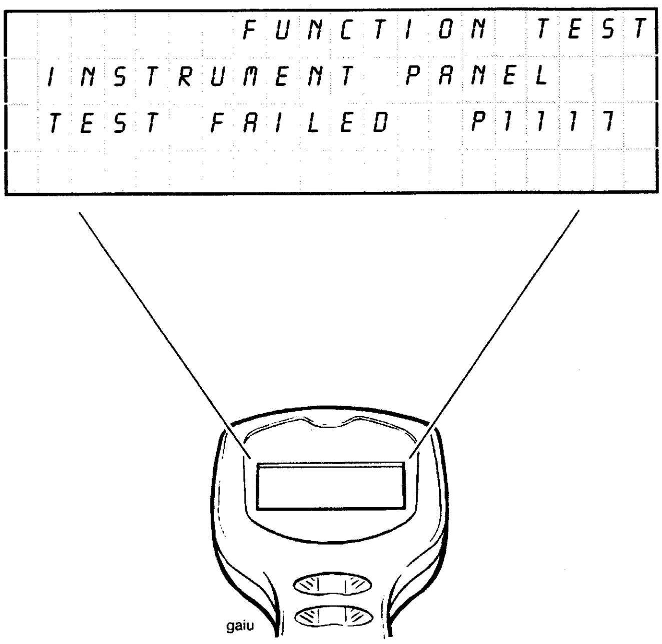


This display allows you to decide whether you wish to test another component.

Either – position the cursor on line 3 **'YES'** and press the Validation key '✳' to return to the **'FUNCTION TEST'** selection menu,

or – position the cursor on line 4 **'NO'** and press the Validation key '✳' to return to **'DIAGNOSTICS'** menu (operation 9).

25. FUNCTION TEST



If the test at operation 22 is unsatisfactory, a DTC will be displayed on line 3 of this display (except fuel pump tests).

Press the Help key (**?**) to access the diagnosis information associated with that code.

Press the Validation key '✳' if you wish to test another component (operation 24).

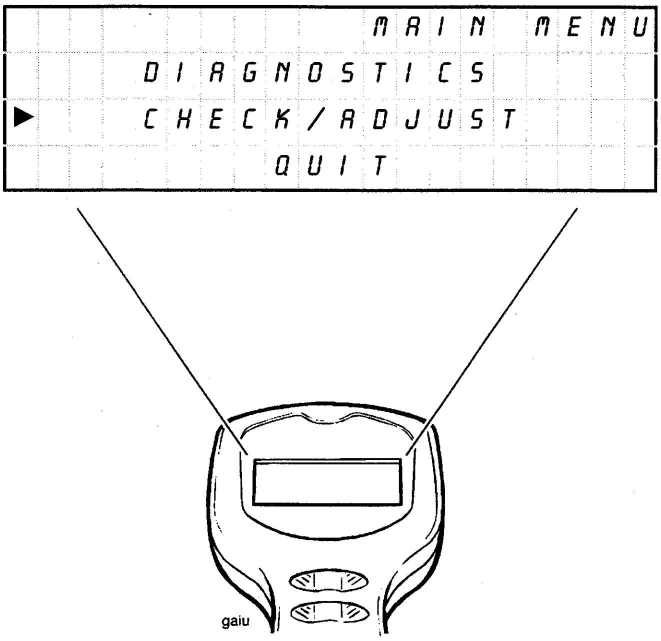
NOTE:

- **Any DTC's logged in the system will be automatically cleared at this point.**

To return to the **'DIAGNOSTICS'** menu, Select **'QUIT'** and press the Validation key '✳' to return to the **'MAIN MENU'** (operation 8).

That completes the **FUNCTION TESTS** cycle.

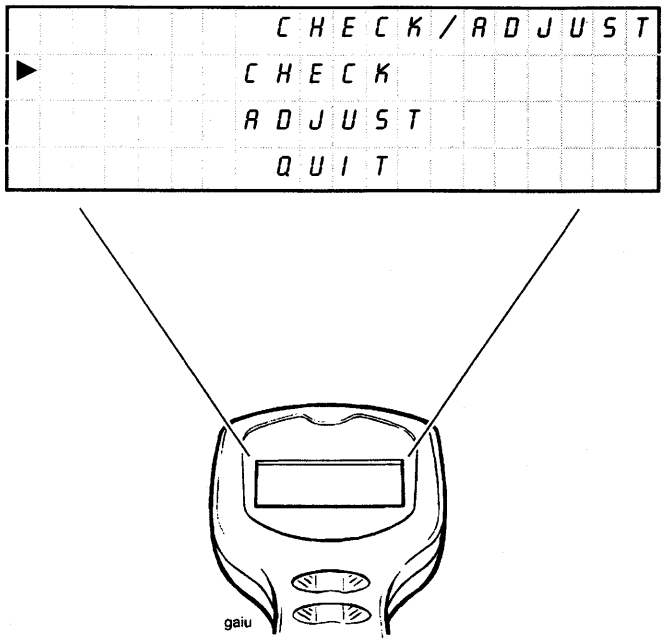
26. To select 'CHECKS/ADJUSTMENTS' from the MAIN MENU (operation 8):–



Use the 'Up' and 'Down' keys to position the cursor opposite **'CHECK/ADJUST'.**

Press the Validation key '⁎'; the **'CHECK/ADJUST'** menu will be displayed.

27. CHECK/ADJUST



This is the Checks and Adjustments menu.

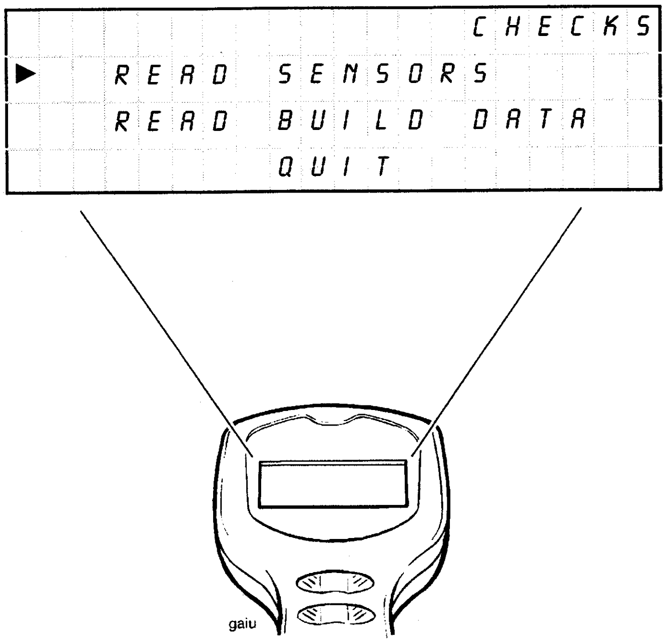
Use the 'Up' and 'Down' keys to position the cursor as follows, and then press the Validation key '⁎':

Opposite **'CHECK'** – **'CHECKS'** will be displayed (operation 28).

Opposite **'ADJUST'** – **'ADJUST'** will be displayed (operation 32).

Opposite **'QUIT'** – to return to **'MAIN MENU'** (operation 8).

28. CHECKS



You now have the option to access the motorcycle **'BUILD DATA'** or the **'SYSTEM DATA'**, or to quit.

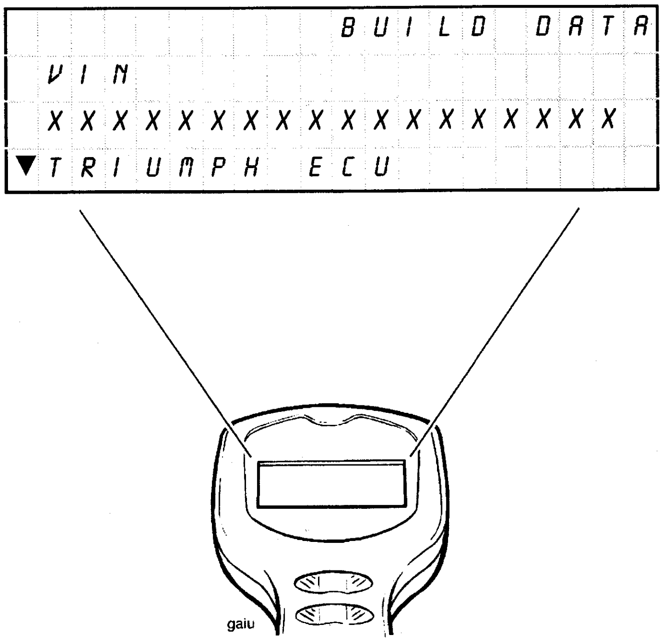
Position the cursor as follows and then press the Validation key '✳':

Opposite **'READ SENSORS'** – **'SENSOR DATA'** (operation 30) will be displayed.

Opposite **'READ BUILD DATA'** – **'BUILD DATA'** (operation 29) will be displayed.

Opposite **'QUIT'** – to return to **'MAIN MENU'** (operation 8).

29. BUILD DATA

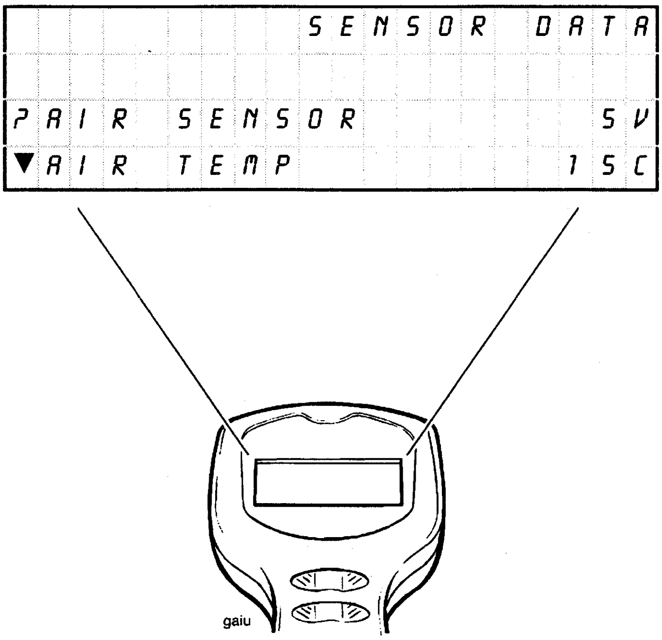


Providing the information was recorded at the time of build, the display will show the following information relating to the motorcycle under test by scrolling up and down:

Vehicle Identification Number (VIN)
Triumph ECM part number
Supplier's ECM part number
ECM Serial number
Tune Number

Press the Validation '✳' keys to return to **'CHECK/ADJUST'** menu (operation 27).

30. SENSOR DATA



The display can be scrolled to show:

The status of the various sensors and actuators

To obtain further data information, scroll the appropriate line to the help key mark (**?**) and press the Help key.

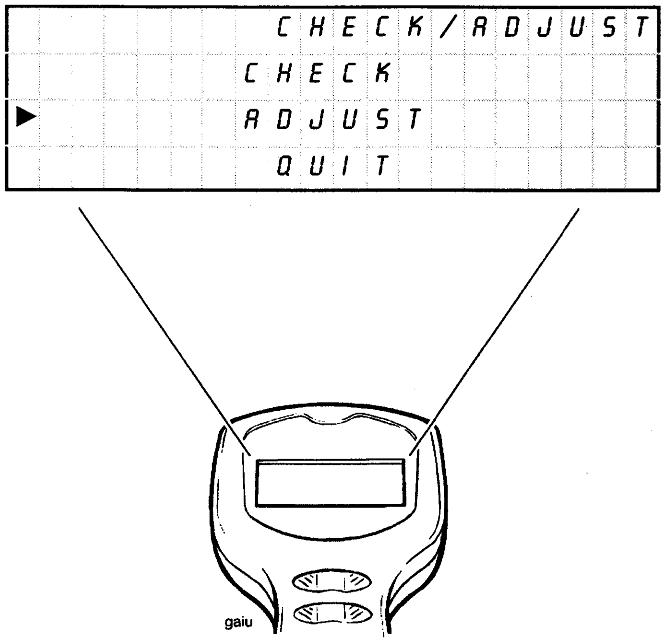
NOTE:

- **The help information shows the likely range of readings for a correctly functioning system at normal operating temperature.**

That completes examination of the Checks.

Press the Validation key '✳' to return to **'CHECK/ADJUST'** (operation 27).

31. To access the 'ADJUSTMENTS' menu.

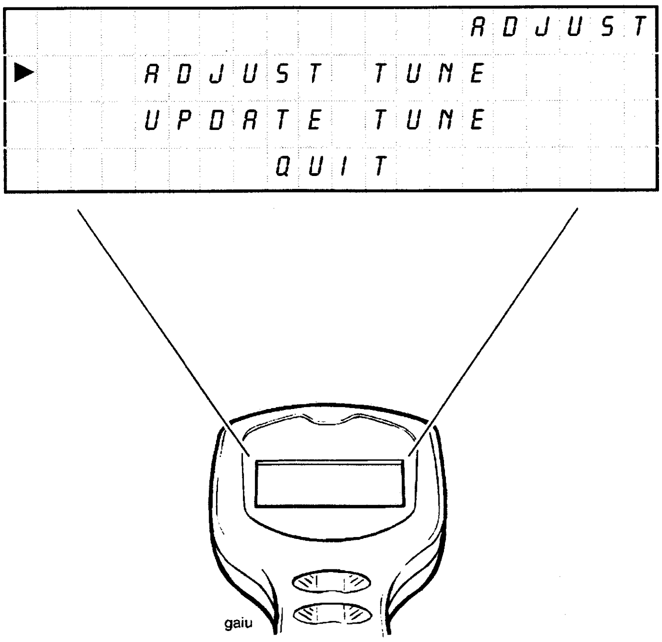


Use the 'Up' and 'Down' keys to position the cursor opposite **'ADJUST'**.

Press the Validation key '✳'; **'ADJUST'** will be displayed.

Start the engine.

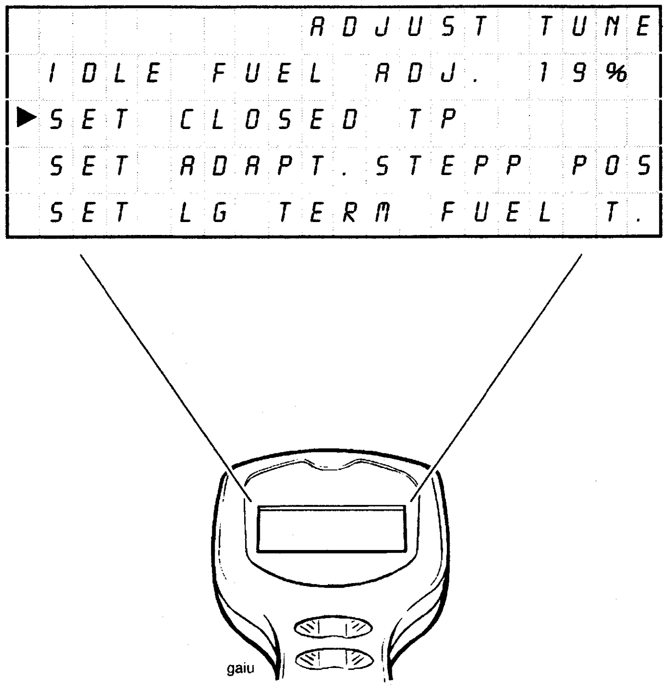
32. ADJUST



Position the cursor on line 2 **'ADJUST TUNE'** if you wish to check and/or adjust the values of certain tune items. Then press the Validation key '✳' to display **ADJUST TUNE** (see operation 33).

In special circumstances, Triumph will request you to introduce a completely new engine tune. Given this situation, select **'UPDATE TUNE'** and press the Validation key '✳' (see operation 36).

33. ADJUST TUNE



The following sequence shows status data and allows adjustments to be made to items which affect the engine operation

IDLE FUEL ADJ. (Idle fuelling) **
– See operation 34

The current setting for idle fuelling is shown in the right hand column. ,

SET CLOSED TP (Closed throttle position)
– See operation 36

SET ADAPT STEPP POS (adaptive stepper position)
– See operation 37

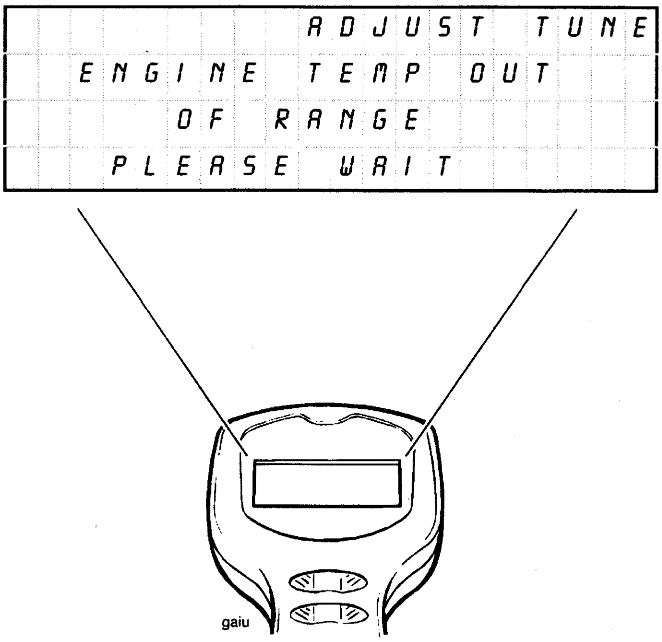
SET LG TERM FUEL T* (set long term fuel trim)
– See operation 38

Position the cursor opposite the setting you wish to adjust and press the Validation key '✳'.

*** Closed loop catalyst models only**

**** Not available on closed loop models**

34. ADJUST TUNE (Idle fuel adjustment)



Because idle fuelling adjustment must be made at normal operating temperature, the above screen may be displayed if the engine is either too cold (thermostat closed) or too hot (cooling fan operating). The current temperature is displayed while the engine warms/cools.

Until the engine warms or cools to the correct temperature range, the tool will not allow access to any other functions. If you wish to escape from this area (and not carry out the adjustment) switch off the ignition and disconnect the tool.

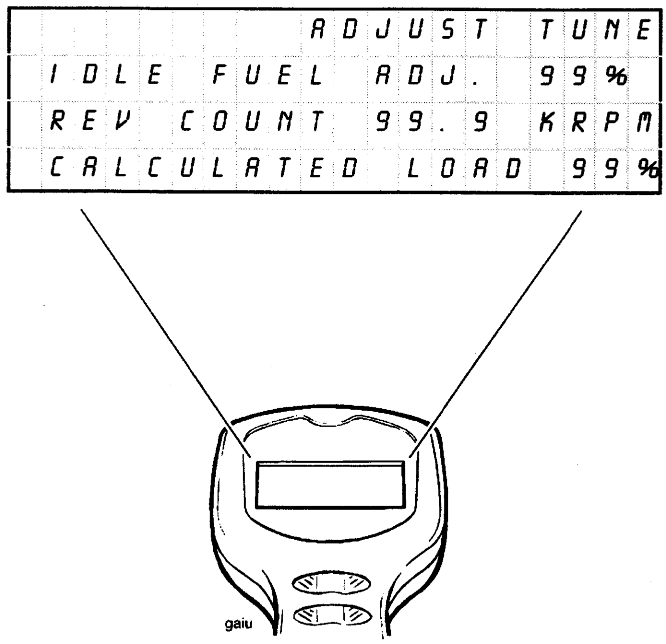
Once the correct temperature range has been reached, the **ADJUST TUNE** screen (operation 35) will automatically be displayed.

The Idle Fuelling (idle Co) can be adjusted when this display is showing, in fuelling increments of 1% by pressing the 'Up' or 'Down' keys as appropriate.

The idle fuel adjustment read out will change accordingly, and the new values of engine speed and calculated load will be displayed.

> ⚠ **CAUTION: Do not confuse the percentage reading on the tool with the carbon monoxide percentage reading as measured by an exhaust gas analyser. The tool reports idle fuelling as a percentage of the maximum fuelling range <u>NOT AS A PERCENTAGE CO READING.</u>**

35. ADJUST TUNE (Idle fuel adjustment)



Start the engine and allow it to warm up at idle until the tool allows access to the adjustment screen. Ensure that the fuel tank is at least half full.

Once adjustment is enabled by the tool, turn on the headlights, blip the throttle to stabilise combustion and begin sampling the exhaust gases.

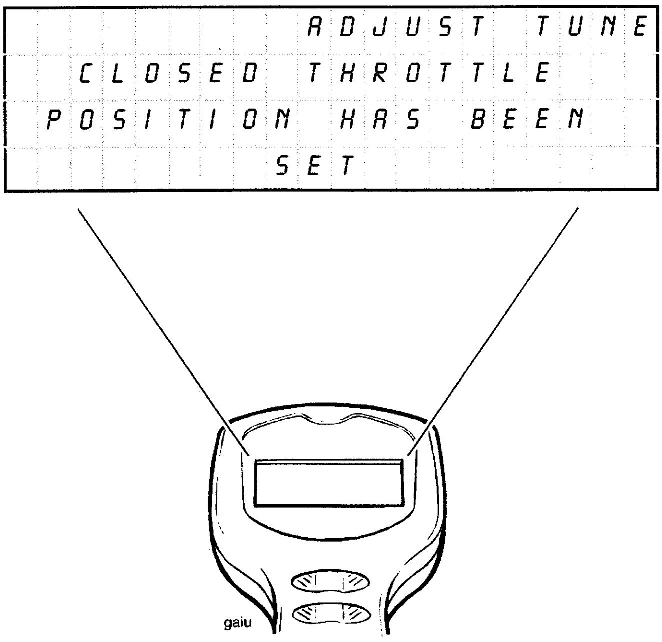
Adjust the idle CO level until the correct reading is shown on the CO meter. Ensure the meter reading is stable before pressing the Validation key '✳' to confirm the new setting and to return to operation 33.

If the desired setting is not reached before the tool locks out further adjustment due to a rise in the coolant temperature, stop the engine and allow it to cool for 30 minutes before repeating the adjustment process. This will allow airbox temperatures to fall and will help ensure an accurate setting is ultimately achieved.

NOTE:

- **Idle fuelling adjustment must always be carried out using an accurate exhaust gas analyser to measure idle carbon monoxide levels.**
- **On California models, an open loop catalyst is fitted. In order to correctly set the idle CO level, the gas analyzer probe must be inserted in the port on the exhaust header, not in the silencer outlet.**
- **Correct idle CO level is 1.5 % +/– 0.3% unless a 'race' silencer is fitted in which case a 2% CO level would be beneficial:**

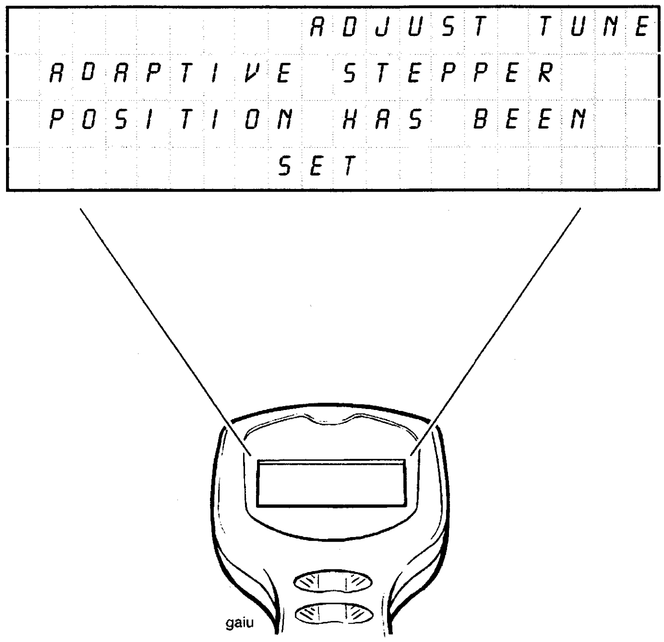
36. ADJUST TUNE (closed throttle position)



The electronic value of the closed throttle position is automatically reset by the tool.

Press either the validate '✳' or return (↵) to return to the main menu.

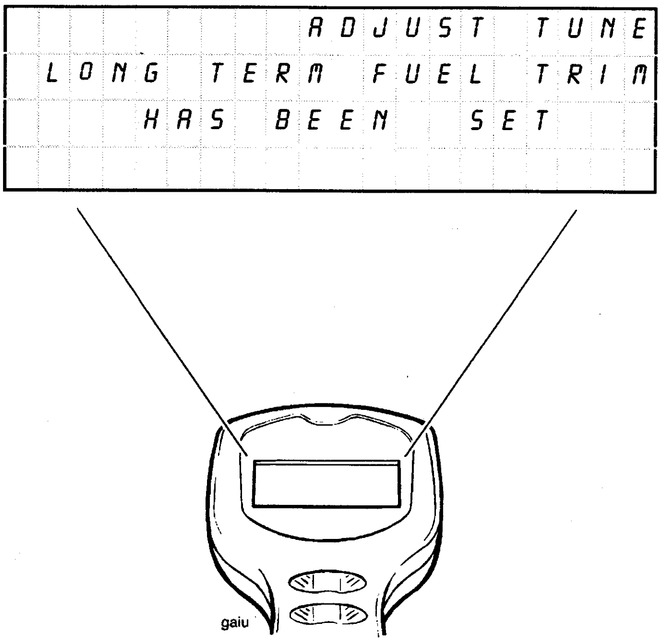
37. ADJUST TUNE (set adaptive stepper position)



The electronic value of the adaptive stepper position is automatically reset by the tool.

Press either the validate '✳' or return (↵) to return to the main menu.

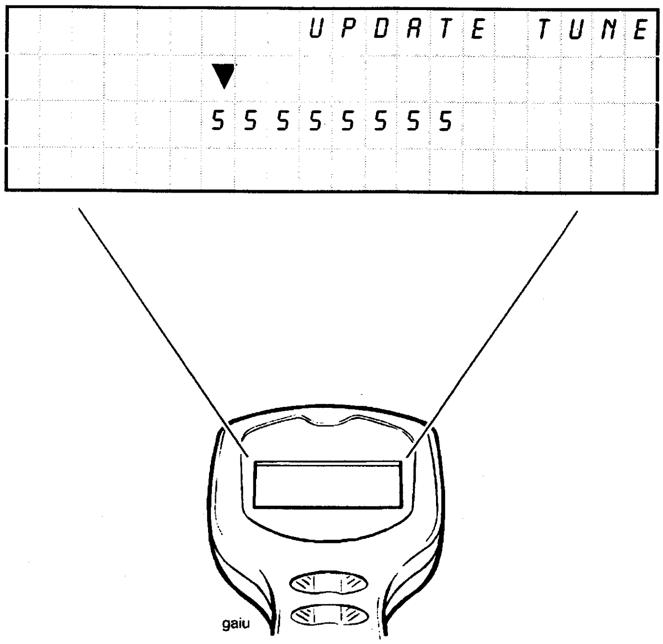
38. ADJUST TUNE (set long term fuel trim)



The electronic value of the long term fuel trim setting is automatically reset to nominal by the tool.

Press either the validate '✳' or return (↵) to return to the main menu.

39. UPDATE TUNE



(Accessed from operation 32). On receipt of special instructions from Triumph you may be asked to input a completely new engine tune.

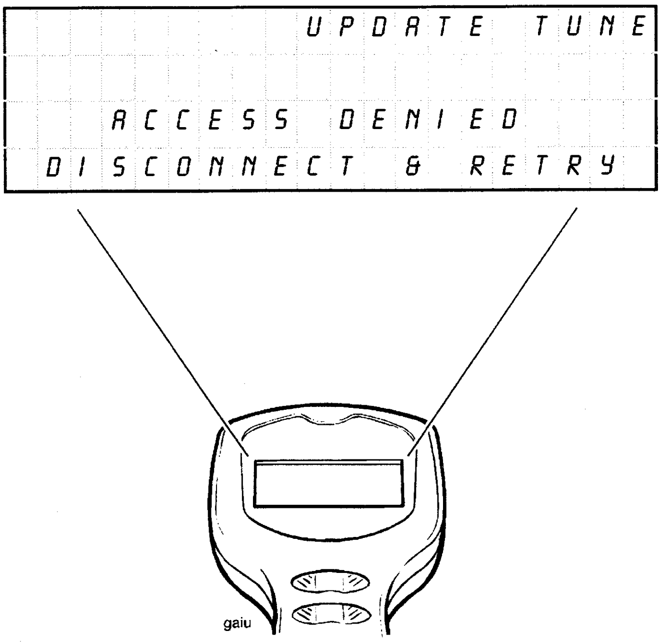
To do this, they will give you a Password Number which must be entered using the 'Up' and 'Down' keys in the same way as was done to enter your dealer code number.

After entering the final digit, press the Validation key '✳' again.

If the Password number entered is invalid, the screen shown in operation 40 will be displayed.

If the Password number is valid, **'UPDATE TUNE'** (operation 41) will be displayed.

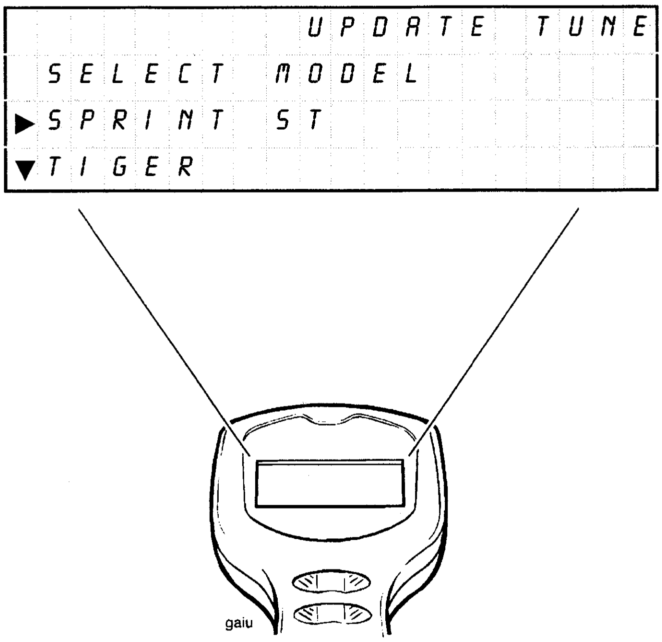
40. UPDATE TUNE



If the Password number has been incorrectly entered, the screen will display **'ACCESS DENIED'**. Press the Validation key '⁎' to return to **MAIN MENU** (operation 8) and start again.

If after a second attempt the entry is still invalid, the screen will display **'ACCESS DENIED DISCONNECT AND RETRY'**. The diagnostic tool must be disconnected and the complete procedure re–started.

41. UPDATE TUNE



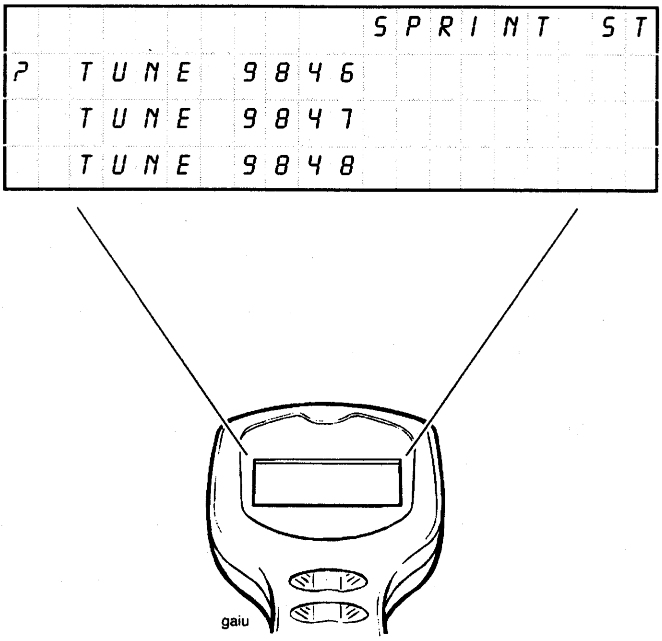
Align the cursor with the model to which a tune is to be downloaded and, when satisfied that the selection is correct, press the validation key '⁎'.

The models available at the time of writing are:

- T595 Daytona (all markets except France)
- T595 Daytona (French 108 PS engine)
- Daytona 955i
- 885cc Speed Triple
- 955cc Speed Triple
- Sprint ST
- Tiger

Once a model has been selected and the validation key pressed, screen 42 will be displayed.

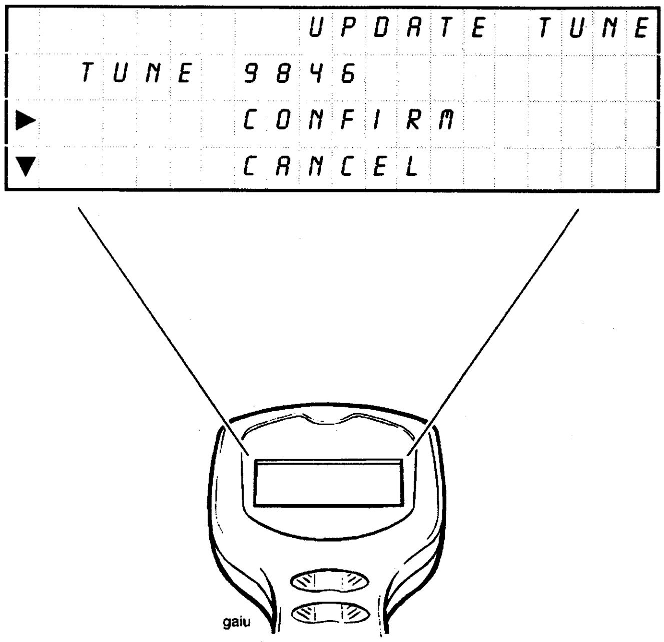
42. UPDATE TUNE



Scroll to the tune required and press the Validation key '✳' to move on to operation 43.

Press the help key for information on the applicability of each tune number.

43. UPDATE TUNE



Scroll to either **'CONFIRM'**, **'CANCEL'** or **'QUIT'** (quit option will not be visible until the text has been scrolled) then press the Validation key '✳'.

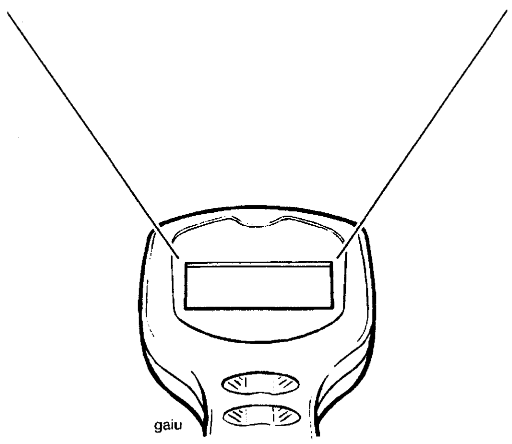
If **'QUIT'** has been selected – this will return to **MAIN MENU** (operation 8)

If **'CANCEL'** has been selected – return to operation 39.

If **'CONFIRM'** has been selected, downloading will begin.

44. UPDATE TUNE (confirm selected)

```
         UPDATE  TUNE
DOWNLOADING.....
    10% COMPLETE
```



The screen will show **'DOWNLOADING'**, and the selected software will be automatically downloaded into the ECM.

When complete, the screen will display **'DOWNLOAD COMPLETE'**.

Press the Validation key '*' to return to the **'MAIN MENU'** (operation 8).

If downloading has been unsuccessful the screen will display **'DOWNLOAD FAILED'**.

Press the Validation key '*' to return to the **'MAIN MENU'** (operation 8).

RESTARTING TUNE DOWNLOAD

CAUTION: If, for any reason downloading is interrupted, the ECM will not function and tune download cannot be restarted in the normal way. This is because the tool's operating system has been erased from the ECM's memory and has not yet been fully replaced.

Download interruption can occur for a variety of reasons such as, accidental disconnection of the tool, a flat battery, turning the ignition switch to OFF during download etc.

In these circumstances, a special-tool key-press-sequence must be followed which is described below

To restart download, switch the motorcycle ignition to OFF and disconnect the tool. Reconnect the tool, switch the motorcycle ignition to ON, and scroll through to the screen shown below.

```
 TRIUMPH MOTORCYCLES
   DIAGNOSTIC TOOL
SOFTWARE VERSION 6.0
        1998
```

From this screen, use the following button press sequence:

HELP (?) – HELP (?) – RETURN (↵) – HELP (?) VALIDATE (*).

The update tune password screen will then be displayed. From that screen, download can be restarted in the normal way.

NOTE:

- **The software version number is not relevant to this procedure. All versions of the diagnostic software will operate in the way described.**

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 Electronic Control Module relies on the supply of accurate information to enable it to plan the correct fuelling and ignition timing. 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 which 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

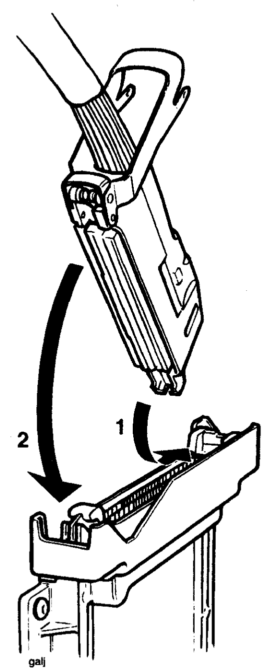
- Ensure there is no dirt around the connector/seal
- Push together squarely to ensure terminals are not bent or incorrectly located
- Push the two halves together positively.

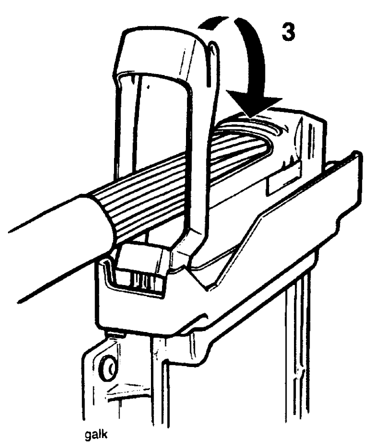
ECM Connector

Many of the diagnostic routines described in the following tables call for checking of ECM connections by cable number. The illustrations given below, describe the method of connection and disconnection of the ECM connector.

NOTE:

- **Not all of the available cable spaces in the connector are used.**



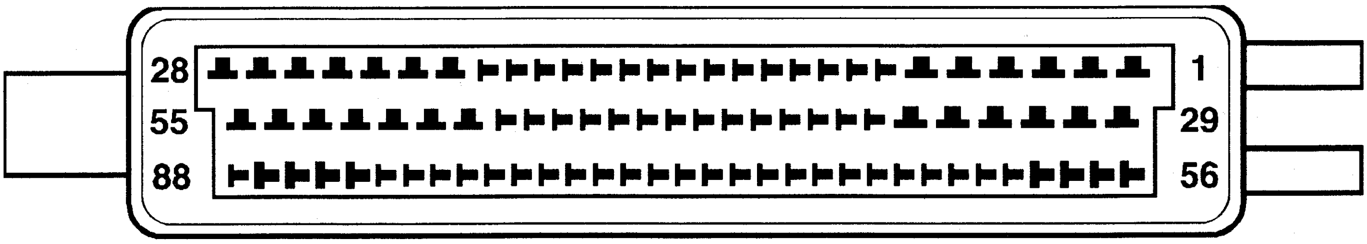


NOTE:

- **The sequence shown in the diagram above must be used when reconnecting the ECM main connector.**
  When disconnecting, reverse the sequence.

ECM Connector Pin Numbering

The diagram below shows the pin sequence of the ECM main connector. These pin numbers correspond directly with the pin numbers given in the diagnostic routines and schematic wiring diagrams used throughout this manual.



gali

ECM Connector Pin Numbers

FURTHER DIAGNOSIS

The tables which follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

In addition, a further chart which follows the electrical diagnosis section gives advice on non–electrical fault diagnosis.

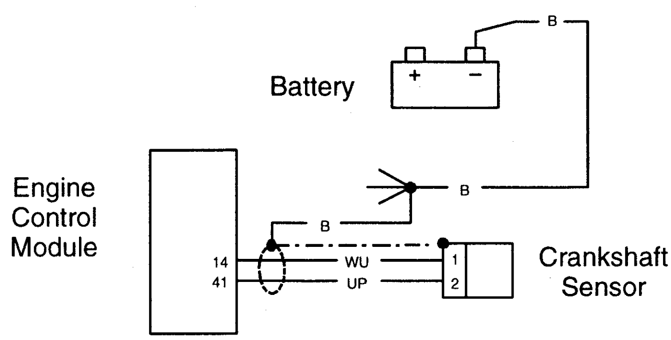
CRANKSHAFT SENSOR

Fault Code	Possible cause	Action
P0335	Crankshaft sensor system fault	View & note diagnostic tool 'freeze frame' data if available. Ensure sensor is fitted correctly and connector is secure. Check for 1 mm sensor air gap Disconnect ECM and proceed to pinpoint test 1
P1335	Crank toothed wheel / screen cable fault	proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: – ECM pin 14 – ECM pin 41	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check cable for short circuit: – ECM pin 14 to earth – ECM pin 41 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 7
3 Check cable continuity: – ECM pin 14 to sensor pin 1 – ECM pin 41 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: – ECM pin 14 to ECM pin 41	OK	Renew crankshaft sensor, proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable continuity: – Sensor screen cable to earth	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
6 Check crank toothed wheel: – Damage to teeth – Magnetic debris contamination	OK	Proceed to test 7
	Faulty	Clean / renew toothed wheel, 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



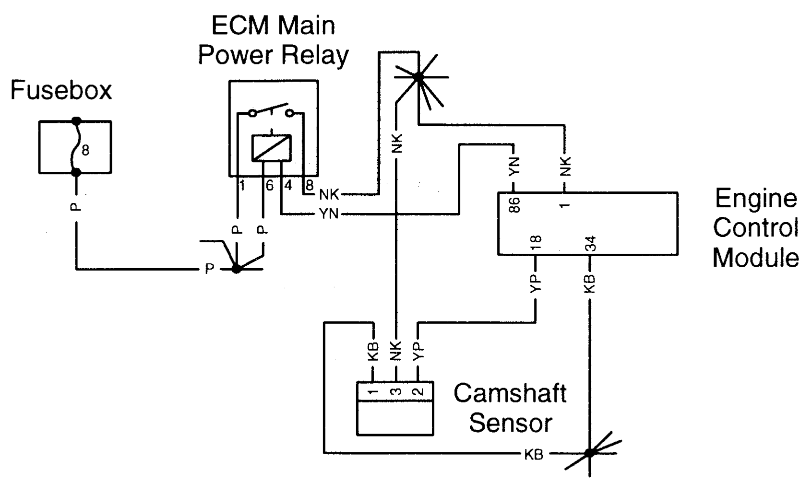
CAMSHAFT SENSOR

Fault Code	Possible cause	Action
P0340	Camshaft sensor system fault	View & note diagnostic tool 'freeze frame' data if available. Ensure sensor is fitted correctly and connector is secure.
P0341	Camshaft sensor / wiring fault	Disconnect ECM and proceed to pinpoint test 1
P1340	Excessive electrical interference	clear interference source and proceed to pinpoint test 6
P1341	Cam toothed wheel fault	proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: – ECM pin 18	OK	Disconnect sensor and proceed to test 2
– ECM pin34	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit:	OK	Proceed to test 3
– ECM pin18 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity:	OK	Proceed to test 4
– ECM pin 1 to sensor pin 3 – ECM pin 18 to sensor pin 2 – ECM pin 34 to sensor pin 1	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: –ECM pin 18 to ECM pin 1	OK	Renew camshaft sensor, proceed to test 7
–ECM pin 18 to ECM pin 34	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cam 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



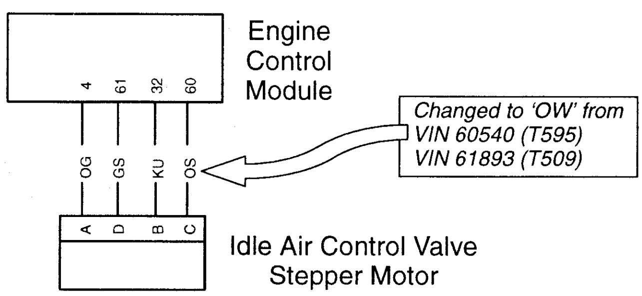
IDLE AIR CONTROL

Fault Code	Possible cause	Action
P0505	IACV stepper motor / wiring fault	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Proceed to test 2
– ECM pin 4 – ECM pin 32 – ECM pin 60 – ECM pin 61	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: – ECM pin 4 to ECM pin 61	47 to 59Ω	Disconnect stepper motor and proceed to test 3
– ECM pin 32 to ECM pin 60	Open circuit	Proceed to test 4
	Short circuit	Disconnect stepper motor and proceed to test 5
3 Check cable for short circuit:	OK	Proceed to test 7
– ECM pin 4 to earth – ECM pin 32 to earth – ECM pin 60 to earth – ECM pin 61 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity:	OK	Proceed to test 6
– ECM pin 4 to stepper motor pin A – ECM pin 32 to stepper motor pin B – ECM pin 60 to stepper motor pin C – ECM pin 61 to stepper motor pin D	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit:	OK	Proceed to test 6
– ECM pin 4 to ECM pin 61 – ECM pin 32 to ECM pin 60	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check stepper motor resistance:	47 to 59Ω	Proceed to test 7
– Motor pin A to motor pin D – Motor pin B to motor pin C	Faulty	Renew stepper motor, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of stepper motor	OK	Action complete – quit test
	Fault	Contact Triumph service

Circuit Diagram



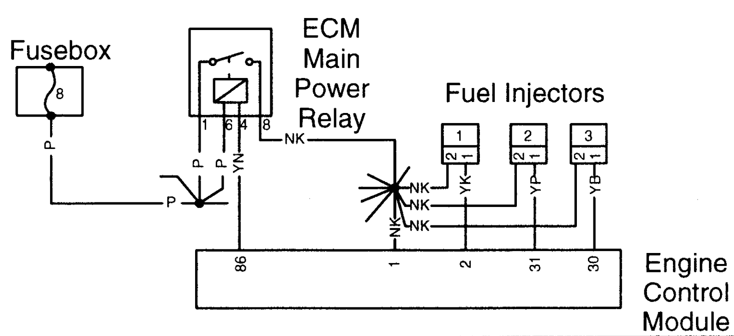
FUEL INJECTORS

Fault Code	Possible cause	Action
P0201/02/03	Injection system fault – Injector 1/2/3 – Misfire indicates open circuit – Flooding indicates short circuit	View & note diagnostic tool 'freeze frame' data if available. Ensure relevant injector connector is secure. Disconnect ECM and proceed to pinpoint test 1
P1201/02/03	Open or short circuit – Injector 1/2/3	
P1205/06/07	Short circuit to battery+ – Injector 1/2/3	Disconnect relevant injector and proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Proceed to test 2
– ECM pin 2 – ECM pin 30 – ECM pin 31	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: – ECM pin 1 to ECM pin 2 (injector 1)	15.5 to 16.3Ω	Disconnect relevant injector and proceed to test 3
– ECM pin 1 to ECM pin 31 (injector 2) – ECM pin 1 to ECM pin 30 (injector 3)	Open circuit	Proceed to test 4
	Short circuit	Disconnect relevant injector and proceed to test 5
3 Check cable for short circuit:	OK	Proceed to test 7
– ECM pin 2 to earth – ECM pin 31 to earth – ECM pin 30 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity:	OK	Proceed to test 6
– ECM pin 1 to relevant injector pin 2 – ECM pin 2 to injector 1 pin 1 – ECM pin 31 to injector 2 pin 1 – ECM pin 30 to injector 3 pin 1	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit:	OK	Proceed to test 6
– ECM pin 1 to ECM pin 2 (injector 1) – ECM pin 1 to ECM pin 31 (injector 2) – ECM pin 1 to ECM pin 30 (injector 3)	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant injector resistance:	15.5 to 16.3Ω	Proceed to test 7
– Injector pin 1 to injector pin 2	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
	Fault still present	Contact Triumph service

Circuit Diagram



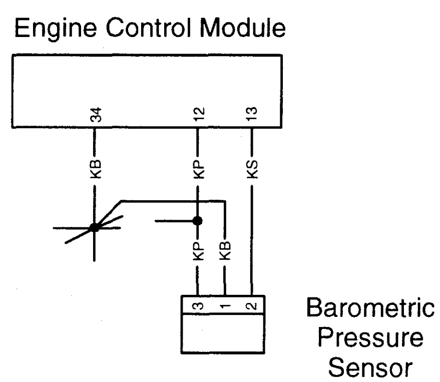
BAROMETRIC PRESSURE SENSOR

Fault Code	Possible cause	Action
P0105	Barometric pressure sensor / wiring fault	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 12	OK	Disconnect sensor and proceed to test 2
– ECM pin 13 – ECM pin 34	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit:	OK	Proceed to test 3
– ECM pin 13 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity:	OK	Proceed to test 4
– ECM pin 34 to sensor pin 1 – ECM pin 13 to sensor pin 2 – ECM pin 12 to sensor pin 3	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: – ECM pin 13 to ECM pin 12	OK	Renew barometric pressure sensor, proceed to test 5
– ECM pin 13 to ECM pin 34	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



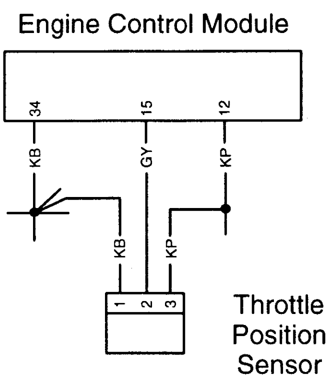
THROTTLE POSITION SENSOR

Fault Code	Possible cause	Action
P0120 P0122 P0123	Throttle position sensor system fault Sensor low input voltage Sensor high input voltage	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 12	OK	Disconnect sensor and proceed to test 2
– ECM pin 15 – ECM pin 34	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit:	OK	Proceed to test 3
– ECM pin 15 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity:	OK	Proceed to test 4
– ECM pin 34 to sensor pin 1 – ECM pin 15 to sensor pin 2 – ECM pin 12 to sensor pin 3	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: – ECM pin 15 to ECM pin 12	OK	Renew throttle position sensor, proceed to test 5
– ECM pin 15 to ECM pin 34	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



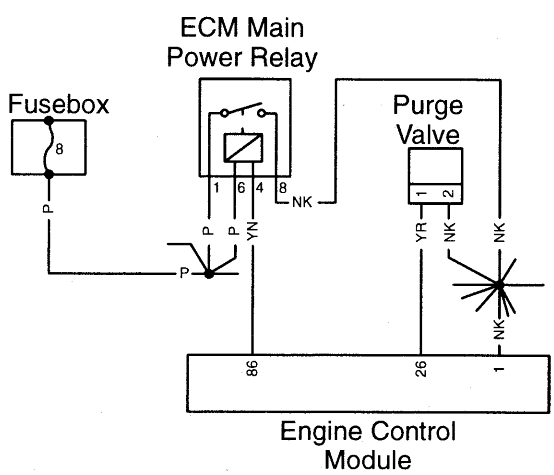
PURGE VALVE

Fault Code	Possible cause	Action
P0443	Purge valve system fault	View & note diagnostic tool 'sensor' data. Ensure purge valve connector is secure. Disconnect ECM and proceed to pinpoint test 1
P0444	Open circuit or short circuit to earth	
P0445	Short circuit to battery+	disconnect purge valve and proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Proceed to test 2
– ECM pin 26	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: – ECM pin 1 to ECM pin 26	26Ω	Disconnect purge valve and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect purge valve and proceed to test 5
3 Check cable for short circuit:	OK	Proceed to test 7
– ECM pin 26 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity:	OK	Proceed to test 6
– ECM pin 26 to valve pin 1 – ECM pin 1 to valve pin 2	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit:	OK	Proceed to test 6
– ECM pin 1 to ECM pin 26	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check purge valve resistance:	26Ω	Proceed to test 7
– Valve pin 1 to valve pin 2	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



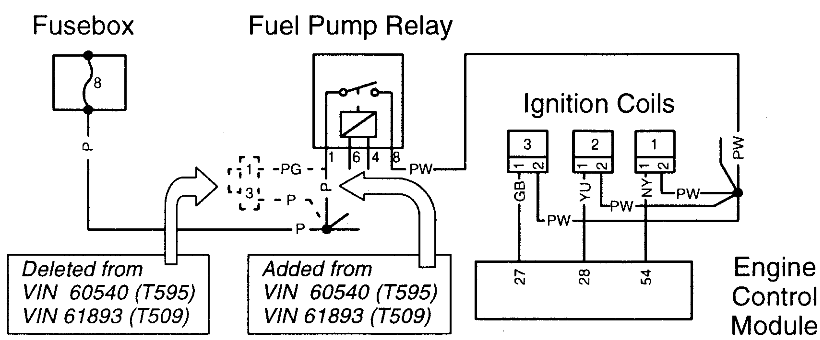
IGNITION COILS

Fault Code	Possible cause	Action
P0351/52/53	Ignition system fault – Ign coil 1/2/3	View & note diagnostic tool 'freeze frame' data if available. Ensure relevant ign coil connector is secure. Disconnect ECM and proceed to pinpoint test 1:–
P1351/52/53	Open or short circuit – Ign coil 1/2/3	
P1355/56/57	Short circuit to battery+ – Ign coil 1/2/3	disconnect relevant ign coil and proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 27 – ECM pin 28 – ECM pin 54	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: Fuel pump relay pin 8 to – ECM pin 54 (ign coil 1) – ECM pin 28 (ign coil 2) – ECM pin 27 (ign coil 3)	0.8Ω	Disconnect relevant ign coil and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect relevant ign coil and proceed to test 5
3 Check cable for short circuit: – ECM pin 27 to earth – ECM pin 28 to earth – ECM pin 54 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: – Fuel pump relay pin 8 to any ign coil pin 2 – ECM pin 54 to ign coil 1 pin 1 – ECM pin 28 to ign coil 2 pin 1 – ECM pin 27 to ign coil 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: Fuel pump relay pin 8 to – ECM pin 54 (ign coil 1) – ECM pin 28 (ign coil 2) – ECM pin 27 (ign coil 3)	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant ign coil resistance: – Ign coil pin 1 to ign coil pin 2	0.8Ω	Proceed to test 7
	Faulty	Renew relevant ign 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



COOLANT TEMPERATURE SENSOR

Fault Code	Possible cause	Action
P0115	Coolant temperature system fault	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:–
P0117	Open circuit, or short circuit to battery+	
P0118	Short circuit to earth	disconnect sensor and proceed to test 6
P0119	Voltage signal too high	proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 34 – ECM pin 46	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: – ECM pin 46 to ECM pin 34 (Temperature dependent – see data below)	OK	Disconnect temp sensor and proceed to test 6
	Open circuit	Proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: – ECM pin 46 to sensor pin 1 – ECM pin 34 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: – ECM pin 46 to ECM pin 34	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 data below)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: – ECM pin 46 to earth	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	Contact Triumph service

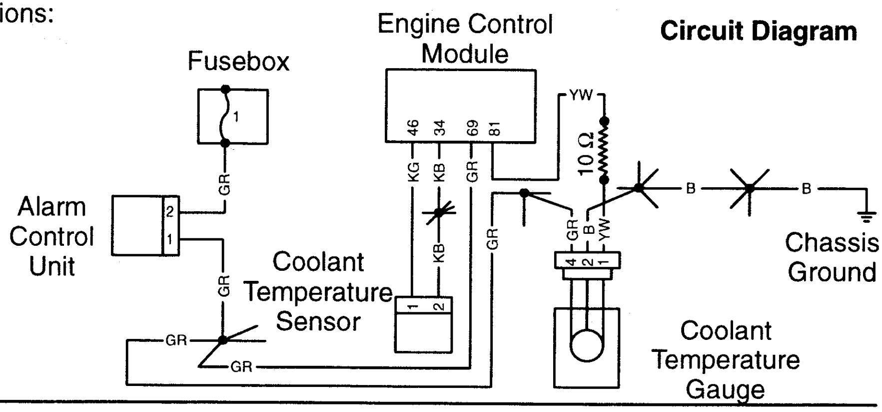
Resistance data under typical conditions:

Warm engine – 200 to 400Ω.

Cold engine:

20ºC ambient	2.35 to 2.65KΩ.
10ºC ambient	3.60 to 4.00KΩ.
0ºC ambient	5.60 to 6.25KΩ

Circuit Diagram



INLET AIR TEMPERATURE SENSOR

Fault Code	Possible cause	Action
P0110	Inlet air temperature system fault	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:–
P0113	Open circuit, or short circuit to battery+	
P0112	Short circuit to earth	disconnect sensor and proceed to pinpoint test 6

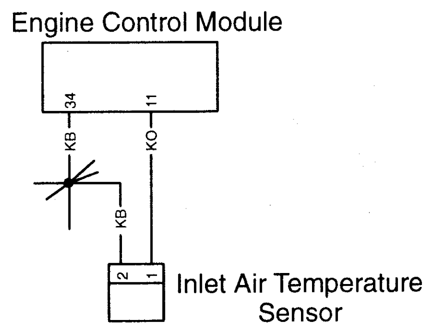
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Proceed to test 2
– ECM pin 34 – ECM pin 11	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: – ECM pin 11 to ECM pin 34	OK	Disconnect temp sensor and proceed to test 6
(Temperature dependent – see data	Open circuit	Proceed to test 3
below)	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity:	OK	Proceed to test 5
– ECM pin 11 to sensor pin 1 – ECM pin 34 to sensor pin 2	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit:	OK	Proceed to test 5
– ECM pin 11 to ECM pin 34	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance:	OK	Proceed to test 7
– Sensor pin 1 to sensor pin 2 (Temperature dependent – see data below)	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit:	OK	Proceed to test 7
– ECM pin 11 to earth	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	Contact Triumph service

If engine is warm, remove sensor and allow time to cool to ambient prior to test. Resistance data:

Ambient temp	Resistance value
30ºC	1.6 to 1.8KΩ
25ºC	1.9 to 2.2KΩ
20ºC	2.3 to 2.7KΩ
15ºC	2.9 to 3.3KΩ
10ºC	3.5 to 4.0KΩ
5ºC	4.4 to 4.9KΩ
0ºC	5.5 to 6.1KΩ

Circuit Diagram



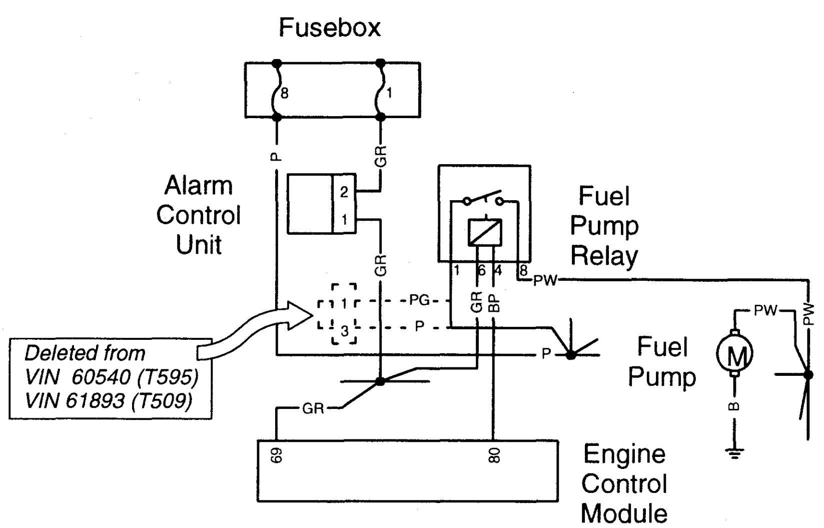
FUEL PUMP RELAY

Fault Code	Possible cause	Action
P0230	Fuel pump relay system fault	Check if pump runs briefly when ignition is switched on. Ensure relay connector is secure and relay is operational – renew if faulty. Disconnect ECM and proceed to pinpoint test 1:–
P1231	Open circuit, or short circuit to earth	
P1232	Short circuit to battery+	Disconnect relay and proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Disconnect relay and proceed to test 2
– ECM pin 80	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit:	OK	Proceed to test 3
– ECM pin 80 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity:	OK	Proceed to test 4
– ECM pin 80 to relay pin4 – Relay pin 6 to alarm control unit pin1	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit:	OK	Proceed to test 5
– ECM pin 80 to ECM pin 69	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic tool function test to verify fault cleared	OK	Action complete – quit test
	Fault still present	Contact Triumph service

Circuit Diagram



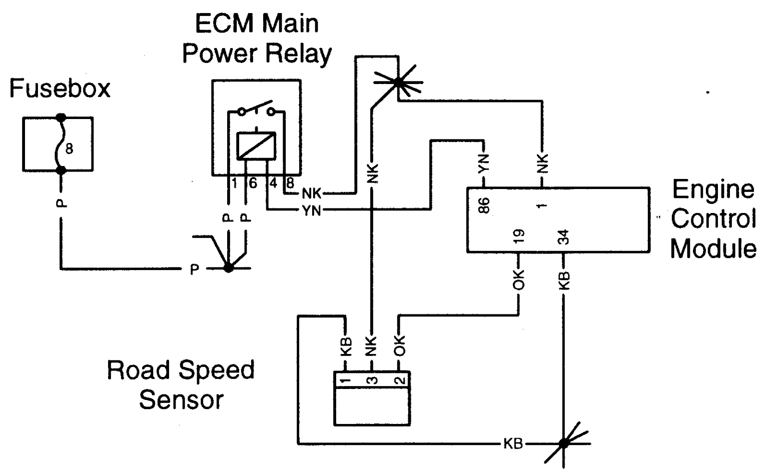
ROAD SPEED SENSOR

Fault Code	Possible cause	Action
P0500	Road speed sensor / wiring fault	Ensure sensor connector is secure. Check for 1 mm air gap between sensor and wheel disc. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 19 – ECM pin 34	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: – ECM pin 19 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: – ECM pin 1 to sensor pin 3 – ECM pin 19 to sensor pin 2 – ECM pin 34 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: – ECM pin 19 to ECM pin 1 – ECM pin 19 to ECM pin 34	OK	Renew road speed sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run bike to verify fault cleared	OK	Action complete – quit test
	Fault still present	Contact Triumph service

Circuit Diagram



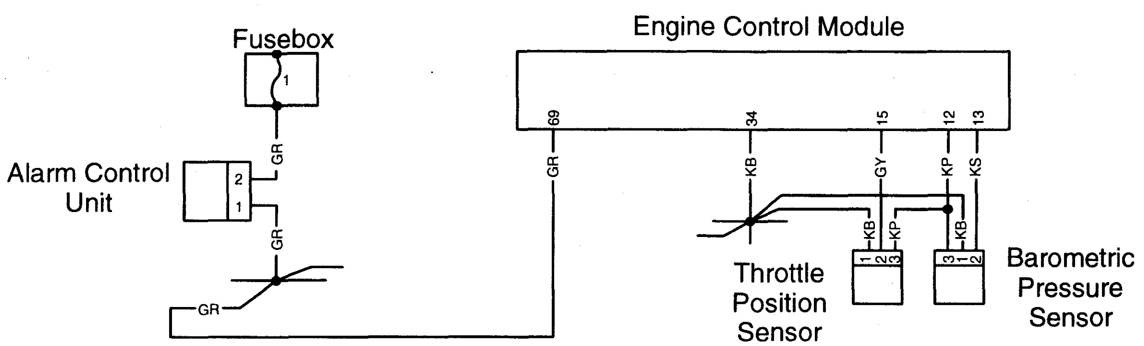
SENSOR SUPPLY VOLTAGE

Fault Code	Possible cause	Action
P1560	Engine control module / wiring fault	View & note diagnostic tool 'sensor' data. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 12	OK	Disconnect throttle position sensor and air pressure sensor, proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check for short circuit: – ECM pin 12 to ECM pin 34	OK	Reconnect ECM, proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 With ignition 'on', check voltage at: – ECM pin 12	4.5 to 5.5v	Proceed to test 4
	Faulty	Renew ECM, proceed to test 4
4 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



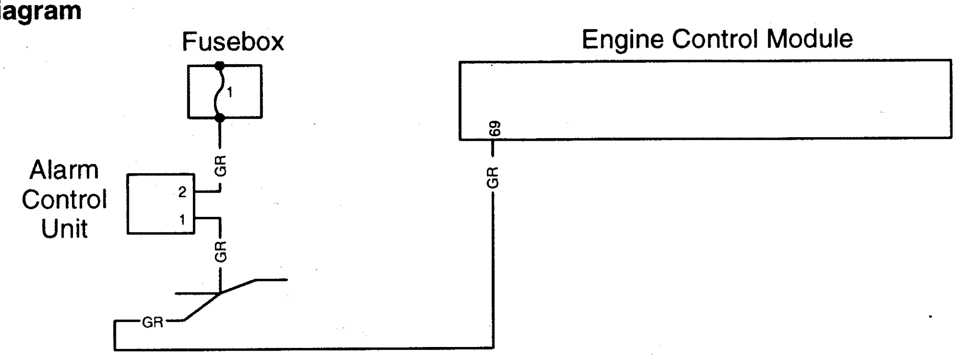
SYSTEM VOLTAGE

Fault Code	Possible cause	Action
P0560	Bike voltage system fault	View & note diagnostic tool 'sensor' data. Ensure voltage across battery is acceptable, note voltage. Disconnect ECM and proceed to pinpoint test 1
P0562	Wiring / alternator / battery fault – low voltage	
P0563	Alternator fault – high voltage	Ensure alternator output voltage is acceptable, note voltage.

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 69	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 3
2 With Ignition 'on', check voltage at: – ECM pin 69	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



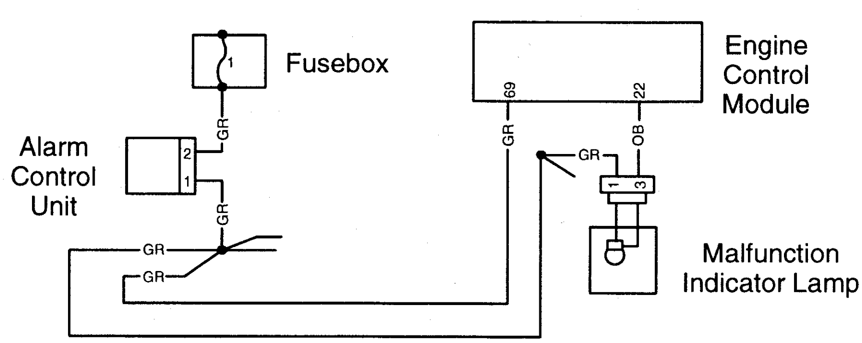
MALFUNCTION INDICATION LAMP

Fault Code	Possible cause	Action
P1600	MIL system fault	Ensure warning lamp connector is secure and bulb is operational – renew if faulty. Disconnect ECM and proceed to pinpoint test 1:–
P1601	Open circuit, or short circuit to earth	
P1602	Short circuit to battery+	disconnect warning lamp and proceed to test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 22	OK	Disconnect warning lamp and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: – ECM pin 22 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: – Warning light pin 3 to ECM pin 22 – Warning light pin 4 to earth	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check for short circuit: – ECM pin 22 to ECM pin 69	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and switch ignition 'on' to verify fault cleared	OK	Action complete – quit test
	Fault still present	Contact Triumph service

Circuit Diagram



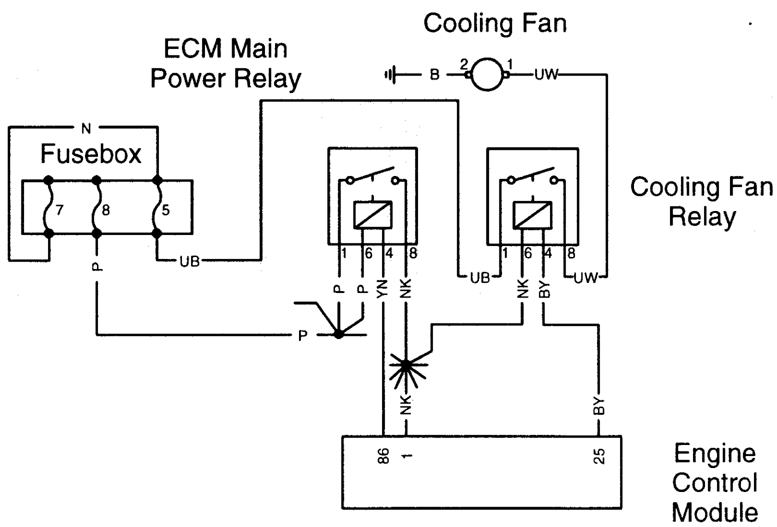
COOLING FAN RELAY

Fault Code	Possible cause	Action
P1551	Cooling fan relay system fault	View & note diagnostic tool 'sensor' data. Ensure relay connector is secure and relay is operational – renew if faulty. Disconnect ECM and proceed to pinpoint test1:–
P1552	Open circuit, or short circuit to earth	
P1553	Short circuit to battery+	Disconnect relay and proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Disconnect relay and proceed to test 2
– ECM pin 25	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit:	OK	Proceed to test 3
– ECM pin 25 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity:	OK	Proceed to test 4
– Relay pin 4 to ECM pin 25 – Relay pin 6 to ECM relay pin 8	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit:	OK	Proceed to test5
– ECM pin 25 to ECM pin 1	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 cooling fan	OK	Action complete – quit test
	Fault still present	Contact Triumph service

Circuit Diagram



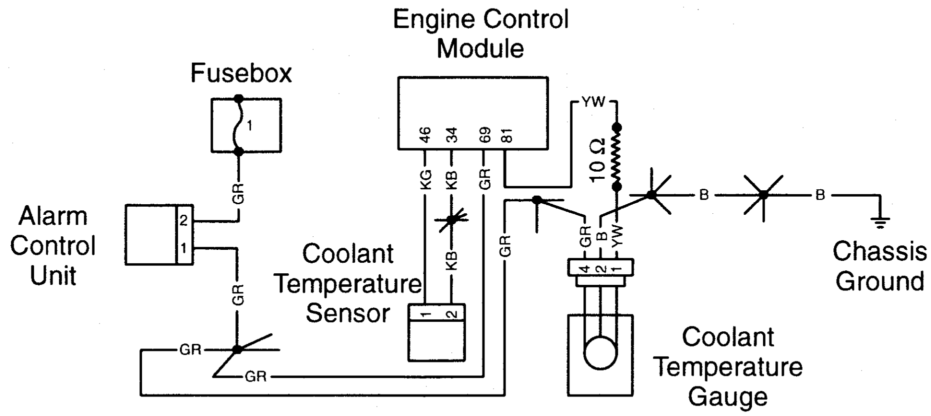
COOLANT TEMPERATURE GAUGE

Fault Code	Possible cause	Action
P1115	Temperature gauge system fault	View & note 'freeze frame' data if available. View & note 'sensor' data. Ensure temp gauge connector is secure. Disconnect ECM and proceed to pinpoint test 1:–
P1116	Open circuit, or short circuit to earth	
P1117	Short circuit to battery+	Disconnect temp gauge and proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 81	OK	Disconnect temp gauge and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: – ECM pin 81 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable resistance: – ECM pin 81 to temp gauge pin 1	9.5 to 10.5Ω	Proceed to test 4
	Faulty	Renew 10Ω in–line resistor, proceed to test 6
4 Check cable continuity: – Temp gauge pin 2 to earth – Temp gauge pin 4 to alarm control unit pin 1	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable for short circuit: ECM pin 81 to ECM pin 69	OK	Renew temp gauge, proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of temp gauge	OK	Action complete – quit test
	Fault still present	Contact Triumph service

Circuit Diagram



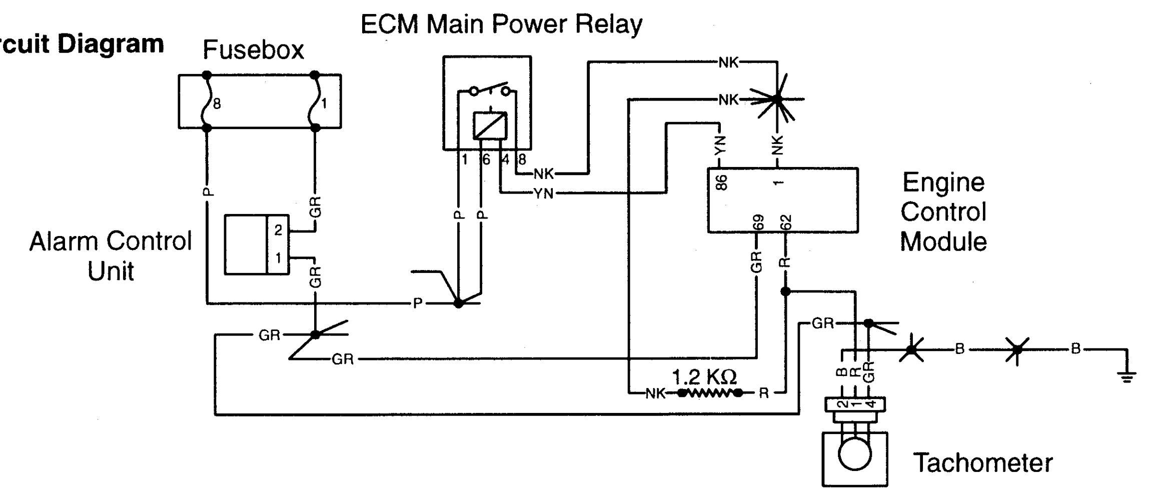
TACHOMETER

Fault Code	Possible cause	Action
P1385	Tachometer system fault	View & note 'freeze frame' data if available. View & note 'sensor' data. Ensure tachometer connector is secure. Disconnect ECM and proceed to pinpoint test 1:–
P1386	Open circuit, or short circuit to earth	
P1387	Short circuit to battery+	Disconnect tachometer and proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: – ECM pin 62	OK	Disconnect tachometer and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: – ECM pin 62 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable resistance: – ECM pin 62 to ECM pin 1	1.1 to 1.3KΩ	Proceed to test 4
	Faulty	Renew 1.2KΩ in–line resistor, proceed to test 6
4 Check cable continuity: – Tachometer pin 1 to ECM pin 62 – Tachometer pin 2 to earth – Tachometer pin 4 to alarm control unit pin1	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 6
5 Check cable for short circuit: ECM pin 62 to ECM pin 69	OK	Renew tachometer, proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of tachometer	OK	Action complete – quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fault Finding – Non Electrical

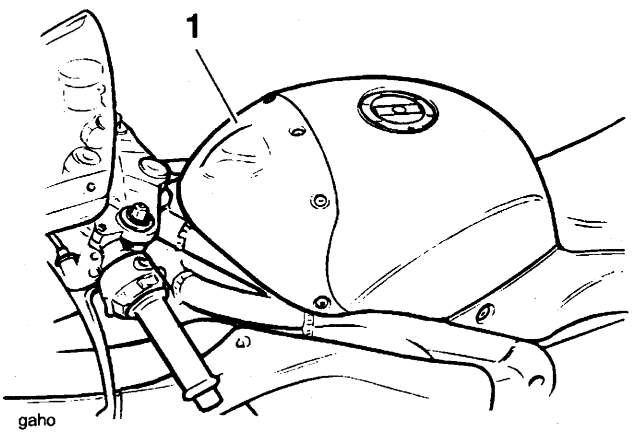
Symptom	Possible cause(s)
Poor throttle response at low Rpm	Excessively low/high C.O. setting
	One way valve inside pipe from throttle bodies to IACV (Idle Air Control Valve) sticking or damaged
	Low fuel pressure caused by filter blockage/leaks
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter
Cutting out at idle	Throttle bodies out of balance
	IACV (Idle Air Control Valve) inoperative
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter.
	Excessively low/high C.O. setting
	Low fuel pressure
Poor response to C.O. adjustment when using the Actia Diagnostic Tool	Weak mixture caused by air leak at the throttle body gasket to cyl. head face
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter.
	One way valve inside pipe from throttle bodies to IACV (Idle Air Control Valve) sticking
Rev limitation cutting in too early	Crankshaft sensor air gap to wide
Tick over too low/high	IACV (Idle Air Control Valve) sticking
	Incorrect closed throttle position setting
	Mechanical fault with the throttle linkage
Actia tool malfunctions during tune download procedure	Low battery voltage
Throttle hang–up	Incorrect closed throttle position setting
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter.
	Low fuel pressure due to split fuel filter
Bike will start but cuts out immediately	IACV Stepper Motor stuck
	One way valve inside pipe from throttle bodies to IACV (Idle Air Control Valve) sticking
Abnormally high fuel pressure	Fuel pressure regulator inoperative.
Temperature gauge reads cold	Cooling system air-locked resulting in coolant temperature sensor operating in air instead of coolant.

FUEL TANK

Fuel Tank Removal

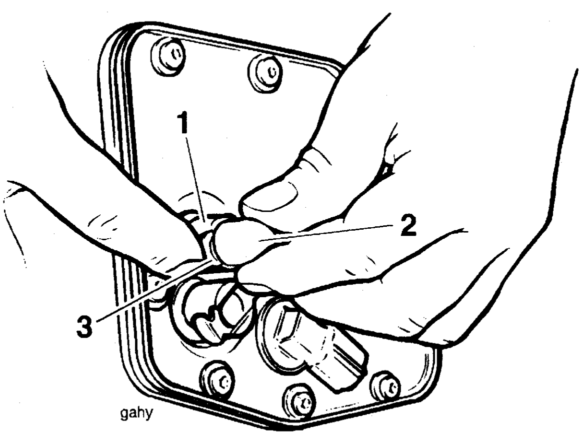
> **WARNING: Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.**
>
> **A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.**

1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the body side panels as described in the body section.
3. Remove the fuel tank cover.



1. Fuel Tank Cover

4. Disconnect the fuel hoses by pressing the metal tag between the hose and socket inwards. Once released, the hoses will spring out from the socket.



1. Socket

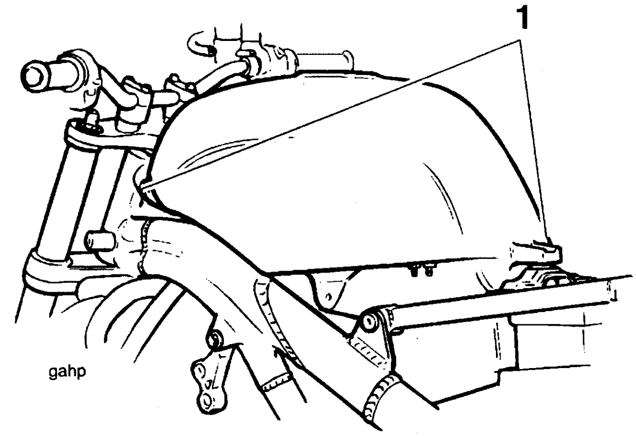
2. Hose

3. Metal Tag

NOTE:

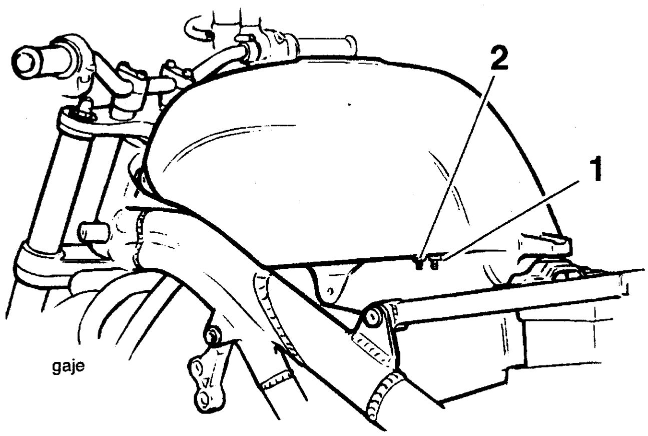
- **When disconnected, the fuel hoses are self-sealing.**

5. Disconnect the hose leading to the fuel pressure regulator.
6. Release the bolts securing the fuel tank to the frame.



1. Fuel Tank to Frame Bolts

7. Disconnect the fuel tank drain hose and the connection to the roll-over valve (where fitted) from the left hand side of the tank.
8. Raise the fuel tank and disconnect the electrical connections from the fuel pump and low fuel level sensor.



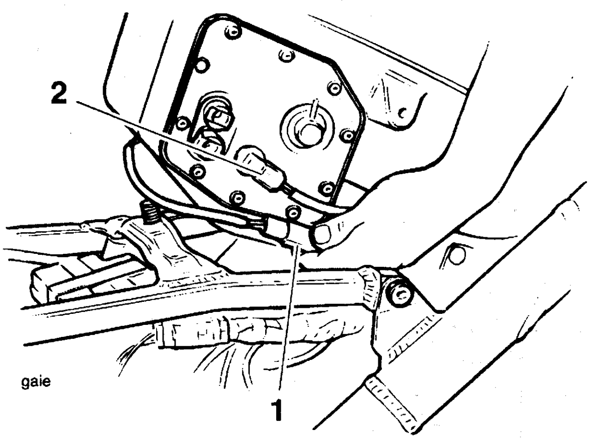
1. Roll over valve connection

2. Fuel tank drain

9. Remove the tank from the frame.

Installation

1. Position the fuel tank to the motorcycle frame and reconnect the electrical connections to the fuel pump and low fuel level sensor.



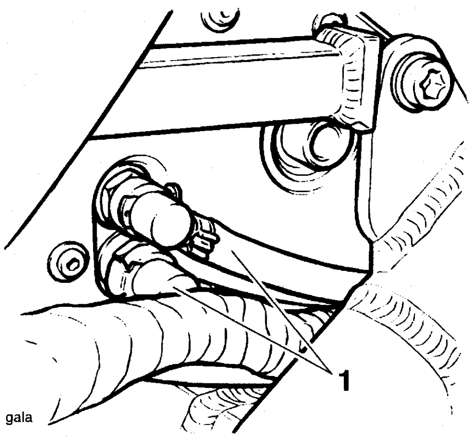
1. Low Fuel Level Sender Connection

2. Fuel Pump Connection

2. Reconnect the hoses to the fuel tank drain point and (where fitted) the roll-over valve connection point.

3. Align the fuel tank to the mounting points and tighten the fuel tank mounting bolts to **12 Nm**.

4. Reconnect the fuel feed and return hoses by inserting each hose into the corresponding socket and gently pushing inwards until the hoses engage.



1. Fuel Hoses

NOTE:

- **When a fuel hose is correctly engaged, an audible 'click' will be heard.**

5. Reconnect the hose leading to the fuel pressure regulator.

6. Refit the body side panels as described in the bodywork section.

7. Refit the fuel tank cover.

8. Reconnect the battery, positive (red) lead first.

9. Start the engine and check carefully for fuel leaks. Rectify as necessary.

10. Refit the seat.

FUEL PUMP

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

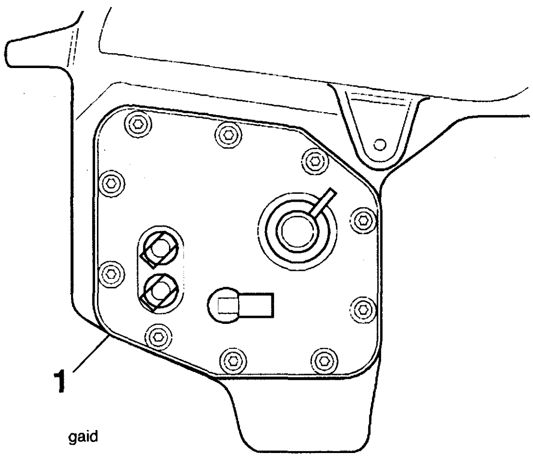
2. Remove the fuel tank as described elsewhere in this section.

3. Drain the fuel tank into a suitable container.

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.

4. Release the ring of bolts securing the fuel pump mounting plate to the fuel tank.

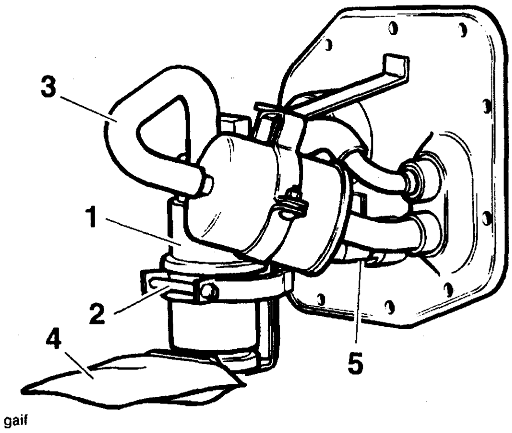


1. Fuel Pump Mounting Plate

5. Remove the mounting plate and discard the gasket.

6. Release the clip securing the fuel hose to the pump. Disconnect the fuel pump electrical connection at the pump.

7. Loosen the fuel pump clamp screw and ease the pump from the bracket ensuring the gauze pick-up filter is not damaged during removal.



1. Fuel Pump
2. Clamp Screw
3. Fuel Hose
4. Gauze Pick-up Filter
5. Fuel Pump Connection

Assembly

1. Locate the pump to the mounting bracket ensuring that the rubber support ring is in place around the clamp/pump.

2. Tighten the clamp screw to **3 Nm.**

3. Refit the fuel hose to the pump and tighten the clip.

4. Reconnect the fuel pump cable.

5. Position a new gasket to the fuel tank opening and locate the pump mounting plate to the fuel tank. Tighten the mounting plate fixings to **6 Nm.**

6. Refit the fuel tank as described elsewhere in this section.

7. Refill the fuel tank with the fuel drained earlier.

8. Reconnect the battery, positive (red) lead first.

9. Refit the seat.

FUEL FILTER

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank as described elsewhere in this section.

3. Drain the fuel tank into a suitable container.

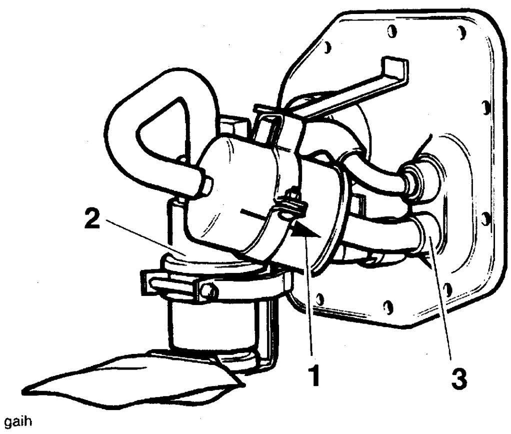
> **WARNING: Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.**
>
> **A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.**

4. Release the ring of bolts securing the fuel pump mounting plate to the fuel tank.

5. Ease the mounting plate away from the fuel tank and discard the gasket.

6. Release the clips securing the fuel hoses to the filter.

7. Loosen the filter clamp screw and ease the filter from the bracket.



1. Fuel Filter

2. Fuel Pump

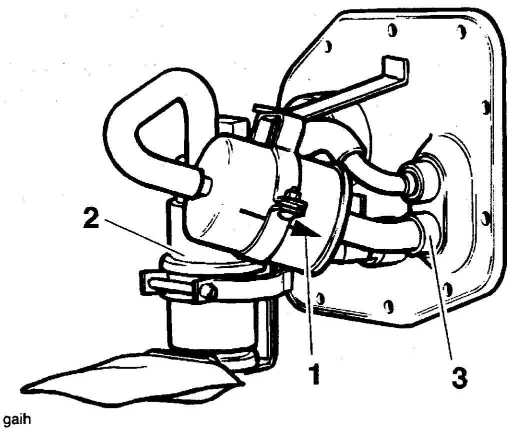
3. Fuel Exit Connection/Outlet

Inspection/Test

Renew the fuel filter in accordance with the scheduled maintenance chart.

Assembly

1. Locate the filter to the mounting bracket ensuring that the arrow on the filter body (which indicates the direction of flow) is pointing such that fuel will flow from the pump, through the filter. towards the fuel exit connection in the mounting plate.



Arrow indicates direction of flow

1. Arrow

2. Fuel Pump

3. Fuel Exit Connection

2. Tighten the clamp ring screw to **3 Nm**.

3. Refit the fuel hoses to the filter and tighten the clips.

4. Position a new gasket to the fuel tank opening and locate the pump mounting plate to the fuel tank. Tighten the mounting plate fixings to **6 Nm**.

5. Refit the fuel tank as described elsewhere in this section.

6. Refill the fuel tank with the fuel drained earlier.

7. Reconnect the battery, positive (red) lead first.

8. Refit the seat.

FUEL PRESSURE REGULATOR

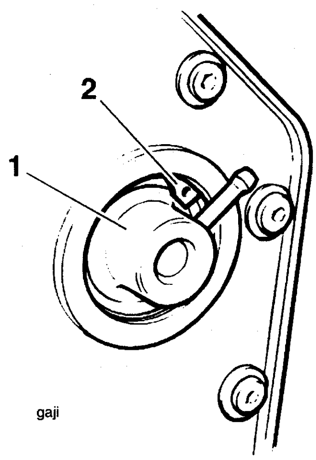
1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank as described elsewhere in this section.

3. Drain the fuel tank into a suitable container.

> **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.**

4. Remove the circlip securing the pressure regulator to the fuel pump mounting plate.



1. Fuel Pressure Regulator

2. Circlip

5. Ease the pressure regulator from the mounting plate.

6. Remove and discard the regulator 'O' rings.

Assembly

1. Fit new 'O' rings to the pressure regulator and lightly lubricate the 'O' rings with petroleum jelly.

2. Fit the pressure regulator and retain with a new circlip.

3. Refit the fuel tank as described elsewhere in this section.

4. Refill the fuel tank with the fuel drained earlier.

5. Reconnect the battery, positive (red) lead first.

6. Refit the seat.

FUEL HOSE CONNECTORS

NOTE:

- **Fuel hose connectors are fitted to the mounting plate using a tapered screw thread.**

Removal

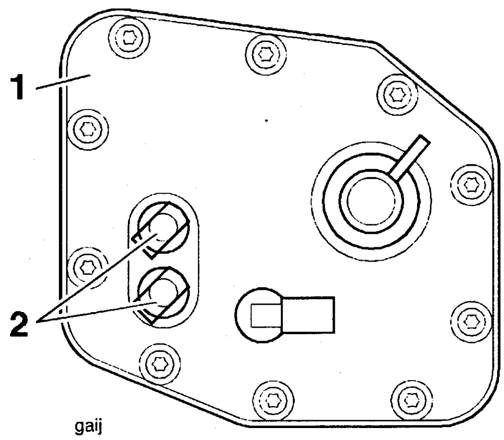
1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank as described elsewhere in this section.

3. Drain the fuel tank into a suitable container.

> **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.**

4. Unscrew the fuel hose connectors from the mounting plate.



1. Mounting Plate

2. Connectors

Inspection

1. Check the connector for cracks, thread damage and splits.

2. Check that the connecting hose is being correctly retained and that the connection is fuel tight.

WARNING: A leaking or damaged fuel connector could cause a fire causing burn injuries to the rider and technician.

To minimise the risk of fuel leaks, always replace any suspect fuel connectors.

Assembly

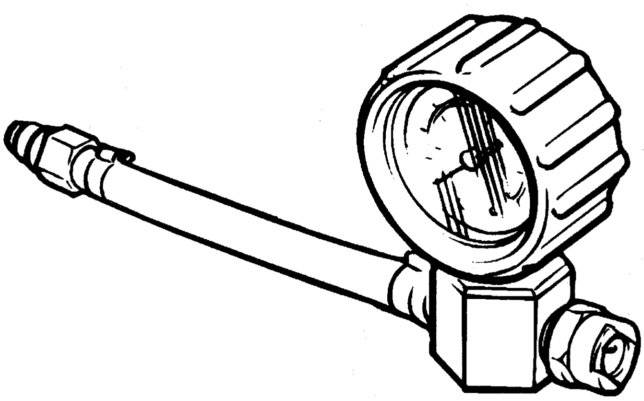
1. Fit the connectors to the mounting plate and tighten to **5 Nm**.

CAUTION: The connectors will be damaged if the specified torque is exceeded. Do not overtighten the connectors.

2. Refit the fuel tank as described elsewhere in this section.
3. Refill the fuel tank with the fuel drained earlier.
4. Reconnect the battery, positive (red) lead first.
5. Refit the seat.

FUEL PRESSURE CHECKING

Using Triumph service tool T3880048, allows diagnosis of fuel pump, fuel pressure relief valve and hose related problems without first removing the component concerned.



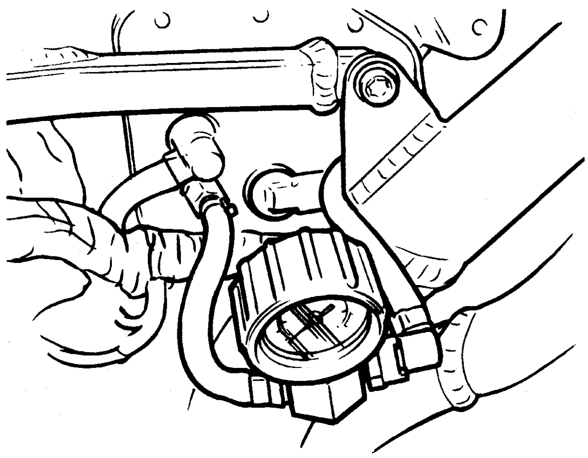
Tool T3880048

Test Procedure

1. In order to connect the gauge, turn the ignition to the OFF position and remove the motorcycle side panel assembly.

CAUTION: Never turn the ignition on with either fuel hose disconnected as this will by–pass the fuel pressure regulator and cause excess pressure in the system.

2. Disconnect either of the fuel hoses and connect the gauge between the detached hose and the fuel pump mounting plate.



3. Turn the ignition to the ON position and check the gauge reading.

NOTE:

- **If correct, the fuel pressure should be 3.0 Bar +/– 0.25 Bar.**
- **If a higher or lower fuel pressure reading is shown on the gauge, refer to the non–electrical diagnosis table earlier in this section.**

Fuel Delivery System

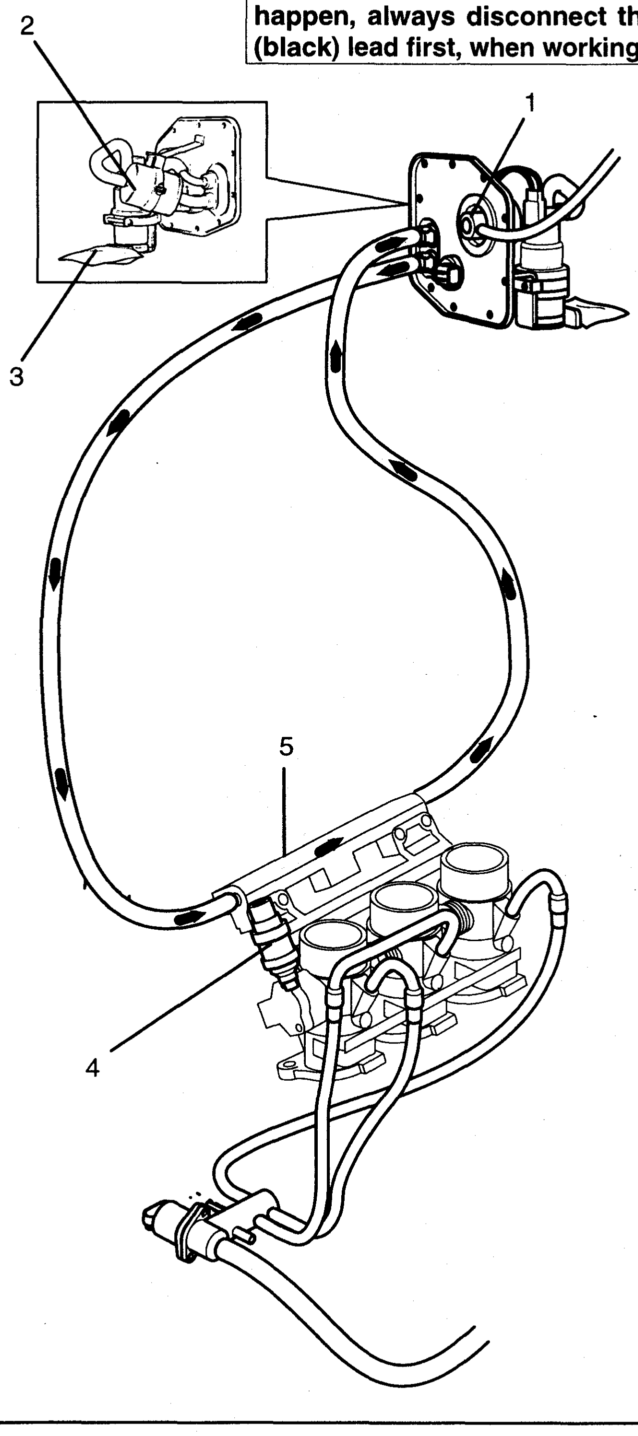
Fuel is delivered to the injectors by a fully submerged pump located inside the fuel tank. Fuel flows in the direction of the arrows shown in the diagram below.

Incorporated in the system is a filter, a pressure regulator and pick–up strainer.

CAUTION: Under no circumstances should the fuel pump be activated (by switching on the ignition) with either, or both, of the fuel hoses disconnected.

Although there is little risk of a fuel leak due to the use of dry-fit connectors, if the fuel pump is activated in this condition, the fuel pressure regulator is bypassed as the system is incomplete.

In this condition, unregulated fuel pressure can be delivered to the fuel filter and hoses which may lead to damage to the filter and detachment of the hoses inside the fuel tank. To ensure this does not happen, always disconnect the battery, negative (black) lead first, when working on the fuel system.



1. Regulator
2. Filter
3. Strainer
4. Injector
5. Fuel Rail

AIRBOX

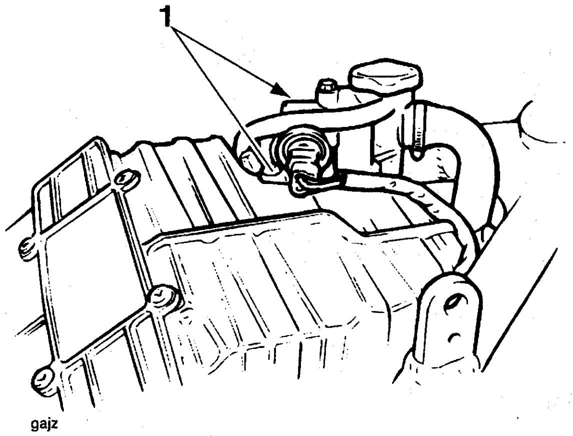
Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank as described elsewhere in this section.

3. Disconnect the air intake hoses at the joints with the cockpit.

4. Without draining the cooling system, release the bolts securing the thermostat housing to the airbox.



1. Thermostat Housing Bolts

5. Disconnect the coolant temperature sensor multi-plug from the thermostat housing.

WARNING: If the engine has recently been running, the thermostat housing may be hot to the touch. To avoid burn injuries to the skin, always allow sufficient time for the cooling system to cool down to room temperature before working on or near any part of the cooling system.

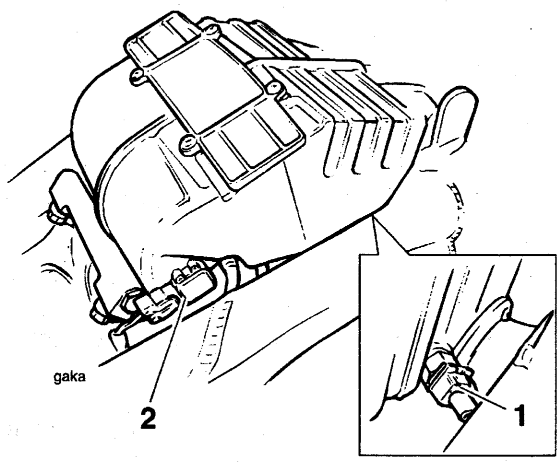
6. Disconnect the airbox drain hoses from both the front and rear of the airbox.

7. On early models only, release the bolt securing the front of the airbox to the bracket at the front edge of the cam cover.

NOTE:

- **On later models, no bolt is fitted, the airbox is retained on a slotted latch and no action is necessary at this stage.**

8. Disconnect the multi-plug connections to the inlet air temperature and barometric pressure sensors.



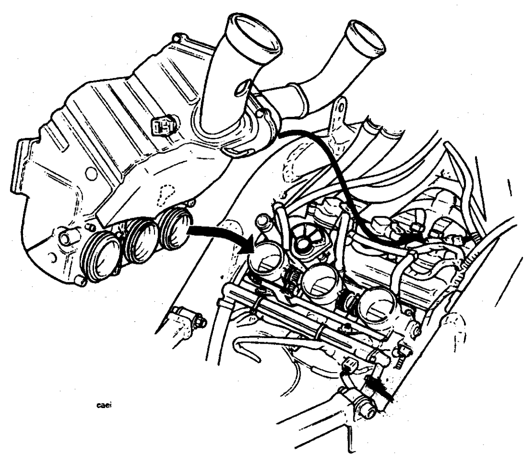
1. Inlet Air Temperature Connection

2. Barometric Pressure Sensor

9. Disconnect the engine breather hose and the air bypass hose at the airbox.

10. Where necessary, release the worm-drive clips securing the airbox to the throttle bodies.

11. Raise the rear of the airbox, slide to the rear and remove from the frame.



Airbox Removal (front location for later models shown)

CAUTION: To prevent dirt and debris from falling into the throttle openings while the airbox is removed, seal the openings with tape.

If the openings are not protected, debris may fall into the throttles causing damage to the engine and causing the throttles to stick.

Assembly

1. Check that the clips which secure the airbox to the throttles are in place and positioned to allow tightening once fitted.

NOTE:

- **Later models are fitted with self-gripping clips which do not require positioning prior to fitment.**

2. Assemble the airbox to the throttle bodies ensuring full engagement of the intakes over the throttles and, on later models, engagement of the front airbox retaining latch.

3. On early models only, fit the bolt securing the airbox to the bracket at the front edge. Tighten the bolt to **5 Nm.**

4. Where necessary, tighten the clips securing the airbox to the throttle bodies.

5. Reconnect the airbox drain hoses, fuel pressure regulator hose and engine breather hose.

6. Reconnect the following:
    - Inlet air temperature sensor.
    - Barometric pressure sensor.

7. Position the thermostat housing to the airbox. Tighten the thermostat housing to airbox fixings to **5 Nm.**

8. Reconnect the coolant temperature sensor.

9. Reconnect the air intake hoses at the cockpit.

10. Refit the fuel tank as described elsewhere in this section.

11. Reconnect the battery, positive (red) lead first.

12. Refit the seat.

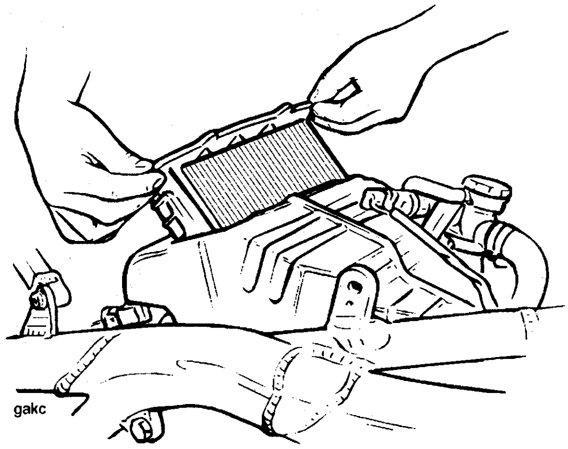
Air Filter Element

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank as described elsewhere in this section.

3. Release the screws securing the air filter housing to the airbox and lift up the housing. Retain the gasket for future re-use.

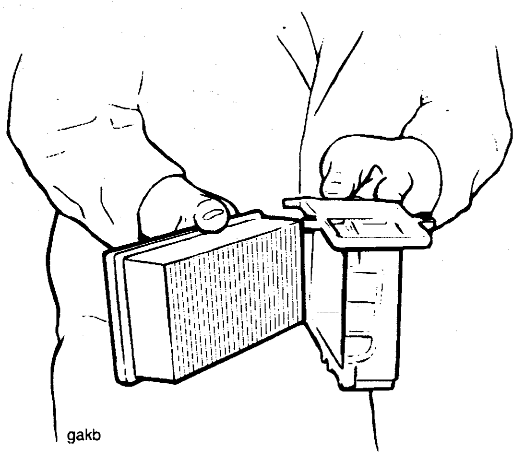


Raising the Housing

4. Detach the air filter element from the housing.

NOTE:

- **Note the orientation of the element before final detachment. The new item must be assembled in the same orientation.**



Replacing the Air Filter Element

Assembly

1. Clean the air filter housing and locate the new element in the orientation noted during removal.

2. Locate the housing to the airbox ensuring the gasket is correctly positioned. Tighten the screws.

3. Refit the fuel tank as described elsewhere in this section.

4. Reconnect the battery, positive (red) lead first.

5. Refit the seat.

BAROMETRIC PRESSURE SENSOR

Removal

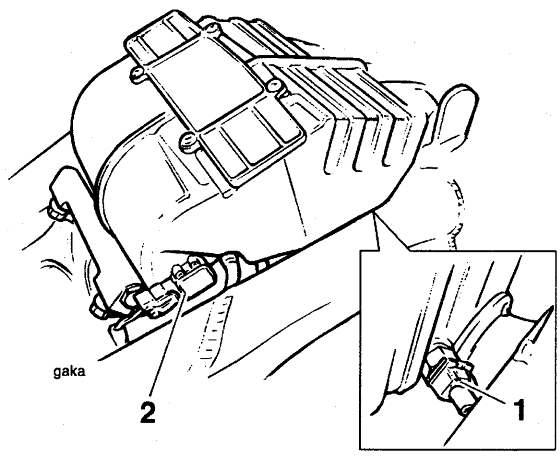
1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank and airbox as described elsewhere in this section.

NOTE:

- **The barometric pressure sensor is a push fit in the airbox and is retained by a barbed seal.**

3. Remove the sensor by gently pulling in an outward direction.



1. Intake Air Temperature Sensor

2. Barometric Pressure Sensor

Assembly

1. Align the sensor to the airbox and push fully home.

2. Refit the airbox and fuel tank as described elsewhere in this section

3. Reconnect the battery, positive (red) lead first.

4. Refit the seat.

INTAKE AIR TEMPERATURE SENSOR

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank and airbox as described elsewhere in this section.

NOTE:

- **The intake air temperature sensor has a threaded base which retains it to the airbox.**

3. Unscrew the sensor to remove it from the airbox.

Assembly

1. Fit the temperature sensor to the airbox taking care not to overtighten.

2. Refit the airbox and fuel tank as described elsewhere in this section

3. Reconnect the battery, positive (red) lead first.

4. Refit the seat.

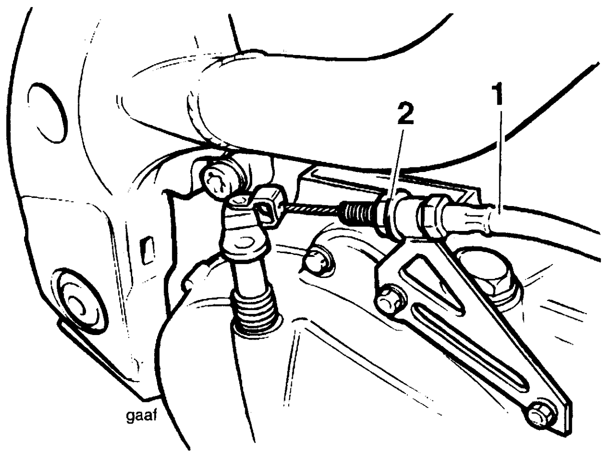
CRANKSHAFT POSITION SENSOR

Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.

2. Remove the belly panel and right hand lower fairing (where fitted).

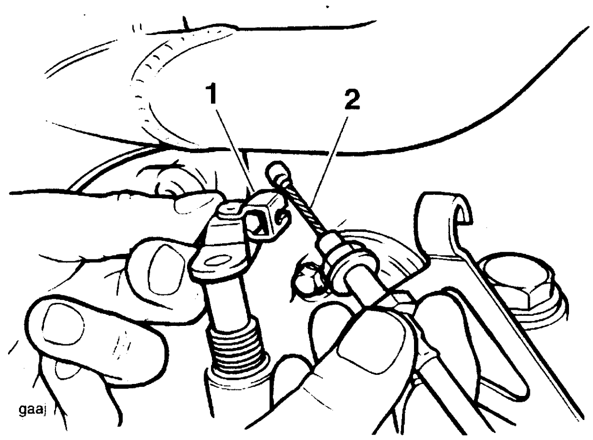
3. Slacken the cable locknut and release the adjuster at the clutch cover end, to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

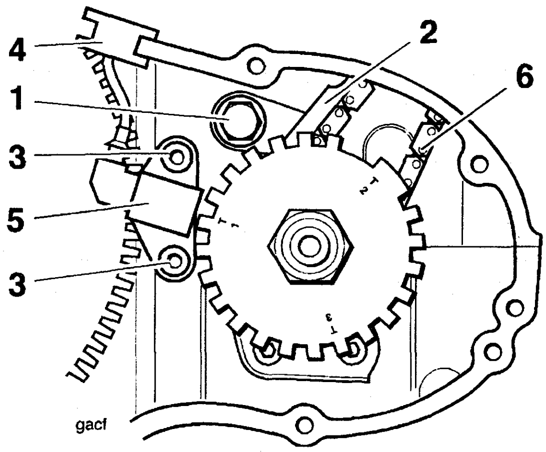
4. Release the clutch cable from the actuating arm by pushing the inner cable nipple through the arm and sliding the cable out of the slot.



1. Actuating Arm

2. Inner Cable

5. Drain the engine oil as described in the lubrication section.
6. Remove the clutch cover.
7. Release the sensor multiplug and detach the sensor grommet from the crankcase.
8. Release the sensor screws and detach the sensor.



1. Camchain Tensioner Blade Retaining Bolt

2. Camchain Tensioner Blade

3. Sensor Screws

4. Rubber Grommet

5. Crankshaft Position Sensor

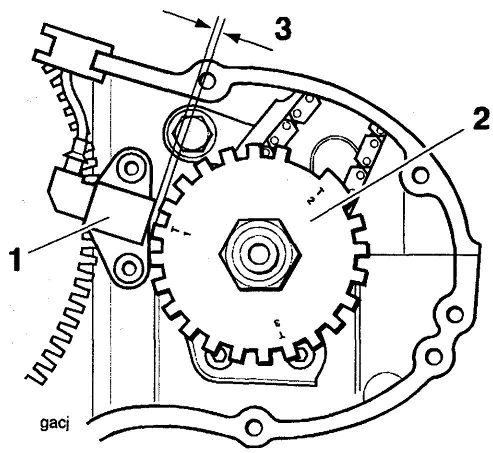
6. Cam Chain

Assembly

1. Assemble the sensor to the crankcase and tighten the screws.
2. Refit the sensor grommet to the crankcase and reconnect the multiplug.
3. Turn the engine over until the 'T1' mark on the crankshaft rotor aligns with the centre of the sensor.
4. Adjust the air gap between the sensor probe and the rotor to 1mm ± 0.20 mm.

NOTE:

- **Always recheck the gap after tightening the screws. Rest the gap if the setting has moved.**



1. Crankshaft Position Sensor

2. Crankshaft Rotor

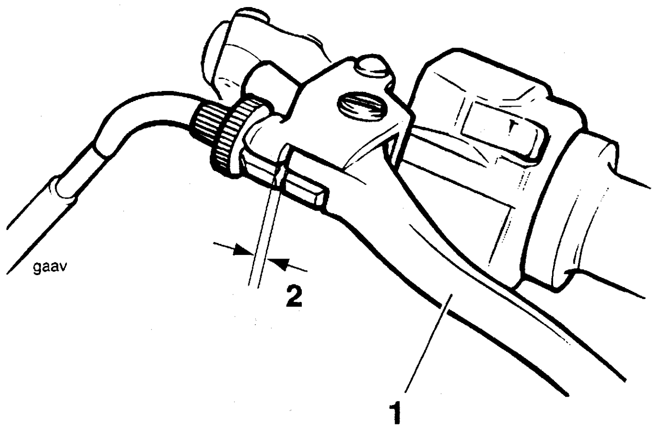
3. 1.00 mm ± 0.20 mm

5. Clean and refit the clutch cover using a new gasket. Tighten the clutch cover bolts to **9 Nm.**
6. Refit the sump drain plug and tighten to **28 Nm.** Re-fill the engine with the correct grade and type of engine oil.
7. Refit the outer cable to the adjuster bracket at the clutch end.

NOTE:

- **Ensure that the two adjuster nuts are positioned, one either side of the bracket.**

8. Set the lever adjuster to a point where an equal adjustment is possible in both directions.
9. Set the adjuster at the clutch end to give a preliminary setting of 2–3mm of free-play as measured at the lever.
10. Operate the clutch lever several times and recheck the amount of free-play present at the lever.



1. 0.4–0.8mm Free Play

11. Set the final adjustment of the cable to give 0.4–0.8 mm of free-play at the lever by turning the adjuster nut and locknut at the lever end.

12. Refit the bodywork removed earlier (if any).

13. Reconnect the battery positive (red) lead first then the negative (black) lead.

14. Refit the seat.

CAMSHAFT POSITION SENSOR (early models only)

NOTE:

- **This item has been deleted from later models.**

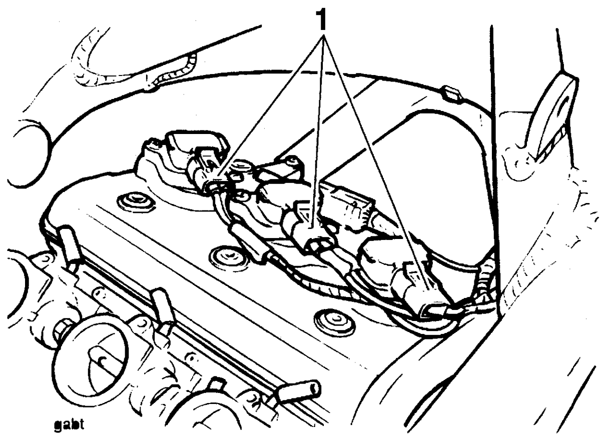
Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.

2. Remove the side panel assembly as detailed in the body section.

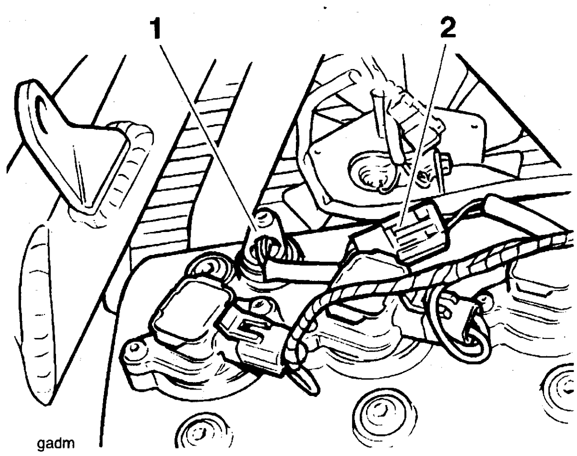
3. Remove the fuel tank and airbox as detailed in the fuel system section.

4. Disconnect the electrical connections to the ignition coils, then remove the coils from the cam cover.



1. Coil Connections

5. Disconnect and remove the camshaft sensor.



1. Camshaft Sensor

2. Sensor Connection

Assembly

1. Fit the camshaft position sensor and tighten the fixing to **10 Nm**.
2. Fit the ignition coils and tighten the coil fixings to **10 Nm.**
3. Reconnect the ignition coils.
4. Refit the fuel tank and airbox as described elsewhere in this section.
5. Refit the side panels and seat.
6. Reconnect the battery positive (red) lead first.

ROAD SPEED SENSOR (early models only)

NOTE:

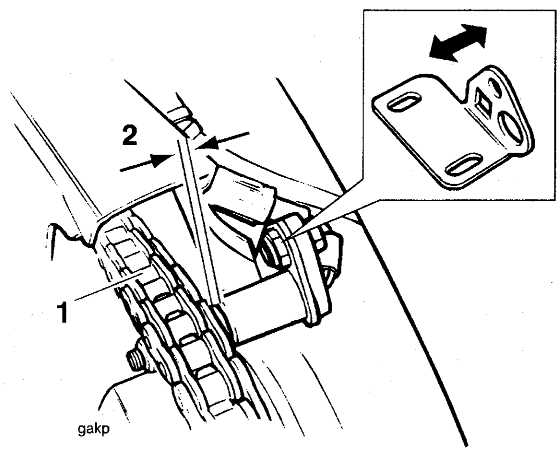
- **This item has been deleted from later models.**

Removal

1. Release the sensor multiplug.
2. Release the screw securing the sensor to the bracket and detach the sensor.

Assembly

1. Assemble the sensor to the bracket and tighten the fixing to **6 Nm**.
2. Rotate the rear wheel until one of the sprocket bolt heads aligns with the sensor.
3. Slacken the sensor bracket bolts and adjust the sensor bracket to give a 1mm gap between the sensor and the bolt head.



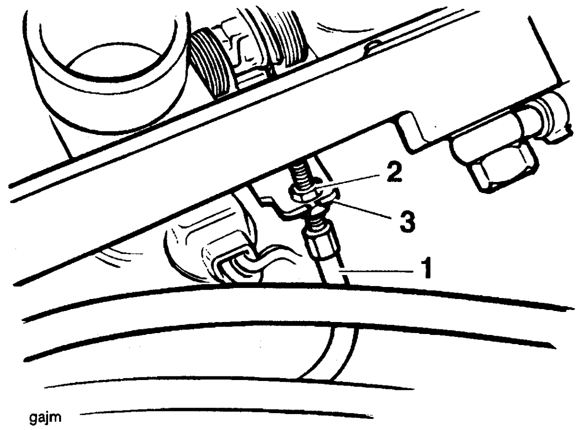
1. Sprocket

2. 1 mm gap

THROTTLE CABLE

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the fuel tank and airbox as described in this section.
3. Slacken the adjuster locknut at the throttle body end of the cable such that it will allow the outer cable to be detached from the cable bracket.

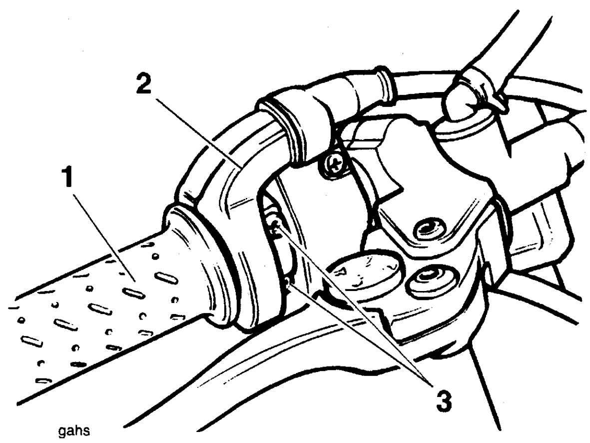


1. Outer Cable

2. Adjuster Locknut

3. Cable Bracket

4. Detach the inner cable from the throttle cam.
5. At the twist grip end, slide off the rubber boot and release the screws which secure the two halves of the twist grip guide to each other.

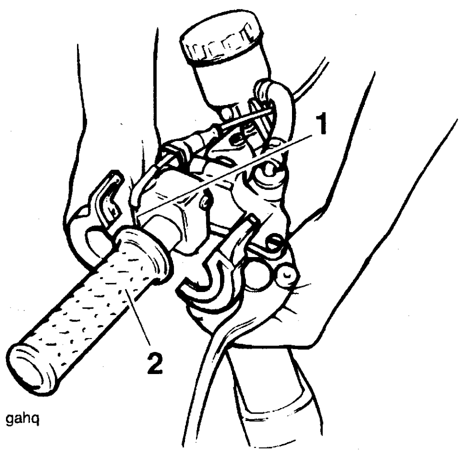


1. Twist Grip

2. Twist Grip Guide

3. Screws

6. Slide off the boot and separate the two halves of the guide. Release the throttle inner cable from the twist grip.



1. Inner Cable

2. Twist Grip

7. Note the routing of the throttle cable and remove from the frame.

Examination

1. Check that the throttle cable operates smoothly, without sticking or binding. Replace the cable if there is any doubt as to its correct operation.

> **WARNING: Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.**

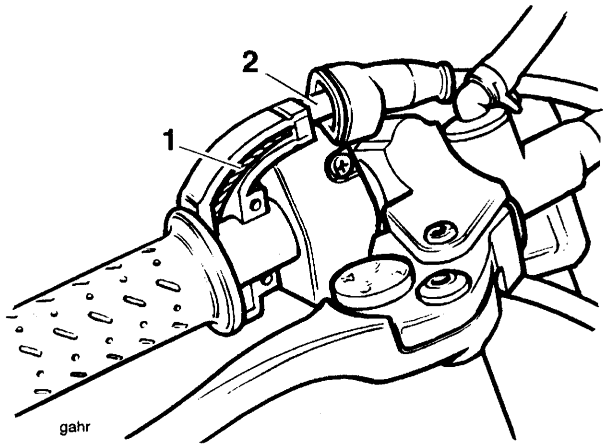
> **WARNING: Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.**

Installation

1. Locate the cable to the frame following the routing noted during removal.

2. Engage the inner cable nipple to the twist grip.

3. Assemble the two halves of the cable guide ensuring that the outer cable is correctly located in the guide. Refit the boot.



1. Cable Guide

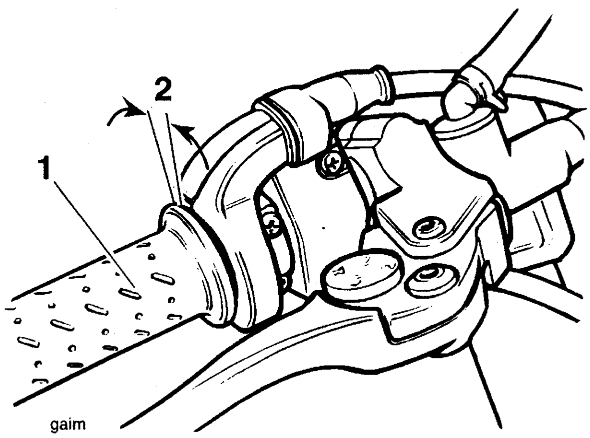
2. Outer Cable

4. Attach the other end of the inner cable to the throttle cam and locate the outer cable to the cable bracket. Tighten the cable locknut.

5. Set the cable adjustment as described below.

Adjustment

1. When correctly set, the throttle must have 2-3 mm of free–play at the throttle twist grip. If there is more or less than 2–3 mm of free–play present, the throttle cable must be adjusted.

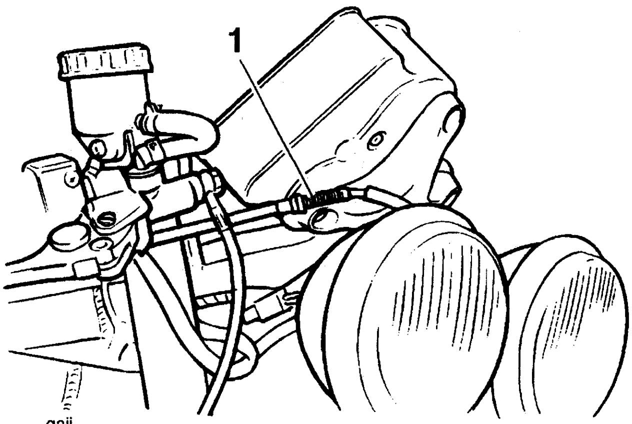


1. Throttle Twist Grip

2. 2–3 mm

NOTE:

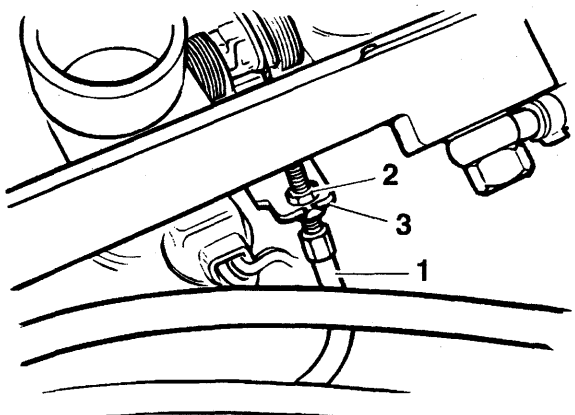
- **Minor adjustments can be made using the adjuster near the twist grip end of the throttle. Where a correct setting cannot be achieved in this way, the adjuster at the throttle body end must be used.**



1. Adjuster – Twist Grip End

2. Set the cable adjuster at the twist grip end such that it has an equal amount of adjustment in each direction.

3. Set the adjuster at the throttle body end of the cable to give 2–3mm of play at the twist grip. Tighten the locknut.



1. Outer Cable

2. Adjuster Locknut

3. Cable Bracket

4. Refit the airbox and fuel tank.

5. Make any minor adjustments as necessary to give 2-3 mm of play using the adjuster at the twist grip end of the cable. Tighten the locknut.

WARNING: Ensure that the adjuster locknuts are tightened. A loose throttle cable adjuster could cause the throttle to stick leading to loss of control and an accident.

6. Reconnect the battery, positive (red) lead first.

7. Refit the seat.

THROTTLE BODIES

Removal

NOTE:

- **If the fuel rail is to be removed, select neutral, disconnect the wiring connection to the fuel pump and crank the engine briefly to reduce fuel pressure in the fuel rail.**

WARNING: Because fuel stored in the fuel rail will be at 3 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the throttle bodies takes place.

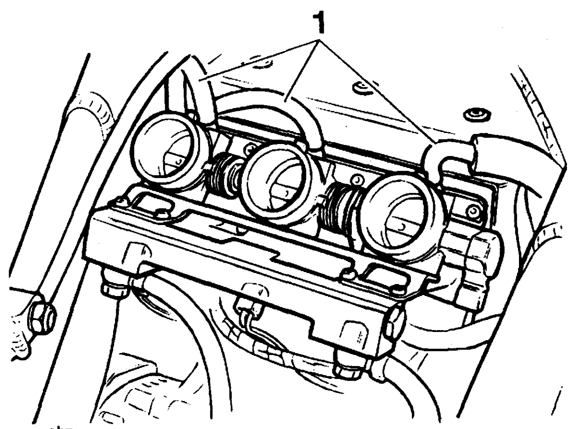
If the throttle bodies are dismantled without first reducing fuel pressure, pressurised fuel may escape causing clothing and components to be coated with fuel.

This would represent a serious fire hazard which could lead to burn injuries and damage to property.

1. Remove the seat and disconnect the battery negative (black) lead first.

2. Remove the fuel tank and airbox as described elsewhere in this section.

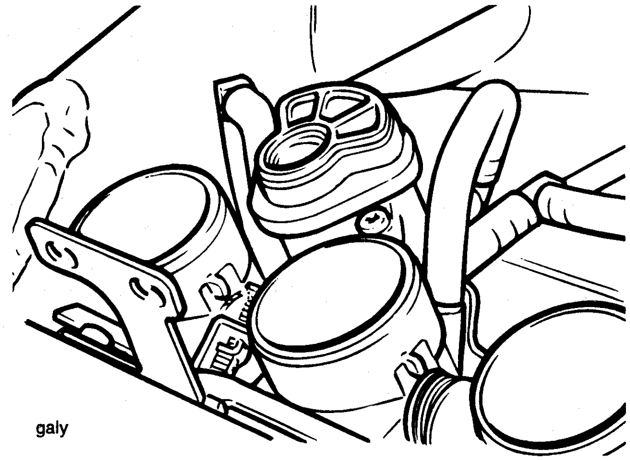
3. **Early Models Only:** To ensure that they are returned to the same positions on assembly, note the position of each hose leading from the idle air control valve to the throttle bodies. Disconnect the hoses.



1. Hoses

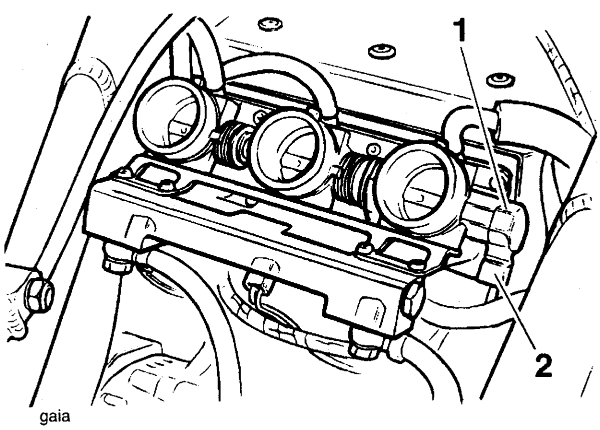
NOTE:

- **On models with the idle air control valve as shown in the diagram below , it is not necessary to disconnect the air bypass hoses when removing the throttle bodies.**



Later Model Air Bypass System

4. Disconnect the multi-plug leading to the throttle position sensor.



1. Throttle Position Sensor

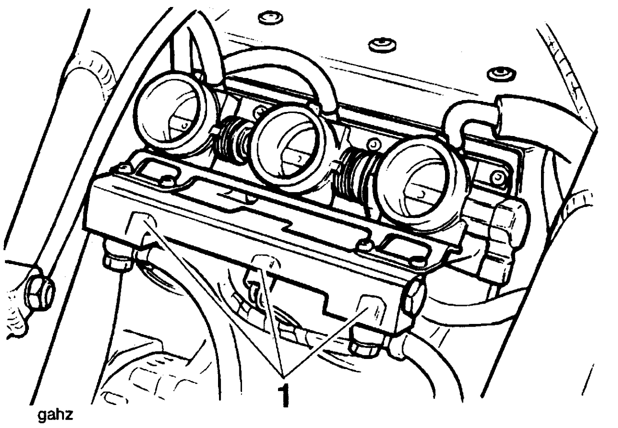
2. Multi-plug

5. Release the throttle cable adjusters and disconnect the throttle cable.

6. Release any cable ties securing the injector cables to the fuel rail.

7. Disconnect the multi-plugs to each injector.

8. Disconnect the multiplug to the idle air control valve.



1. Injector Multi-plugs

9. Release the screws securing the throttle body assembly to the cylinder head.

NOTE:

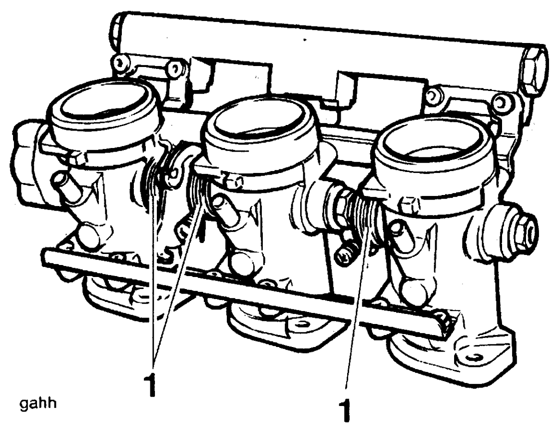
- **On early models, a bracket which supports the idle air control valve assembly is secured by one of the throttle bodies to cylinder head screws.**

10. Remove the throttle body assembly and collect the gasket.

Inspection

1. Check that the throttles open and close smoothly and do not stick in any position.

2. Examine all throttle springs for damage, looseness and breakages.



1. Throttle Springs

3. Check for signs of fuel leaks at the injector connections with the fuel rail.

Assembly

1. Thoroughly clean the throttle body to cylinder head mating surfaces.

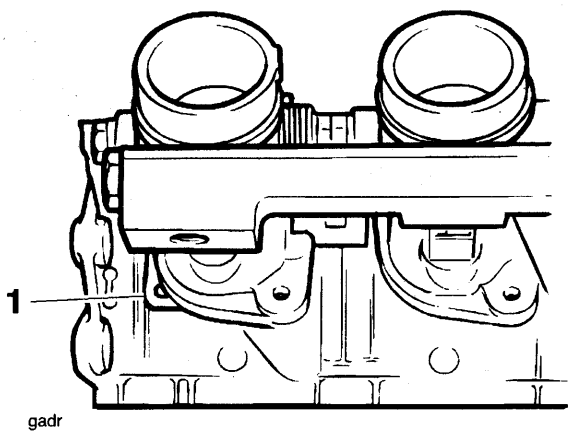
> ⚠ **CAUTION: Ensure that no debris is allowed to fall into the engine or throttles.**
>
> **Engine damage will result from ingress of debris to the cylinder head or throttles.**

2. Check that the two locating dowels are correctly seated in the cylinder head.

3. Fit a new gasket over the locating dowels ensuring that the gasket tab is positioned to the left hand side.

NOTE:

- **There are two different throttle body gaskets which are selected according to engine size. The gasket for the 955cc engine has a hole in the tab whereas the gasket for the 885cc engine has a plain tab.**



1. Identification Hole (955 cc Engine Only)

4. Locate the throttle body assembly to the cylinder head.

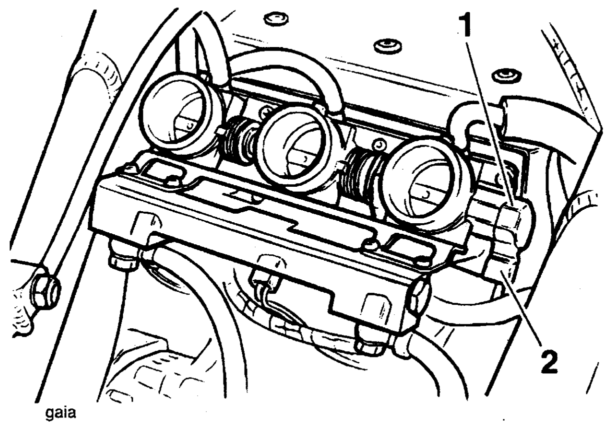
5. Ensuring that the idle air control valve (early models only) is refitted in its original location, tighten the throttle body to cylinder head screws to **12 Nm.**

6. Refit the throttle cable and adjust to give 2-3mm of free–play at the twist grip (the adjustment procedure is detailed elsewhere in this section). Check for smooth throttle operation. Rectify as necessary.

7. Reconnect the injector multi-plugs and secure the cables to the fuel rail using new cable ties.

8. Reconnect the throttle position sensor.

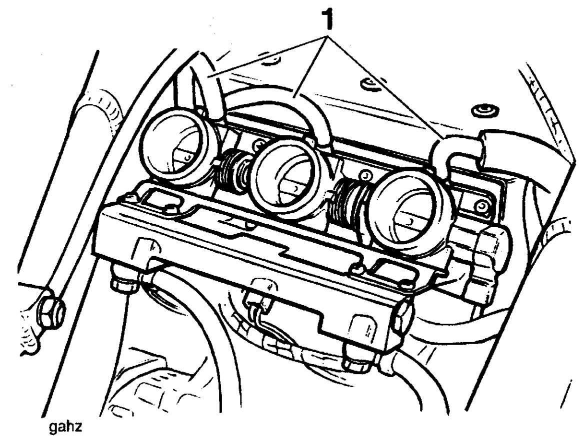
9. Reconnect the multiplug to the idle air control valve.



1. Throttle Position Sensor

2. Multi-plug

10. **Early models only:** Reconnect the idle air control valve hoses as noted during removal.



1. Hoses

11. Refit the airbox and fuel tank as described elsewhere in this section.

12. Reconnect the battery, positive (red) lead first.

13. Refit the seat.

THROTTLE BODY BALANCING

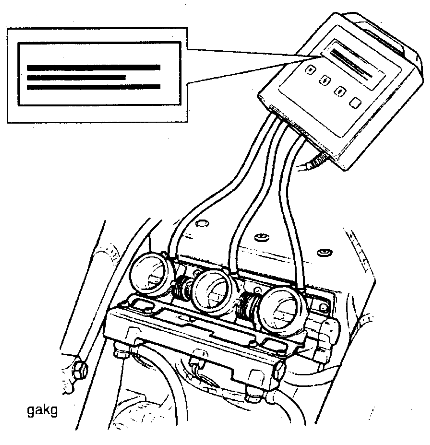
NOTE:

- **In order to accurately balance the throttle bodies, Triumph recommend the use of the *Souriau Indiana* digital inlet vacuum analyser or another similar device. Although mercury columns or analogue gauges will allow balancing of the throttle bodies, use of a digital meter will allow a more accurate balance to be achieved.**

1. Remove the fuel tank and airbox as described elsewhere in this section.
2. Disconnect the idle air control hoses from the throttle bodies.
3. Position the analyser in a position that it can be easily read and attach the hoses to the idle air control ports on the throttle bodies.
4. Remove the sealer from the adjustment screws.

WARNING: If the engine has recently been running, the components beneath the fuel tank cover may be hot to the touch.

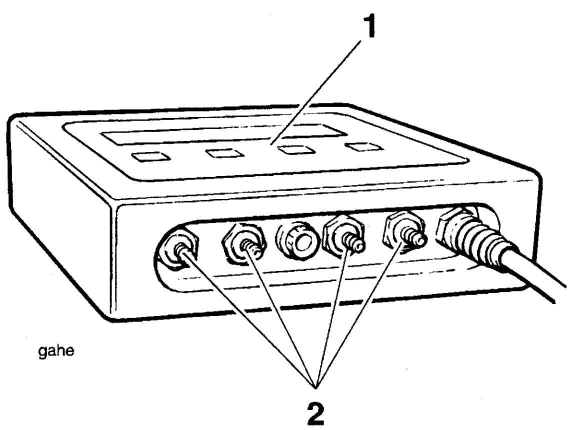
Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before hose disconnection/connection.



Typical Analyser Display

NOTE:

- **The hose connections on the tool are marked 1, 2, 3 etc. denoting which cylinder they should be connected to. When connecting the hoses to the throttles, ensure that hose 1 is connected to cylinder number one etc. Cylinder 1 is on the left hand side of the motorcycle.**



1. Analyser marking

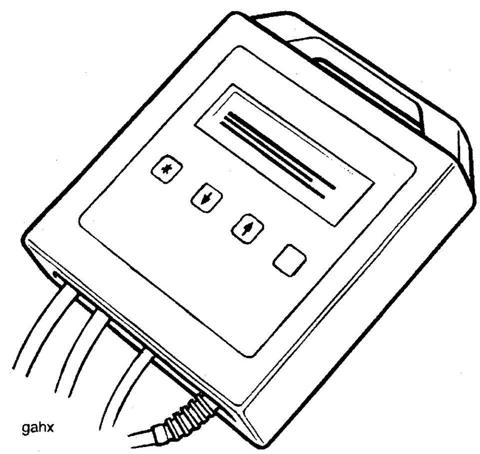
2. Throttle body connections

5. Temporarily refit the fuel tank and reconnect the fuel hoses and fuel pump connection.
6. Attach an exhaust extraction hoses to the silencer.
7. Start the engine.

NOTE:

- **Throughout the balancing procedure, it will be necessary to open the throttle slightly to prevent the engine from stalling. This is because the idle air control system has been disconnected to allow attachment of the analyser hoses.**

8. Using the throttle twist grip, hold the engine speed at approximately 1200 RPM.
9. Select the bar chart display on the analyser and assess which cylinders require adjustment.

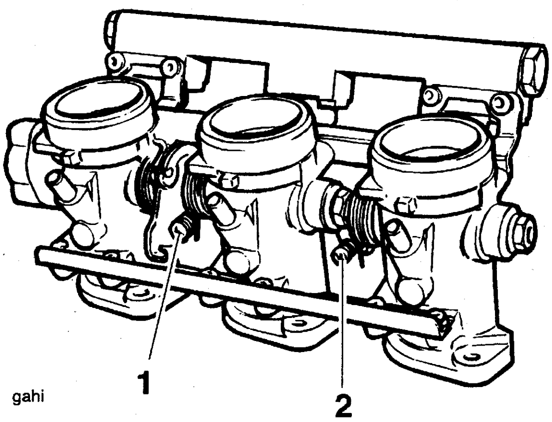


Typical display of imbalanced throttles.

NOTE:
- **The left hand (number 1) cylinder is non-adjustable. All other cylinders are adjusted to match the setting of number 1 cylinder, though it should be noted that adjustment of any cylinder will marginally affect the setting of the other two.**

10. Keeping the engine speed at around 1200 rpm, set both adjusters such that all three throttle bodies have an equal vacuum reading.

NOTE:
- **The adjusters can be reached by working in the space where the fuel tank cover would normally fit.**



1. Adjuster – number 2 cylinder

2. Adjuster – number 3 cylinder

11. Stop the engine.
12. Remove the fuel tank
13. Reconnect the idle air control hoses.
14. Refit the air box and fuel tank as described earlier in this section.
15. Start the engine and check that the idle speed is in the range 1200 $\pm$ 50 rpm.
16. Re–apply sealer to the adjustment screws.

NOTE:
- **If the idle speed now falls outside the above range, adjust the closed throttle position using the Triumph service diagnostic tool. Refer to the tool's operating instructions for details.**

INJECTORS

Removal

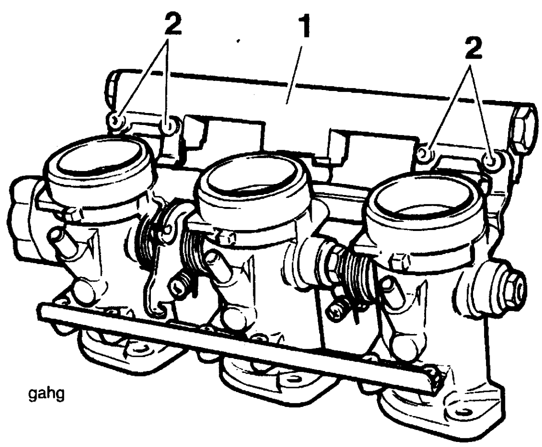
1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the fuel tank and airbox as described elsewhere in this section.
3. Move the gearchange to neutral and crank the engine briefly to reduce fuel pressure in the fuel rail.

WARNING: Because fuel stored in the fuel rail will be at 3 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the throttle bodies takes place.

If the throttle bodies are dismantled without first reducing fuel pressure, pressurised 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.

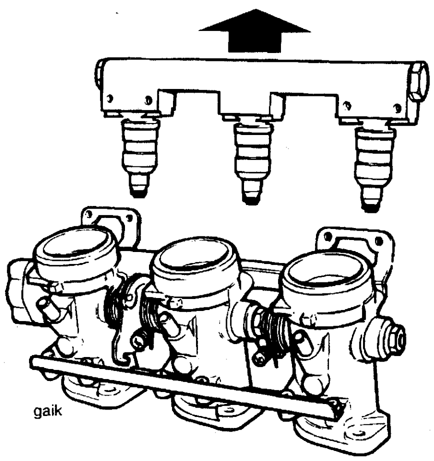
4. Release any cable ties securing the injector cables to the fuel rail.
5. Disconnect the multi-plugs to each injector.
6. Release the four screws (two screws on later models) securing the fuel rail to its support bracket.



1. Fuel Rail

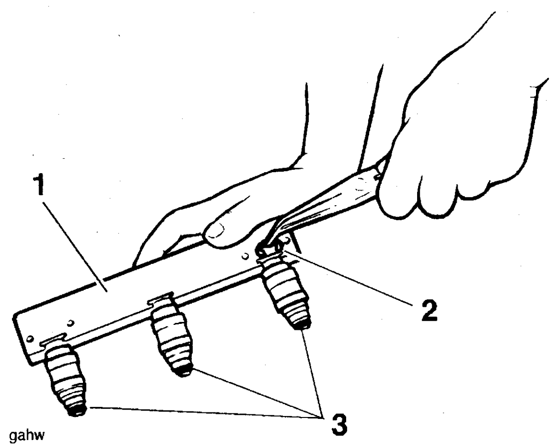
2. Fuel Rail Screws

7. Leaving the injectors attached to the fuel rail, ease the injectors upwards and remove from the throttle body assembly.



Removing the Injectors/Fuel Rail

8. Remove the clips from the top of each injector.



1. Fuel Rail

2. Circlip

3. Injector

9. Ease the injectors from the fuel rail to remove each injector.

Inspection

1. Check the injector 'O' rings for damage, splits etc. Renew as necessary.

Testing

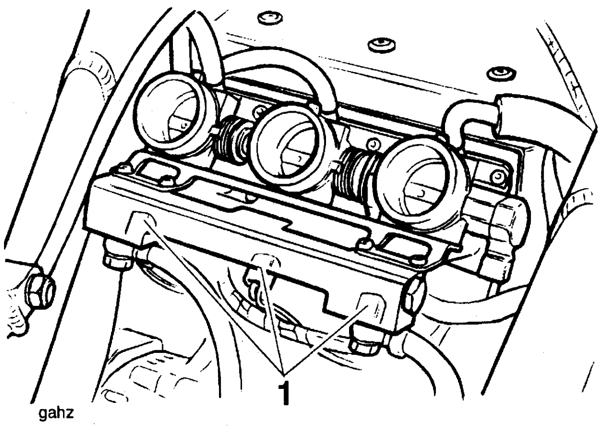
1. Check the ECM for stored diagnostic trouble codes (DTCs) using the Triumph service diagnostic tool. Rectify as necessary.

NOTE:

- **The injectors cannot be pressure tested.**

Assembly

1. Fit new injector 'O' rings if necessary.
2. Locate the injectors to the fuel rail and rotate the injectors such that the electrical connections will face down and to the rear of the motorcycle when fitted.
3. Refit the injector retaining clips.



1. Injector Multiplugs

4. Locate the injectors to the throttle bodies and engage to a depth that allows the fuel rail to bracket screws to be refitted.
5. Refit the fuel rail to bracket screws and tighten to **5 Nm**.
6. Refit the electrical connections to the injectors and secure the cable to the fuel rail using new cable ties.
7. Refit the airbox and fuel tank as described elsewhere in this section.
8. Reconnect the battery, positive (red) lead first.
9. Refit the seat.

THROTTLE POSITION SENSOR

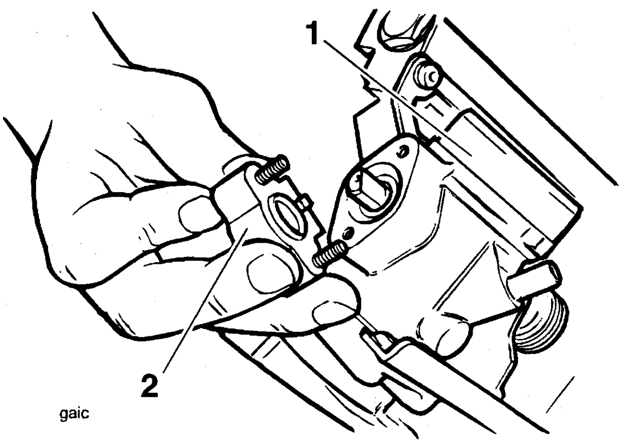
CAUTION: If the throttle position sensor is replaced, the electronic value of the closed throttle position must be adjusted using the Triumph service diagnostic tool.

If the closed throttle position value is not reset, fuel consumption, idle speed and engine performance will be adversely affected.

For details of how to reset the closed throttle position value, refer to the 'adjustment' instructions elsewhere in this section.

Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the throttle bodies as described elsewhere in this section.
3. Release the screws securing the sensor to the right hand throttle body. Remove the sensor.



1. Right Hand Throttle Body

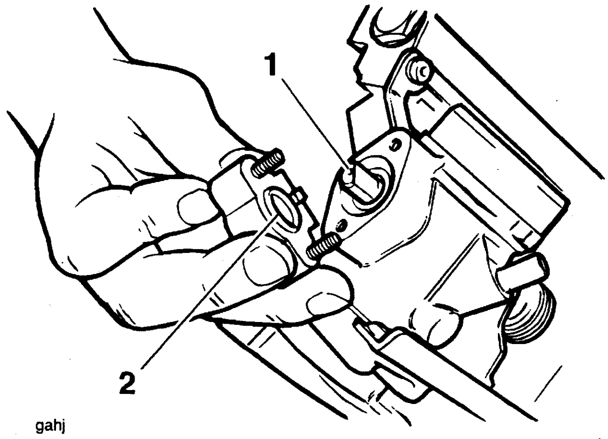
2. Throttle Position Sensor

Inspection

1. Check the electrical connectors for pin damage and corrosion. Renew as necessary.
2. Check the sensor body for damage, splits, cracks etc. Renew as necessary.

Assembly

1. Locate the sensor to the throttle body ensuring that the 'D' shaped extension of the throttle spindle engages in the mating recess in the sensor.



1. 'D' Shaped Spindle Extension

2. 'D' Shaped Switch Recess

2. Tighten the sensor fixings to **2 Nm**.
3. Refit the throttle bodies as described elsewhere in this section.
4. Reconnect the battery, positive (red) lead first.
5. Adjust the closed throttle position electronic value using the Triumph service diagnostic tool.

NOTE:
- **For details of how to reset the closed throttle position value, refer to the diagnostic tool instructions elsewhere in this section.**

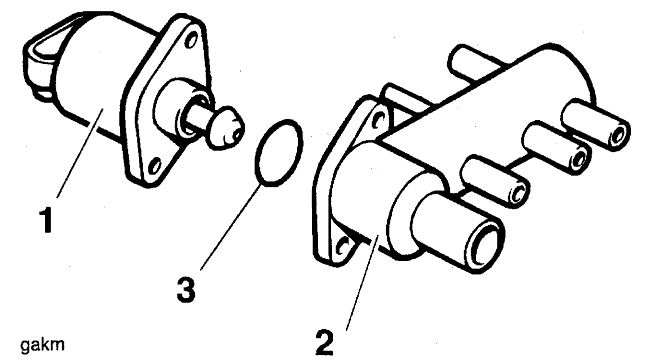
6. Refit the seat.

IDLE AIR CONTROL VALVE

Removal

1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the fuel tank as detailed elsewhere in this section.
3. To ensure that they are returned to the same positions on assembly, note the position of each hose leading from the idle air control valve to the throttle bodies. Disconnect the hoses at the valve.
4. **Early Models Only:** Release the screw securing the valve bracket to the lower side of the throttle body and remove the valve assembly.
   Late Models Only: Release the two screws securing the valve to the upper side of the throttle body and remove the valve assembly.

5. Release the screws securing the stepper motor to the valve body.



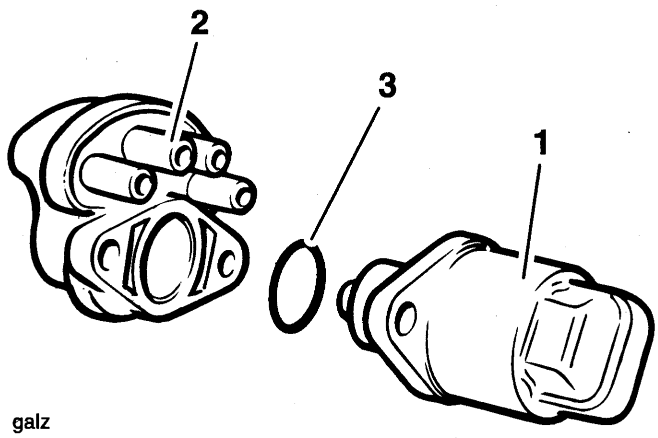
Early Air Bypass System

1. Stepper Motor

2. Valve Body

3. 'O' ring

Later Air Bypass System



1. Stepper Motor

2. Valve Body

3. 'O' ring

Inspection/test

1. The valve is checked for correct operation using the Triumph service diagnostic tool. No other tests are possible.

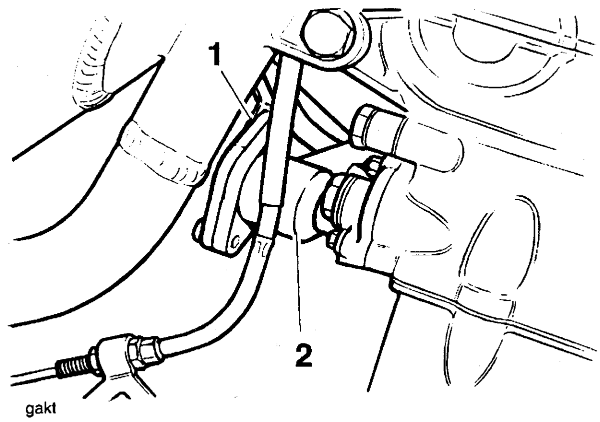
2. Check the valve body for cracks, damage and deterioration. Replace as necessary.

Assembly

1. Assemble the stepper motor to the valve body and secure using the original fixings.

2. Position the valve bracket to the throttle body and tighten the fixing to **12 Nm.**

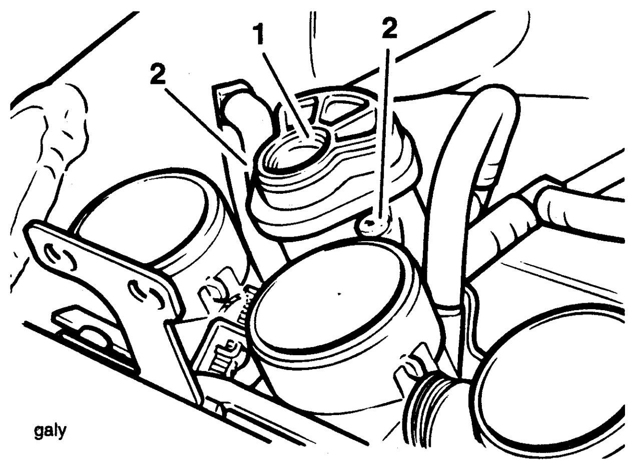
Early Air Bypass System



1. Idle Air Control Valve Stepper Motor

2. Valve Body

Later Air Bypass System



1. Idle Air Control Valve Stepper Motor

2. Retaining Screws

3. Reconnect the hoses as noted during the removal process.

4. Refit the fuel tank as described elsewhere in this section.

5. Reconnect the battery, positive (red) lead first.

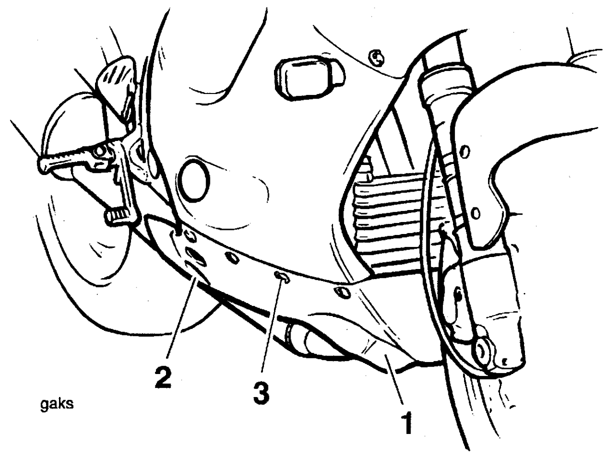
6. Refit the seat.

EXHAUST SYSTEM

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.**

1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the fairing belly panel (where fitted).

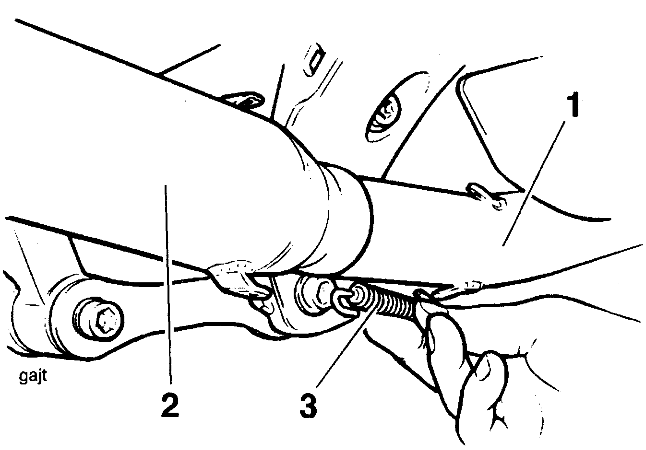


1. Belly Panel

2. Fixing Bolt

3. Quarter-turn Fixings

4. Unhook the springs securing the silencer to the downpipe.

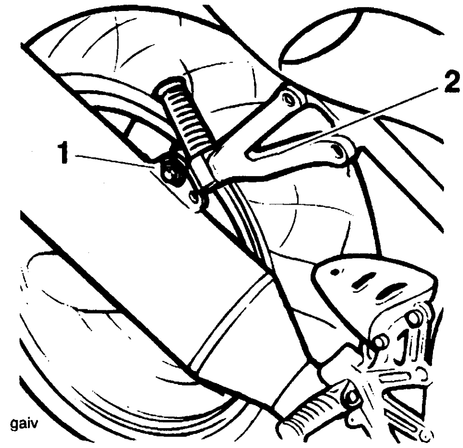


1. Silencer

2. Downpipe

3. Springs

5. Support the silencer and release the bolt securing the silencer mounting bracket to the right hand rear footrest support.



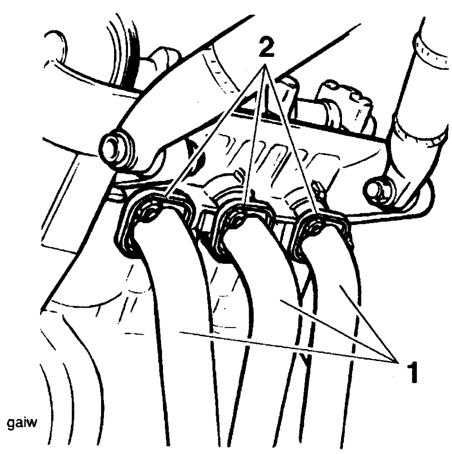
1. Silencer Mounting Bracket

2. Rear Footrest Support

6. Remove the silencer.
7. Drain the cooling system and remove the radiator (as described in the cooling system section) to gain access to the downpipe fixings.

> **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 the pressurised coolant will cause scalds and skin damage.**

8. Release the fixings securing the downpipe joints to the cylinder head.



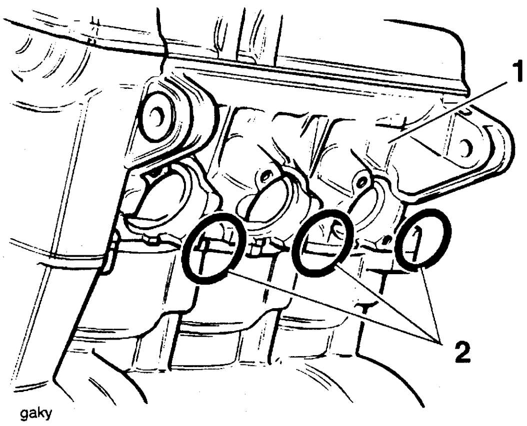
1. Downpipes

2. Downpipe to Cylinder Head Fixings

9. Detach the downpipe assembly and collect the seals from the head ports.

Assembly

1. Fit new seals to the cylinder head.



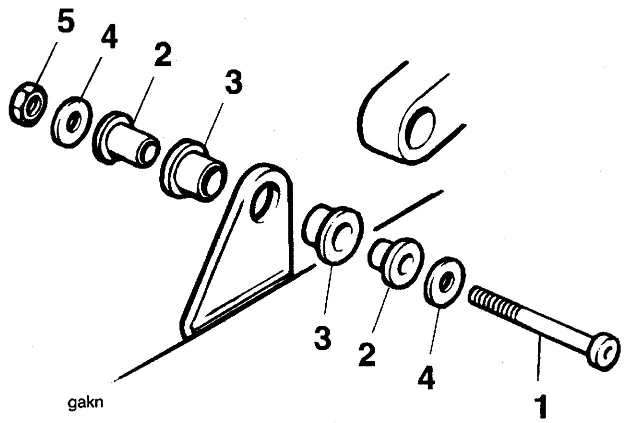
1. Cylinder Head

2. Seals

NOTE:

- **A smear of grease may be used to retain the seals in the cylinder head during assembly.**

2. Locate the downpipes and align the downpipe flanges to the fixings points.
3. Tighten the downpipe flange fixings in stages; first tighten all downpipe fixings to **8 Nm**, then tighten all downpipe fixings to **12 Nm.**
4. Refit the radiator and refill the cooling system as described in the cooling section.
5. Position and engage the silencer to the downpipe.
6. Align the silencer mounting bracket to the rear footrest support.
7. Ensuring that the flanged sleeves, bushes and washers are positioned as shown in the diagram, fit the silencer mounting bolt and tighten to **18 Nm.**



1. Silencer Mounting Bolt

2. Flanged Sleeves

3. Rubber Bushes

4. Flat Washers

5. Securing Nut

8. Refit the springs securing the silencer to the downpipe.
9. Refit the fairing belly panel (if removed earlier).
10. Reconnect the battery, positive (red) lead first.
11. Refit the seat.
12. Start the engine and check for exhaust gas leaks etc. Rectify as necessary.

EVAPORATIVE LOSS CONTROL SYSTEM

California Models Only

All California models are fitted with a system to control the evaporation of fuel vapour into the atmosphere.

A carbon cannister absorbs vapour while the engine is not running and, 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. These two conditions are explained overleaf.

Component Locations

Carbon Cannister – behind the throttle bodies.

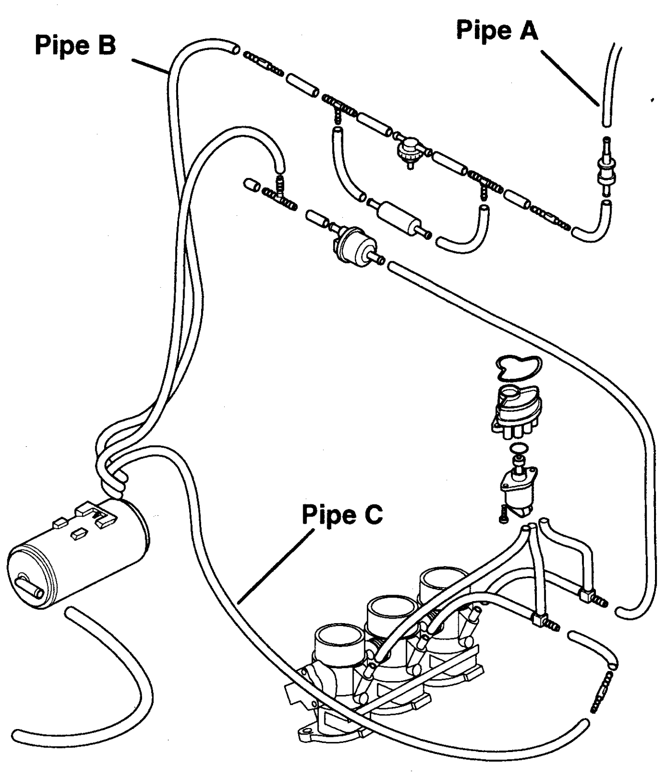
Pressure Control Valve – in the vapour line from the fuel tank.

Return Valve – adjacent to frame, left hand side (electronically controlled by the ECM).

Roll Over Valve – in the vapour line from the fuel tank.

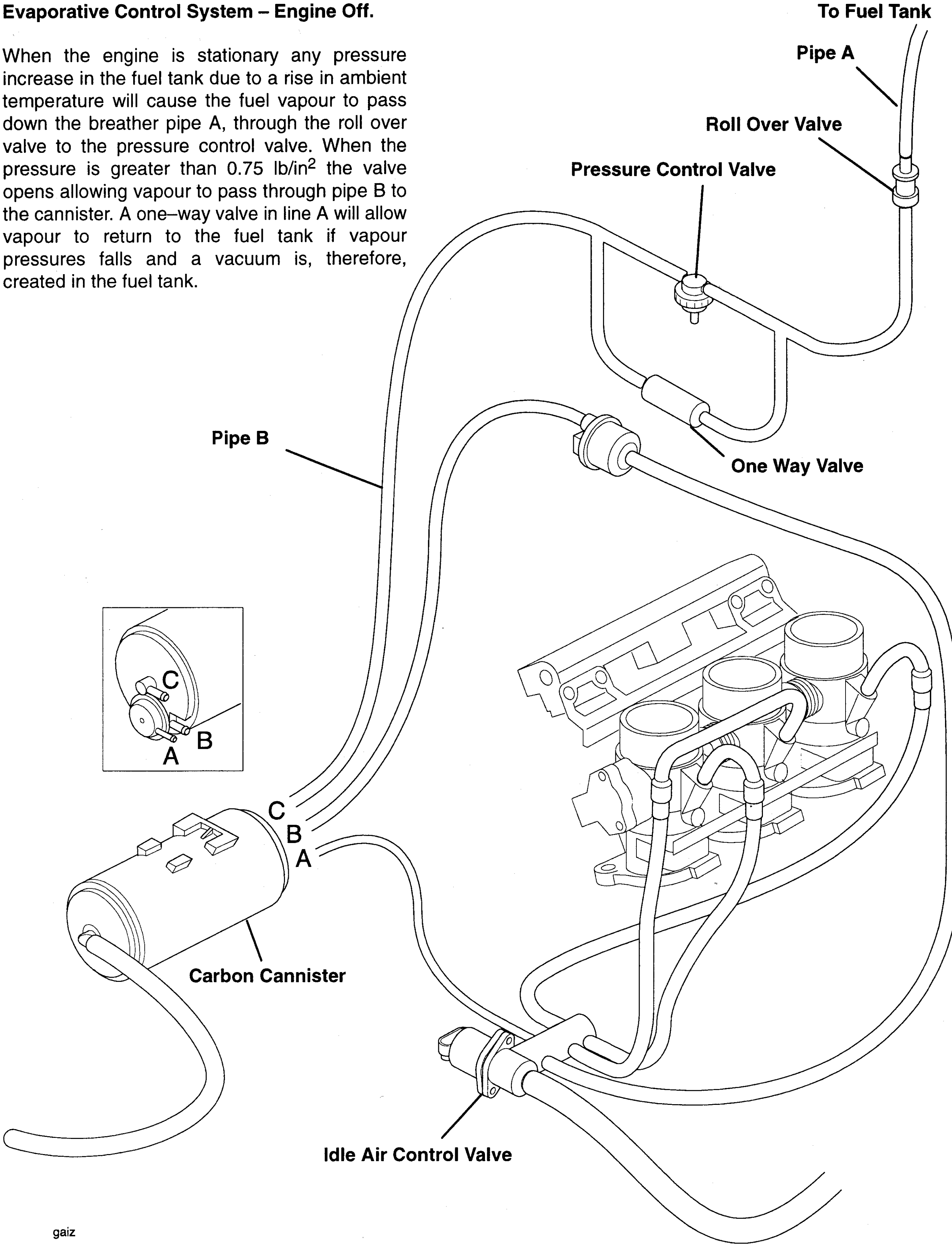
NOTE:

- **On the following two pages, the earlier evaporative system is depicted. The later system, shown below, operates in the same way.**



Evaporative 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, through the roll over valve to the pressure control valve. When the pressure is greater than 0.75 lb/in^2 the valve opens allowing vapour to pass through pipe B to the cannister. A one–way valve in line A will allow vapour to return to the fuel tank if vapour pressures falls and a vacuum is, therefore, created in the fuel tank.



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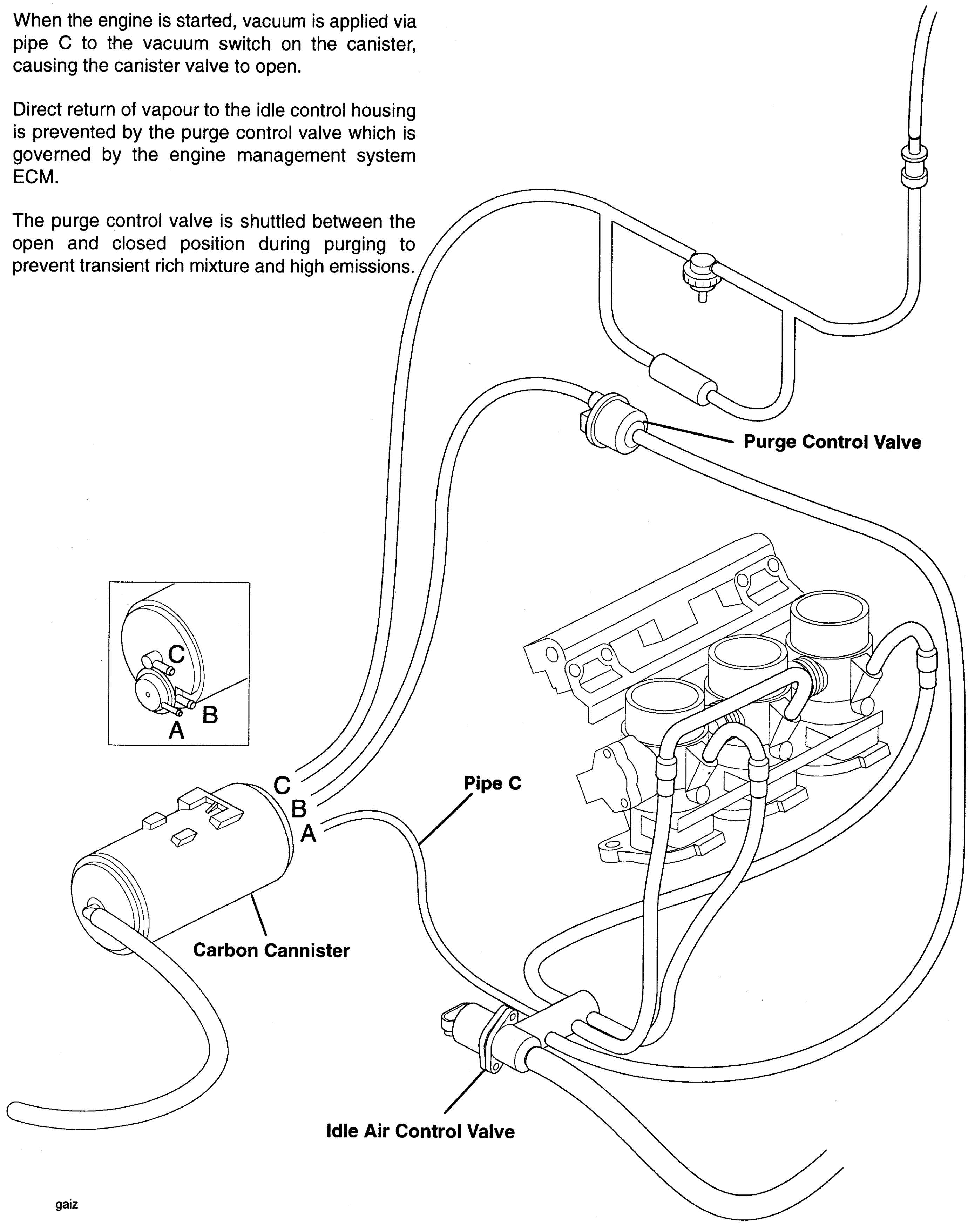
Evaporative Control System – Engine Running

When the engine is started, vacuum is applied via pipe C to the vacuum switch on the canister, causing the canister valve to open.

Direct return of vapour to the idle control housing is prevented by the purge control valve which is governed by the engine management system ECM.

The purge control valve is shuttled between the open and closed position during purging to prevent transient rich mixture and high emissions.



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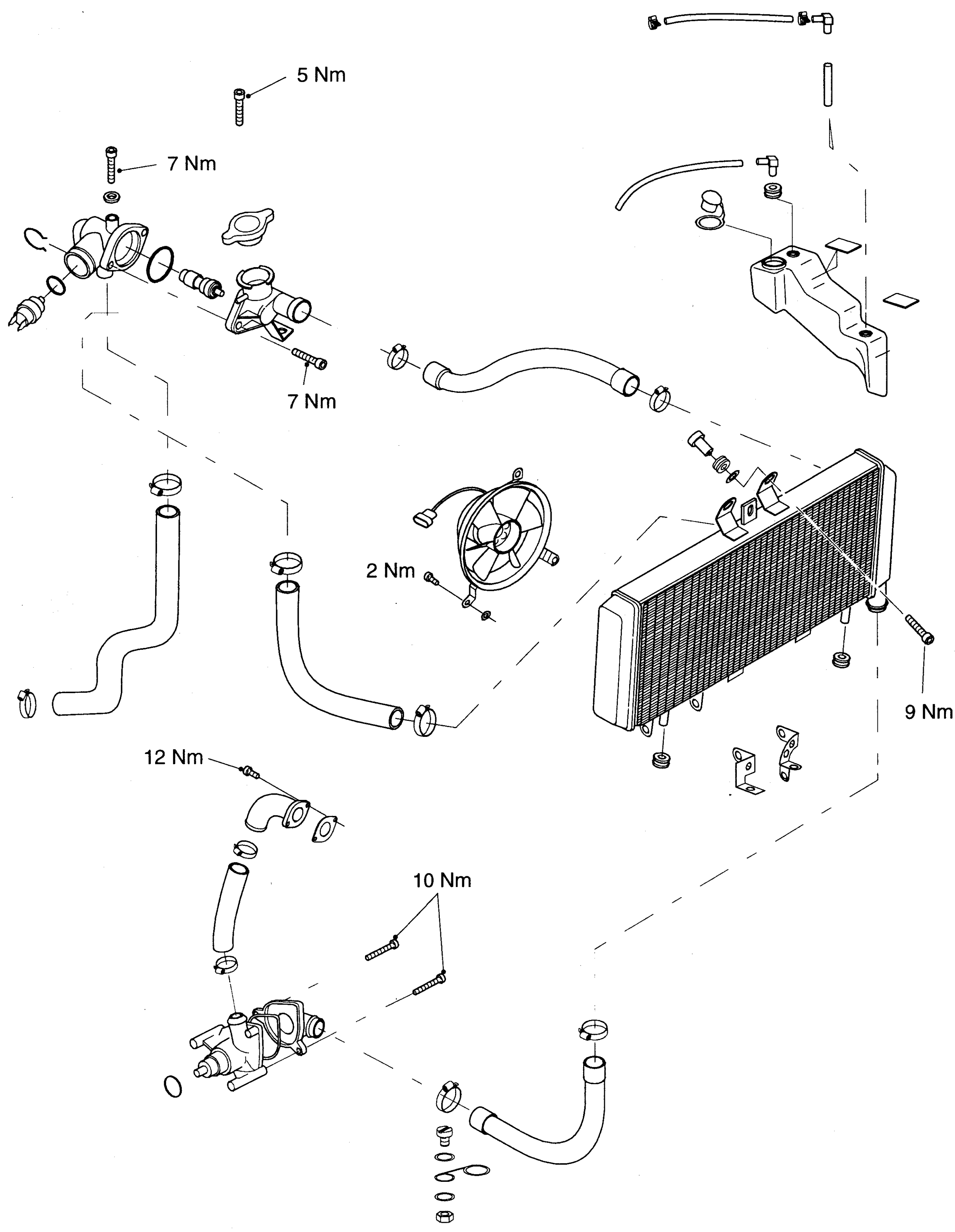
COOLING SYSTEM

CONTENTS

Exploded View – Cooling System



COOLANT

A permanent type of anti–freeze is installed in the cooling system when the motorcycle leaves the factory. It is coloured blue, contains a 50% solution of ethylene glycol, and has a freezing point of –35°C (–31°F).

Always change the coolant at the intervals specified in the scheduled maintenance chart.

WARNING: Coolant mixture which contains anti–freeze and corrosion inhibitors contains toxic chemicals which are harmful to the human body. Never swallow anti-freeze or any of the motorcycle coolant.

CAUTION: The coolant anti–freeze 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 anti–freeze as specified in the owner's handbook. Never use a methanol based anti-freeze as this does not contain the required corrosion inhibition properties.

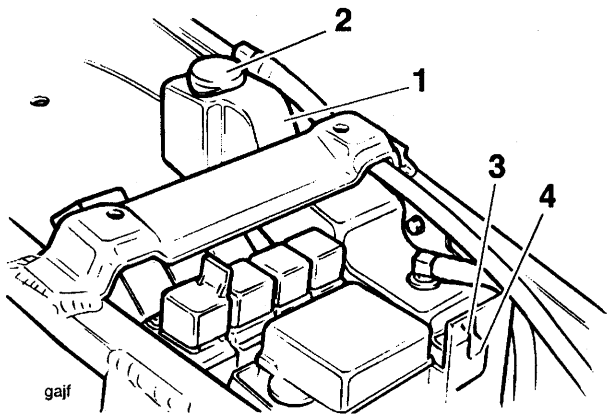
CAUTION: Distilled water must be used with the anti–freeze (see specification for anti–freeze) in the cooling system.

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 cause the engine to overheat and suffer severe damage.

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 the pressurised coolant will cause scalds and skin damage.

1. Position the motorcycle on level ground and in an upright position.
2. Remove both seats.
3. Check the coolant level in the expansion tank. The coolant level should be between the 'MAX and 'MIN.' marks.



1. Expansion Tank

2. Expansion Tank Filler Cap

3. 'Max' Mark

4. 'Min.' Mark

4. If the level of coolant is low, remove the cap from the expansion tank and add coolant mixture as necessary to bring the level up to the 'MAX' mark. Refit the cap.

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 REPLACEMENT

Drainage (all models)

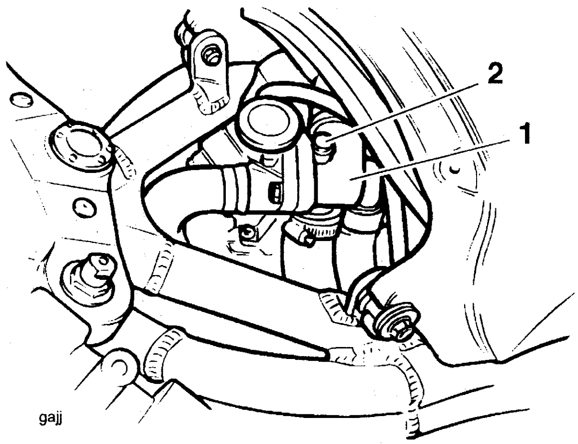
1. Remove the seat.

2. Disconnect the battery negative (black) lead first.

3. Remove the fuel tank cover.

> **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 the pressurised coolant will cause scalds and skin damage.**

4. Remove the coolant pressure cap on the thermostat housing and slacken the bleed screw to help drainage.



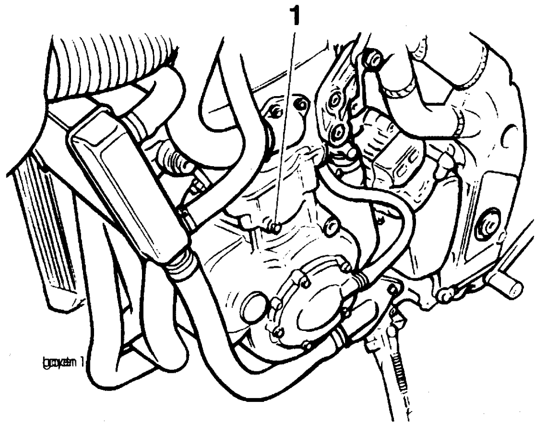
1. Thermostat Housing

2. Bleed Screw

5. Remove the left hand lower fairing (if fitted).

6. Position a container to collect the displaced coolant.

7. Remove the coolant drain plug.



1. Coolant Drain Plug

Filling

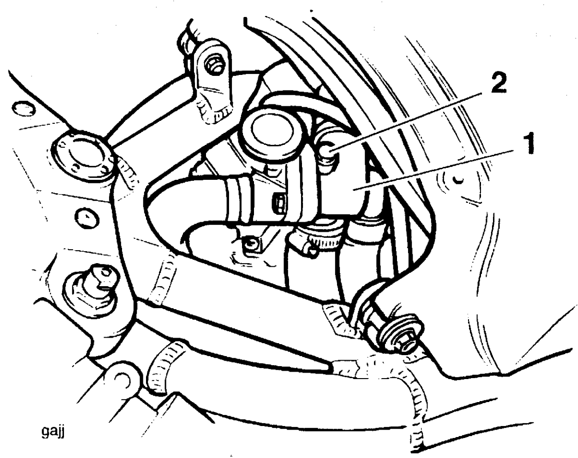
1. Refit the crankcase drain plug and tighten to **13 Nm**.

2. Remove the seat.

3. Remove the fuel tank cover.

> **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.**

4. If not already removed, remove the coolant pressure cap on the thermostat housing and also remove the bleed screw.



1. Thermostat Housing

2. Bleed Screw

5. **Slowly** add coolant mixture to the system, through the filler opening, until the system is full. If the system has filled correctly and fully there should be coolant visible through the bleed screw opening as well as in the filler opening.

6. If there is no coolant visible through the 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 from the cylinder head etc. into the bleed screw side of the thermostat housing.

NOTE:

- **A hand operated vacuum pump or similar should be used to syphon the coolant through the system. Ensure that the coolant that flows into the bleed screw side of thermostat housing comes from within the cylinder head etc. and is not merely drawn through the thermostat from the filler opening side.**

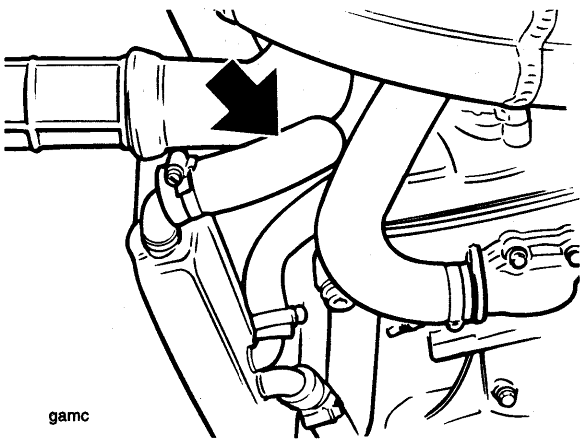
7. If necessary, top up the system through the filler and refit the pressure cap.

8. Refit the bleed screw and tighten to **7 Nm.**

9. Refit the coolant pressure cap.

10. Reconnect the battery positive (red) lead first.

11. Start the motorcycle and allow the engine to idle for a short period of time to allow any air to be expelled from the system. In particular, check for air–locks in the area of the radiator top hose.



Arrowed – Potential Air-lock Area

12. Stop the engine and top up the coolant level as necessary.

13. Fit the coolant pressure cap.

14. Check the expansion tank level and top up if necessary.

15. Refit the fuel tank cover.

16. Refit the seat.

RADIATOR HOSES

Regularly check all radiator hoses and hose clips for cracks, leaks or deterioration in accordance with the scheduled maintenance chart.

RADIATOR AND COOLING FAN

Check the radiator fins for obstruction by insects, mud, leaves and general debris. Clean off any obstructions by hand or with a stream of low pressure water.

WARNING: The cooling fan operates automatically, even with the ignition switched off. To prevent injury, keep hands and clothing away from the fan blades at all times.

CAUTION: Using high-pressure water, as from a car-wash facility, can damage the radiator fins and impair the radiator's efficiency.

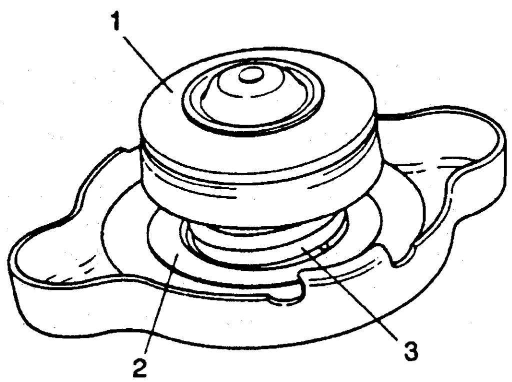
Do not obstruct or deflect airflow through the radiator by installing unauthorized accessories in front of the radiator or behind the cooling fan. Interference with the radiator airflow can lead to overheating and consequent engine damage.

COOLANT PRESSURE CAP

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 the pressurised coolant will cause scalds and skin damage.

1. Check condition of the upper and lower seals of the coolant pressure cap.



1. Lower Seal

2. Upper Seal

3. Spring

NOTE:

- **If there is any sign of damage or deterioration replace the cap.**

2. Pressure test the cap to the blow off pressure of 1.1 bar. If the cap opens at a lower pressure or fails to open at 1.1 bar, replace the cap.

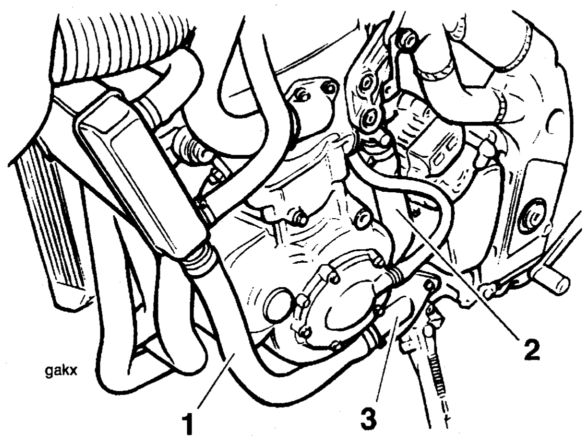
WATER PUMP

Removal

1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank cover, belly panel and left hand lower fairing (where fitted).
4. Drain the coolant as described earlier.

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 the pressurised coolant will cause scalds and skin damage.

5. Disconnect the coolant hoses to the water pump.



1. Bottom Hose

2. Bypass Hose

3. Water Pump

6. Release the bolts securing the water pump to the crankcase.
7. Withdraw the water pump.

Inspection

1. Check the water pump shaft and shaft bearings for side and end float. Renew if necessary
2. Check for corrosion and scale build-up around the impellor and in the pump body. Renew if necessary.

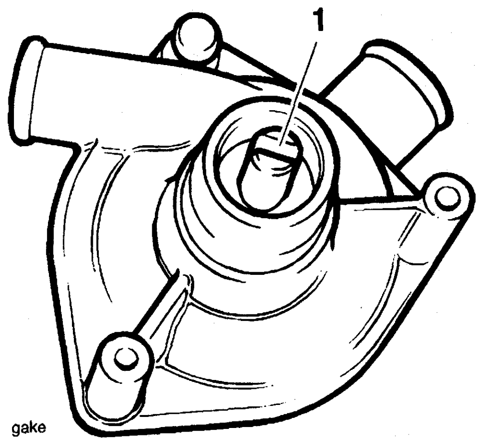
Installation

1. Replace the water pump 'O' ring seal.

2. Align the drive slot in the water pump with the drive slot on the oil pump (inside the crankcase)

NOTE:

- **The water pump will not engage fully into the crankcase unless the drive slots are engaged.**

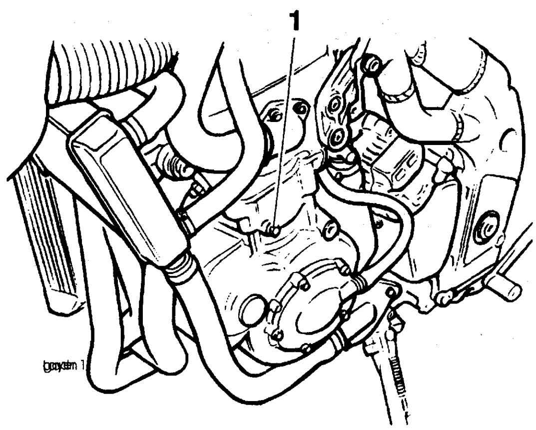


1. Water pump slot

3. Fit the pump and tighten the fixings to **10 Nm**.

4. Refit the hoses to the water pump and tighten the clips.

5. Refit the coolant drain plug and tighten to **13 Nm**.



1. Coolant Drain Plug

6. Refill the cooling system as described earlier in this section.

7. Reconnect the battery positive (red) lead first.

8. Start the motorcycle and allow the engine to idle for a short period of time to allow any air to be expelled from the system.

9. Stop the engine and top up the coolant level as necessary.

10. Fit the coolant pressure cap.

11. Check the expansion tank level and top up if necessary.

12. Refit the fuel tank cover.

13. Refit the seat.

14. Refit the left hand lower fairing and belly panel (where removed earlier).

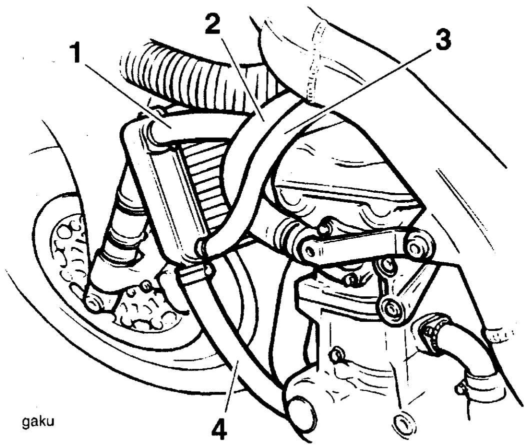
RADIATOR

Removal

1. Remove the seats.
2. Disconnect the battery negative (black) lead first.
3. Remove the fuel tank cover, belly panel and lower fairings (where fitted) to give access to the radiator.
4. Drain the engine coolant as described earlier.

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 the pressurised coolant will cause scalds and skin damage.

5. Disconnect the top, bottom and bypass hoses at the radiator.



1. Top hose

2. Thermostat Housing to Cylinder Head Hose

3. Bypass Hose

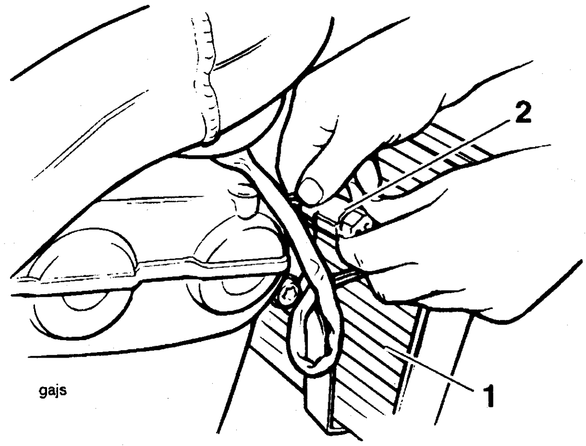
4. Bottom Hose

6. Release the fixings which secure the oil cooler to the radiator.
7. Detach and support the oil cooler.

CAUTION: To prevent damage to the cooler pipes and the oil cooler, always support the oil cooler while it is detached from the radiator.

Failure to support the cooler could lead to damage to components which may lead to oil leaks.

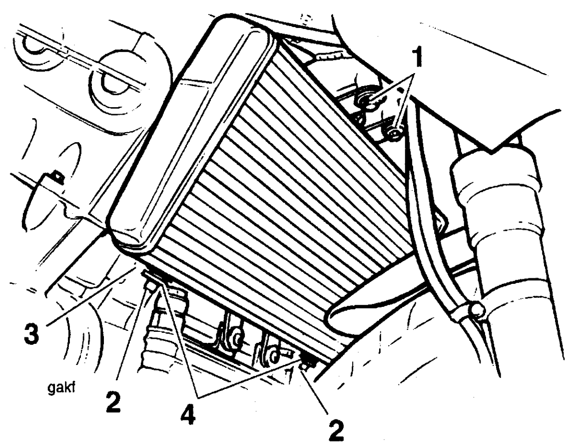
8. Disconnect the cooling fan.



1. Radiator

2. Cooling fan connection

9. Release the bolts securing the radiator to the frame.
10. Remove the radiator by raising it to allow the locating dowels to clear the lower brackets.



1. Radiator to frame bolts

2. Locating dowels

3. Lower brackets

4. Grommets

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.**

Installation

1. Position the radiator to the lower mounting brackets and fully engage the dowels into the lower brackets. Ensure the grommets do not become detached from the lower brackets during assembly.
2. Align the radiator to the frame and fit the upper mounting bolts. Tighten the bolts to **9 Nm**.
3. Reconnect the cooling fan.
4. Refit the oil cooler to the radiator.
5. Reconnect the top, bottom and bypass hoses to the radiator. Tighten the hose clips.
6. Refit the crankcase drain plug and tighten to **13 Nm**.
7. Refill the cooling system as described earlier in this section.
8. Reconnect the battery positive (red) lead first.
9. Start the motorcycle and allow the engine to idle for a short period of time to allow any air to be expelled from the system.
10. Stop the engine and top up the coolant level as necessary.
11. Fit the coolant pressure cap.
12. Check the expansion tank level and top up if necessary.
13. Refit the fuel tank cover.
14. Refit the lower fairings and belly panel (where previously removed).
15. Refit the seats.

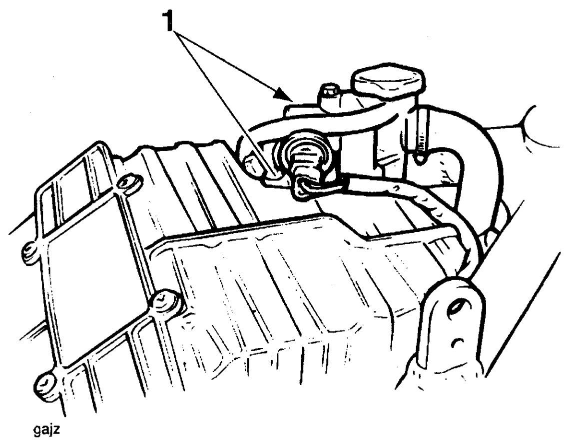
THERMOSTAT

Removal

1. Remove the fuel tank cover.
2. Remove the seats.
3. Disconnect the battery, negative (black) lead first.
4. Drain the cooling system as described earlier in this section.

> **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 the pressurised coolant will cause scalds and skin damage.**

5. Detach all hoses connected to the thermostat housing and disconnect the temperature sensor wiring.
6. Release the 2 screws securing the thermostat housing to the airbox.



1. Thermostat to airbox screws

7. Separate the 2 halves of the thermostat housing by releasing the 2 securing screws. Discard the 'O' ring.

> **WARNING: The thermostat is spring loaded. Always wear eye hand and face protection when disassembling the thermostat housing as the spring loaded components could cause injury to unprotected skin and eyes.**

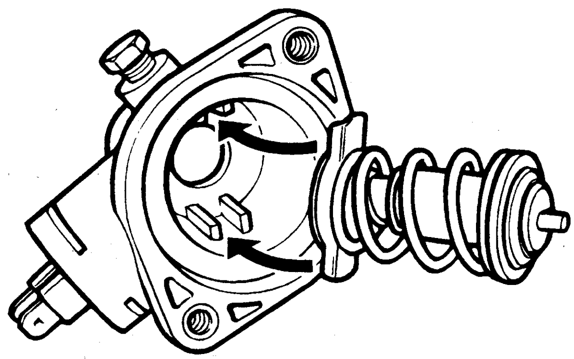
8. Remove the thermostat from the housing.

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.
3. If the temperature at which thermostat opening takes place is incorrect, replace the thermostat.

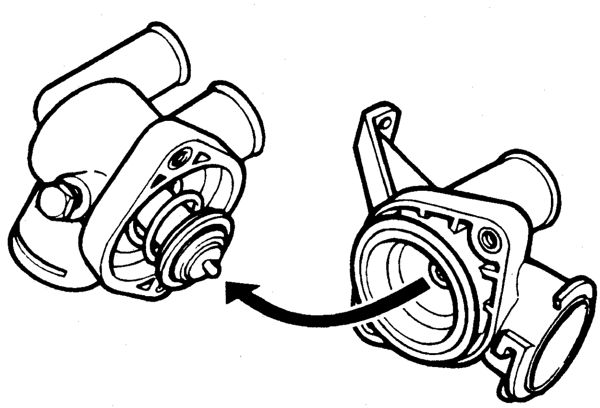
Assembly

1. Locate the thermostat into the rear half of the housing such that the feet of the thermostat align with the thermostat mounting points in the housing.



Arrowed: Thermostat Mounting Point

2. Fit a new 'O' ring to the front half of the thermostat housing.
3. Align the two halves of the thermostat housing so that the 'nose' of the thermostat aligns with the central lug in the front half of the housing.



Arrowed: Thermostat 'Nose' Mounting Point

4. Evenly close the two halves of the thermostat housing and tighten the retaining screws to **7 Nm.**

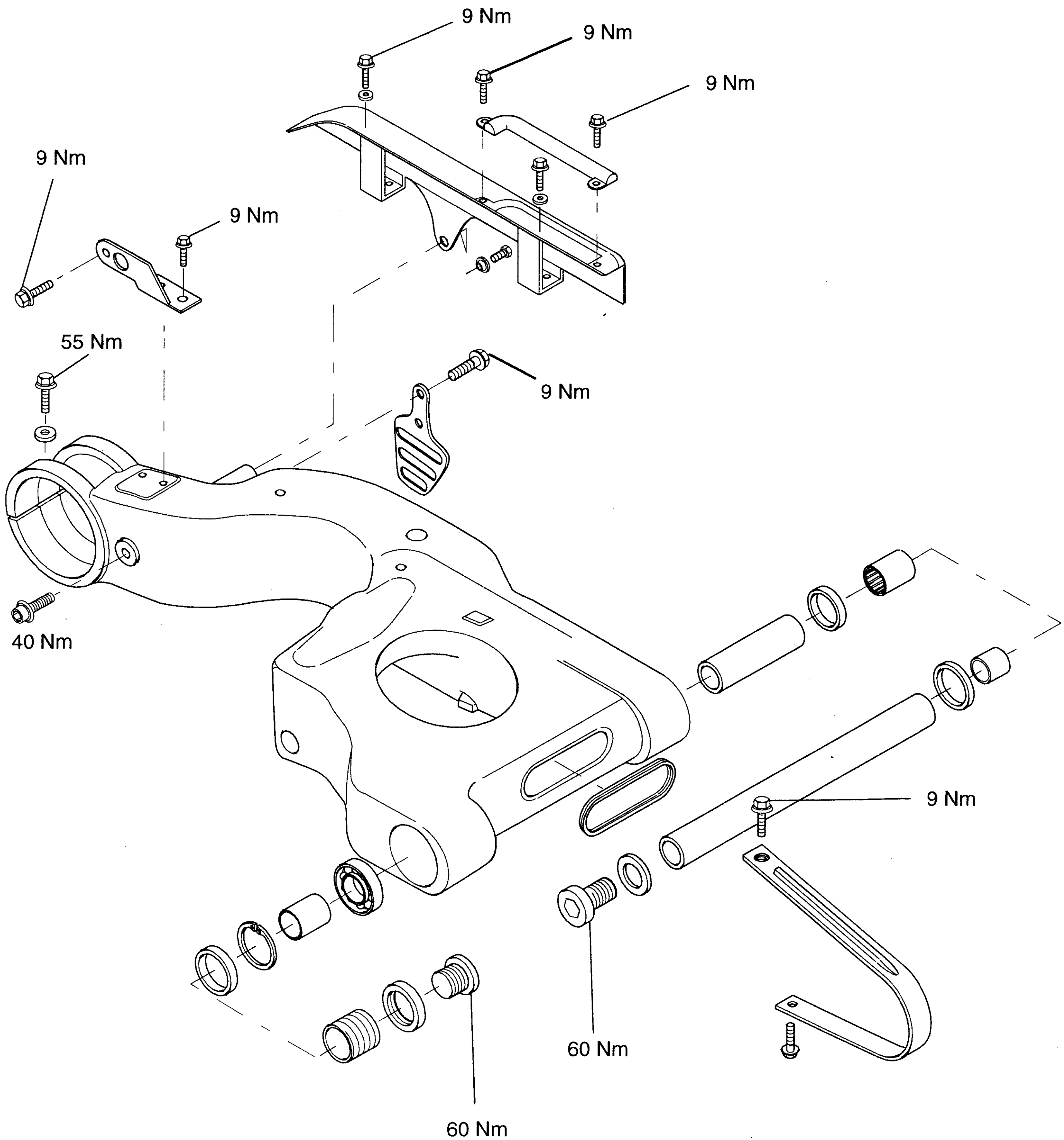
> **CAUTION: Ensure that the thermostat is correctly seated in both sides of the housing before tightening the thermostat housing screws. Damage to the housing and thermostat will result from an incorrectly seated thermostat.**
>
> **Ensure that the 'O' ring does not become damaged during assembly. A damaged 'O' ring may cause a coolant leak causing overheating and engine damage.**

5. Refit the thermostat housing to the airbox and reconnect the coolant temperature sensor.
6. Reconnect the coolant hoses and tighten the hose clips.
7. Refit the crankcase drain plug and tighten to **13 Nm**.
8. Refill the cooling system as described earlier in this section.
9. Reconnect the battery positive (red) lead first.
10. Start the motorcycle and allow the engine to idle for a short period of time to allow any air to be expelled from the system.
11. Stop the engine and top up the coolant level as necessary.
12. Fit the coolant pressure cap.
13. Check the expansion tank level and top up if necessary.
14. Refit the fuel tank cover.
15. Reconnect the battery, positive (red) lead first.
16. Refit the seats.

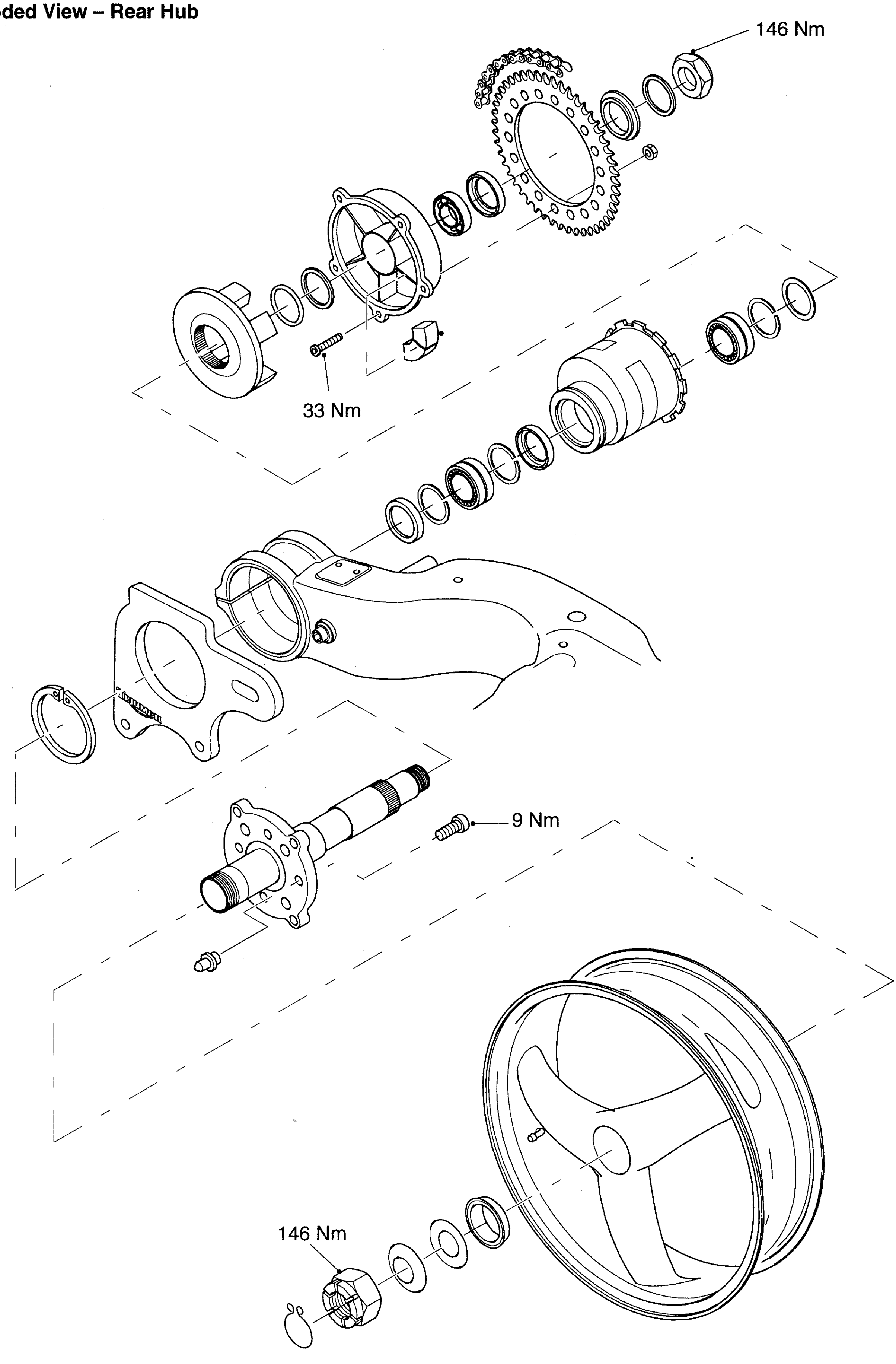
REAR SUSPENSION

CONTENTS

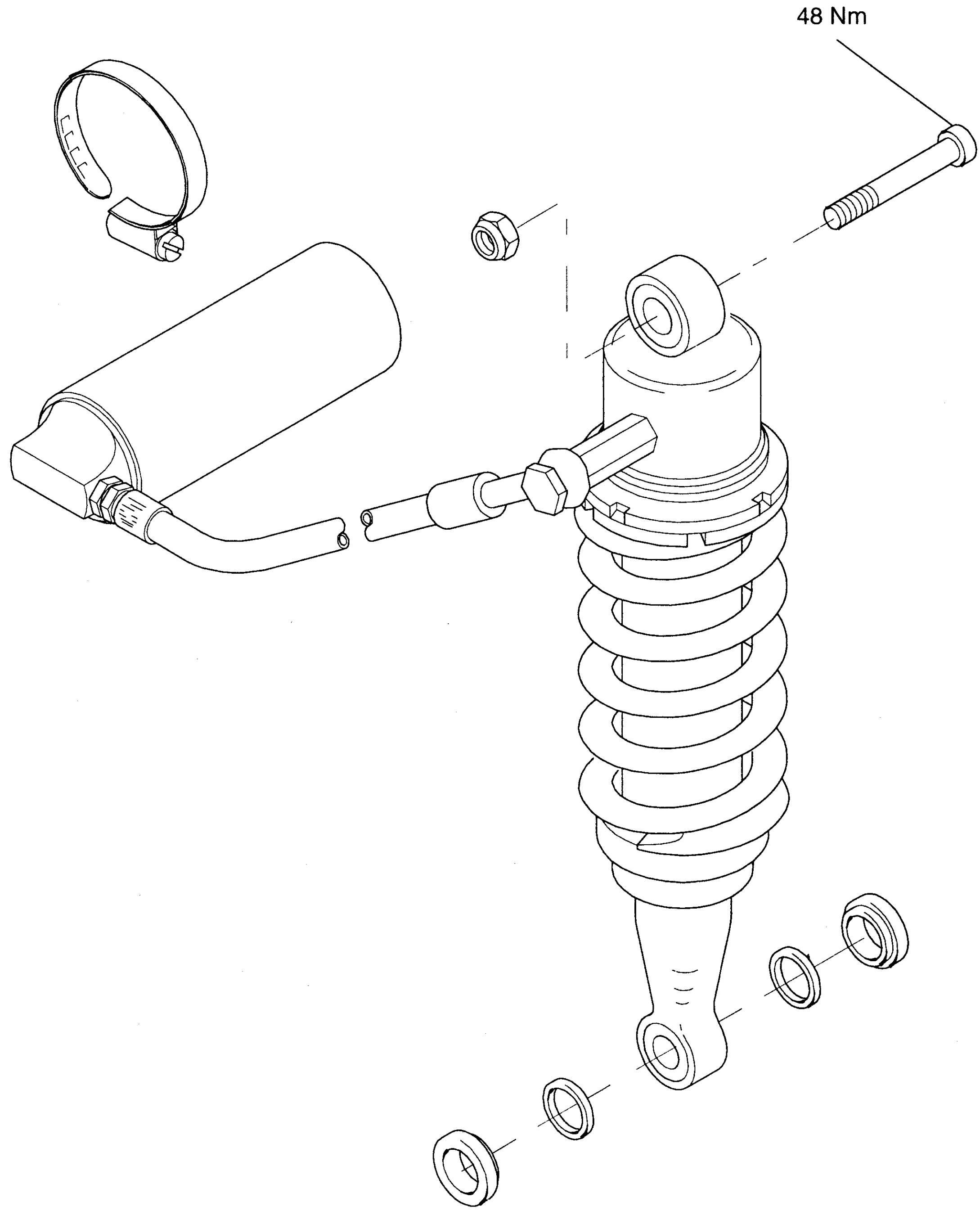
Exploded View – Swinging Arm



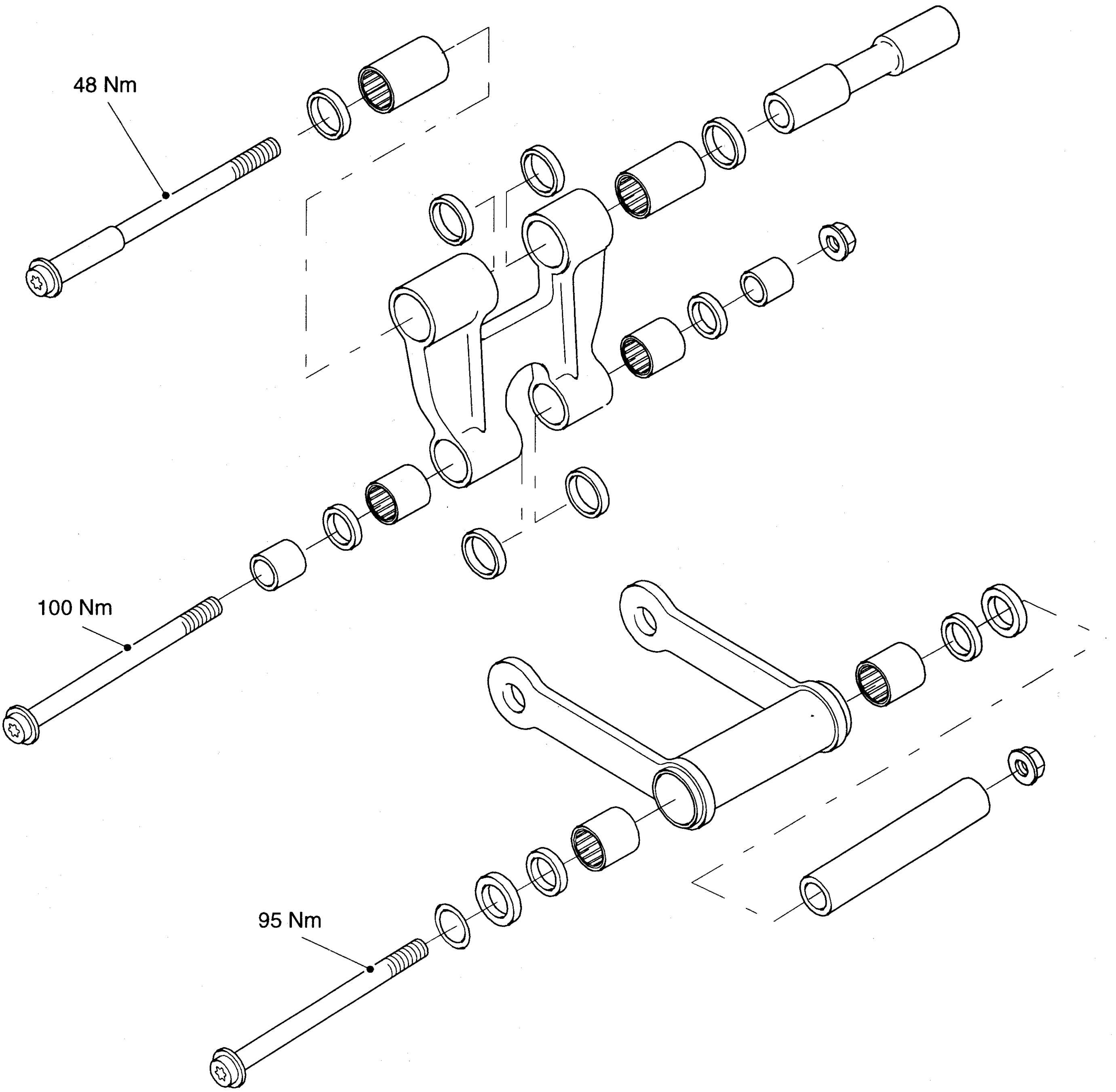
Exploded View – Rear Hub



Exploded View – Rear Suspension Unit



Exploded View – Drop/Drag Link



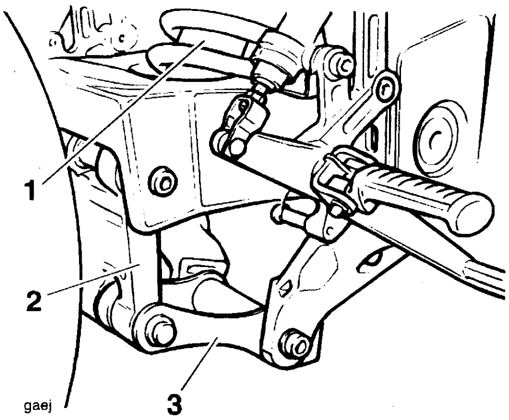
REAR SUSPENSION UNIT

Removal

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.

WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

1. Raise and support the rear of the motorcycle under the frame or engine. Position a block to support the rear wheel.
2. Remove the seat and the rear panels.
3. Disconnect the battery, negative (black) lead first.



1. Rear suspension unit

2. Drop link

3. Drag link

4. Remove the nut and bolt securing the rear suspension unit lower mounting to the drop link and drag link. Pivot the links clear and capture the 2 spacers and their 'O' rings on either side of the mounting.

WARNING: Never disconnect the reservoir from the rear suspension unit. It contains fluid under pressure and serious injury could result if any part of the system is disturbed.

5. Detach the rear suspension unit reservoir from the battery box by releasing it from the re–usable clip.
6. Remove the rear suspension unit upper mounting nut and bolt, and lower the unit clear of the motorcycle.

Inspection

1. Clean all components and inspect for damage / wear to:

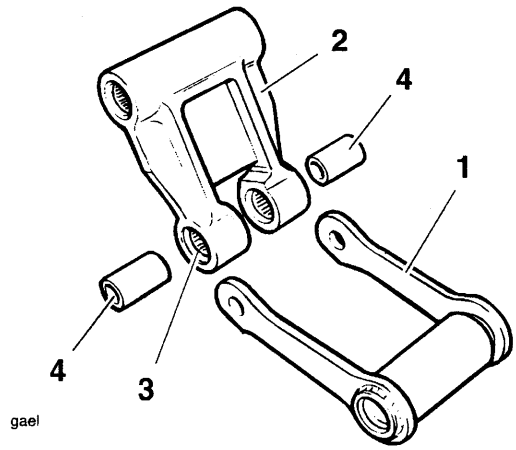
- rear suspension unit upper and lower mountings,
- lower mounting spacers and 'O' rings,
- drop link bearings, sleeves and seals.

Renew as necessary.

2. Check the drop link upper bearings and drag link bearings for wear. Overhaul as necessary (see sections 'Drop Link' and 'Drag Link').

Installation

1. Locate the rear suspension unit and loosely fit the upper mounting bolt / nut.
2. Position the rear suspension unit reservoir to the battery box and secure with the clip.
3. Pack with grease the drop link bearings and fit the sleeves.



1. Drag Link

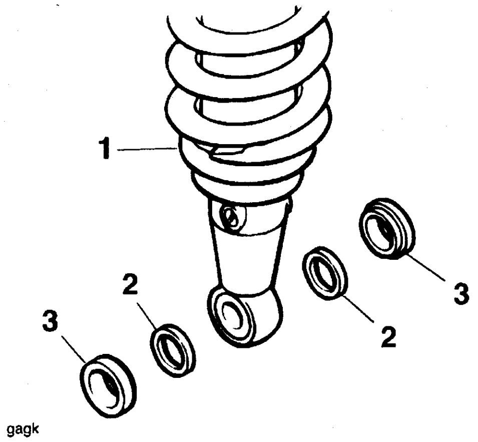
2. Drop Link

3. Drop Link Bearings

4. Sleeves

4. Fit the 'O' ring seals over the smaller outside diameters of the rear suspension unit lower mounting spacers.

5. Position the spacers on either side of the rear suspension unit lower mounting with their smaller outside diameters towards the mounting.



1. Rear suspension unit

2. 'O' rings

3. Spacers

6. Pivot the drag link and drop link into position and loosely fit the securing bolt / nut.

7. With the weight of the motorcycle on its wheels, tighten the rear suspension unit upper mounting to **48 Nm**.

8. Tighten the rear suspension unit lower mounting to **100 Nm**.

9. Connect the battery, red (positive) lead first.

10. Fit the rear body panels and the seat.

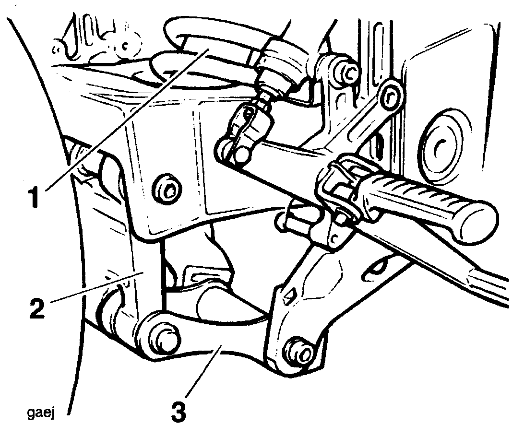
DROP LINK

Removal

> **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.**

> **WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.**

1. Raise and support the rear of the motorcycle under the frame or engine. Position a block to support the rear wheel.



1. Rear suspension unit

2. Drop link

3. Drag link

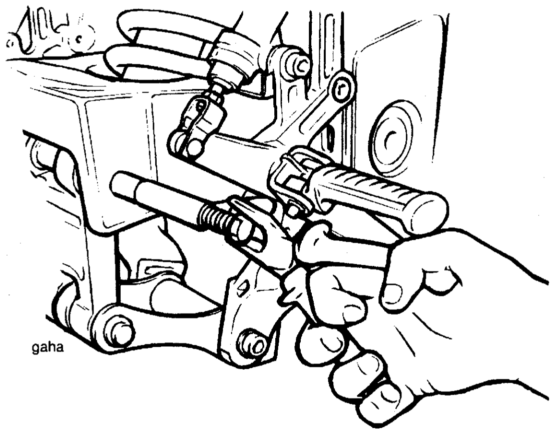
2. Remove the nut and bolt securing the the drop link and drag link to the rear suspension unit lower mounting. Pivot the links clear and capture the 2 spacers and their 'O' rings on either side of the rear suspension unit mounting.

3. Remove the bolt securing the drop link to the swinging arm.

4. Detach the drop link by pulling out its mounting spindle from the swinging arm.

NOTE:

- **If tight, an M14 (1.5mm thread pitch) bolt can be threaded into the spindle to assist extraction.**



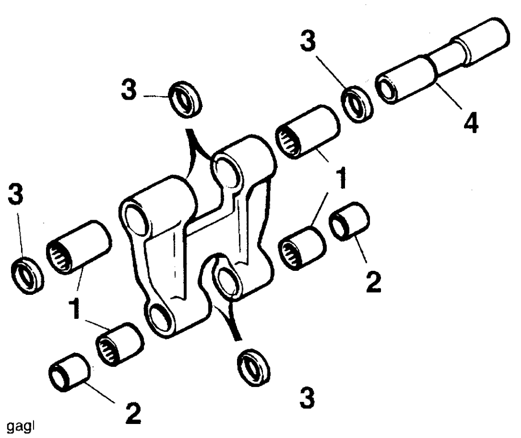
Removing drop link spindle

Inspection

1. Clean all components and inspect for damage / wear:

- drop link bearings, sleeves and seals,
- drop link spindle,
- rear suspension unit lower mounting bush, spacers and 'O' rings,

Renew as necessary.



1. Drop link bearings

2. Drop link sleeves

3. Drop link seals

4. Drop link spindle

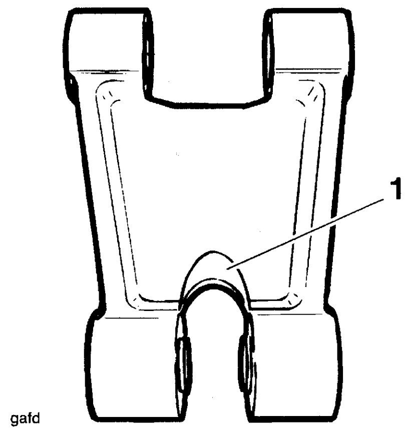
2. Check the drag link bearings for wear.

Installation

1. Pack all the drop link bearings with grease.

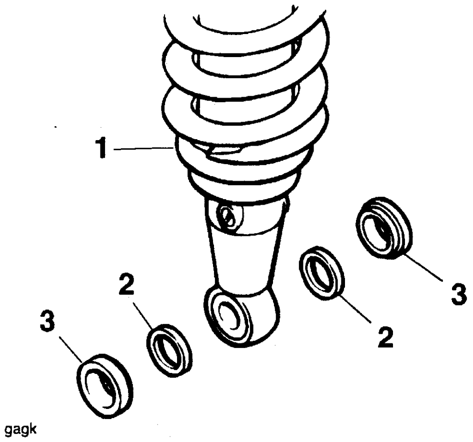
NOTE:

- **The drop link must be fitted the correct way round, and its spindle MUST be fitted with its internally threaded end towards the right hand side.**



1. Cut–away area

2. Position the drop link to the swinging arm with its cut–away central area towards the rear suspension unit. Push the spindle fully into position, **internally threaded end to the right hand side of the motorcycle.**
3. Fit the drop link to swinging arm securing bolt and tighten to **48 Nm**.
4. Check the drop link for freedom of movement; rectify as necessary.
5. Lubricate with grease, the 2 sleeves and locate in the drop link.
6. Fit the 'O' ring seals over the smaller outside diameters of the rear suspension unit lower mounting spacers.
7. Position the spacers on either side of the rear suspension unit lower mounting with their smaller outside diameters towards the lower mounting.



1. Rear suspension unit

2. 'O' rings

3. Spacers

8. Pivot the drag link and drop link into position and fit the rear suspension unit lower securing bolt / nut. Tighten to **100 Nm**.

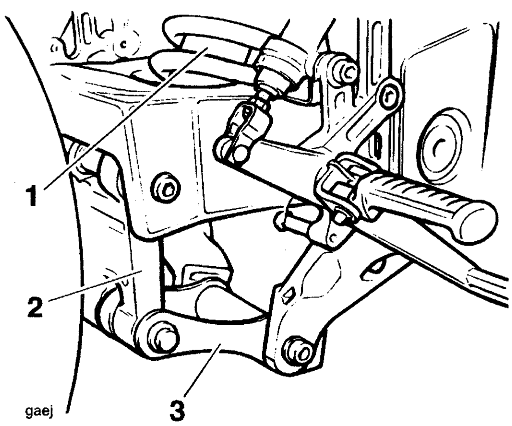
DRAG LINK

Removal

> **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.**

> **WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.**

1. Raise and support the rear of the motorcycle beneath the frame or engine. Position a block to support the rear wheel.



1. Rear suspension unit

2. Drop link

3. Drag link

2. Remove the nut and bolt securing the the drop link and drag link to the rear suspension unit lower mounting. Pivot the links clear and capture the 2 spacers and their 'O' rings on either side of the mounting.

3. Remove the nut and bolt securing the drag link front mounting and remove the drag link (if necessary, slacken the engine lower mounting bolts to assist removal).

4. Collect the drag link spacers from either side of the link.

Inspection

1. Clean all components and inspect for damage / wear:

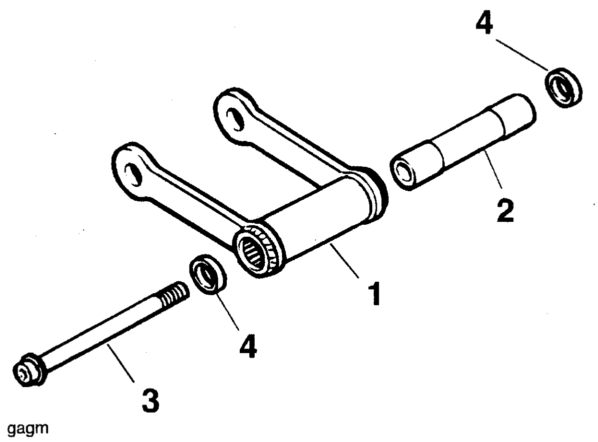
- drag link and bearings,
- drag link spindle,
- rear suspension unit lower mounting bush, spacers and 'O' rings,
- drop link bearings, seals and sleeves.

   Renew as necessary.

2. Check the drop link upper bearings for wear.

Installation

1. Pack the drag link bearings with grease, position the drag link and spacers to the frame and fit the spindle. Fit the securing bolt (hardened washer under the bolt head) and nut, and tighten to **95 Nm**.



1. Drag link

2. Spindle

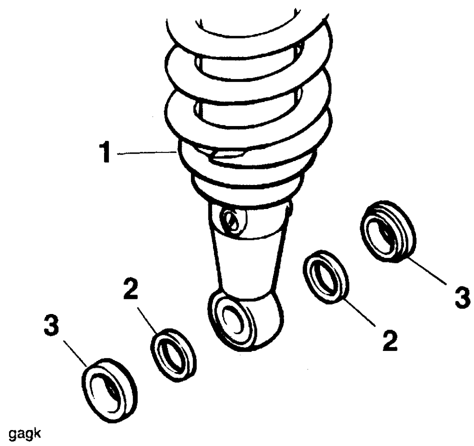
3. Spindle securing bolt

4. Spacers

2. If slackened during removal, tighten the engine lower mounting bolts to **95 Nm.** Check the drag link for freedom of movement; rectify as necessary.

3. Fit the 'O' ring seals over the smaller outside diameters of the rear suspension unit lower mounting spacers.

4. Position the spacers on either side of the rear suspension unit lower mounting with their smaller outside diameters towards the mounting.



1. Rear suspension unit

2. 'O' rings

3. Spacers

5. Pivot the drag link and drop link into position and fit the rear suspension unit lower securing bolt / nut. Tighten to **100 Nm**.

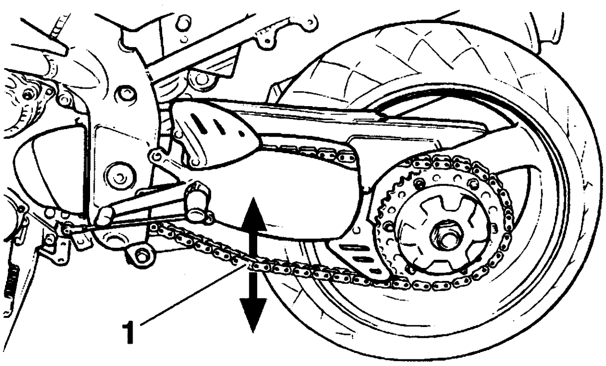
DRIVE CHAIN

The drive chain must be checked, adjusted, and lubricated in accordance with the scheduled maintenance chart. For reasons of safety, and to prevent excessive wear, never neglect any part of the drive chain maintenance. If the chain is badly worn, or incorrectly adjusted – either too loose or too tight – the chain could jump off the sprockets or break. Checking of the adjustment and lubrication should be carried out more frequently where the machine is regularly used in dirty or dusty conditions or where large amounts of road salt are used.

WARNING: A chain that breaks or jumps off the sprockets could snag on the engine drive sprocket or the rear wheel severely damaging the motorcycle and causing an accident. Never neglect chain maintenance.

Chain Slack Inspection

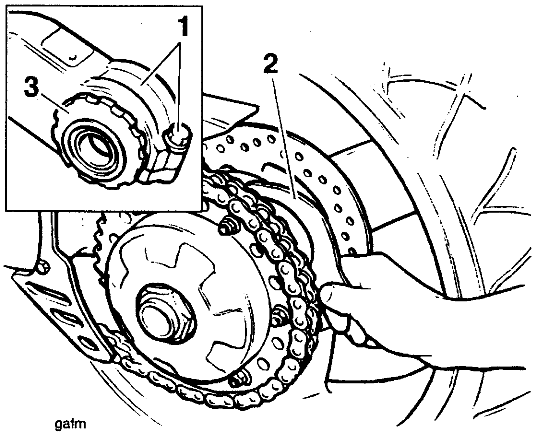
1. Set the motorcycle up on the side stand.
2. Rotate the rear wheel to find the position where the chain has least slack. Measure the chain's vertical movement, mid-way between sprockets.
3. If correct, the vertical movement of the drive chain midway between the sprockets should be 35–40 mm.



1. Vertical Movement 35–40mm

Drive chain adjustment

1. Slacken the swinging arm/hub pinch bolt.
2. Using the 'C' spanner from the motorcycle tool kit, turn the eccentric adjuster clockwise to increase vertical movement, anticlockwise to take out vertical movement.



1. Pinch bolt

2. 'C' spanner

3. Eccentric adjuster

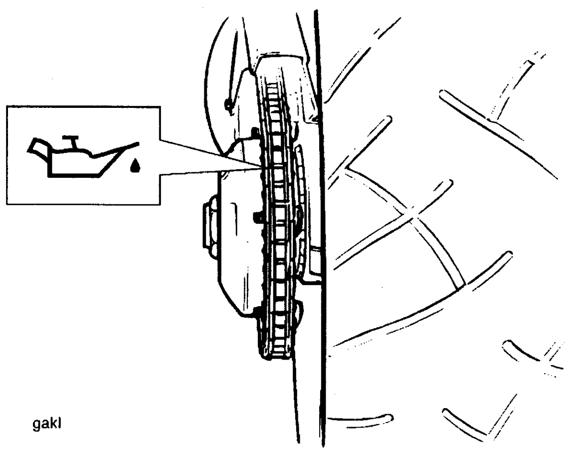
3. Once the correct chain setting has been achieved, tighten the swinging arm/eccentric adjuster pinch bolt to **55 Nm.**

Chain Lubrication

Chain lubrication is necessary after riding through rain, standing water, on wet roads, or any time that the chain appears dry. Use the chain lubricant recommended in the specification.

CAUTION: Never use a power wash system to clean the chain as this may cause damage to the chain components.

1. Apply chain lubricant to the sides of the chain rollers, and also the 'O'-rings. The lubricant will penetrate the rollers and bushings and also prevent the O-rings from deterioration.

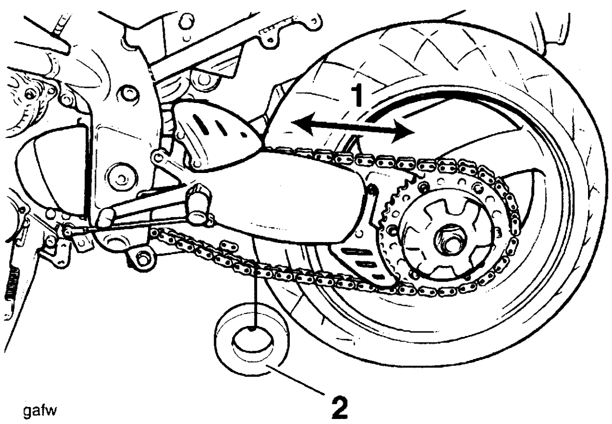


Chain Lubrication Positions

2. Wipe off any excess oil.
3. If the chain is especially dirty, clean using paraffin before applying the lubricant.

Chain Wear Inspection

1. Remove the chainguard from the swinging arm.
2. Stretch the chain taut by hanging a 10–20 kg (20–40 lb) weight on the chain.
3. Measure a length of 20 links on the straight part of the chain from pin centre of the 1st pin to pin centre of the 21st pin. Repeat the test at various sections of the chain to establish an average reading. This is because the chain may wear unevenly.



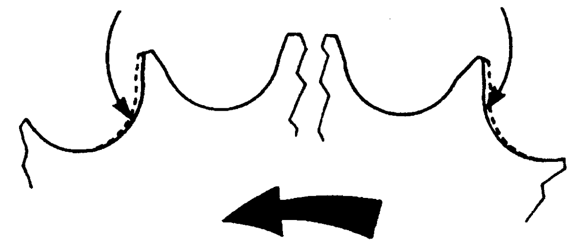
1. Measurement Position

2. 10–20kg Weight

4. If the length exceeds the service limit of 321 mm, the chain must be replaced.

> **WARNING: Use a genuine Triumph supplied chain as specified in the Triumph Parts Catalogue. The use of non-approved chains may result in a broken chain or may cause the chain to jump off the sprockets. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing loss of motorcycle control and an accident.**
> **Never neglect chain maintenance and always have chains installed by an authorised Triumph Dealer.**

5. Examine the whole length of the chain. If there are any excessively tight or loose sections, loose pins or damaged rollers, the chain should be replaced.
6. Inspect sprockets for unevenly or excessively worn teeth. Also examine the sprockets for damaged teeth.



(Wear exaggerated for clarity of information)

NOTE:

- **Sprocket wear is exaggerated for illustration.**

7. If there is any irregularity found in any of the components, replace the drive chain and/or any other damaged components.
8. Refit the chain/wheel guard.

SWINGING ARM/DRIVE CHAIN

Removal

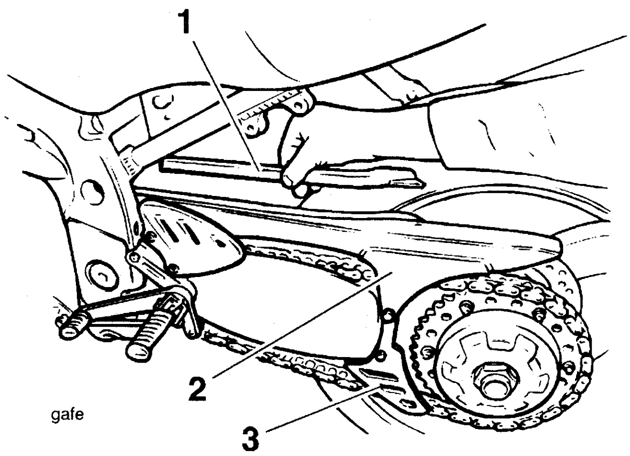
1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the silencer as described in the fuel system section.

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.

4. Raise and support the rear of the motorcycle under the frame or engine.

WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

5. Remove the rear wheel as described in the wheel section.
6. Remove the rear brake hose cover from the upper chain guard, then remove the upper chain guard.

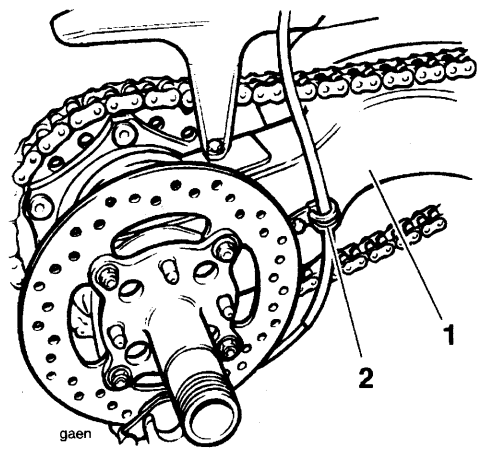


1. Brake hose cover

2. Upper chain guard

3. Lower chain guard

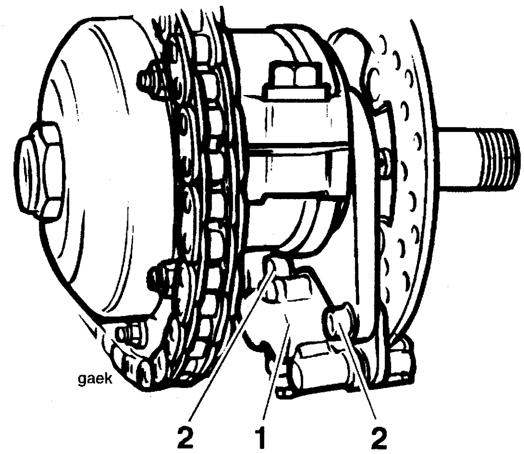
7. Remove the lower chain guard.
8. Release the bolt securing the brake pipe clip to the right hand side of the swinging arm.



1. Swinging arm

2. Brake pipe clip

9. Without disconnecting the brake hose, detach then support the rear brake caliper.

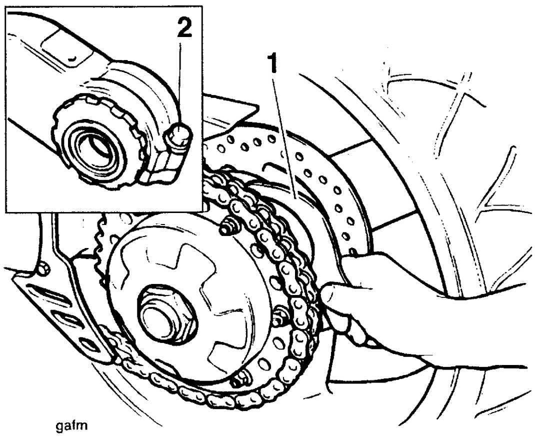


1. Rear brake caliper

2. Caliper mounting bolts

CAUTION: To prevent damage to the brake pipe and caliper, do not allow the caliper to hang on the brake pipe.

10. Slacken the swinging arm / hub pinch bolt.
11. Use the 'C' spanner from the motorcycle tool kit to turn the hub and slacken the drive chain.
12. Disconnect the road speed sensor (if fitted).



1. 'C' spanner

2. Swinging arm/hub pinch bolt

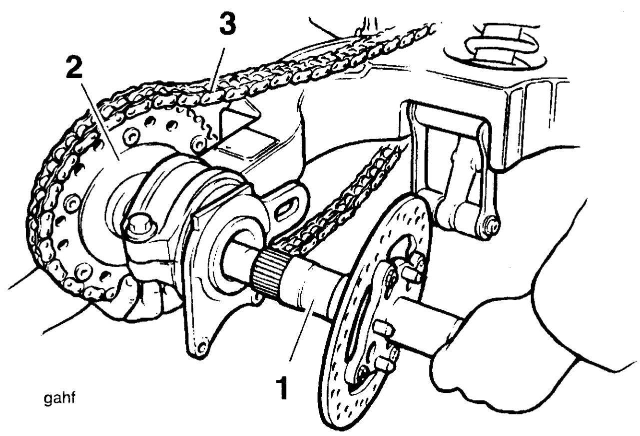
13. De-stake then slacken the nut securing the final drive unit to the axle shaft.

14. Remove the staked nut (discard the nut), belleville washer and stepped washer from the axle shaft.

15. Pull the axle shaft through the hub to the right hand side such that the shaft clears the final drive assembly. Remove the final drive unit disconnecting the chain at the same time.

NOTE:

- **Collect the spacer fitted between the final drive and the hub.**
- **Support the chain while the final drive is being removed to prevent it dragging through the dirt.**

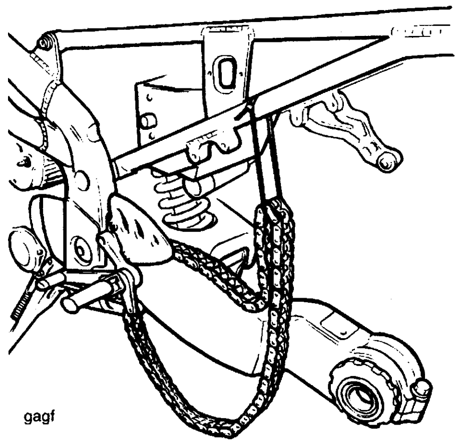


1. Axle shaft

2. Final drive

3. Chain

16. Place the axle shaft/brake disc assembly to one side.

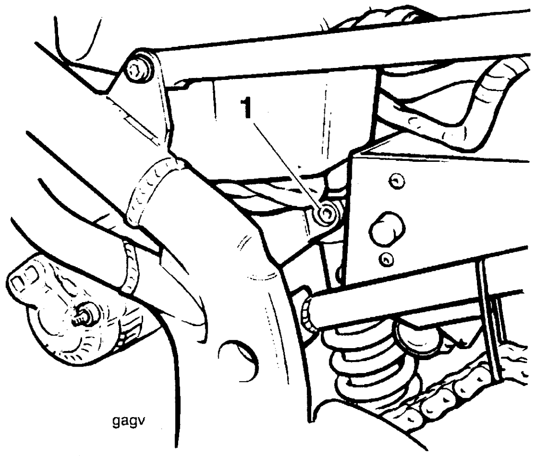


Typical Drive Chain Support

17. Release the brake fluid reservoir from the battery box and move it to one side.

> **CAUTION: The brake fluid reservoir has an air hole in the cap through which brake fluid could escape if the reservoir became inverted.**
>
> **To prevent body damage from leaking brake fluid, always keep the reservoir upright.**

18. Support the swinging arm and remove the rear suspension unit upper bolt. Allow the swinging arm to pivot downwards after removing the bolt.



1. Rear suspension unit top bolt

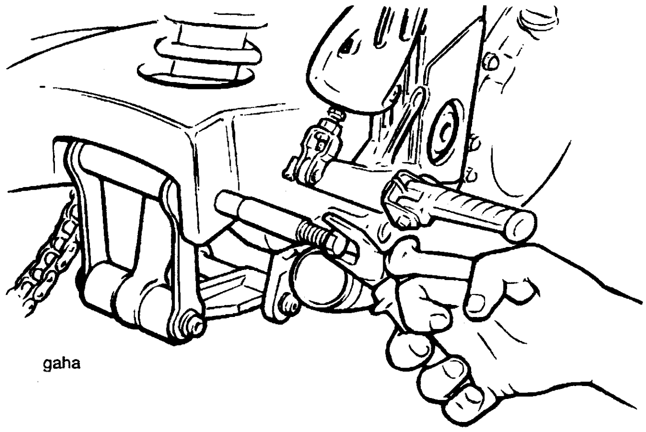
19. Release the clip securing the rear suspension unit reservoir to the battery box. Detach the reservoir but leave the clip in place around the battery box.

20. Remove the drop link bolt from the swinging arm.

21. Detach the drop link by pulling out its mounting spindle from the swinging arm.

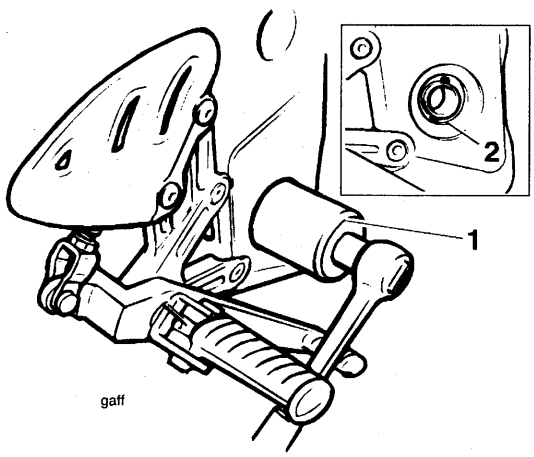
NOTE:

- **If tight, an M14 (1.5 mm thread pitch) bolt can be threaded into the spindle to assist extraction.**



Removing drop link spindle

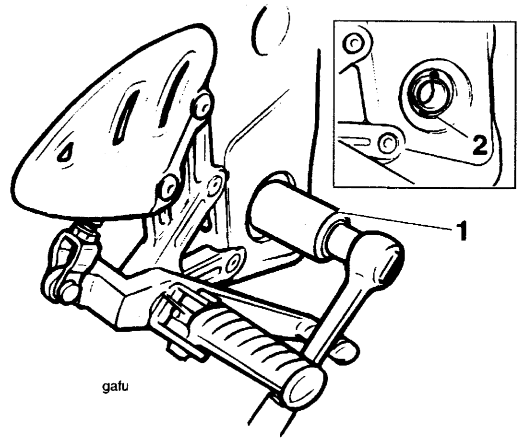
22. Release the swinging arm spindle bolts from both sides of the motorcycle.
23. Using tool T3880295, remove the locking ring from the right hand side of the swinging arm spindle.



1. Tool T3880295

2. Locking ring

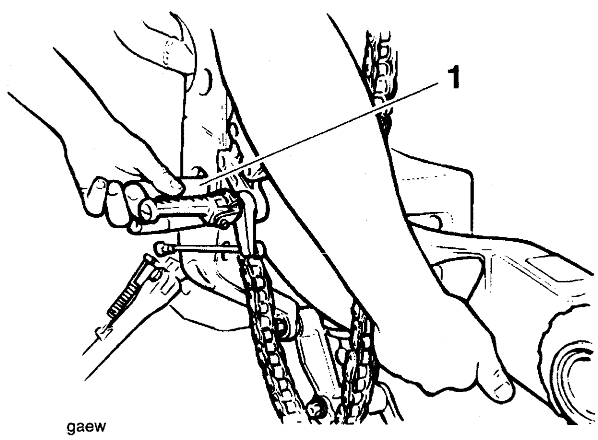
24. Using tool T3880290, slacken the swinging arm clamping ring from the right hand side of the swinging arm spindle.



1. Tool T3880290

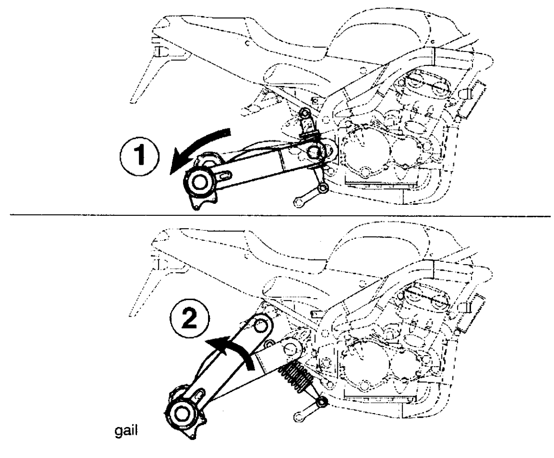
2. Clamping ring

25. Support the swinging arm and remove the swinging arm spindle.



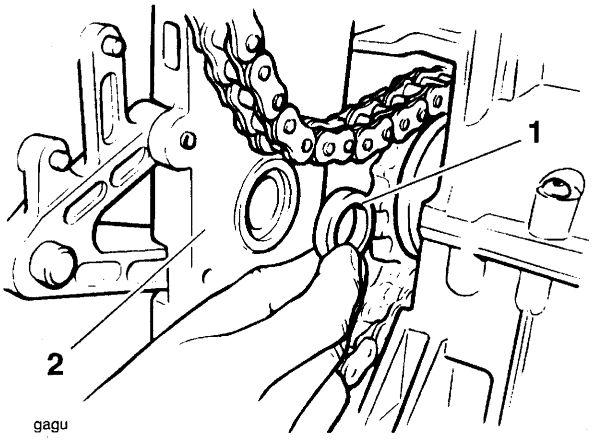
1. Swinging arm spindle

26. Carefully detach the arm from the frame and feed the rear suspension unit upper section and reservoir through the hole in the swinging arm.



Removing the swinging arm

27. Collect the spacer from the recess inside the left hand frame outrigger.



1. Spacer

2. Frame outrigger

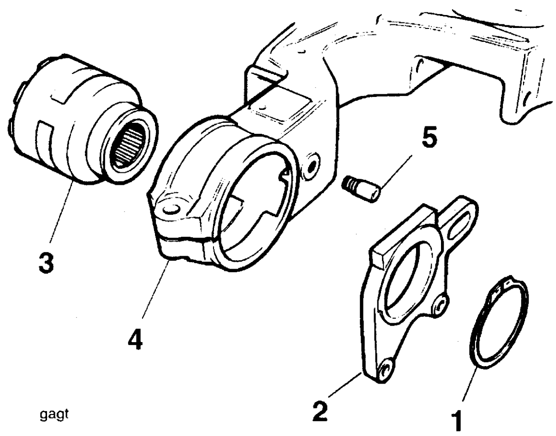
NOTE:

- **If the swinging arm is to be replaced, proceed through paragraphs 28 – 34.**

28. Remove the large circlip securing the caliper carrier to the hub and detach the carrier.

29. Remove the hub from the left hand side of the swinging arm.

30. Remove the caliper carrier positioning stud.



1. Circlip

2. Caliper carrier

3. Hub

4. Swinging arm

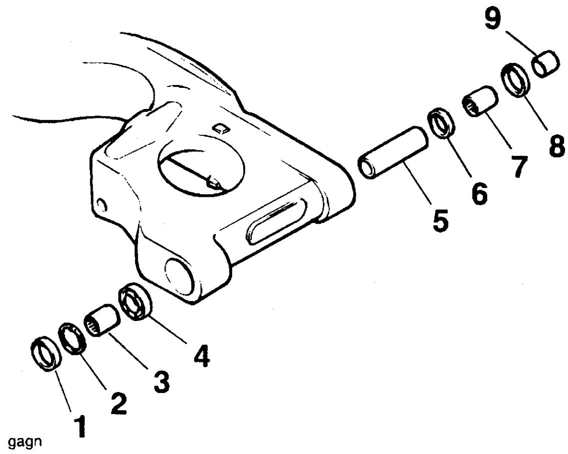
5. Caliper carrier positioning stud

31. Remove the road speed sensor bracket (if fitted).

32. Remove the bearing sleeves from both sides.

33. Remove the right hand bearing by drifting through from the left.

34. Collect the spacer tube.



1. Seal | **6. Seal**

2. Circlip | **7. Needle roller bearing**

3. Bearing sleeve | **8. Seal**

4. Ball bearing | **9. Bearing Sleeve**

5. Sleeve

NOTE:

- **The needle roller bearing in the left hand side of the arm cannot be removed undamaged.**
- **If the drive chain is being replaced, proceed through paragraphs 35 to 36.**

35. Remove the sprocket cover.

36. Detach the chain from .the output sprocket and remove the chain.

Inspection

1. Check all swinging arm bearing for damage, pitting, and cracks. Replace as necessary.
2. Check the swinging arm for damage. Replace as necessary.
3. Check the axle bearings for damage, pitting, and cracks. Replace as necessary.
4. Check all bearing seals for damage, splits etc. Replace as necessary.
5. Check the chain for wear, damage etc. Replace as necessary.
6. Check both sprockets for wear, damage etc. Replace as necessary.

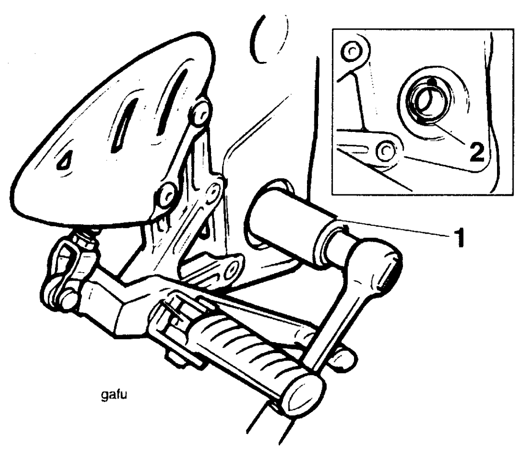
Assembly

1. Fit the drive chain to the output sprocket.
2. Refit the sprocket cover. Tighten the sprocket cover bolts to **9 Nm.**
3. Install the bearings (marked faces outwards), sleeves etc. into the swinging arm in the order shown on the previous page. Use new seals throughout.
4. Refit the caliper carrier positioning stud and tighten to **40 Nm.**
5. Refit the road speed sensor bracket (if fitted) and tighten the bolts to **9 Nm**.
6. Refit the hub with the circlip groove to the right hand side.
7. Refit the caliper carrier (logo side facing to the right) and retain with the circlip.
8. Fit the spacer to the recess on the inside of the left hand frame outrigger.

NOTE:

- **A smear of grease will help to retain the spacer while the swinging arm is being positioned.**

9. Position the swinging arm to the frame feeding the rear suspension unit reservoir and upper mounting point through the hole in the centre of the arm.
10. Refit the swinging arm spindle.
11. Using tool T3880290, tighten the swinging arm spindle inner adjustment ring to **18 Nm.**



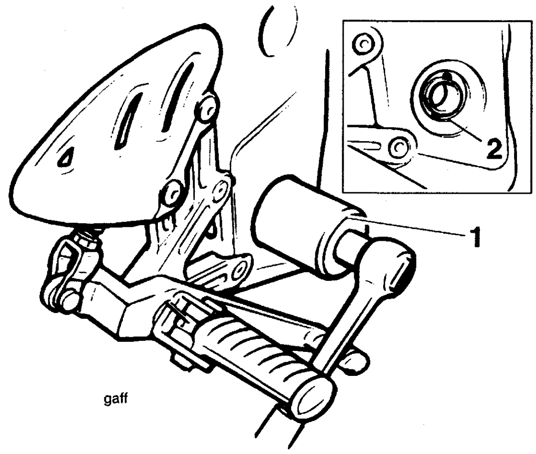
1. Tool T3880290

2. Clamping ring

CAUTION: Incorrect adjustment of the swinging arm clamping ring will damage the bearings, seals and swinging arm.

Never overtighten the clamping ring or set the adjustment to allow excessive sideways movement.

12. Fit the locking ring and tighten to **32 Nm** using tool T3880295.

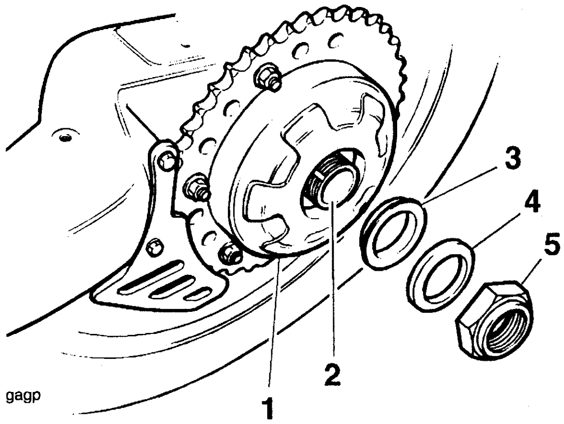


1. Tool T3880295

2. Locking ring

13. Check that the clamping ring adjustment has not changed, re–adjust if necessary.
14. Tighten both swinging arm bolts to **60 Nm.**
15. Apply a smear of grease to the drop link bearings.
16. Align the drop link to the swinging arm and fit the drop link spindle **with the internally threaded end to the right hand side.**
17. Fit the drop link to swinging arm bolt and tighten to **48 Nm.**
18. Align the rear suspension unit upper mounting to the frame and fit the upper mounting bolt. Tighten the bolt to **48 Nm.**
19. Position the rear suspension unit reservoir to the battery box and secure with the clip.
20. Refit the rear brake fluid reservoir to the battery box.
21. Fit the axle shaft/rear disc assembly ensuring that the final drive spacer is fitted to the left hand side of the axle shaft.
22. Align the final drive assembly to the axle shaft fitting the chain during assembly.

23. Fit the stepped washer, belleville washer (dished side out) and a **new** staked nut to the shaft.



1. Final drive unit

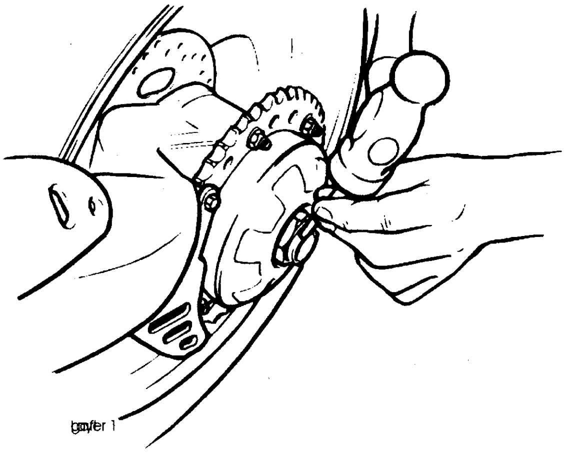
2. Axle shaft

3. Stepped washer

4. Belleville washer

5. Retaining nut

24. Prevent the axle from turning and tighten the nut to **146 Nm**. Stake to secure.



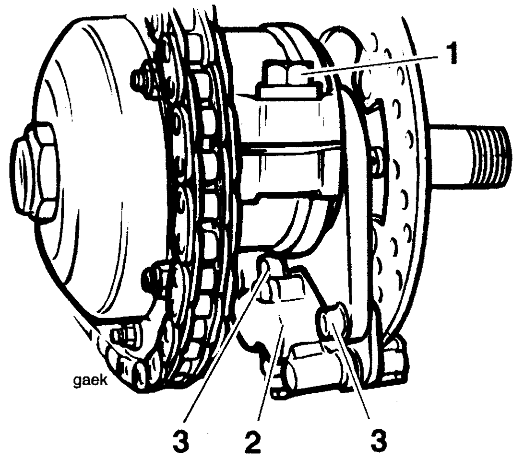
Staking the nut

25. Adjust the chain tension to give 35-40 mm of slack by turning the hub with the 'C' spanner.

26. Tighten the swinging arm / hub pinch bolt to **55 Nm.**

27. Refit the rear brake caliper. Tighten the caliper fixings to **40 Nm.**

28. Pump the rear brake pedal a few times to position the brake pads in the caliper. Rectify as necessary if correct brake operation is not restored.



1. Swinging arm / hub pinch bolt

2. Rear brake caliper

3. Rear brake caliper fixings

29. Align the rear brake pipe and clip to the right hand side of the swinging arm and tighten the clip fixing.

30. Refit the upper and lower chain guards. Tighten the fixings to **9 Nm.**

31. Align the rear brake hose to to the chain guard and refit the hose cover. Tighten the hose cover fixings to **9 Nm.**

32. Reconnect the road speed sensor (if fitted).

33. Refit the rear wheel as described in the wheel section.

34. Refit the silencer as described in the fuel system section.

35. Lower the motorcycle to the ground and place on the side stand.

36. Reconnect the battery positive (red) lead first.

37. Refit the seat.

FINAL DRIVE

Removal

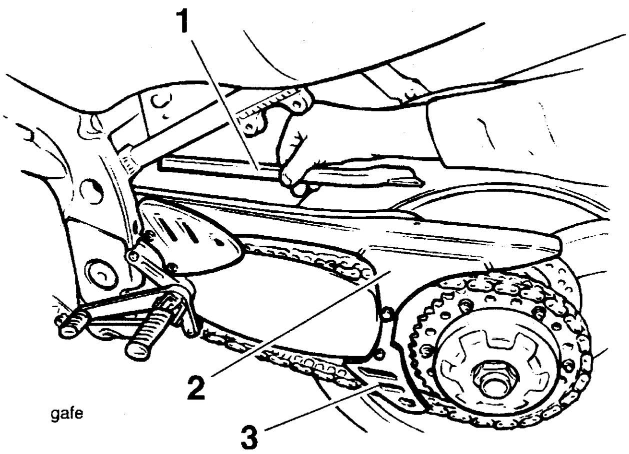
1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the silencer as described in the fuel system section.

> **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.**

4. Raise and support the rear of the motorcycle under the frame or engine.

> **WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.**

5. Remove the rear wheel as described in the wheel section.
6. Remove the rear brake hose cover from the upper chain guard, then remove the chain guard.

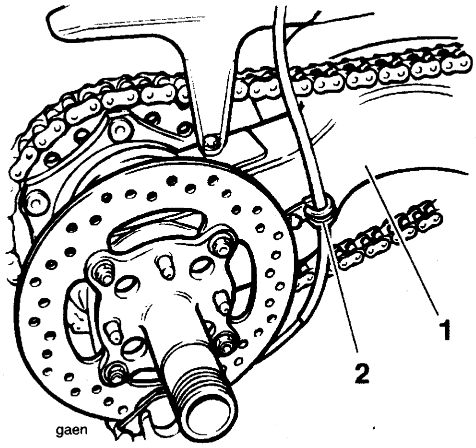


1. Brake hose cover

2. Upper chain guard

3. Lower chain guard

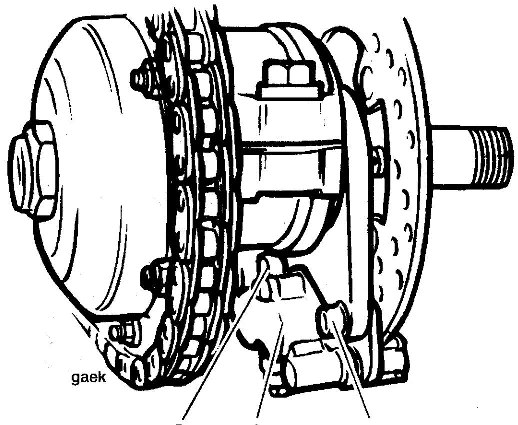
7. Remove the lower chain guard.
8. Release the bolt securing the brake pipe clip to the right hand side of the swinging arm.



1. Swinging arm

2. Brake pipe clip

9. Without disconnecting the brake hose, detach then support the rear brake caliper.

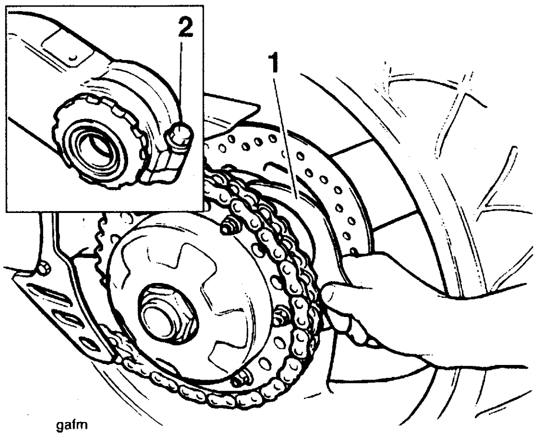


1. Rear brake caliper

2. Caliper mounting bolts

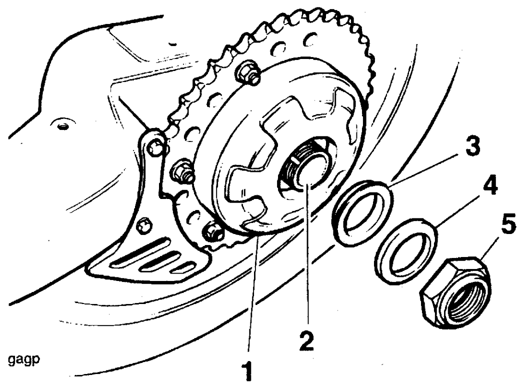
> **CAUTION: To prevent damage to the brake pipe and caliper, do not allow the caliper to hang on the brake pipe.**

10. De-stake then slacken the nut securing the final drive unit to the axle shaft.
11. Slacken the swinging arm / hub pinch bolt.
12. Use the 'C' spanner from the motorcycle tool kit to turn the hub and slacken the drive chain.



1. 'C' Spanner
2. Swinging arm/hub pinch bolt

13. To release the final drive unit, remove the staked nut (discard the nut), belleville washer and stepped washer.

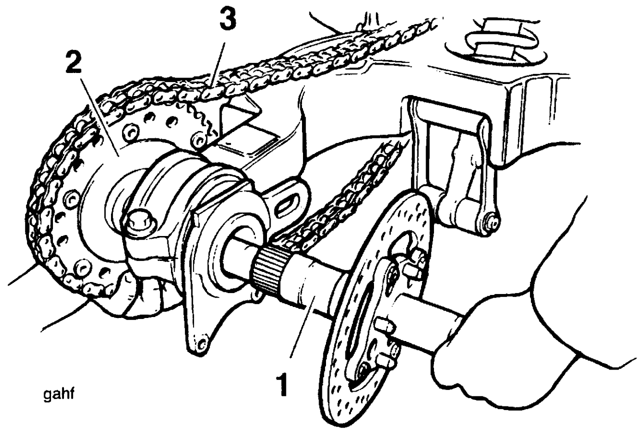


1. Final drive unit
2. Axle shaft
3. Stepped washer
4. Belleville washer
5. Retaining nut

14. Pull the axle shaft through the hub to the right hand side such that the shaft clears the final drive assembly. Remove the final drive unit disconnecting the chain at the same time.

NOTE:

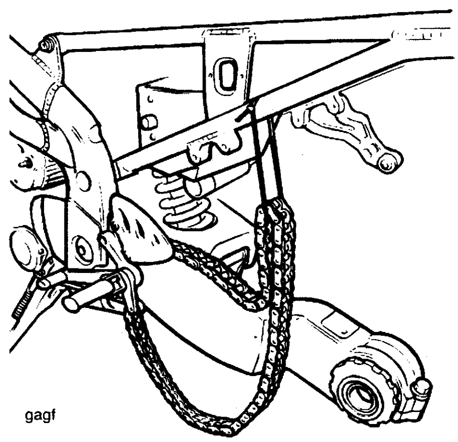
- **Collect the spacer fitted between the final drive and the hub.**



1. Axle shaft
2. Final drive
3. Chain

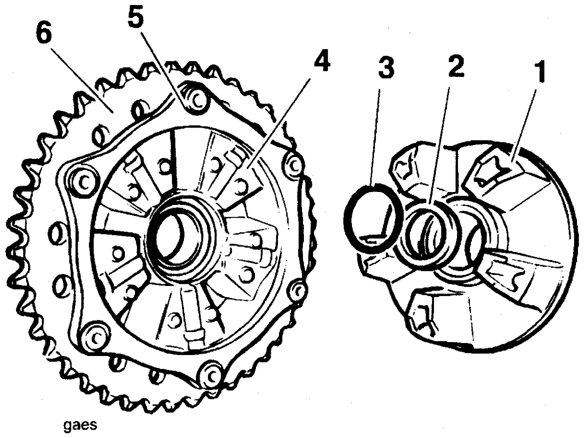
NOTE:

- **Support the chain while the hub is removed to prevent it dragging through the dirt.**
- **If necessary, the brake disc can be removed at this point.**



Typical Drive Chain Support

15. Ease off the cush drive hub, and capture the spacer.
16. Remove the cush drive rubbers.
17. If required, remove the securing nuts to release the chain sprocket.



1. Cush drive hub

2. Spacer

3. 'O' ring

4. Cush drive rubbers

5. Cush drive housing

6. Sprocket

Inspection

1. Thoroughly clean all components and inspect for damage, wear etc. Renew as necessary.
2. Pay particular attention to the condition of the cush rubbers, examining for splits, damage, softness etc.
3. Check the final drive bearing for wear or rough running, and the seal for damage.
4. Inspect the 'O' ring in the cush drive hub for damage.
5. Inspect the sprocket teeth for wear, damage and chips.

Assembly

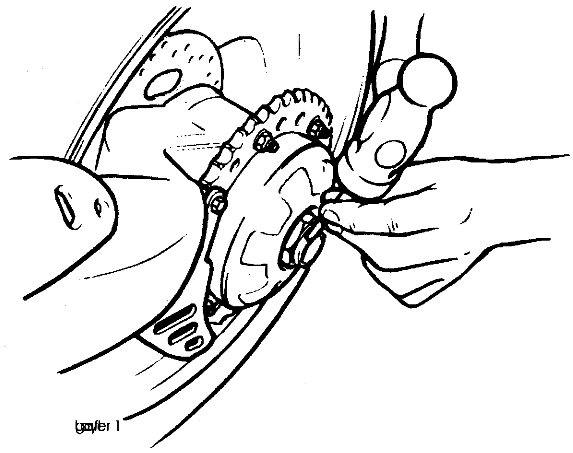
1. Position the sprocket, fit the bolts from the inside face of the cush drive housing and secure with nuts tightened to **33 Nm**.
2. Fit the 'O' ring to the cush drive hub.
3. Fit the cush rubbers.
4. Locate the spacer in the cush drive housing and fit the hub.

Installation

1. Refit the axle shaft and align the spacer to the final drive side.
2. Locate the final drive on the shaft and refit the chain to the sprocket.
3. Fit:

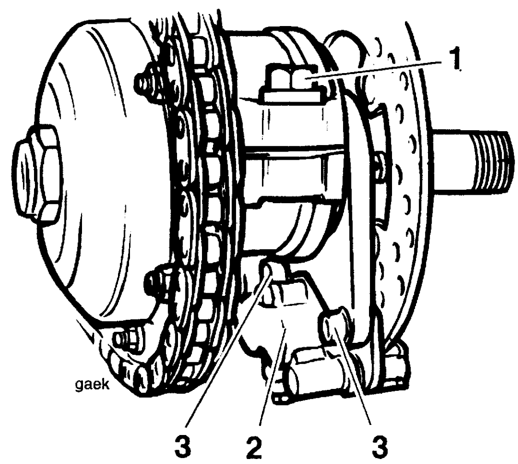
- collar, stepped side inwards,
- belleville washer, dished side out,
- a new stake nut.

4. Tighten the nut to **146 Nm**, and stake to secure.



Staking the nut

5. Adjust the chain tension to give 35-40 mm of slack by turning the hub with the 'C' spanner
6. Tighten the swinging arm / hub pinch bolt to **55 Nm.**
7. Refit the rear brake caliper. Tighten the caliper fixings to **40 Nm.**



1. Swinging arm / hub pinch bolt

2. Rear brake caliper

3. Rear brake caliper fixings

8. Align the rear brake pipe and clip to the right hand side of the swinging arm and tighten the clip fixing.
9. Refit the upper and lower chain guards. Tighten the fixings to **9 Nm.**
10. Align the rear brake hose to to the chain guard and refit the hose cover. Tighten the hose cover fixings to **9 Nm**.
11. Reconnect the road speed sensor (if fitted).
12. Refit the rear wheel as described in the wheel section.
13. Refit the silencer as described in the fuel system section.
14. Lower the motorcycle to the ground and place on the side stand.
15. Reconnect the battery positive (red) lead first.
16. Refit the seat.
17. Pump the rear brake pedal a few times to position the brake pads in the caliper. Rectify as necessary if correct brake operation is not restored.

DRIVE CHAIN (Split link type)

Removal

NOTE:

- **The following procedure describes the fitment of a replacement chain using a split link. If the replacement chain to be fitted is a 'continuous' type, removal of the swinging arm and sprocket cover is necessary (as described earlier in this section).**

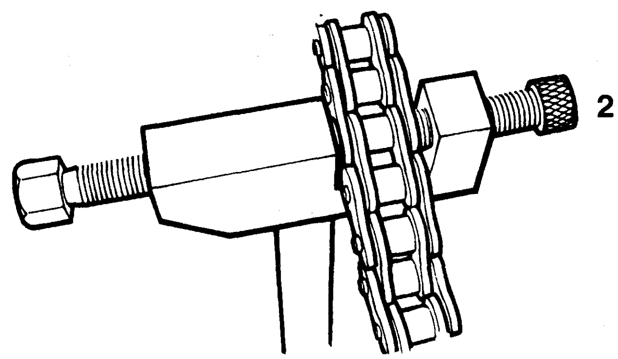
1. Raise the rear of the motorcycle and securely support with the rear wheel clear of the ground.

WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

2. Remove any convenient chain link pin using the chain splitter tool as follows:

3 Unscrew the knurled knob to withdraw the arbor as far as possible, and unscrew the pin punch until the link pin extractor is fully withdrawn.

4 Position the tool over the chain link pin to be extracted, and turn the knurled knob clockwise to move the arbor inwards until the chain link is supported. Check that the chain lies squarely in the tool and the extractor aligns with the pin to be removed.



1. Pin punch

2. Arbor

5 Turn the pin punch clockwise, and continue to turn with the aid of a suitably sized spanner until the link pin has been pushed out of its link.

6 Remove the tool and separate the two ends of the chain.

Replacement

NOTE:

- **The replacement chain is supplied in a 'split' condition, complete with a link kit to join the two ends.**

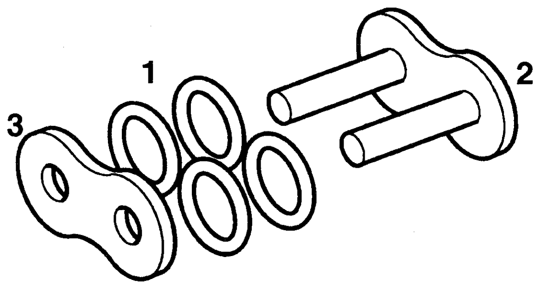
CAUTION: The component parts of the new link kit are coated with a special grease which must not be removed. Removal of this special grease will severely reduce the service life of the chain.

1. Use the old drive chain to pull the new chain into position as follows:

NOTE:

- **Do not use the new connector link as the special grease on it may be removed.**

2. Temporarily attach the end of the new chain to a free end of the old chain using an old connector link. Carefully pull the other end of the old chain to pull the new chain around the sprockets.
3. Disconnect the two chains. Turn the chain and the rear wheel until the ends of the chain are in a convenient working position.



Link kit

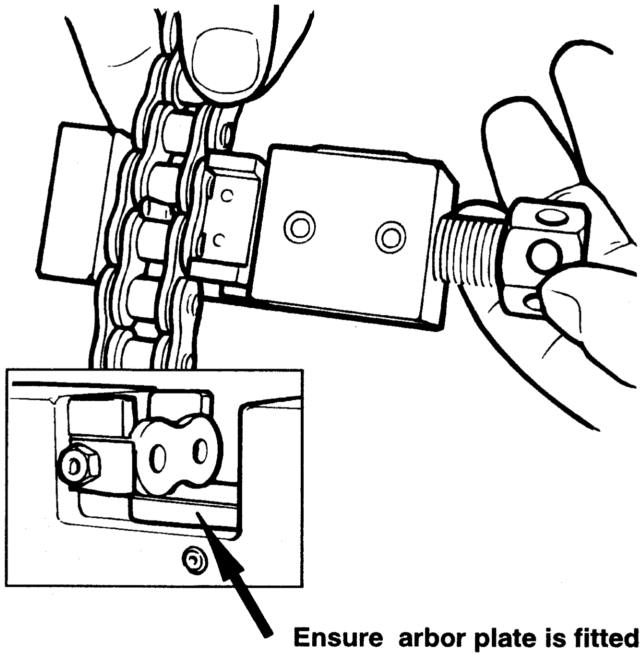
1. 'O' rings (4)

2. Connector link

3. Side plate

CAUTION: Always hold the connector link by its plate, NOT by the pins. The special grease on the pins must not be disturbed. Removal of the special grease will severely reduce the service life of the chain.

4. Fit two of the 'O' rings onto the inboard (nearest the wheel) side of the links to be joined, and fit the connector link from the same side without disturbing the 'O' rings.
5. Fit the other two 'O' rings on the outboard side of the links (side nearest the exhaust).

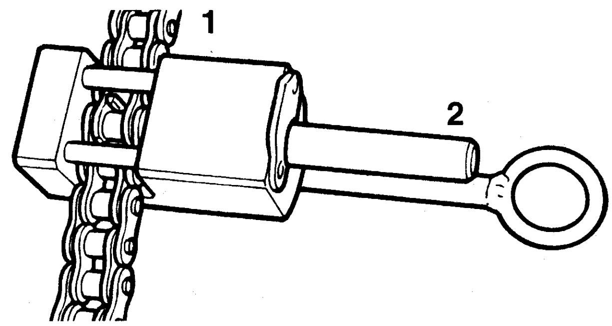


Fitting side plate

6. Retract the threaded arbor of the side plate installer tool as far as it will go and place the arbor plate over the chain location pin. Fit the side plate into the arbor and position the tool over the chain link to be connected.

CAUTION: Fitting the side plate without the arbor plate present will cause damage to the chain link resulting in premature failure of the chain.

7. Turn the threaded arbor clockwise to press the side plate onto the connector link pins. The tool will not allow the plate to be fitted too deeply as a stop mechanism is incorporated in the tool to prevent incorrect fitment. Turn the threaded arbor as far as it will go without excessive force.
8. Remove the tool.
9. Use the riveting tool to secure the side plate as follows:
10. Pull back the slide on the riveting tool and position the tool over one of the two pins to be secured. Release the slide.

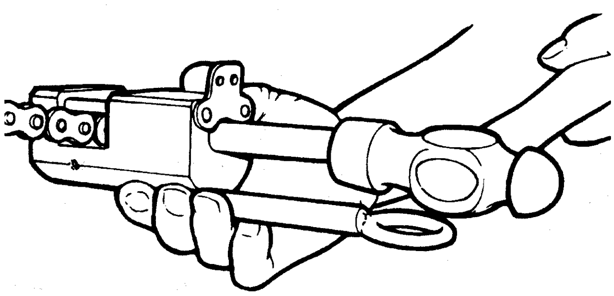


1. Slide

2. Punch

WARNING: To prevent risk of injury, do not place fingers or hands inside the slide. The slide is spring loaded and will cause injury to fingers or hands which become trapped inside the slide.

11. Use a hammer to apply a sharp blow to the tool punch 4 times. Rotate the punch by 45° between each blow.

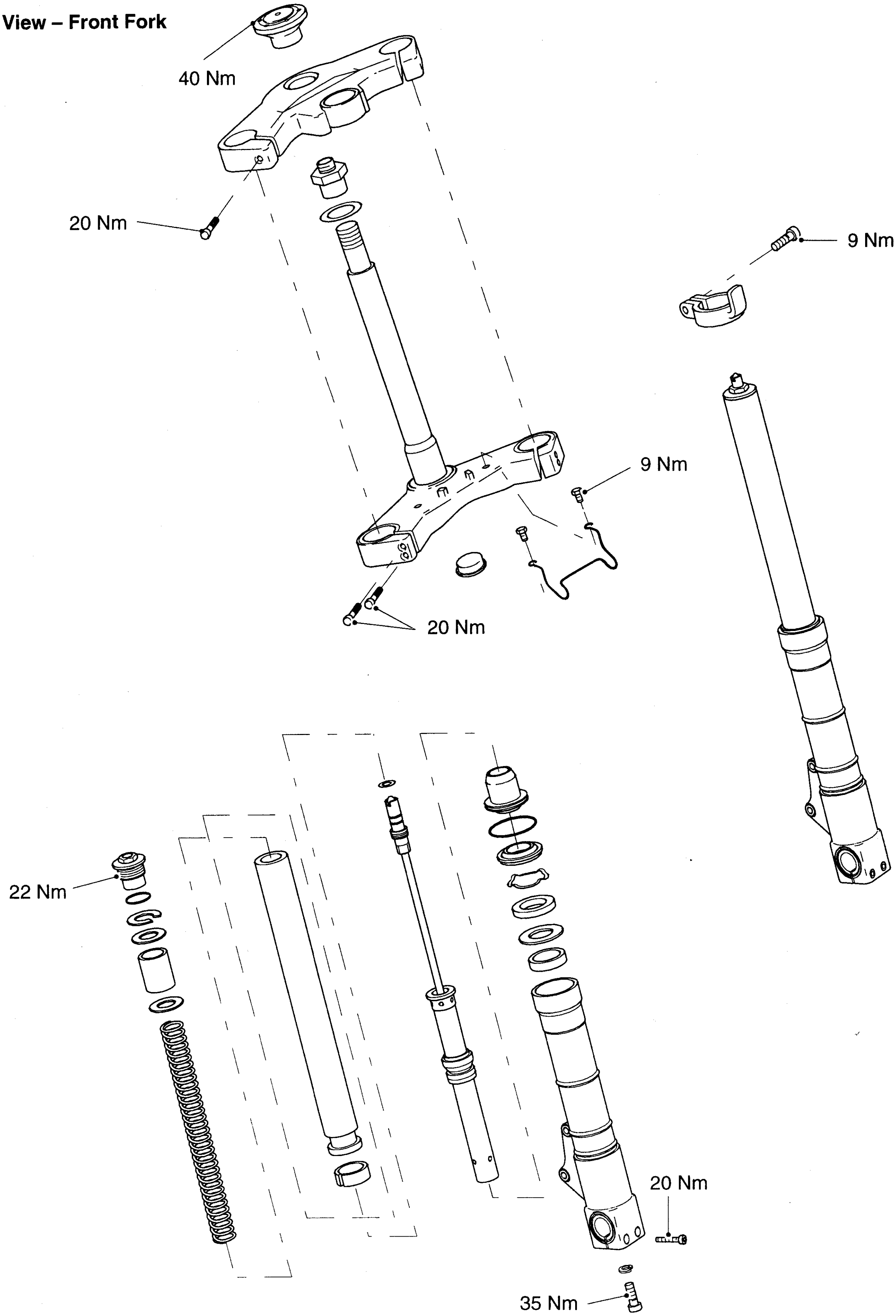


12. Remove the tool and examine the end of the link pin to check that is has been securely riveted over.
13. Repeat the riveting operation with the second link pin.
14. Check that the links can rotate freely around the pins. If not, the link just fitted must be removed and discarded and a new link fitted.
15. Adjust the drive chain tension and rear wheel alignment.
16. Lower the motorcycle to the ground.

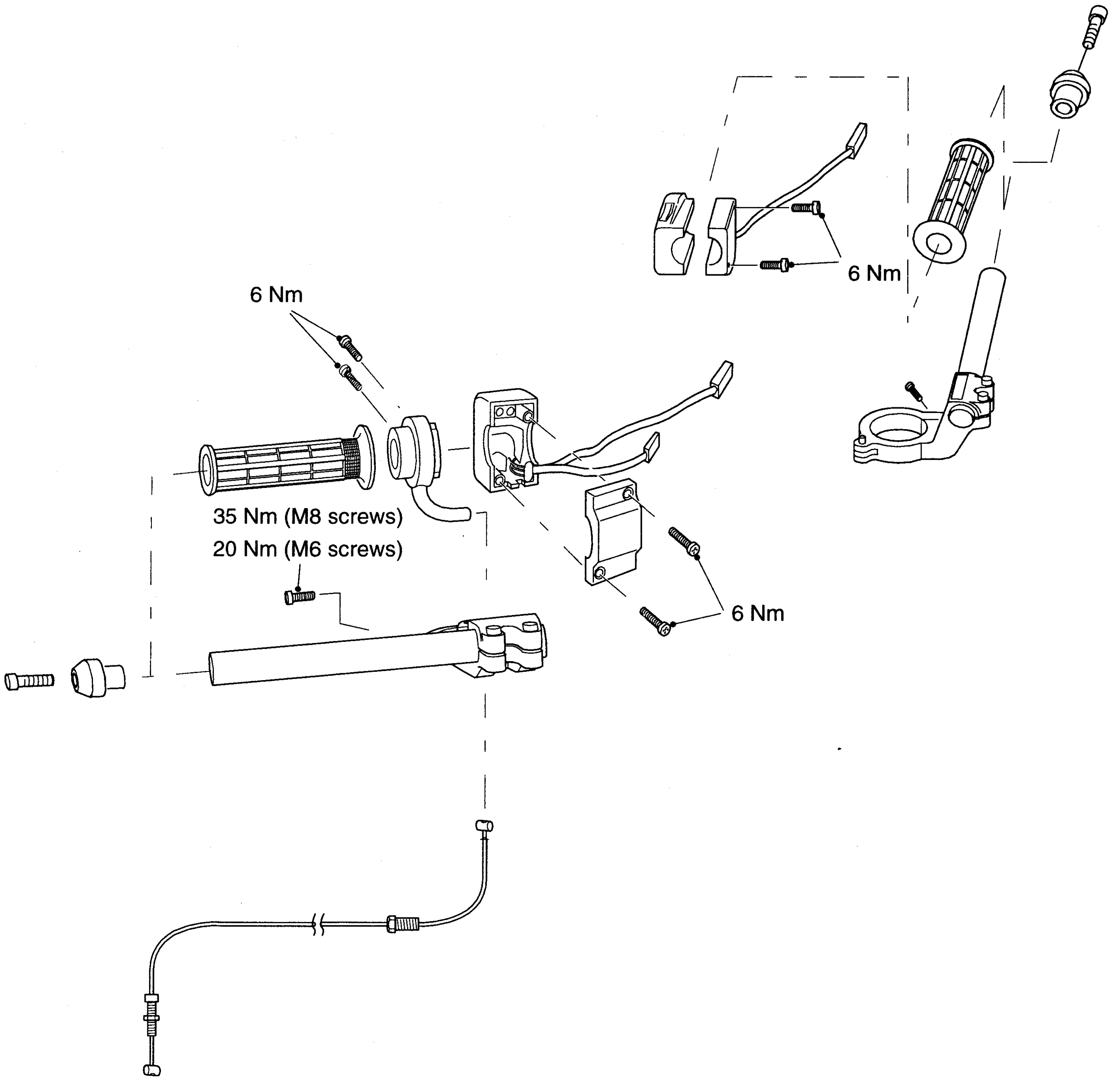
FRONT SUSPENSION

CONTENTS

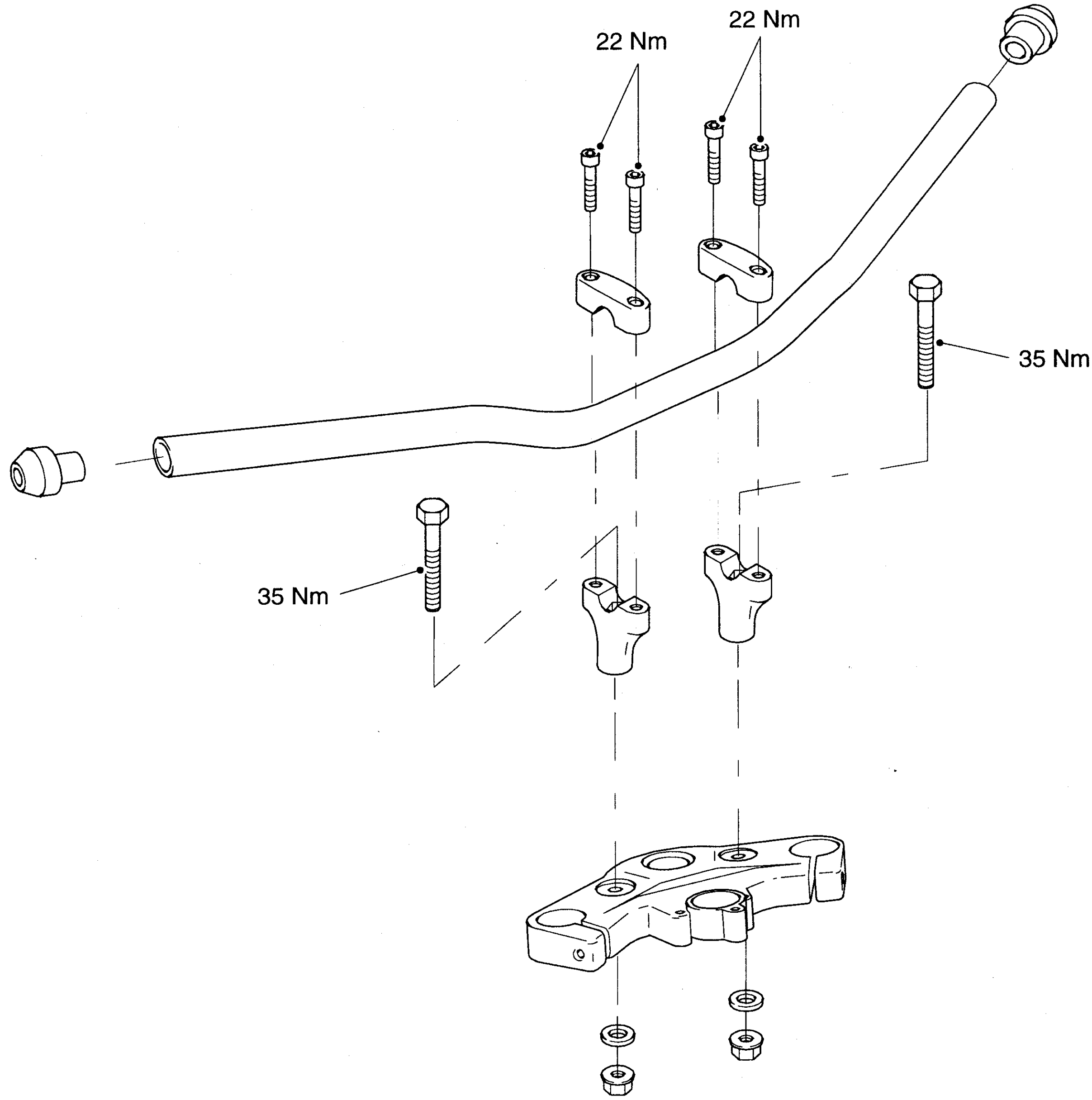
Exploded View – Front Fork



Exploded View – Low Handlebars



Exploded View – Tall Handlebars

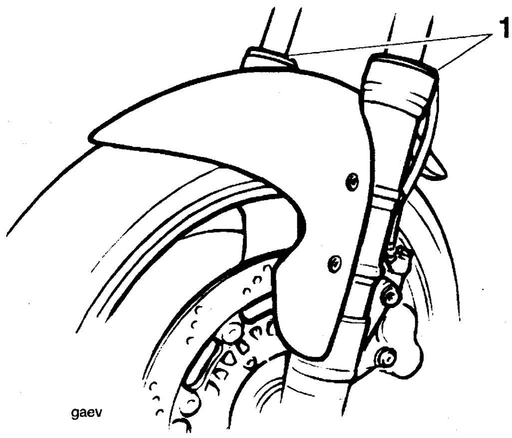


FRONT SUSPENSION

All models are equipped with hydraulic, telescopic front forks which are adjustable for spring pre-load, rebound and compression damping. 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 – ALL MODELS

1. Visually inspect the fork inner tube assembly for rust and damage. Repair or replace as necessary.
2. Visually inspect the dust/oil seal areas for signs of damage and fluid leaks. If oil leaks are found, the fork must be stripped and overhauled or replaced completely.



1. Fork Seal Area

3. 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.

> **WARNING: If roughness or excessive stiffness is detected, investigate the cause and take the necessary remedial action before riding the motorcycle.**
>
> **Riding the motorcycle with defective or damaged suspension can damage the motorcycle, cause loss of control, or an accident.**

> **WARNING: All suspension units contain pressurised gas. Always wear eye, face and skin protection during fork disassembly.**

FORK OIL

Oil change

1. Remove the fork assembly as described later in this section.

NOTE:

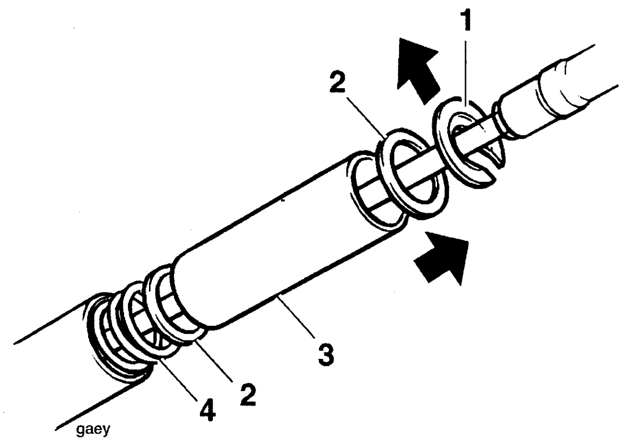
- **To aid removal, slacken but do not remove the top cap before releasing the fork from the yoke.**

2. Unscrew the fork cap from the inner tube, then remove it from the preload adjuster / damper. Discard the top cap 'O' ring.

> **WARNING: The fork cap will spring clear due to spring tension. To prevent injury, always wear eye, face and hand protection when removing spring loaded items.**

3. Raise the damping cylinder rod slightly and remove:

- dished, slotted washer,
- guide washer
- guide tube
- guide washer
- damping spring.



1. Dished, slotted washer

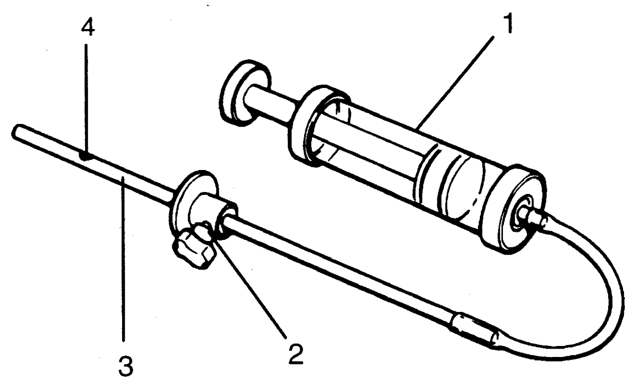
2. Guide washers

3. Guide tube

4. Damping spring

4. Invert the fork assembly and allow all the oil to drain into a suitable container. Turn the fork back to an upright position.
5. Fill the fork with the grade of oil specified in the fork oil table, to a level above that which will finally be required.

6. Set the scale on tool 3880160-T0301 to the level specified for the model being worked on (see the fork oil table for the correct level setting).



1. Tool 3880160-T0301

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.**

7. Operate the fork several times to expel any trapped air from the valves, then **fully compress the fork.**

8. Insert the scale end of the tool into the fork inner tube.

9. Hold the tool adjuster plate level with the upper surface of the fork inner tube and draw fluid into the syringe until fluid flow ceases (empty the syringe if the body becomes full before fluid flow stops).

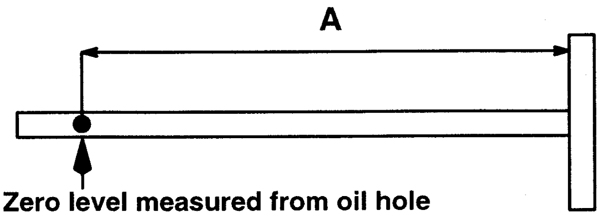
10. The fluid level in the fork is now set to the height set on the tool scale. Check the tool scale setting and repeat the process if incorrectly set.

11. When the correct level has been set, assemble the fork components removed earlier ensuring that they are assembled in the same order in which they were removed.

12. Refit the fork and tighten the top cap to **22 Nm**.

WARNING: Incorrect tool adjustment and/or failure to keep the tool level with the fork slider will affect the final fluid level setting.

Incorrect fork oil levels could result in an unsafe riding condition leading to loss of control and an accident.



Zero level measured from oil hole
Set dimension 'A' to the required oil level

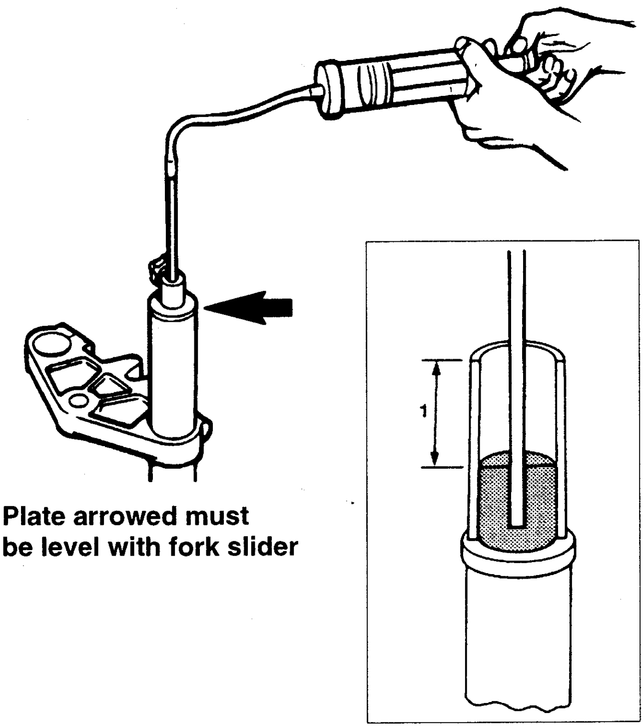


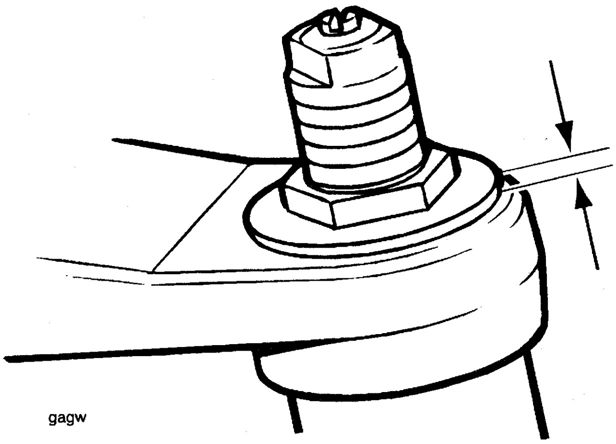
Plate arrowed must be level with fork slider

1. Fork Oil Level Setting (fork fully compressed)

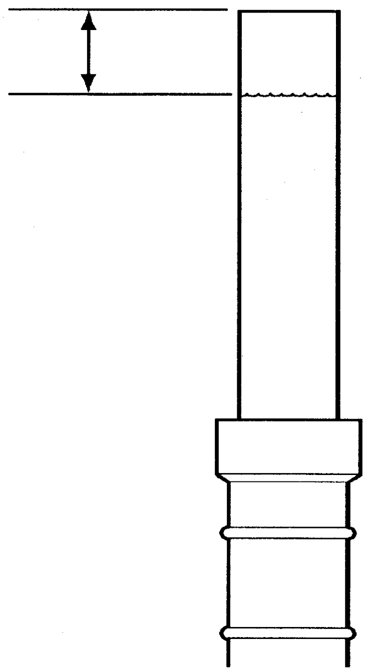
FORK OIL LEVEL CHART

Model	Oil Level*	Oil Volume	Oil Grade	Fork Pull Through
T595 Daytona	76 mm	589 cc	Showa SS8	Inner tube flush with upper face of top yoke
T509 Speed Triple	76 mm	589 cc	Showa SS8	Inner tube flush with upper face of top yoke
Daytona 955i	76 mm	589 cc	Showa SS8	Inner tube flush with upper face of top yoke
955cc Speed Triple	76 mm	589 cc	Showa SS8	Inner tube flush with upper face of top yoke

WARNING: Any variation in fork oil level from the figures quoted above could result in an unsafe riding condition leading to loss of control and an accident.



Fork Pull Through



Fork Oil Level*

*** Fork fully compressed**

FRONT FORK

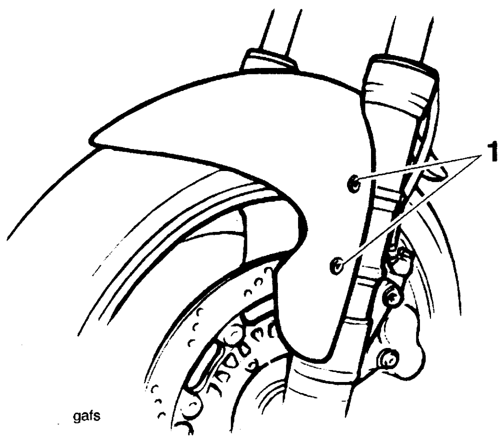
Removal

1. Raise and support the front of the motorcycle.

> **WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.**

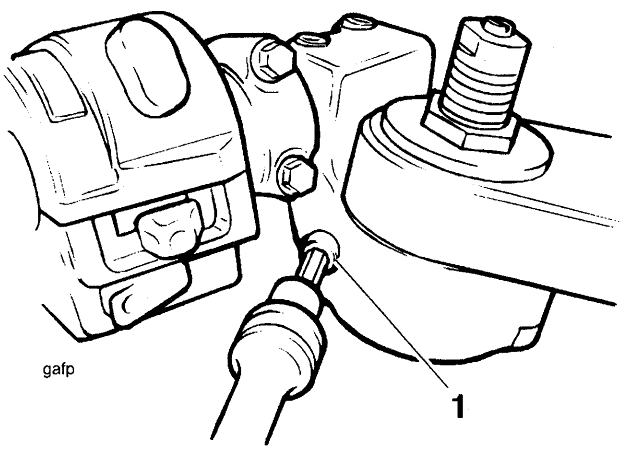
2. Remove the front wheel as described in the wheels and tyres section.

3. Remove the front mudguard.



1. Mudguard fixings

4. Low handlebar models only: Remove the handlebar clamp screw and detach the handlebar.



1. Handlebar clamp screw

> **WARNING: If working on the right hand fork, do not invert the brake master cylinder as this will introduce air into the brake system and may also cause brake fluid to escape and damage the bodywork.**
>
> **A dangerous riding condition leading to loss of control or an accident could result if this warning is ignored.**

NOTE:

- **If the fork is to be dismantled, slacken the fork cap (at the top of the fork) and the damping cylinder securing bolt (at the bottom) before releasing the yoke clamps. Gently secure the damping cylinder bolt to prevent oil leaks.**

> **CAUTION: After slackening the damping cylinder securing bolt, lightly secure it again to prevent oil escaping.**

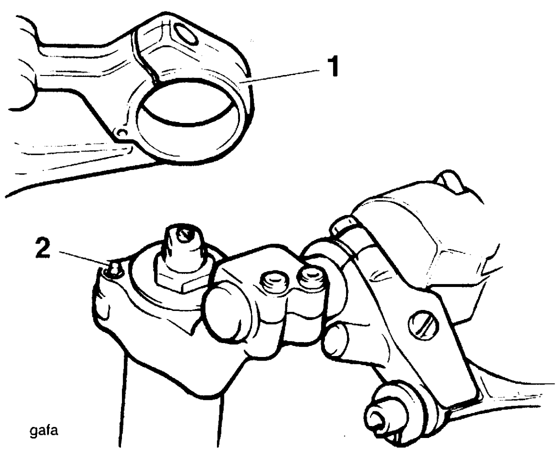
5. Slacken but do not remove the pinch bolts on the top and bottom yokes and, using a downward twisting motion, slide the fork out of the yokes.

Installation

1. Fit the forks into the yokes and adjust the fork height such that the top of the fork inner tube is flush with the top face of the upper yoke.

2. Tighten the top and bottom yoke pinch bolts to **20 Nm**.

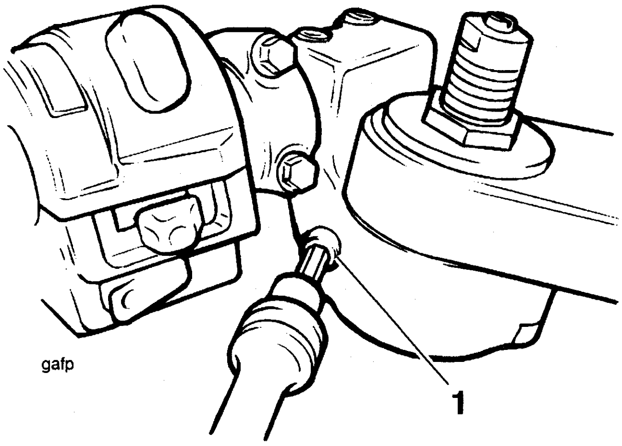
3. Fit the handlebar, ensuring its locating pin fits into the lower face of the top yoke.



1. Top yoke

2. Locating pin

4. Tighten the handlebar clamp bolt to **35 Nm (M8 screws) 20 Nm (M6 screws).**



1. Handlebar clamp bolt

5. Fit the mudguard and tighten the mudguard fixings to **6 Nm.**

6. Fit the front wheel as described in the wheel section.

FORK DISMANTLING / ASSEMBLY

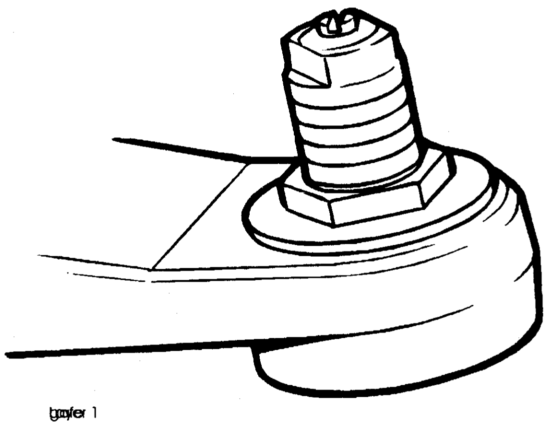
Dismantling

> **CAUTION: If securing the fork in a vice use the caliper mounting points. Never clamp directly onto the tube itself as this will cause the tube to distort beyond repair.**

1. Secure the fork by its caliper mountings in a soft jawed vice, taking care not to mark or damage the mountings.

2. If not already done, release the torque on the damping cylinder securing bolt, then lightly re-tighten to prevent oil from escaping.

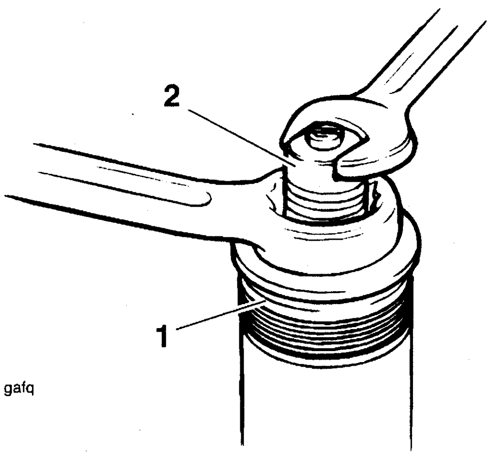
3. Note the position of the preload adjuster relative to the fork cap to ensure the setting is retained on re–assembly.



Preload adjuster marks

> **WARNING: Do not change the damper compression and rebound adjuster settings. If they are changed, this will affect the handling of the motorcycle from those which the rider is used to. Riding with unfamiliar fork settings may cause unexpected handling characteristics leading to loss of control and an accident.**

4. Unscrew the fork cap from the inner tube, then remove it from the preload adjuster / damper. Discard the cap 'O' ring.

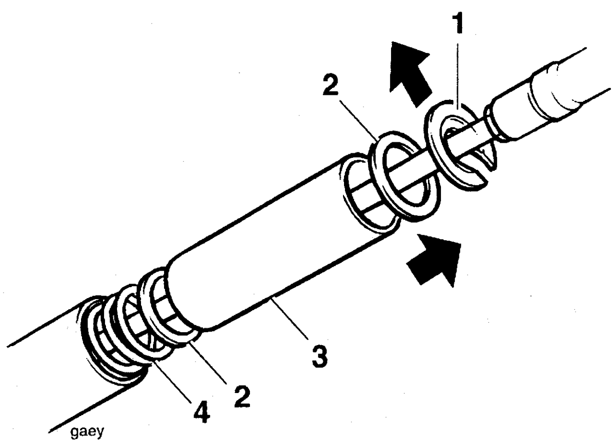


1. Fork cap

2. Preload adjuster / damper

5. Raise the damping cylinder rod slightly and remove:

- dished, slotted washer,
- guide washer
- guide tube
- guide washer
- damping spring.



1. Dished, slotted washer

2. Guide washers

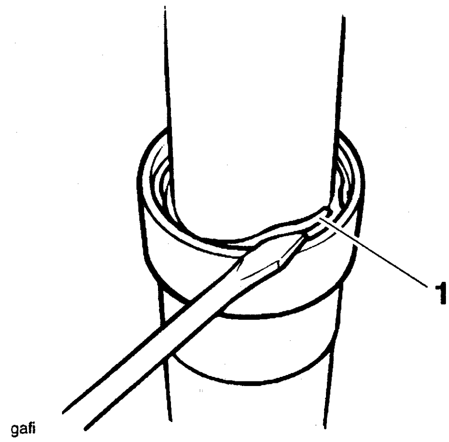
3. Guide tube

4. Damping spring

6. Drain the oil from the fork by removing it from the vice and inverting over a suitable container.

7. Return the fork to the vice.

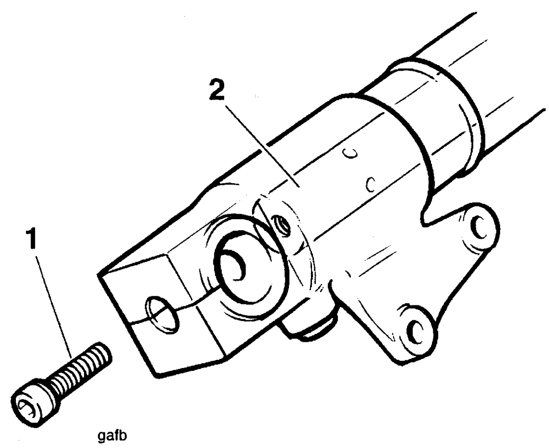
8. Prise out the dust seal from the outer tube and remove the circlip from beneath the seal.



1. Circlip

9. Remove the damping cylinder securing bolt from the lower end of of the assembly. Discard the copper washer.

10. Remove the damping cylinder.



1. Damping cylinder bolt

2. Damping cylinder

11. Pull sharply upwards on the inner tube to release it from the outer tube and remove the seal, washer and bush.

NOTE:

- **The oil lock at the base of the outer tube may be removed, if necessary, by pushing the oil lock upwards through the damping cylinder bolt hole. Always renew the oil lock 'O' ring if the lock is removed.**

Inspection

1. Thoroughly clean and examine all components for damage, wear, scoring, corrosion etc. Renew as necessary.

2. Always renew the oil and dust seals.

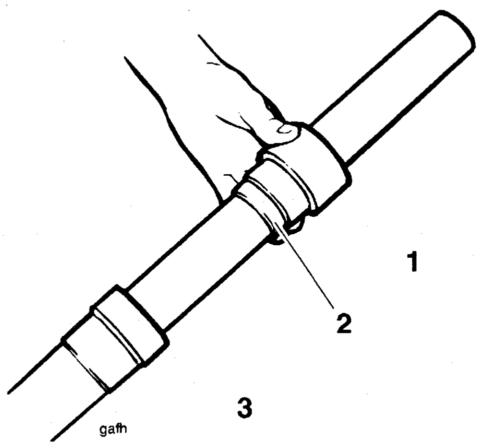
Assembly

> **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 control or an accident.**

1. Fit the inner tube into the outer tube.

2. Fit the bearing over the inner tube.

3. Slide the bearing down the tube and tap it into its location in the outer tube using the smaller diameter end of tool T3880285.



1. Tool T3880285

2. Bearing

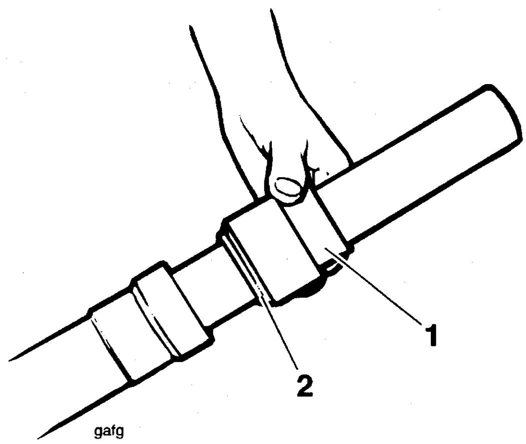
3. Outer tube

4. Fit the washer.

5. Lubricate a new oil seal and fit it into the outer tube (text face upwards). Tap it into position again using the smaller diameter end of tool T3380285.

6. Secure the assembly with the circlip

7. Fit a new dust seal (spring band upwards) over the inner tube, tapping it into position in the outer tube using the larger diameter end of tool T3880285.



1. Tool T3880285

2. Dust seal

8. Locate the damping cylinder in the fork inner tube and secure with the bolt in the base of the outer tube. Use a new copper washer.

9. Fill with the correctly specified oil, as described in the section 'Fork Oil Change'.

10. Fit to the damping cylinder rod:

- damping spring, close coils down,
- guide washer,
- guide tube,
- guide washer,
- slotted washer, convex face down.

11. Fit a new 'O' ring to the fork cap, and fit the cap to the damping cylinder rod, turning it down to the pre–load adjuster mark noted prior to dismantling.

12. Screw the fork cap into the inner tube, tightening down by hand as far as possible.

13. Tighten the damping cylinder securing bolt to **35 Nm**.

14. Refit the fork as described in 'front fork Installation'.

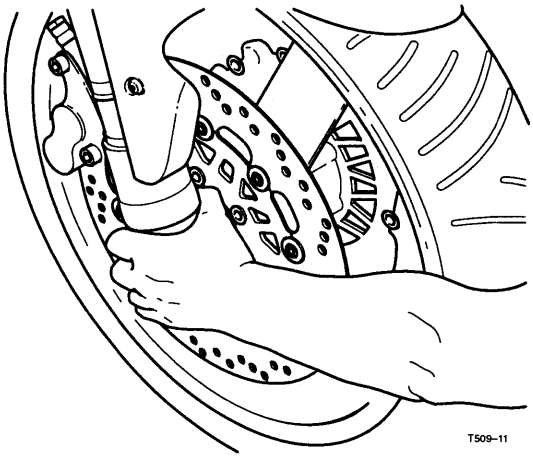
15. Tighten the fork cap to **22 Nm**. Check that the preload height adjustment remains at the mark noted prior to dismantling.

HEADSTOCK BEARING CHECK / ADJUSTMENT

Check

1. Raise and support the front of the motorcycle.

> **WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.**



Checking headstock bearing adjustment

2. Hold the lower end 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.

Adjustment

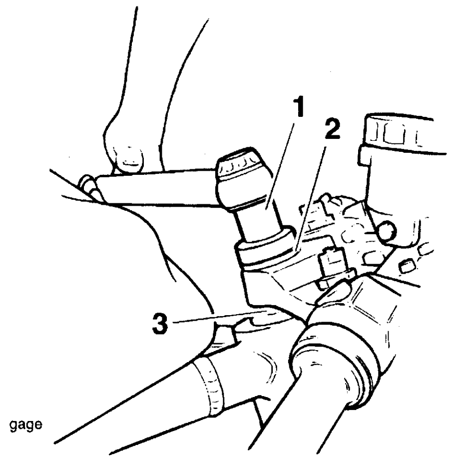
1. Raise and support the front of the motorcycle.

2. Slacken the handlebar clamp bolts (low handlebar models only)

3. Slacken the yoke pinch bolts **on the top yoke only.**

> **WARNING: If the lower yoke fixings are also slackened, the forks will no longer support the weight of the motorcycle.**
>
> **Do not slacken the lower yoke fixings as, in this condition, the motorcycle could topple over causing damage and/or risk of injury.**

4. Slacken the headstock top nut using tool T3880300.



1. Tool T3880300
2. Headstock top nut
3. Headstock adjustment nut

5. Adjust the bearing free-play as follows:–
   - Tighten the nut to **32 Nm.**
   - Loosen the nut and then retighten by hand until any bearing free play is eliminated.

> **WARNING: It is essential that the adjuster nut is not over-tightened. If the adjuster is over–tightened it will cause a pre–load on the headstock bearings. This will introduce tight steering which will lead to premature bearing wear and could cause loss of control and an accident.**

NOTE:

- **Correct adjustment is attained when the bearing play is eliminated without preloading the bearings.**
- **Before tightening the headstock nut, or if the nut is ever removed for any other reason, apply a smear of 'copperslip' grease to the nut threads in order to prevent the nut from binding.**

6. Hold the adjuster nut and tighten the top nut using tool T3880300 to **40 Nm**.

7. Tighten the top yoke pinch bolts to **20 Nm**.

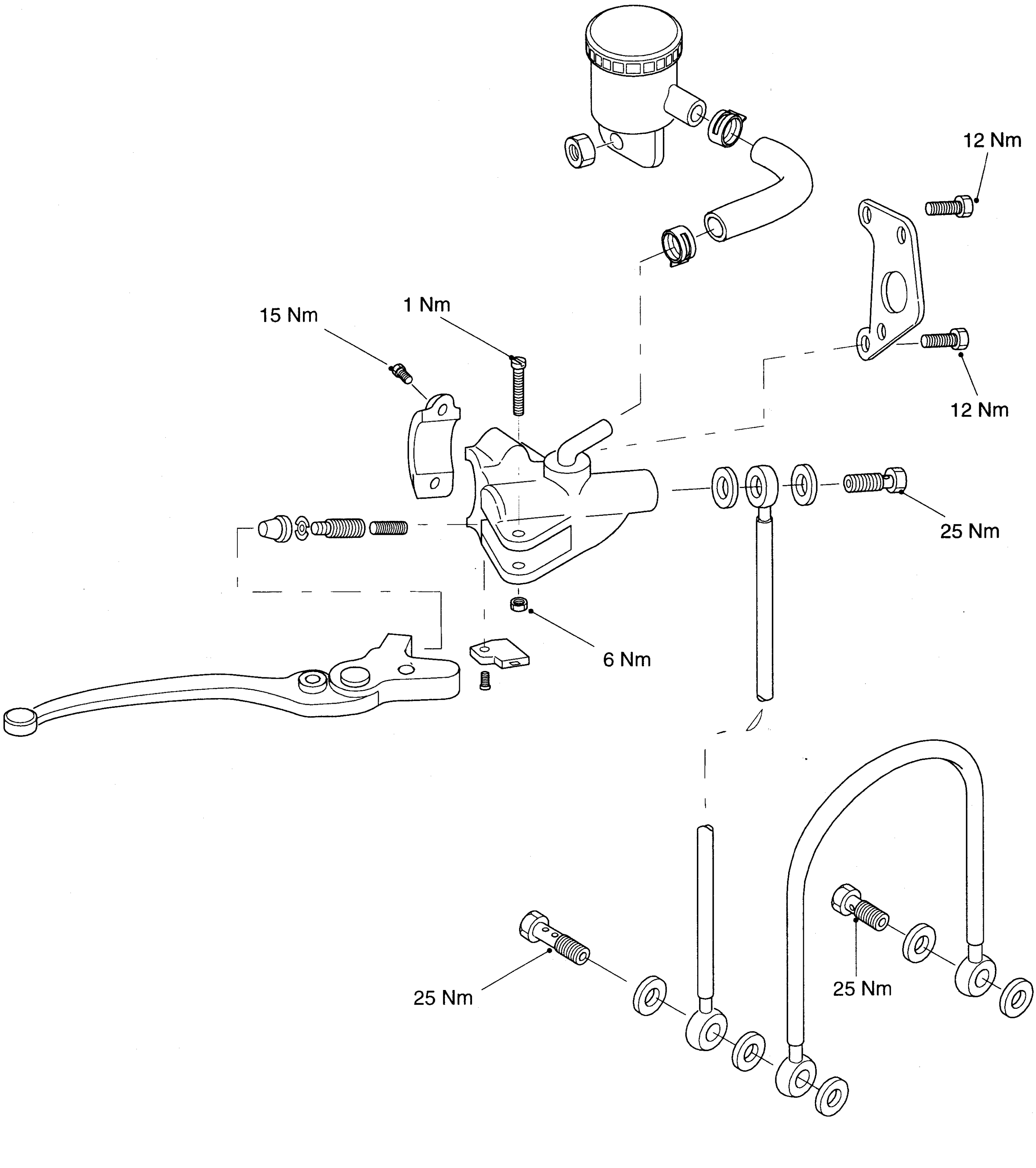
8. Tighten the handlebar clamp bolts to **35 Nm (M8 screws) 20 Nm (M6 screws)** (low handlebar models only).

9. Check that the free play has been eliminated, and that the steering can be turned freely from lock to lock without any sign of tightness. Re–adjust if necessary.

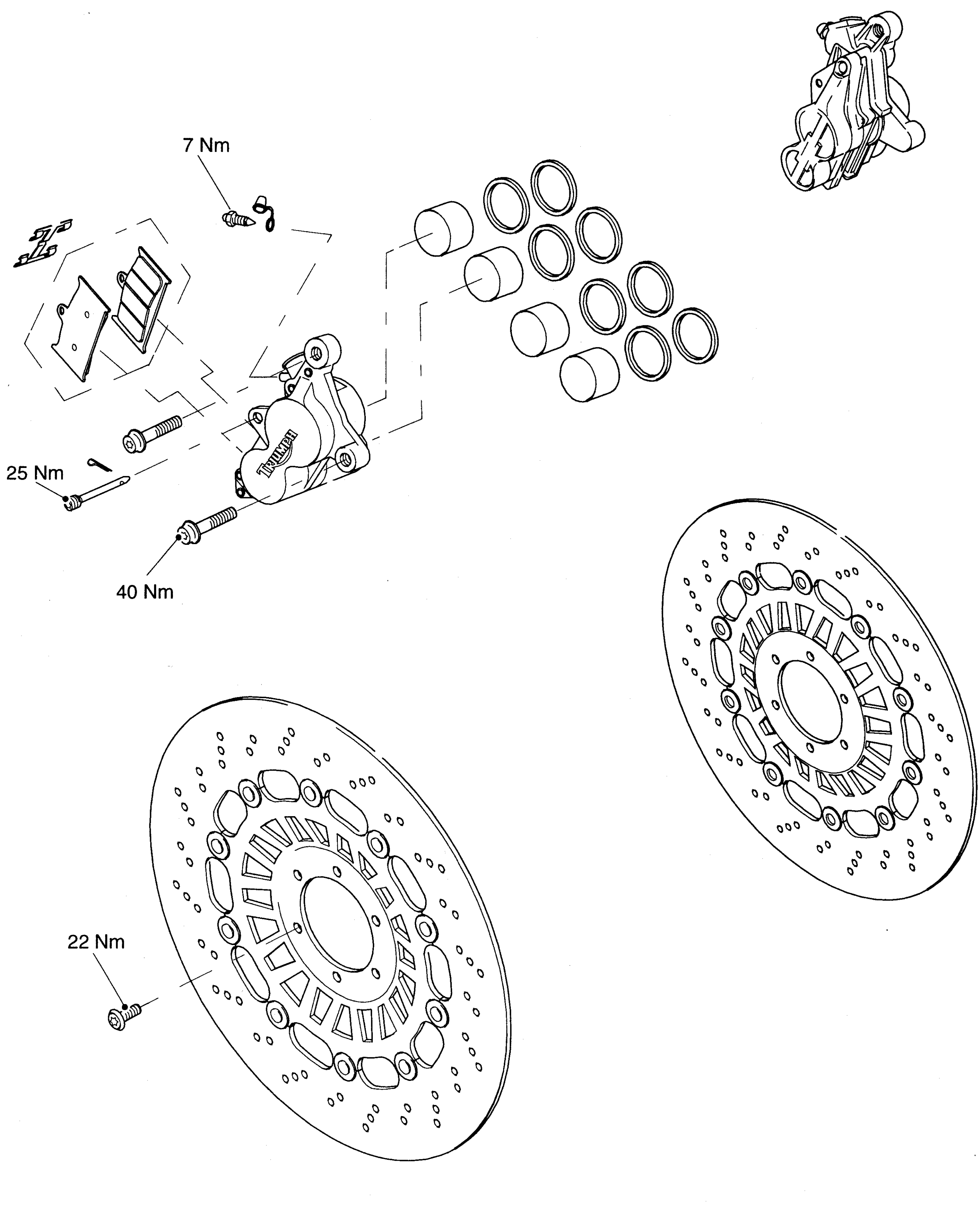
BRAKING SYSTEM

CONTENTS

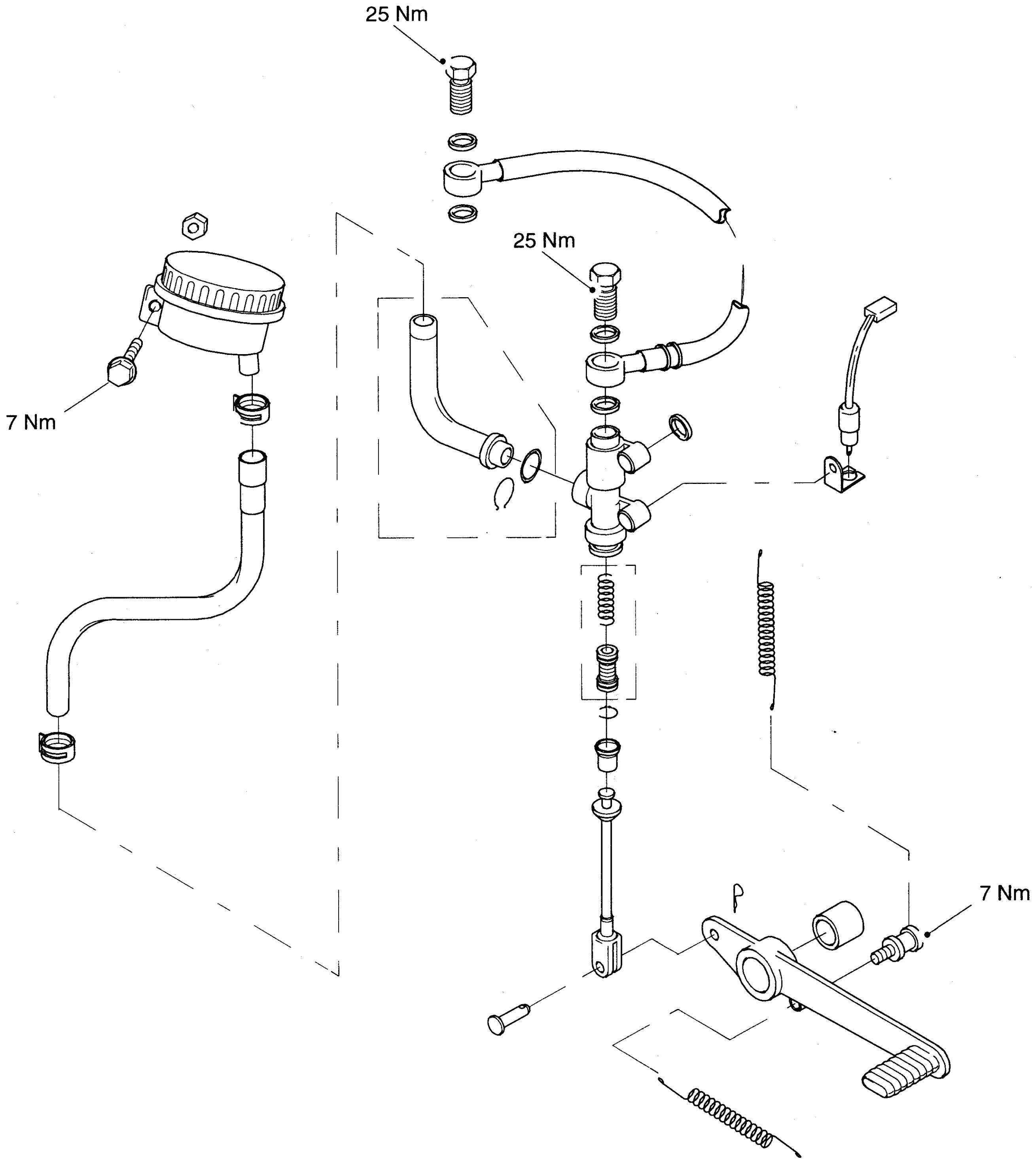
Exploded View – Front Brake Master Cylinder



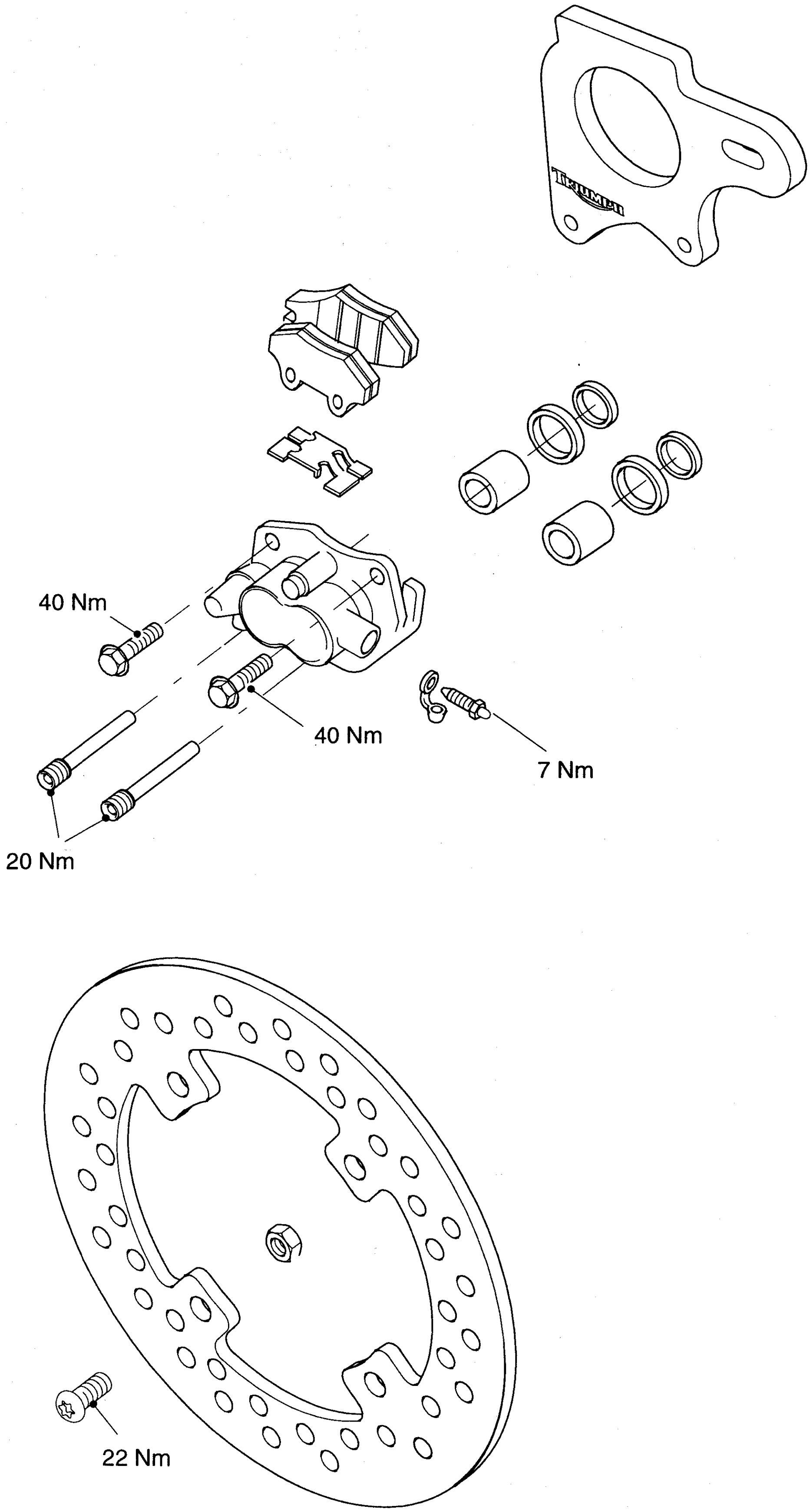
Exploded View – Front Brake Caliper



Exploded View – Rear Brake Master Cylinders



Exploded View – Rear Brake Caliper



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 which 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 D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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 scheduled maintenance chart may reduce braking efficiency resulting in an accident.

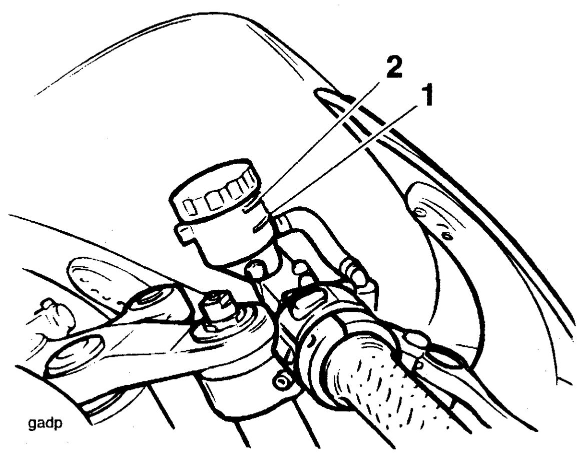
WARNING: Never use mineral based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral based grease will damage the hydraulic seals in the calipers and master cylinders.

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

FLUID LEVEL INSPECTION

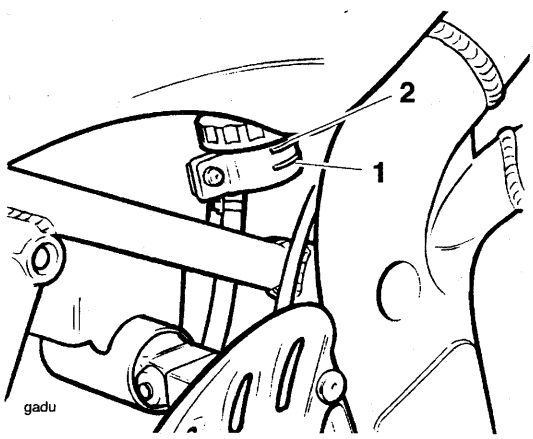
In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

1. Ensure that the brake fluid level in the front and rear brake fluid reservoirs is between the upper and lower level lines (reservoir held horizontal).



1. Front Reservoir Lower Level

2. Front Reservoir Upper Level



1. Rear Reservoir Lower Level

2. Rear Reservoir Upper Level

CHANGING BRAKE FLUID

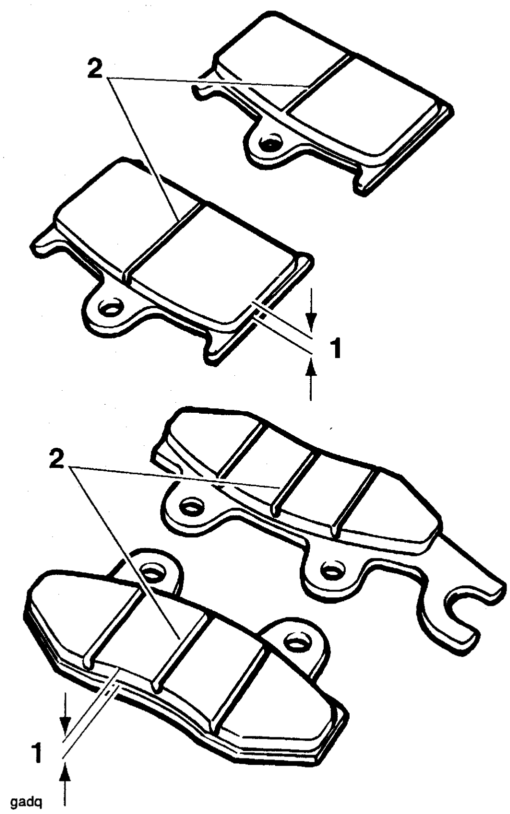
Brake fluid should be changed at the interval specified in the scheduled maintenance chart.

BRAKE PADS

Front and Rear 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 1.5mm. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



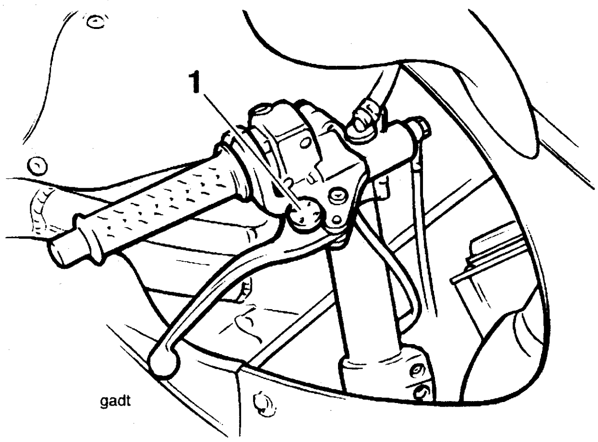
1. Lining material thickness

2. Centre groove

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 together. Replacing individual pads will reduce braking efficiency and may cause an accident.

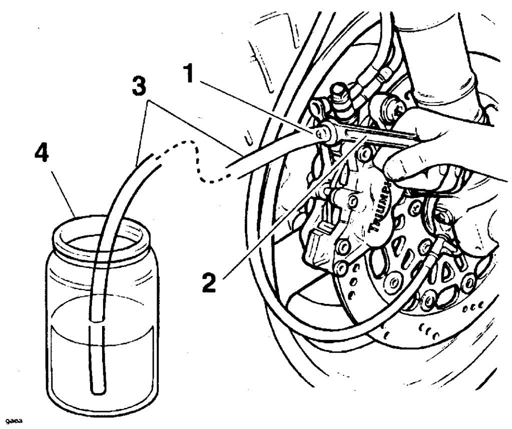
BLEEDING THE FRONT BRAKES, RENEWING BRAKE FLUID

1. **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

2. Remove the rubber cap from the bleed nipple on the right hand caliper.
3. Attach a transparent tube to the bleed nipple.



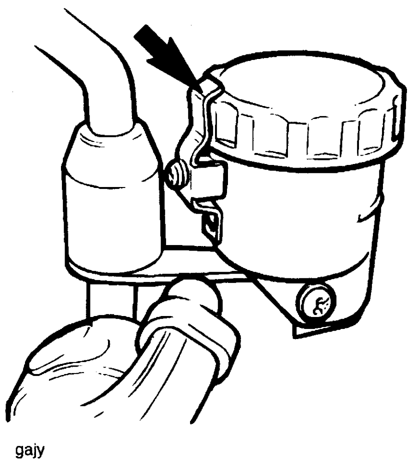
1. Bleed Nipple

2. Spanner

3. Bleed Tube

4. Container

4. Place the other end of the tube in a suitable receptacle containing new brake fluid.
5. Turn the handlebars to bring the fluid reservoir to a level position.



Arrowed – Safety Clip

6. Remove the safety clip from the brake reservoir cover.

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 body damage, do not spill brake fluid onto any area of the bodywork.

7. Carefully remove the reservoir cover taking care not to spill any fluid.
8. Check the condition of the sealing diaphragm for the reservoir. Replace if necessary.
9. Release the bleed nipple.

WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.

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.**

10. Slowly pull the brake lever to the handlebar and, holding the lever fully in, close the bleed nipple.

    Repeat steps 9 and 10 until no more air appears in the bleed tube.

11. Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
12. When all air has been expelled from the system, hold the lever in and close the bleed nipple. Tighten the nipple to **7 Nm**.
13. Fill the reservoir to the upper level with new DOT 4 fluid.

WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.

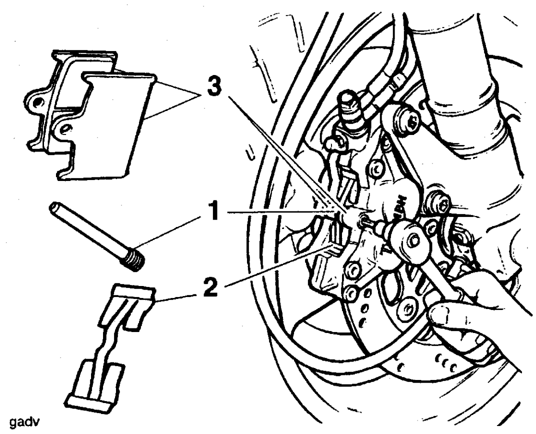
14. Remove the transparent bleed tube.
15. Replace the bleed nipple cap.
16. Repeat the procedure for the left–hand caliper.
17. Refit the reservoir cover and diaphragm. Refit the safety clip and screw.

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

18. Reset the brake lever adjuster to the original setting.
19. Check that the brake operates correctly.

FRONT BRAKE PADS

Removal



1. Retaining Pin

2. Anti–rattle Spring

3. Brake Pads

1. Remove the brake pad retaining pin after removing and discarding its split pin. Inspect the retaining pin for damage.
2. Remove the anti–rattle spring and inspect the spring for damage.

CAUTION: Never lever directly against the disc, caliper or the pad lining material as this will damage these components. Always use a levering tool made from a soft material which 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.

3. Carefully push the brake pads apart to force the caliper pistons back and allow withdrawal of the pads.
4. Remove both brake pads and inspect for damage and wear beyond the service limit.

NOTE:

- **Complete the assembly of the brake pads to one caliper (see assembly for details) before removing the pads from the other caliper.**

Installation

> **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.**

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: 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.**

2. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease.
3. Fit the anti–rattle spring over the pads and push down in the centre to allow the pad retaining pin to slide across the top of the spring.
4. Tighten the pad retaining pins to **25 Nm**, and secure with new split pins.
5. Pump the brake lever to correctly position the caliper pistons.

> **WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.**

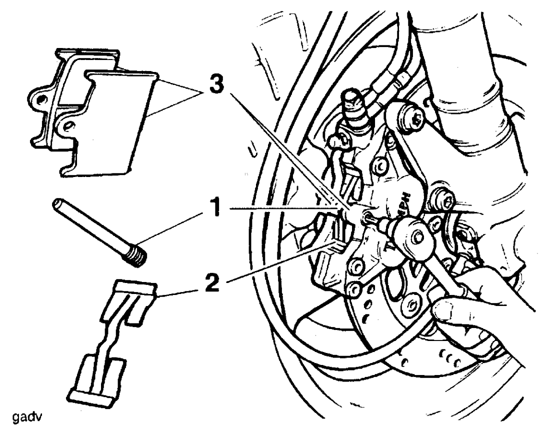
6. Check the front brake fluid level and top up as required with new DOT 4 fluid.

FRONT BRAKE CALIPER

Removal

> **CAUTION: To prevent body damage, do not spill brake fluid onto any area of the bodywork.**

1. Disconnect the brake hose at the caliper (two hoses on right hand caliper), and place the free end of the hose(s) in a suitable container to collect brake fluid.
2. If the caliper is to be overhauled, remove the split pin and slacken the pad retaining pin.



1. Retaining Pin

2. Anti–rattle Spring

3. Brake Pads

> **CAUTION: Never lever directly against the disc, caliper or the pad lining material. Always use a levering tool made from a soft material which will not cause damage to the load bearing surfaces.**
>
> **Brake fluid will be displaced from the hose joint 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**

3. Remove the two caliper securing bolts.
4. Manoeuvre the caliper clear of the disc, taking care not to damage the wheel.

Disassembly

WARNING: Do not attempt to split the two halves of the caliper. A dangerous riding condition leading to an accident could occur if this warning is ignored.

1. Remove the pad retaining pin and extract the pads.

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.

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 pistons one at a time.

Inspection

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.

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 an accident could result if this warning is ignored.

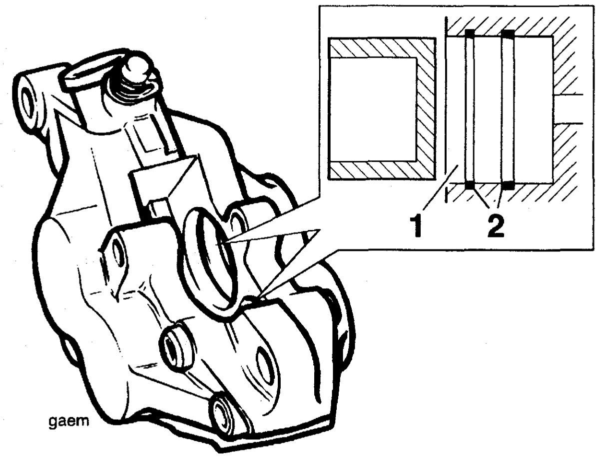
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Assembly

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.

A dangerous riding condition leading to an accident could result if this warning is ignored.

1. Fit new fluid seals.



1 Caliper bore

2. Piston seal

WARNING: Ensure that the caliper bores do not become scratched during piston removal and assembly. Ensure that the pistons remain square to their bores during fitment otherwise damage to the caliper could result

A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Apply brake fluid to the outside of the caliper pistons and fluid seals, and carefully push the pistons fully into the caliper bores by hand.

Installation

1. Position the caliper over the disc and tighten the caliper bolts to **40 Nm.**
2. Fit the brake pads to the caliper and locate the anti–rattle spring over the pads.

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.

3. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease. Push down in the centre of the anti rattle spring and fit the retaining pin.
4. Tighten the brake pad retaining pin to **25 Nm** and fit a new split pin.
5. Connect the brake hose(s) to the caliper using new sealing washers on each side of the banjo(s).
6. Tighten the banjo bolt to **25 Nm.**

WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.

7. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
8. Bleed the front brake line as described earlier in this section.

FRONT DISCS

Wear

1. Replace any brake disc if worn beyond the service limit or exceeds the disc run–out limit.

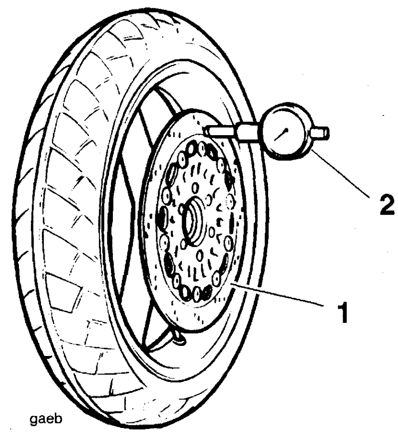
Front Disc Thickness

Standard: .... 4.0 mm
Service Limit: .... 3.5 mm

Disc Run–out

Standard: .... 0.1 mm
Service Limit: .... 0.3 mm

Measure disc run out using an accurate dial gauge mounted on a surface plate.



1. Disc

2. Dial Gauge

Removal

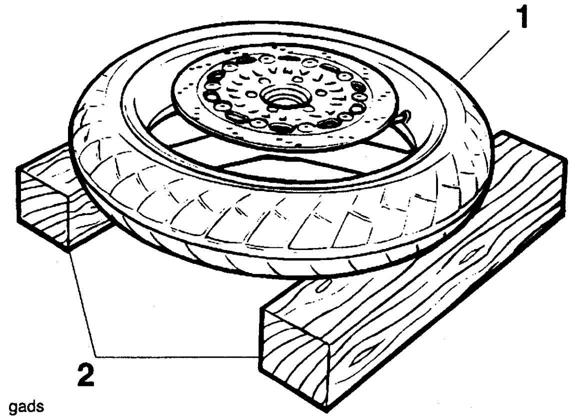
WARNING: Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable.

A dangerous riding condition leading to an accident could result if this warning is ignored.

1. Remove the front wheel as described in the wheel section.

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 to avoid damage to the wheel centre.



1. Wheel

2. Support block

NOTE:

- **The discs are handed. Observe the offset of each disc to its hub and the orientation of the cooling holes, for correct installation.**

3. Remove and discard the 6 securing bolts to detach the disc.
4. Repeat operations 2 and 3 to remove the disc on the opposite side.

Installation

1. Locate the first disc on the correct side of the wheel (offset of disc outwards) as noted during removal.
2. Fit new securing bolts and tighten to **22 Nm.**
3. Fit the other disc in the same way.
4. Refit the wheel as described in the wheel section.

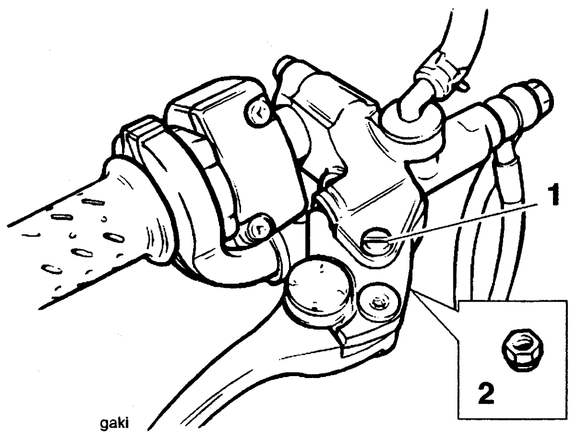
FRONT BRAKE MASTER CYLINDER

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.

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

2. To drain the fluid from the master cylinder, attach a tube to the right hand caliper bleed nipple, slacken the nipple and allow the fluid to drain into a suitable container. Operate the brake lever until all fluid has been expelled.
3. Note the setting of the brake lever adjuster to ensure it is returned to the same position when the overhaul operation is complete.
4. Remove the pivot locknut and bolt securing the brake lever to the master cylinder, and remove the lever.



1. Pivot bolt

2. Nut

5. Disconnect from the master cylinder:

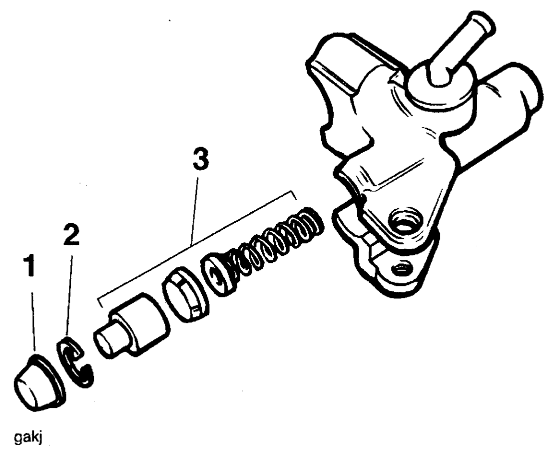
- brake hoses,
- brake light switch connections.

6. Release the clamp screws from the handlebar to remove the master cylinder.

Disassembly

1. Remove the reservoir.
2. Detach the boot from the lever end of the cylinder.
3. Remove the circlip from beneath the boot.

4. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.



1. Boot

2. Circlip

3. Piston Set

Inspection

1. Check the following for wear, damage, cracks or deterioration:

- Cylinder bore
- Dust cover
- Spring
- Piston
- Pivot Bolt

2. Always renew the piston and seal set if the cylinder is dismantled.

3. Check that the relief and supply ports on the cylinder are not blocked.

Assembly

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.

A dangerous riding condition leading to an accident could result if this warning is ignored.

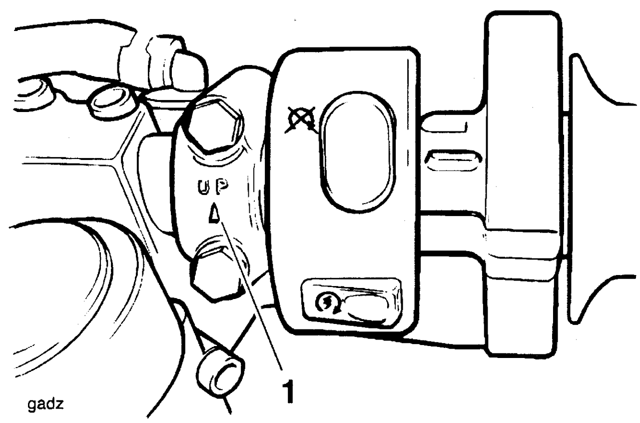
1. Lubricate the piston and cylinder with new, clean brake fluid.

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.

Installation



1. Arrow Mark

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 dot mark on the handlebar.

2. Tighten the clamp bolts, upper first and then the lower to **15 Nm**.

3. Connect the brake light switch.

4. Position the brake lever ensuring that pivot boss is correctly aligned to the push rod. Fit and tighten the pivot bolt to **6 Nm**, and the locknut to **1 Nm**.

5. Connect the brake hose to the master cylinder using new sealing washers. Tighten the banjo bolt to **25 Nm.**

> **WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.**

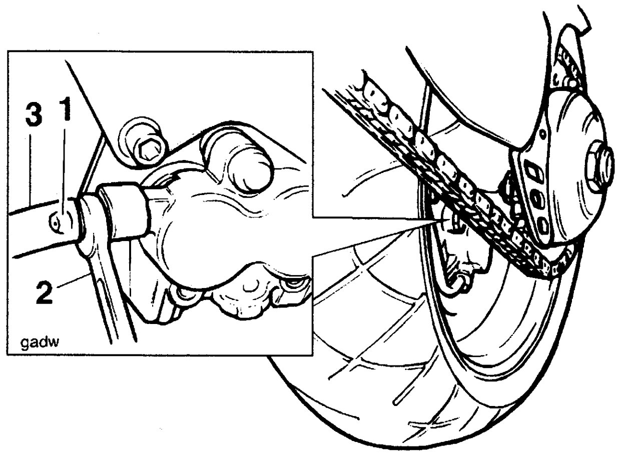
6. Fill and bleed the front brakes as described earlier.

> **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.**

7. Reset the brake lever adjuster to the original setting.
8. Examine the system for correct operation and fluid leaks. Rectify as necessary.
9. Connect the battery positive, (red) lead first, and refit the seat.

BLEEDING THE REAR BRAKES, RENEWING BRAKE FLUID

1. Remove the body side panel assembly.
2. Remove the cap from the rear bleed nipple.
3. Attach a transparent tube to the bleed nipple.



1. Bleed Nipple

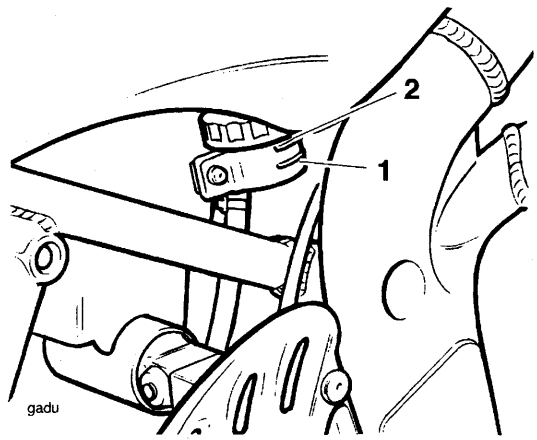
2. Spanner

3. Bleed Tube

4. Place the other end of the tube in a suitable receptacle containing new brake fluid.

> **CAUTION: To prevent body damage, do not spill brake fluid onto any area of the bodywork.**

5. Unscrew and remove the rear brake reservoir cover taking care not to spill any fluid.



1. Rear Reservoir Lower Level

2. Rear Reservoir Upper Level

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.

6. Check the condition of the sealing diaphragm. Replace the diaphragm as necessary.
7. 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.**

8. Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple. Repeat steps 7 and 8 until no more air appears in the bleed tube.
9. Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
10. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **7 Nm.**
11. Fill the reservoir to the maximum level with new DOT 4 fluid.

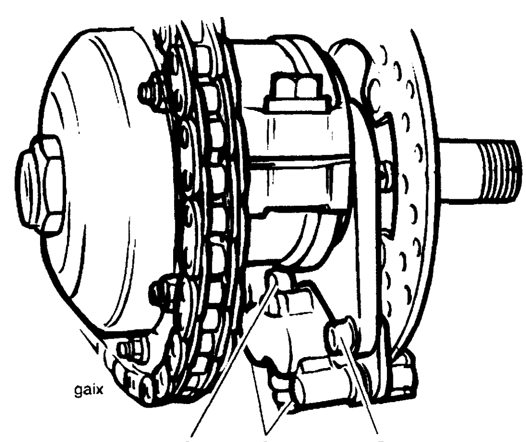
WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

12. Fit the reservoir cover and diaphragm. Check for correct diaphragm fitment before final tightening of the cover.
13. Remove the bleed tube from the nipple.
14. Replace the bleed nipple dust cap.
15. Check that the brake operates correctly.

REAR BRAKE PADS

Removal



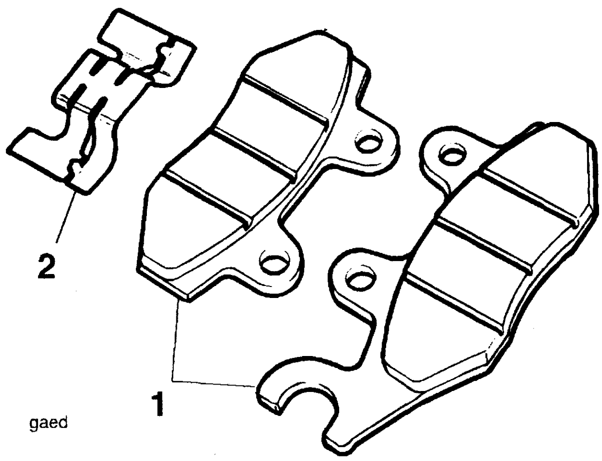
1. Pad Retaining Pins

2. Caliper Mounting Bolts

1. Slacken the brake pad retaining pins.

WARNING: Do not allow the caliper to hang on the brake hoses as this may damage the hoses and could lead to an accident.

2. Remove the caliper mounting bolts and position the caliper to allow withdrawal of the pad retaining pins.
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.



1. Brake Pads

2. Anti Rattle Spring

5. Remove the anti–rattle spring and inspect for damage.

Installation

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 mineral based grease may reduce braking efficiency resulting in an accident.

CAUTION: 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 or the rear wheel.

1. If fitting new pads, use hand pressure to compress the caliper pistons fully into their bores.
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.

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. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease. Press down on both pads and fit the retaining pins.
5. Position the caliper over the disc ensuring both pads are correctly aligned.
6. Fit the caliper retaining bolts, and tighten to to **40 Nm.**
7. Tighten the brake pad retaining pins to **20 Nm**.
8. Pump the brake pedal to correctly position the caliper pistons.

WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.

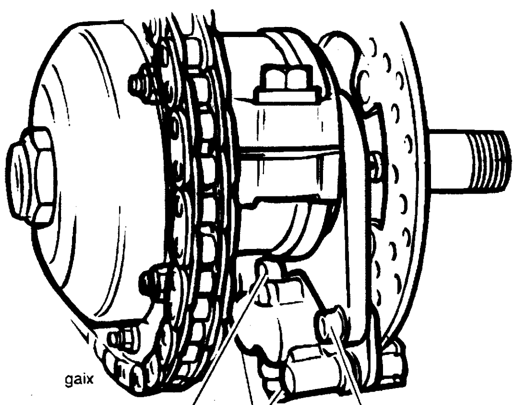
9. Check the brake fluid level and top–up as required with new DOT 4 fluid.

REAR BRAKE CALIPER

Removal

CAUTION: To prevent body damage, do not allow brake fluid to contact any area of the bodywork or the rear wheel.

1. Disconnect the rear brake hose at the caliper and place the free end of the hose in a suitable container to collect brake fluid.
2. Slacken the two pad retaining pins.
3. Remove the caliper mounting bolts.
4. Remove the brake caliper assembly.



1. Pad Retaining Pins

2. Caliper Mounting Bolts

Disassembly

1. Press downwards on both pads and remove the retaining pins. Remove the brake pads.

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.

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 pistons one at a time.

Inspection

1. Check the piston and caliper bore for corrosion, scoring and damage. Renew as necessary.

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 an accident could result if this warning is ignored.

2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Assembly

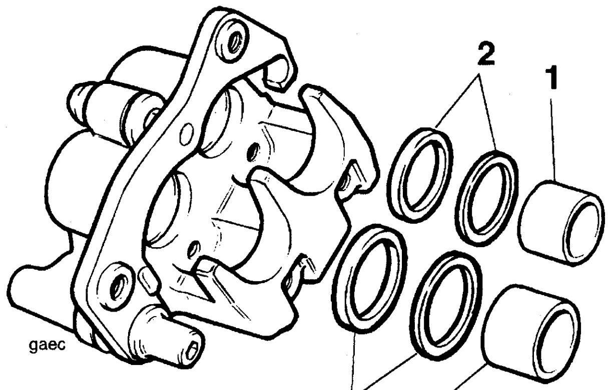
WARNING: Never use mineral based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral based grease will damage the hydraulic seals in the calipers and master cylinders.

A dangerous riding condition leading to an accident could result if this warning is ignored.

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.

1. Fit new fluid seals to the caliper. Apply brake fluid to the outside of the caliper piston and fluid seal.



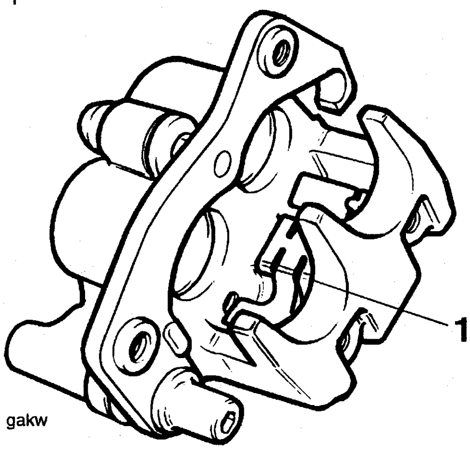
1. Pistons

2. Seals

WARNING: Ensure that the pistons do 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 both pistons into the caliper by hand.
3. Install the anti–rattle spring into the caliper.



1. Anti Rattle Spring

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. Position the brake pads in the caliper. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease. Press down on both pads and fit the pad retaining pins.

Installation

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. Tighten the brake pad retaining pins to **20 Nm**.
4. Connect the brake hose to the caliper using new washers on each side of the banjo bolt.
5. Tighten the banjo bolt to **25 Nm.**

WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 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.

6. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
7. Bleed the brake line as described earlier.

REAR BRAKE DISC

Wear

1. Replace any brake disc if worn beyond the service limit or exceeds the disc run–out limit.

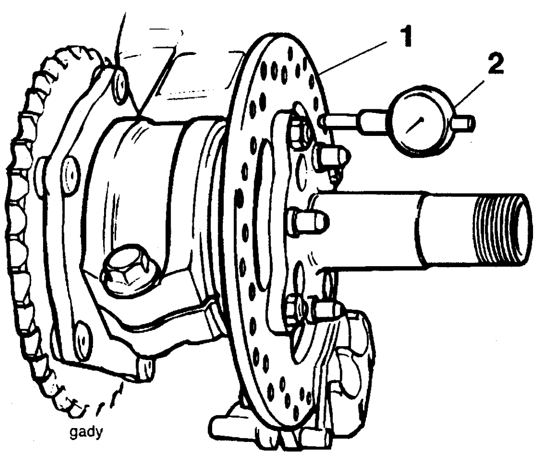
Rear Disc Thickness

Standard: .... 5.0 mm
Service Limit: .... 4.5 mm

Disc Run–out

Standard: .... 0.1 mm
Service Limit: .... 0.3 mm

Measure disc run out using an accurate dial gauge mounted on a surface plate.



1. Disc

2. Dial Gauge

NOTE:

- **Details of rear brake disc removal and installation can be found in the rear suspension section.**

REAR MASTER CYLINDER

Removal

1. Remove the seat and rear panels, and disconnect the battery negative (black) lead first.

> **CAUTION: To prevent body damage, do not spill brake fluid onto any area of the bodywork or wheels.**

2. Drain the fluid from the master cylinder by bleeding the system at the rear caliper until all fluid has been expelled.
3. Remove the clip and washer from the clevis pin at the lower end of the brake pushrod . Remove the clevis pin.
4. Disconnect from the master cylinder:
   - the rear brake hose (noting orientation),
   - the reservoir hose.
5. Remove the screws securing the master cylinder and heel guard to the frame to release the master cylinder.

NOTE:

- **During removal of the master cylinder, note the position of the brake light switch bracket and spacing washer between the cylinder and frame. Ensure both parts are refitted in the same positions.**

Disassembly

1. Remove the boot from the cylinder and pushrod.
2. Remove the circlip retaining the pushrod to the cylinder.
3. Remove the pushrod and piston set from the master cylinder bore noting the relative position of the seals and piston components.

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. Always renew the piston seals if the cylinder has been dismantled.
3. Examine the pushrod for bends and damage. Replace as necessary.

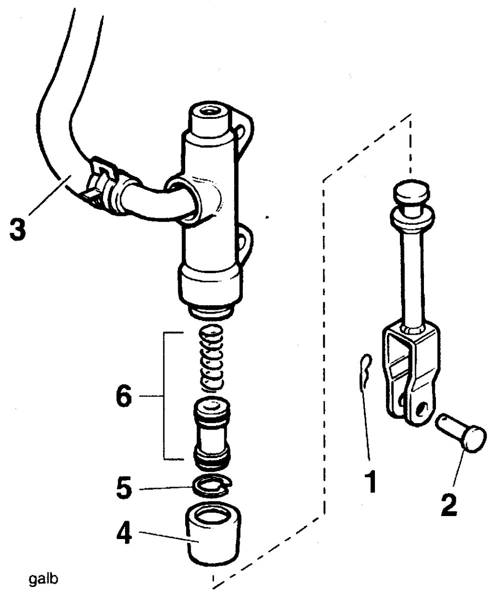
Assembly

> **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.**
>
> **A dangerous riding condition leading to 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. Refit the boot.



1. Clip

2. Clevis pin

3. Reservoir hose

4. Dust boot

5. Circlip

6. Piston set

Installation

1. Fit the reservoir hose to the master cylinder.
2. Secure the master cylinder and cover to the frame. Tighten the securing screws to **30 Nm.**

NOTE:

- **The brake light switch and spacer washer fits between the master cylinder and frame.**

3. Connect the push rod to the brake pedal using a new clevis pin and split pin.
4. Using 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. Fit the brake light switch.

WARNING: Use only D.O.T. 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those D.O.T. 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to an accident.

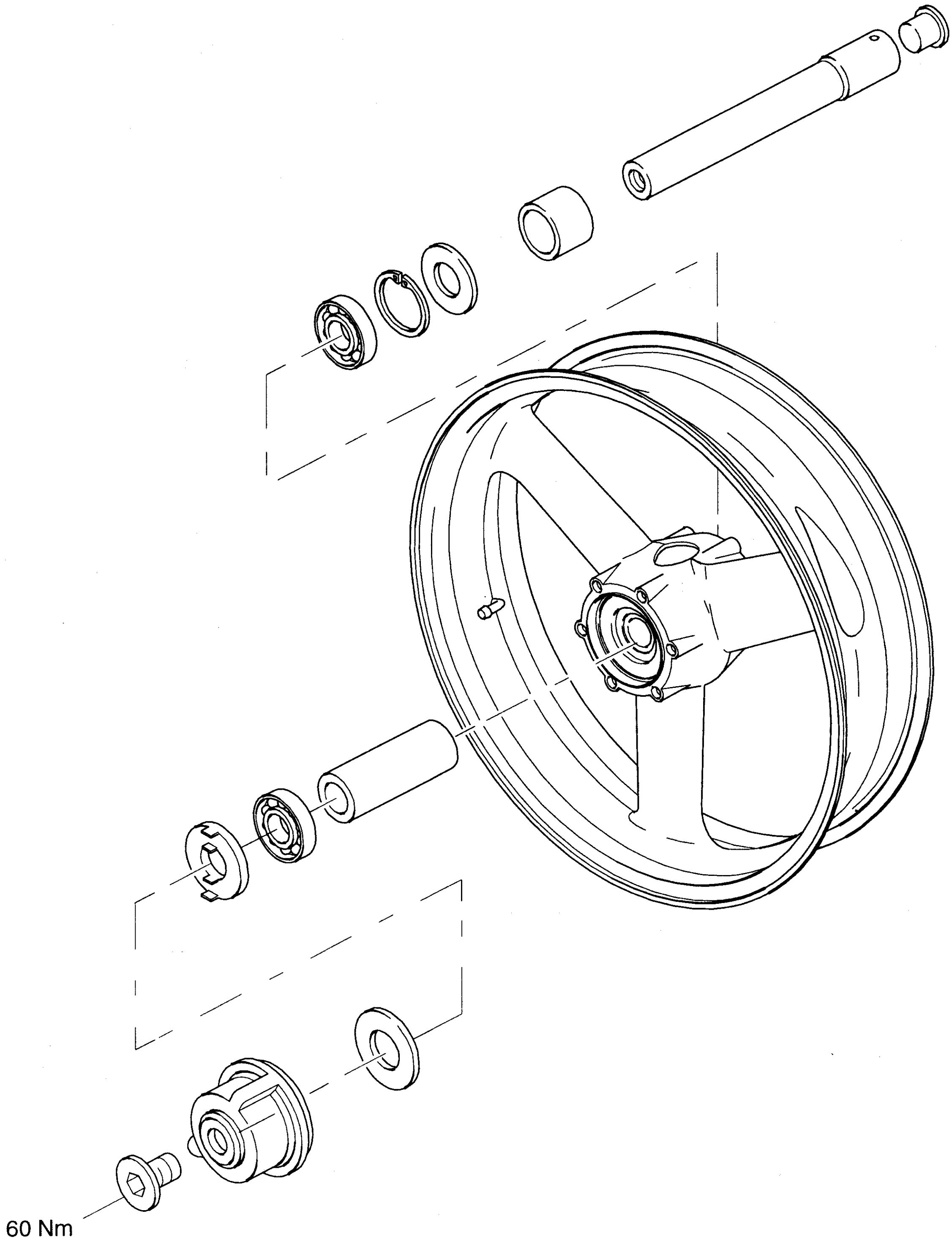
Observe the brake fluid handling warnings given earlier in this section of the manual.

6. Fill and bleed the rear brake system as described earlier.
7. Reconnect the battery positive, (red) lead first.
8. Fit the body rear panels and seat.

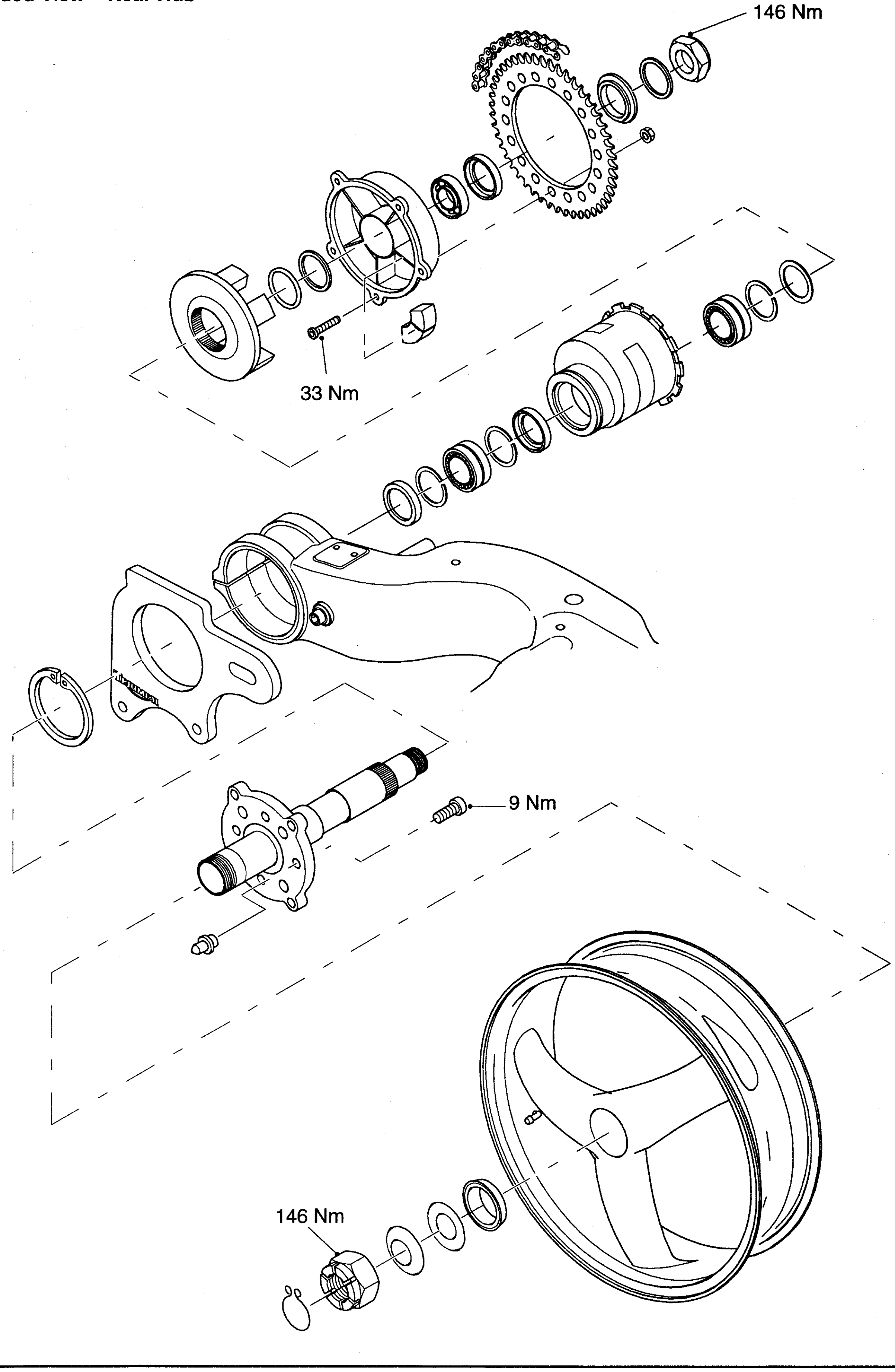
WHEELS

CONTENTS

Exploded view – Front Wheel

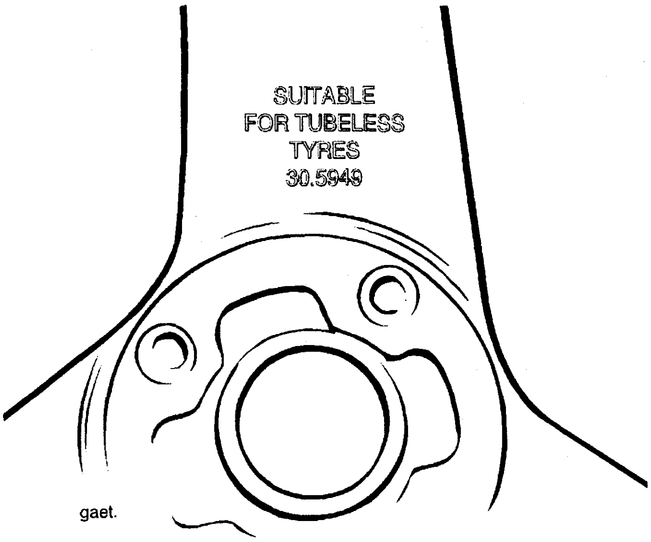


Exploded View – Rear Hub

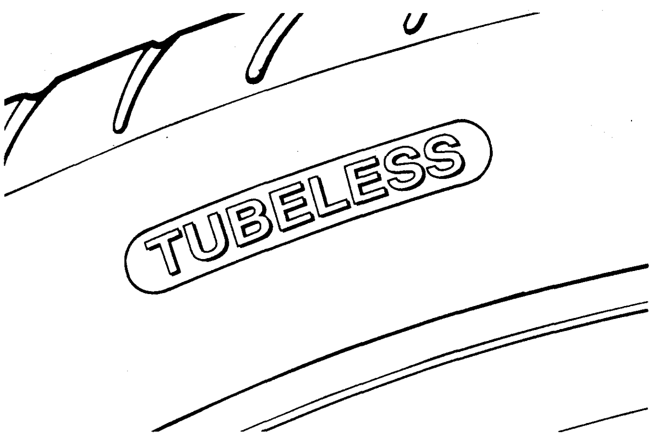


TYRES

Both models are equipped with tubeless tyres, valves, and wheel rims. Only tyres marked 'TUBELESS' and tubeless type tyre valves mounted on rims marked 'SUITABLE FOR TUBELESS TYRES' can be used.



Rim Marking



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, All Models

Correct inflation pressure will provide maximum stability, rider comfort and tyre life.

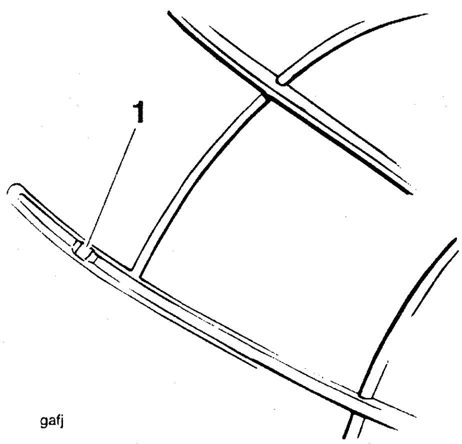
Tyre pressures should be checked frequently and adjusted as necessary. See the Owner's Handbook or the specification section for the correct inflation pressures for your model.

> **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, All Models

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

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 being damaged.

WARNING: Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control or an accident.
When tubeless tyres become punctured, leakage is often very slow. Always inspect tyres very closely for punctures.
Check the tyres for cuts, imbedded nails or other sharp objects. On spoked wheels, check spokes for looseness and damage.
Check the rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of control or an accident could result.
Always consult your Triumph Dealer for tyre replacement, or for a safety inspection of the tyres.

Minimum Recommended Tread Depth

The following chart can be used as a guide to the minimum safe tread depth.

Under 130 km/h (80mph)	2 mm (0.08 in)
Over 130 km/h (80 mph)	Rear 3 mm (0.12 in) Front 2 mm (0.08 in)

WARNING: Triumph motorcycles must not be operated above the legal road speed limit except in authorised closed course conditions.

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. Always refer to the owner's handbook data section for details of approved tyres and tyre combinations.

WARNING: If a tyre sustains a puncture, the tyre must be replaced. Failure to replace a punctured tyre, or operation with a repaired tyre can lead to instability, loss of control or an accident.
Never use an inner tube to repair a punctured tyre. The rough surface inside the tyre can chafe the tube leading to instability, rapid deflation, loss of control and an accident.

WARNING: The use of tyres other than those listed in the specification section of the owner's handbook may adversely affect handling leading to loss of control or an accident. Use the recommended tyre options only in the combinations given in the owner's handbook.
Do not mix tyres from different manufacturers or tyres from the same manufacturer but from another option.

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: 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 vehicle control and an accident.

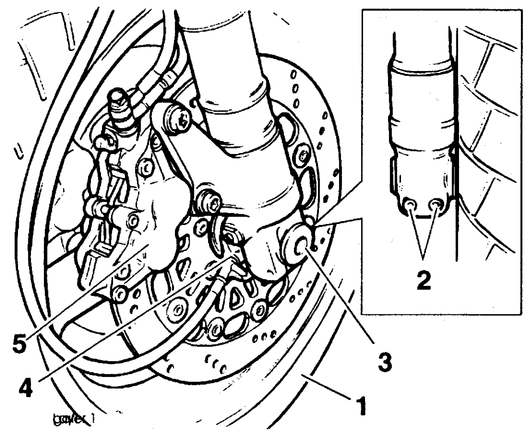
Do not install an inner tube inside a tubeless tyre. This may cause instability and excessive heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.

WARNING: Accurate wheel balance is necessary 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 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 resulting in tyre deflation, loss of control and 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 manufacturers 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 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) to become accustomed to the new handling characteristics.
After both 24 hours and 100 miles, 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 may lead to loss of control and an accident.

FRONT WHEEL

Removal



1. Front wheel

2. Fork pinch bolts

3. Wheel spindle bolt

4. Speedo drive

5. Brake caliper

1. Remove the speedometer cable retaining screw and disconnect the cable.
2. Remove the brake caliper mounting bolts and detach the calipers on each side of the wheel. Do not disconnect the brake hoses.

WARNING: Do not allow the calipers to hang on the brake hoses as this may damage the hoses and could lead to an accident.

3. Raise and support the front of the motorcycle to allow removal of the front wheel.

WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

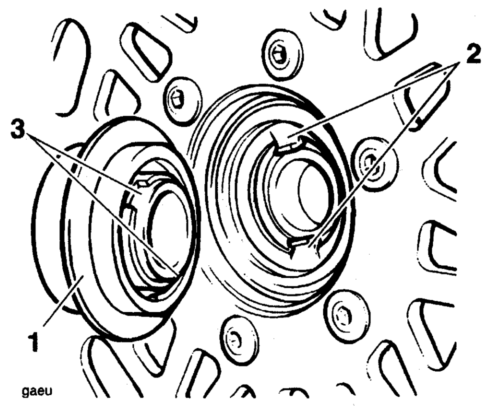
4. Remove the wheel spindle bolt.
5. Slacken the two wheel spindle pinch bolts at the lower end of each fork.
6. Support the wheel and withdraw the spindle from the left hand side.
7. Remove the wheel, recovering the speedometer drive assembly from the right hand side of the wheel, and the sleeve from the left hand side. Place the wheel on wooden blocks.

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.

WARNING: Do not allow the wheel to rest on either brake disc as this may damage the disc and could lead to an accident.

8. Thoroughly clean all components and inspect for wear or damage.

Installation



1. Speedometer drive

2. Drive tongues

3. Drive cut–outs

1. Position the speedometer drive on the wheel hub, ensuring the two drive cut-outs engage with the drive tongues in the wheel.
2. Lightly smear the sleeve surface with grease and locate it in the left hand side of the hub.
3. Position the wheel between the forks and fit the wheel spindle. Turn the speedometer drive fully clockwise (viewed from right hand side)
4. Fit the wheel spindle bolt and tighten it to **60 Nm**. (If necessary, a bar can be fitted through the holes in the left hand end of the spindle to prevent it from turning while tightening.)
5. Lower the motorcycle to the ground and pump the front suspension to allow the left hand fork to 'float' to it's natural position on the wheel spindle.
6. Tighten all four fork end pinch bolts to **20 Nm.**
7. Fit the brake calipers, tightening the mounting bolts to **40 Nm.**
8. Fit the speedometer drive cable to the speedometer drive and secure with the screw.
9. Check the operation of the front brake by pumping the brake lever several times.

REAR WHEEL

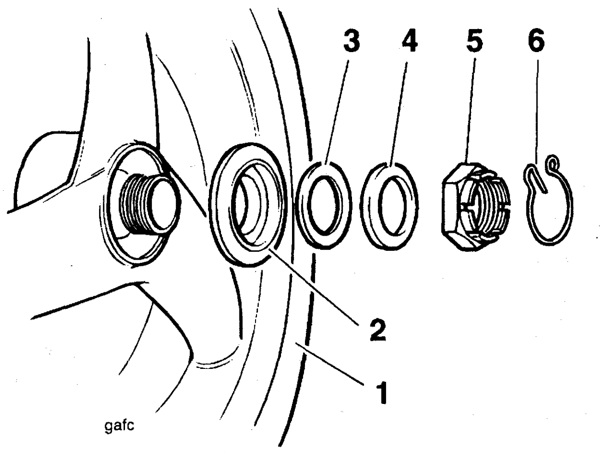
Removal

WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

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. Remove the silencer as described in the fuel system/engine management section.



1. Rear Wheel

2. Conical spacer

3. Plain washer

4. Belleville washer

5. Nut

6. Clip

3. To release the wheel, remove:

- clip,
- nut,
- belleville washer
- plain washer
- conical spacer.

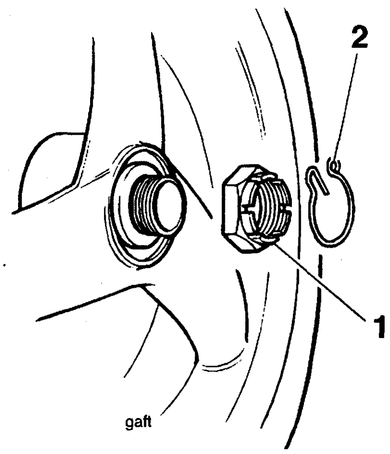
4. Remove the wheel (at a slight angle to avoid contact with the rear footrest).

Installation

1. Fit the wheel, aligning with the 4 location dowels.
2. Hold the wheel squarely in position while fitting:

- conical spacer
- plain washer
- belleville washer, dished face outwards
- nut

3. Tighten the wheel retaining nut to **146 Nm**, and fit the clip.



1. Wheel nut

2. Clip

4. Refit the silencer as described in the fuel system/engine management section.

FRONT WHEEL BEARINGS

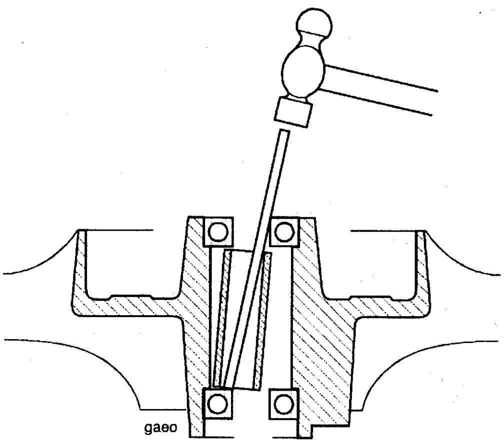
WARNING: Operation with worn or damaged steering head or wheel bearings may cause impaired handling and instability leading to an accident. If in doubt, have the motorcycle inspected by an authorised Triumph dealer before riding.

Removal

1. Remove the wheel as described earlier.
2. Lay the wheel on its side while supporting the wheel on wooden blocks to prevent damage to the brake disc.

CAUTION: Do not allow the wheel to rest on the brake disc as this may damage the disc. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake disc is raised above the ground.

3. Remove the circlips from the hub.
4. Using a suitable drift, through the centre of the wheel, drift out each bearing. Collect the centre sleeve.

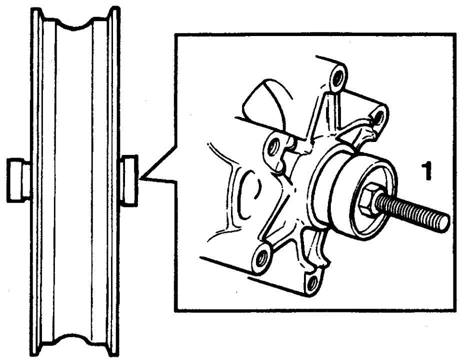


WARNING: To prevent injury, always wear eye, hand and face protection when using a drift.

Installation

1. Refer to the chart below for the correct tool and tool face to use when inserting bearings.
   Bearings are installed by means of a draw bolt acting on the insertion tool. A support tool is located on the opposite side of the hub to the insertion tool and as the draw bolt is tightened, the bearing is drawn into the hub.

   Insert bearings with the marked or shielded side facing outwards and always fit a new bearing circlip.



1. Tool 3880075-T0301 in position

Bearing Tool Selection Chart

	FRONT	
	Bearing Insertion Tool	**Support Tool**
Left Bearing	**3880070-T0301 Small face to bearing**	**3880075-T0301 Large face to hub**
Right Bearing	**3880070-T0301 Small face to bearing**	**3880075-T0301 Large face to hub**

NOTE:

Install bearings with the marked or shielded sides face out.

WARNING: When using bearing service tools always ensure that the selected tool matches the diameter of the bearing being installed. Damage to the wheel and bearing will result from incorrect tool selection which may cause loss of control and an accident.

Ensure that the bearing remains square to the hub during the drawing in procedure. Damage to the bearing and hub will result from forcing a bearing which is not square to the hub which could cause loss of control and an accident.

Always install bearings with the marked or shielded sides facing outwards.

2. Refit the speedometer drive ring with the drive tags facing outwards.
3. Lubricate and fit new seals to the wheel hubs.
4. Refit the wheel as described earlier in this section.

REAR WHEEL BEARINGS

Removal

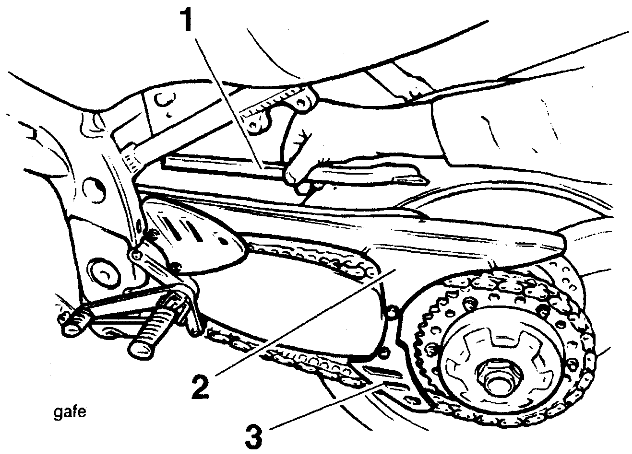
1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the silencer as described in the fuel system section.

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.

4. Raise and support the rear of the motorcycle under the frame or engine.

WARNING: Ensure the motorcycle is stabilised and adequately supported, to prevent it falling and causing damage or injury.

5. Remove the rear wheel as described earlier in this section.
6. Remove the rear brake hose cover from the upper chain guard, then remove the chain guard.

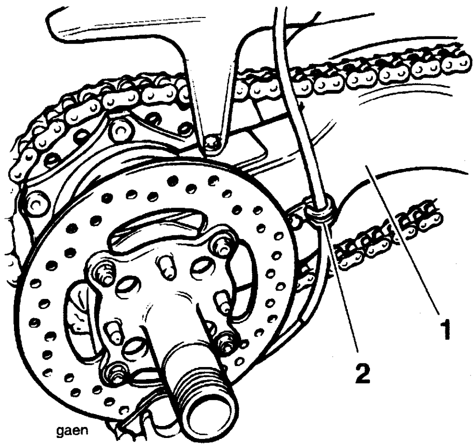


1. Brake hose cover

2. Upper chain guard

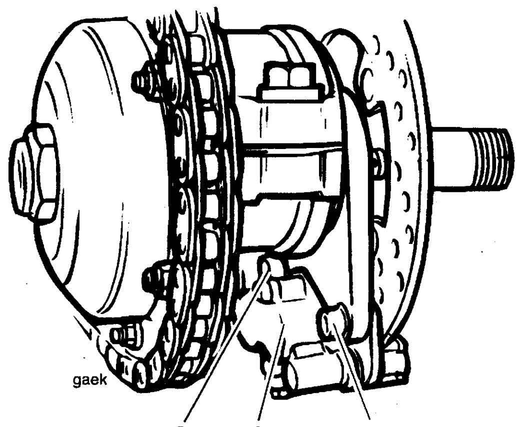
3. Lower chain guard

7. Remove the lower chain guard.
8. Release the bolt securing the brake pipe clip to the right hand side of the swinging arm.



1. Swinging arm
2. Brake pipe clip

9. Without disconnecting the brake hose, detach then support the rear brake caliper.

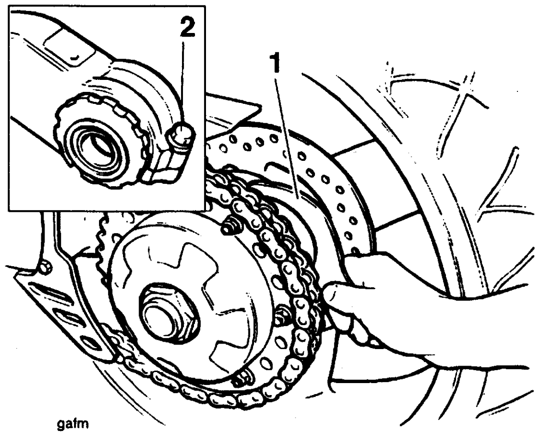


1. Rear brake caliper
2. Caliper mounting bolts

> **CAUTION: To prevent damage to the brake pipe and caliper, do not allow the caliper to hang on the brake pipe.**

10. Slacken the swinging arm / hub pinch bolt.

11. Use the 'C' spanner from the motorcycle tool kit to turn the hub and slacken the drive chain.



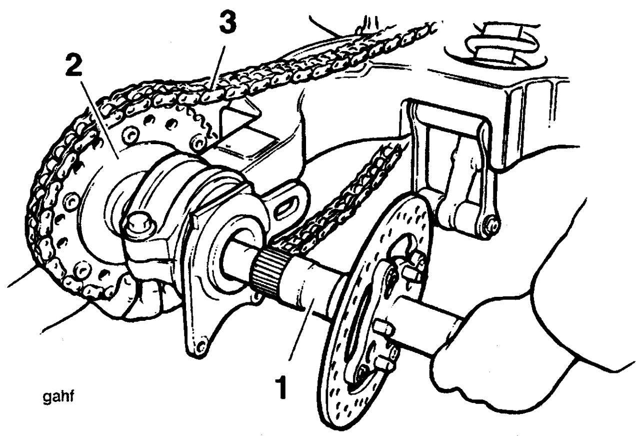
1. 'C' spanner
2. Pinch bolt

12. De-stake then slacken the nut securing the final drive unit to the axle shaft.

13. Remove the staked nut (discard the nut), belleville and stepped washers from the axle shaft.

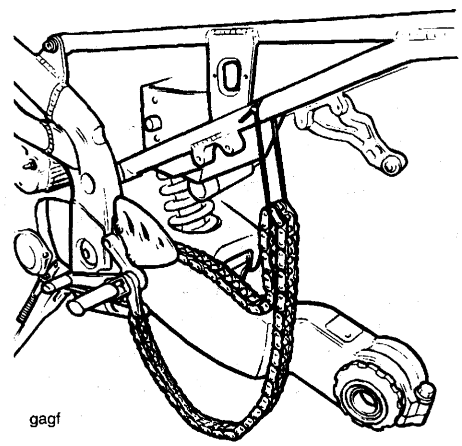
14. Pull the axle shaft through the hub to the right hand side such that the shaft clears the final drive assembly. Remove the final drive unit disconnecting the chain at the same time.

NOTE:
- **Collect the spacer fitted between the final drive and the axle bearing carrier/eccentric adjuster.**
- **Support the chain while the hub is removed to prevent it dragging through the dirt.**



1. Axle shaft
2. Final drive
3. Chain

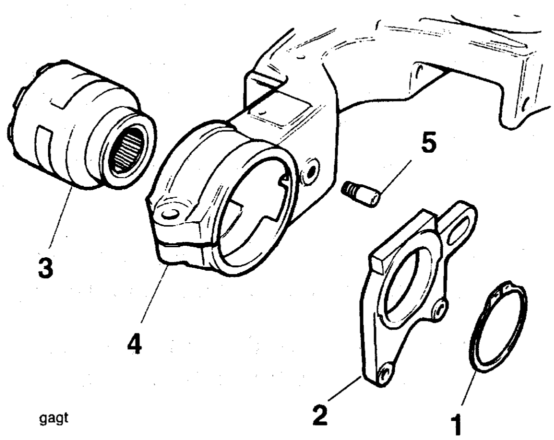
15. Place the axle shaft/ brake disc assembly to one side.



Typical Drive Chain Support

16. Remove the large circlip securing the caliper carrier to the swinging arm and detach the carrier.

17. Remove the axle bearing carrier/eccentric adjuster from the left hand side of the swinging arm.



1. Circlip

2. Caliper carrier

3. Axle bearing carrier/eccentric adjuster

4. Swinging arm

5. Caliper carrier positioning stud

NOTE:

- **The rear hub may be disassembled and the bearings removed and replaced. However, this will require the use of a press and press tools.**

  A more economical and timely alternative is to replace the hub assembly complete as detailed in the Triumph parts information.

Inspection

1. Check all bearings for smooth operation, damage, loose rollers etc.

2. Check all oil seals for damage.

Installation

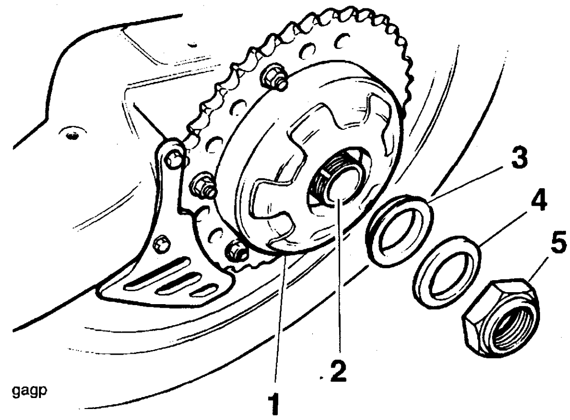
1. Refit the axle bearing carrier/eccentric adjuster to the swinging arm with the circlip groove to the right hand side.

2. Refit the caliper carrier (logo side facing to the right) and retain with the circlip.

3. Fit the axle shaft/brake disc assembly ensuring that the final drive spacer is fitted to the left hand side of the axle shaft.

4. Align the final drive assembly to the axle shaft fitting the chain during assembly.

5. Fit the stepped washer, belleville washer (dished side out) and a **new** staked nut to the shaft.



1. Final drive unit

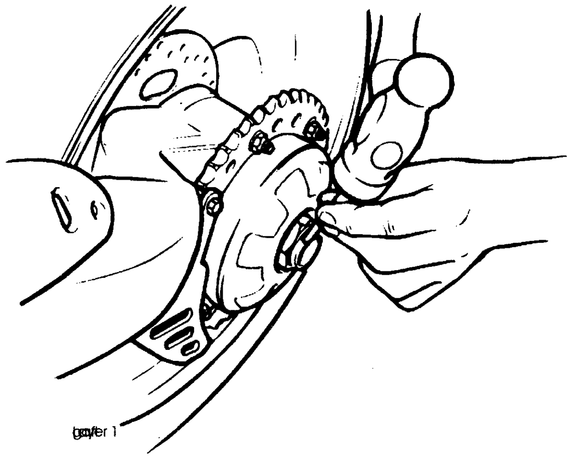
2. Axle shaft

3. Stepped washer

4. Belleville washer

5. Retaining nut

6. Prevent the hub from turning and tighten the nut to **146 Nm.** Stake to secure.

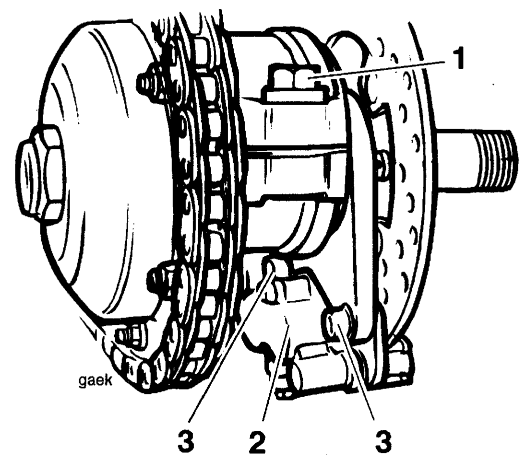


Staking the nut

7. Adjust the chain tension to give 35-40 mm of slack by turning the eccentric adjuster with the 'C' spanner; then tighten the hub pinch bolt to **55 Nm.**

8. Refit the rear brake caliper. Tighten the caliper fixings to **40 Nm.**

9. Pump the rear brake pedal a few times to position the brake pads in the caliper. Rectify as necessary if correct brake operation is not restored.



1. Swinging arm pinch bolt

2. Rear brake caliper

3. Rear brake caliper fixings

10. Align the rear brake pipe and clip to the right hand side of the swinging arm and tighten the clip fixing.

11. Refit the upper and lower chain guards. Tighten the fixings to **9 Nm.**

12. Align the rear brake hose and road speed sensor cable to to the chain guard and refit the hose cover. Tighten the hose cover fixings to **9 Nm.**

13. Refit the rear wheel as described in the wheel section.

14. Refit the silencer as described in the fuel system section.

15. Lower the motorcycle to the ground and place on the side stand.

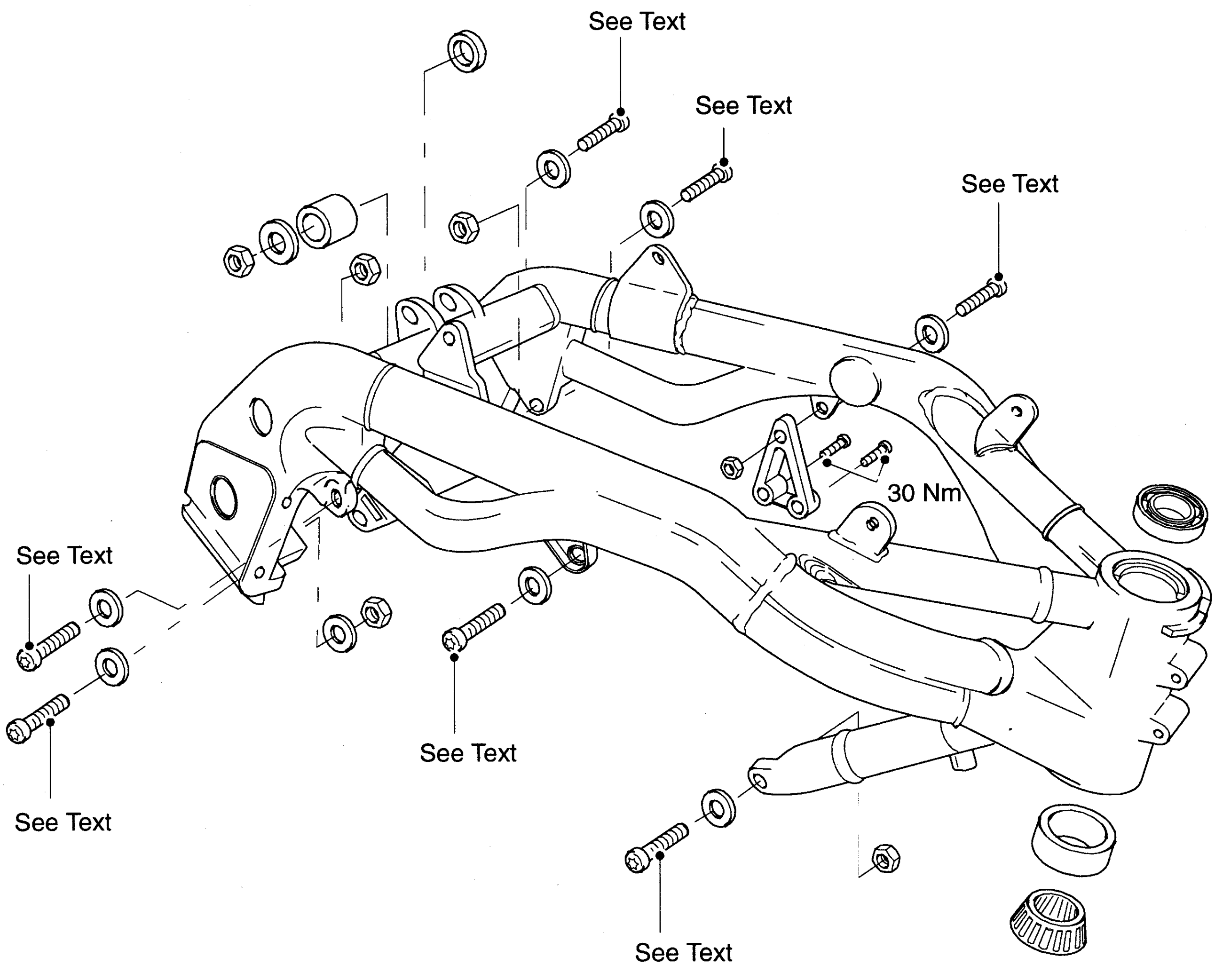
16. Reconnect the battery positive (red) lead first.

17. Refit the seat.

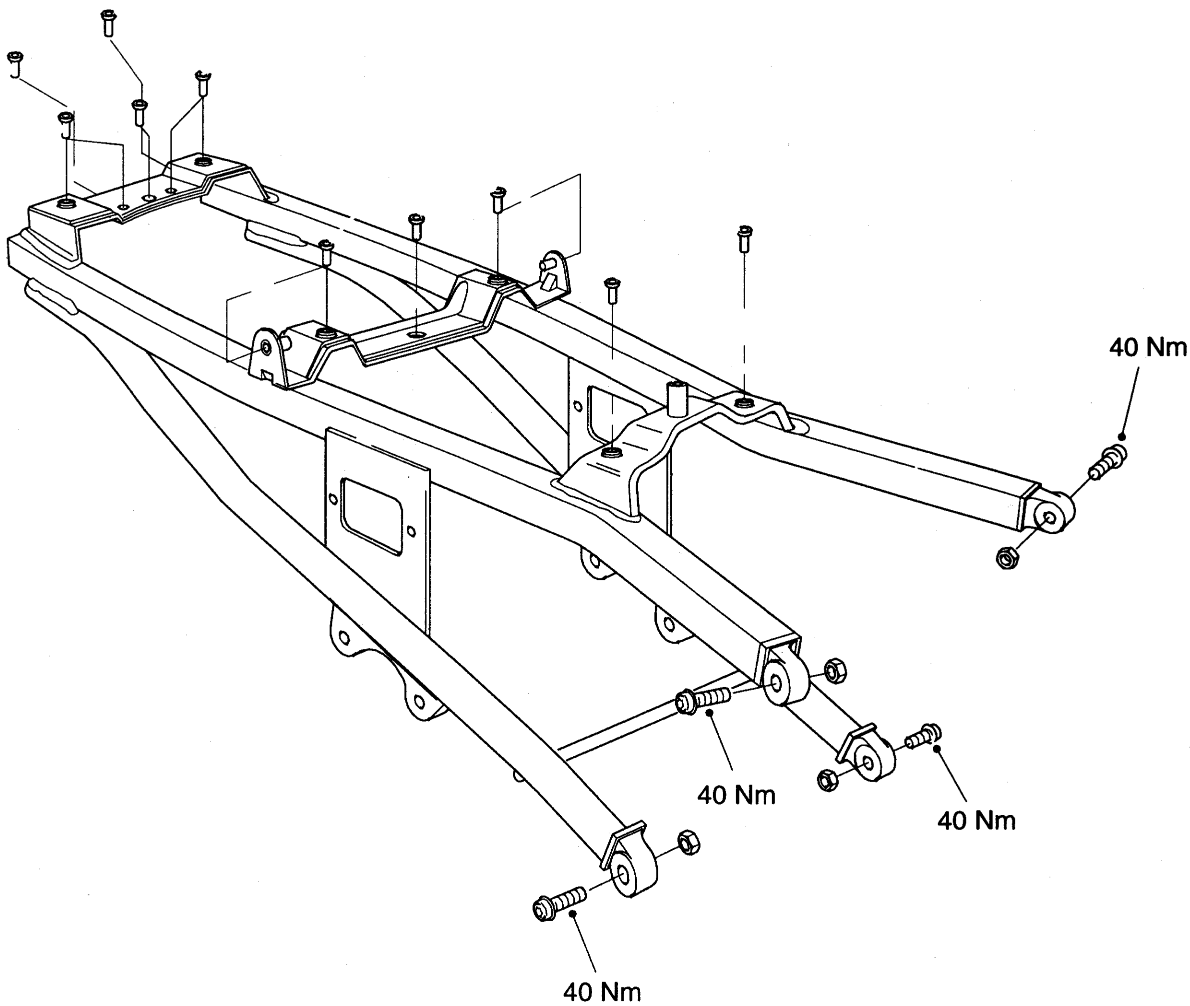
BODYWORK & FRAME

CONTENTS

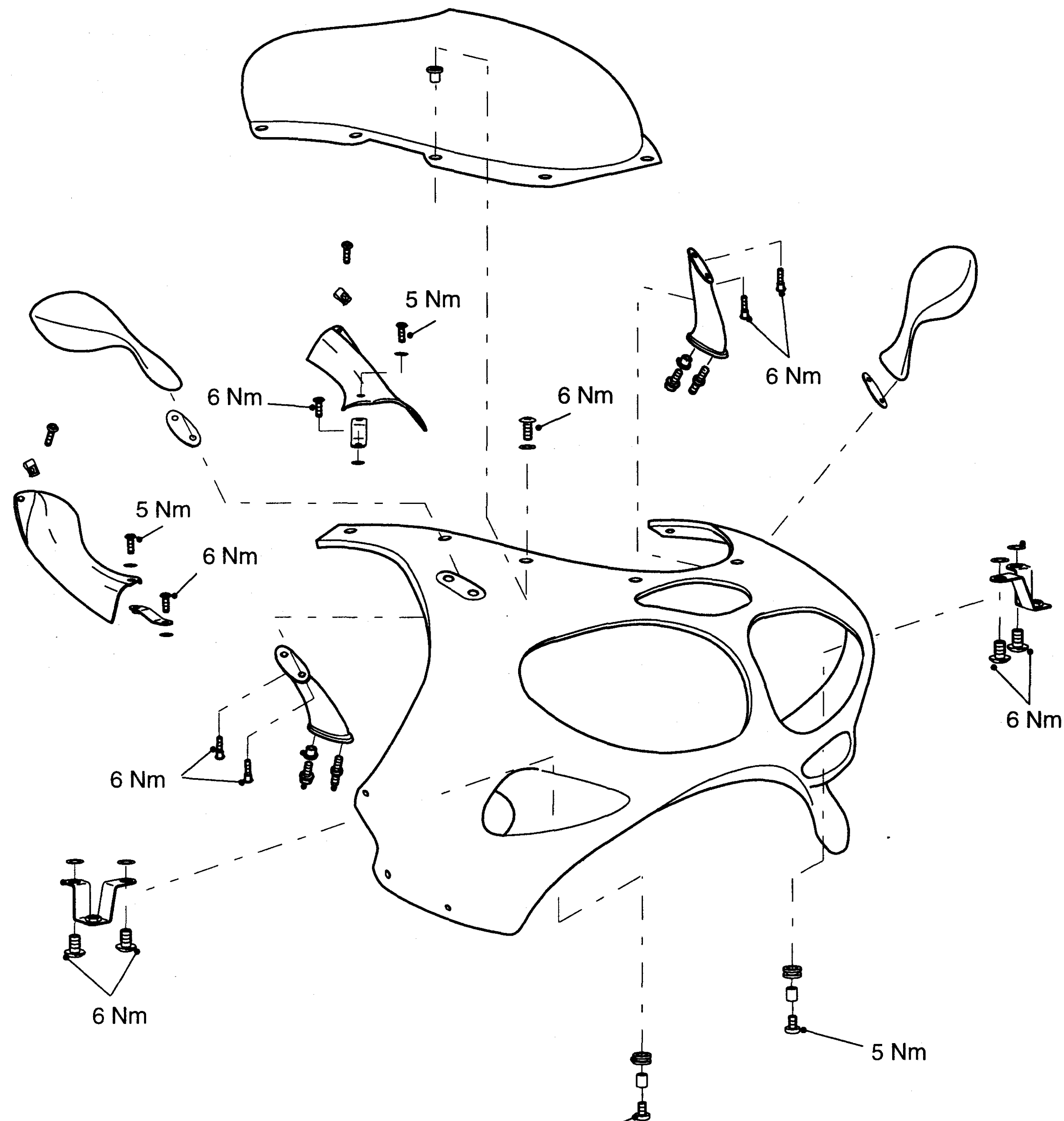
Exploded View – Frame



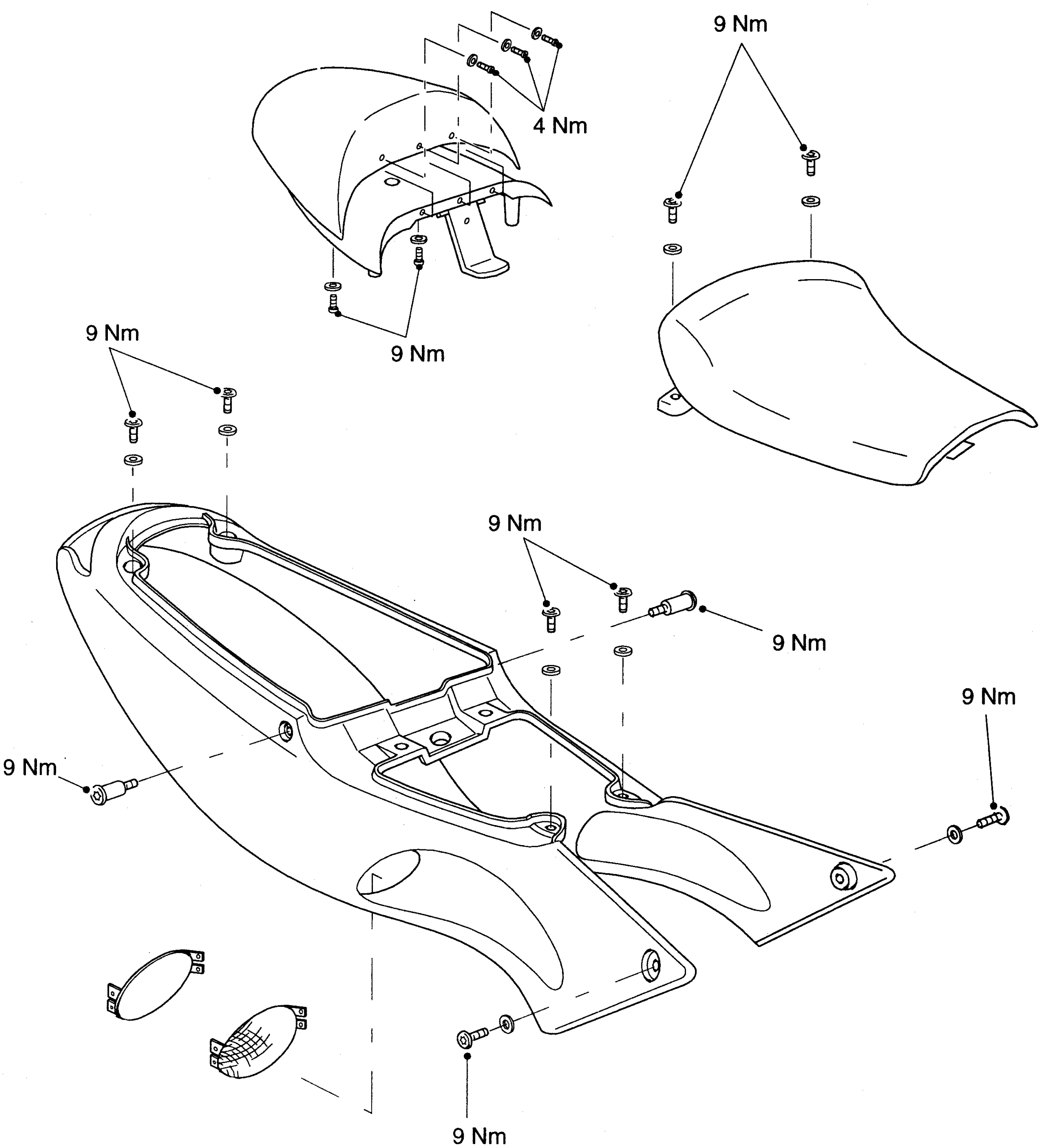
Exploded View – Seat Rails



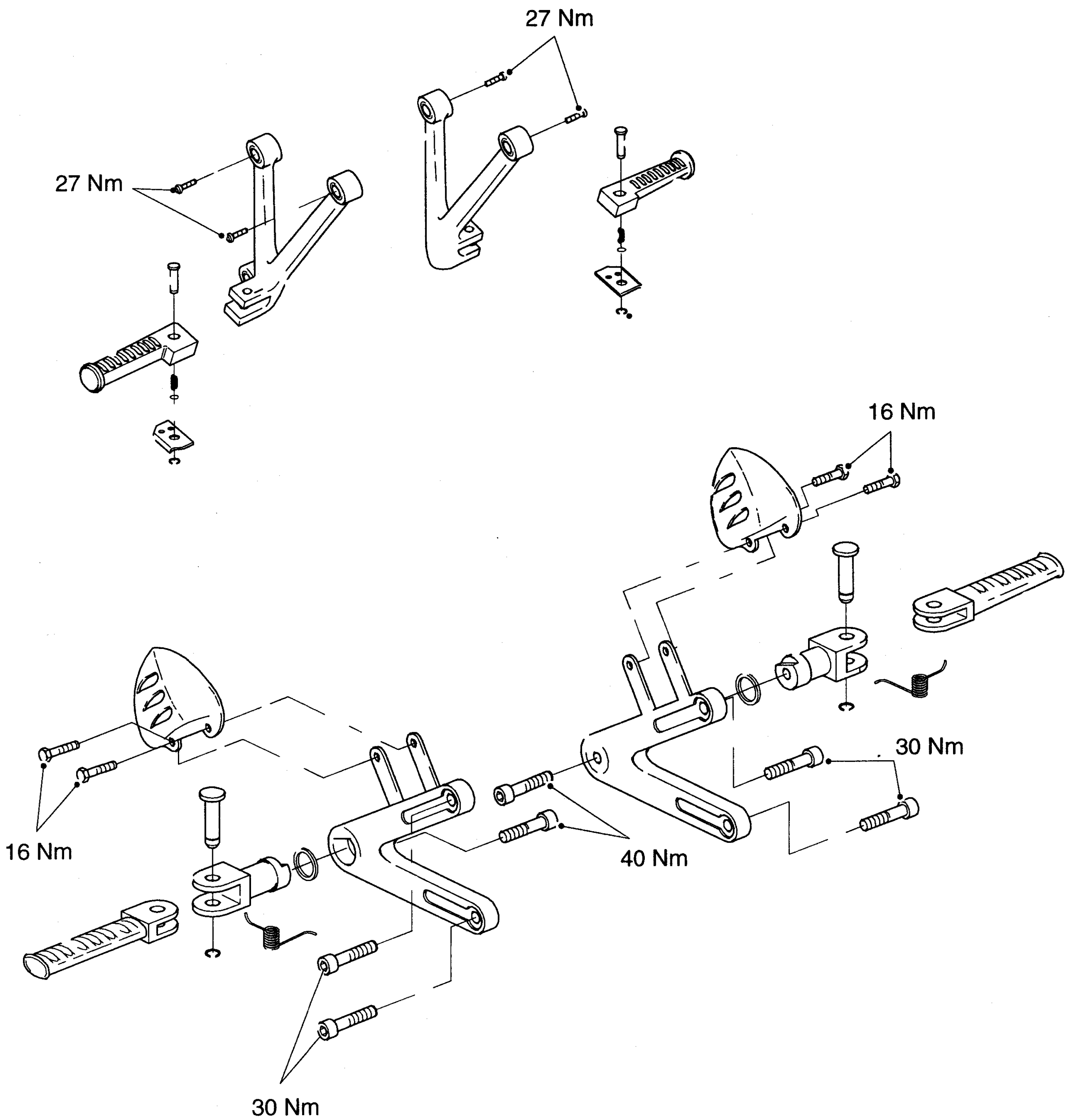
Exploded View – Cockpit and Mountings



Exploded View – Rear Panels



Exploded View – Footrests and Mountings



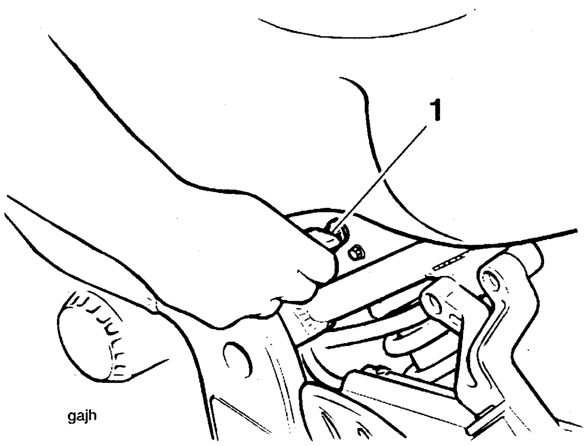
SEAT

Removal

NOTE:

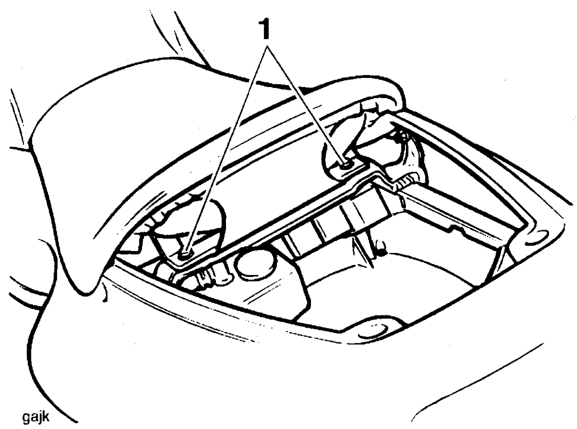
- **The seat lock is situated on the left hand side of the battery box, in line with the footrest mounting rail, on the left hand side of the motorcycle.**
- **The seat is removed in two sections. The rear seat (or rear cover, where fitted) is retained by the seat lock. The front seat is held in place by two threaded fixings.**

1. Insert the ignition key into the seat lock and turn the key anti–clockwise while pressing down on the rear part of the rear seat/rear cover.



1. Seat Lock

2. To detach the seat/rear cover, lift the rear of the seat cover and slide it away from the front seat.
3. Release the screws securing the front seat to the frame.



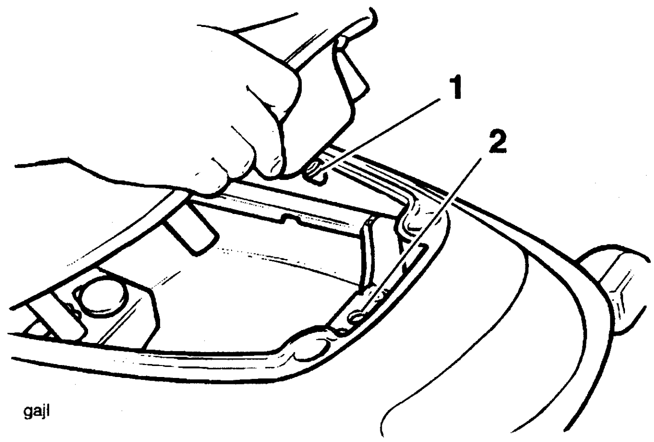
1. Front Seat

2. Seat Retaining Screws

4. Lift the rear of the seat and disengage the front lip from below the fuel tank.

Refit

1. Position the front seat to the fuel tank and engage the front lip.
2. Align the fixing points to the frame and tighten the seat fixings to **9 Nm.**
3. Engage the front section of the rear seat/rear cover under the seat bracket and press down on the rear to engage in the seat lock.



1. Seat Lock

2. Seat Engagement Point

4. Grasp the seat/cover and ensure that it is securely retained.

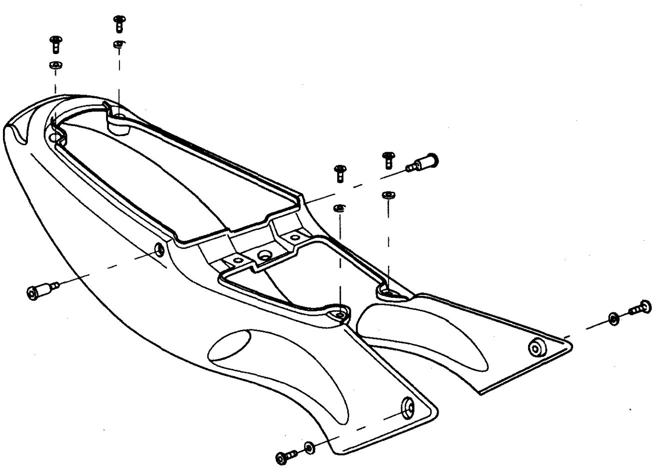
NOTE:

- **An audible ‘click’ can be heard when the seat/seat cover is correctly engaged in the lock.**

SIDE PANEL

Removal

1. Unlock the rear seat/cowl, and lift clear.
2. Remove the front seat.
3. Disconnect the battery, negative (black) lead first.
4. Disconnect the rear light multiplug.
5. To release the side panel assembly, remove the fixings shown in the illustration below.



Side Panel Fixings

Installation

1. Installation is the reverse of removal noting the following.

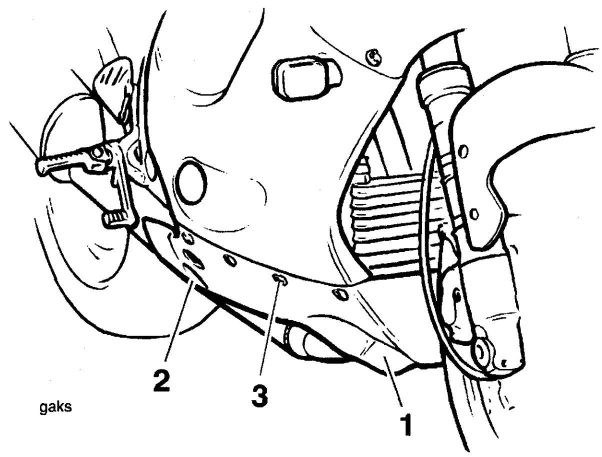
NOTE:

- **Reconnect the battery, positive (red) lead first.**
- **Check the rear light for correct operation after reconnection.**

BELLY PANEL

Removal

1. Remove the screws on each side which attach the belly panel to the engine bracket.
2. Support the belly panel while releasing the quarter-turn fasteners.



1. Belly Panel

2. Engine Bracket Screws

3. Quarter-turn Fasteners

Installation

1. Installation is the reverse of removal.

LOWER FAIRINGS

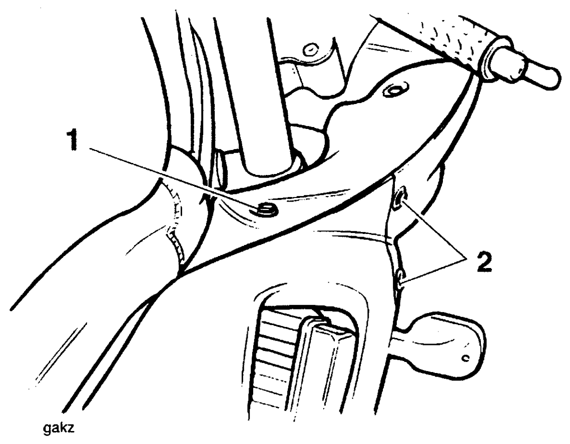
Removal

1. Unlock the rear seat/cowl, and lift clear.
2. Remove the front seat.
3. Disconnect the battery, negative (black) lead first.
4. Remove the belly panel as described elsewhere in this section.
5. Remove the screws securing the fairing to the fairing brackets.

1. Lower Fairing

2. Fairing Retaining Screws

6. Support the fairing while releasing:
   - Quarter–turn fastener which secures it to the duct cover.
   - Quarter–turn fasteners which secure it to the cockpit.



1. Quarter Turn Fastener – Duct Cover

2. Quarter Turn Fastener – Cockpit

7. Disconnect the direction indicator at its multiplug.

Installation

1. Installation is the reverse of removal noting the following points.

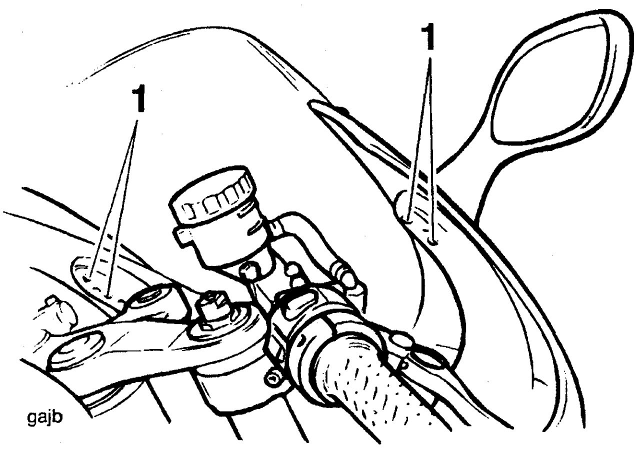
NOTE:

- **Reconnect the battery, positive (red) lead first.**

COCKPIT

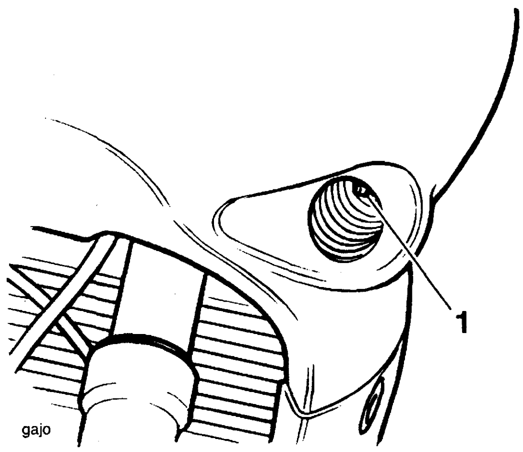
Removal

1. Unlock the rear seat/cowl, and lift clear.
2. Remove the front seat.
3. Disconnect the battery, negative (black) lead first.
4. Remove both mirrors at the cockpit fairing.



1. Mirror Fixings

5. Remove the front duct covers.
6. Remove the cockpit securing screw in each air intake duct.



1. Air Intake Duct Screw Location

7. Release the quarter-turn fasteners on each side of the cockpit.
8. Disconnect the two air ducts behind the fairings and ease the cockpit forward to disengage it from its mountings.
9. Disconnect the position light bulb holder from the light before final removal.

Installation

1. Refitting is the reverse of removal.

NOTE:

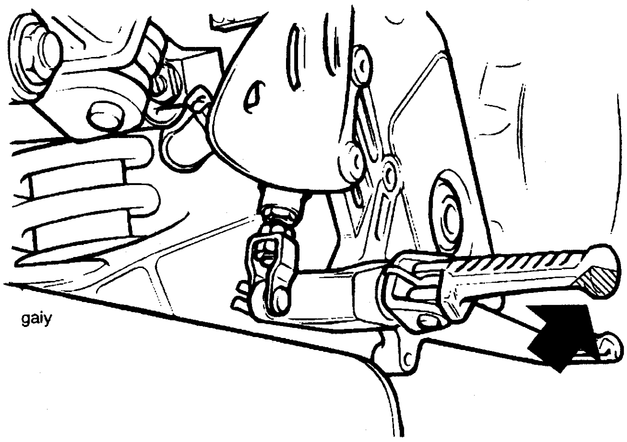
- **Ensure the air ducts are located correctly.**
- **Reconnect the battery, positive (red) lead first.**
- **Check the position light for correct operation after refitting the bulb holder.**

FRAME, FOOTRESTS AND FIXINGS

Inspection

1. Inspect the frame footrests and fairings for damage, cracks, chafing and other dangerous conditions. Check fairing and frame fixings for security.

2. Inspect the footrests for wear. If more than 50% of the radiused end is worn away, the footrest must be replaced.



Arrowed – Footrest Wear Limit

WARNING: Use of a motorcycle with footrests worn beyond the maximum limit will allow the motorcycle to be banked to an unsafe angle.

Banking to an unsafe angle may cause instability, loss of control and an accident causing injury or death.

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 another accident which may result in injury or death.

WARNING: 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.

FRAME RENEWAL

Strip Down

1. Mount the rear of the motorcycle on a paddock stand.

2. Remove both seats.

3. Disconnect the motorcycle battery negative (black) lead first.

4. Remove all bodywork items including the fuel tank.

WARNING: Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.

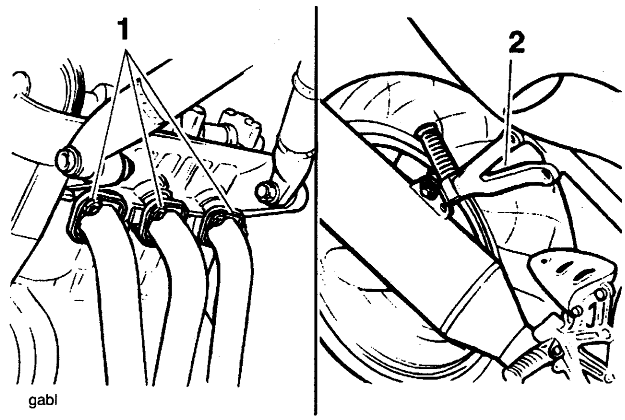
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

5. Drain the cooling system into a clean container and retain the displaced coolant for re–use.

WARNING: Do not remove the coolant pressure cap or attempt to drain the cooling system 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.

6. Disconnect all of the radiator hoses at the engine end and remove the radiator.

7. Remove the exhaust downpipes and silencer as one complete unit.



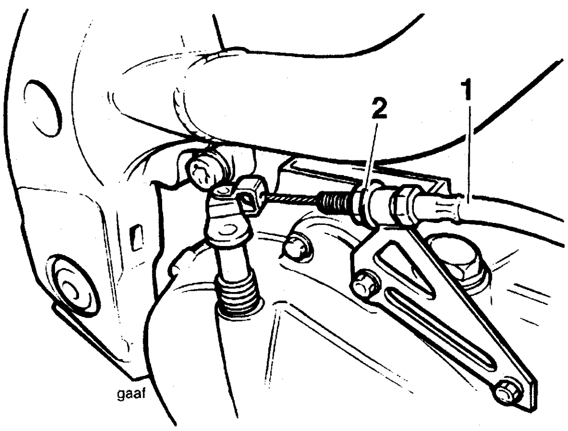
1. Downpipe to Head Fixings

2. Silencer Mounting

8. Remove the airbox assembly as described in section 9 of this manual.

9. Disconnect all electrical connections to the engine. On Speed Triple models, also disconnect the instruments and headlights. Note the position of each connector to ensure correct re-connection during rebuild.

10. Working at the engine end, disconnect both the throttle and clutch cables. Gently coil each cable around the corresponding side of the lower yoke,



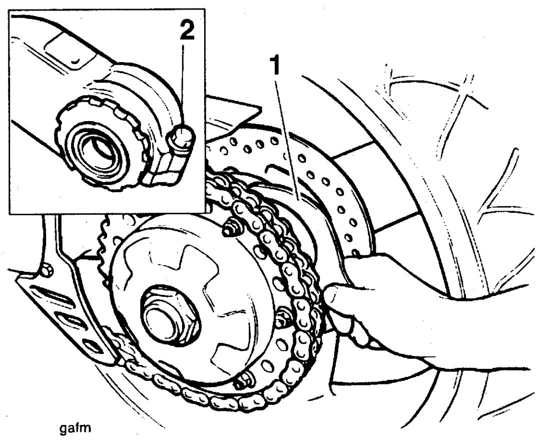
1. Clutch Cable

2. Adjuster

11. Release the gearchange rod from the pedal/lever.

12. Remove the sprocket cover.

13. Slacken the hub pinch bolt and set the chain tensioner to allow maximum free-movement in the chain.

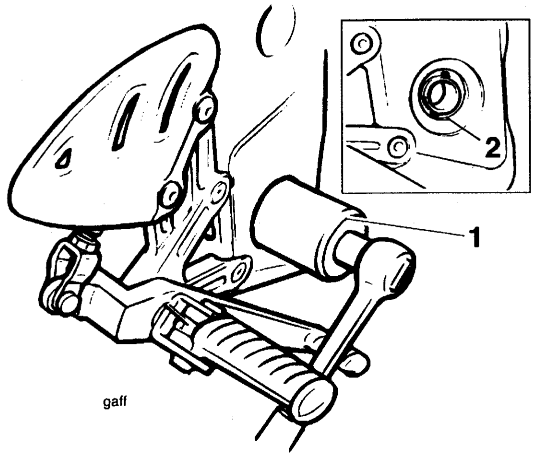


1. 'C' spanner

2. Hub pinch bolt

14. Remove the swinging arm spindle bolts.

15. Using tools T3880290 and T3880295, release the pre load adjustment on the swinging arm.



1. Tool T3880295

2. Locking ring

16. Detach both control plates/footrest assemblies from the frame. Do not detach the hose to the rear braking system.

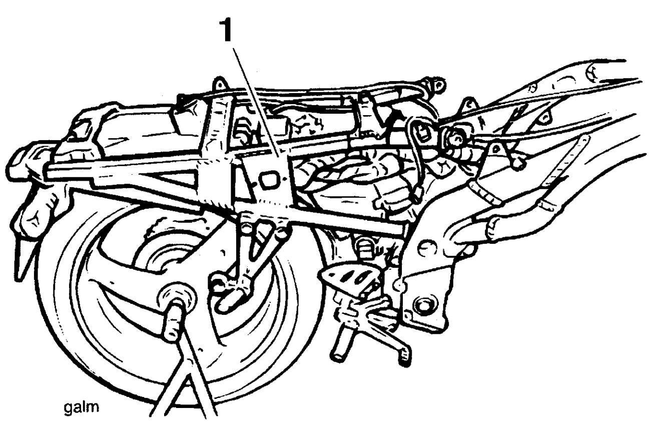
17. Support the engine.

> **CAUTION: Do not support the engine beneath the oil filter as this will cause the filter to become damaged and may lead to engine damage if the oil flow is restricted.**

18. Slacken but do not remove the lower drag link bolt.

19. Release the engine mounting bolts and lower the engine, disconnecting the drive chain from the output sprocket at the same time. Place the engine to one side.

20. Remove the rear subframe mounting bolts and lower the subframe assembly onto the rear wheel.

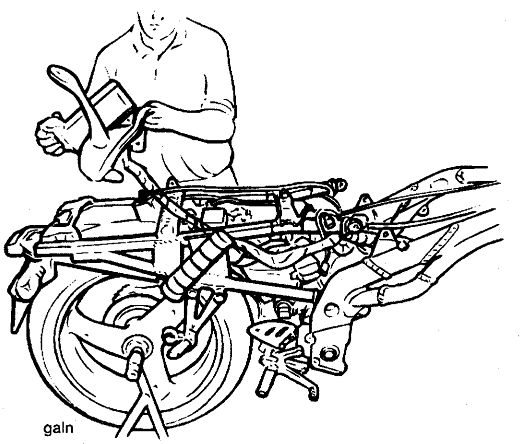


1. Rear Subframe

21. Disconnect the speedometer cable at the instrument end of the cable.

22. Disconnect the electrical connection to both handlebar switches, and the ignition switch.

23. Support the headlight casting and remove the casting retaining bolts. Without further electrical disconnections, feed the headlight casting assembly through the frame and rest the complete assembly on the rear subframe.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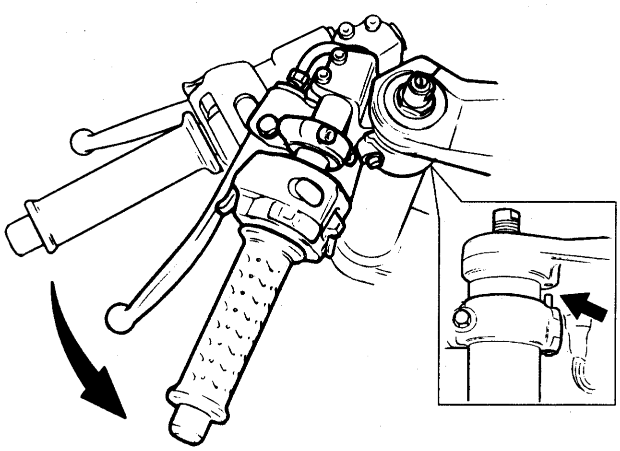
24. On Daytona only, loosen the handlebar pinch bolts and rotate the handlebars inboard.



Rotate the Handlebars Inboard

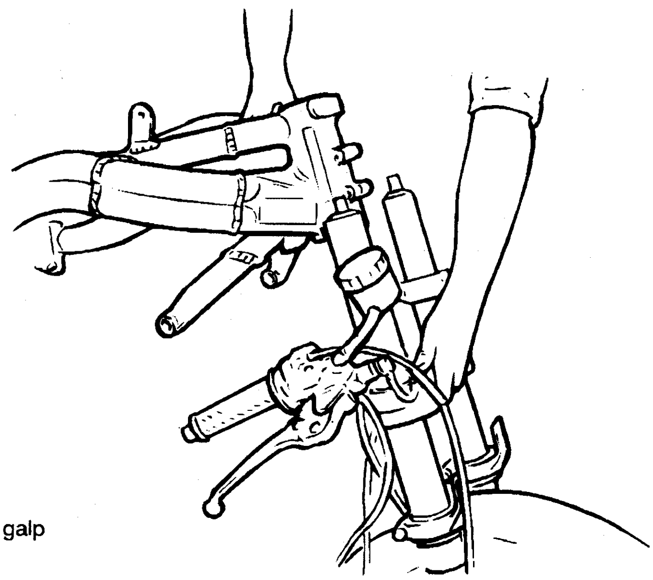
25. Remove the top yoke nut using tool T3880300

26. Slacken the top yoke to fork pinch bolts and remove the top yoke.

27. Remove the headstock bearing adjuster nut.

28. Place a support beneath the front of the swinging arm.

29. Support the front wheel/fork assembly and lift the frame off the yoke stem. Collect the front fork/wheel assembly.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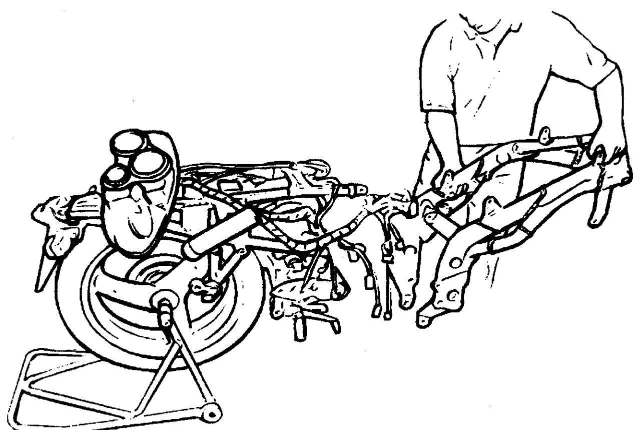
Lifting the Frame from the Forks

30. Disconnect the wiring harness from the frame cross beam.

31. Remove the starter solenoid from it's mounting.

32. Remove the rear suspension unit upper mounting bolt.

33. Remove the swinging arm and drag link spindles and separate the frame from the rear suspension/mudguard assembly.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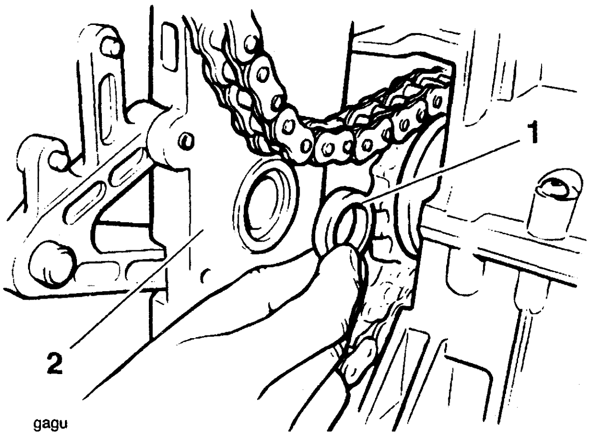
Lifting the Frame from The Rear Suspension

Assembly

1. Transfer the following items, if serviceable, from the original frame to the new frame:

   - Swinging arm spacer from inside the left hand outrigger



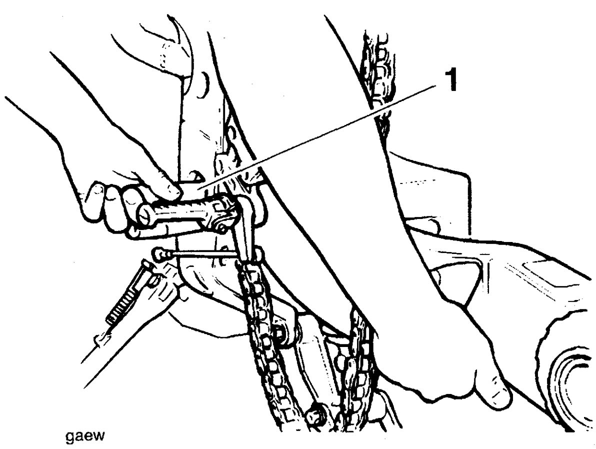
1. Spacer

2. Frame outrigger

   - Starter solenoid mounting bracket
   - Chain rubbing block
   - Swinging arm side float adjuster and locknut

2. Position the new frame over the rear suspension/rear mudguard assembly and engage the rear suspension unit upper mounting bolt. Ensure that the positive (red) battery lead is routed to the left hand side of the rear suspension unit.

3. Position the drive chain as shown below and align the swinging arm to the frame. Refit the swinging arm spindle from the left hand side.



1. Swinging arm spindle

4. Align the drag link to the frame and refit but do not tighten the drag link spindle bolt.

5. Lubricate the lower headstock bearing on the lower yoke spindle using Mobil Grease HP 222.

6. Align the fork/yoke assembly to the frame and fit the lower yoke spindle into the headstock.

7. Fit the headstock adjuster nut and set the headstock bearing adjustment as follows:

   - Tighten the nut to **32 Nm.**
   - Loosen the nut and then retighten by hand until any bearing free play is eliminated.

WARNING: It is essential that adjuster nut is not over-tightened. If the adjuster is over–tightened it will cause a pre–load on the headstock bearings. This will introduce tight steering which will lead to premature bearing wear and could cause loss of control and an accident.

8. Position the headlight casting/headlight assembly to the headstock and tighten the retaining fixings to **6 Nm.**

9. Refit the rear frame to the main frame and tighten the four retaining bolts to **40 Nm.**

10. Locate the wiring harness to the frame cross beam.

11. Refit the starter solenoid.

12. Position the top yoke to the lower yoke spindle and tighten the centre nut to **40 Nm** using tool T3880300. Ensure that the headstock bearing adjuster is not disturbed during tightening.

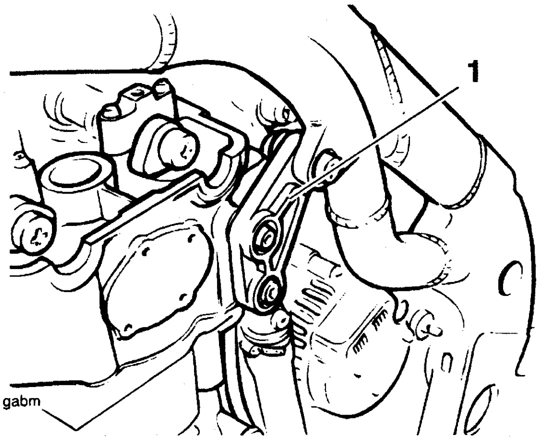
13. Tighten the upper yoke pinch bolts to **20 Nm.**

14. Position the engine below the frame.

15. Raise the engine and, during the alignment process, fit the drive chain over the output sprocket.

16. Locate, but do not tighten the engine mounting bolts.

17. Fit the frame to head bracket to the left hand side of the motorcycle. Tighten the bracket to cylinder head bolts to **30 Nm. DO NOT TIGHTEN THE BRACKET TO FRAME BOLT UNTIL INSTRUCTED TO DO SO.**



1. Frame to Cylinder Head Mounting Bracket

> ⚠ **CAUTION: Unless the following engine mounting bolt tightening sequence is precisely followed, severe frame damage can occur.**

18. Tighten the front left hand frame to cylinder head bolt to **80 Nm.**

19. Tighten the rear left hand frame to cylinder head bolt to **80 Nm.**

20. Tighten the upper left hand frame to engine bolt to **80 Nm.**

21. Tighten the lower left hand frame to engine bolt to **80 Nm.**

22. Check the gap between the frame and engine at all right hand engine mounting locations. If any gap is found to be greater than 1 mm, add spacer (part number 3550220–T0301) to reduce the gap below 1 mm.

NOTE:

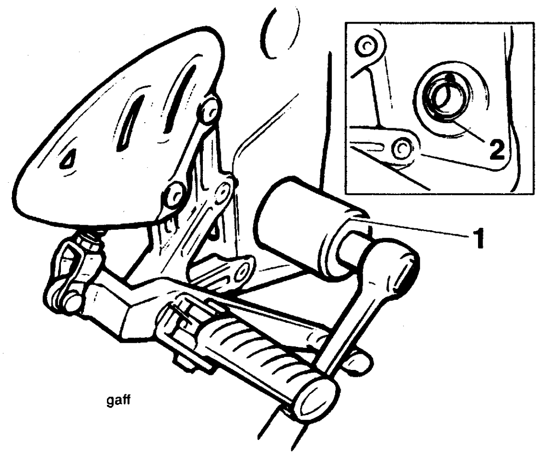
- **If a spacer is needed for the lower right hand rear engine mounting bolt, an equivalent sized spacer (see parts catalogue for part number) must also be fitted to the drag link to frame bolt on the right hand side.**
- **If a gap larger than 1 mm exists between the frame and drag link, but no shim was found to be necessary for the lower right hand engine mounting bolt, the drag link spacer must not be used.**

23. Once all the necessary shims have been added, tighten the right hand frame to engine bolts to **80 Nm** in the same sequence as was used to tighten the left hand bolts.

24. Tighten the left hand frame to engine bolts to **95 Nm** using the sequence used for initial tightening.

25. Tighten the right hand frame to engine bolts to **95 Nm** using the sequence used for initial tightening.

26. Tighten the swinging arm spindle inner adjustment ring to **18 Nm** and the outer locking ring to **32 Nm** using service tools part numbers T3880290 and T3880295 respectively.



1. Tool T3880295

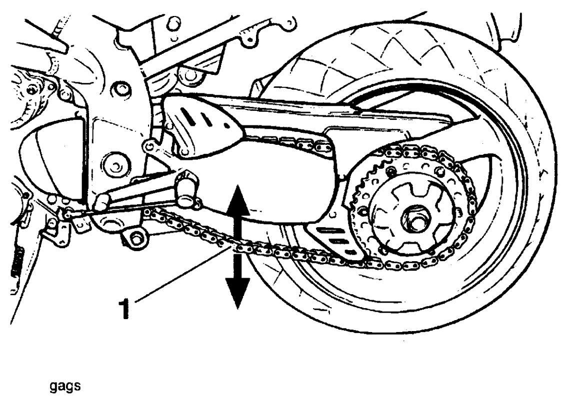
2. Locking ring

27. Tighten the swinging arm spindle bolt to **60 Nm.**

28. Tighten the drag link spindle bolt to **95 Nm.**

29. Set the chain adjustment to give 35–40 mm of vertical movement as follows:

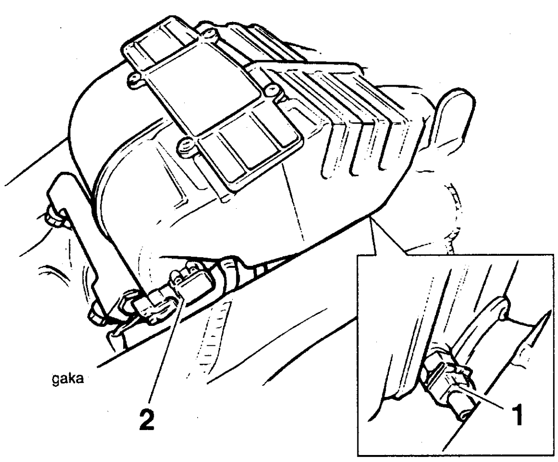
   - Rotate the rear wheel to find the position where the chain has least slack. Measure the chain's vertical movement, mid-way between sprockets. If correct, the vertical movement of the drive chain should be 35–40 mm.



1. Vertical Movement 35–40mm

- Slacken the swinging arm/hub pinch bolt.
- Using the 'C' spanner from the motorcycle tool kit, turn the eccentric adjuster clockwise to increase vertical movement, anti–clockwise to take out vertical movement.
- Once the correct chain setting has been achieved, tighten the swinging arm/eccentric adjuster pinch bolt to **55 Nm.**

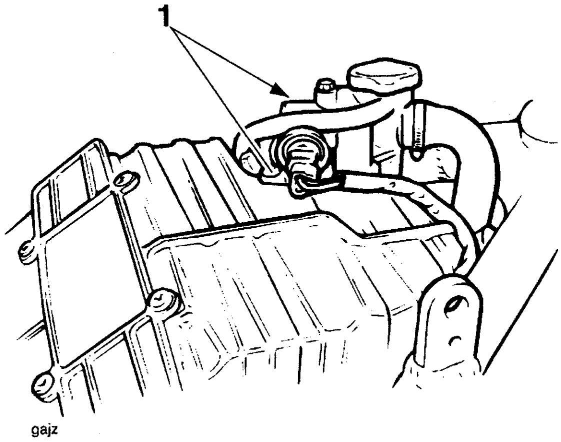
30. Refit the sprocket cover, tightening the fixings to **9 Nm.**
31. Using new bolts, refit the control plates to the frame, tightening the fixings to **30 Nm.**.
32. Refit the exhaust system. Tighten the downpipes to head fixings firstly to **8 Nm** then to **12 Nm.**
33. Refit the radiator and connect the radiator hoses.
34. Remake all electrical connections to the engine.
35. Refit the airbox as described in section 9 of this manual.
36. Reconnect the inlet air temperature and barometric pressure sensors during fitment of the airbox.



1. Inlet Air Temperature Connection

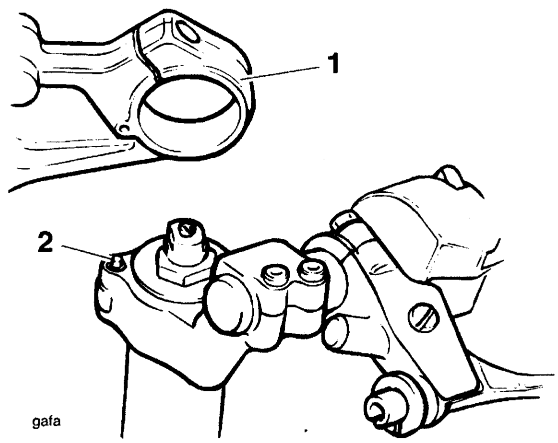
2. Barometric Pressure Sensor

37. Refit the thermostat housing to the airbox and connect the temperature sensor.



1. Thermostat Housing Bolts

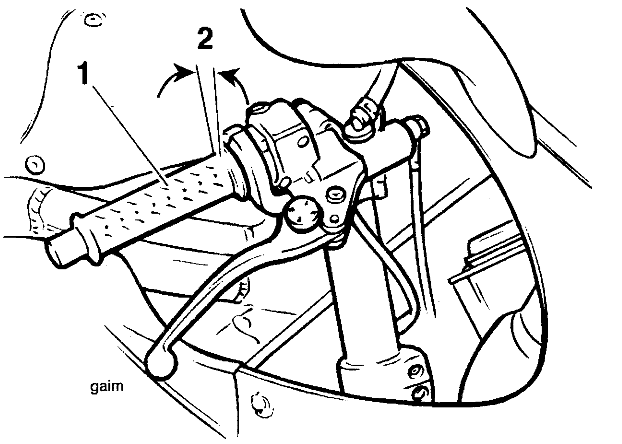
38. If displaced previously, reset the handlebars to the correct orientation, ensuring the locating pins fit into the lower face of the top yoke. Tighten the handlebar clamp bolts to **35 Nm (M8 fixings) or 15 Nm (M6 fixings)**.



1. Top yoke

2. Locating pin

39. Re-make all electrical connections to the handlebar switches and headlights.
40. Reconnect the speedometer cable.
41. Connect and adjust the throttle cable as described below/over:
    - Refit the throttle cable to the throttle bodies. When correctly set, the throttle must have 2-3 mm of free play at the throttle twist grip. If there is more or less than 2–3 mm of free–play present, the throttle cable must be adjusted.

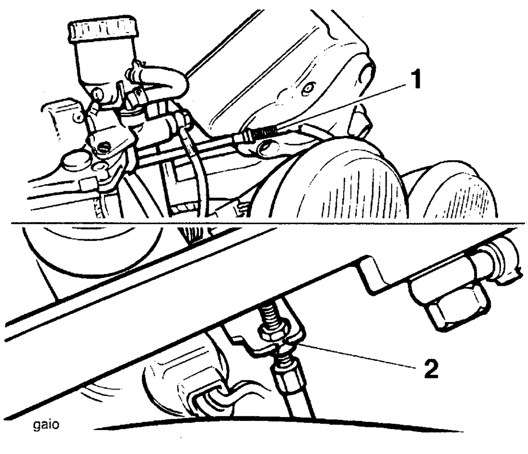


1. Throttle Twist Grip

2. 2–3 mm

WARNING: Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.

WARNING: Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. A cable or harness which binds will restrict the steering and may cause loss of control and an accident.



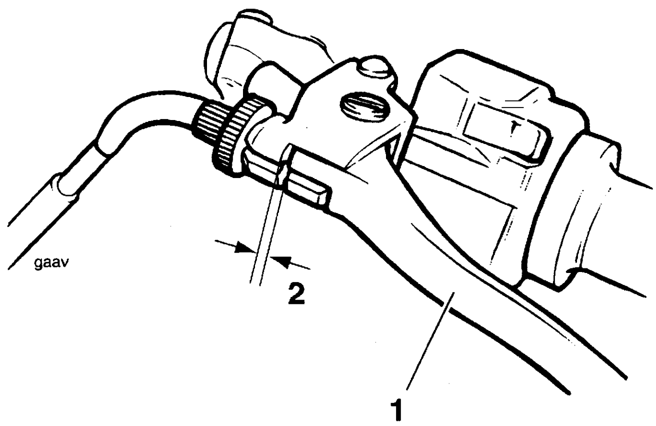
1. Adjuster – Twist Grip End
2. Adjuster – Throttle Body End

- Set the cable adjuster at the twist grip end such that it has an equal amount of adjustment in each direction.
- Set the adjuster at the throttle body end of the cable to give 2–3 mm of play at the throttle twist grip. Tighten the locknut.
- Make any minor adjustments as necessary to give 2-3 mm of play using the adjuster at the twist grip end of the cable. Tighten the locknut.

WARNING: Ensure that the adjuster locknuts are tightened. A loose throttle cable adjuster could cause the throttle to stick leading to loss of control and an accident.

42. Connect the clutch cable and adjust as follows:

- Set the adjuster at the clutch end to give a preliminary setting of 2–3 mm of free play as measured at the lever.
- Operate the clutch lever several times and re-check the amount of free-play present.
- Set the final adjustment of the cable to give 0.4–0.8 mm of free-play at the lever by turning the adjuster nut and locknut at the lever end. Secure the setting with the knurled locknut.



1. Clutch Lever

2. Correct Setting, 0.4–0.8 mm

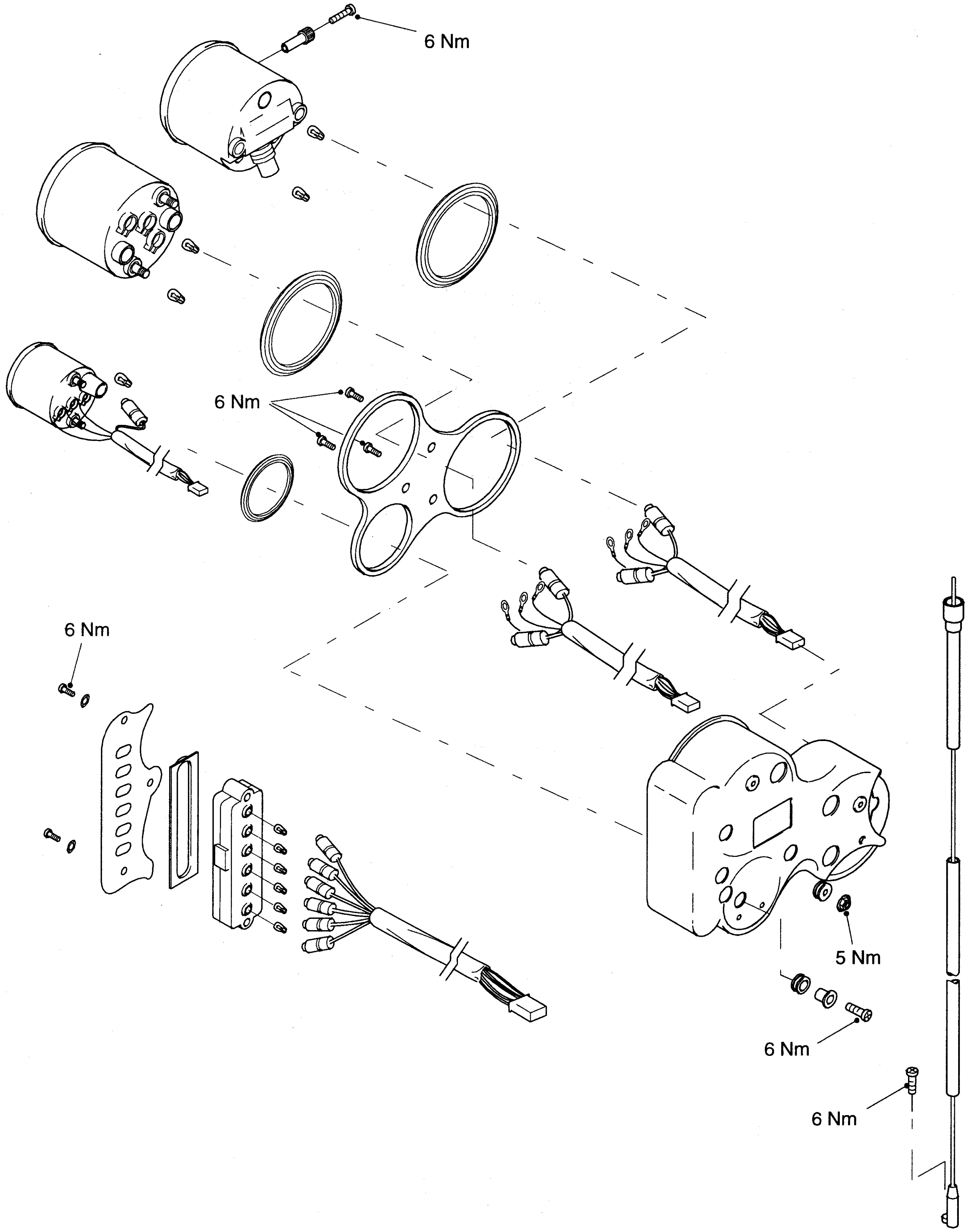
43. Refit the gearchange linkage ensuring equal engagement of the linkage rod threads at each end of the rod.
44. Using the coolant retained during strip down, refill the cooling system as described in the cooling system section.
45. Refit all bodywork.
46. Reconnect the motorcycle battery, positive (red) lead first.
47. Refit the seats.
48. Start the motorcycle engine and check for fluid leaks, correct operation of the throttle, clutch, cooling system, brakes etc.

ELECTRICAL SYSTEM

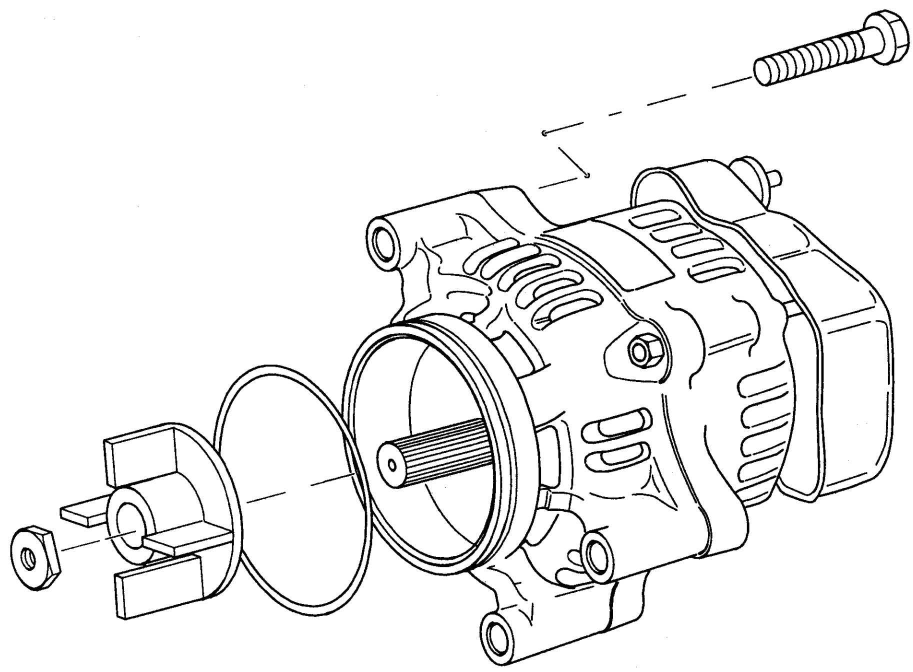
CONTENTS

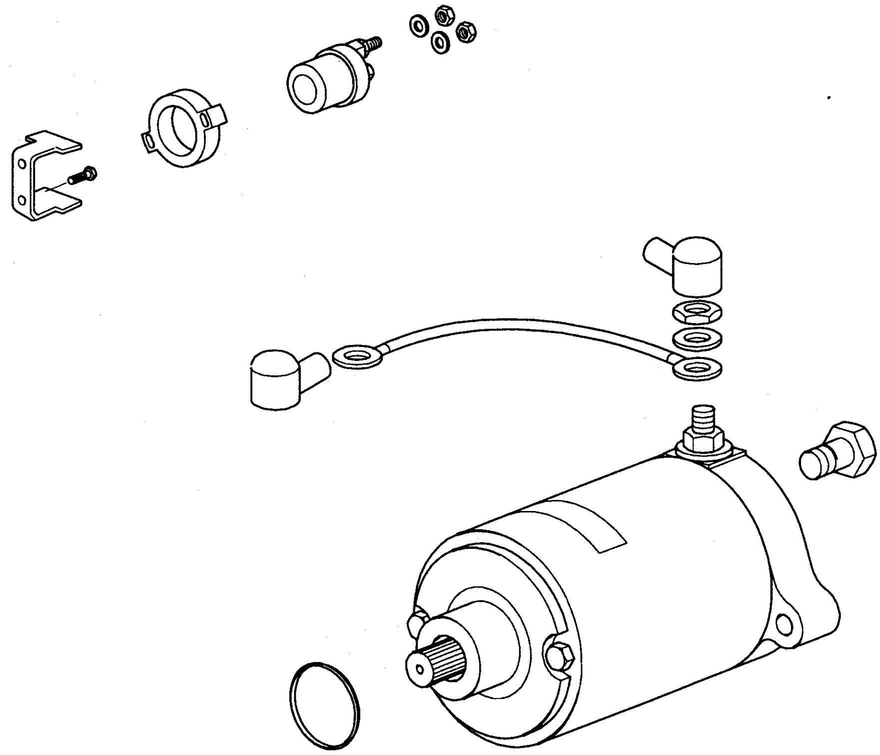
CONTENTS (cont'd)

Exploded View – Instruments

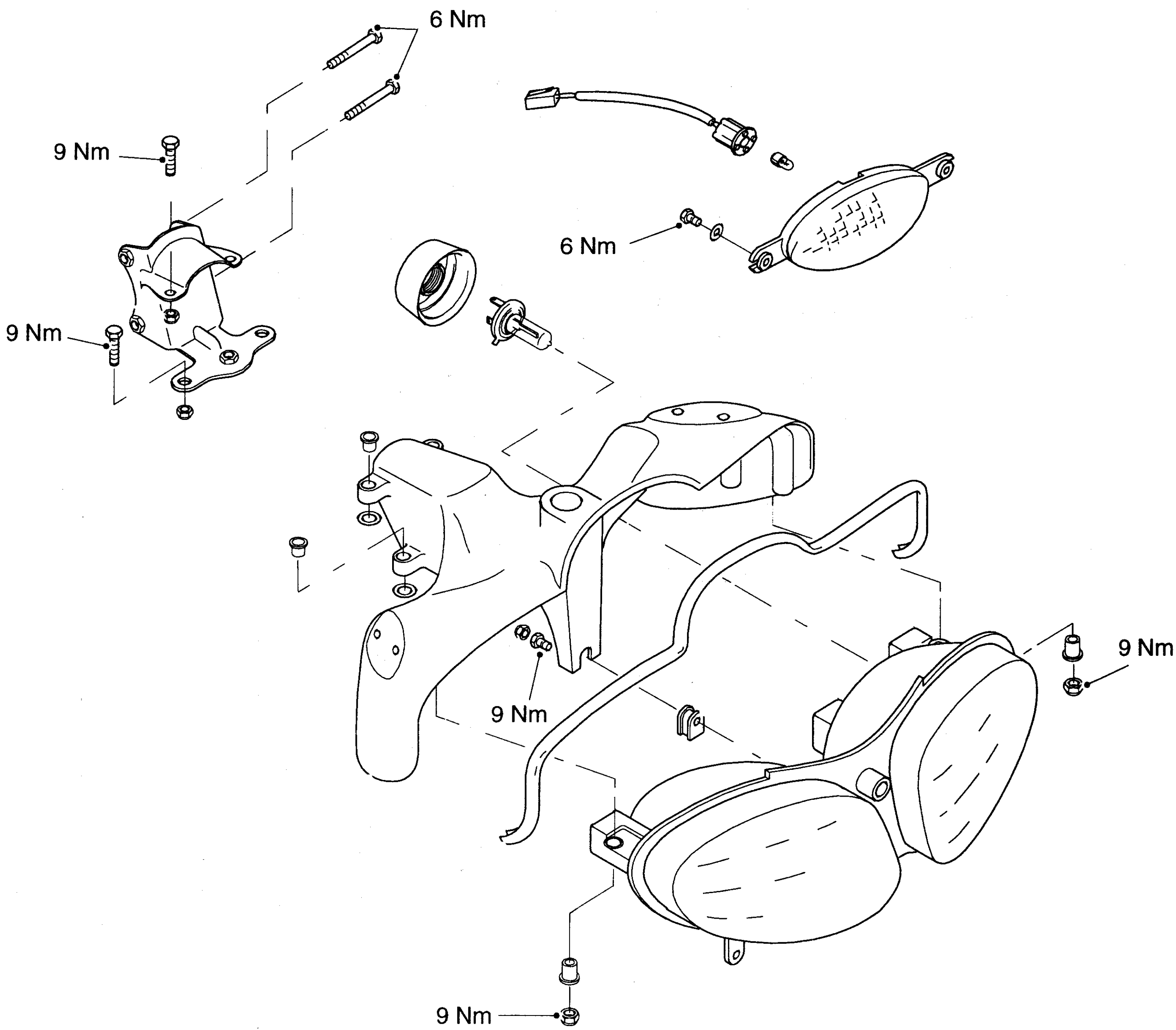


Exploded View – Alternator and Starter Motor

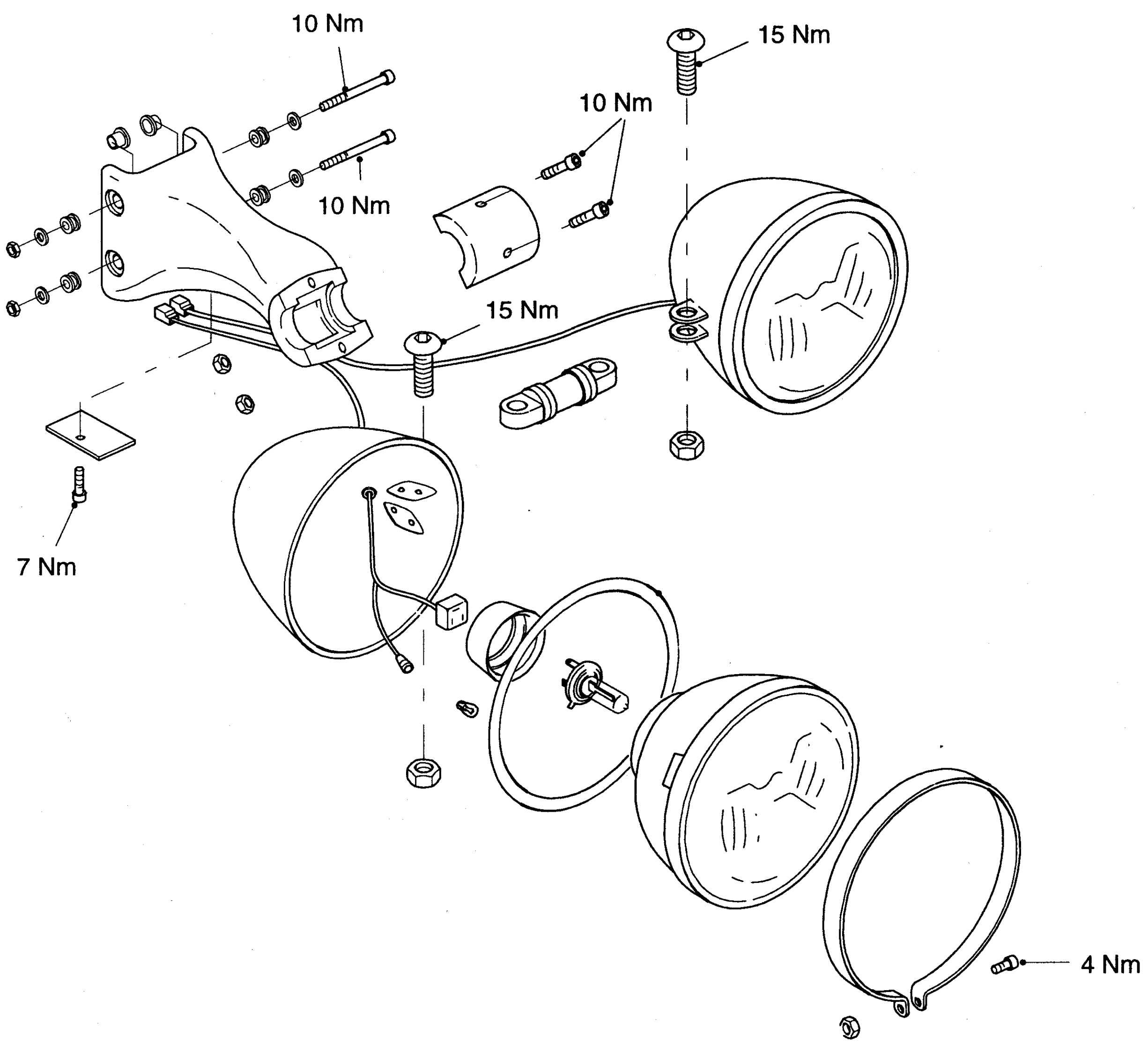




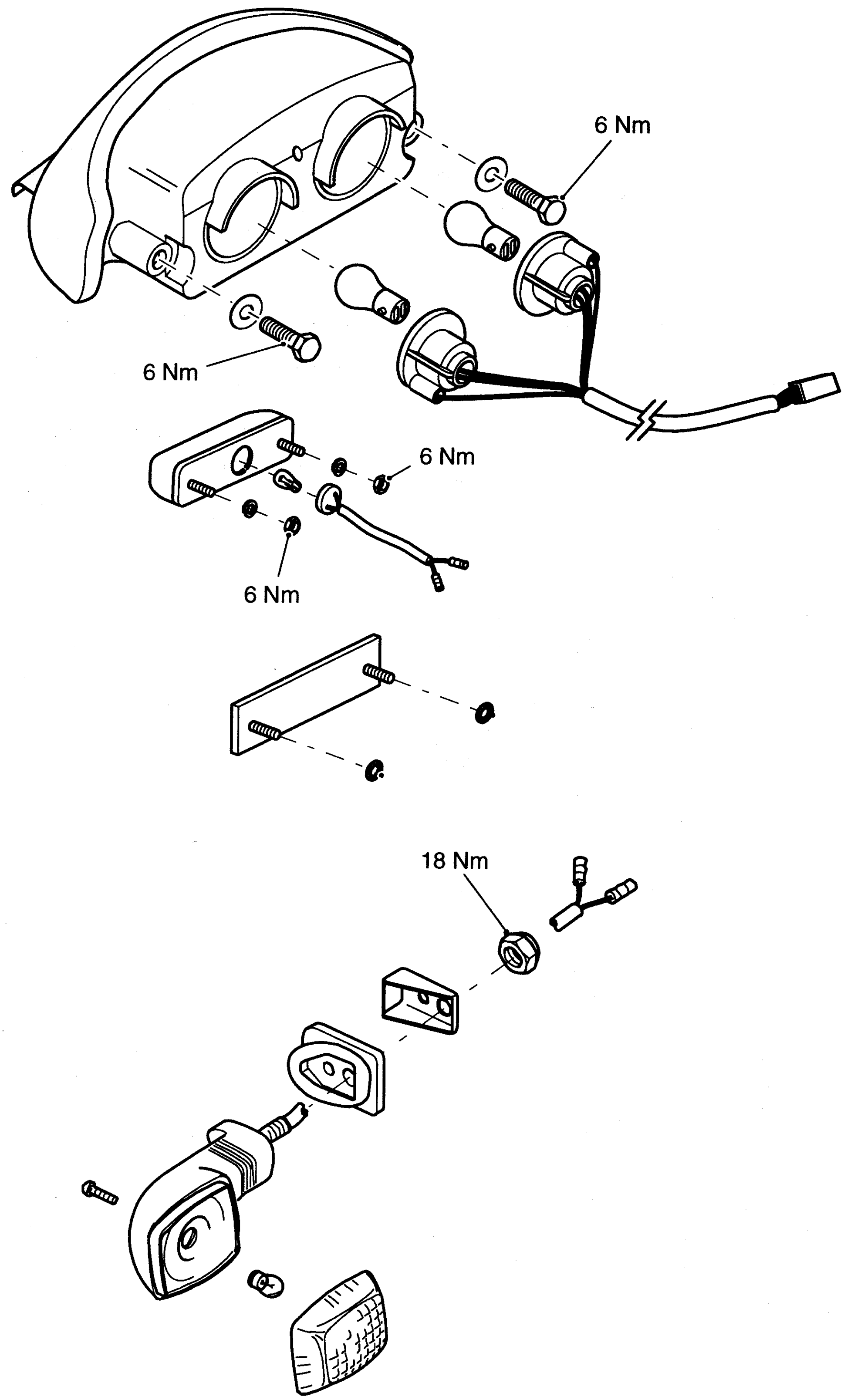
Exploded View – Daytona Headlight



Exploded View – Speed Triple Headlight



Exploded View – Rear Lights and Indicators



BATTERY

WARNING: The battery gives 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 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 gasses causing a risk of personal injury.

WARNING: The battery electrolyte is corrosive and poisonous. Never swallow battery electrolyte or allow to come into contact with the skin. Always wear eye and skin protection when adjusting the electrolyte level

CAUTION: When checking the battery electrolyte level, or adding distilled water, ensure that the breather is not blocked. A blocked breather may cause a build-up of gas in the battery which would damage the battery case.

To prevent battery damage, use only distilled water in the battery. Tap water will shorten the service life of the battery.

Filling the battery above the UPPER LEVEL line may cause the electrolyte to overflow, resulting in corrosion to engine or nearby parts. Immediately wash off any spilled electrolyte.

Battery Types

There have been two types of battery used on the models covered by this manual. A wet filled battery manufactured by Yuasa and a sealed battery manufactured by GS.

For identification, the Yuasa battery has a white translucent base whereas the GS battery is black.

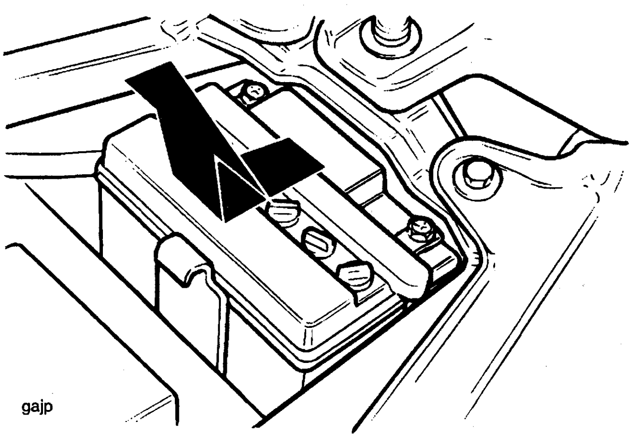
There are significant differences in the commissioning and charging procedure for these batteries which if not followed, will reduce battery life and output. Always follow the correct commissioning and charging procedure for each battery.

CAUTION: Failure to commission or charge a battery correctly can significantly reduce battery output and service life.

To ensure optimum performance and service life, always follow the correct procedures for the battery type being worked on.

Battery Removal

1. Unlock and remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the battery strap and disconnect the breather tube.
4. Take the battery out of the case.



Direction of Battery Removal

> **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.**

Battery Refit

> **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, and connect the battery breather tube.
2. Reconnect the battery, positive (red) lead first.
3. Apply a light coat of grease to the terminals to prevent corrosion.
4. Cover the terminals with the protective caps.
5. Refit the battery strap.

BATTERY CHARGING – YUASA WET BATTERY

New Battery

To ensure that a new battery is correctly commissioned and will deliver maximum capacity for starting, the following procedure must be followed.

1. Remove the sealing tape and vent cap.
2. Remove the filler plugs and fill the battery with electrolyte to the upper level.
3. Allow the battery to stand for 30 minutes and then adjust the electrolyte level back to the upper level mark.
4. Charge the battery continuously at 1.4 A maximum for 15–20 hours
5. After charging, top up the battery using distilled water only.
6. Replace the filler plugs and vent cap, and thoroughly clean the battery.

Battery Already in Service

When re-charging a battery in service, the following precautions must be taken to avoid damage to the battery.

1. The charging rate must not exceed 10% of the battery capacity. The standard Triumph battery capacity is a 14 Amp. hour unit and therefore the charging rate must not exceed 1.4 A.
2. Before the battery reaches the gassing stage, this rate may be briefly exceeded but the temperature of the electrolyte must not be allowed to rise above 55°C.
3. After charging, allow the battery to cool and then top up the electrolyte level with distilled water.
4. Never allow the battery to stand in a discharged state or with the electrolyte level below the minimum level.

> ⚠ **CAUTION: Using a battery charger set to a charge rate greater than 10% of the battery capacity will cause permanent damage to the battery. Therefore, the maximum rate of charge is 1.4 Amps.**

BATTERY CHARGING – GS SEALED BATTERY

New Battery

To ensure that a new battery is correctly commissioned and will deliver maximum capacity for starting, the following procedure must be followed.

1. Remove the sealing tape.
2. Using the funnel and electrolyte pack supplied, fill the battery. Use all the electrolyte.
3. Carefully remove the electrolyte pack and funnel.
4. Fit the battery cell covers.
5. Charge the battery continuously at 1.2 Amps maximum for 5 hours

Battery Already in Service

When re-charging a battery in service, the following precautions must be taken to avoid damage to the battery.

1. The charging rate must not exceed 1.4 A. except for a boost charge where a maximum charge rate of 6 A. (for no longer than 1 hour) is allowed.

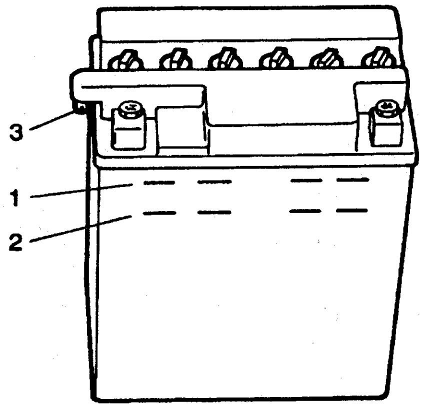
Battery Maintenance (Yuasa wet battery)

The battery electrolyte level must be kept between the upper and lower level lines. Check the electrolyte level in each cell in accordance with scheduled maintenance chart.

1. Remove the battery as described earlier.

2. Check that the electrolyte level in each cell is between the upper and lower level lines.

3. If the electrolyte level is low in any cell, top-up the cell with distilled water.



1. Upper Electrolyte Level

2. Lower Electrolyte Level

3. Breather Tube Connection

WARNING: Electrolyte is highly corrosive and will damage clothing and cause burns if in contact with the skin

Never route the battery breather pipe in any way which could cause the pipe to become blocked or trapped. A blocked or damaged pipe will cause a build up of pressurised, explosive gas which may ignite.

When adding electrolyte, always wear eye and skin protection.

CAUTION: Use only distilled water to top-up the battery. Tap water will shorten the service life of the battery.

Battery Maintenance (GS sealed battery)

The battery is a sealed type and does not require any maintenance other than routine recharging such as during storage.

It is not possible to adjust the electrolyte level in the battery.

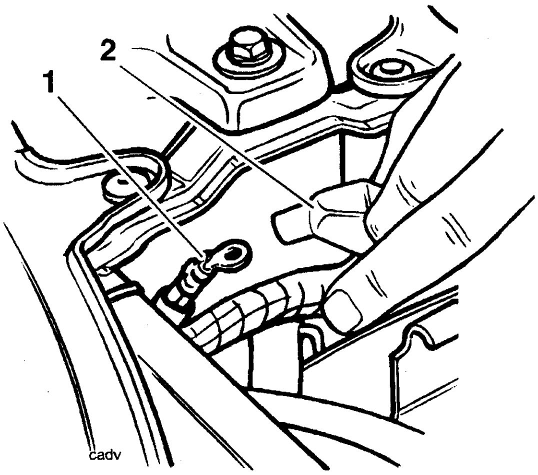
BATTERY LEAD CONVERSION – WET TO SEALED BATTERY

An accessory kit is available from your authorised Triumph dealer to convert the Yuasa manufactured wet battery installation to one suitable for use with the GS manufactured dry battery. The following procedure should be followed when carrying out this conversion.

1. Remove the motorcycle seat(s) and disconnect the battery negative (black) lead first, then the positive lead (red) lead second.

2. Remove the original battery.

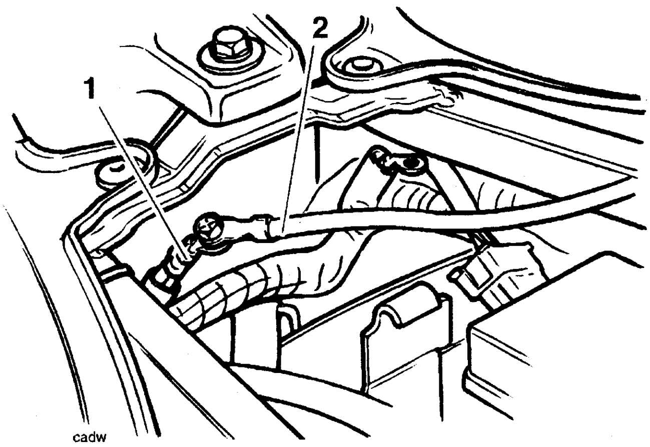
3. Remove the terminal cover from the positive lead and retain for re-use.



1. Positive Lead

2. Terminal Cover

4. Take the supplementary positive cable (coloured red) and attach one end to the existing positive lead. Secure both terminals together using the bolt and nut supplied.



1. Original Positive Lead

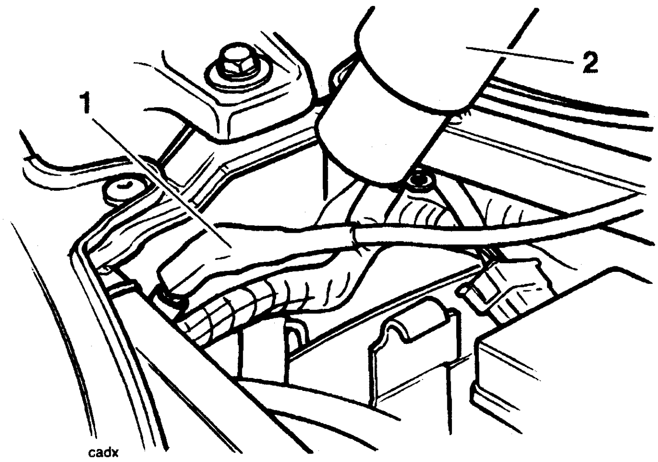
2. Supplementary Lead

NOTE:

- **Always ensure that, when secured, the cables and are not fitted at an angle to each other.**

5. Place a length of insulation material over the cable joint and ensure that the insulation is positioned equally either side of the joint.

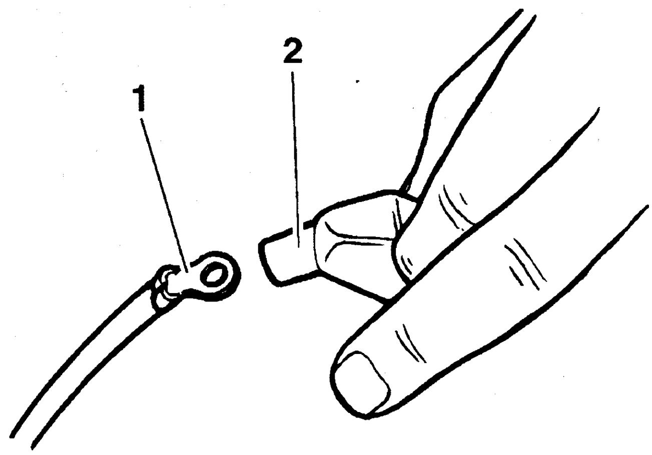
6. Using a hot air gun, hair dryer or similar, direct hot air towards the insulation material until it has shrunk to fit over the positive cable joint.



1. Insulation Material

2. Hot Air Gun

7. Re-attach the positive terminal cover to the exposed end of the lead.

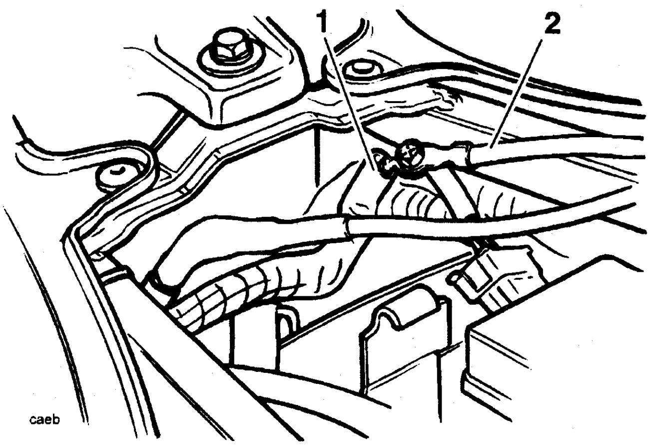


cady

1. Extended Positive Lead

2. Positive Terminal Cover

8. Turning to the negative lead, attach the supplementary negative cable (coloured black) and attach one end to the existing negative lead. Secure both terminals together using the bolt and nut supplied.



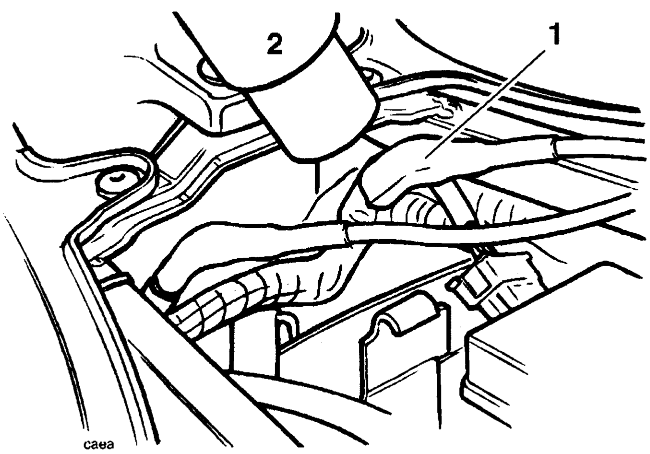
1. Original Negative Lead

2. Supplementary Lead

NOTE:

- **Always ensure that, when secured, the cables and are not fitted at an angle to each other.**

9. Using a hot air gun, hair dryer or similar, direct hot air towards the insulation material until it has shrunk to fit over the negative cable joint.



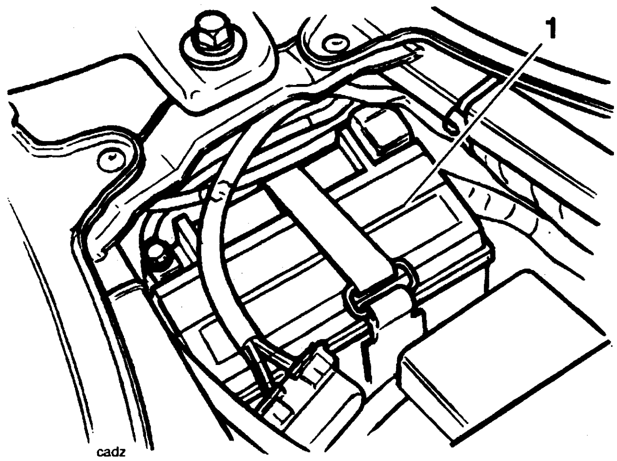
1. Insulation Material

2. Hot Air Gun

10. Remove the original battery carrier base from the battery recess in the rear mudguard and fit the replacement item supplied with the kit.

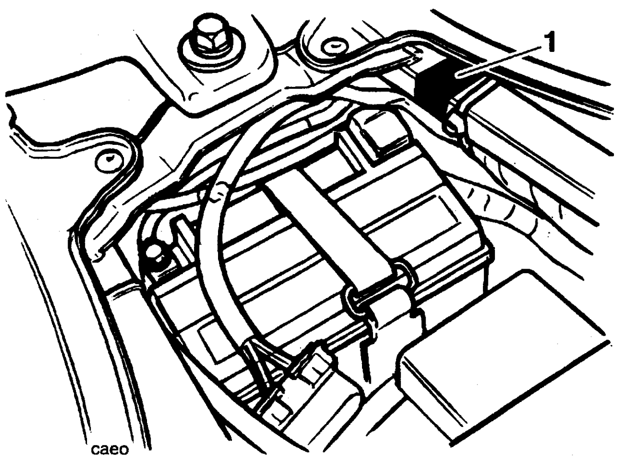
11. Install the new sealed battery with the battery terminals to the front of the motorcycle.

12. Position the new battery leads and connect to the battery positive lead (brown lead with the red cap) first, then the negative (black) lead second.



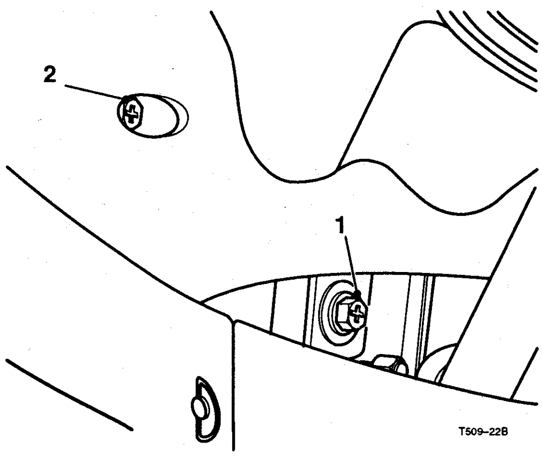
1. New Battery, Correctly Installed

13. Finally, apply the length of insulating tape supplied with the kit to the area shown arrowed below. Thoroughly clean the area before application of the tape.



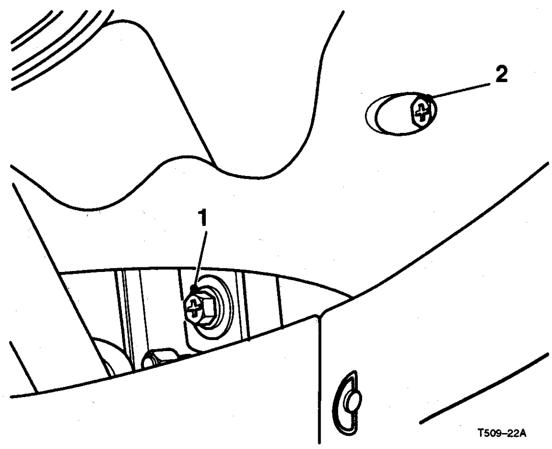
1. Insulation Material

HEADLIGHTS – DAYTONA



1. Vertical Adjustment Screw (LH)

2. Horizontal Adjustment Screw (LH)



1. Vertical Adjustment Screw (RH)

2. Horizontal Adjustment Screw (RH)

WARNING: Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated.

Ensure that the 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: Never attempt to adjust the headlamp beam when the motorcycle is in motion.

Any attempt to adjust the headlamp beam when the motorcycle is in motion may result in loss of control and an accident.

Headlight Adjustment

1. Each headlight can be adjusted by means of vertical and horizontal adjustment screws located on the rear of the headlight unit.

2. Switch the headlight dipped beam on.

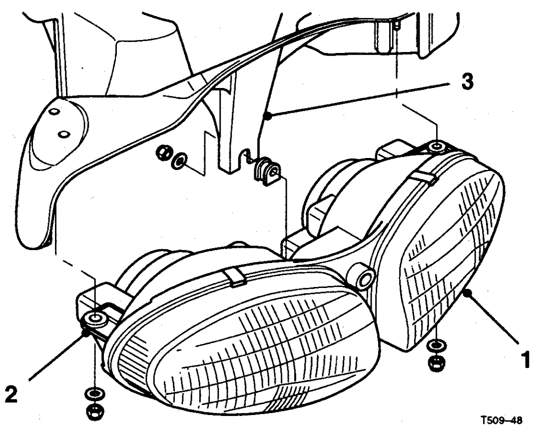
3. Turn the vertical adjustment screw on each headlight clockwise to lower the beam or anti–clockwise to raise the beam.

4. On the RH headlight turn the horizontal adjustment screw clockwise to move the beam to the right or anti–clockwise to move the beam to the left.

5. On the LH headlight turn the horizontal adjustment screw anti–clockwise to move the beam to the right or clockwise to move the beam to the left.

6. Switch the headlights off when the beam settings are satisfactory.

Headlight Bulb Replacement



1. Headlight Unit

2. Side Fixing (RH)

3. Centre Fixing

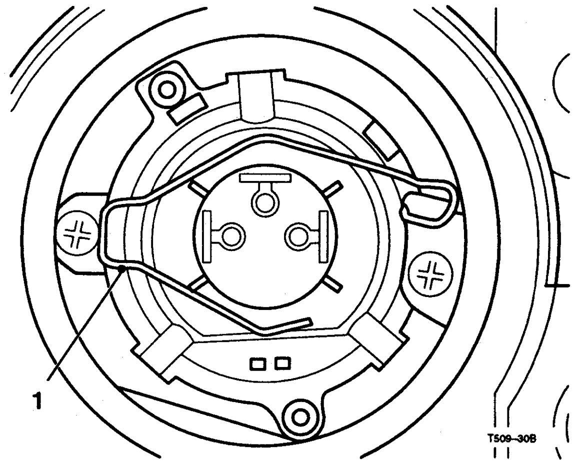
NOTE:

- **The complete headlight unit must be removed to gain access for bulb replacement.**

Removal

1. Remove the seat(s).
2. Disconnect the battery, negative (black) lead first.
3. Remove the cockpit panel as described in the body section.
4. Remove the light unit as described elsewhere in this section
5. Disconnect the multi–pin electrical connector from the bulb to be replaced and remove the rubber cover.
6. Detach the wire bulb retainer from the clip. It is not necessary to undo the screw.
7. Remove the bulb from the headlight unit.

> **WARNING: The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling.**
>
> **Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before re–use.**



1. Wire Clip

Assembly

1. Install the bulb and secure with the wire clip.
2. Refit the light unit as described elsewhere in this section.
3. Refit the cockpit as described in the body section.
4. Reconnect the battery, positive (red) lead first.
5. Check that the head and position lights function correctly
6. Refit the seat.

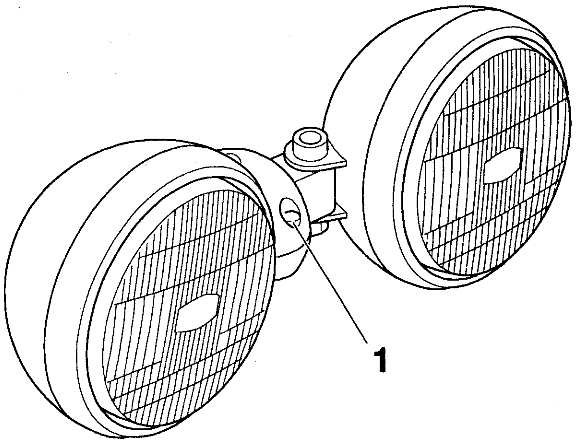
Position Lamp Bulb Replacement

The position lamp is fitted to the cockpit panel above the headlight aperture.

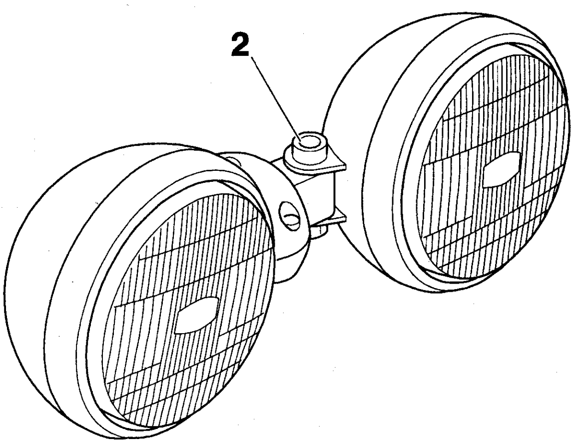
Remove the cockpit panel, as described in the body section, to gain access for bulb replacement.

HEADLIGHTS – SPEED TRIPLE

The horizontal beam of each headlight can be adjusted individually. The vertical beams are adjusted as a pair.



1. Vertical Adjustment Screw



2. Horizontal Adjustment Screw

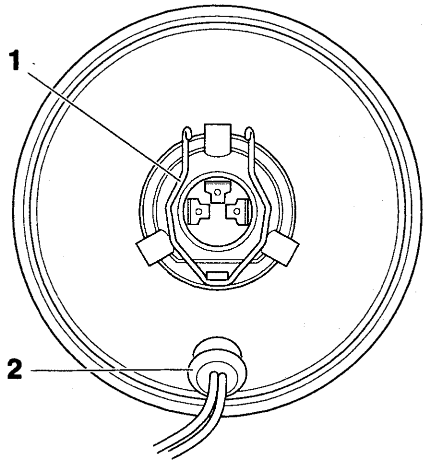
> **WARNING: Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated.**
>
> **Ensure that the beam is adjusted to illuminate the road surface sufficiently far ahead without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing an accident.**

> **WARNING: Never attempt to adjust the headlamp beam when the motorcycle is in motion.**
>
> **Any attempt to adjust the headlamp beam when the motorcycle is in motion may result in loss of control and an accident.**

Headlight Adjustment

1. Switch the headlight dipped beam on.
2. Partially release the central clamp fixing on the headlight mounting bracket and pivot both headlights upward or downward as necessary.
3. Tighten the central clamp fixing while holding the headlights in the desired position.
4. Release the clamp fixing to the rear of the headlight bowl and pivot the headlamp to the left or right as necessary.
5. Tighten the clamp fixing while holding the headlight in the desired position.
6. Repeat for the other headlight.
7. Switch the headlights off when the beam settings are satisfactory.

Headlight Bulb Replacement



1. Bulb Retainer

2. Position Light

Each halogen headlight bulb can be replaced as follows:

WARNING: The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling.

Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before re–use.

1. Disconnect the battery, negative (black) lead first.
2. Release the headlight bezel clamp screw.
3. Support the headlight unit and remove the bezel. Ease the headlight from the headlight bowl.
4. Disconnect the multi–pin electrical connector from the headlight bulb and remove the rubber cover.
5. Unhook the wire retaining clip from behind the bulb.
6. Remove the bulb from the headlight unit.

Installation

Installation is the reverse of the removal procedure.

Position Lamp Bulb Replacement

Position lamps are fitted to both headlight units. To replace a position light bulb, remove the headlight unit from the headlight bowl to gain access for position light bulb replacement.

LICENCE PLATE LIGHT

Bulb Replacement

1. Remove the rear bodywork, as described in the body section, to gain access to the licence plate light unit.

2. Carefully remove the rubber bulb holder from the back of the light unit.

> **CAUTION: Do not pull the bulb holder out by means of the electrical wires.**

3. Replace the bulb and fit the bulb holder to the light unit.

4. Refit the bodywork and seat(s) as described in the body section.

TAIL LIGHT

Removal

1. Remove the seat(s)

2. Disconnect the battery, negative (black) lead first.

3. Release the fixings securing the light to the rear body panels.

4. Rotate the bulb holders anti-clockwise and detach from the light unit.

5. Withdraw the light from the bodywork.

Installation

1. Locate the light to the rear body panel.

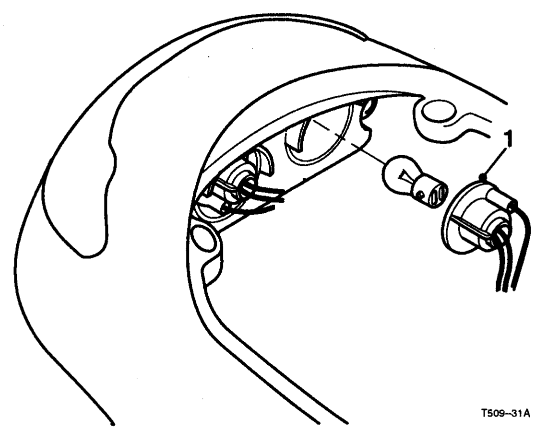
2. Refit and tighten the fixings to secure the lamp to the body panel.

3. Refit the bulb holders to the light and turn clockwise to lock into place.

4. Reconnect the battery, positive (red) lead first.

5. Refit the seat(s)

Bulb Replacement



1. Bulb Retainer

1. Remove the seat(s)

2. Disconnect the battery, negative (black) lead first.

3. Rotate the bulb holders anti-clockwise and detach from the light unit.

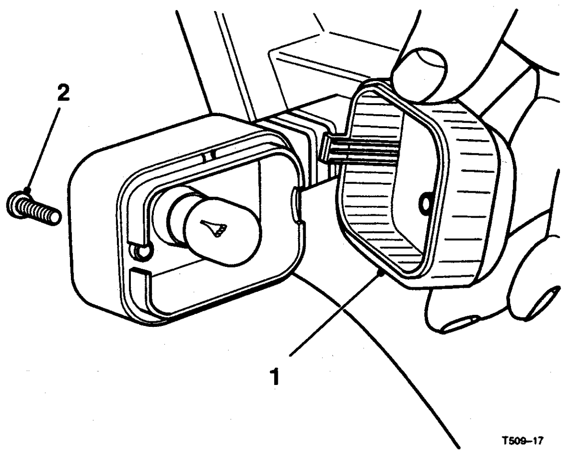
4. Detach the bulb from the bulb holder.

Installation

1. Refit the bulb to the bulb holder.
2. Refit the bulb holders to the light and turn clockwise to lock into place.
3. Reconnect the battery, positive (red) lead first.
4. Refit the seat(s)

INDICATOR

The lens on each indicator light is held in place by a securing screw located in the body of the light.



1. Lens

2. Lens Retaining Screw

Removal

1. Release the screw securing the lens to the light body.
2. Remove the lens.
3. Release the bulb

Replacement

1. Refit the bulb.
2. Locate the lens to the light body.
3. Refit the lens retaining screw.

LIGHTING CIRCUIT DIAGRAM

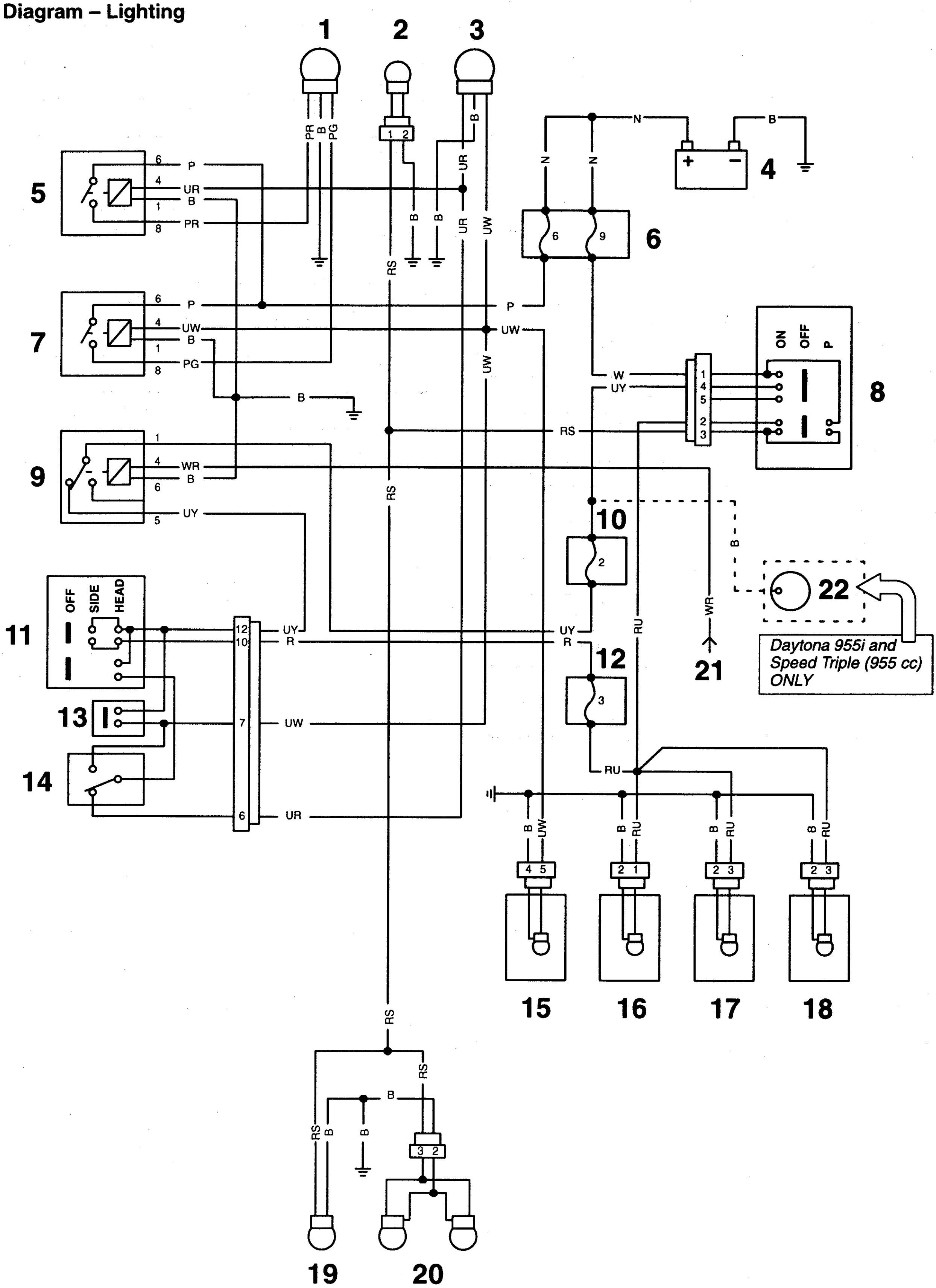
The wiring circuit found on the following page depicts the lighting circuit for the T595 Daytona/Daytona 955i model. The circuit for the Speed Triple range is similar.

The key found below must be used for identification of components.

Key No:	Item Description
1	Left Hand Headlight
2	Position Light
3	Right Hand Headlight
4	Battery
5	Headlight Dip Beam Relay
6	Fuses 6 & 9
7	Headlight Main Beam Relay
8	Ignition Switch
9	Headlight Cut-out Relay
10	Fuse 2
11	Lighting Switch
12	Fuse 3
13	Passing Button
14	Headlight Dip Switch
15	Main Beam Warning Light
16	Speedometer Illumination
17	Tachometer Illumination
18	Temperature Gauge Illumination
19	Number Plate Light
20	Tail Light
21	Feed From Engine Start Switch
22	Alternator

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Grey
O	Orange
K	Pink
LG	Light Green
R	Red
P	Purple
W	White
Y	Yellow

Circuit Diagram – Lighting



STARTING/CHARGING CIRCUIT DIAGRAM UP TO VIN 71698

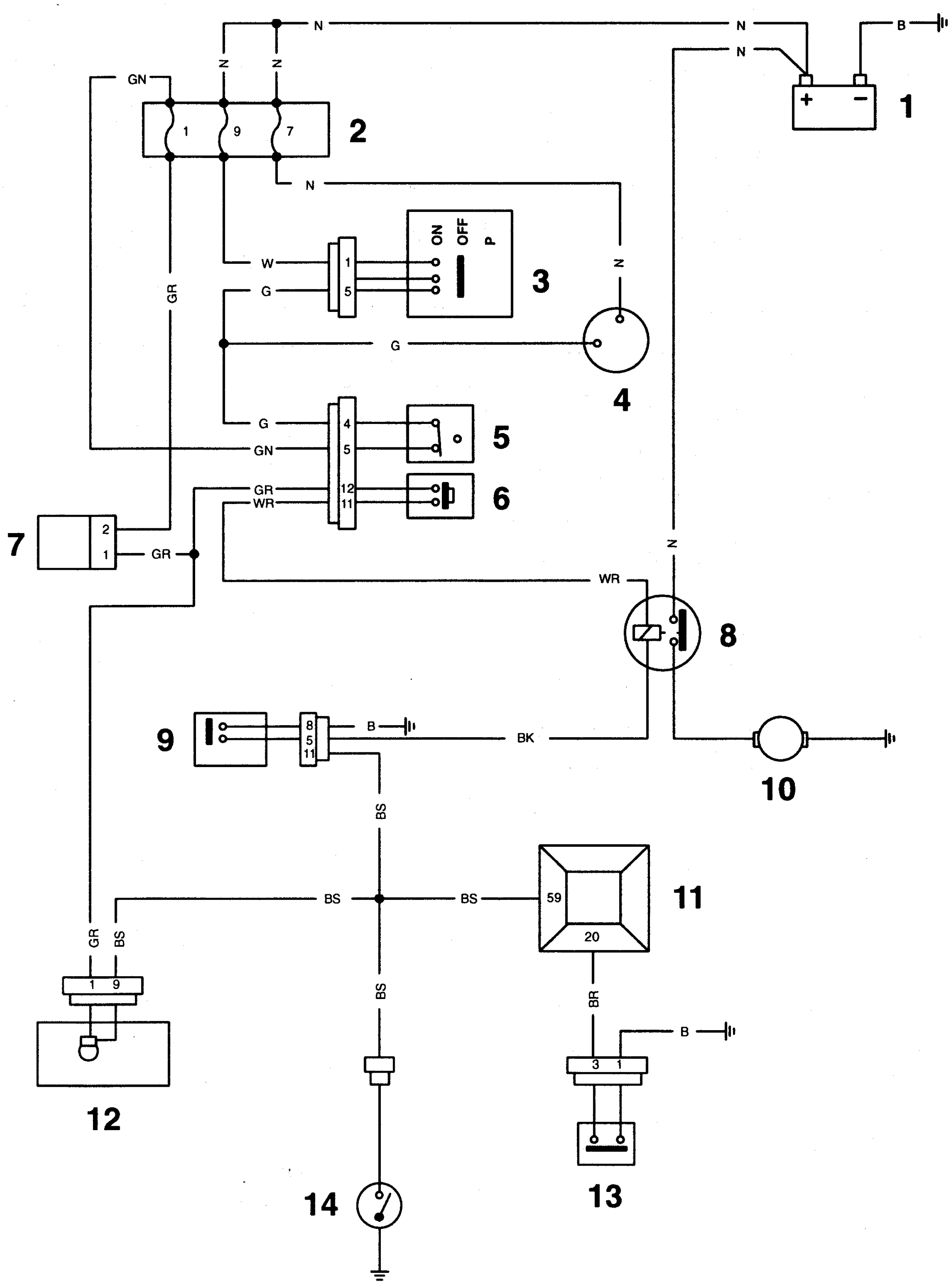
The wiring circuit found on the following page depicts the starting and charging circuit for the T595 Daytona and T509 Speed Triple models.

The key found below must be used for identification of components.

Key No:	Item Description
1	Battery
2	Fuses 1, 9 and 7
3	Ignition Switch
4	Alternator
5	Engine Stop (kill) Switch
6	Engine Start Button
7	Alarm Control Unit (or shorting plug)
8	Starter Solenoid
9	Clutch Lever Switch
10	Starter Motor
11	Engine Control Module
12	Neutral Warning Light
13	Sidestand Switch
14	Neutral Switch

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Grey
O	Orange
K	Pink
LG	Light Green
R	Red
P	Purple
W	White
Y	Yellow

Circuit Diagram – Starting/Charging – up to VIN 71698



STARTING/CHARGING CIRCUIT DIAGRAM FROM VIN 71699

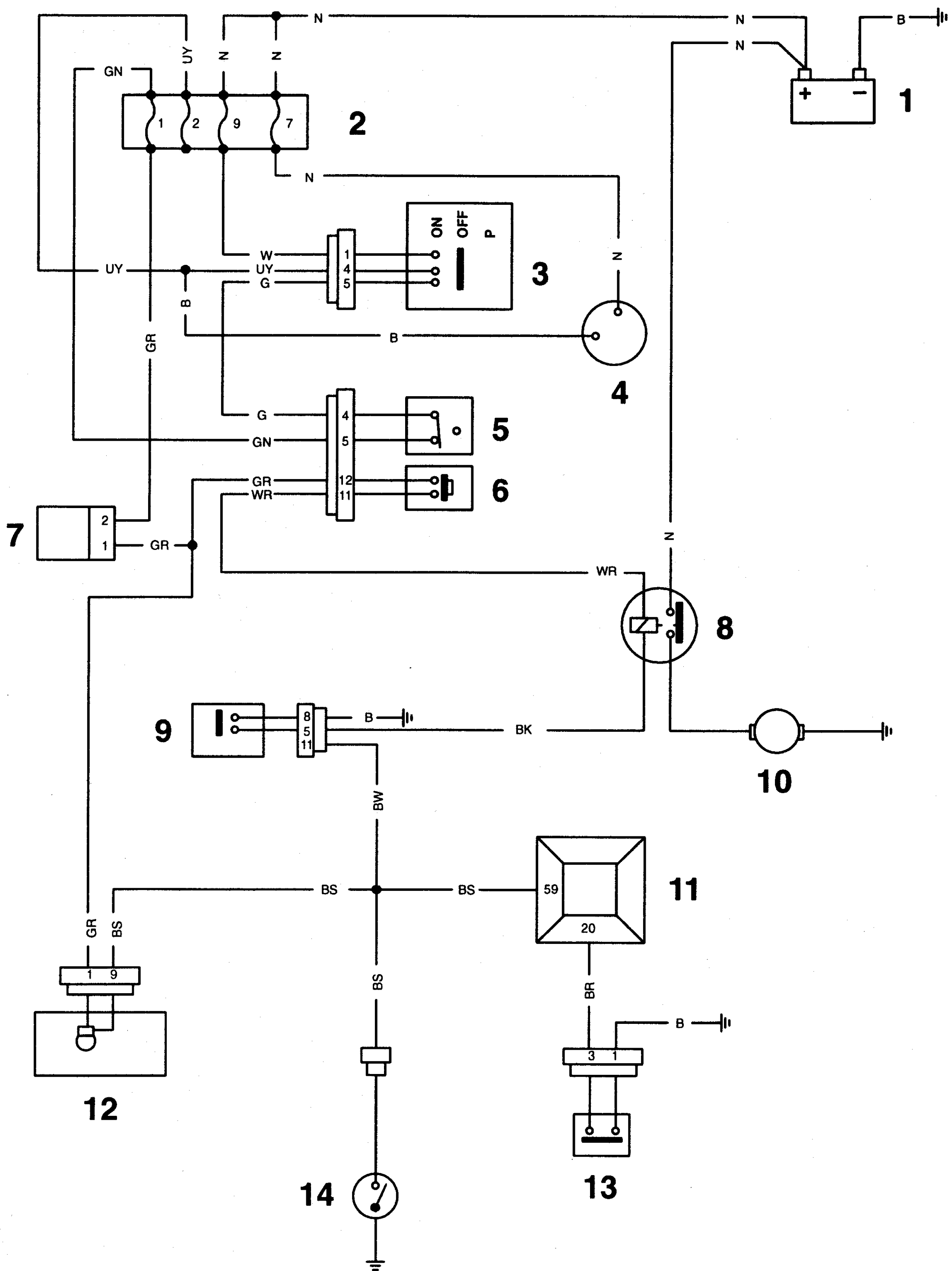
The wiring circuit found on the following page depicts the starting and charging circuit for the Daytona 955i and Speed Triple models.

The key found below must be used for identification of components.

Key No:	Item Description
1	Battery
2	Fuses 1, 9 and 7
3	Ignition Switch
4	Alternator
5	Engine Stop (kill) Switch
6	Engine Start Button
7	Alarm Control Unit (or shorting plug)
8	Starter Solenoid
9	Clutch Lever Switch
10	Starter Motor
11	Engine Control Module
12	Neutral Warning Light
13	Sidestand Switch
14	Neutral Switch

Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Grey
O	Orange
K	Pink
LG	Light Green
R	Red
P	Purple
W	White
Y	Yellow

Circuit Diagram – Starting/Charging – from VIN 71699



ALTERNATOR

Removal

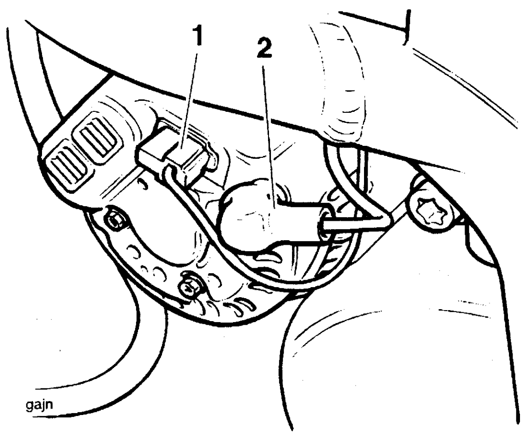
1. Remove the seat and disconnect the battery, negative (black) lead first.

2. Remove the belly panel and left hand fairing (if fitted).

3. Drain the coolant from the crankcase as described in the Cooling System section.

4. Detach the water pump hose at its connection to the crankcase.

5. Disconnect the cable and the multiplug from the alternator.



1. Multiplug

2. Cable

6. Release the alternator by removing the alternator to crankcase securing bolts.

7. Remove the alternator, capturing the 4 cush drive rubbers from the cush drive.

Inspection

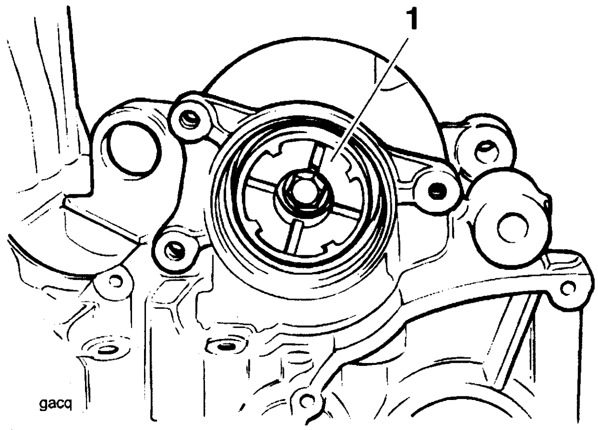
1. Inspect the alternator 'O' ring and renew if damaged / stretched.

Installation

1. Fit the cush drive rubbers into the alternator cush drive.

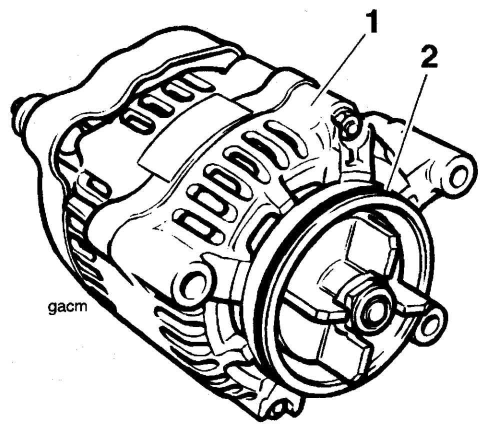
NOTE:

- **If necessary, a small amount of petroleum jelly can be used to hold the rubbers in position.**



1. Alternator Drive Rubbers

2. Fit the 'O' ring to the alternator and smear with a small amount of engine oil.



1. Alternator 'O' ring

3. Fit the alternator and tighten the bolts to **20 Nm.**

NOTE:

- **Ensure the earth cable is fitted to the rear bolt.**

4. Connect the cable and the multiplug to the alternator.

5. Refit the water pump hose.

6. Fit a new washer to the coolant drain screw and tighten the screw to **12 Nm.**

7. Fill the cooling system with the specified coolant (see section 'Cooling System' for correct filling procedure).

8. Refit the fairing and belly panel (if removed).

9. Connect the battery, positive (red) lead first.

10. Refit the seat.

STARTER MOTOR

Removal

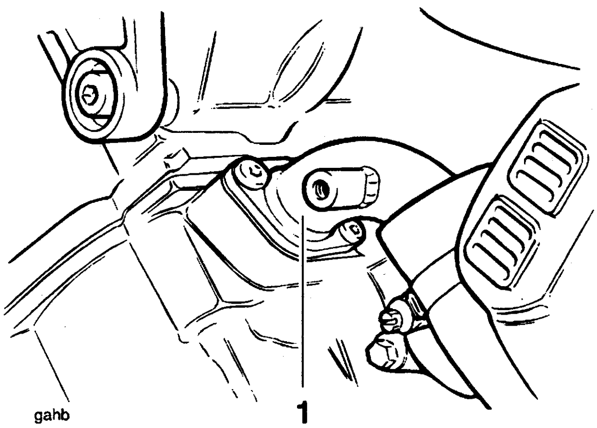
1. Remove the seat and disconnect the battery, negative (black) lead first.

2. Remove the belly panel and left hand fairing (if fitted).

3. Drain the coolant from the cylinder block as described in the section 'Cooling System'.

4. Detach the water pump hose at its connection to the crankcase.

5. Remove the coolant elbow from the crankcase. Clean off all traces of gasket from the elbow and crankcase mating faces.



1. Coolant Elbow

6. Disconnect the starter motor cable .

7. Release the starter motor from the crankcase.

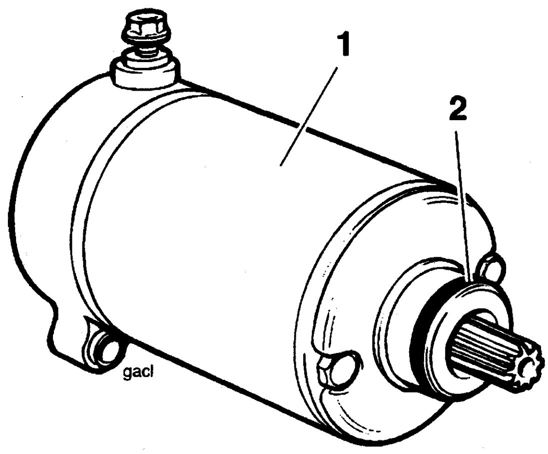
8. Remove the starter motor.

Installation

1. Clean the mating faces of the crankcase and starter motor to ensure efficient grounding.

2. Inspect the sealing 'O' ring and renew if damaged / stretched.

3. Fit the 'O' ring to the starter motor and smear with a small amount of engine oil.



1. Starter Motor

2. 'O' ring

4. Fit the starter motor and tighten the securing bolts to **10 Nm**.

5. Connect the starter motor cable.

6. Apply sealant to both sides of a new coolant elbow gasket. Fit the elbow and tighten the securing nuts to **12 Nm**.

7. Fit a new washer to the coolant drain screw and tighten the screw to **12 Nm.**

8. Fill the cooling system with the specified coolant (see section 'Cooling System' for correct filling procedure).

9. Refit the fairing and belly panel (if removed).

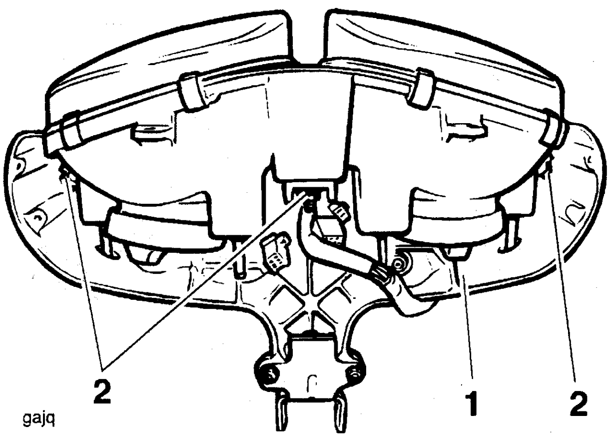
10. Connect the battery, positive (red) lead first.

11. Refit the seat.

INSTRUMENTS

Removal

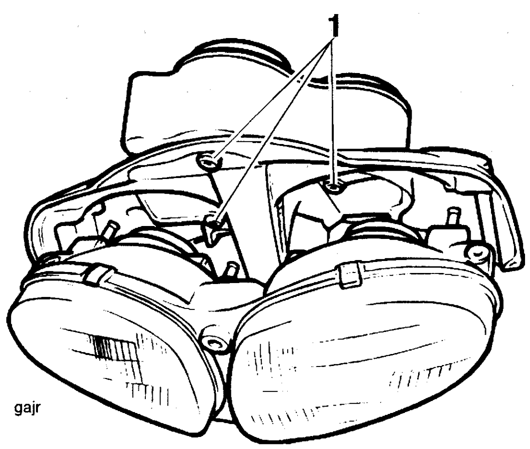
1. Remove the seat and disconnect the battery, negative (black) lead first.
2. Remove the cockpit fairing (where fitted) as described in the 'Body' section.
3. On T595 Daytona models only, support the headlight assembly and remove 3 fixings to detach it from the headlight casting.



1. Headlight Casting

2. Headlight Retaining Screws

4. On T509 Speed Triple models, turn the steering to allow access to the instrument mounting screws.
5. Disconnect the speedometer cable.
6. Disconnect the multiplugs to the instrument pack.
7. Release the instrument pack by removing the screws securing it to the headlight casting/mounting bracket.



1. Instrument Pack mounting Screws

8. Release the instrument to be accessed by removing its securing nuts and washers.

NOTE:

- **If removing the speedometer, first unscrew and remove the tripmeter knob.**

9. Pull out the panel illumination bulb holders.

Installation

1. Installation is the reverse of the removal procedure, ensuring the rubber seal is correctly located in the instrument aperture before fitting the instrument(s).

NOTE:

- **If all the instruments have been removed, fit the speedometer before the tachometer.**

FUSES

Fuse Identification

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 below to establish which fuse has blown.

Fuse No	Circuits Protected	Fuse Rating
1	Ignition Control	10A
2	Dip and Main Beam Right Hand	15A
3	Side and Rear Light	5A
4	Indicators/Stop Light	10A
5	Fan	10A
6	Dip and Main Beam Left Hand	15A
7	Main Fuse	40A
8	Fuel Pump ECU	15A
9	All circuits from ignition switch	30A
10	Spare	–

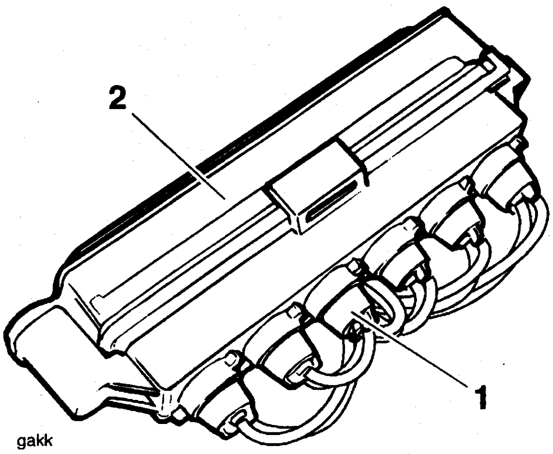
NOTE:

- **The fuse identification numbers listed above correspond with those printed on the fuse box cover.**

INSTRUMENT WARNING LIGHTS

Removal

1. Remove the instrument pack and all 3 instruments as described in 'Instruments Removal'.
2. Remove the screws securing the instrument facia to its housing.
3. Remove the screws securing the warning light cover housing to the instrument pack, and remove the housing.
4. Pull out the holder of the bulb to be accessed, and remove the bulb.



1. Bulb Holders

2. Warning Light Housing

Installation

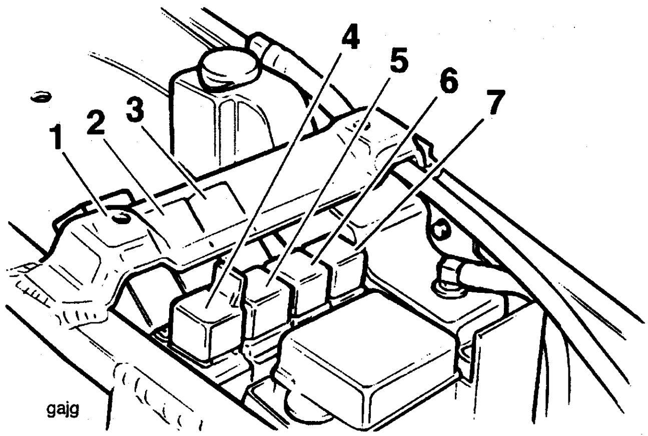
1. Installation is the reverse of the above.

RELAY PACK

A relay pack is situated beneath the front seat which also contains the indicator unit.

The relay are attached to the bracket by means of barbed extensions. Never exert extreme force when removing a relay as this may cause damage and never pull on the relay block connector.

Identification of Relays



1. Indicator Unit

2. Headlamp Dip Beam

3. Headlamp Main Beam

4. Headlamp Cut–out*

5. Cooling Fan

6. Fuel Pump

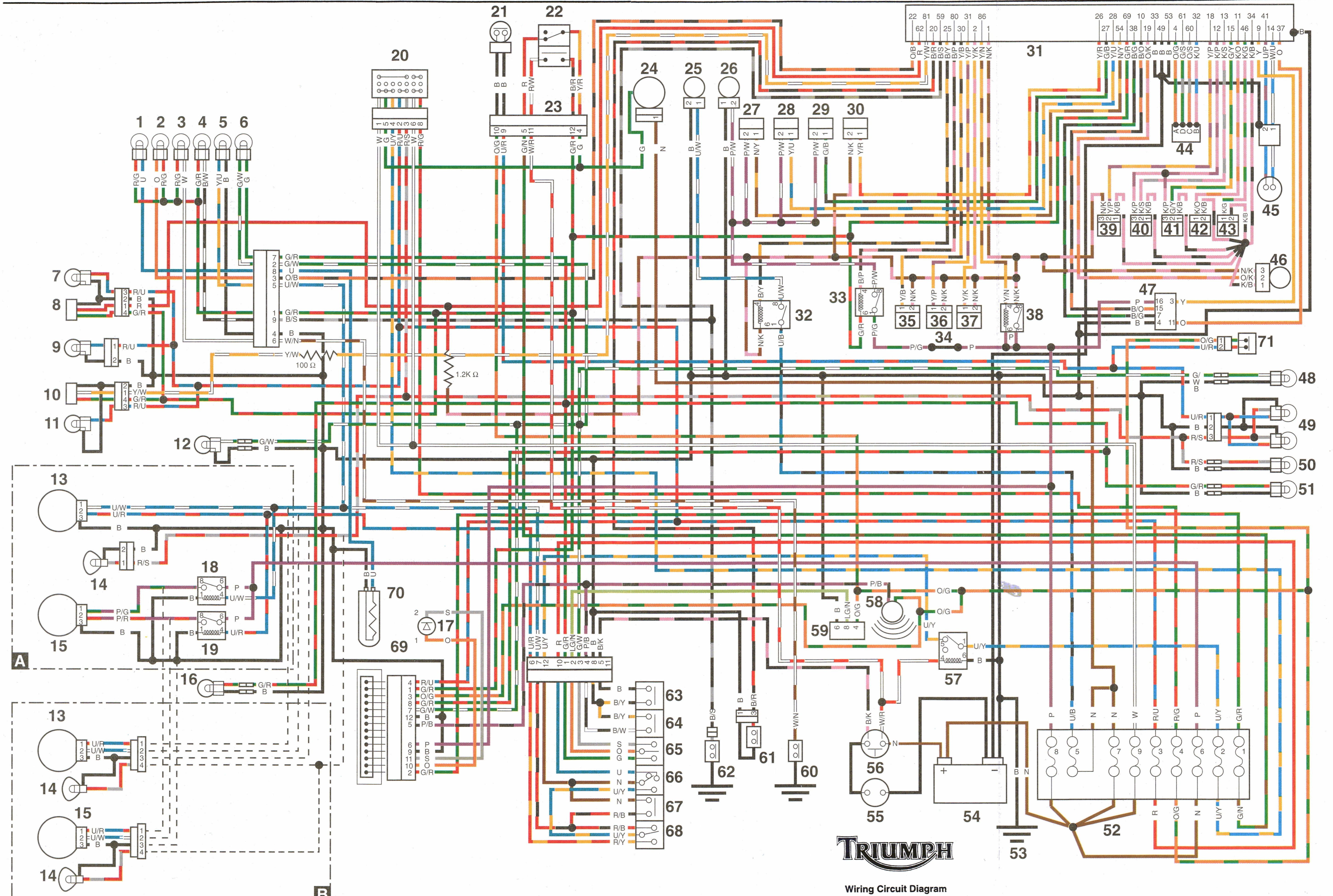
7. ECM Main Power Relay

*** (Daytime lights-on countries only)**

Key To Wiring Circuit Diagram

1	Low Fuel Warning Light
2	Malfunction Indicator Light
3	Low Oil Pressure Warning Light
4	Neutral Warning Light
5	Main Beam Warning Light
6	Direction Indicator Warning Light
7	Tachometer Illumination
8	Tachometer
9	Speedometer Illumination
10	Water Temperature Gauge
11	Water Temperature Gauge Illumination
12	Right Hand Front Indicator
13	Right Hand Headlight
14	Position Light
15	Left Hand Headlight
16	Left Hand Front Indicator
17	Alarm LED
18	Main Beam Relay
19	Dip Beam Relay
20	Ignition Switch/Steering Lock
21	Front Brake Light Switch
22	Engine Stop Switch
23	Start Button
24	Alternator
25	Fan Motor
26	Fuel Pump
27	Ignition Coil 1
28	Ignition Coil 2
29	Ignition Coil 3
30	Purge Valve (California Models Only)
31	Engine Control Module
32	Cooling Fan Relay
33	Fuel Pump Relay
34	Wire Link
35	Injector 3
36	Injector 2
37	Injector 1

38	Main Power Relay
39	Camshaft Position Sensor
40	Barometric Pressure Sensor
41	Throttle Potentiometer
42	Inlet Air Temperature Sensor
43	Coolant Temperature Sensor
44	Idle Air Control Valve Stepper Motor
45	Crankshaft Position Sensor
46	Road Speed Sensor
47	Diagnostic Connector
48	Right Hand Rear Indicator
49	Stop/Rear Light
50	Number Plate Light
51	Left Hand Rear Indicator
52	Main Fuse Box
53	Chassis Ground Point
54	Battery
55	Starter Motor
56	Starter Solenoid
57	Lighting Inhibit ion Relay
58	Horn
59	Direction Indicator Unit
60	Low Oil Pressure warning Light Switch
61	Side Stand Switch
62	Neutral Switch
63	Clutch Switch
64	Horn Switch
65	Direction Indicator Switch
66	Light Switch
67	Pass Switch
68	Dip Switch
69	Alarm Connection (Alarm Optional)
70	Low Fuel Level Sender
71	Rear Brake Light Switch
A	T595 Daytona Headlights
B	T509 Speed Triple Headlights

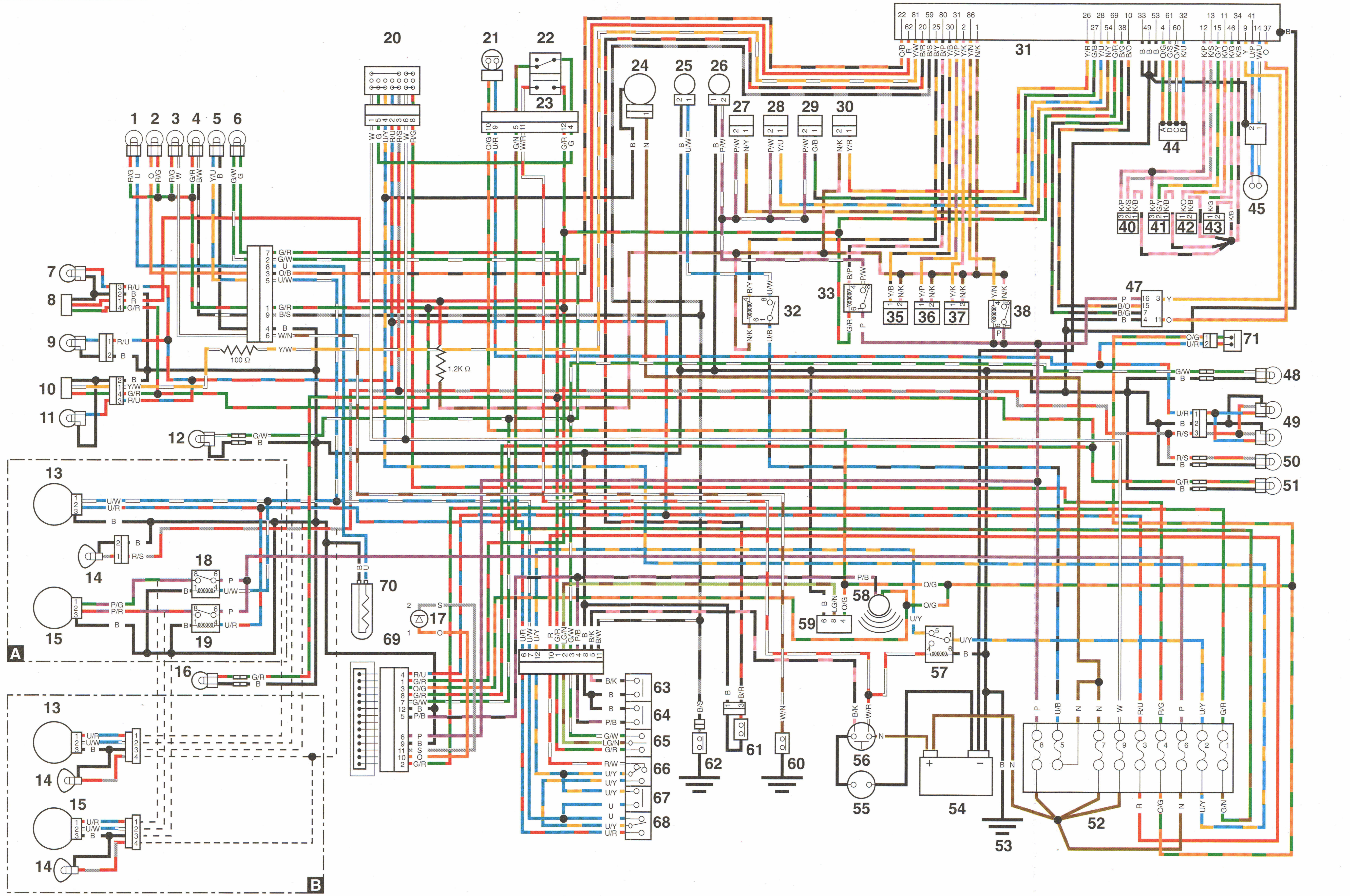


Wiring Circuit Diagram
T595 Daytona/T509 Speed Triple (885cc)

Key To Wiring Circuit Diagram

1	Low Fuel Warning Light
2	Malfunction Indicator Light
3	Low Oil Pressure Warning Light
4	Neutral Warning Light
5	Main Beam Warning Light
6	Direction Indicator Warning Light
7	Tachometer Illumination
8	Tachometer
9	Speedometer Illumination
10	Water Temperature Gauge
11	Water Temperature Gauge Illumination
12	Right Hand Front Indicator
13	Right Hand Headlight
14	Position Light
15	Left Hand Headlight
16	Left Hand Front Indicator
17	Alarm LED
18	Main Beam Relay
19	Dip Beam Relay
20	Ignition Switch/Steering Lock
21	Front Brake Light Switch
22	Engine Stop Switch
23	Start Button
24	Alternator
25	Fan Motor
26	Fuel Pump
27	Ignition Coil 1
28	Ignition Coil 2
29	Ignition Coil 3
30	Purge Valve (California Models Only)
31	Engine Control Module
32	Cooling Fan Relay
33	Fuel Pump Relay
34	Wire Link
35	Injector 3
36	Injector 2
37	Injector 1

38	Main Power Relay
39	Not Used
40	Barometric Pressure Sensor
41	Throttle Potentiometer
42	Inlet Air Temperature Sensor
43	Coolant Temperature Sensor
44	Idle Air Control Valve Stepper Motor
45	Crankshaft Position Sensor
46	Not Used
47	Diagnostic Connector
48	Right Hand Rear Indicator
49	Stop/Rear Light
50	Number Plate Light
51	Left Hand Rear Indicator
52	Main Fuse Box
53	Chassis Ground Point
54	Battery
55	Starter Motor
56	Starter Solenoid
57	Lighting Inhibit ion Relay
58	Horn
59	Direction Indicator Unit
60	Low Oil Pressure warning Light Switch
61	Side Stand Switch
62	Neutral Switch
63	Clutch Switch
64	Horn Switch
65	Direction Indicator Switch
66	Light Switch
67	Pass Switch
68	Dip Switch
69	Alarm Connection (Alarm Optional)
70	Low Fuel Level Sender
71	Rear Brake Light Switch
A	T595 Daytona Headlights
B	T509 Speed Triple Headlights



TRIUMPH

Wiring Circuit Diagram

Daytona 955i/Speed Triple (955cc)

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