TRIUMPH

Daytona 955i
Speed Triple

Both from 2002 model year onwards

Motorcycle Service Manual

Part Number 3850595 issue 2, 07.03

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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.**

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

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

In the presence of any water or humidity hydrogen fluoride may dissolve to form extremely corrosive liquid hydrofluoric acid.
If such conditions exist, do not touch the material and avoid all skin contact. Skin contact with liquid or decomposition residues can cause painful and penetrating burns leading to permanent, irreversible skin and tissue damage.

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.

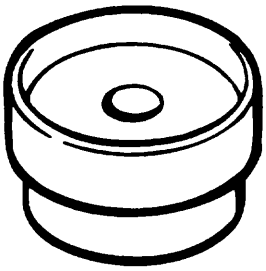
Authorised Triumph Dealers are not agents of Triumph and have no authority to bind the manufacturer by any expressed or implied undertaking or representation.

Service tools and garage equipment

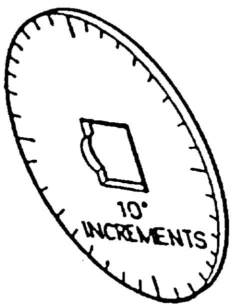
Special service tools have been developed to facilitate removal, dismantling and assembly of certain mechanical components in a practical manner without causing damage. Some operations in this Service Manual cannot be carried out without the aid of the relevant service tools. Where this is the case,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

Special service tools:-

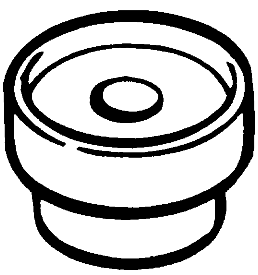
3880075-T0301 - Wheel Bearing Fitment



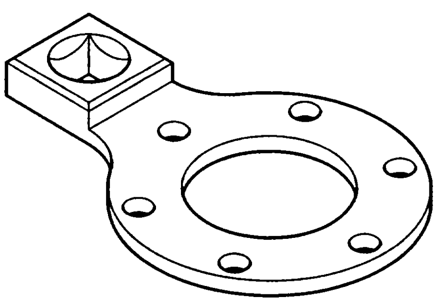
T3880105 - Angular Torque Gauge



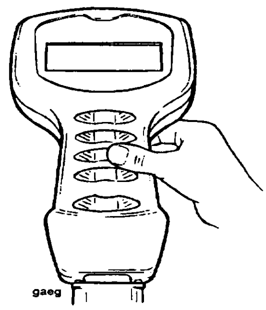
3880070-T0301 - Wheel Bearing Fitment



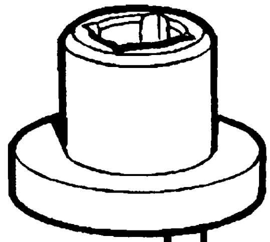
T3880371 - Holder, Oil Pump Drive Gear



T3880250 - Engine Management Diagnostics

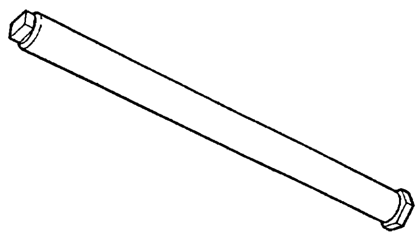


T3880300 - Wrench, Yoke Upper Nut

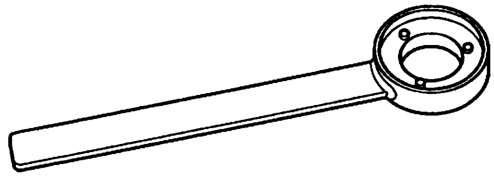


gabe

3880090-T0301 - Fork Piston Holder

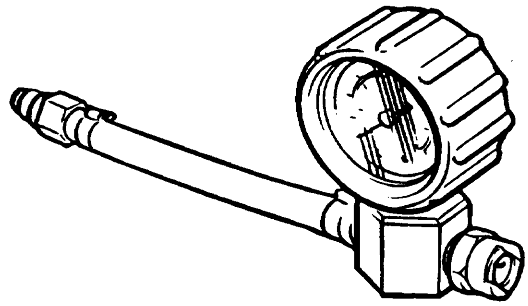


T3880017 - Holder, Sprag Clutch

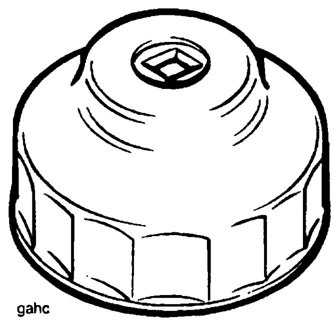


mm

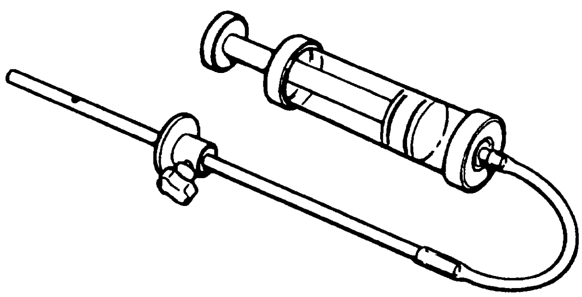
T3880048 - Fuel Pressure Gauge



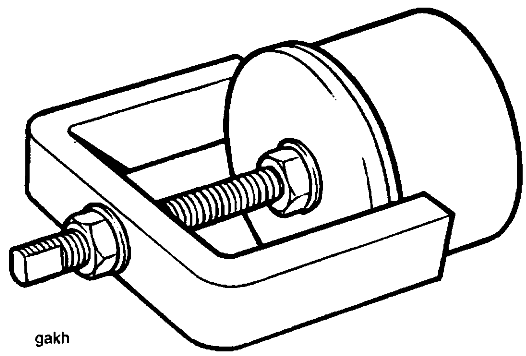
T3880311 - Oil Filter Wrench



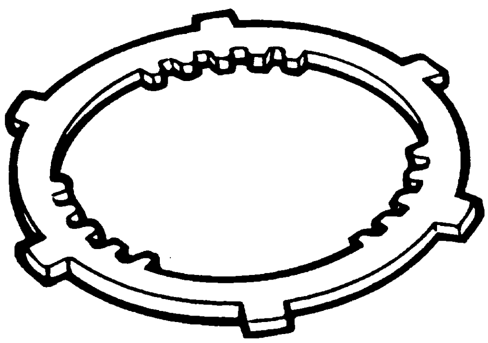
3880160-T0301 - Fork Filler/Evacuator



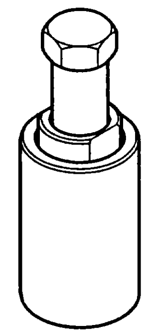
T3880315 - Extractor - Cylinder Liners



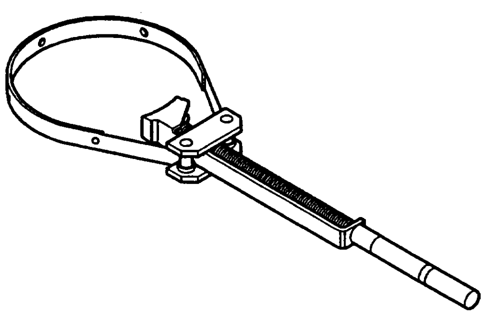
T3880305 - Clutch Anti-rotation Tool



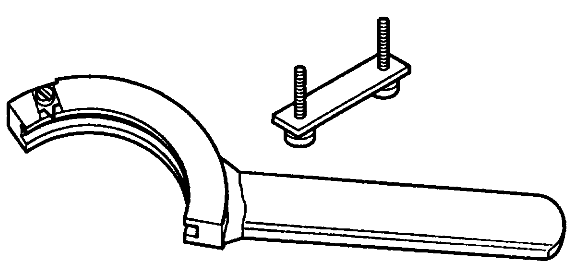
T3880365 - Puller, Alternator Rotor



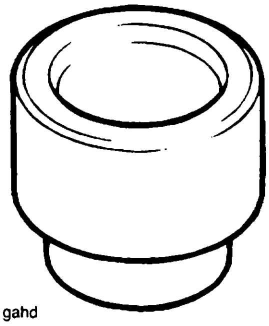
T3880375 - Alternator rotor holder



T3880016 - Holder, Balancer Gear



T3880285 - Fork Seal/Bearing Drift



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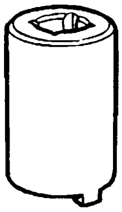
T3880290 - Wrench, Swinging Arm Adjuster



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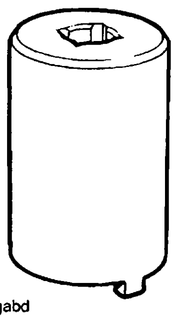
T3880295 - Wrench, Swinging Arm Adjuster Lock-Ring



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Full Specification		Speed Triple 955cc	Daytona 955i
Engine			
Engine configuration		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		12.0 : 1	12.0 : 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		120 PS @ 9100 RPM	149 PS @ 10700 RPM
Max. Torque		100 Nm @ 5100 RPM	100 Nm @ 8200 RPM
Cylinder Head/Valves			
Valve Head Dia.	In.	33.5 mm	33.5 mm
	Ex.	27.0 mm	27.0 mm
Valve Lift	In.	9.15 mm	10.15 mm
	Ex.	8.00 mm	9.65 mm
Valve Stem Dia.	In.	4.975 - 4.990 mm	4.975 - 4.990 mm
Service limit		4.965 mm	4.965 mm
	Ex.	4.955 - 4.990 mm	4.955 - 4.990 mm
Service limit		4.945 mm	4.945 mm
Valve Guide Bore Dia.	In	5.00 mm - 5.015 mm	5.00 mm - 5.015 mm
Service limit		5.043 mm	5.043 mm
	Ex	5.00 mm - 5.035 mm	5.000 mm - 5.035 mm
Service limit		5.063 mm	5.063 mm
Valve Stem to Guide Clearance	In.	0.010 - 0.040 mm	0.010 - 0.040 mm
	Ex.	0.030 - 0.060 mm	0.030 - 0.060 mm
Valve Seat Width (in head)	In	0.9 - 1.1 mm	0.9 - 1.1 mm
Service limit		1.5 mm	1.5 mm
	Ex	1.1 - 1.3 mm	1.1 - 1.3 mm
Service limit		1.7 mm	1.7 mm
Valve Seat Width (valve)		1.5 - 1.9 mm	1.5 - 1.9 mm
Valve Seat Angle		45°	45°
Inlet Valve Spring 'Load at Length		181 N +/-9 at 24.5 mm (Inner) 374 N +/- 19N at 26.05mm (Outer)	181 N +/-9N at 24.5 mm (Inner) 374 N +/- 19N at 26.05mm (Outer)
Exhaust Valve Spring 'Load at Length'		471N +/- 24 N at 25 mm	471N +/- 24 N at 25 mm
Valve Clearance	In.	0.10 - 0.20 mm	0.10 - 0.20 mm
	Ex.	0.20 - 0.30 mm	0.20 - 0.30 mm
Valve Bucket Dia.		28.476 - 28.490 mm	28.476 - 28.490 mm
Service limit		28.468 mm	28.468 mm
Valve Bucket Bore Dia.		28.515 - 28.535 mm	28.515 - 28.535 mm
Service limit		28.549 mm	28.549 mm

Full Specification			Speed Triple 955cc	Daytona 955i
Camshafts				
Cam Timing	Inlet	Open	26° BTDC (@ 1.0 mm Lift)	25° BTDC (@ 1.0 mm Lift)
		Close	38° ABDC (@ 1.0 mm Lift)	53° ABDC (@ 1.0 mm Lift)
		Duration	244°	258°
	Exhaust	Open	43° BBDC (@ 1.0 mm Lift)	39.5° BBDC (@ 1.0 mm Lift)
		Close	5° ATDC (@ 1.0 mm Lift)	29° ATDC (@ 1.0 mm Lift)
		Duration	228°	249°
Camshaft Journal Dia.			22.93 - 22.96 mm 22.953 - 22.956 mm (Outrigger)	2.93 - 22.96 mm 22.953 - 22.956 mm (Outrigger)
Camshaft Journal Clearance ..		Cyl 1-3	0.040 - 0.091	0.040 - 0.091
Service limit			0.13 mm	0.13 mm
		Outrig'r	0.044 - 0.068 mm	0.040 - 0.068 mm
Service limit			0.13 mm	0.13 mm
Camshaft Journal Bore Dia.			23.000 mm - 23.021 mm	23.000 mm - 23.021 mm
Camshaft End Float			0.03 - 0.13 mm	0.03 - 0.13 mm
Service limit			0.20 mm	0.20 mm
Camshaft Run-out			0.05 mm max	0.05 mm max
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			10	10
Plate Flatness			Within 0.2 mm	Within 0.2 mm
Friction Plate Thickness (inner and outer)			3.80mm	3.80mm
Service limit			3.60 mm	3.60 mm
Friction Plate Thickness (all others)			3.30 mm	3.30 mm
Service limit			3.10 mm	3.10 mm
Clutch Actuation Method			Cable	Cable
Cable Free Play (at lever)			0.4 - 0.8 mm	0.4 - 0.8 mm
Balancer				
End float			0.06 - 0.41 mm	0.06 - 0.41 mm

Full Specification	Speed Triple 955cc	Daytona 955i
Pistons		
Cylinder Bore Dia.	79.030 - 79.050 mm	78.985 - 79.003 mm
Service limit	79.100 mm	79.053
Piston Dia. (at 90° to gudgeon pin)	78.960 - 78.975 mm Cyl. Nos. 1 & 3	78.970 - 78.980 mm Cyl. Nos. 1 & 3
Service limit	78.920 mm	78.930 mm
Piston Dia. (at 90° to gudgeon pin)	78.960 - 78.970 mm Cyl. No. 2	78.970 - 78.980 mm Cyl. No. 2
Service limit	78.920 mm	78.930 mm
Piston Ring to Groove Clearances		
Top	0.02 - 0.06 mm	0.02 - 0.06 mm
Service limit	0.075 mm	0.075 mm
Second	0.02 - 0.06 mm	0.02 - 0.06 mm
Service limit	0.075 mm	0.075 mm
Piston Ring End Gaps		
Top	0.28 - 0.43 mm	0.15 - 0.30 mm
Service limit	0.55 mm	0.42 mm
Second	0.43 - 0.58 mm	0.30 - 0.45 mm
Service limit	0.73 mm	0.60 mm
Oil	0.33 - 0.83 mm	0.20 - 0.70 mm
Service limit	1.03 mm	0.90 mm
Gudgeon Pin Bore Dia. In Piston	19.002 - 19.008 mm	16.993 - 17.001 mm
Service limit	19.036 mm	17.029 mm
Gudgeon Pin Dia.	18.995 - 19.000 mm	16.984 - 16.989 mm
Service limit	18.985 mm	16.974 mm
Connecting Rods		
Connecting Rod Small End Dia.	19.016 mm - 19.034 mm	17.005 - 17.018 mm
Service limit	19.050 mm	17.028 mm
Connecting Rod Big End Side Clearance	0.15 - 0.30 mm	0.15 - 0.30 mm
Service limit	0.50 mm	0.50 mm
Crankshaft		
Crankshaft Big End Journal Dia.	40.946 - 40.960 mm	34.984 - 35.000 mm
Service limit	40.922 mm	34.960 mm
Crankshaft Big End Bearing Clearance	0.036 - 0.066 mm	0.036 - 0.066 mm
Service limit	0.10 mm	0.10 mm
Crankshaft Main Bearing Journal Dia.	37.960 - 37.976 mm	37.960 - 37.976 mm
Service limit	37.936 mm	37.936 mm
Crankshaft Main Bearing Clearance	0.019 - 0.044 mm	0.019 - 0.044 mm
Service limit	0.07 mm	0.07 mm
Crankshaft End Float	0.05 - 0.20 mm	0.05 - 0.20 mm
Service limit	0.40 mm	0.40 mm
Crankshaft run-out	0.02 mm or less	0.02 mm or less
Service limit	0.05 mm	0.05 mm

Full Specification	Speed Triple 955cc	Daytona 955i
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	5.8 - 5.9 mm	5.8 - 5.9 mm
Service limit	5.7 mm	5.7 mm
Gear Selector Groove Width	6.0 - 6.1 mm	6.0 - 6.1 mm
Service limit	6.25 mm	6.25 mm
Gear Selector Fork to Groove Clearance	0.55 mm max.	0.55 mm max.
Final Drive		
Final Drive	Chain	Chain
Final Drive Ratio (single sided swing arm)	2.333 (18/42)	2.333 (18/42)
Final Drive Ratio (twin sided swing arm)	2.316 (19/44)	2.316 (19/44)
Chain Type	DID X-ring	DID X-ring
No. of Links	106	106
20 Link Length	321 mm	321 mm
Drive Chain Play (single sided swing arm	35-40 mm	35-40 mm
Drive Chain Play (twin sided swing arm)	30-35 mm	30-35 mm
Chain lubrication	Mobil chain spray	Mobil chain spray
Lubrication		
Type	Pressure Lubrication, Wet Sump	Pressure Lubrication, Wet Sump
Oil Capacity (dry fill)	3.50 litres	3.50 litres
Oil Capacity (wet fill including filter)	3.20 litres	3.20 litres
Oil Capacity (wet fill excluding filter)	3.00 litres	3.00 litres
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	0.15 mm
Service limit	0.2 mm	0.2 mm
Oil Pump Body Clearance	0.15 - 0.22 mm	0.15 - 0.22 mm
Service limit	0.35 mm	0. 35 mm
Oil Pump Rotor End Float	0.02 - 0.07 mm	0.02 - 0.07 mm
Service limit	0.10 mm	0.10 mm
Ignition System		
Type	Digital Inductive	Digital Inductive
Electronic Rev-Limiter	9700 rpm	11500 rpm
Pick up Coil Resistance	0.56 KΩ ± 10% @ 20°C	0.56 KΩ ± 10% @ 20°C
Ignition Coil Type	Plug-top	Plug-top
Spark Plug Type	NGK-CR9EK	NGK-CR9EK
Spark Plug Gap	0.7 mm	0.7 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	22 Litres	22 Litres
Low Level Warning Lamp	4 litres remaining	4 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	1200 RPM	1200 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, Lambda Sensor Induction air temperature	Barometric Pressure Throttle Position, Coolant Temperature Crankshaft Position, Lambda Sensor 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	88°C (nominal)	88°C (nominal)
Cooling Fan Switch On Temperature	103°C	103°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)	78 mm	78 mm
Oil Volume (dry fill)	586cc	586cc
Front Fork Pull Through	Flush with top yoke upper face	Flush with top yoke upper face
Rear Wheel Travel	140 mm	130 mm
Rear Suspension Bearing Grease	Mobil Grease HP 222	Mobil Grease HP 222

Full Specification	Speed Triple 955cc	Daytona 955i
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 (single sided swinging arm)	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	5 mm
Service limit	4.5 mm	4.5 mm
Master Cylinder Diameter	14mm	14 mm
Recommended Fluid	Mobil Universal Brake and Clutch Fluid DOT4	Mobil Universal Brake and Clutch Fluid DOT4
Rear Type (twin sided swinging arm)	Hydraulically Actuated 1 Piston Caliper Single disc	Hydraulically Actuated 1 Piston Caliper Single disc
Caliper Piston Dia.	38.18 mm	38.18 mm
Disc Dia.	220 mm	220 mm
Disc Thickness	5 mm	5 mm
Service limit	4.5 mm	4.5 mm
Master Cylinder Diameter	14mm	14mm
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)	See section 14	See section 14
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)	See section 14	See section 14
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.

Full Specification	Speed Triple 955cc	Daytona 955i
Frame		
Frame Type	Twin-spar aluminium	Twin-spar aluminium
Overall Length	2115 mm	2072 mm
Overall Width	780 mm	725 mm
Overall Height	1340 mm	1165 mm
Wheelbase	1431 mm	1431 mm
Seat Height	815 mm	815 mm
Castor	22.8 °	22.8 °
Trail	81 mm	81 mm
Dry Weight	186 kg	188 kg
Max. Payload (rider, passenger, luggage & accessories)	185 kg	185 kg
Electrical Equipment		
Battery Type	GS GTX14-BS	GS GTX14-BS
Battery Rating	12V - 12 Amp. hour	12V - 12 Amp. hour
Alternator Rating	35A	35A
Fuses #1	Dip/main beam	Dip/main beam
#2	Ignition switch	Ignition switch
#3	Main fuse	Main fuse
#4	Horn, indicators, stop lights, diagnostics	Horn, indicators, stop lights, diagnostics
#5	Kill switch, fuel pump, ECM, starter	Kill switch, fuel pump, ECM, starter
#6	Engine management	Engine management
#7	Cooling fan	Cooling fan
#8	Instrument illumination	Instrument illumination
#9	Lighting	Lighting
#10	Position lights	Position lights

Torque Wrench Settings

Cylinder Head Area

Application	Torque(Nm)	Notes
Cam cover to cylinder head	10	
Secondary air injection valve covers to cam cover	9	
Cam chain tensioner to crankcase	9	
Cam chain tensioner centre bolt	23	
Camshaft bearing caps and camshaft bearing ladder to head	10	Lubricate threads
Camshaft sprocket to camshaft	15	Use new fixings
Cam chain tensioner blade to crankcase	18	Use a new fixing
Cam chain top pad to head	10	Use new fixings
Cylinder head to crankcase (M6 screws)	10	
Cylinder head to crankcase bolts	See section 3	
Sound suppression bolt in head	10	
Airbox front bracket to cam cover	12	
Oil feed pipe union to head	25	
Spark plug to cylinder head	20	

Clutch

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

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	
Connecting rod big end nut	See section 6	
Balancer retaining bolt	60	Apply Three-bond 1305 to the threads
Big end bearings	See section 6	
Sprag clutch to crankshaft	54	

Engine Covers

Application	Torque(Nm)	Notes
Clutch cover to crankcase	9	
Clutch cover sound suppression plate to cover	9	
Sprocket cover to crankcase	9	
Water outlet cover	9	
Alternator cover to crankcase	9	
Crank cover to crankcase	9	
Starter cover to crank cover	9	
Plug, crank cover	18	

Transmission

Application	Torque(Nm)	Notes
Output sprocket to output shaft	132	Use new tab washer
Detent wheel to selector drum	12	Use a new fixing
Detent arm bolt	12	Use a new fixing
Selector drum bearing retaining screw	12	Use a new fixing
Selector shaft retainer	12	Use a new fixing
Spring abutment bolt	28	
Neutral switch	10	
Gear pedal pinch bolt	9	

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 Three bond 1305 to the threads
Low oil pressure warning light switch to crankcase	13	Use new washers
Oil filter to adapter	10	
Oil cooler pipe unions - Daytona	10	Use new O-rings
Oil cooler pipe unions - Speed Triple	25	
Oil cooler to mountings - Daytona	9	
Oil cooler to mountings - Speed Triple	9	
Oil pump to crankcase	13.7	
Oil pump drive sprocket to pump shaft	15	
Oil feed pipe union to head	25	
Transmission oil feed pipes to crankcase	8	

Final Drive - single sided swinging arm versions

Application	Torque(Nm)	Notes
Rear sprocket to cush drive	33	
Chain guard to swinging arm	4.5	
Chain guard lower fixing	4.5	
Chain rubbing strip to swinging arm	4.5	
Cush drive housing to shaft	146	Use a new fixing

Final Drive - twin sided swinging arm versions

Application	Torque(Nm)	Notes
Rear sprocket to cush drive - twin sided swinging arm versions	55	
Chain guard to swinging arm - twin sided swinging arm versions	9	

Cooling System

Application	Torque(Nm)	Notes
Water pump to crankcase	10	
Radiator to frame	9	
Water elbow to head	12	
Thermostat housing to head	12	
Fan shroud to radiator	5	
Radiator bleed screw	12	
Crankcase coolant drain plug	13	

Fuel System, Exhaust System and Airbox

Application	Torque(Nm)	Notes
Fuel tank to frame (front fixing)	8	
Fuel tank to frame (rear fixing)	5	
Fuel cap to fuel tank	3	
Fuel pump mounting plate to fuel tank	5	
Fuel pipe clamp screw	4	
Throttle body transition piece to cylinder head	12	
Fuel rail bracket to cylinder head	6	
Fuel rail to bracket	6	
Throttle potentiometer to throttle body	2	
Exhaust downpipe to cylinder head	19	
Exhaust downpipe to frame	15	
Silencer mounting bracket to frame	27	
Exhaust clamp to downpipe	22	
Fuel level sensor to fuel tank	5	
Secondary air injection control solenoid to airbox	3	
Airbox upper section to lower	4	
Airbox to bracket	5	

Rear Suspension - single sided swinging arm models

Application	Torque(Nm)	Notes
Swinging arm spindle bolts	60	
Swinging arm rubbing strip bolts	7	
Caliper carrier location peg	40	
Rear hub/eccentric adjuster clamp bolt	55	
Chain guard bolts	7	
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	
Drop links to swinging arm	48	
Wheel hugger fixings	9	
Swinging arm end-float adjuster	15	
Swinging arm lateral adjuster lock ring	30	

Rear Suspension - twin sided swinging arm models

Application	Torque(Nm)	Notes
Swinging arm spindle nut	110	
Chain guard bolts	9	
Chain adjuster locknut	27	
Rear suspension unit upper mounting bolt	48	
Rear suspension unit lower mounting bolt/drop to drag link pivot	48	
Drag link pivot at frame	95	
Drop links to swinging arm	48	
Drop links to drag link	65	
Swinging arm lateral adjuster	15	
Swinging arm lateral adjuster lock ring	30	

Front Suspension

Application	Torque(Nm)	Notes
Upper yoke pinch bolt	20	
Lower yoke pinch bolt	20	
Fork top cap to inner tube	22	
Upper yoke centre nut	65	
Damping cylinder bolt	35	Use a new washer
Handlebar clamp to top yoke (Daytona)	11	
Handlebar clamp bolt (Daytona)	27	
Handlebar clamp base to top yoke (Speed Triple)	35	
Handlebar upper clamp to lower clamp (Speed Triple)	22	

Wheels

Application	Torque(Nm)	Notes
Front wheel spindle/axle bolt	65	
Front wheel spindle pinch bolts	20	
Rear wheel spindle nut - twin sided swinging arm models	110	
Rear wheel to stub axle - single sided swinging arm models only	146	

Front Brakes

Application	Torque(Nm)	Notes
Front brake caliper to fork	40	
Front brake pad retaining pin	20	
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 mounting	9	
Front brake hose to master cylinder	25	
Front brake disc to wheel	22	Use new fixings

Rear Brakes

Rear brake caliper to carrier (single sided swinging arm versions only)	40	
Rear brake pad retaining pin (single sided swinging arm versions only)	20	
Rear brake caliper to carrier (twin sided swinging arm versions only)	20	M8 bolt only
Rear brake caliper to carrier (twin sided swinging arm versions only)	29	M12 bolt only
Rear brake pad retaining pin (twin sided swinging arm versions only)	17	
Rear brake pad retaining pin plug (twin sided swinging arm versions only)	17	
Rear brake caliper bleed screw	7	
Rear brake hose to caliper	25	
Rear brake master cylinder to frame	18	Use new fixings
Rear brake master cylinder reservoir to battery box	3	
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	See section 6	
Lower crankcase to frame	See section 6	
Cylinder head to frame	See section 6	
Engine mounting bracket to frame	See section 6	
Engine mounting bracket to cylinder head	30	
Control plate to frame, left hand	30	Use new fixings
Control plate and master cylinder to frame, right hand	18	Use new fixings
Front footrest to control plate	80	Use a new fixing
Rear footrest hanger to frame	27	
Side stand mounting bracket	40	
Side stand pivot bolt	20	

Electrical

Application	Torque(Nm)	Notes
Alternator rotor to crankshaft	105	
Alternator stator to cover	12	
Alternator regulator to frame	7	
Starter motor to crankcase	10	
Spark plug to cylinder head	20	

Bodywork

Application	Torque(Nm)	Notes
Cockpit subframe fixings	9	
Cockpit to lower fairing	3	
Mirror to cockpit subframe	9	
Lower fairing to brackets	3	
Rear panels to frame	3	
Front seat bracket fixings	6	

MAINTENANCE

CONTENTS

Page

INTRODUCTION

This maintenance schedule given overleaf describes the maintenance requirements for the Daytona 955i and Speed Triple models.

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.

Scheduled Maintenance Chart

Operation Description	Odometer Reading in Miles (Kms) or time period, whichever comes first.						
	Every	500 (800) 1month	6000 (10000) 1 year	12000 (20000) 2 years	18000 (30000) 3 years	24000 (40000) 4 years	30000 (50000) 5 years
Engine oil cooler - check for leaks	-	●	●	●	●	●	●
Engine oil - renew	-	●	●	●	●	●	●
Engine oil filter - renew	-	●	●	●	●	●	●
Valve clearances - check/adjust	-			●		●	
Cam chain wear - check	-					●	
Air cleaner - renew	-			●		●	
Engine ECM - check for stored DTCs	-	●	●	●	●	●	●
Spark plugs - check	-		●	●		●	●
Spark plugs - renew	-				●		
Throttle bodies - balance	-			●		●	
Throttle cable - check/adjust	Day	●	●	●	●	●	●
Cooling system - check for leaks	Day	●	●	●	●	●	●
Coolant level - check/adjust	Day	●	●	●	●	●	●
Coolant - renew	Every 2 Years						
Fuel system - check for leaks	Day	●	●	●	●	●	●
Lights, instrument & electrical systems - check	Day	●	●	●	●	●	●
Fuel Filter - renew	-			●		●	
Steering - check for free operation	Day	●	●	●	●	●	●
Headstock bearing - check/adjust	-			●		●	
Headstock bearing - lubricate	-			●		●	
Forks - check for leaks/smooth operation	Day	●	●	●	●	●	●
Fork oil - renew	-			●		●	
Brake fluid levels - check	Day	●	●	●	●	●	●
Brake fluid - renew	Every 2 years						
Brake hoses - renew	Every 4 years						
Brake pads - check wear levels	Day	●	●	●	●	●	●
Brake master cylinder - renew seals	Every 4 years						
Brake calipers - renew seals	Every 4 years						

Operation Description	Odometer Reading in Miles (Kms) or time period, whichever comes first.						
	Every	500 (800) 1month	6000 (10000) 1 year	12000 (20000) 2 years	18000 (30000) 3 years	24000 (40000) 4 years	30000 (50000) 5 years
Drive chain - lubricate	Every 200 miles (300 kms)						
Drive chain - wear check	Every 500 miles (800 kms)						
Drive chain slack - check/adjust	Day	●	●	●	●	●	●
Drive chain rubbing strip - check	-		●	●	●	●	●
Rear suspension - lubricate	3 years/18000 miles (30000 kms)						
Rear wheel bearing - lubricate (single sided swing arm only)				●		●	
Fasteners - inspect visually for security	Day	●	●	●	●	●	●
Wheels - inspect for damage	Day	●	●	●	●	●	●
Tyre wear/tyre damage - check	Day	●	●	●	●	●	●
Tyre pressures - check/adjust	Day	●	●	●	●	●	●
Clutch cable - check/adjust	Day	●	●	●	●	●	●
Secondary air injection system - clean and reset				●			●
Fuel/evaporative* hoses - renew	Every 4 years						

* Evaporative hoses on California models only

CYLINDER HEAD

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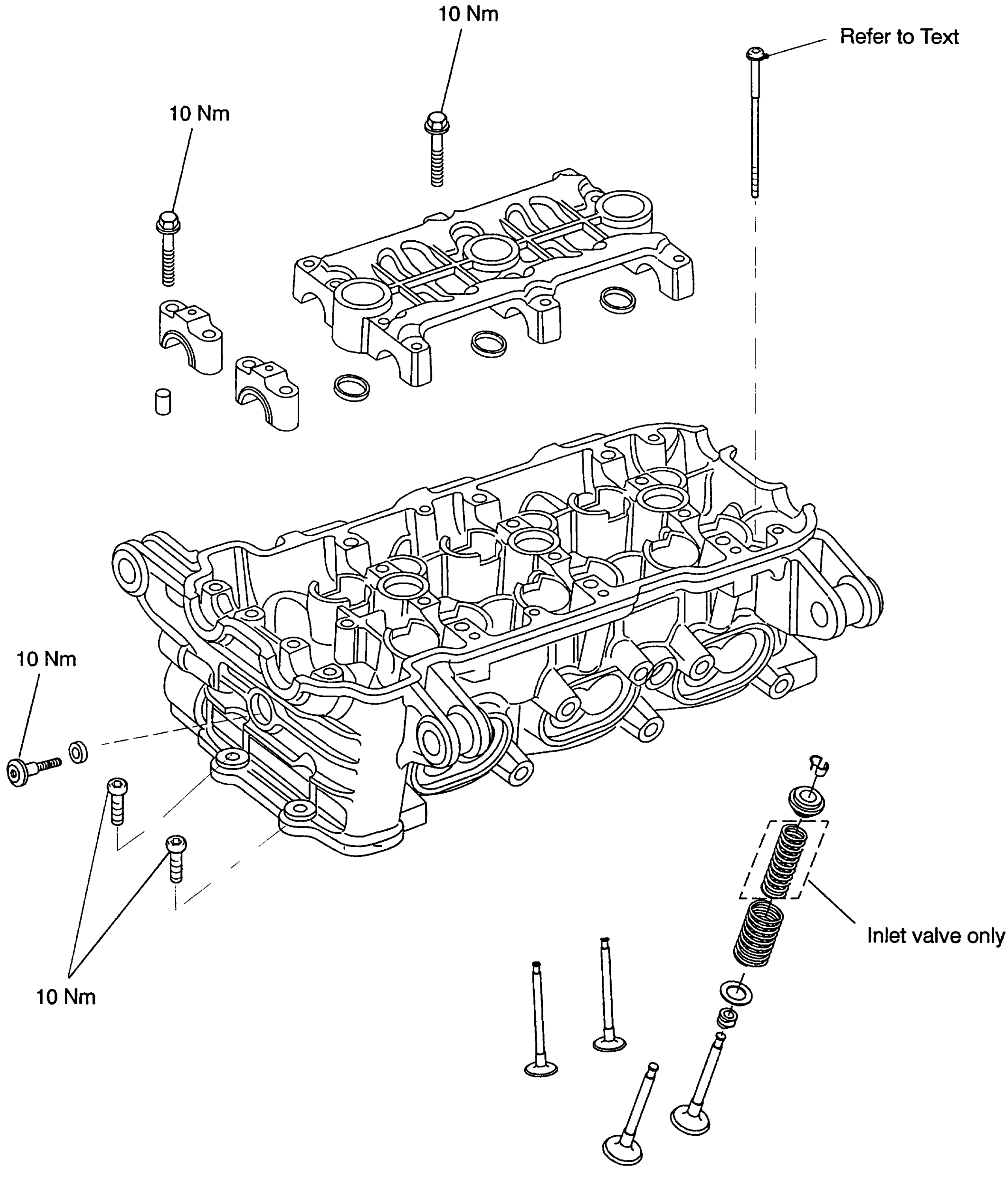
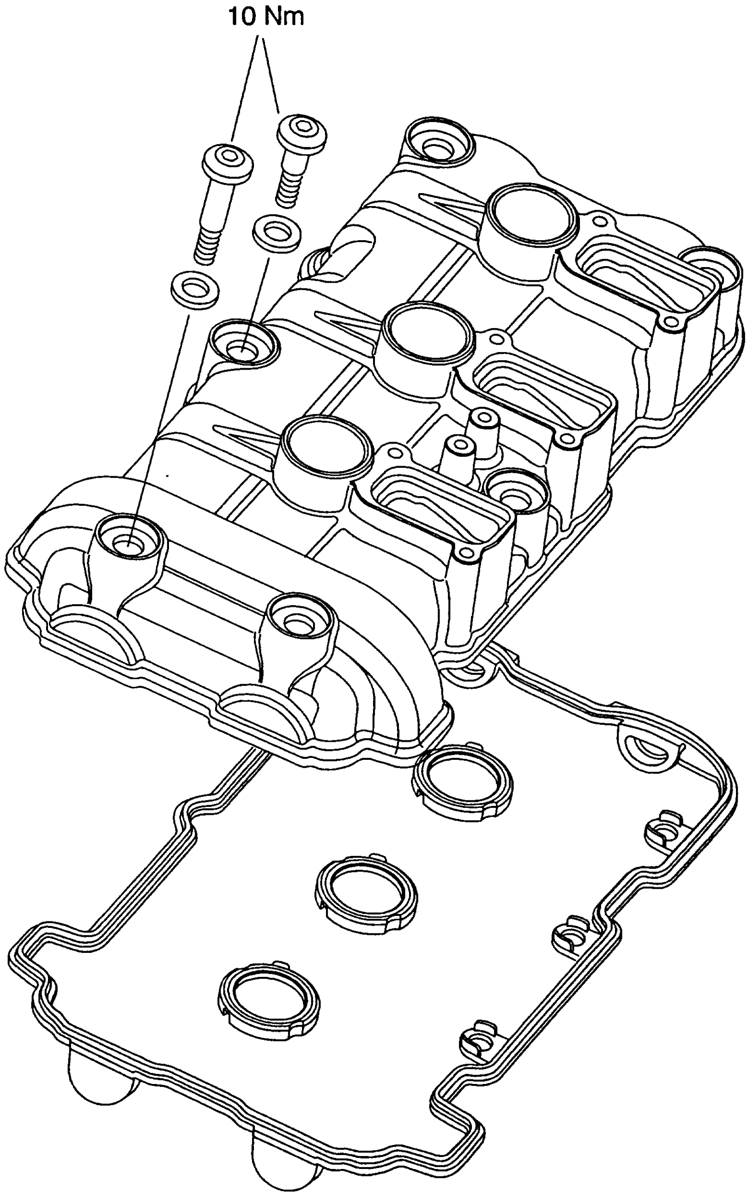
Exploded View

Cylinder Head and Valves



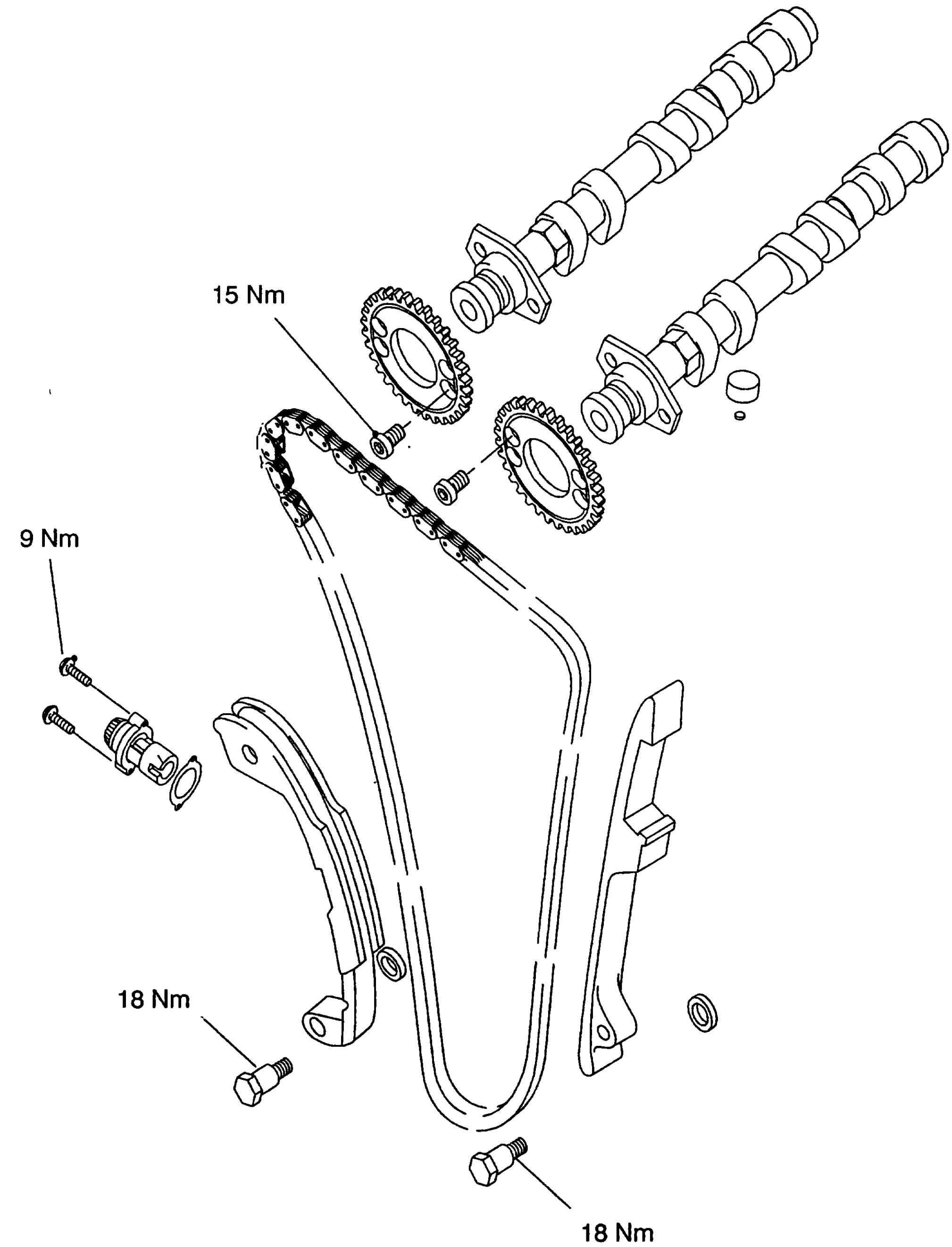
Exploded View

Cam Cover



Exploded View

Camshaft and Camshaft Drive



CYLINDER HEAD DESCRIPTION

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

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

The camshafts are driven by a silent-type chain. The cam chain is tensioned by a spring loaded device fitted in the cylinder head, 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 valves and single springs to close the 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.

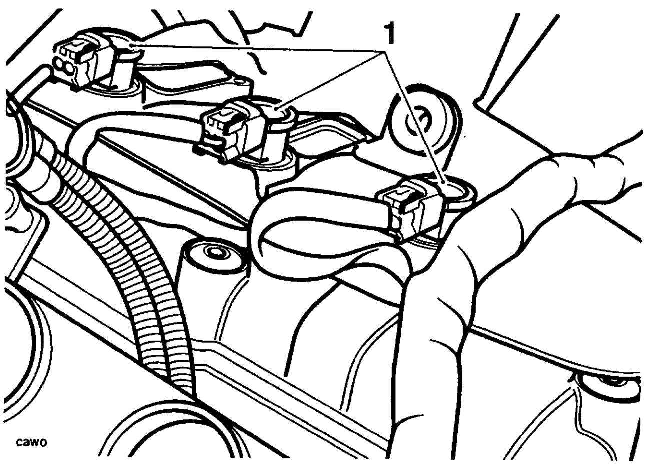
Due to the methods used to assemble the valve seats and valve guides to the head, these parts cannot be replaced.

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.

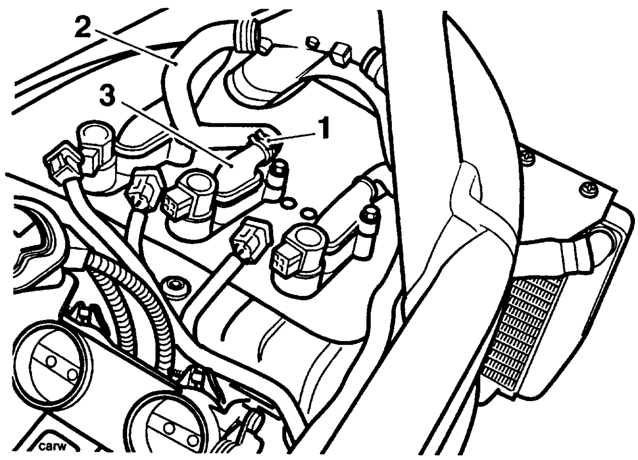
CAM COVER

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. When fitted, detach the secondary air injection feed hoses from the reed valves on top of the cam cover.



1. Coils



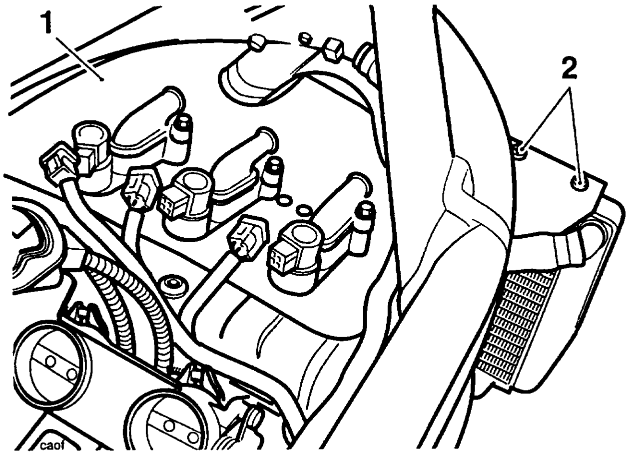
1. Spring-close hose clip

2. Secondary air injection hose

3. Reed valve assembly

6. Remove the airbox front bracket from the cam cover.
7. Release the clutch cable at the clutch end and pass the loose end through the air deflector shield.

8. Release the clips securing the air deflector shield, then remove the shield.



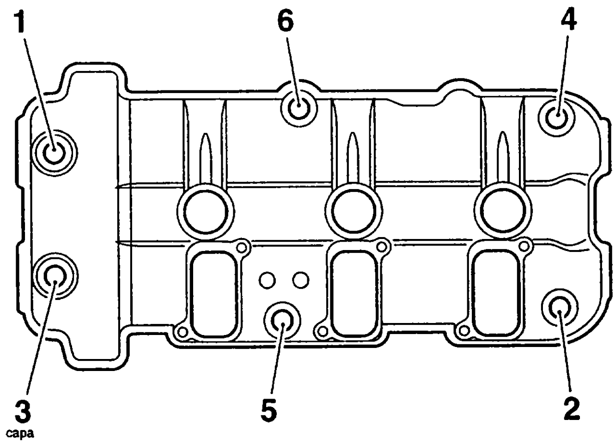
1. Air deflector shield

2. Clip locations (right hand shown, left hand clips are identical)

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

NOTE:

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



Cam cover bolt release sequence

10. 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.**

11. Remove the cam cover gasket and plug tower seals. If necessary, recover the dowels from the secondary air injection holes in the head (these may come away in the cover or gasket).

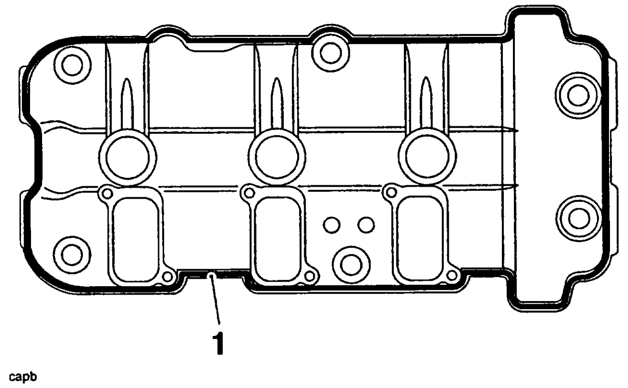
12. Remove any residual oil from the front of the head using a syringe or lint free cloth.

Installation

1. Check the condition of the cam cover gasket and plug tower seals. Replace as necessary.

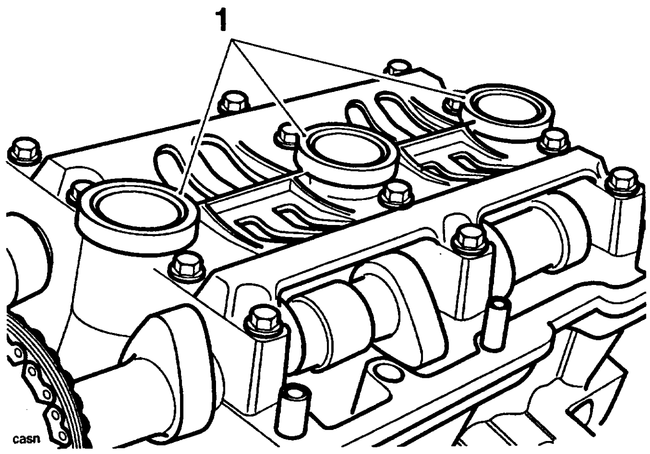
2. Check the condition of the cam cover bolt seals. Replace as necessary.

3. Fit the cam cover seal to the groove in the cam cover.



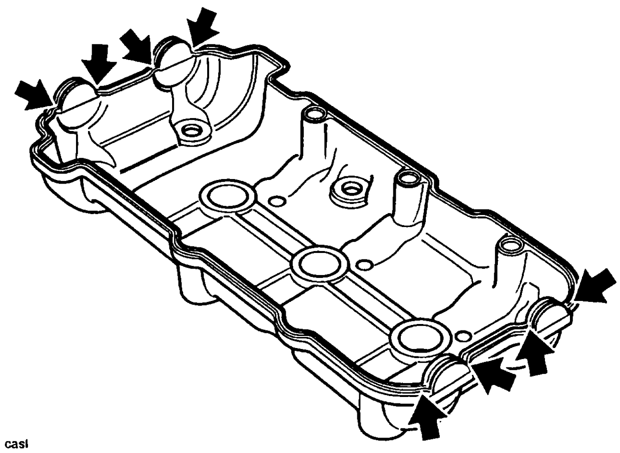
1. Cam cover seal groove

4. Fit the plug tower seals to the cam cap ladder



1. Plug tower seals

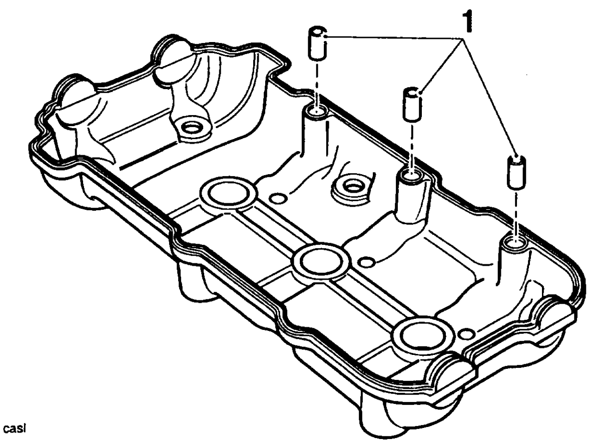
5. Apply silicone sealer to the areas arrowed in the diagram below.



6. Fit the cam cover, ensuring that the gasket and seals remain in the correct positions.

NOTE:

- **On models fitted with secondary air injection, refit the dowels to the cam cover before locating the it to the head.**



1. Dowels

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

8. Finally, tighten the cam cover screws, in same order as for removal, to **10 Nm.**

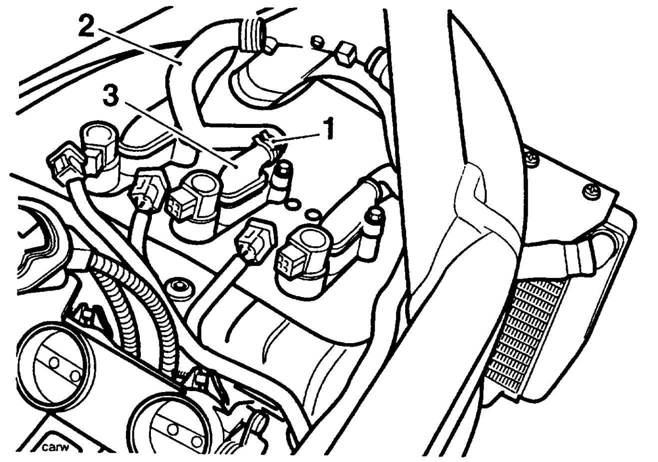
9. Refit the air deflector shield and retain with the clips.

10. Pass the clutch cable through the hole provided in the air deflector shield.

11. Refit the clutch cable to the clutch and adjust as detailed in the clutch section.

12. Refit the airbox front bracket and tighten the fixings to **12 Nm.**

13. Where necessary, refit the secondary air injection hoses to the reed valves. Position the spring-close hose clips using pliers.

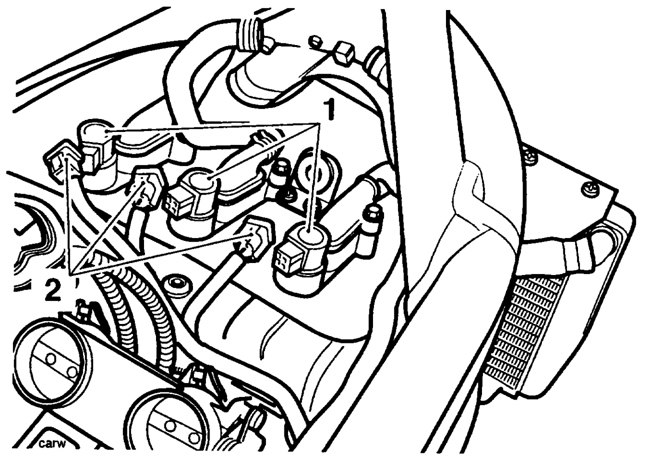


1. Spring-close hose clip

2. Secondary air injection hose

3. Reed valve assembly

14. Fit the ignition coils and reconnect.



1. Coils

2. Coil connections

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

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

17. Refit the side panel assembly.

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

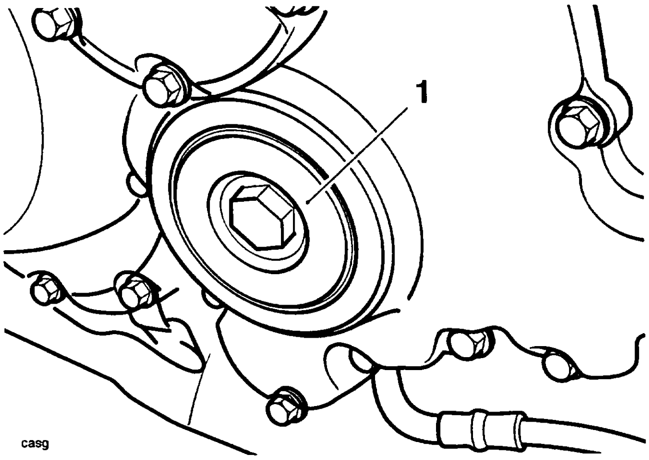
CAM CHAIN TENSIONER

Removal

NOTE: For access to the cam chain tensioner:

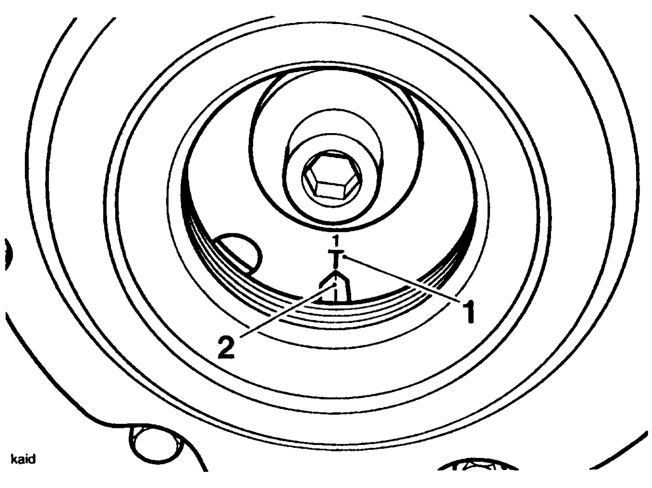
- **Disconnect the battery, negative (black) lead first.**
- **Remove the fuel tank (see section 9)**
- **Remove the airbox (see section 9)**
- **Remove the cam cover (see this section)**

1. Remove the inspection plate from the right hand crank cover.



1. Inspection plate

2. Rotate the crankshaft clockwise (the normal direction of rotation), using the bolt 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 sprag clutch aligns with the line at the bottom of the cover.

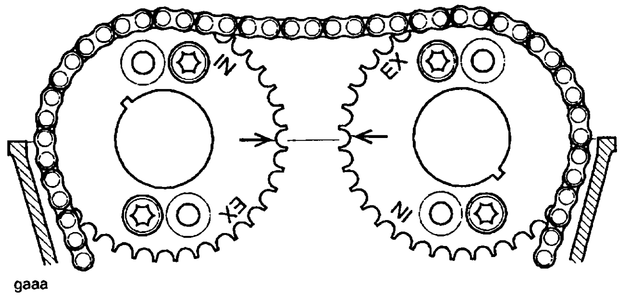


1. 'T1' Mark

2. Marker line

NOTE:

- **In addition to the 'T1' mark alignment, at TDC, the alignment marks on the camshaft sprockets will point inwards at a point level with the joint face.**

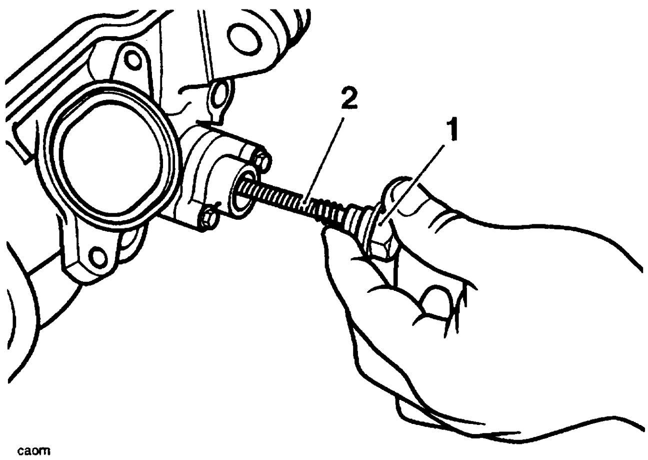


Camshaft to Cylinder Head Alignment Marks

3. Place a suitable wedge between the tensioner blade and crankcase, to hold the cam chain taut during removal of the tensioner.

4. 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.**



1. Centre nut

2. Spring

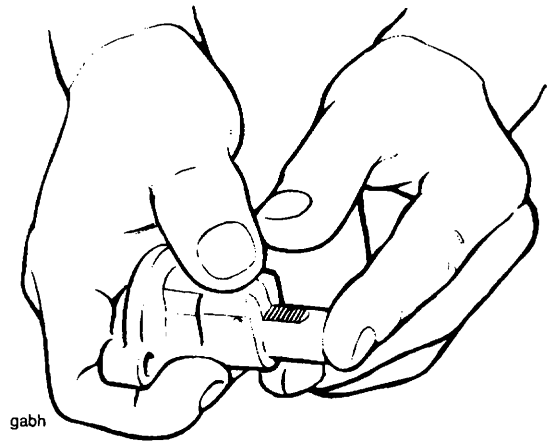
5. Remove the bolts securing the tensioner to the upper crankcase and remove the tensioner and gasket.

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 cam chain. Check that the camshaft timing marks point inwards and are level with the joint face of the head.

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**.

NOTE:

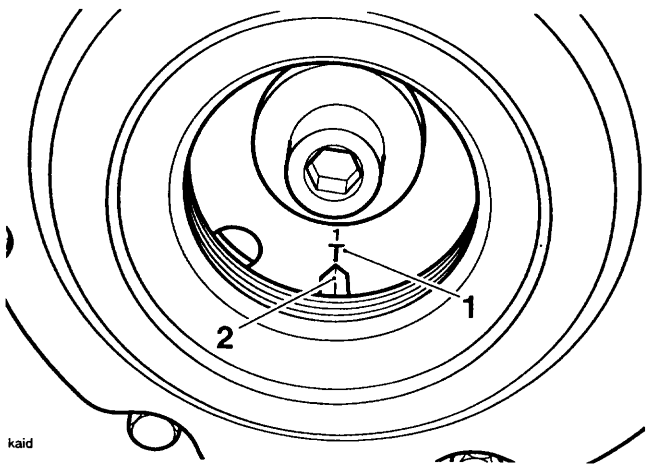
- **If fitting a new tensioner, observe the following:**
  a. **Remove the new tensioner assembly from the packaging. On examination, it can be seen that the tensioner nut will not be tightened fully into the tensioner body and that the tensioner 'nose' (i.e., the part which actually contacts the chain rubbing strip) is fully retracted into the housing.**
  b. **Prior to assembly into the engine it is necessary to disassemble the tensioner nut, washer and spring. To do this without damaging the internal components, turn the tensioner nut at least a half turn clockwise (i.e. tighten it further into the housing) until the plunger springs outwards. The tensioner nut can then be withdrawn safely without causing internal damage to tensioner components.**

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. 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.

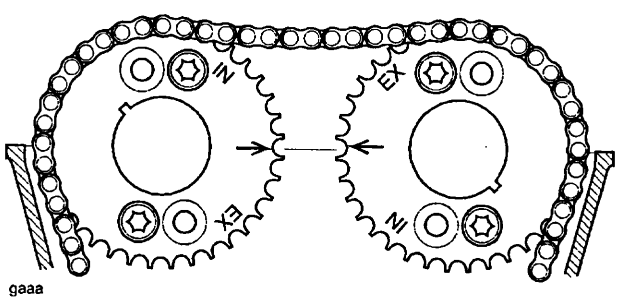
8. Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC. Ensure that the 'T1' mark on the sprag clutch aligns with the line at the bottom of the cover.



1. 'T1' Mark

2. Marker line

9. Check that the camshaft timing marks align as illustrated below.



Camshaft to Cylinder Head Alignment Marks

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

11. Refit the cam cover as described earlier in this section.

12. Check the O-ring in the crank cover inspection plate. Renew as necessary.

13. Refit the crank cover inspection plate, tightening it to **18 Nm**.

14. Refit all items removed for access as described in the relevant sections of this service manual.

NOTE:

- **Refit and reconnect the battery positive (red) lead first.**

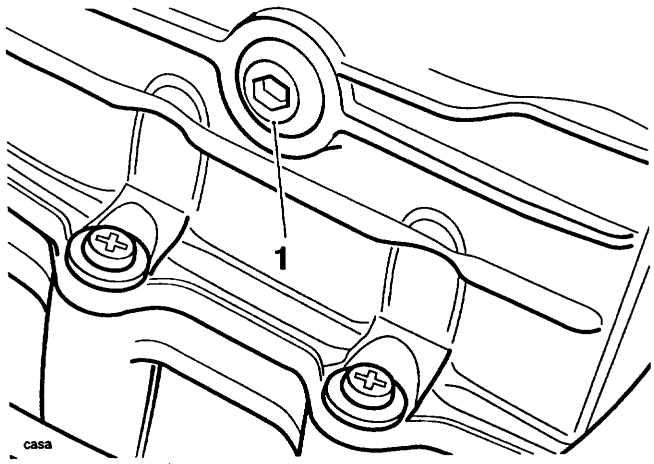
CAM CHAIN

Removal

NOTE: For access to the cam chain:

- **Disconnect the battery, negative (black) lead first.**
- **Remove the fuel tank (see section 9).**
- **Remove the airbox (see section 9).**
- **Remove the cam cover (see this section)**
- **Remove the cam chain tensioner (see this section)**
- **Remove the camshafts (see this section)**
- **Remove the starter gear cover (see section 7)**
- **Remove the right hand crank cover (see 'starter gear' in section 7)**
- **Remove the sprag clutch and drive gear (see 'starter gear' in section 7)**

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



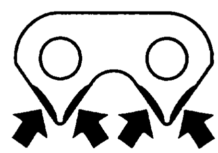
1. Centre Bolt

2. The cam chain is removed from inside the head-space or through the crankcase, after first detaching the chain from the crankshaft gear.

Inspection

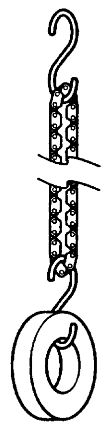
Visual in-situ checks can also be made as follows:

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



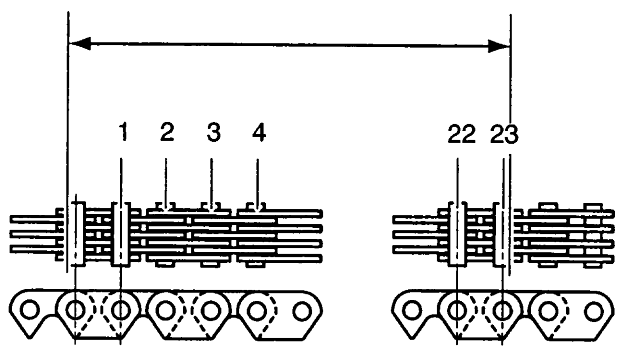
For a more thorough check, proceed as follows:

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



cajs

3. Measure across 23 links as shown in the diagram below. If the chain is within limits, the measurement should be no longer than 147.63 mm. Measurements beyond 147.63 mm indicate that the chain must be replaced.



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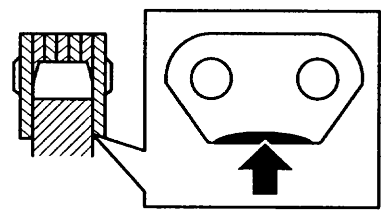
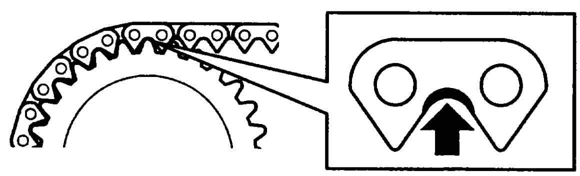
5. Check for severe wear of the inner surface of the outer plates at the side-contact points with the sprocket teeth.



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



caju

If any of these symptoms are evident, the cam chain must be replaced.

Installation

1. Fit the cam chain and locate the lower end around the crankshaft gear.

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

3. Refit all items removed for access as described in the relevant sections of this service manual.

NOTE:

- **Refit and reconnect the battery positive (red) lead first.**

CAMSHAFTS

Removal

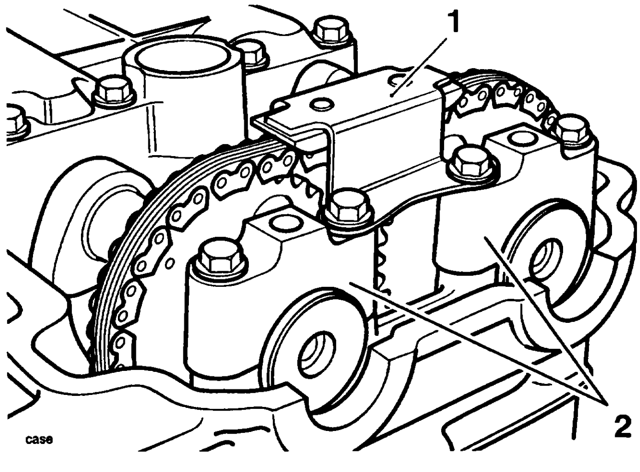
NOTE: For access to the camshafts:

- **Disconnect the battery, negative (black) lead first.**
- **Remove the fuel tank (see section 9)**
- **Remove the airbox (see section 9)**
- **Remove the cam cover (see this section)**
- **Remove the cam chain tensioner (see this section)**

NOTE:

- **It is not necessary to remove the cam chain completely.**
- **Each camshaft and sprocket is removed as an assembly.**
- **Before commencing work, ensure the crankshaft T1 mark is in alignment with the line in the crank cover inspection plate.**

1. Remove the cam chain top pad from the cam caps and cylinder head.



1. Cam Chain Top Pad

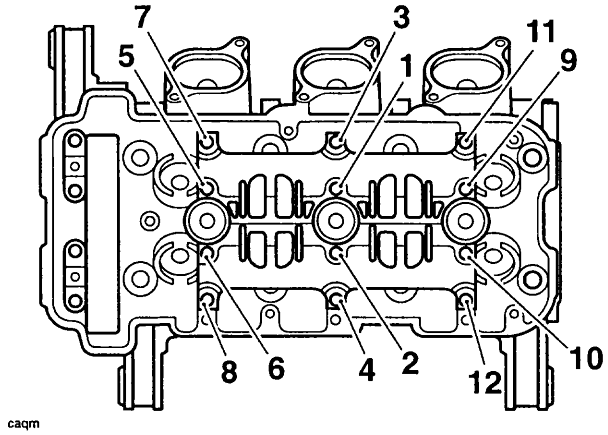
2. Cam caps

2. To ensure that all components are refitted in the same positions as prior to removal, mark the position of each cam cap and the orientation of the cam bearing ladder in relation to the head.

NOTE:

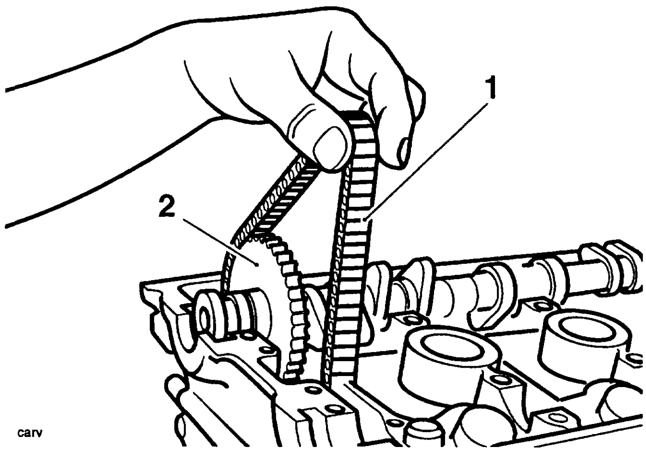
- **A laundry marker or similar may be used to mark the cap positions.**

3. Progressively release each of the remaining fasteners securing the individual cam caps to the cylinder head.
4. Remove the caps.
5. Progressively release the bolts securing the cam cap ladder to the head in the sequence shown below.



Cam ladder bolt release sequence

6. Remove the cam cap ladder and collect the dowels (if loose) and spark plug tower O-rings.
7. Lift the cam chain from the exhaust camshaft sprocket and remove the exhaust camshaft.
8. Repeat the procedure for the inlet camshaft.

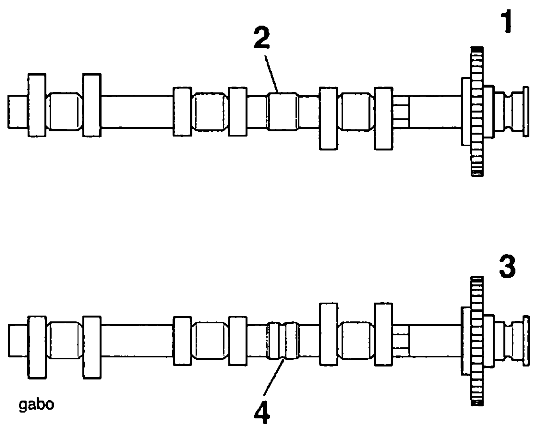


1. Cam chain

2. Inlet camshaft

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

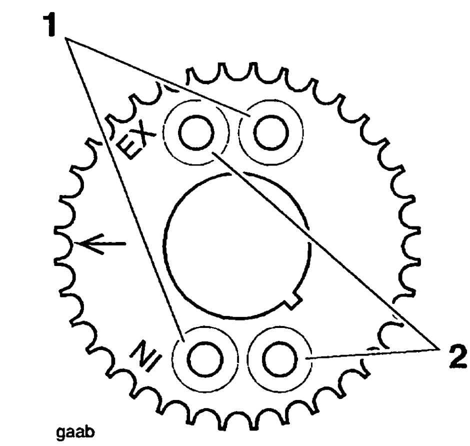
3. Inlet Camshaft

4. Grooved section

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

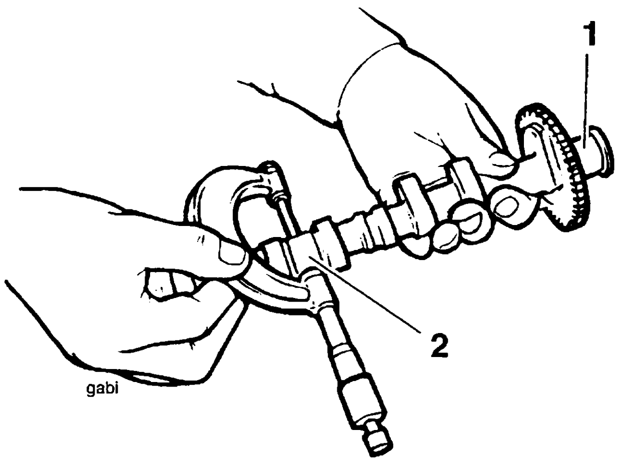
2. Measure the camshaft journals with a micrometer. If any journal is outside the specified tolerance, replace the camshaft.

Outrigger Journal Diameter

Standard: 22.953 - 22.956 mm

Standard Journal Diameters

Standard: 22.93 - 22.96 mm



1. Outrigger Journal

2. Standard Journal

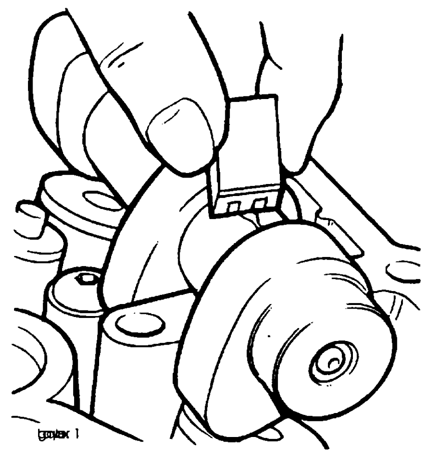
3. Examine all camshaft and camshaft bearing caps for excessive wear and damage, paying particular attention to the outrigger caps.

4. Check the journal-to-head clearances, using '*Plastigage*' (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 and cam cap ladder to **10 Nm.**
- Remove the cam cap and cam cap ladder using the bolt release sequence given earlier. Wipe the exposed areas of both the camshaft journal and a single cap or cap area of the ladder.
- 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 *Plastigage* to fit across the camshaft journal. Fit the *Plastigage* to the camshaft journal using the grease to hold the strip in place.
- Refit the cap and cam cap ladder then evenly and progressively tighten all the camshaft cap and ladder bolts to **10 Nm in the correct sequence (see camshaft installation).**
- Release the cap bolts and remove the cap/ladder. Using the gauge provided with the *Plastigage* kit, measure the width of the now compressed *Plastigage*.

NOTE:

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



Measuring The Compressed *Plastigage*.

5. Calculate the journal clearance using the *Plastigage* chart supplied with the *Plastigage* kit.

Camshaft journal clearance, Cylinder 1-3

Standard: 0.040 - 0.091 mm
Service limit: 0.13 mm

Camshaft journal clearance, Outrigger

Standard: 0.044 - 0.068 mm
Service limit: 0.13 mm

6. If the clearance measured is within the specified tolerance, remove the cap/ladder and clean off all traces of *Plastigage*. 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.**

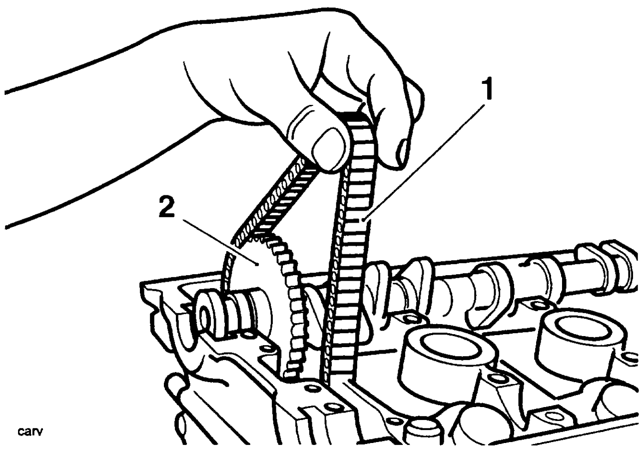
CAUTION: Although *Plastigage* is oil soluble, all traces of the material must be removed to prevent blockage of the oil drillings and resultant engine damage.

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 are 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 and ladder** (that is, with the timing marks on the camshaft sprockets level and pointing inwards, and with the 'T1' mark on the sprag clutch in alignment with the line at the bottom of the cover.



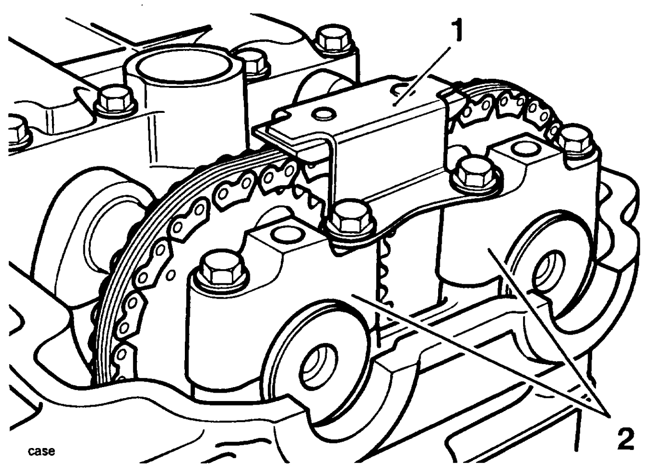
1. Cam chain

2. Inlet camshaft

4. Repeat the procedure for the other camshaft.

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

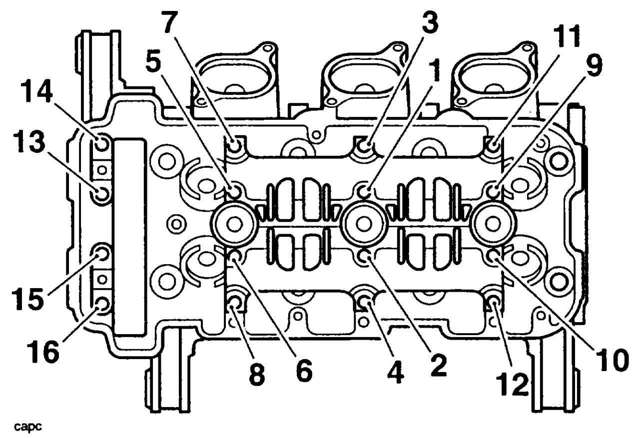
5. Assemble the cam caps, dowels, cam ladder and top pad in the same location and orientation as prior to removal.



1. Cam Chain Top Pad

2. Camshaft caps

6. Lubricate the threads of the camshaft cap and ladder screws with engine oil and <u>evenly and progressively</u> tighten them to **10 Nm in the sequence shown below.**



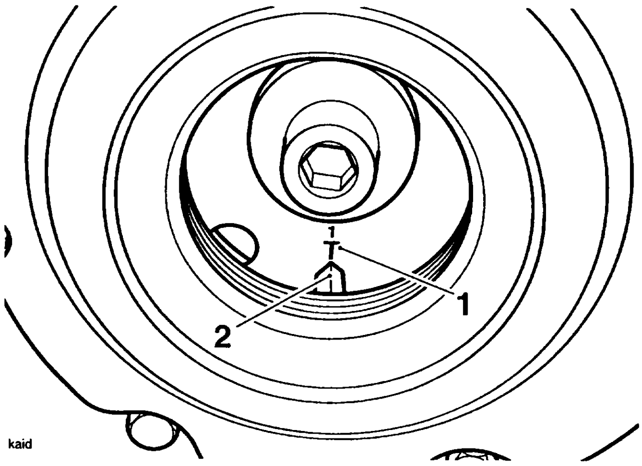
Cam-cap and ladder bolt tightening sequence

7. 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.**

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

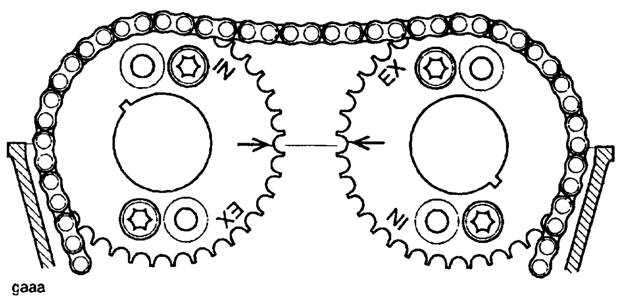
9. Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC. Ensure that the 'T1' mark on the sprag clutch aligns with the line at the bottom of the cover.



1. 'T1' Mark

2. Marker line

10. Check that the camshaft timing marks align as illustrated below. Rectify any misalignment before proceeding.



Camshaft to Cylinder Head Alignment Marks

11. Check the valve clearances as described in this section. Adjust as necessary.

12. Refit all items removed for access as described in the relevant sections of this service manual.

NOTE:

- **Refit and reconnect the battery positive (red) lead first.**

VALVE CLEARANCES

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

Valve Clearance Measurement

NOTE:

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

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.
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 - 0.20 mm

  EXHAUST 0.20 - 0.30 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

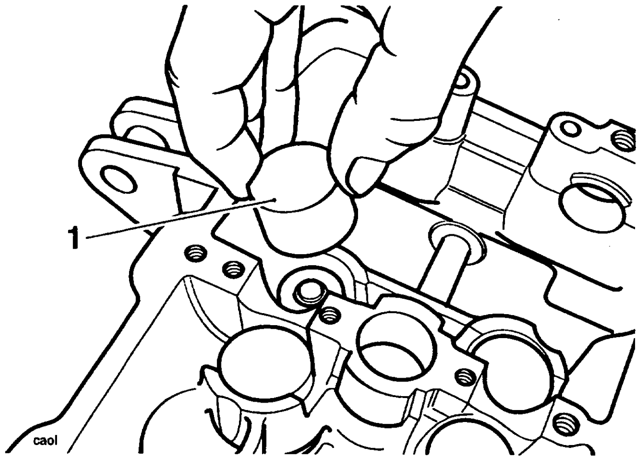
NOTE:

- **To adjust the valve clearances the camshafts must be removed. Follow the camshaft removal procedure described earlier in this section.**
- **The correct valve clearances are in the range given below:**

  Inlet: 0.10 – 0.20 mm

  Exhaust: 0.20 – 0.30 mm

1. Remove the camshafts, using the procedure described earlier in this section.
2. Remove the tappet bucket from the cylinder head.

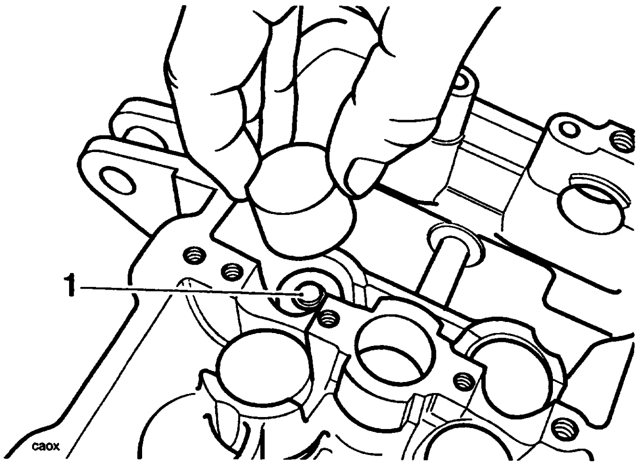


1. Tappet bucket

NOTE:

- **The shim may withdraw with the tappet bucket.**

3. Remove the shim from the valve head.



1. Shim

4. Measure the original shim, using a micrometer and select the appropriate new shim as required.

Clearance too small:

- **Fit a thinner shim.**

Clearance too large:

- **Fit a thicker shim.**

NOTE:

- **Shims are available ranging from 1.70 mm to 3.00 mm in increments of 0.025 mm.**

5. Fit the new shim to the valve head.
6. Lubricate the tappet bucket(s) with a 50/50 solution of engine oil and molybdenum disulphide grease.
7. Refit the tappet bucket.
8. Refit the camshafts, as described earlier in this section.
9. Re-check all valve clearances.
10. Repeat the procedure if the valves require further adjustment.

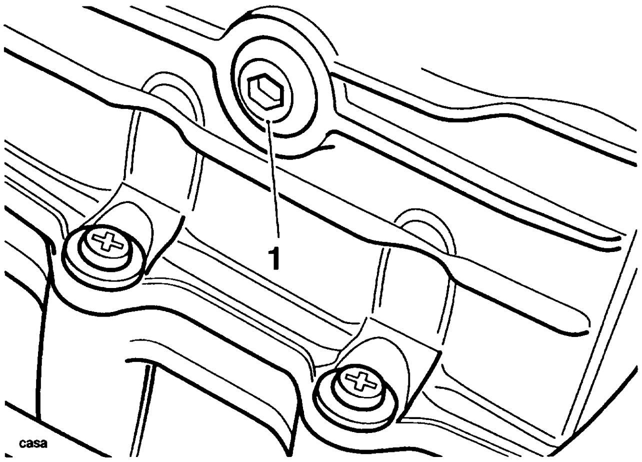
CYLINDER HEAD

Removal

NOTE:

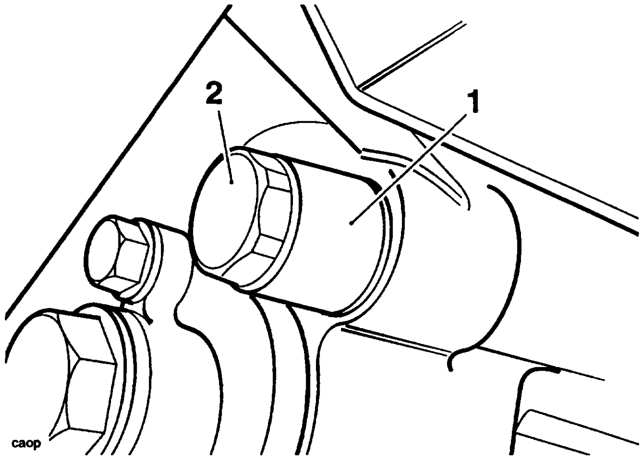
- **The rubbing blades for the cam chain protrude from the crankcase such that removal of the head while in the frame is made extremely difficult and may lead to damage to the head, rubbing blades and frame.**

1. Remove the engine from the frame as described in section six then mount the engine to an engine stand.
2. Remove the bolt from the centre of the cam chain housing in the cylinder head.



1. Centre bolt

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

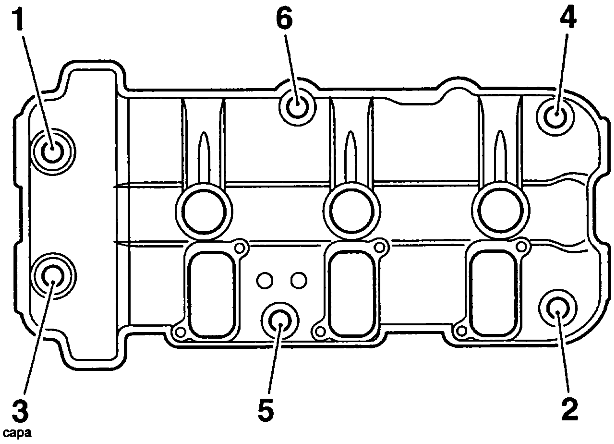


1. Oil feed pipe
2. Banjo bolt

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

NOTE:

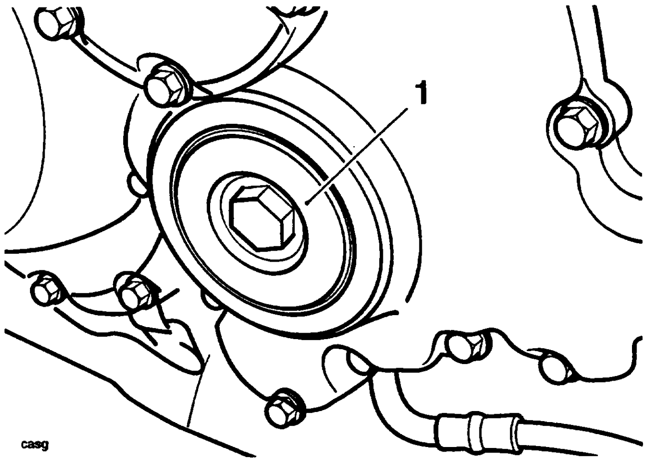
- **Two longer bolts are fitted at the end adjacent to the cam chain.**



Cam cover bolt release sequence

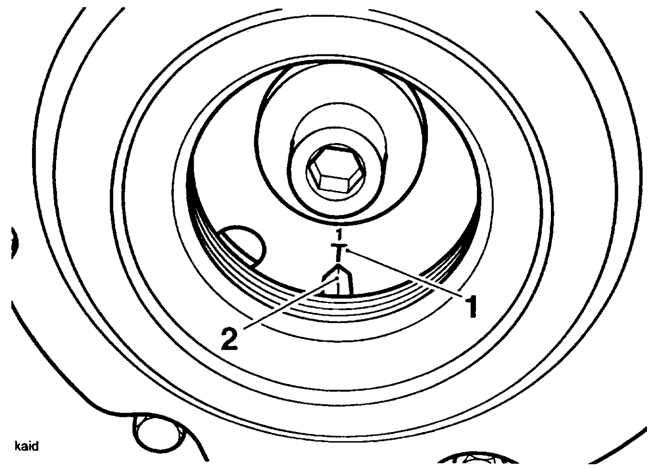
> ⚠ **CAUTION: Never use a lever to remove the camshaft cover from the head.**
>
> **Using a lever will cause damage to the head and cam cover which could lead to an oil leak.**

5. Remove the cam cover.
6. Remove the cam cover gasket and plug tower seals. If necessary, recover the dowels from the secondary air injection holes in the head (these may come away in the cover or gasket).
7. Remove any residual oil from the front of the head using a syringe or lint free cloth.
8. Remove the inspection plate from the right hand crank cover.



1. Inspection plate

9. Rotate the crankshaft clockwise (the normal direction of rotation), using the bolt 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 sprag clutch aligns with the line at the bottom of the cover.

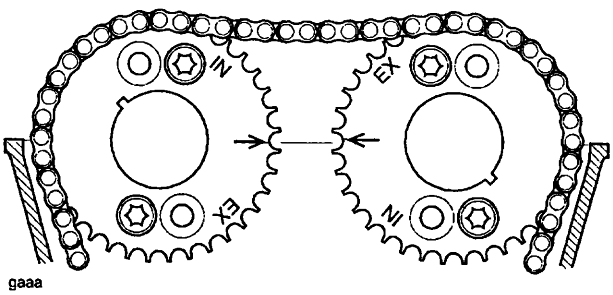


1. 'T1' Mark

2. Marker line

NOTE:

- **In addition to the 'T1' mark alignment, at TDC, the alignment marks on the camshaft sprockets will point inwards at a point level with the joint face.**

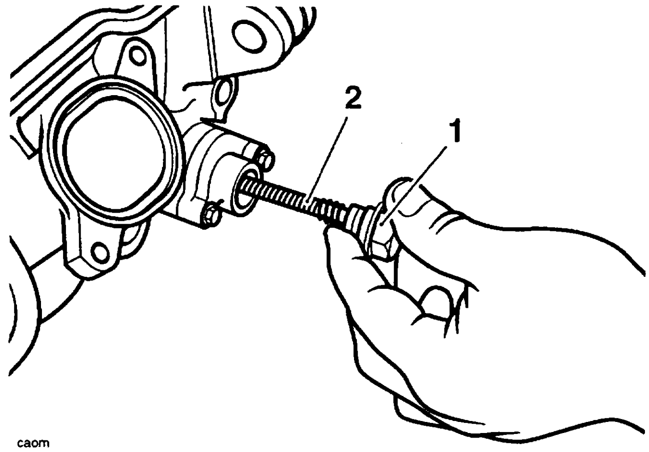


Camshaft to Cylinder Head Alignment Marks

10. Place a suitable wedge between the tensioner blade and crankcase, to hold the cam chain taut during removal of the tensioner.

11. 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.**



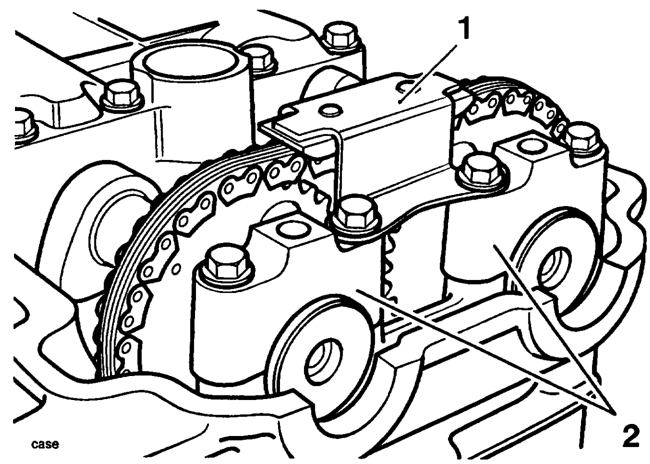
1. Centre nut

2. Spring

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

13. Remove the wedge.

14. Remove the cam chain top pad from the cam caps and cylinder head.



1. Cam Chain Top Pad

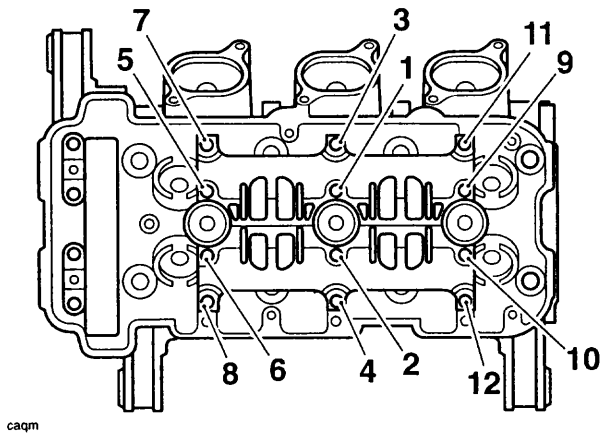
2. Camshaft caps

15. To ensure that the camshaft caps are refitted in the same positions as prior to removal, mark the position of each camshaft cap and the orientation of the cam bearing ladder in relation to the head.

NOTE:

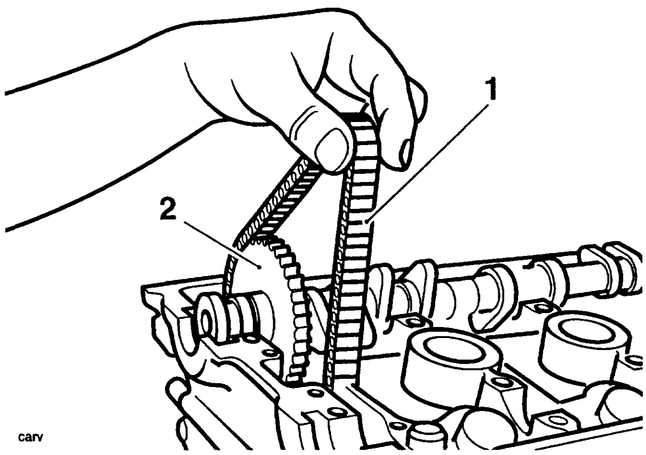
- **A laundry marker or similar may be used to mark the cap positions.**

16. Progressively release each of the remaining fasteners securing the individual camshaft caps to the cylinder head.
17. Remove the caps.
18. Release the bolts securing the cam cap ladder to the head in the sequence shown below.



Cam ladder bolt release sequence

19. Remove the cam cap ladder and collect the spark plug tower O-rings.
20. Lift the cam chain from the exhaust camshaft sprocket and remove the exhaust camshaft.
21. Repeat the procedure for the inlet camshaft.

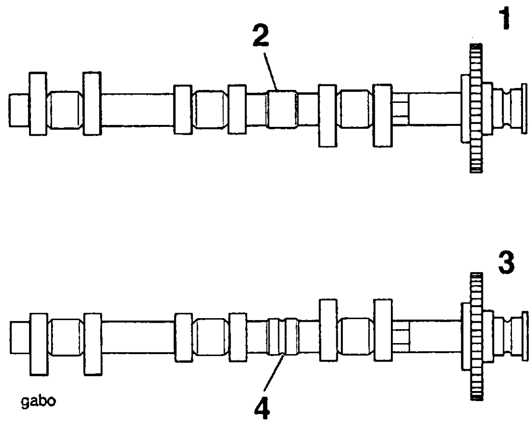


1. Cam chain

2. Inlet camshaft

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.**



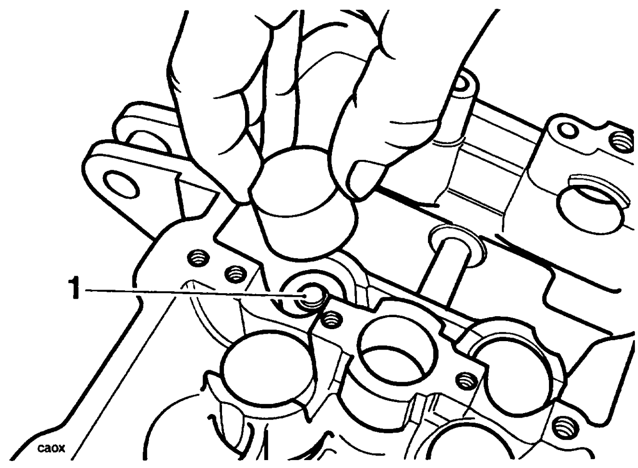
1. Exhaust Camshaft

2. Plain Section

3. Inlet Camshaft

4. Grooved section

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

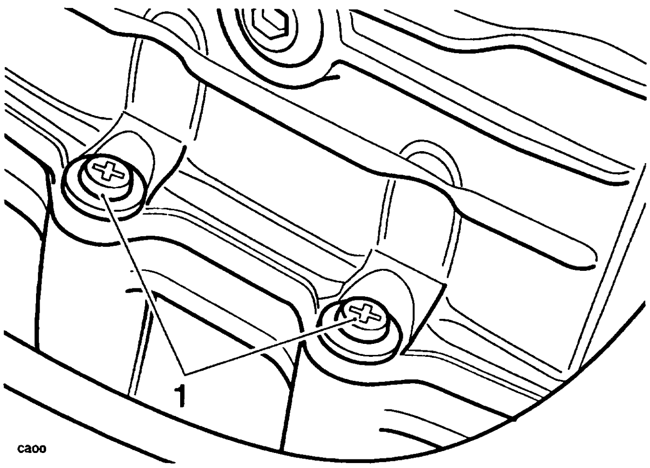


1. Shim

NOTE:

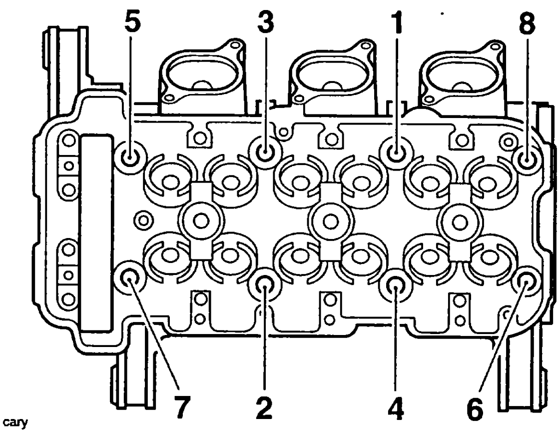
- **To prevent the tappet buckets and shims from becoming mixed, place the shim and tappet together in a marked container. The components must be refitted in their original positions.**

23. Release the screws securing the outside of the cylinder head to the upper crankcase.



1. Cylinder head to upper crankcase screws

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



Cylinder head bolt release sequence

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

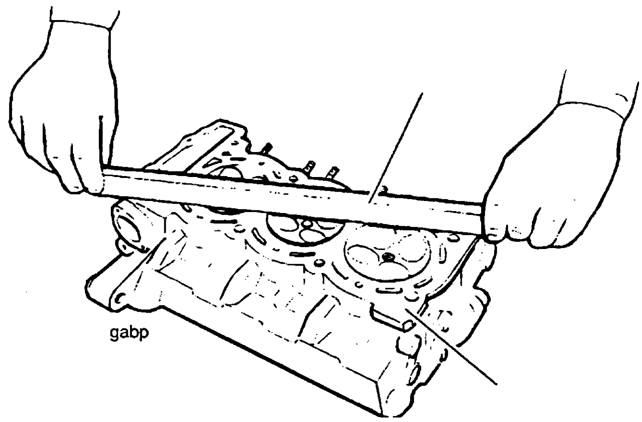
26. Lift the head directly upwards until clear of the cam chain rubbing blades

27. Remove the cylinder liners as described in section six of this manual.

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.

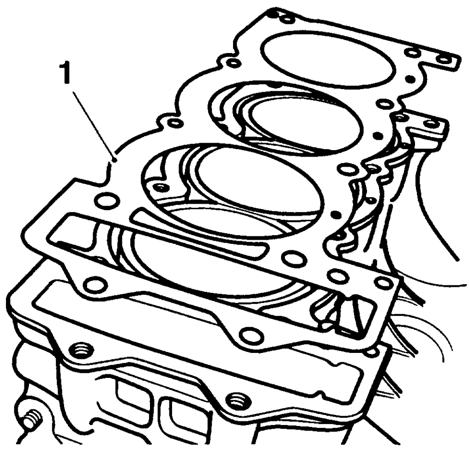
Installation

NOTE:

- **The cylinder liners must be re-sealed prior to refitting the cylinder head. Refer to section six of this manual for details of liner removal, sealing and assembly.**

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

2. With the resealed liners freshly installed, fit a new cylinder head gasket ('top' marking uppermost) ensuring that the head to crankcase location dowels are correctly in place.



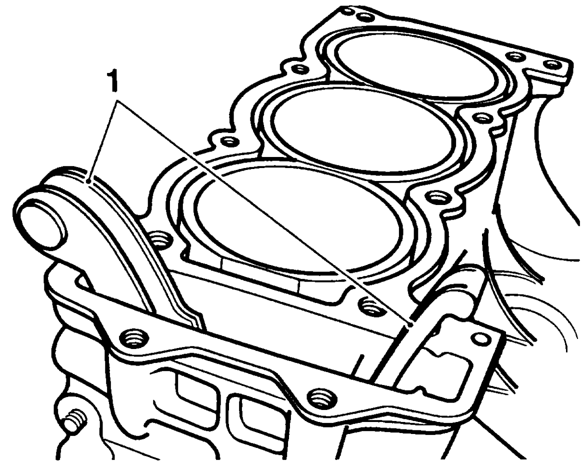
1. Cylinder Head Gasket

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

4. If removed, install the cam chain rubbing strips.

5. Carefully lower the cylinder head over the cam chain and rubbing strips 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.**



1. Rubbing strips

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

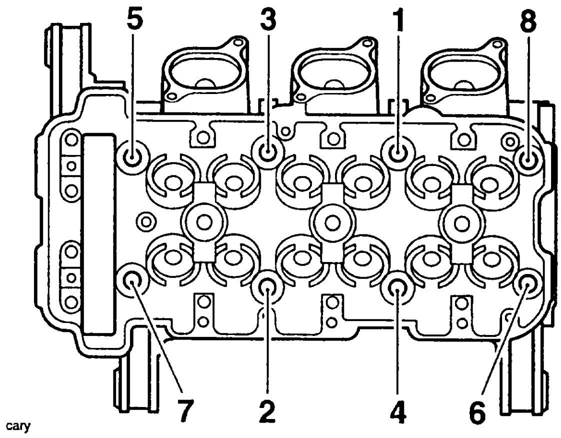
NOTE:

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

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

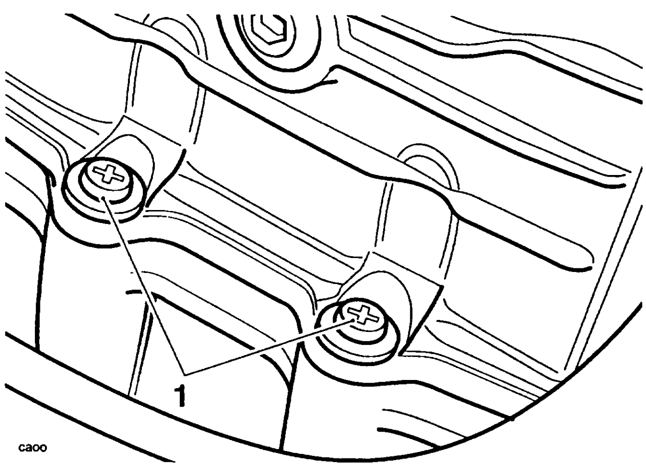
B Tighten the head bolts in the same numerical sequence used to release the bolts, to **27 Nm**.

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°** to reach the final setting. To accurately gauge the 90° 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° gauge increments have rotated past the chosen point on the head.



Cylinder head bolt tightening sequence

7. Fit the screws securing the side of the cylinder head to the crankcase and tighten to **10 Nm**.



1. Cylinder head to upper crankcase screws

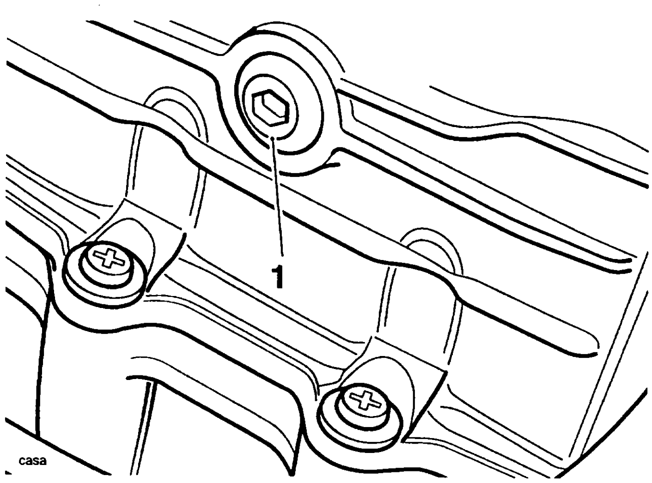
8. Clean and lubricate the tappet buckets with clean engine oil and refit the buckets and shims in the same locations from which they were removed.

9. Temporarily refit the cams and cam chain tensioner as described earlier in this section.

10. Adjust the valve clearances as described earlier in this section.

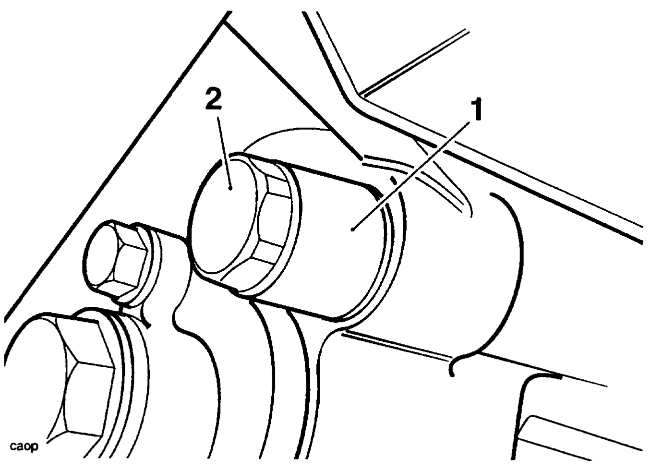
11. Refit the cams, cam chain tensioner and cam cover as described earlier in this section.

12. Check and, if necessary replace the seal for the sound suppression bolt in the cam chain area of the cylinder head. Refit the bolt to the centre of the cam chain housing, tightening to **10 Nm**.



1. Centre bolt

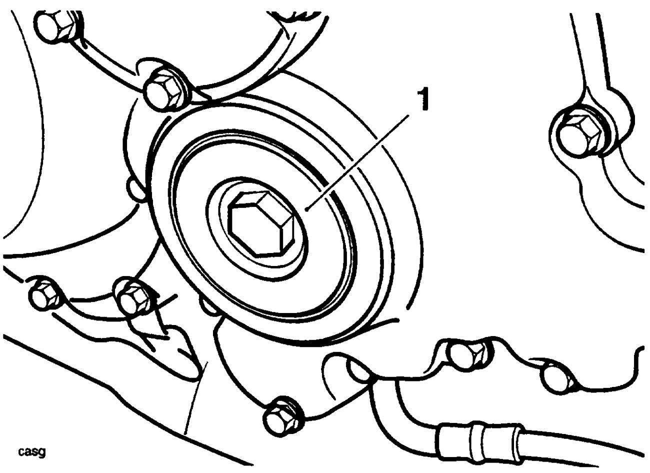
13. Refit the oil feed pipe to the head using new sealing washers to both sides of the banjo bolt. Tighten the banjo bolt to **25 Nm**. Ensure that the oil feed pipe is not twisted during the tightening.



1. Oil Feed Pipe

2. Banjo Bolt

14. Refit the inspection plate, incorporating a new O-ring seal and tighten to **18 Nm**.

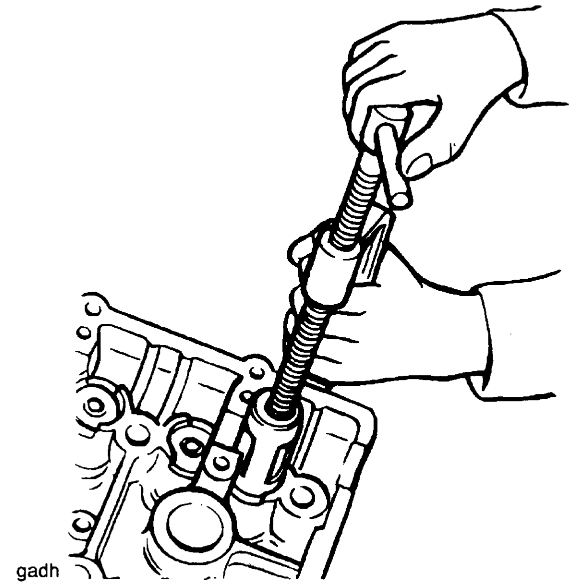


1. Inspection plate

VALVES AND VALVE STEM SEALS

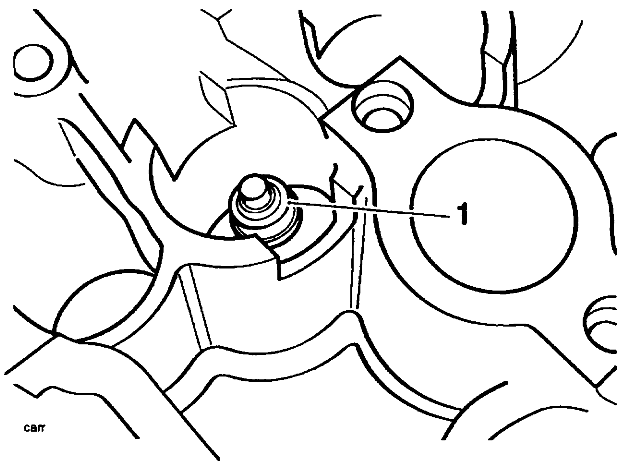
Removal from the cylinder head

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

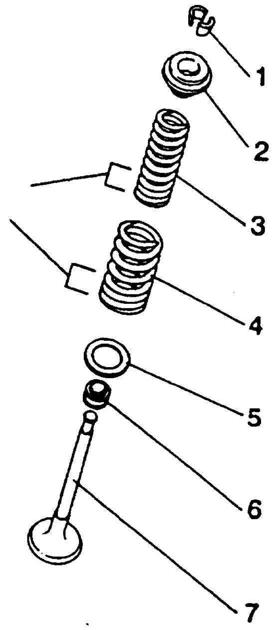
2. Once the collets are released, remove the following items:
   - collets
   - valve spring cap
   - valve springs
   - valve stem seal
   - spring platform
   - valve (de-burr before removal)



1. Valve stem seal

NOTE:

- **The valve springs, spring retainers and spring platforms are different on the exhaust valves when compared to the inlets. Ensure inlet and exhaust valve components do not become mixed.**



1. Collets

2. Valve spring retainer

3. Inner valve spring (inlet valves only)

4. Outer valve spring

5. Valve spring platform

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 spring platform to the valve spring recess in the head.

3. Fit the valve stem seal over the valve stem and, using a suitable tool, press down fully until the seal is correctly seated over the valve guide.

NOTE:

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

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

4. Install the valve spring(s) over the valve stem ensuring that the close wound coil end faces towards the cylinder head. Fit the spring retainer.

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 Stem to Guide Clearance

Inlet.	**0.010 - 0.040 mm**
Exhaust	**0.030 - 0.060 mm**

VALVE GUIDES

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

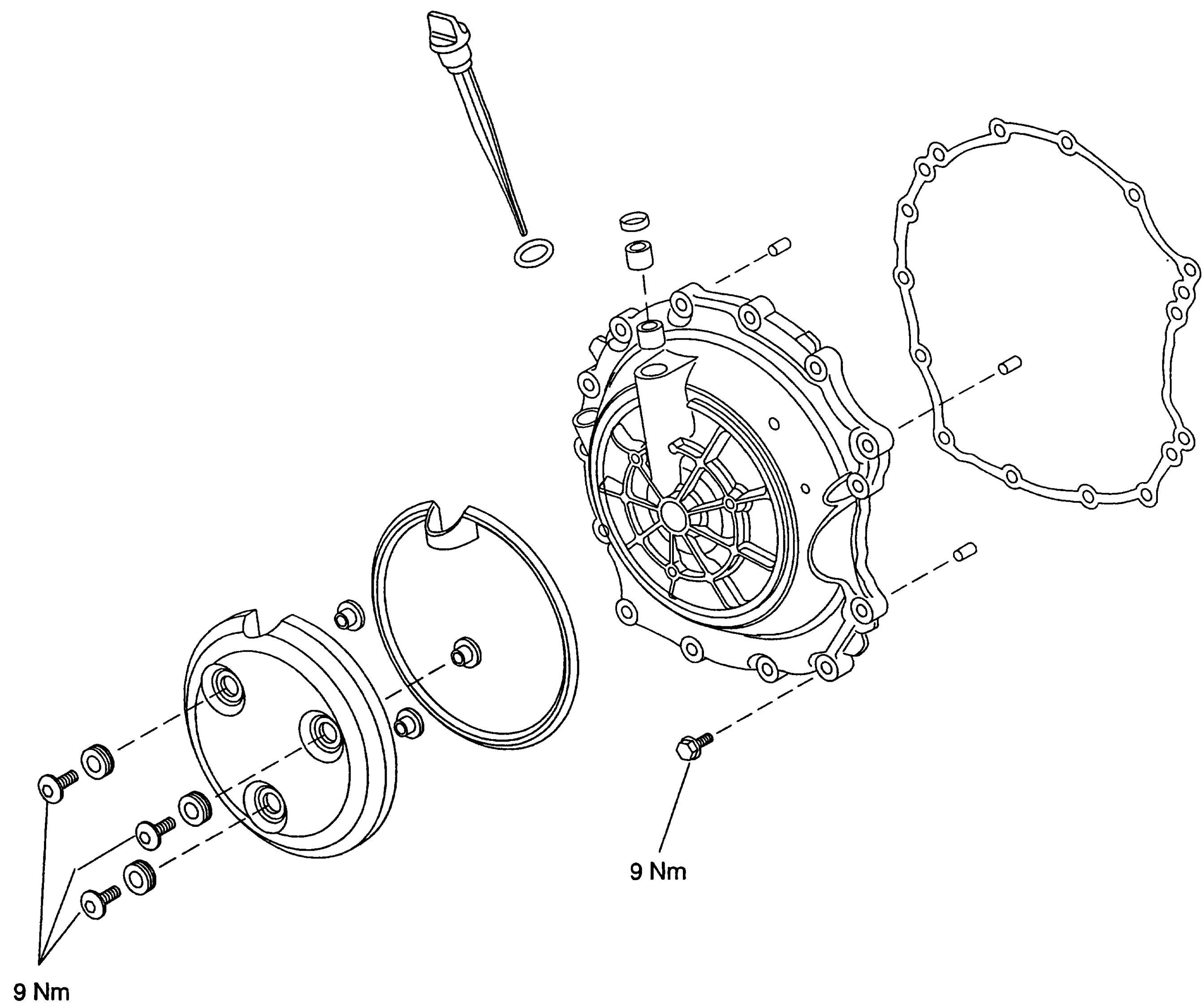
VALVE FACE INSPECTION

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.

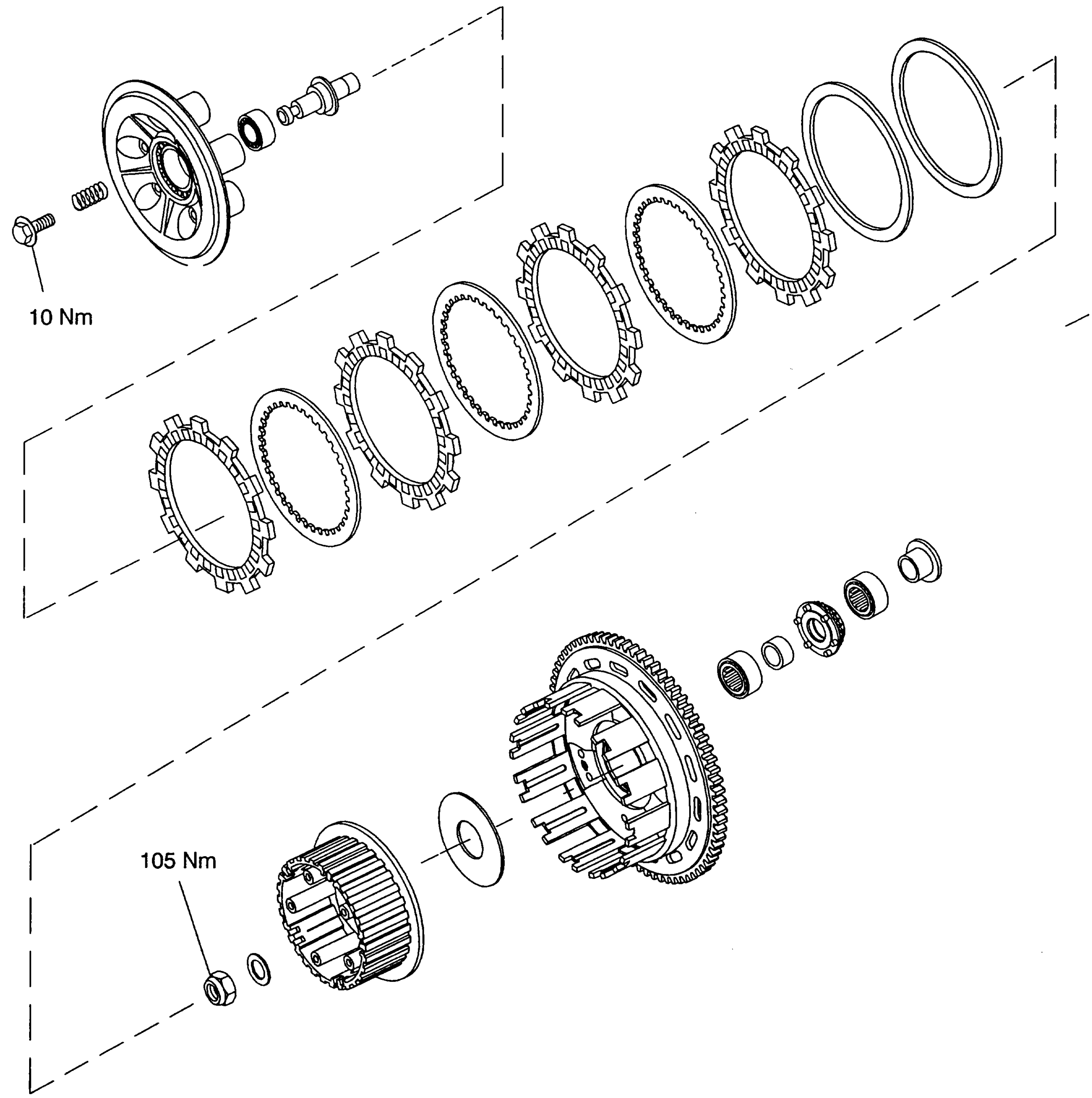
CLUTCH

CONTENTS

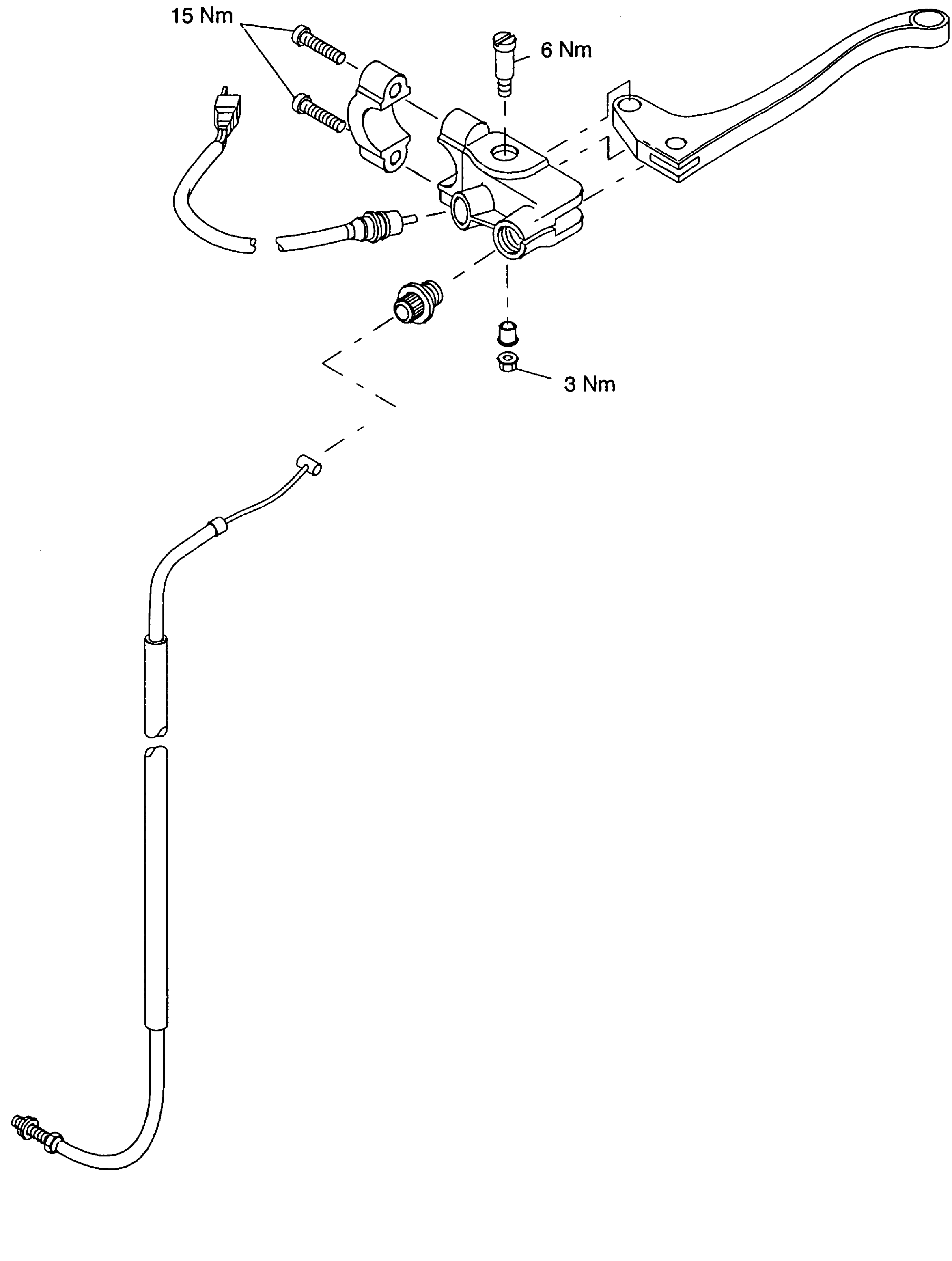
Exploded View - Clutch Cover



Exploded View - Clutch Assembly



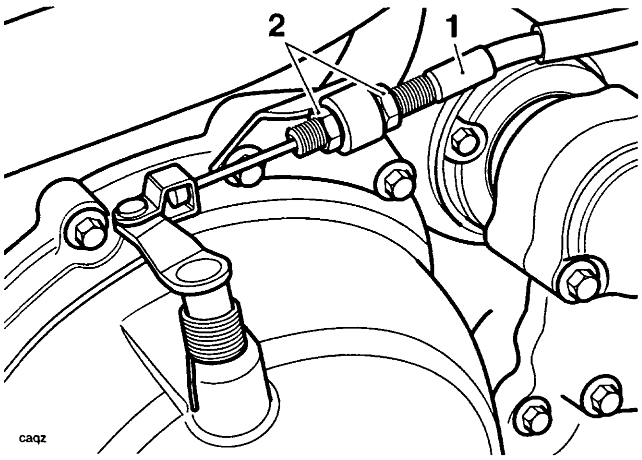
Exploded View - Clutch Controls



CLUTCH CABLE

Removal

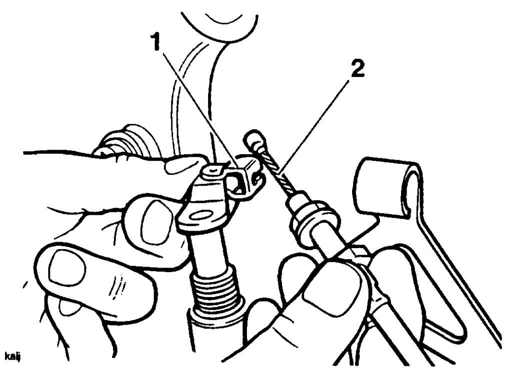
1. Remove the seats and disconnect the battery.
2. Remove the right hand lower fairing (where fitted) as described in the body section.
3. Slacken the cable locknut and release the adjuster at the clutch cover end to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

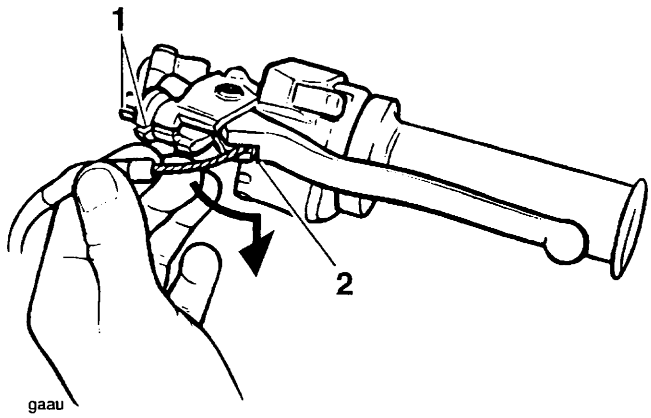
4. Release the clutch cable from the actuating arm by pushing the inner cable nipple through the arm and sliding the cable out of the slot. Detach the cable from the bracket.



1. Actuating Arm

2. Inner Cable

5. Align the lever 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, particularly where it passes through the air deflector shield.

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. Replace the cable if necessary

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:

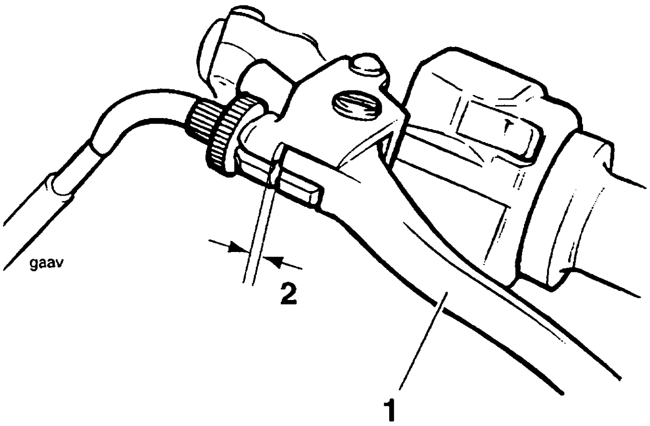
- **Ensure that the two adjuster nuts are positioned, one either side of the bracket.**

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

8. Refit the right hand lower fairing (where necessary) as described in the body section.

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

10. Refit the seats.

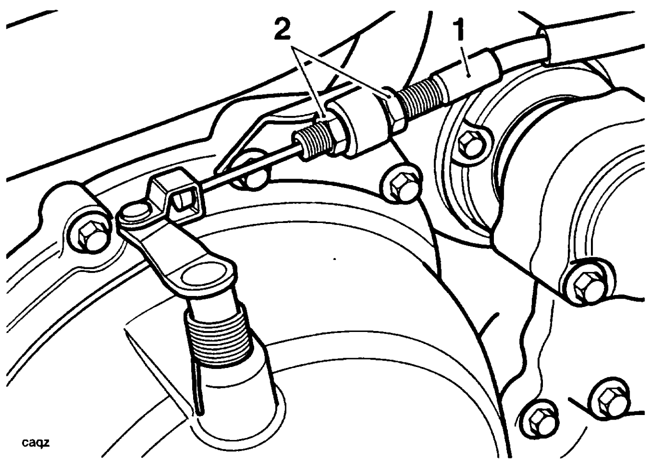
CLUTCH

Disassembly

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

2. Remove the right hand lower fairing (where fitted) as described in the body section.

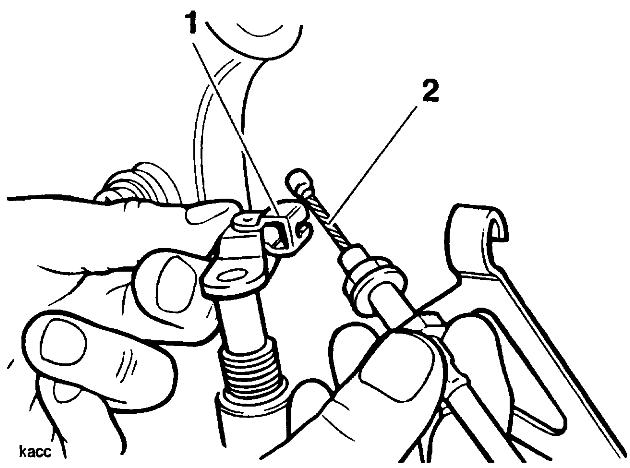
3. Slacken the cable locknut and release the adjuster at the clutch cover end, to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

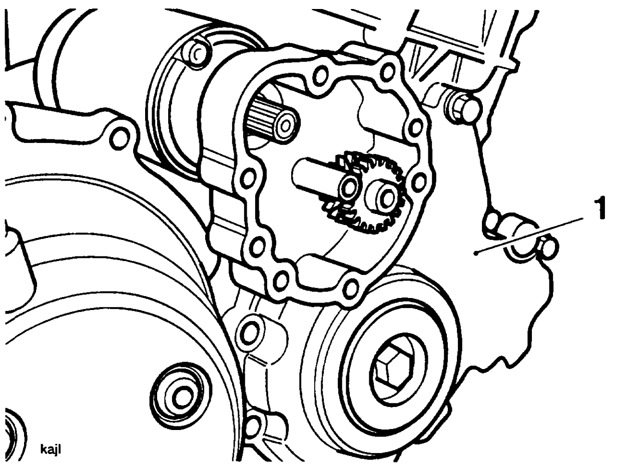
4. Release the clutch cable from the actuating arm by pushing the inner cable nipple through the arm and sliding the cable out of the slot.



1. Actuating Arm

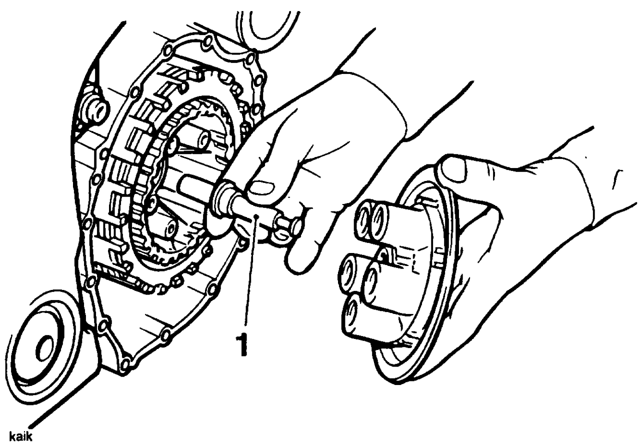
2. Inner Cable

5. Remove the starter cover, right hand crank cover and associated starter gears to gain access to the clutch cover bolt at the centre-right hand side (see section 7).



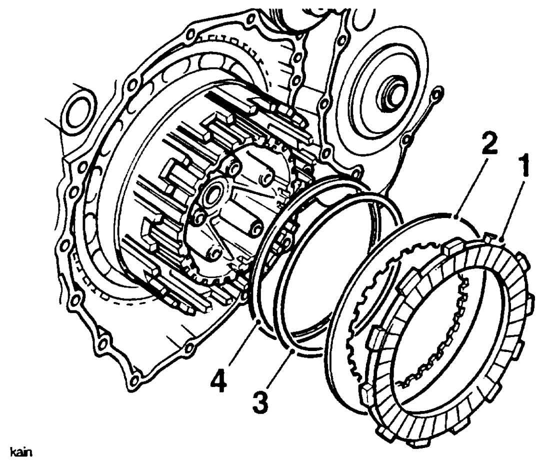
1. Right hand crank cover (starter cover removed)

6. Remove the clutch cover.
7. Undo the bolts and springs and remove the clutch pressure plate.
8. Remove the 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

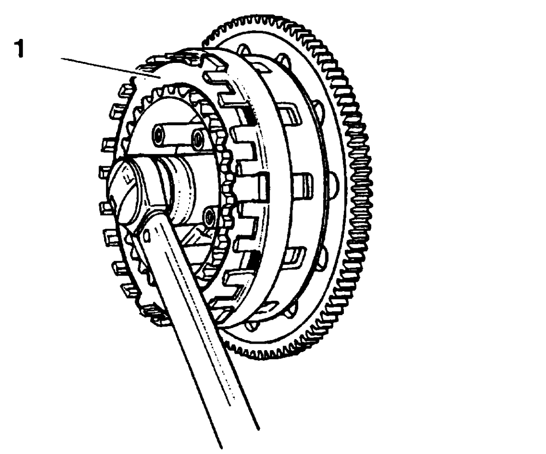
3. Anti-judder Spring

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 thicker and are also darker in colour.**
- **Refer to the following page of this section for details of clutch friction plate checking.**
- **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:**

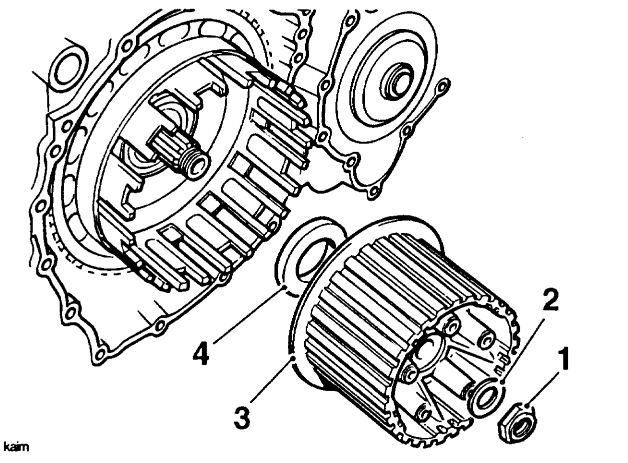
10. Engage second gear and lock the inner and outer clutch drums together using service tool T3880305.



1. Service Tool T3880305

11. Depress the rear brake pedal to prevent the engine from turning, then release the clutch centre nut.

12. Remove the centre nut, belleville washer, clutch inner drum and thrust washer.



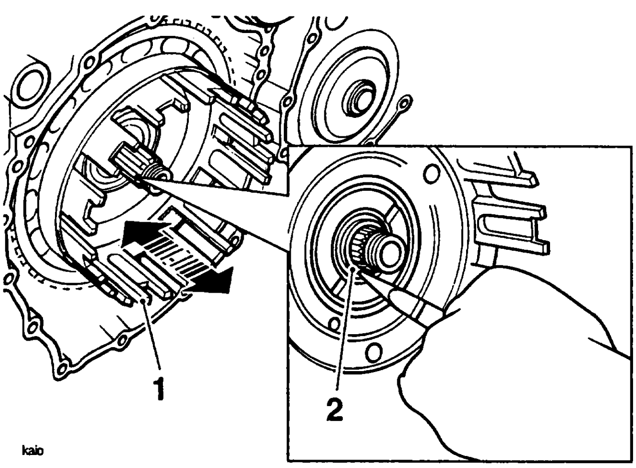
1. Centre Nut

2. Belleville Washer

3. Inner Drum

4. Thrust Washer

13. Slide the clutch outer drum gently backwards and forwards to dislodge the inner bearing sleeve. Carefully remove the bearing sleeve while supporting clutch drum.



1. Outer drum

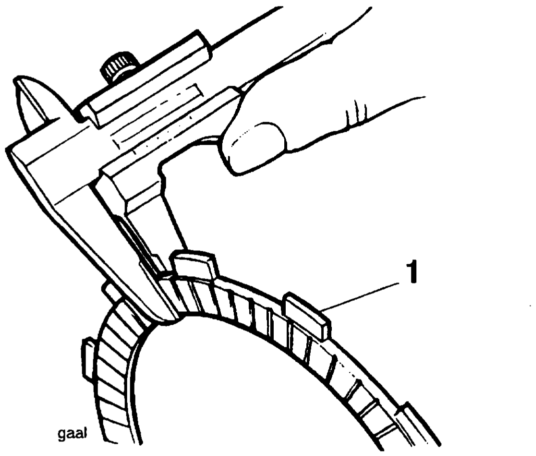
2. Bearing sleeve

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

FRICTION PLATE INSPECTION

Thickness

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



1. Clutch friction Plate

Friction plate thickness - inner and outermost plates

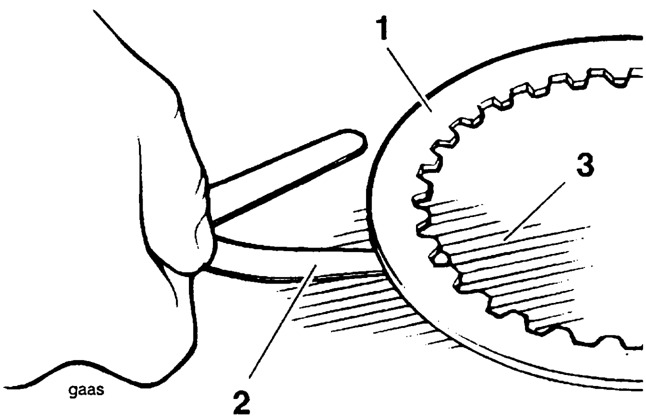
Standard:	**3.80 mm**
Service limit:	**3.60 mm**

Friction plate thickness - all other plates

Standard:	**3.30 mm**
Service limit:	**3.10 mm**

Bend/warp

1. 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

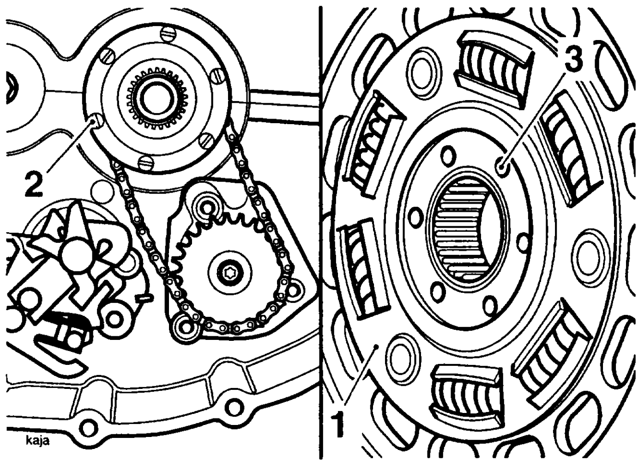
3. Surface Plate

Friction plate bend/warp

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

Assembly

1. Position the clutch outer drum to the input shaft and align the oil pump drive pegs with the corresponding holes in the rear of the clutch outer drum.

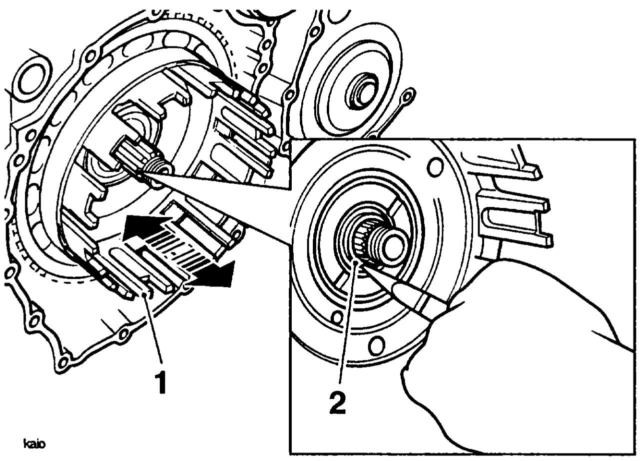


1. Clutch outer drum

2. Oil pump sprocket drive pegs

3. Oil pump drive holes

2. While holding the clutch outer drum in position and ensuring correct engagement with the oil pump drive, refit the bearing sleeve.



1. Outer drum

2. Bearing sleeve

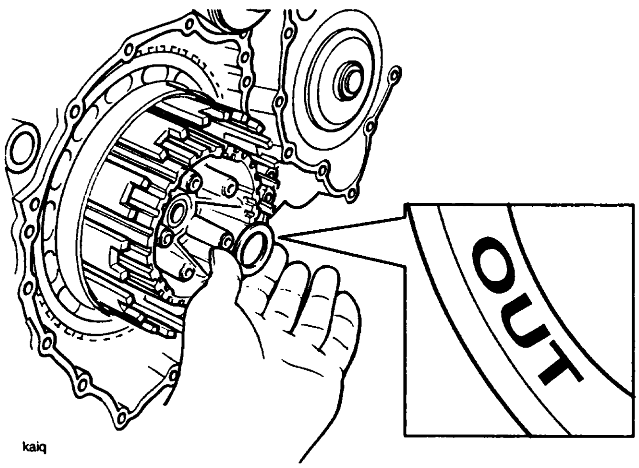
NOTE:

- **When the bearing sleeve is correctly fitted, it will be a flush fit with clutch drum face. In addition, a groove around the input shaft will be visible.**

3. Fit the thrust washer to the shaft.

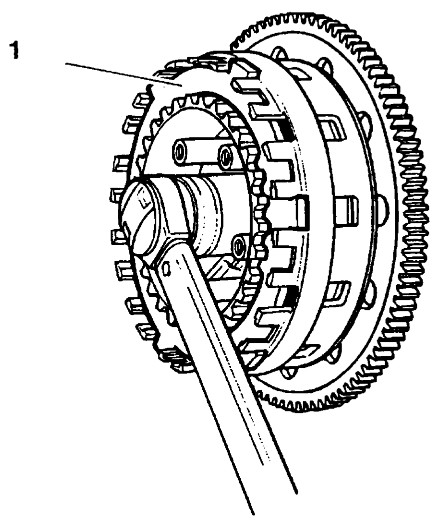
4. Fit the clutch inner drum.

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



Belleville Washer 'Out' Mark

6. 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.



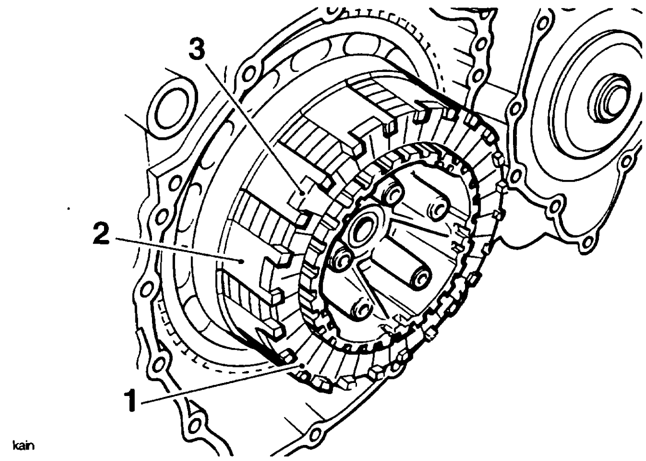
1. Service Tool T3880305

7. Disengage second gear and check for free rotation of the clutch inner drum.

8. 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 innermost and outermost friction plates are different to the remainder. For identification, they are darker in colour and are thicker.**
- **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

9. Refit the clutch pullrod.

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

NOTE:

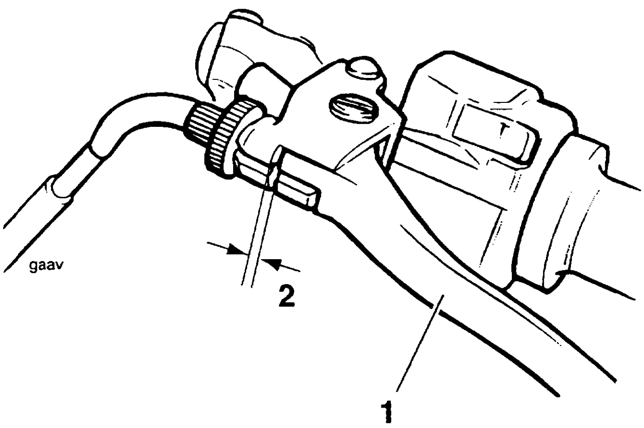
- **The pull rod should be free to move in and out and also it should be free to turn.**

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

12. Refit the starter cover and gears as described in the transmission section (see section 7).

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

14. Set the lever adjuster to a point where an equal adjustment is possible in both directions.
15. Set the adjuster at the clutch end to give a preliminary setting of 2-3 mm of free-play as measured at the lever.
16. Operate the clutch lever several times and recheck the amount of free-play present at the lever.
17. 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

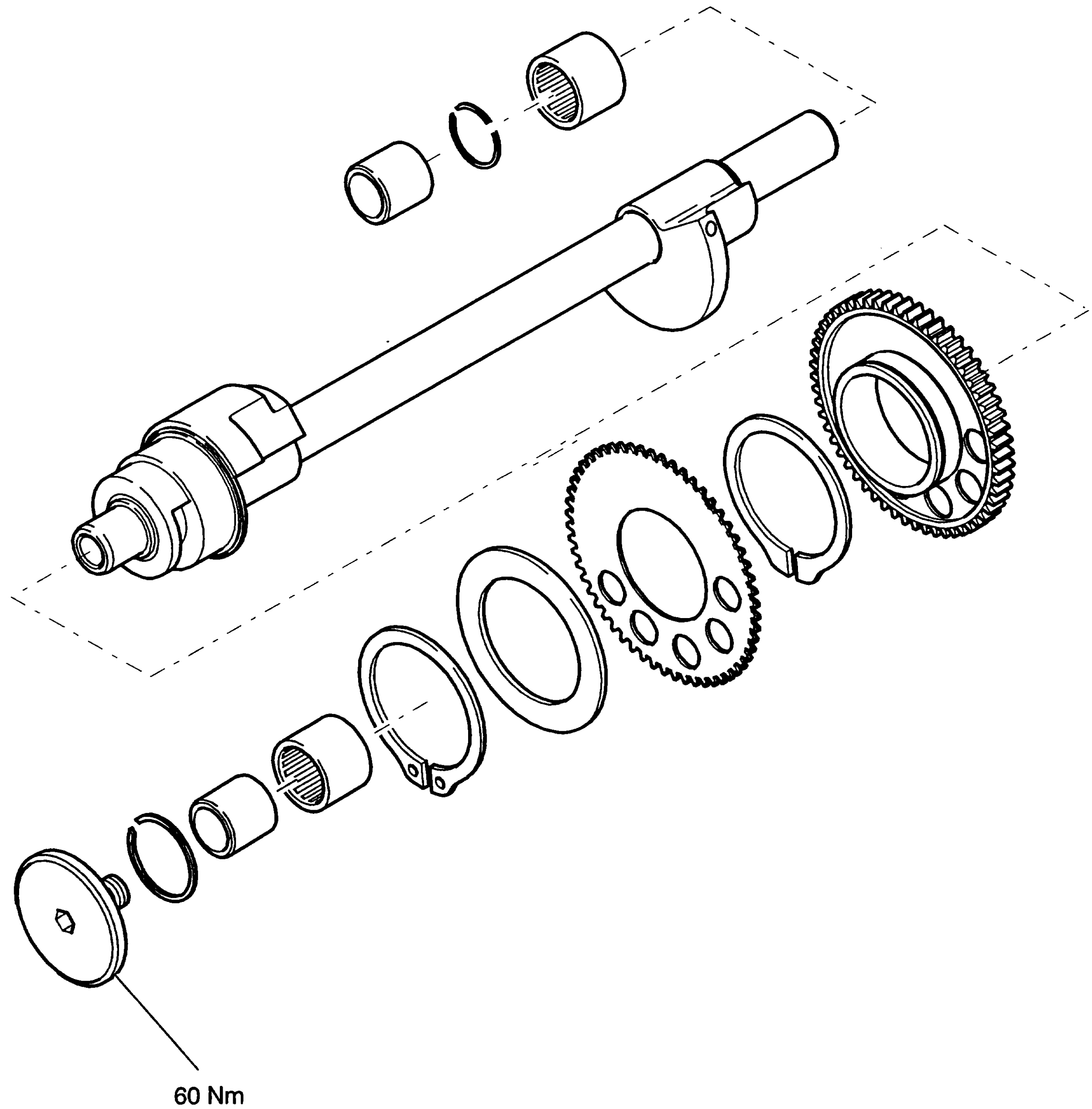
2. Correct Setting, 0.4-0.8 mm

18. Refit the right hand lower fairing (where necessary) as described in the body section.
19. Reconnect the battery positive (red) lead first.
20. Refit the seats.

BALANCER

CONTENTS

Exploded View - Balancer Shaft



BALANCER

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

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

The balancer shaft is hollow and also functions as the centrifugal breather.

Removal

NOTE:

- **To remove the balancer, the crankcase halves must first be separated (see section 6).**

1. With the crankcase halves separated, lift out the balancer shaft complete with the shaft bearings/circlips.

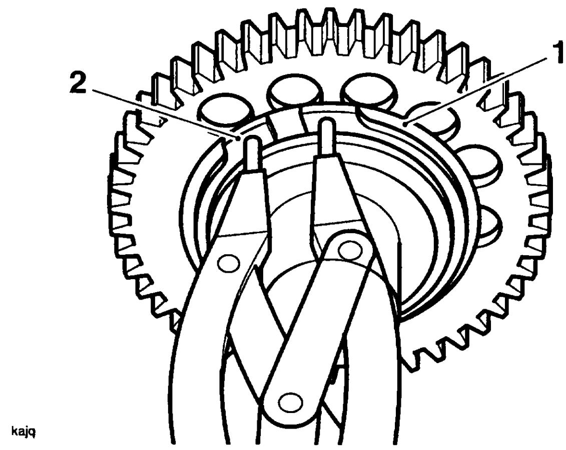
NOTE:

- **As the shaft is released from the crankcase, the backlash eliminator gear will spring out of alignment with the crankshaft.**

2. To remove the left hand bearing, slide the bearing, circlip and bearing from the balancer shaft.
3. To remove the right hand bearing, remove the bolt and slide the circlip, bearing race and inner ring from the shaft.

CAUTION: When removing the circlip, always ensure that the area where the breather seal runs does not become scratched or damaged. A damaged seal track will cause oil to be ejected from the engine.

4. To strip the backlash eliminator from the drive gear, release the circlip and remove the wave-washer, backlash gear and spring.



1. Wave washer

2. Circlip

Inspection

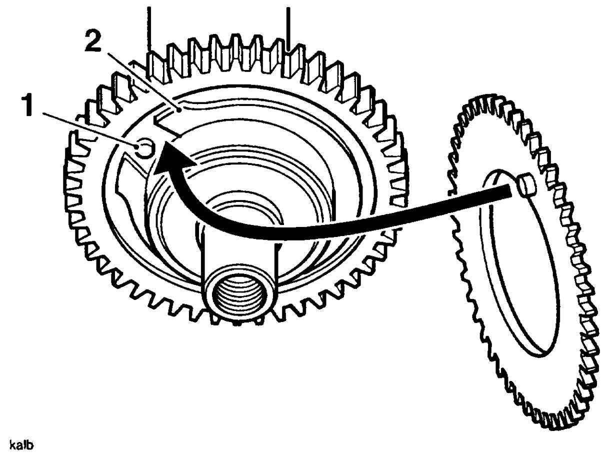
1. Inspect all gears for chipped or missing teeth.
2. Inspect all bearings for signs of overheating (blue discolouration), seized or damaged rollers, and any other damage.
3. Ensure the breather tube in the centre of the shaft is not blocked by oil, debris etc.
4. Inspect the backlash spring for deformities, damage etc.
5. Inspect the gear teeth for overheating (blue discolouration).

NOTE:

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

Assembly/Installation

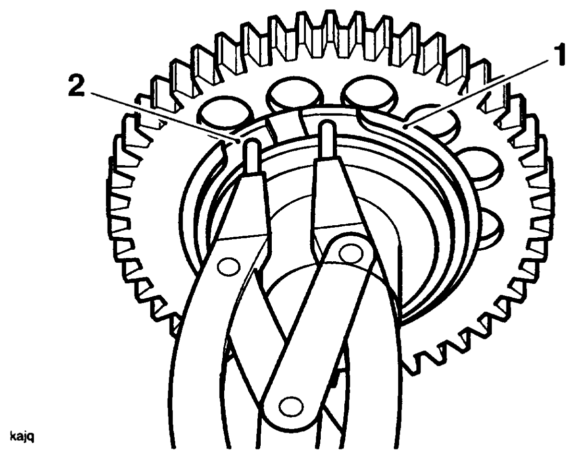
1. If the backlash gear was disassembled, fit the backlash spring to the balancer drive gear, positioning the spring ends on either side of the peg.
2. Fit the backlash gear, ensuring its peg is located clockwise of the balancer gear peg and also between the spring ends.



1. Balancer gear peg

2. Backlash spring

3. Fit the wave washer and secure all components in position with the circlip.



1. Wave washer

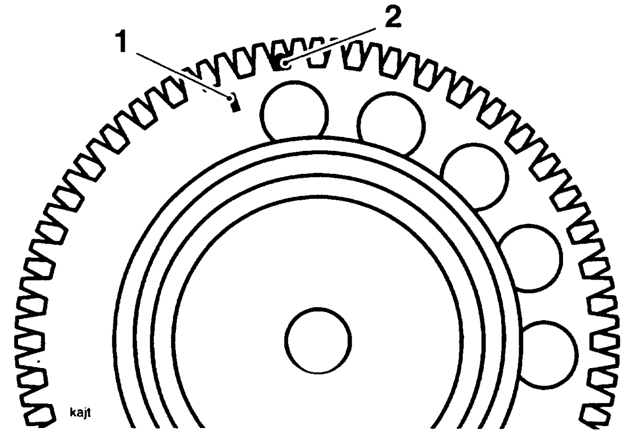
2. Circlip

4. Lubricate and fit the right hand bearing and circlip to the shaft.
5. Apply Threebond TB1305 locking compound to the threads of the balancer bearing bolt.
6. Fit the bolt and tighten to **60 Nm**.

7. Lubricate and fit the left hand bearing and circlip.

NOTE:

- **Prior to installation in the crankcase, it is essential that the markings on the backlash eliminator and drive gears are brought into alignment against the tension of the spring. This will facilitate correct positioning of the balancer in relation to the crankshaft when both are installed in the crankcase.**



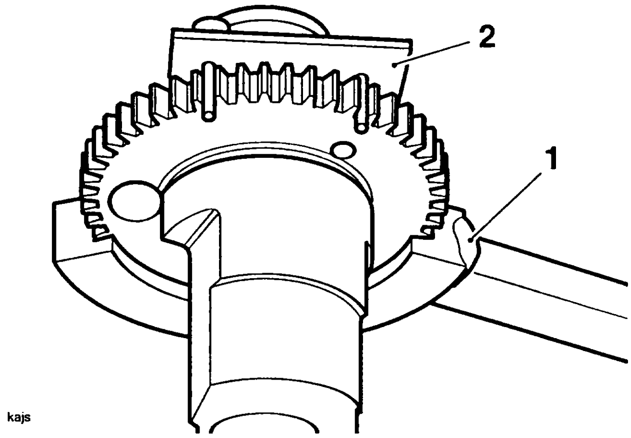
1. Backlash gear line

2. Drive gear dot.

8. Using tool T3880016, bring the backlash and drive gears into alignment against the backlash spring.
9. Secure the backlash gear in position with the fixture supplied with the tool by placing the fixture pegs across two gear teeth (ensure that the fixture will not be in the way when assembling the balancer to the crank).

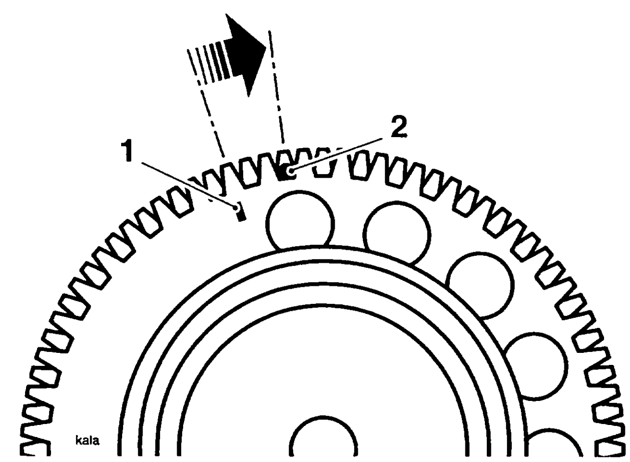
NOTE:

- **When in alignment, the line on the backlash gear must be located directly above the drive gear tooth marked with a dot.**
- **Since the drive gear dot cannot be seen when the backlash gear is in alignment, always mark the dot-marked gear tooth with chalk in order that it can always be identified.**



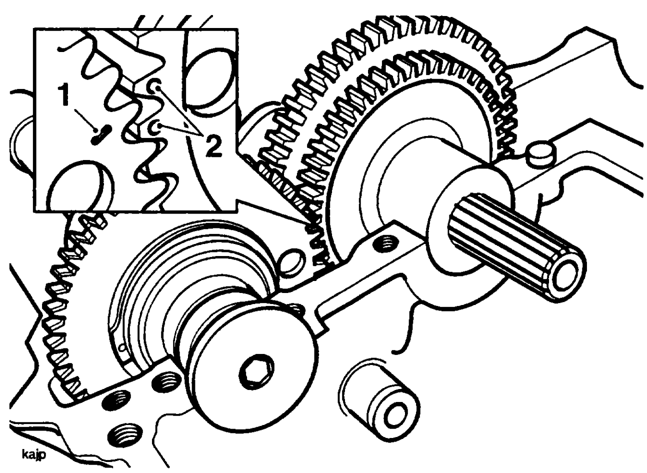
1. Tool T3880016

2. Securing fixture



1. Backlash gear line/Drive gear dot aligned

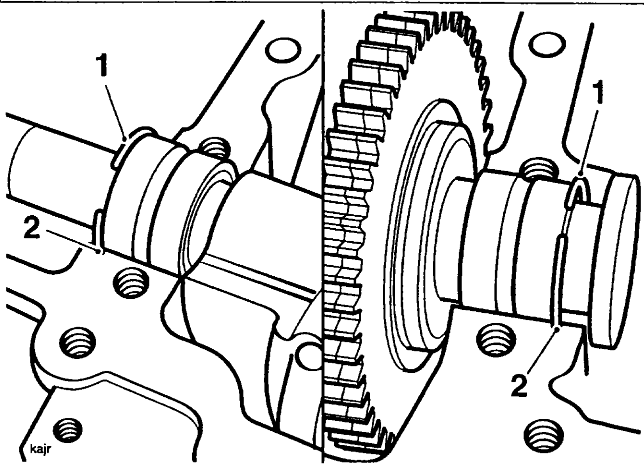
10. With the drive and backlash eliminator gears still correctly aligned, locate the balancer to the crankcase aligning the balancer gears and crankshaft as shown in the illustration below while ensuring that the bearing circlips locate correctly in their corresponding grooves in the crankcase.



1. Balancer backlash and drive gear markings

2. Crankshaft markings

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



1. Circlips

2. Crankcase Circlip Grooves

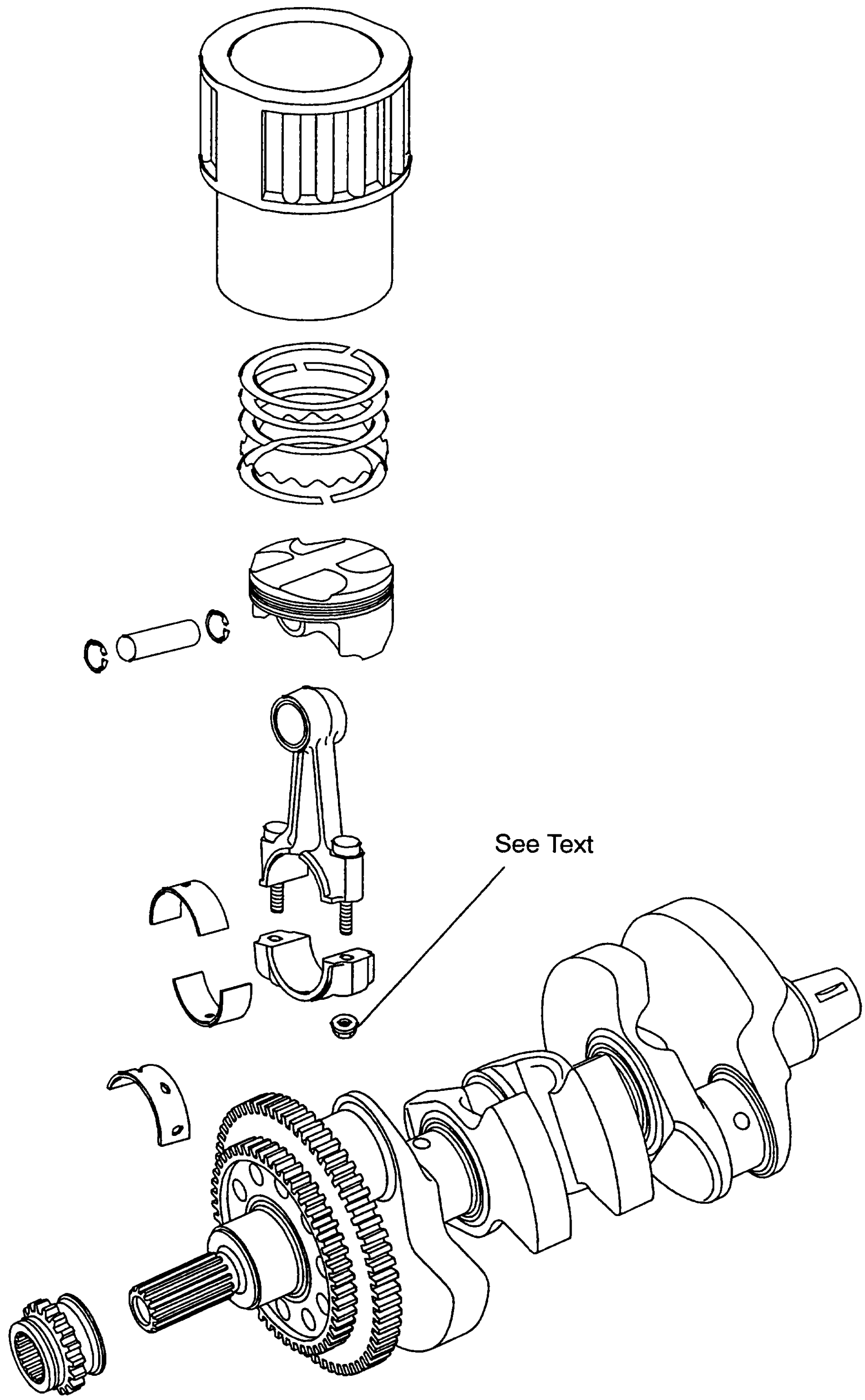
11. Remove the securing fixture.
12. Check that the balancer and crankshaft are correctly aligned before continuing to assemble the crankcase halves.

CRANKSHAFT, RODS and PISTONS

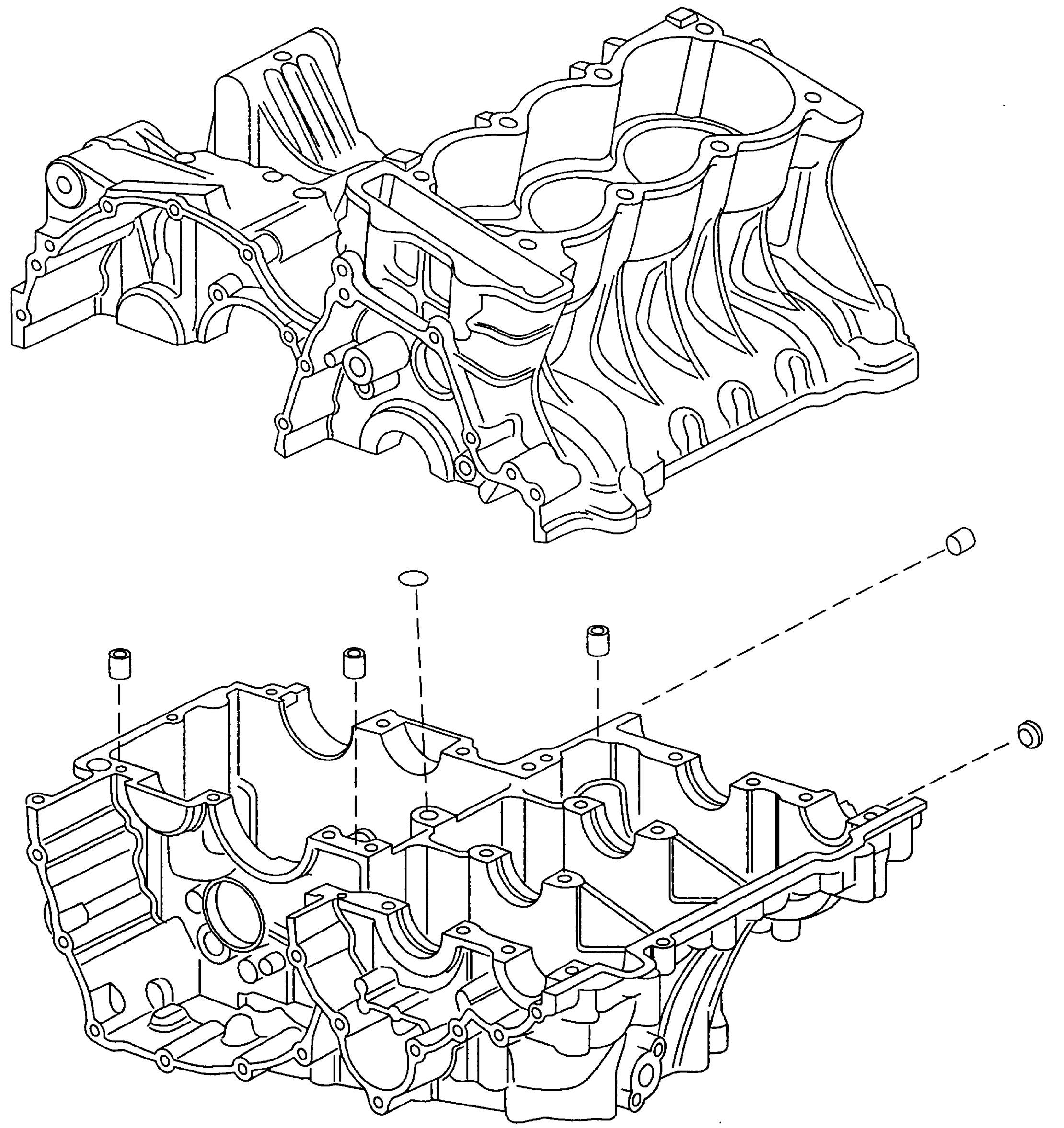
CONTENTS

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

4. Remove the body side panels and lower fairings as described in the bodywork section.
5. Remove the fuel tank and airbox as described in the fuel system section.
6. 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.

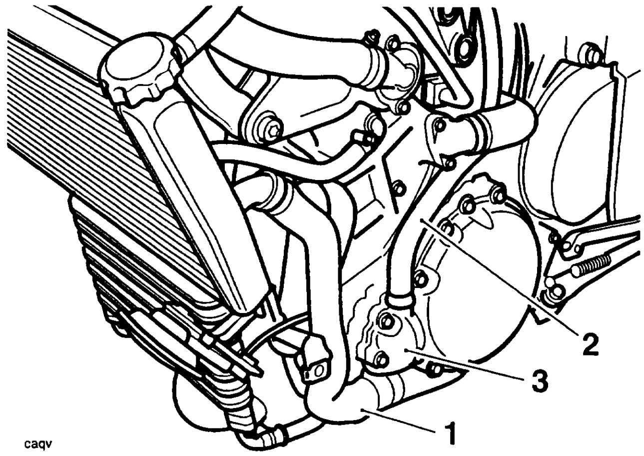
WARNING: Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.

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.

7. 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.

8. Detach the bottom hose at the water pump and the bypass hose at the cylinder head.

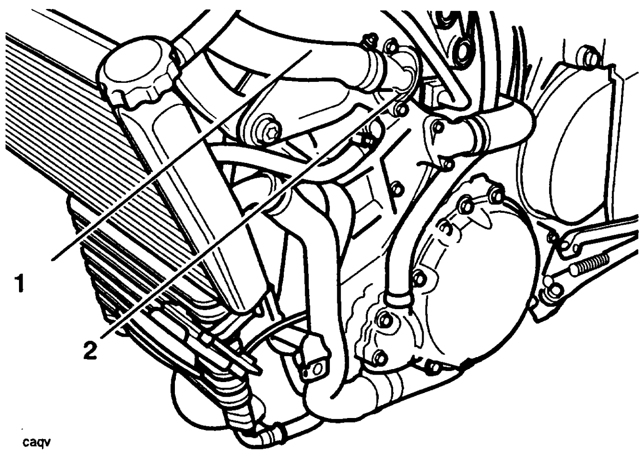


1. Bottom Hose

2. Bypass Hose

3. Water Pump

9. Detach the top hose at the thermostat housing.



1. Top hose

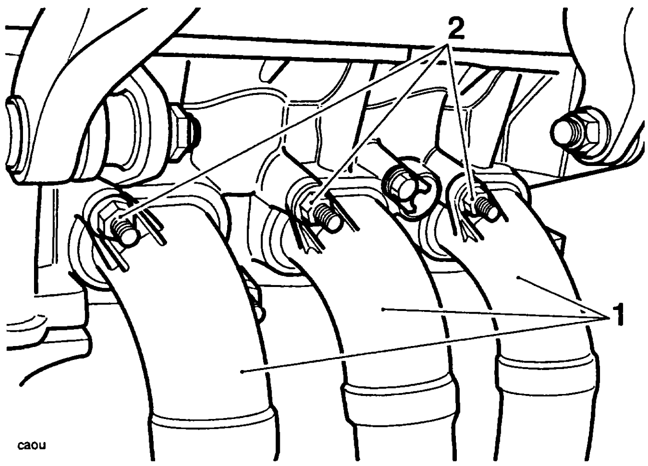
2. Thermostat housing

NOTE:

- **Secure the hoses to prevent damage as the engine is removed.**

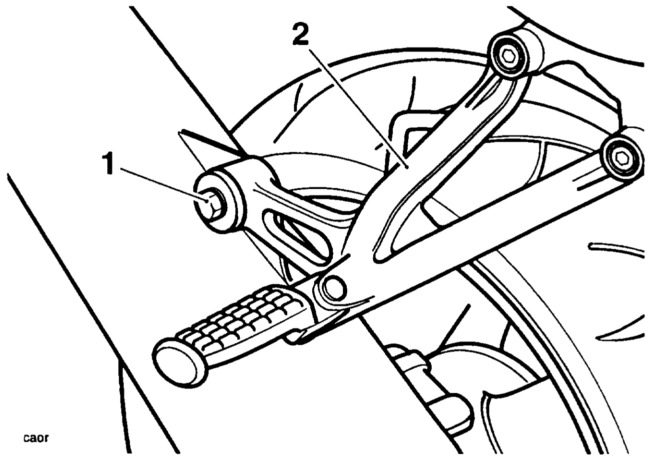
10. Remove the oil cooler as described in the lubrication section.

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



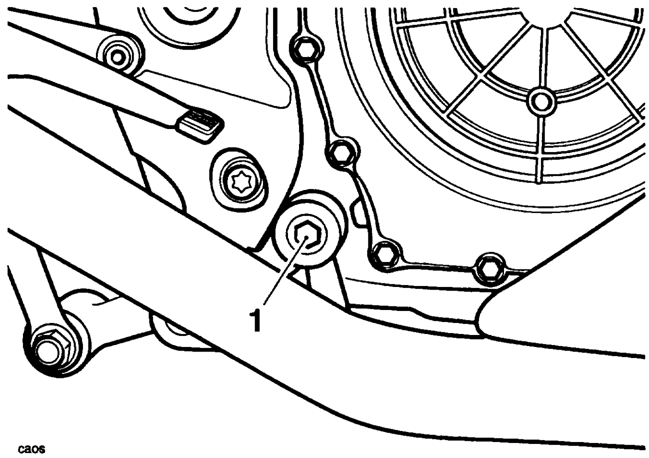
1. Downpipes

2. Fixings (upper fixings shown, there are three others diagonally opposite)



1. Silencer mounting bracket/fixing

2. Rear footrest support



1. Downpipe rear mounting point

12. 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.

13. Remove the sprocket cover.

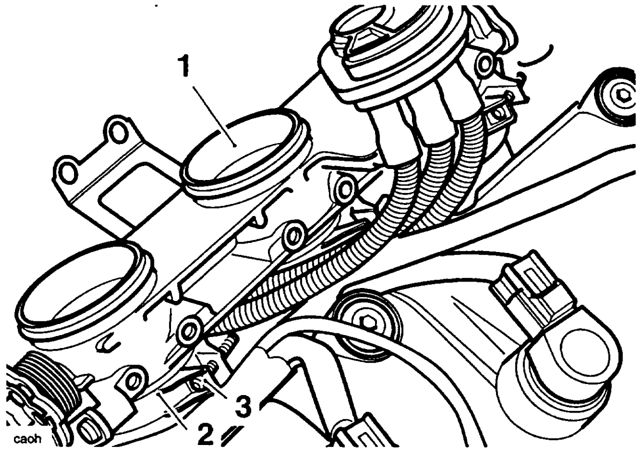
> **CAUTION: To prevent chain damage, do not allow the chain to come into contact with dirt, road grit etc.**

14. Disconnect all electrical connections from the main harness to the engine.

15. Release the clips securing the throttle bodies to the transition pieces.

NOTE:

- **It is not necessary to disconnect the throttle cables.**



1. Throttle bodies

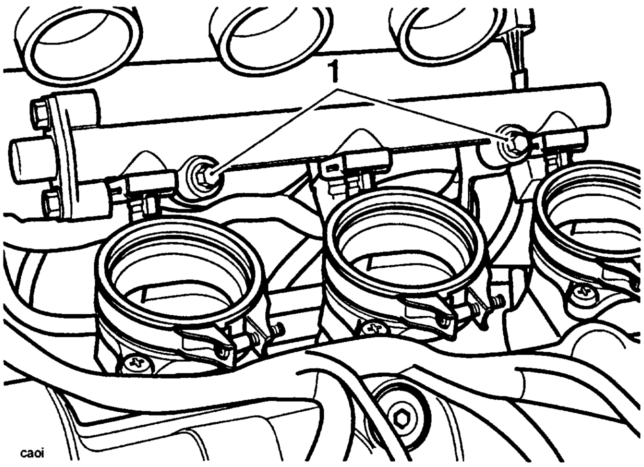
2. Transition pieces

3. Clips

16. Detach the idle air bleed hoses from their connections at the cylinder head.

17. Ease the throttle bodies from the transition pieces and lay the complete assembly on the handlebars.

18. Release the bolts securing the fuel rail to its bracket.

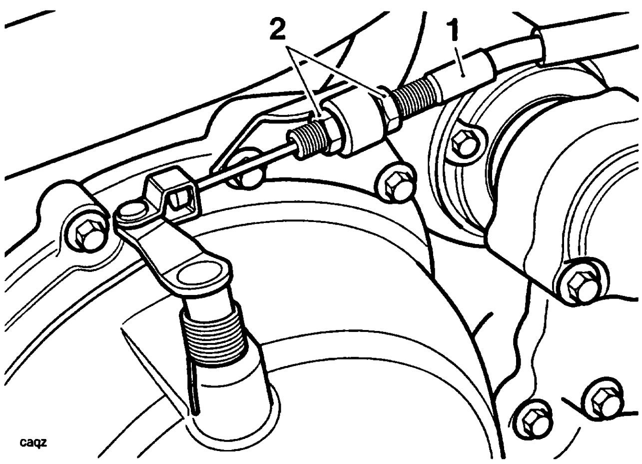


1. Fuel rail bolts

19. Ease the fuel rail and injectors from the cylinder head and remove the assembly from the motorcycle.

20. Note the routing of the clutch cable.

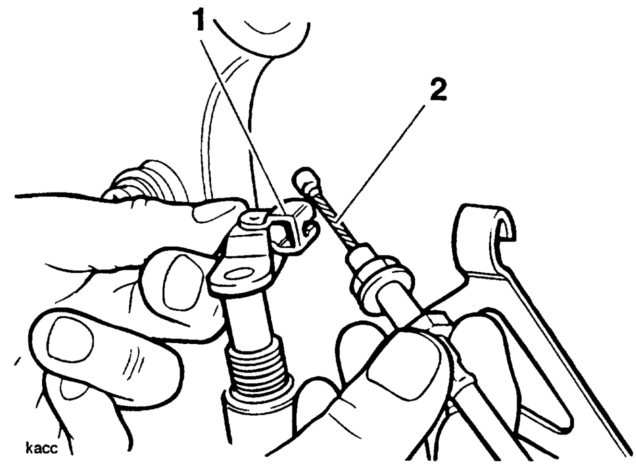
21. Slacken the clutch cable locknut and release the adjuster at the clutch cover end to give maximum play in the cable.



1. Clutch Cable

2. Adjuster

22. 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.



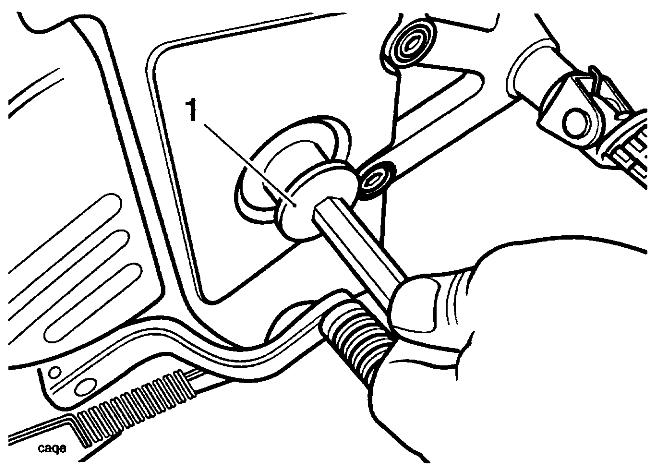
1. Actuating Arm

2. Inner Cable

23. Detach the cable from the clutch lever, pass the cable through the gap in the air deflector shield and remove from the motorcycle.

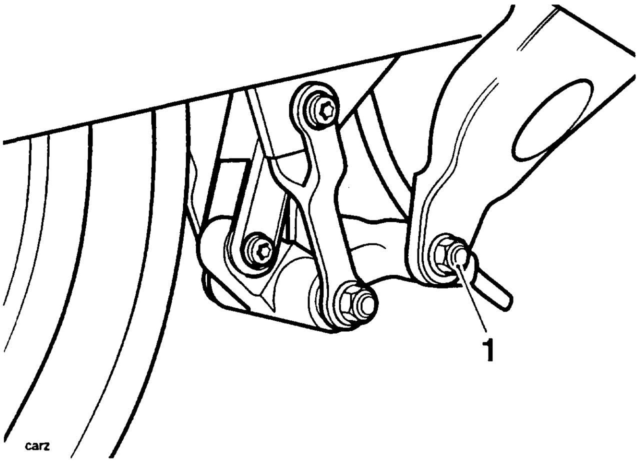
24. Remove the air deflector shield.

25. Slacken the swinging arm nut.



1. Swinging Arm Nut

26. Slacken the drag link pivot bolt.



1. Drag Link Pivot Bolt

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

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

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

30. 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

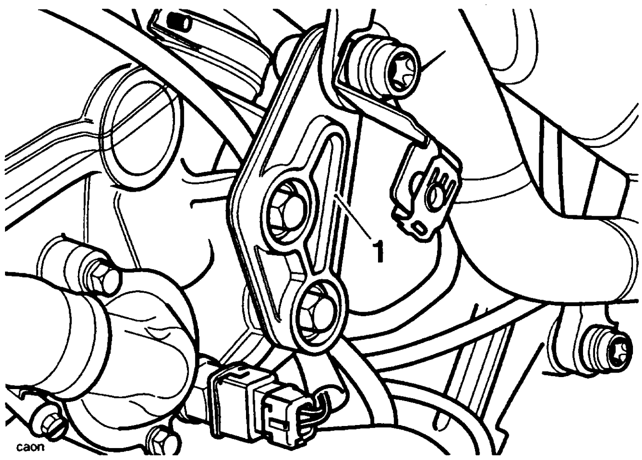
1. Position the engine beneath the frame.

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. Remove the support from beneath the engine.

5. 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.**

6. Tighten the bolt securing the frame to the left hand front cylinder head mounting to **80 Nm.**

7. Tighten the bolt securing the frame to the left hand upper engine mounting to **80 Nm.**

8. Tighten the bolt securing the frame to the left hand lower engine mounting to **80 Nm.**

9. Check the gap between the frame and engine at all right hand engine mounting locations. If a gap is found between the engine and frame, add as necessary to eliminate the gap.

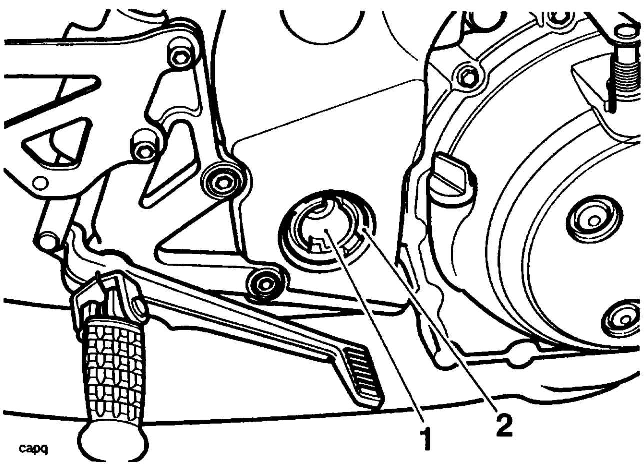
NOTE:

- **Four sizes of spacer are available, 2 mm, 1.5 mm, 1.0 mm and 0.5 mm. Refer to the parts catalogue for part number information.**

NOTE:

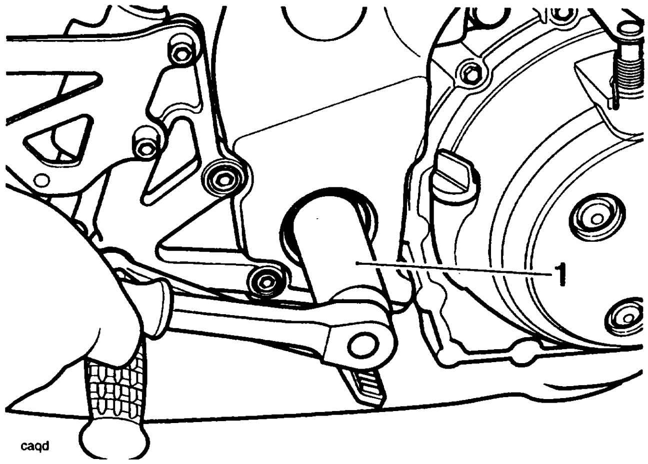
- **If a spacer is needed for the lower right hand rear engine mounting bolt, an equivalent sized spacer (see parts catalogue for part number) must also be fitted to the drag link to frame bolt on the right hand side.**
- **If a gap larger than 1 mm exists between the frame and drag link, but no shim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

10. Once all the necessary shims have been added, tighten the bolt securing the frame to the right front cylinder head mounting to **80 Nm.**
11. Tighten the bolt securing the frame to the right hand rear cylinder head mounting to **80 Nm.**
12. Tighten the bolt securing the frame to the right hand upper engine mounting to **80 Nm.**
13. Tighten the bolt securing the frame to the right hand lower engine mounting to **80 Nm**.
14. Tighten the bolt securing the frame to the cylinder head mounting bracket on the left side of the cylinder head to **80 Nm.**
15. Tighten the swinging arm spindle inner adjustment ring to **15 Nm** and the outer locking ring to **30 Nm** using service tool part numbers T3880290 and T3880295 respectively.

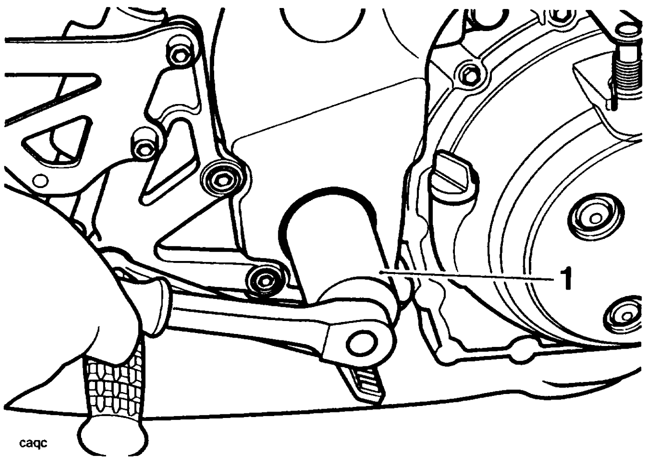


1. Adjuster ring

2. Lock ring



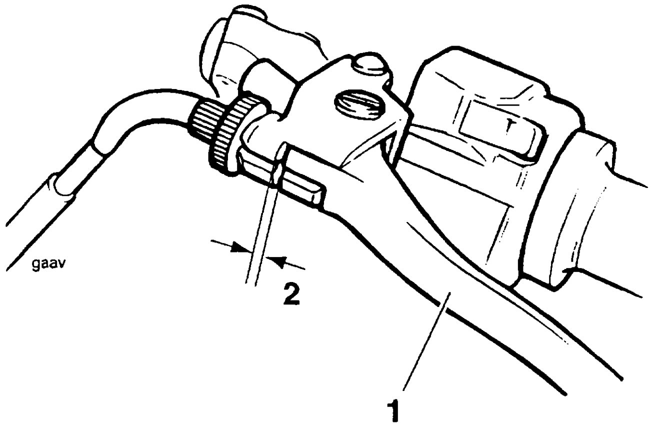
1. Tool T3880290



1. Tool T3880295

16. **Twin sided swinging arm versions only:** Tighten the swinging arm spindle bolt to **60 Nm.**
    Single sided swinging arm versions only: Tighten the swinging arm spindle nut to **110 Nm.**
17. Tighten the drag link spindle bolt to **95 Nm.**
18. Refit the air deflector shield.
19. Refit the clutch cable to the lever and actuating arm ensuring it is correctly routed through the air deflector shield as prior to removal. Set the adjuster at the clutch end to give a preliminary setting of 2-3 mm of free-play as measured at the lever.
20. Operate the clutch lever several times and recheck the amount of free-play present.

21. 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.

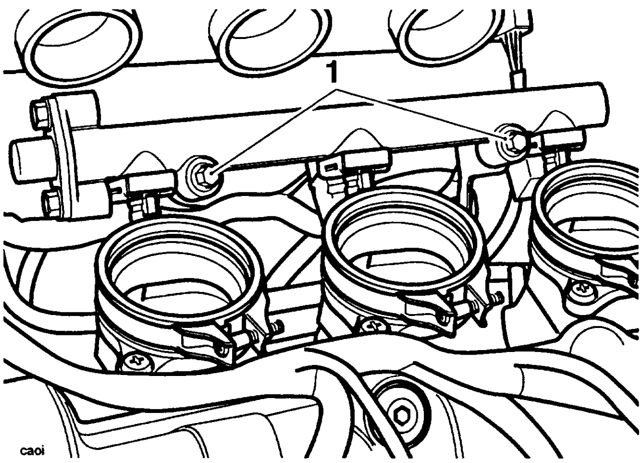


1. Clutch Lever

2. Correct Setting, 0.4-0.8 mm

22. Check the injector O-rings for splits and other damage. Replace as necessary.

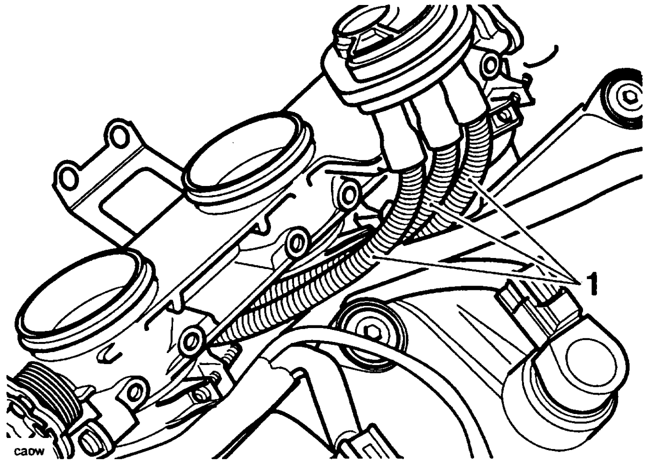
23. Refit the injectors and fuel rail to the cylinder head. Tighten the fuel rail fixings to **6 Nm**



1. Fuel rail bolts

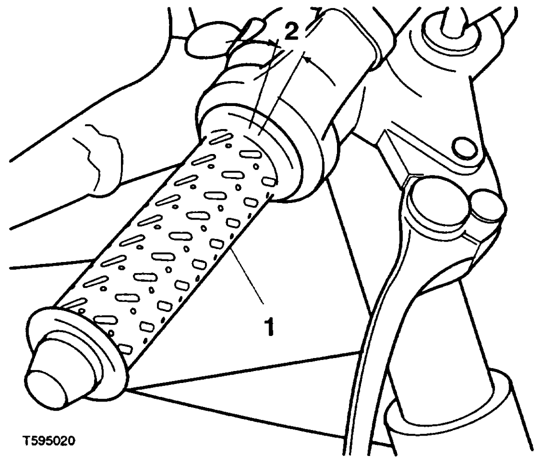
24. Refit the throttle bodies to the transition pieces and secure with the clips.

25. Reconnect the air bleed hoses to the cylinder head.



1. Air bleed hoses

26. Check for correct, unrestricted throttle operation and for cable/throttle binding and sticking. Check also for correct throttle adjustment, when correct, there should be 2-3 mm of free play at the twist grip. If adjustment is needed, proceed as follows:



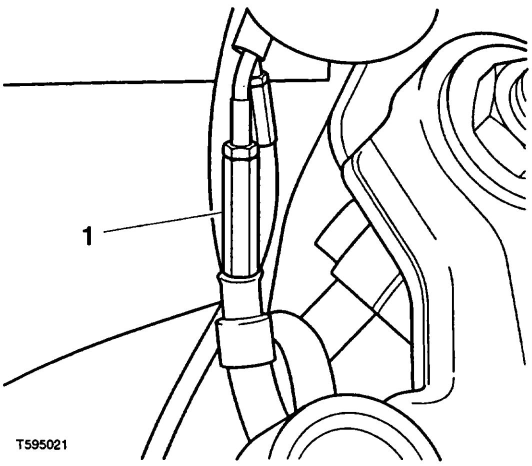
1. Throttle Grip

2. 2-3 mm

WARNING: Operation of the motorcycle with incorrectly adjusted, incorrectly routed or damaged throttle cables 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.

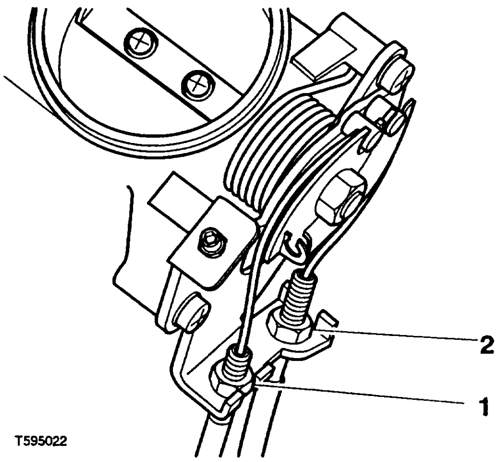
WARNING: Move the handlebars to left and right full lock while checking that cables and harnesses do not bind. Cables or harness that bind will restrict the steering and may cause loss of control and an accident.

27. Set the 'opening' cable adjuster at the twist grip end such that it has an equal amount of adjustment in each direction. Tighten the locknut.



1. 'Opening' Cable Adjuster (Twist Grip End)

28. Set the 'opening' cable adjuster at the throttle end to give 2-3 mm of play at the twist grip. Tighten the locknut.



1.'Opening' Cable Adjuster (Throttle End)

2. 'Closing' Cable Adjuster (Throttle End)

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

30. With the throttle fully closed, ensure that there is 2-3mm of free play in the 'closing' cable. Adjust if necessary ensuring that the locknut is secure afterwards.

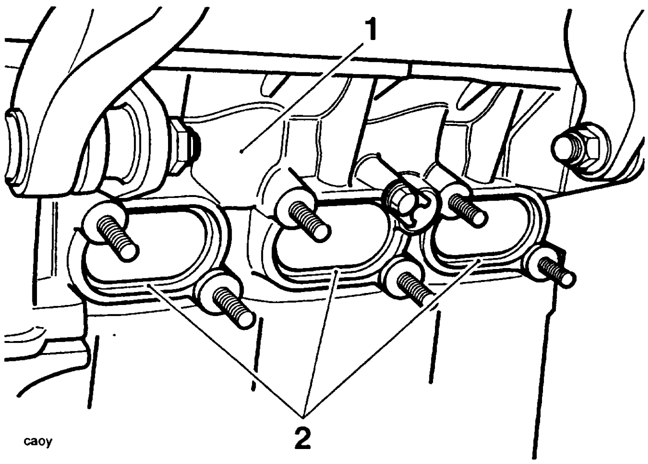
WARNING: Ensure that the adjuster locknuts are tightened. A loose throttle cable adjuster could cause the throttle to stick leading to loss of control and an accident.

31. Reconnect all electrical connections to the engine.

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

33. Apply Loctite A1388 to the sprocket cover bolt threads then refit the sprocket cover and tighten the bolts to **9 Nm.**

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



1. Cylinder head

2. Seals

35. Refit the oil cooler as described in the lubrication section.

36. Reconnect; the top hose at the cylinder head, the bottom hose at the water pump and the bypass hose at the cylinder head.

37. Fit and tighten the crankcase coolant drain plug to **13 Nm.**

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

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

40. Refit the airbox (see section 9).

41. Refit the fuel tank (see section 9).

42. Refit any bodywork previously removed (see section 15).

43. Refit the battery to the battery box and reconnect, positive (red) lead first.

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

CRANKCASES

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

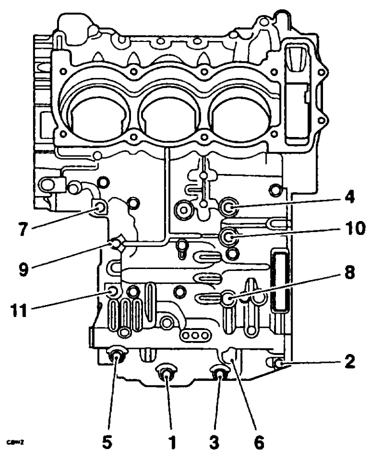
Before the crankcase halves can be separated, the engine must be removed from the frame and the following items must also be removed

1. Sump.
2. Engine covers.
3. Starter motor and starter drive mechanism.
4. Clutch.
5. Oil pump drive chain/gears

Disassembly

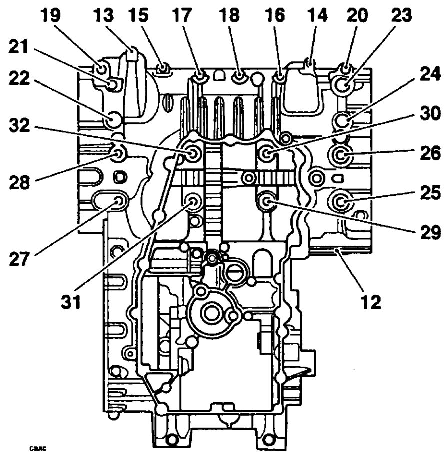
> ⚠ **CAUTION: Failure to follow the correct screw release sequence may result in permanent crankcase damage.**

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, balancer, crankshaft, bearings etc. can be removed.**

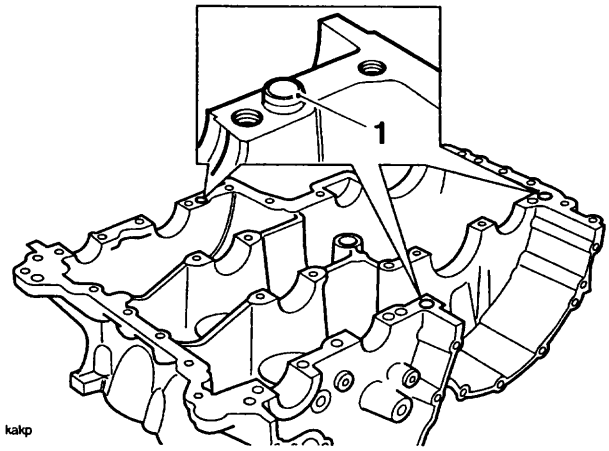
Assembly

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

NOTE:

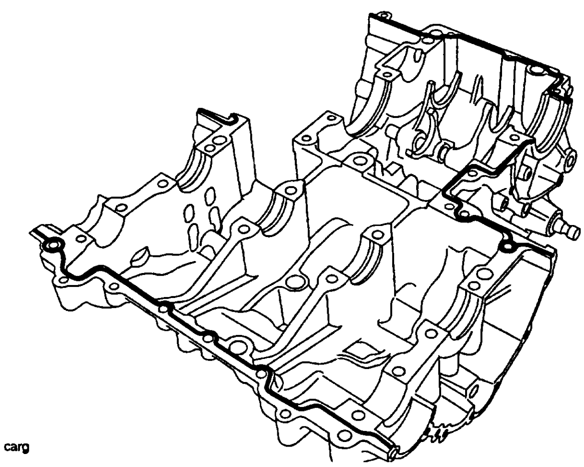
- **If the shafts have been removed, clean all traces of old Threebond from the bearing outer races before assembly.**

2. Apply Threebond 1360 to the outer races of the gearbox shaft 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.
3. Ensure that the transmission is in neutral.
4. Ensure that the 3 locating dowels are in position in the upper crankcase.



1. Locating dowels

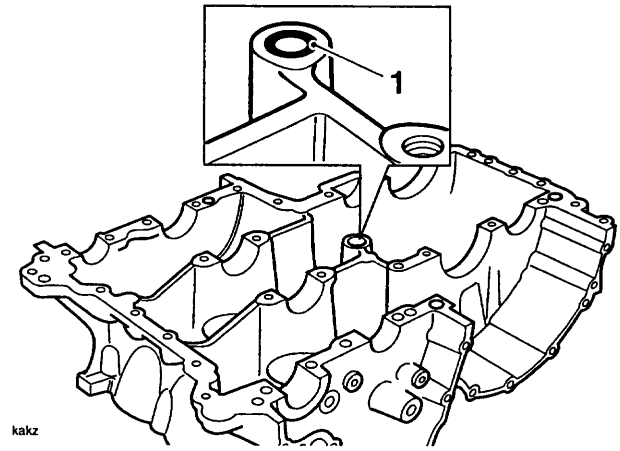
5. Apply a thin bead of silicone sealant to the lower crankcase mating faces. (At the factory, Three Bond 1207B is used).



1. Sealer areas

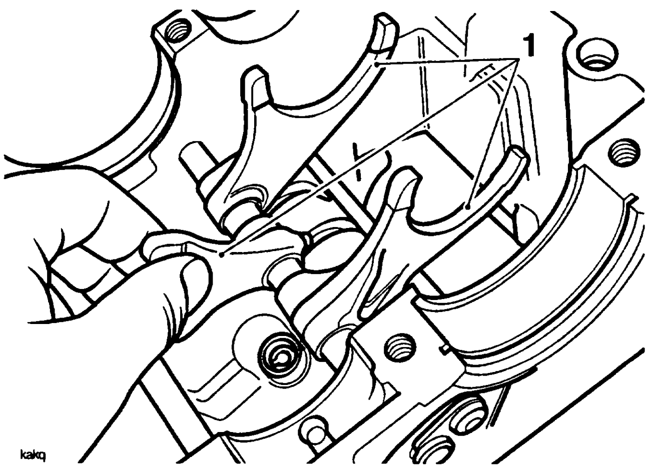
CAUTION: Do not use excessive amounts of sealer. The extra sealer may become dislodged and could block the oil passages in the crankcases causing severe engine damage.

6. Install and lubricate the crankshaft bearing shells with clean engine oil (see bearing selection before proceeding).
7. Lubricate the crankshaft journals with clean engine oil.
8. Locate a new oil gallery O ring to the upper crankcase.



1. O ring

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 until the bolt heads are near contact with the crankcase.

11. Invert the engine.

12. Fit the screws into the upper crankcase and hand tighten until the bolt heads are near contact with the crankcase.

NOTE:

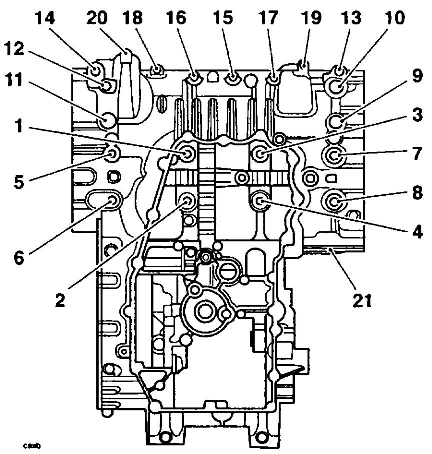
- **The crankcase screws are tightened in stages.**
- **Two different sizes of crankcase screw are used. All screws are tightened through the first stage of the tightening procedure but only the M8 size screws are tightened at the second stage.**

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

Stage 1 - all screws

13. Invert the engine.

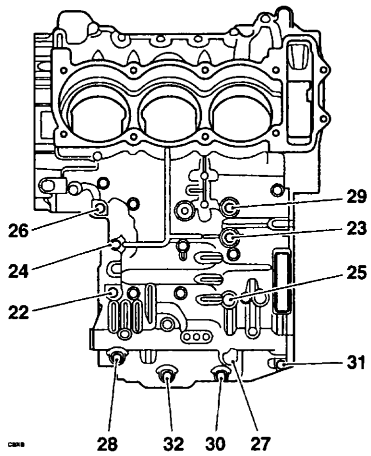
    In the correct sequence, tighten all lower crankcase screws to **12 Nm**.



Lower Crankcase Bolt Tightening Sequence

14. Invert the engine.

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



Upper Crankcase Bolt Tightening Sequence

Stage 2 - M8 screws only

15. In the correct sequence, tighten only the **M8** size upper crankcase screws (numbers 22 to 29) to **28 Nm.**

16. Invert the engine.

    In the correct sequence, tighten only the **M8** size lower crankcase screws (number 1 to 14) to **28 Nm.**

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

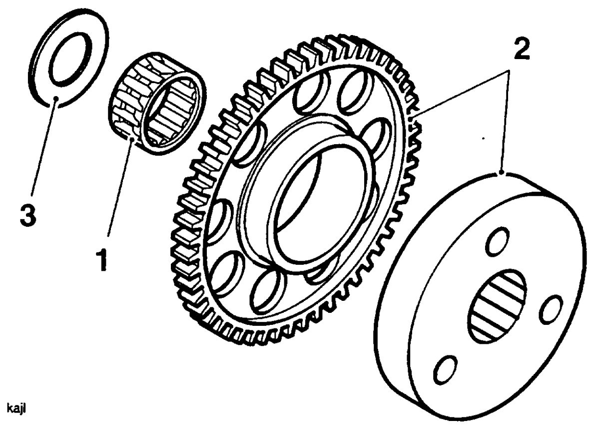
CRANKSHAFT

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 later in this section.
2. Remove the alternator rotor from the crankshaft as described in section 16.
3. Remove the sprag clutch as described in section 7.



1. Needle roller bearing
2. Gear/sprag clutch assembly
3. Plain washer

4. Remove the cam chain as described in section 3.
5. Release and remove the crankshaft from the upper crankcase.

NOTE:

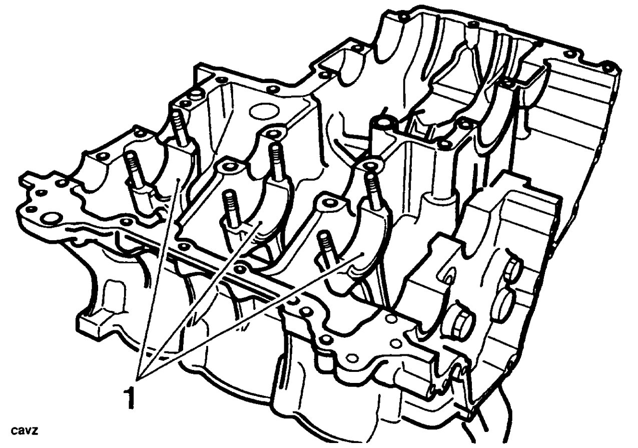
- **Remove all bearings and inspect for damage, wear, overheating (blueing) and any other signs of deterioration. Replace the bearings as a set if necessary.**

6. Remove the balancer.

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.



1. Big end shells

2. Lubricate all bearings with engine oil.
3. Ensure that the crankshaft is clean, and that the oilways within the crank are clean and free from blockages and debris.

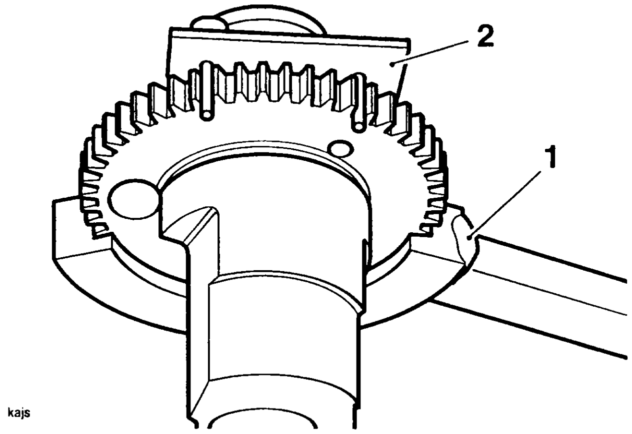
NOTE:

- **Prior to installation, it is essential that the markings on the backlash eliminator and drive gears are brought into alignment against the tension of the spring. This will allow correct positioning of the balancer in relation to the crankshaft when both are installed in the crankcase.**

4. Using tool T3880016, bring the backlash and drive gears into alignment against the backlash spring.

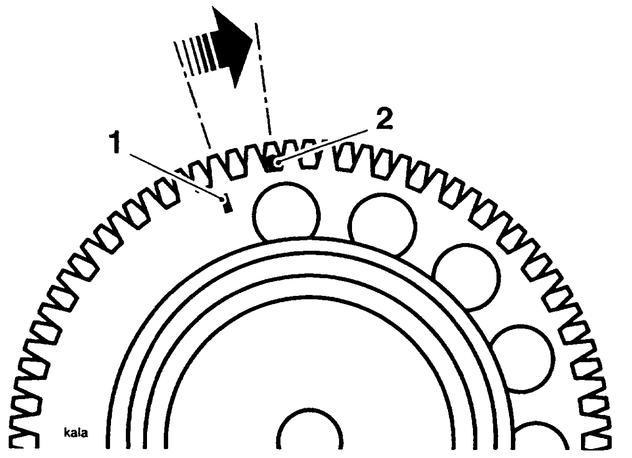
NOTE:

- **When in alignment, the line on the backlash gear must be located directly above the drive gear tooth marked with a dot.**
- **Since the drive gear dot cannot be seen when the backlash gear is in alignment, always mark the dot-marked gear tooth with a laundry marker in order that it can always be identified.**



1. Tool T3880016

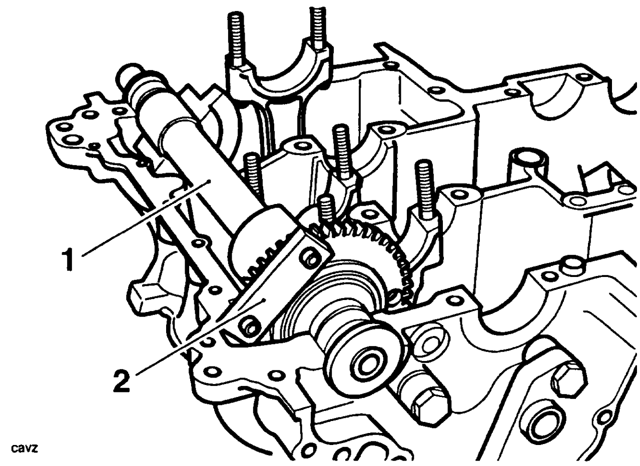
2. Securing fixture



1. Backlash gear line/Drive gear dot aligned

5. Secure the backlash gear in position with the fixture supplied with the tool by placing the fixture pegs across two gear teeth (ensure that the fixture will not be in the way when assembling the balancer to the crank).

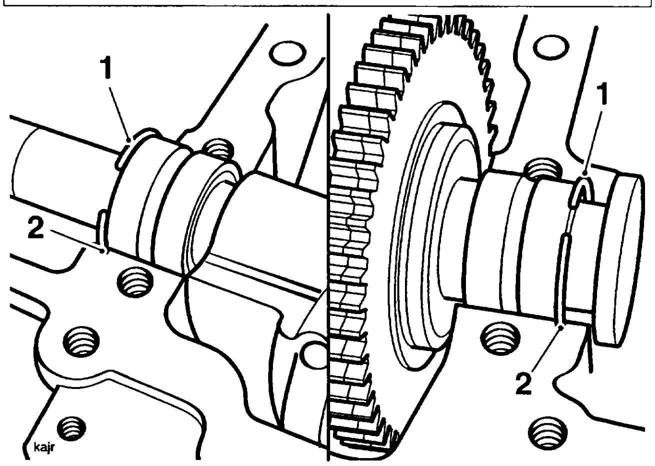
6. With the drive and backlash eliminator gears still correctly aligned, locate the balancer to the crankcase aligning the balancer gears and crankshaft as shown in the illustration while ensuring that the bearing circlips locate correctly in their corresponding grooves in the crankcase.



1. Balancer

2. Fixture from tool T3880016

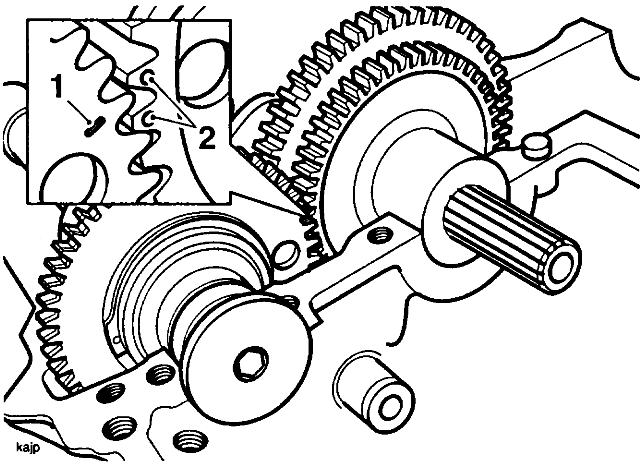
CAUTION: If the balancer and crankshaft are not correctly aligned, severe engine vibration will occur leading to damage to components.



1. Circlips

2. Crankcase Circlip Grooves

7. Install the crankshaft ensuring that the crank pins align with the big ends and that the crankshaft and balancer gear markings align as shown in the next illustration.



1. Balancer backlash and drive gear markings

2. Crankshaft markings

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

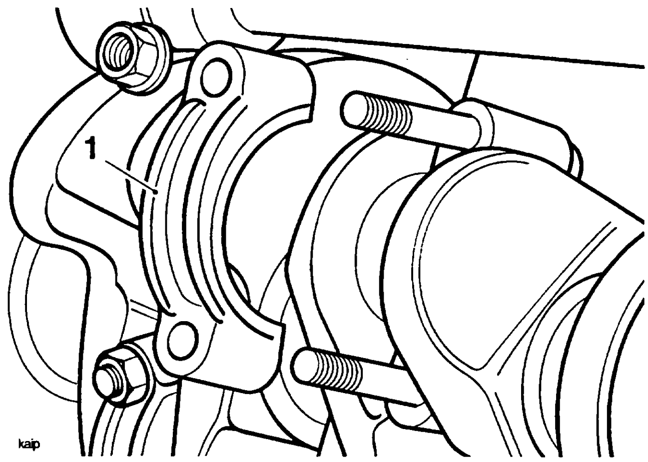
8. Check that the balancer and crankshaft are correctly aligned before continuing to assemble the crankcase halves.
9. Refit the connecting rods as described elsewhere in this section.
10. Assemble the alternator rotor (see section 16), the sprag clutch (see section 7) and cam chain (see section 3).
11. Assemble the crankcases as described earlier in this section.

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 and to identify the correct orientation of the bearing cap to the connecting rod.
2. Release the connecting rod nuts and remove the big end cap. Ensure that the bearing shell remains in place in the cap.



1. Big End Cap

NOTE:

- **It may be necessary to gently tap the big end cap with a rubber mallet to release the cap from the bolts.**

3. Push the connecting rod up through the crankcase and collect the 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.**

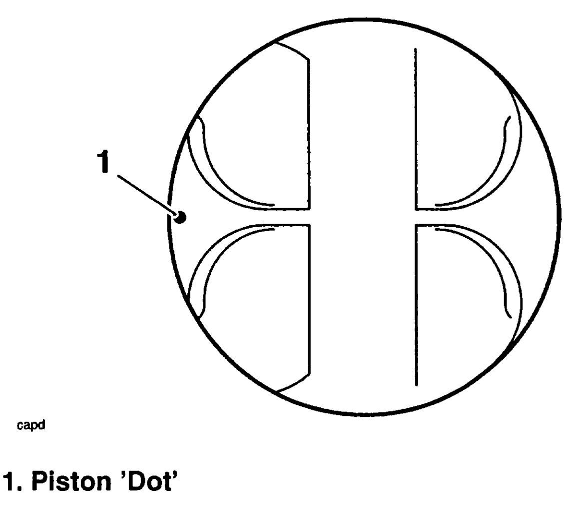
WARNING: Connecting rod bolts and nuts MUST only be used once. If the bolts or nuts are removed or undone for any reason, new bolts and nuts MUST be always be used.

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

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

NOTE: DAYTONA ONLY

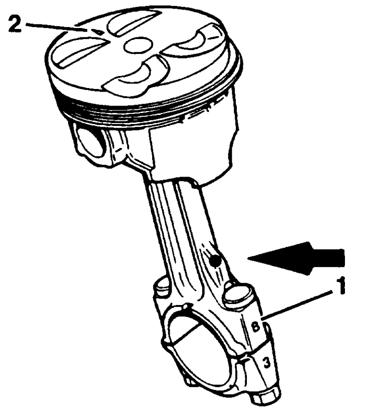
- **The piston may be fitted to the connecting rod in any orientation (because the con-rods are symmetrical). However, when instaled in the liners, the piston must be fitted with the small dot in the crown facing to the front of the engine.**
- **If a previously run engine is being rebuilt, always ensure that the piston and con-rod are assembled in the same orientation as prior to strip-down.**



1. Piston 'Dot'

NOTE: SPEED TRIPLE ONLY

- **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).**



1. Connecting Rod with Oil Hole Arrowed

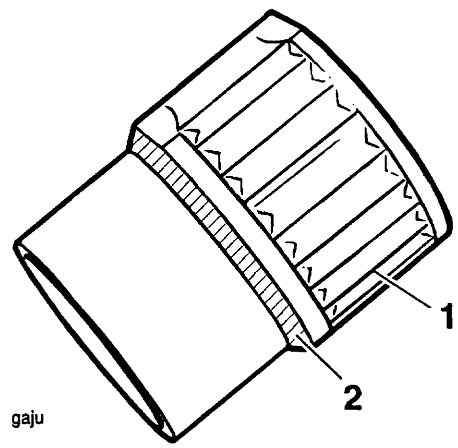
2. Piston Arrow

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

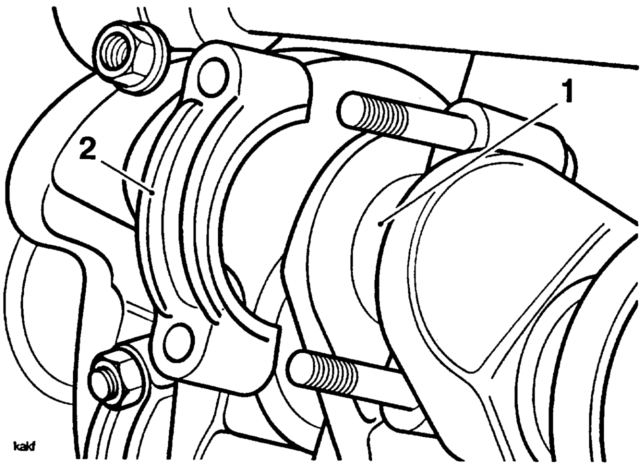
2. Sealer Area

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

5. Fit the liner into the crankcase ensuring that the arrow/dot 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 described 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 five stages as follows;-

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.

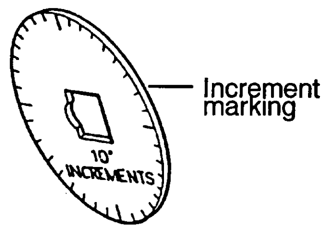
a) **Tighten** to **22 Nm.**

b) **Release** by **140°.**

c) **Tighten** to **10 Nm.**

d) **Tighten** to **14 Nm.**

e) **Tighten** through **120°** of nut rotation as measured using the Triumph torque turn gauge 3880105-T0301.



Service Tool 3880105-T0301

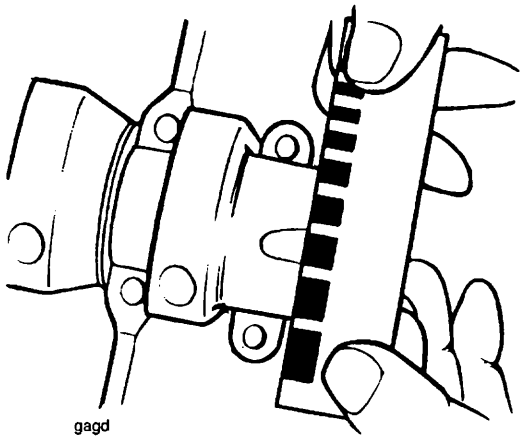
CONNECTING ROD BIG END BEARING SELECTION/CRANKPIN WEAR CHECK

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 '*Plastigage*'. The crankpin clearances are measured using '*Plastigage*' (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 *Plastigage* to fit across the journal. Fit the strip to the journal using the grease to hold the *Plastigage* 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 *Plastigage* kit, measure the width of the compressed *Plastigage*.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Checking the Measured Clearance

Con rod big end bearing/crankpin clearance - Both Models

- **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 - Daytona

Standard:	**34.984 - 35.000 mm**
Service limit:	**34.960 mm**

Crankpin diameter - Speed Triple

Standard:	**40.946 - 40.960 mm**
Service limit:	**40.922 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.
   - Note the connecting rod marking.
2. Select the correct bearings by matching the information found with the chart below.

Big end bearing selection chart - Daytona (all VINs)

Shell Colour	White	Red	Red	Blue
Rod Marking	5	5	4	4
Crankpin Dia	35.000 34.992	34.991 34.984	35.000 34.992	34.991 34.984
Running Clearance: 0.036 - 0.066				

For instance:
Con-rod Mark **5**
Crankpin Diameter **34.987**
Required Bearing **Red**

Big end bearing selection chart - Speed Triple up to VIN 144667.

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 - 0.066				

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

Big end bearing selection chart - Speed Triple from VIN 144668.

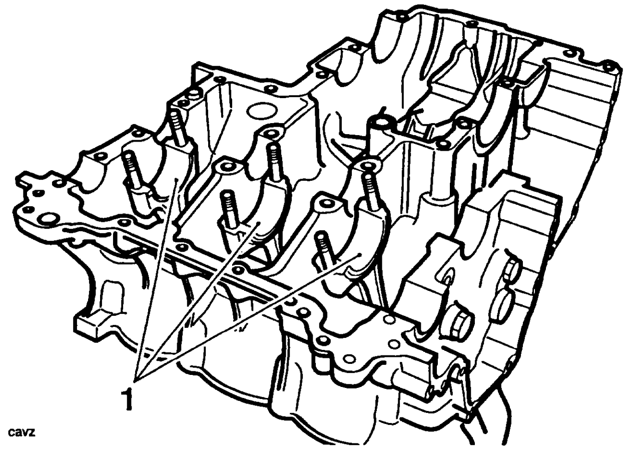
Shell Colour	White	Red	Red	Blue
Rod Marking	5	5	4	4
Crankpin Dia	40.960 40.954	40.953 40.946	40.960 40.954	40.953 40.946
Running Clearance: 0.036 - 0.066				

For instance:
Con-rod Mark **5**
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.



1. Big end shells

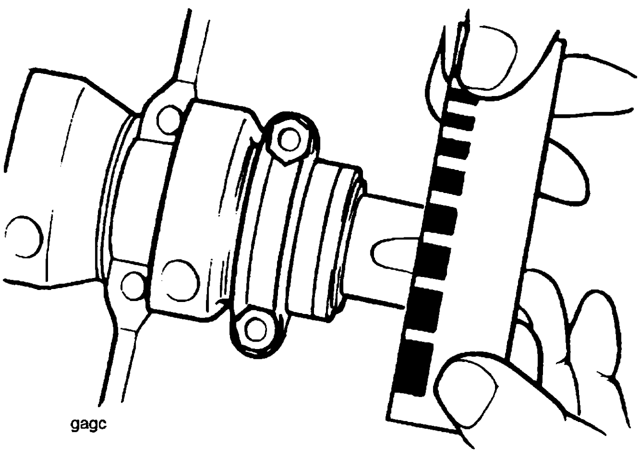
CAUTION: Always confirm, using the *Plastigage* method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance.

CRANKSHAFT MAIN BEARING/JOURNAL WEAR

Main Bearing Selection Chart (all dimensions in mm's)						
Shell Colour	White	Red	Red	Blue	Blue	Green
Crankcase Bore	41.109 41.101	41.109 41.101	41.118 41.110	41.118 41.110	41.127 41.119	41.127 41.119
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	0.043 0.020	0.044 0.020	0.044 0.020	0.043 0.019	0.043 0.020	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 *Plastigage* (Triumph part number 3880150-T0301). Use the method described in connecting rod clearance measurement.



Checking crankpin clearance using *Plastigage*

Crankshaft main bearing/journal clearance - both models

Standard:	**0.019 - 0.044 mm**
Service limit:	**0.07 mm.**

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

Crankshaft main journal diameter - both models

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	**41.120 mm**
Bearing Required	**BLUE**

NOTE:

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

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

Crankshaft End Float - both models

Standard	**0.05 - 0.20 mm**
Service Limit	**0.40 mm.**

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.**

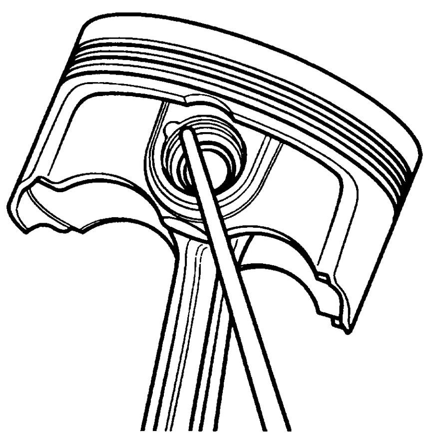
PISTONS

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



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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.**

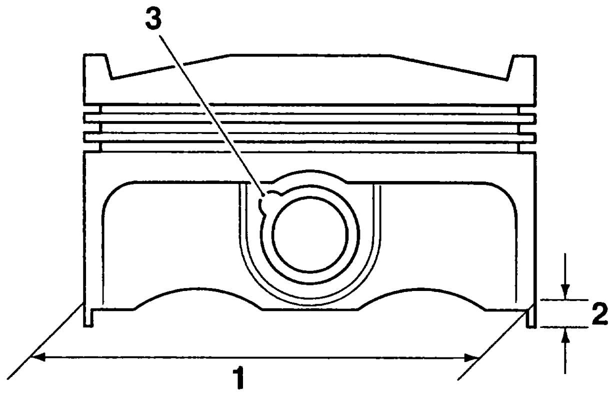
NOTE:

- **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.



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1. Piston Outside Diameter

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

3. Circlip Removal Groove

Piston outside diameter at 90° to Gudgeon Pin - Daytona

All cylinders:	**78.97 - 78.98 mm**
Service limit	**78.93 mm**

Piston outside diameter at 90° to Gudgeon Pin - Speed Triple

Cylinders 1 and 3:	**78.960 - 78.975 mm**
Service limit	**78.920 mm**
Cylinder 2:	**78.960 - 78.970 mm**
Service limit	**78.920 mm**

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

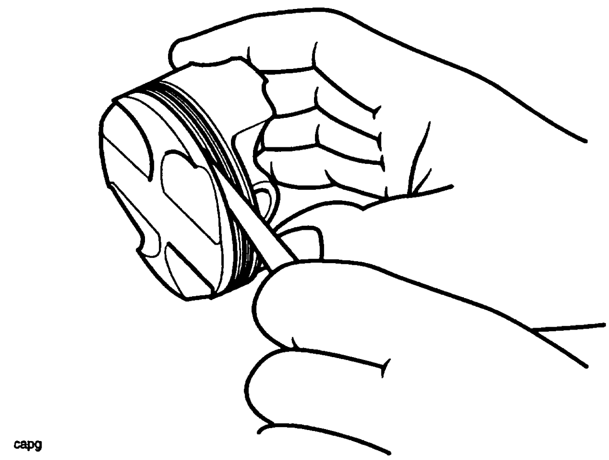
Piston Rings/Ring Grooves

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 models

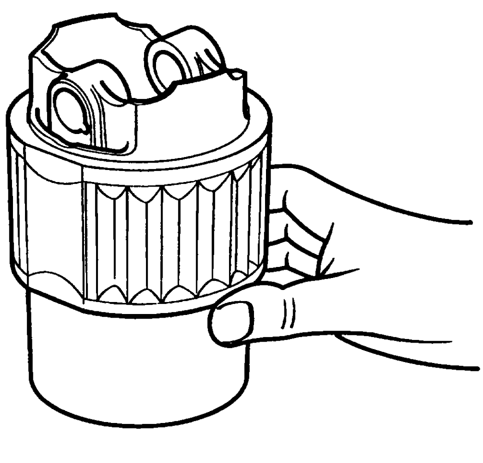
Top ring	**0.02 - 0.06 mm**
Service limit	**0.075 mm**
Second	**0.02 - 0.06 mm**
Service limit	**0.075 mm**

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 - Daytona

Top	**0.15 - 0.30 mm**
Service limit	**0.42 mm**
Second	**0.30 - 0.45 mm**
Service limit	**0.60 mm**
Oil Control	**0.20 - 0.70 mm**
Service limit	**0.90 mm**

Piston Ring End Gap Tolerances - Speed Triple

Top	**0.28 - 0.43 mm**
Service limit	**0.55 mm**
Second	**0.43 - 0.58 mm**
Service limit	**0.73 mm**
Oil Control	**0.33 - 0.83 mm**
Service limit	**1.03 mm**

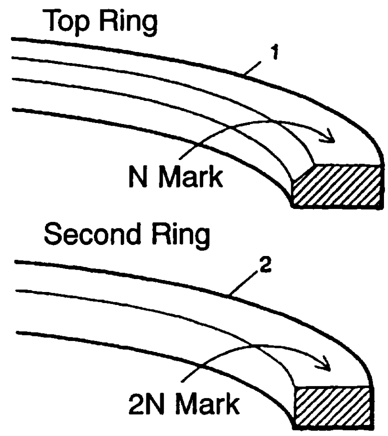
4. If the ring gap is found to be too small, the ring end must be carefully filed until the correct gap is achieved. If the gap is too large, replace the rings with a new set. If the gap remains too large with new rings fitted, both the piston and liner must be replaced.

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



Piston Ring Identification

2. Fit the piston onto the connecting rod as described earlier in this section.

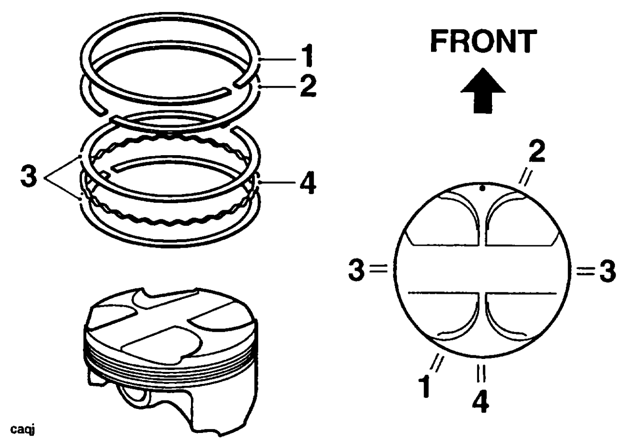
3. Align the small end in the connecting rod with the gudgeon pin hole in the piston.

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.

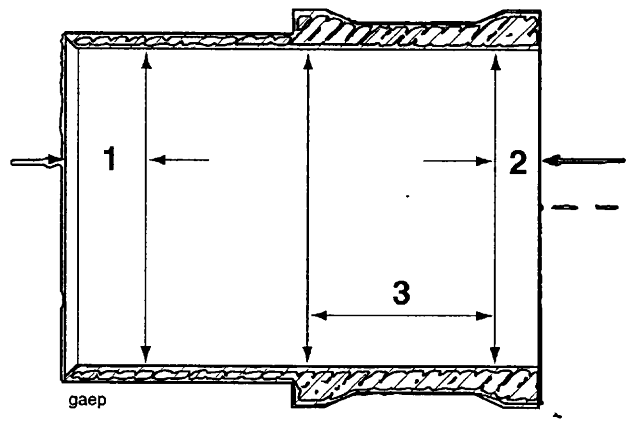
Cylinder bore diameter - Daytona

Standard:	**78.985 - 79.003 mm**
Service limit:	**79.053 mm**

Cylinder bore diameter - Speed Triple

Standard:	**79.030 - 79.050 mm**
Service limit:	**79.100 mm**

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

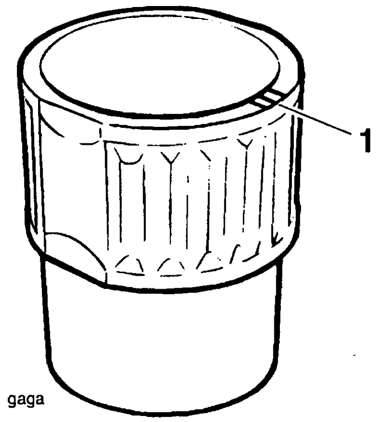


Test Positions For Bore Wear Check (bore shown in section)

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

CYLINDER LINERS

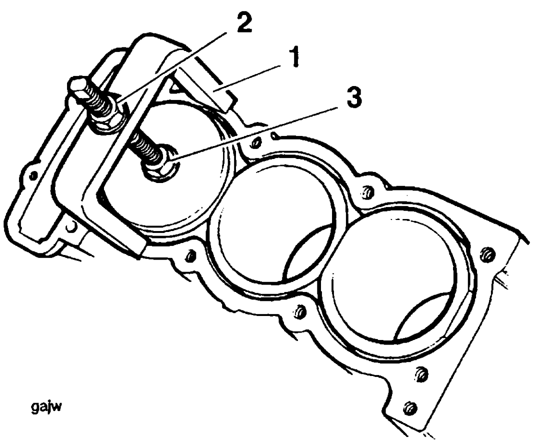
Removal



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: Some cylinder liners are made of aluminium alloy and therefore can be easily damaged. Handle these cylinder liners 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.

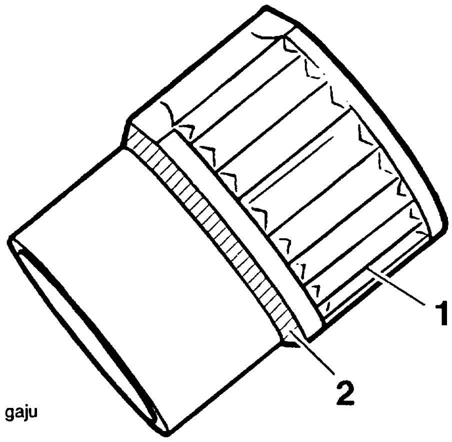
6. Turn the locking nut anticlockwise to release the liner.

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

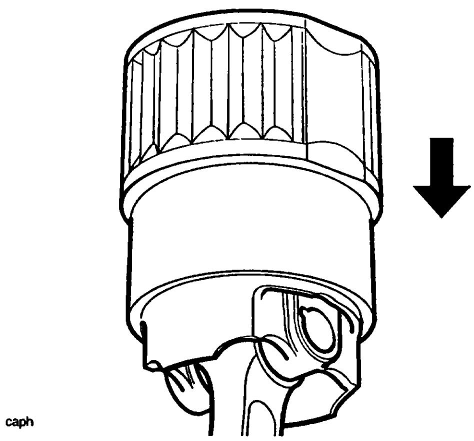
1. Thoroughly clean the liner removing all traces of old silicone sealer.
2. Remove all traces of sealer from the crankcase bores.
3. Apply silicone sealer to the liner to crankcase mating face.



1. Liner

2. Sealer Area

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



Arrowed: Liner-piston fitment

NOTE:

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

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

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

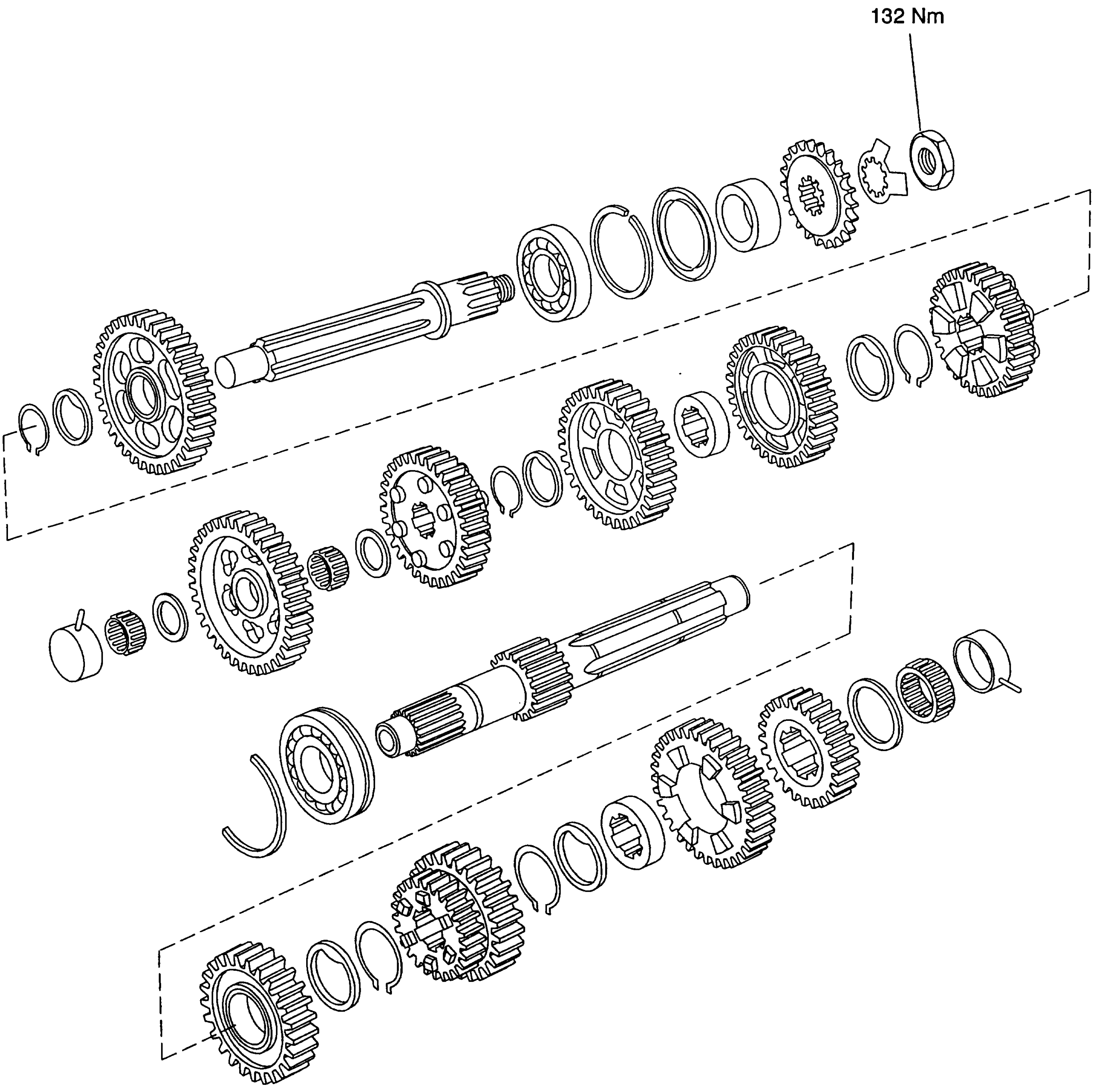
NOTE:

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

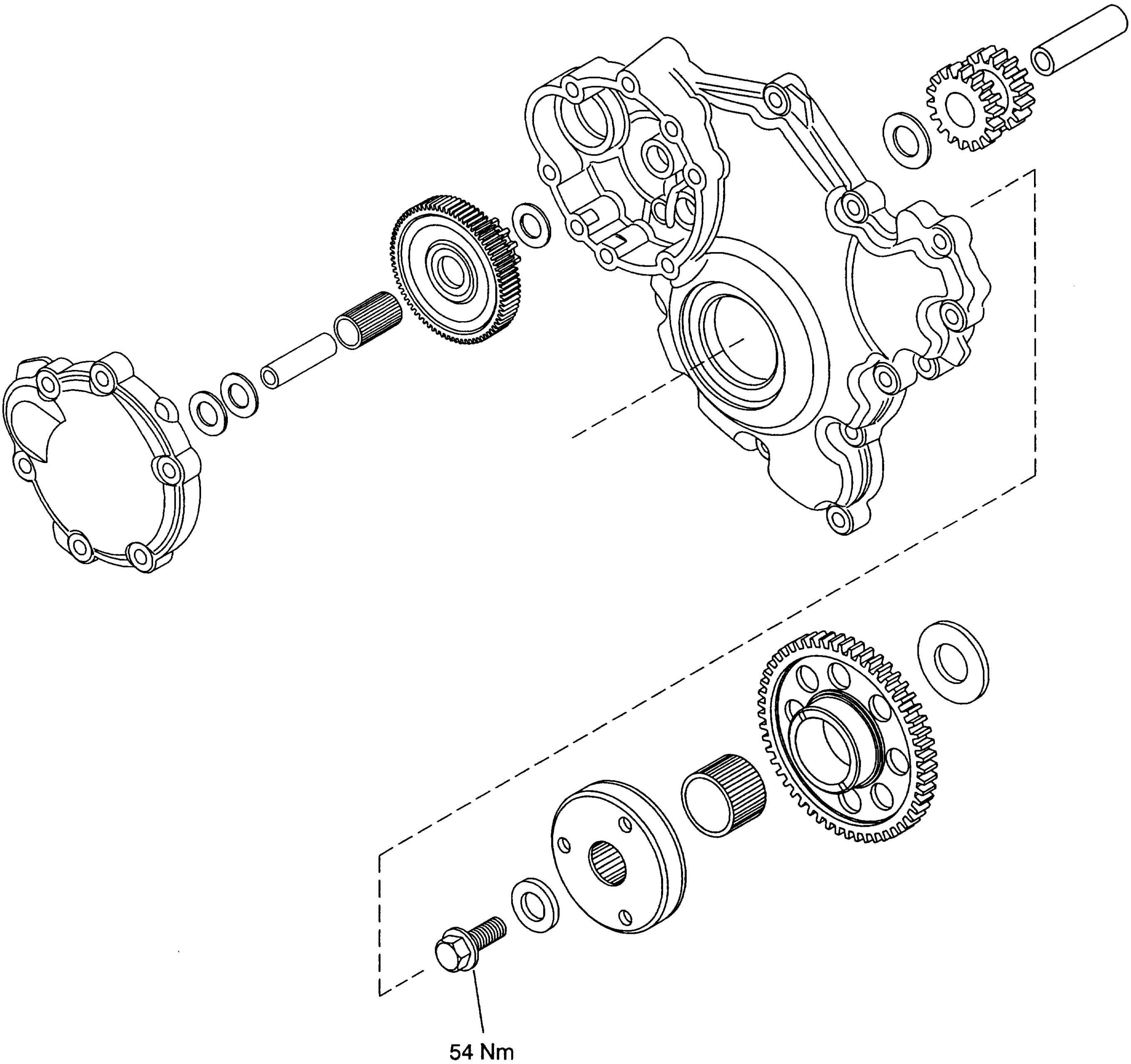
TRANSMISSION

CONTENTS

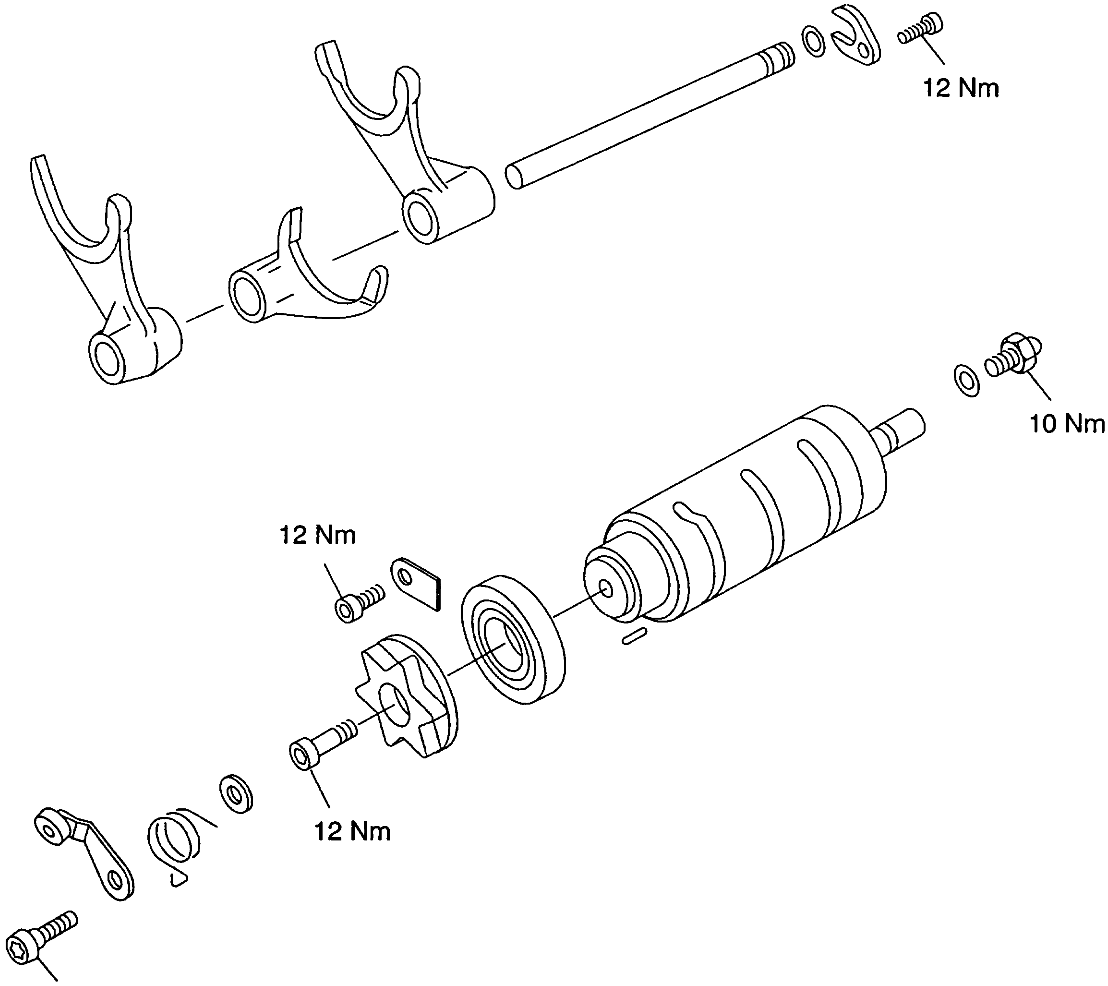
Exploded View, Input and Output Shafts



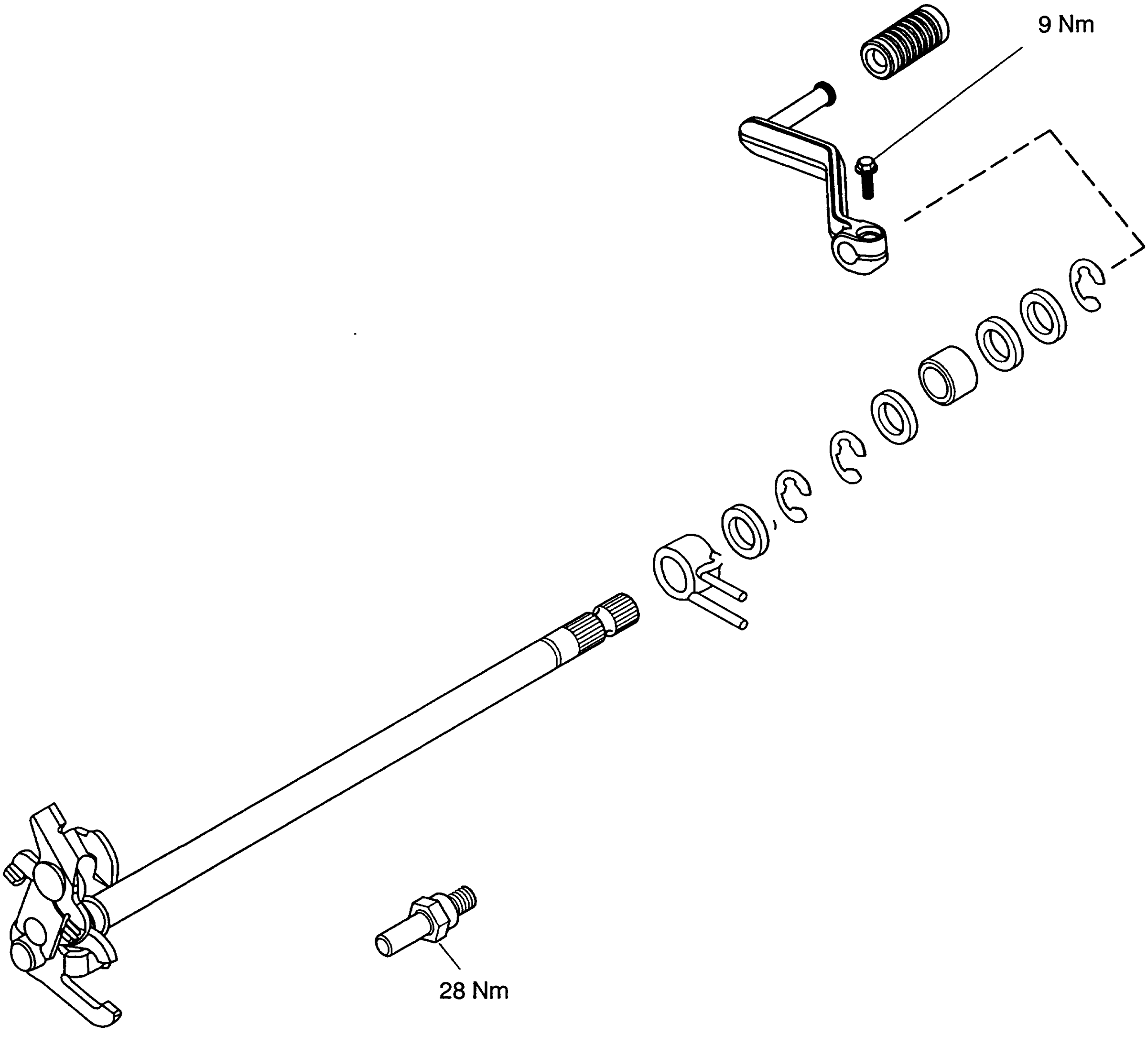
Exploded View, Sprag Clutch and Starter Gears



Exploded View, Gear Selectors and Drum



Exploded View, Gear Change Mechanism



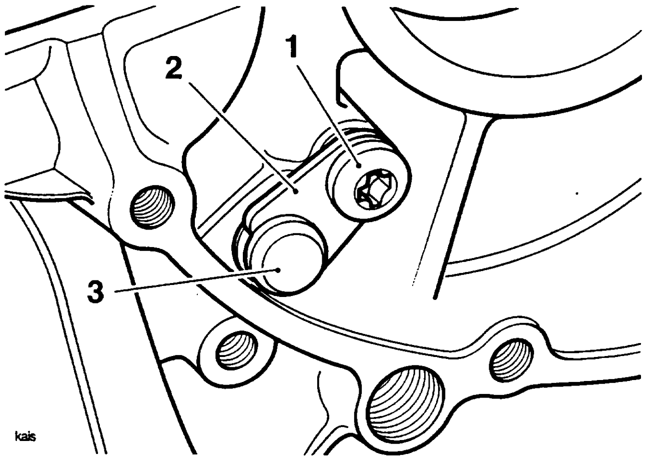
SELECTOR SHAFT, SELECTOR FORKS & DRUM

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 the input and output shafts from the crankcase as described elsewhere in this section.
2. Remove the fixing and take out the 'U' shaped keeper plate from the selector shaft. Discard the fixing.

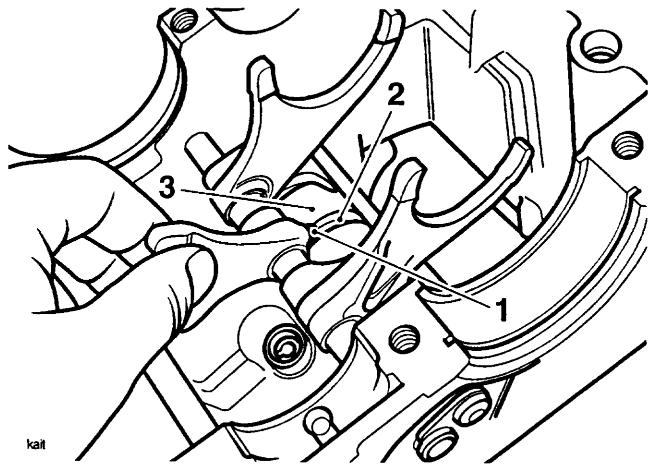


1. Fixing
2. Keeper plate
3. Selector shaft

> ⚠ **CAUTION: The selector forks can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks will cause gearbox damage.**

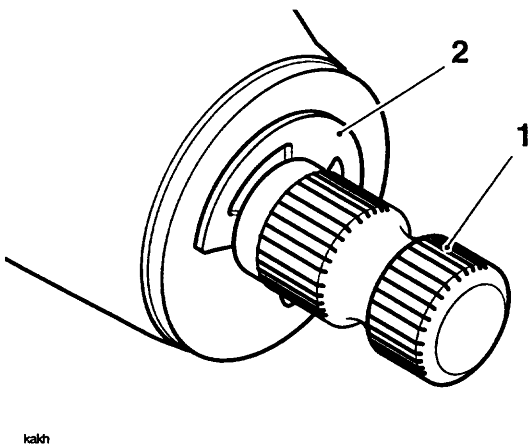
NOTE:

- **The centre selector fork locates in the selector drum as shown below:**



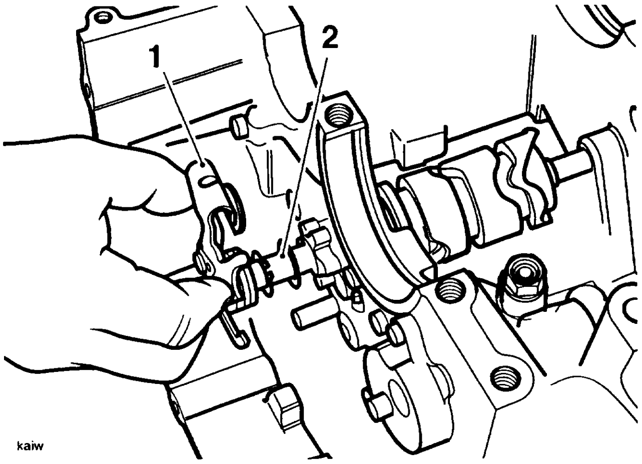
1. Selector fork stop
2. Selector fork guide
3. Selector drum

3. Using a suitable tool, push the selector shaft out from the crankcase in the direction of the keeper plate. Collect each selector fork as they are released by the selector shaft.
4. If not already removed, note the position and orientation of the gear pedal in relation to the shaft, then remove the pedal.
5. Remove the e-clip and washer from the gear pedal end of the gear change shaft.



1. Gear change shaft
2. E-clip

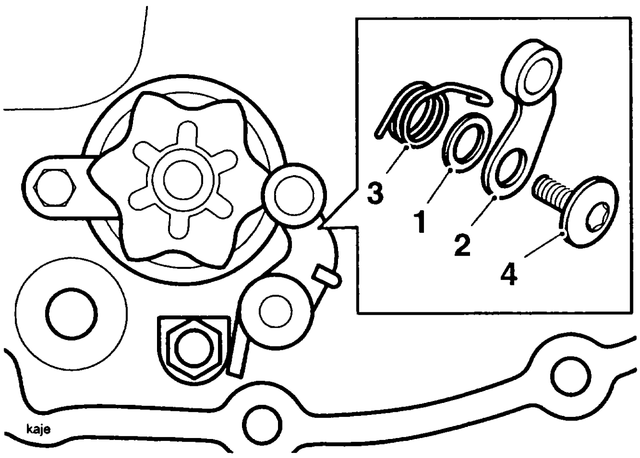
6. Withdraw the gear change shaft from the clutch end of the crankcase and collect the washer from inside the crankcase.



1. Gear change shaft
2. Washer

NOTE:

- **The detent arm is held in position under spring pressure. Prior to removal, note the orientation of the detent arm, fixing, spring and washer. The same orientation must be retained on assembly.**

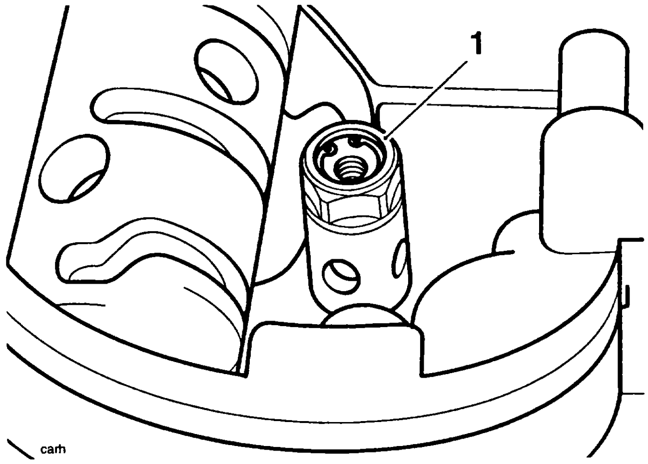


1. Washer
2. Detent arm
3. Spring
4. Fixing

7. Release and remove the fixing securing the detent arm.
8. Withdraw the detent arm complete with its spring and washer. Discard the fixing.
9. Remove the fixing from the centre of the detent wheel (discard the fixing) and withdraw the wheel.

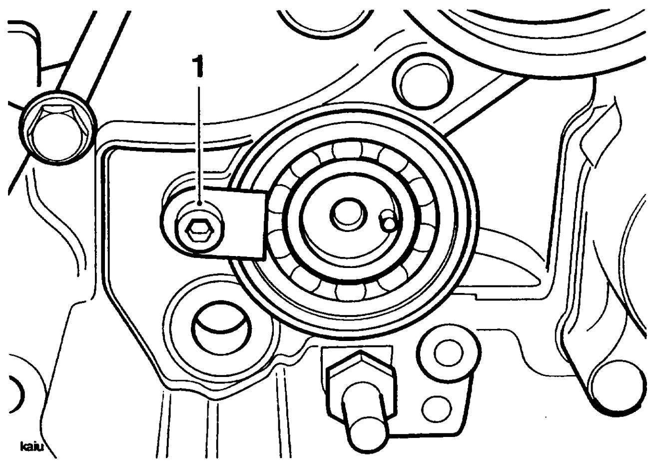
NOTE:

- **To prevent drum rotation, use a stout rod through one of the through-holes in the drum. Care must be taken not to damage the oil pressure relief valve.**



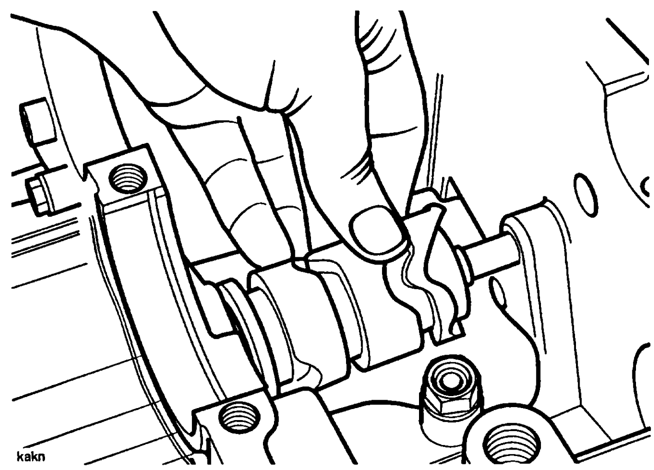
1. Oil pressure relief valve

10. Release and remove the bolt securing the selector drum bearing to the crankcase. Discard the bolt.



1. Bolt

11. Ease the selector drum backwards and forwards to push the drum bearing out of the crankcase.
12. Withdraw the drum from within the crankcase.



Selector drum removal

Inspection

1. Examine all components for damage and/or wear, paying particular attention to the selector forks and selector drum. Replace any parts that are damaged and/or worn.

Gear selector fork thickness

Standard	**5.80 - 5.90 mm**
Service limit	**5.70 mm**

Gear selector groove width

Standard	**6.00 - 6.10 mm**
Service limit	**6.25 mm**

Selector fork to groove clearance

0.55 mm max.

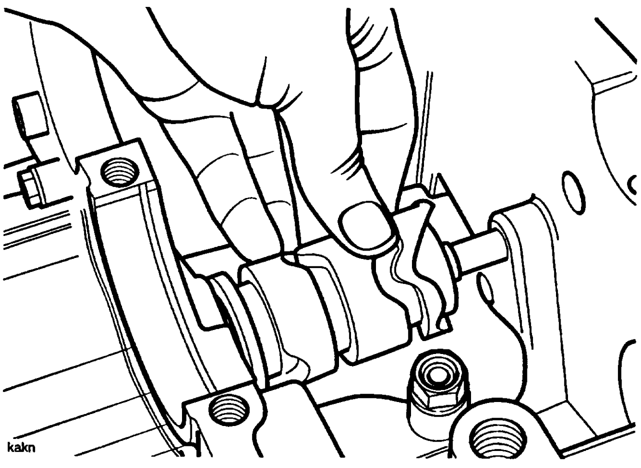
2. Examine the gear change shaft seal for damage and/or wear. Replace the seal if damaged and/or worn.

Installation

NOTE:

- **The detent wheel is keyed to the selector drum**

1. Position the selector drum into the crankcase.

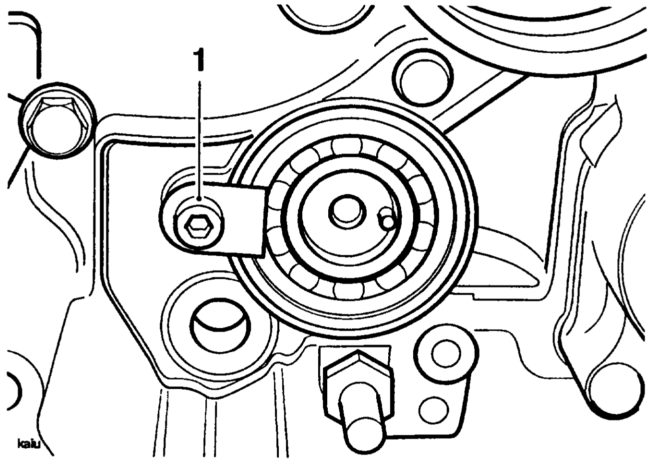


Locating the selector drum

2. Using clean engine oil, lubricate the selector drum bearing.

3. Position the bearing into the crankcase recess and engage with the selector drum.

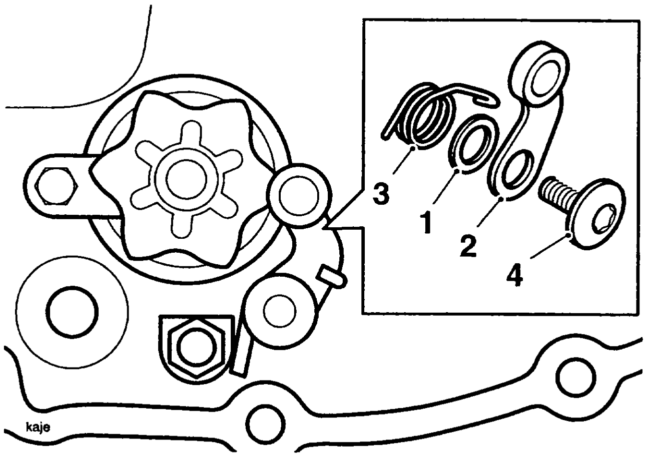
4. Refit the bearing retainer. Secure with a new bolt and tighten to **12 Nm.**



1. Bearing Retaining Bolt

5. Fit the detent wheel engaging the wheel with the locator pin in the selector drum. Tighten a new fixing to **12 Nm.**

6. Assemble the detent arm as noted on removal and place up to the crankcase.



1. Washer
2. Detent arm
3. Spring
4. Fixing

7. Hold the detent arm assembly in position and fit a new fixing. Start the thread and push the detent arm, using finger pressure, to locate on the detent wheel. Ensure the detent arm remains correctly located on the detent wheel. Tighten the capscrew to **12 Nm.**

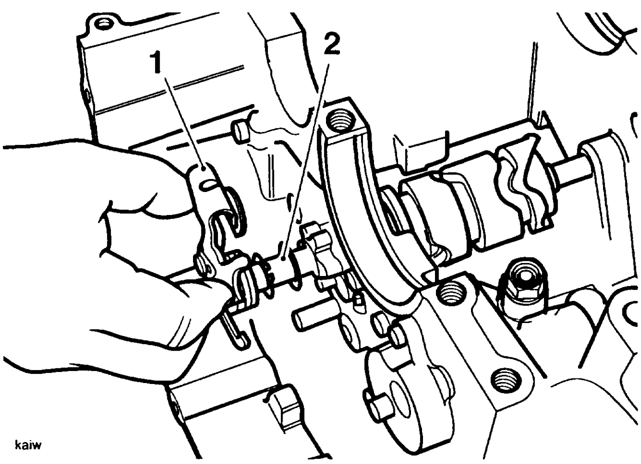
8. Rotate the selector drum and ensure a smooth movement. Rectify as necessary.

9. Using clean engine oil, lubricate the lip of the seal on the gear change shaft.

10. Lubricate, with a 50/50 solution of engine oil and molybdenum disulphide grease, both sides of the fingers of the selector mechanism on the gear change shaft.

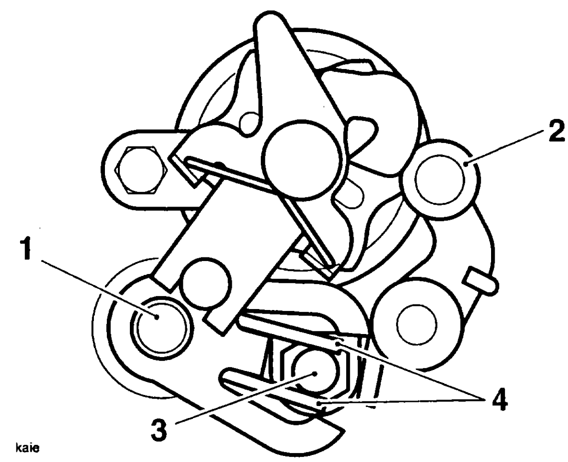
CAUTION: Take care to avoid damaging the lip of the seal when inserting the gear change shaft into the crankcase. A damaged seal will lead to oil loss and could result in engine damage.

11. Feed the washer onto the shaft and insert the gear change shaft into the crankcase. Gently push the gear pedal end of the shaft through the bearing and seal located, at the gear pedal end, in the crankcase.



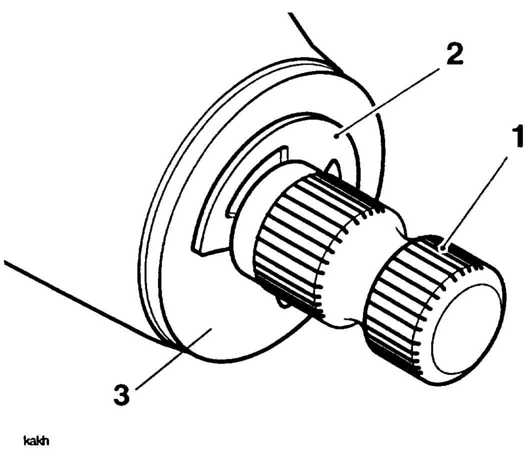
1. Gearchange shaft
2. Washer

12. Ensure that the gear change shaft locates in the detent wheel/arm and that the spring fits over the abutment bolt.



1. Gear change shaft
2. Detent Arm
3. Abutment bolt
4. Spring

13. Fit the large washer and e-clip to the gear pedal end of the gear change shaft.

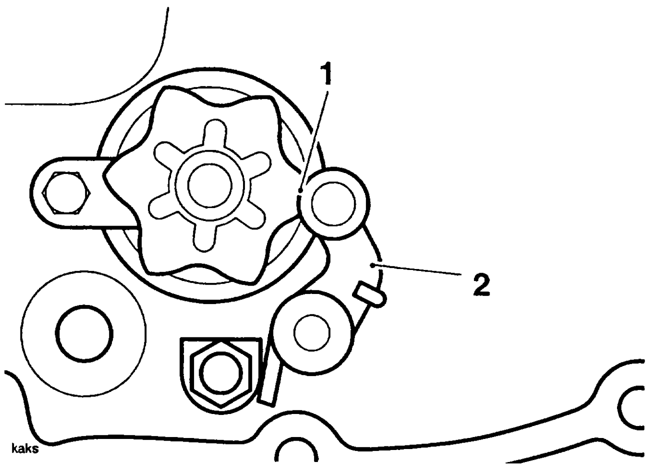


1. Gear change shaft
2. E-clip
3. Washer

14. Fit the gear pedal to the shaft in the same orientation as noted prior to removal. Tighten the fixing to **9 Nm.**

15. Position the selector drum in the neutral position.

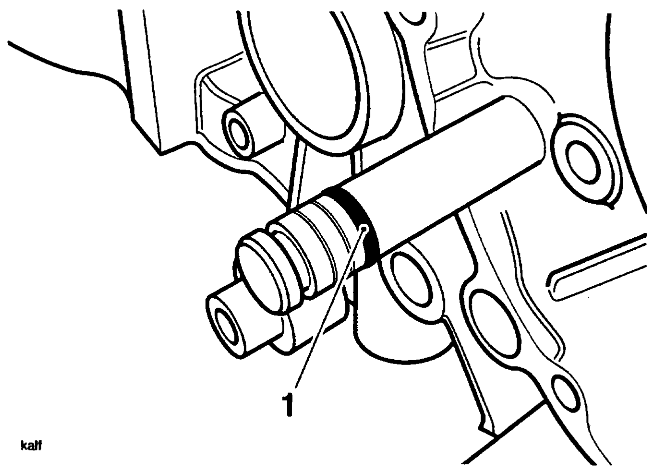
16. Check that the detent arm locates in the raised profile in the detent wheel (neutral position).



1. Raised profile
2. Detent arm

CAUTION: The selector forks can be fitted incorrectly. Ensure the position and orientation of the selector forks are the same as noted during removal. Incorrect fitting of the selector forks will cause gearbox damage when changing gear.

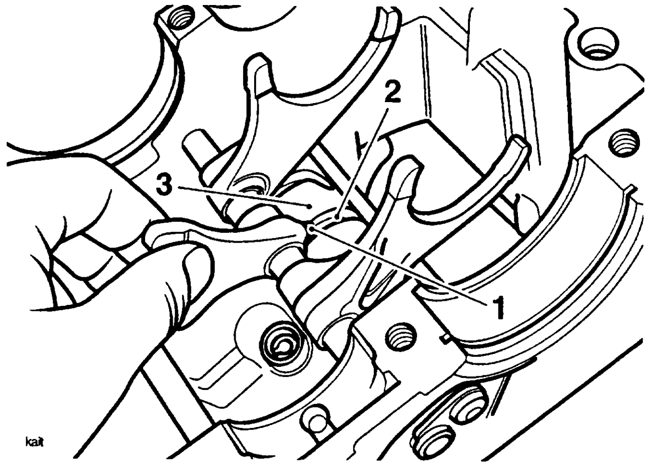
17. Push the selector shaft into the crankcase from the keeper plate end. As the shaft is inserted locate the selector forks and also fit a new O-ring (O-ring located at the keeper plate end). Ensure the forks are fitted in the positions noted during removal.



1. O-ring

NOTE:

- **The centre selector fork locates in the selector drum as shown below:**



1. Selector fork stop
2. Selector fork drum guide
3. Selector drum

18. Fit the 'U' shaped keeper plate.
19. Fit a new capscrew, and tighten to **12 Nm.**
20. Fit the input and output shafts as described elsewhere in this section.

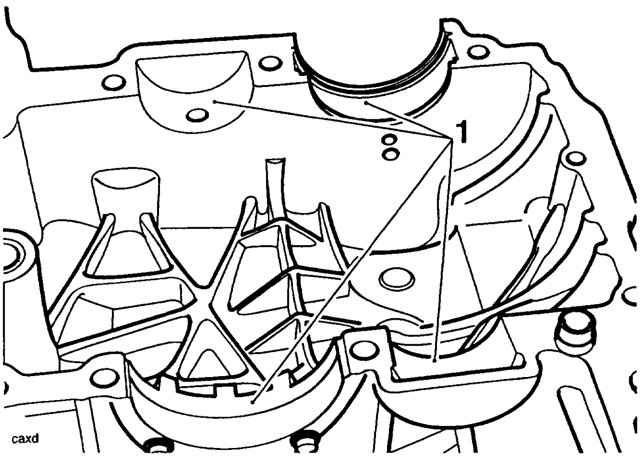
INPUT AND OUTPUT SHAFTS ASSEMBLIES

Removal

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

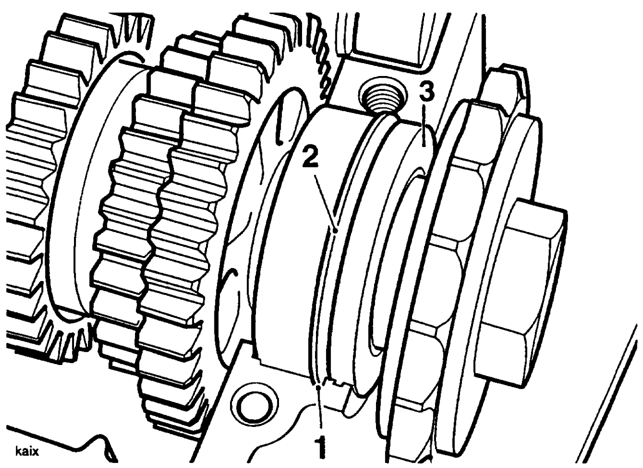
Installation

1. Apply a small amount of Threebond TB1360 to the bearing locations in the upper crankcase.



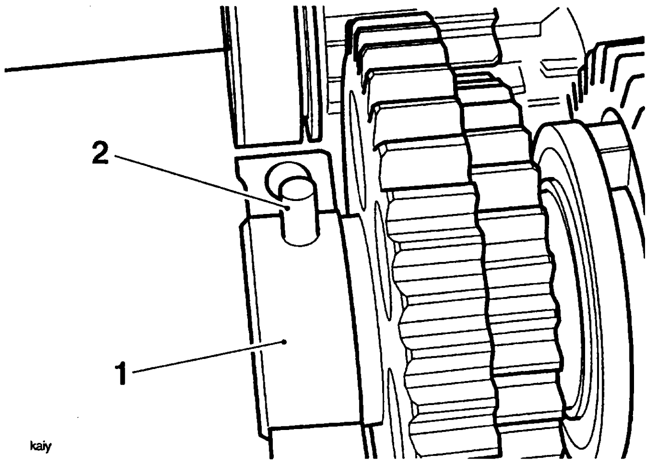
1. Bearing locations
(NOTE: illustration shows crankshaft removed which is not necessary for transmission service)

2. Place the output shaft in position in the crankcase.
3. Ensure the retaining ring on the bearing locates in the groove provided in the crankcase.
4. Ensure the output shaft seal aligns with its recess in the crankcase.



1. Groove in crankcase
2. Retaining ring
3. Seal

5. Ensure the dowel in the output shaft needle roller bearing is positioned to locate in the hole provided in the upper crankcase.



1. Roller bearing
2. Dowel

6. Ensure the output shaft seal aligns with its recess in the crankcase.
7. Repeat steps 1 to 3 for the input shaft and ensure that both sets of gear mesh correctly and that the half-circlip is correctly located and is not accidentally omitted.

INPUT SHAFT

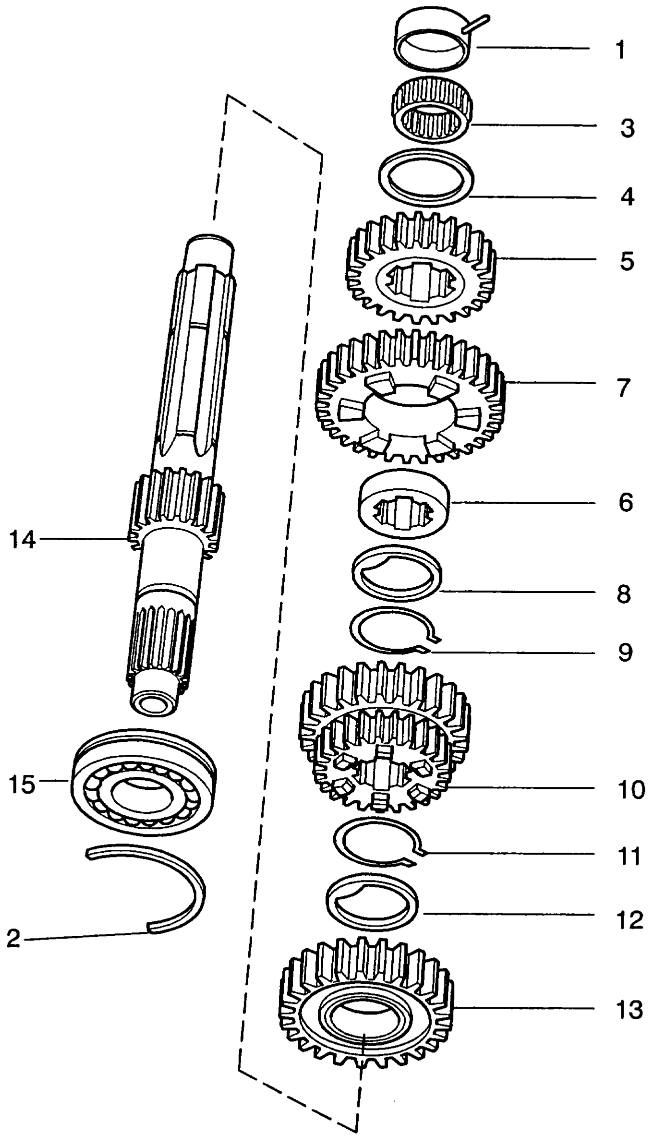
Disassembly

Working from the opposite end to where the clutch assembly is fitted, dismantle the input shaft as follows:

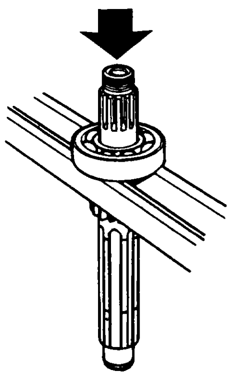
1. Remove the pegged bearing sleeve (1) from the end of the shaft.
2. Slide off the needle bearing (3) and thrust washer (4).
3. Remove second gear (5).
4. Remove sixth gear (7), complete with the splined bush (6) which runs inside the gear.
6. Remove the splined thrust washer (8) from in front of the 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 splined 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. **Half 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**



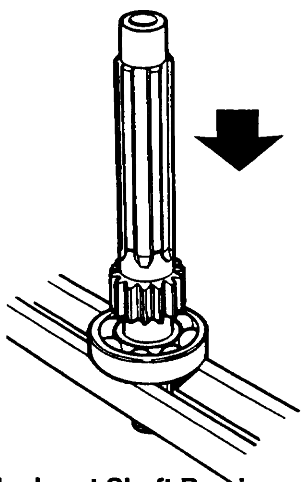
1. Pressing Off The Input Shaft Bearing

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 oil hole in the input shaft **DOES NOT** align with the oil hole in the gear.

WARNING: If the oil hole in the third/fourth gear is aligned with the corresponding hole in the input shaft, engine oil pressure and gear lubrication will be reduced.

Reduced oil pressure and gear lubrication will cause engine damage and could also lead to engine seizure resulting in loss of motorcycle control and an accident.

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 taking care that the oil hole in the shaft corresponds to the 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).
12. Finally, fit the bearing sleeve (1) to the needle roller bearing.

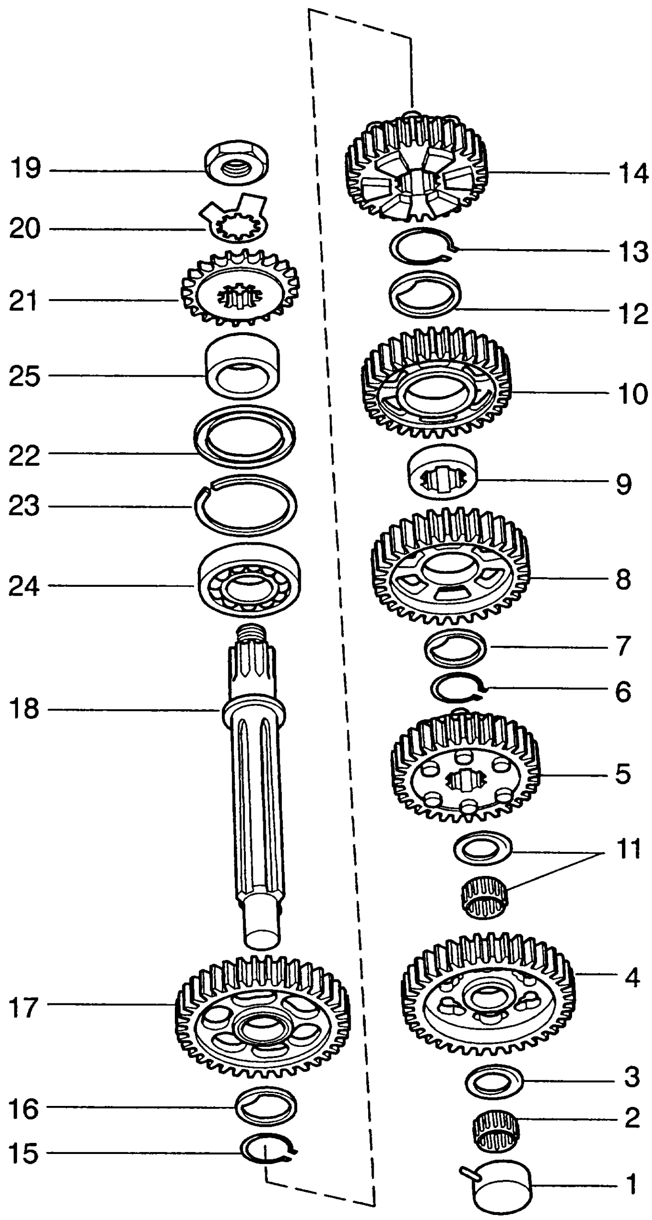
OUTPUT SHAFT

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. Remove the first gear bearing and thrust washer (11).
4. Slide fifth gear (5) from the shaft.
5. Remove the circlip (6) from in front of the third gear.
6. Remove the splined thrust washer (7) from the shaft.
7. Remove the third gear (8).
8. Slide fourth gear (10) off the shaft and also remove the splined bush (9) and thrust washer (12).
9. Remove the circlip (13) from in front of sixth gear.
10. Remove sixth gear (14) from the shaft.
11. Remove the circlip (15) from in front of second gear.
12. Remove thrust washer (16) and slide off second gear (17).
13. 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.
14. Remove the transmission sprocket nut (19), locktab (20) and sprocket (21).
15. 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, use a press to remove both the bearing and output sprocket sleeve together.

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.



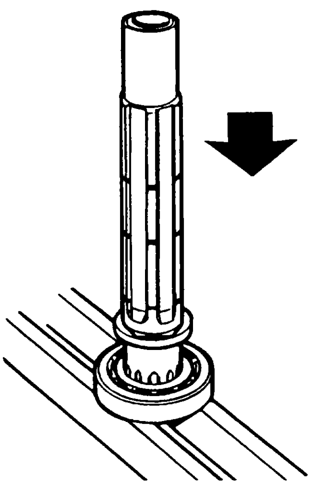
1. **Bearing Sleeve**
2. **Needle Roller Bearing**
3. **Thrust Washer**
4. **First Gear**
5. **Fifth Gear**
6. **Circlip**
7. **Thrust Washer**
8. **Third Gear**
9. **Third Gear Bush**
10. **Fourth Gear**
11. **First gear brg & washer**
12. **Thrust Washer**
13. **Circlip**
14. **Sixth Gear**
15. **Circlip**
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) and new sleeve (25) to the shaft using a press and press bars. Fit the sleeve with the large chamfer facing outwards.



2. Fit the retaining ring (23) to the shaft. Lubricate and fit a new oil seal (22).
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 holes in the gear **DO NOT** align with the corresponding oil hole in the output shaft.

WARNING: If the oil holes in the sixth gear are aligned with the corresponding hole in the output shaft, engine oil pressure and gear lubrication will be reduced.

Reduced oil pressure and gear lubrication will cause engine damage and could also lead to engine seizure resulting in loss of motorcycle control and an accident.

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 (9) for fourth gear Taking care to align the oil hole in the shaft with the corresponding hole in the bush. Fit fourth gear (10) to the shaft with the large step side facing towards the output sprocket.
9. Fit third gear (8) with the larger step side facing away from 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 groove facing towards the output sprocket. Ensure that the oil holes in the gear **DO NOT** align with the corresponding oil hole in the output shaft.

WARNING: If the oil holes in the fifth gear are aligned with the corresponding hole in the input shaft, engine oil pressure and gear lubrication will be reduced.

Reduced oil pressure and gear lubrication will cause engine damage and could also lead to engine seizure resulting in loss of motorcycle control and an accident.

11. Fit the first gear thrust washer and bearing (11).
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.

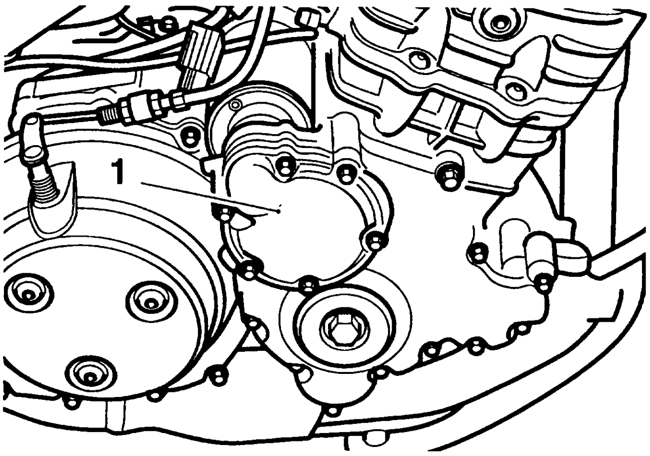
STARTER DRIVE GEARS/SPRAG CLUTCH

Removal

NOTE: For access to the starter mechanism:

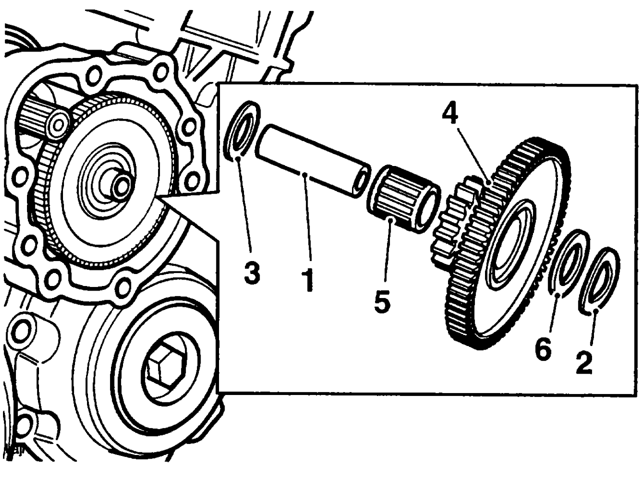
- **Disconnect the battery, negative (black) lead first.**
- **Remove the rear bodywork and the right hand lower fairing.**

1. Remove the starter cover.



1. Starter cover

2. Withdraw the large starter idler gear noting the fitted position of all components.

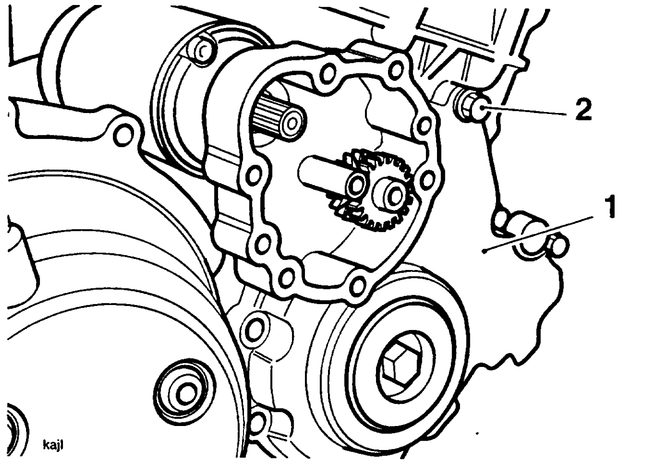


1. Idler shaft
2. Wave washer
3. Flat washer
4. Idler gear
5. Bearing
6. Flat washer

3. Remove the bolts securing the right hand crank cover noting the position of the aluminium washer under the head of one of the upper bolts.

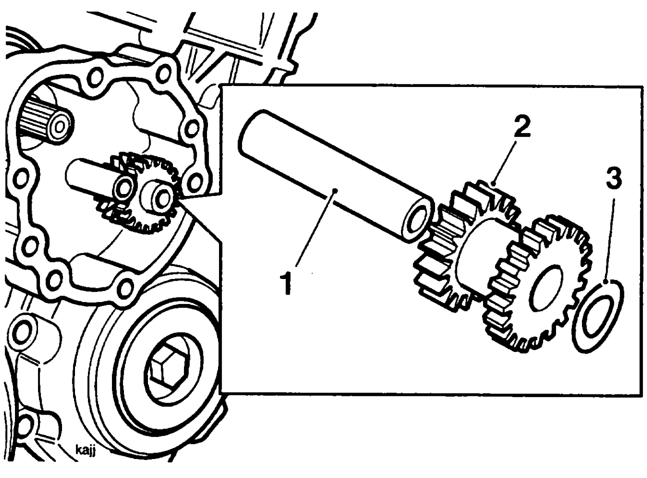
NOTE:

- **There are two bolts located inside the cover in the area behind the starter idler gear.**



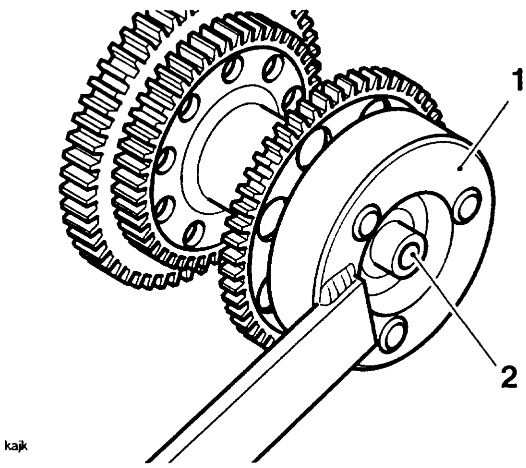
1. Right hand crank cover
2. Aluminium washer position

4. Ease the cover from the crankcase and collect the small starter idler gear again noting the position of all components.



1. Idler shaft
2. Gear
3. Wave washer

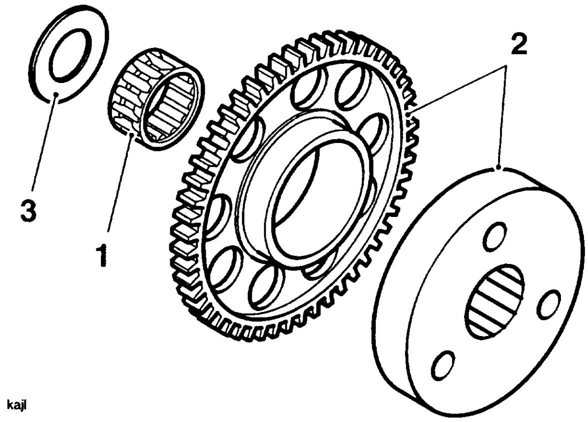
5. Using tool T3880017, prevent the sprag from turning and remove the sprag fixing and washer from the end of the crankshaft.



1. Tool T3880017
2. Sprag fixing

6. Slide the sprag clutch and gear from the crankshaft.

7. Separate the sprag clutch, bearing and gear from each other.



1. Needle roller bearing
2. Sprag clutch and gear
3. Plain washer

8. Recover the washer from the end of the crankshaft.

Inspection

1. Examine the sprag clutch for signs of slipping, overheating (going blue) and for any other damage.

2. Examine all gears for chipped teeth, overheating (going blue) and for any other damage.

3. Examine all bearings for chipped, broken or seized rollers, overheating (going blue) and for any other damage.

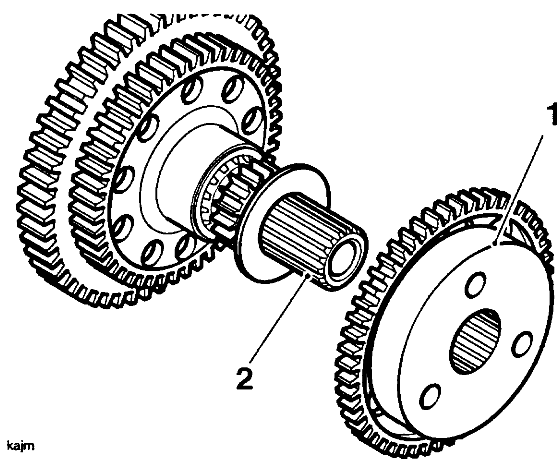
4. Examine the end of the crankshaft for damage.

Installation

1. Fit the sprag's washer to the crankshaft.
2. Assemble the needle roller bearing and sprag gear to the sprag clutch.
3. Locate the sprag clutch assembly to the crankshaft.

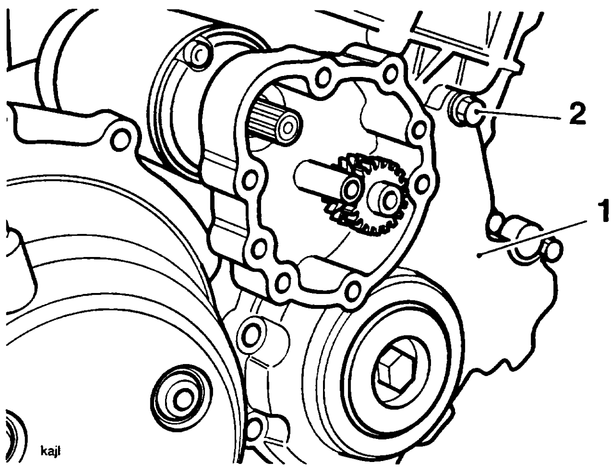
NOTE:

- **The sprag clutch will only fit with the crankshaft when the master splines on both components are aligned.**



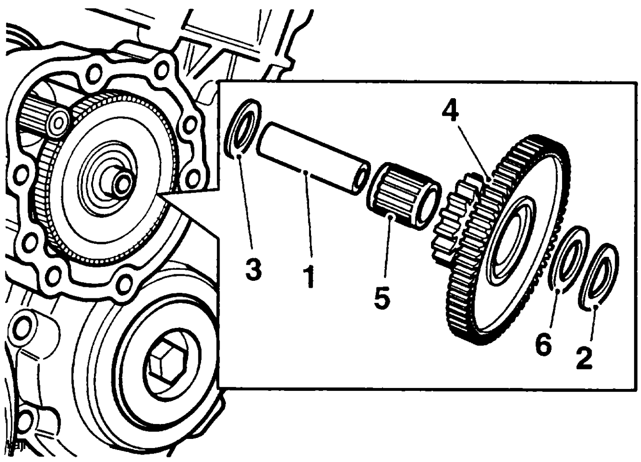
1. Sprag clutch
2. Crankshaft end

4. Prevent the sprag from turning using tool T3880017 then fit and tighten a new sprag fixing and washer to **54 Nm.**
5. Lubricate the idler gear shaft.
6. Fit the small idler gear, shaft and wave-washer (washer to the outside of the gear) to the crankcase.
7. Thoroughly clean the right hand crank cover.
8. Position a new gasket to the crankcase dowels then refit the right hand crank cover.
9. Ensure the bolt with the aluminium washer is correctly located then tighten the cover bolts to **9 Nm.**



1. Right hand crank cover
2. Aluminium washer position

10. Lubricate then refit the large starter idler gear ensuring that all components are located in the positions noted on removal.



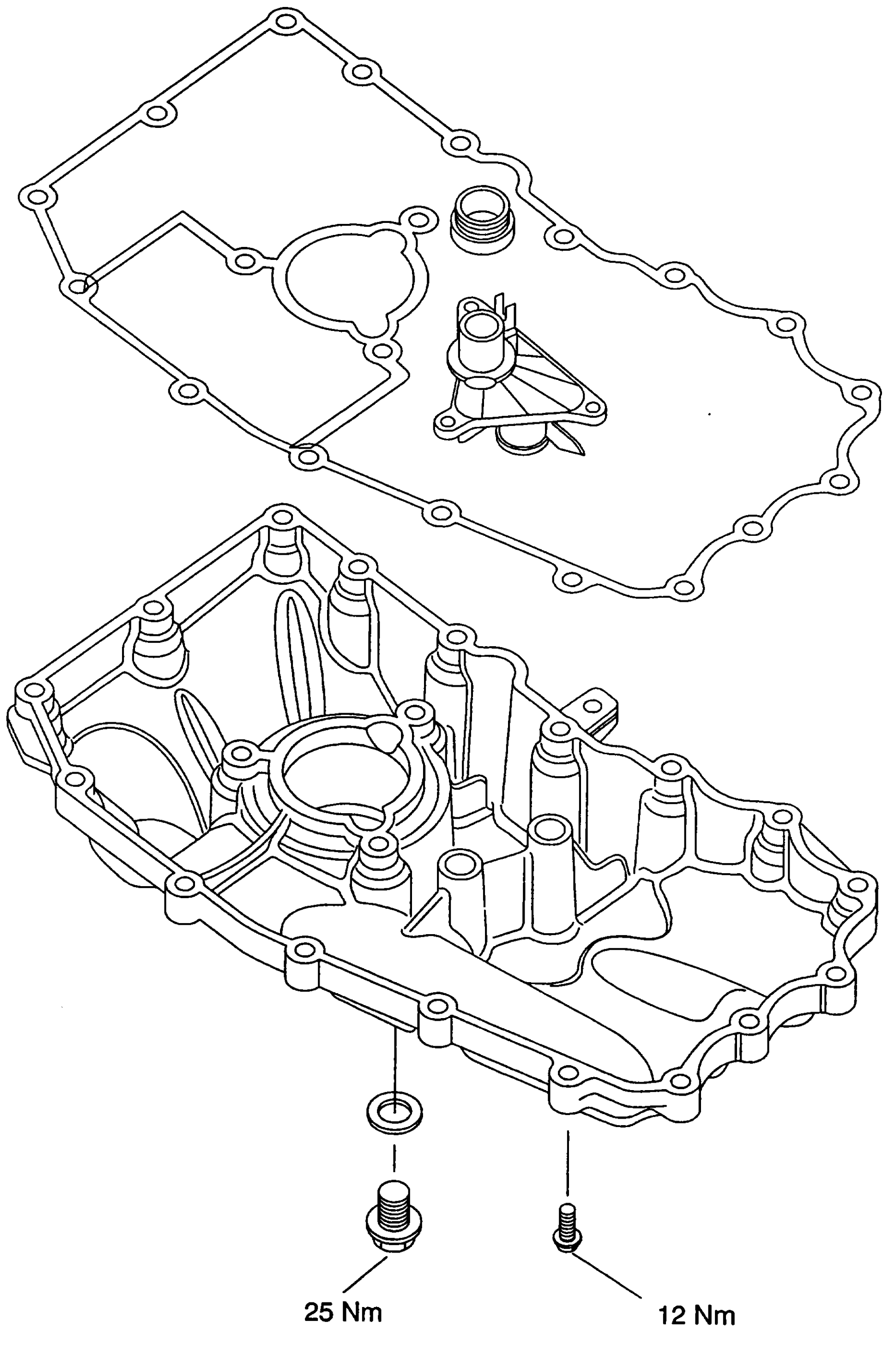
1. Idler shaft
2. Wave washer
3. Flat washer
4. Gear
5. Bearing
6. Flat Washer

11. Thoroughly clean the starter cover.
12. Position a new gasket to the dowels then refit the starter cover.
13. Fit and tighten the cover bolts to **9 Nm.**
14. Refit any removed bodywork as described in the body section.
15. Reconnect the battery positive (red) lead first.

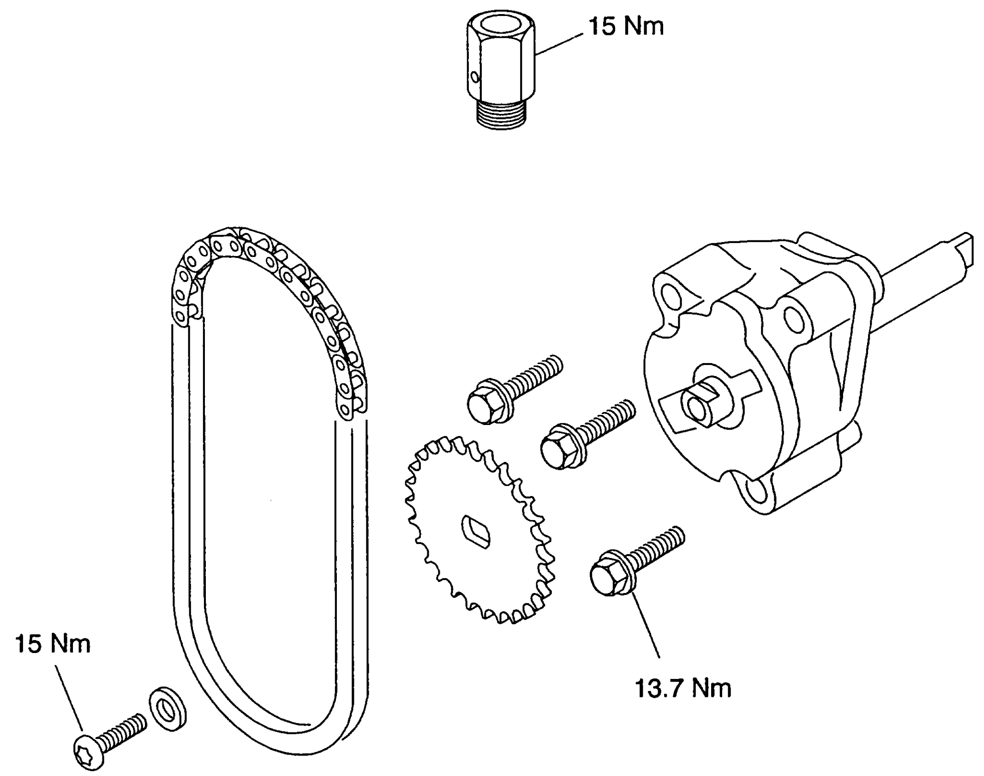
LUBRICATION SYSTEM

CONTENTS

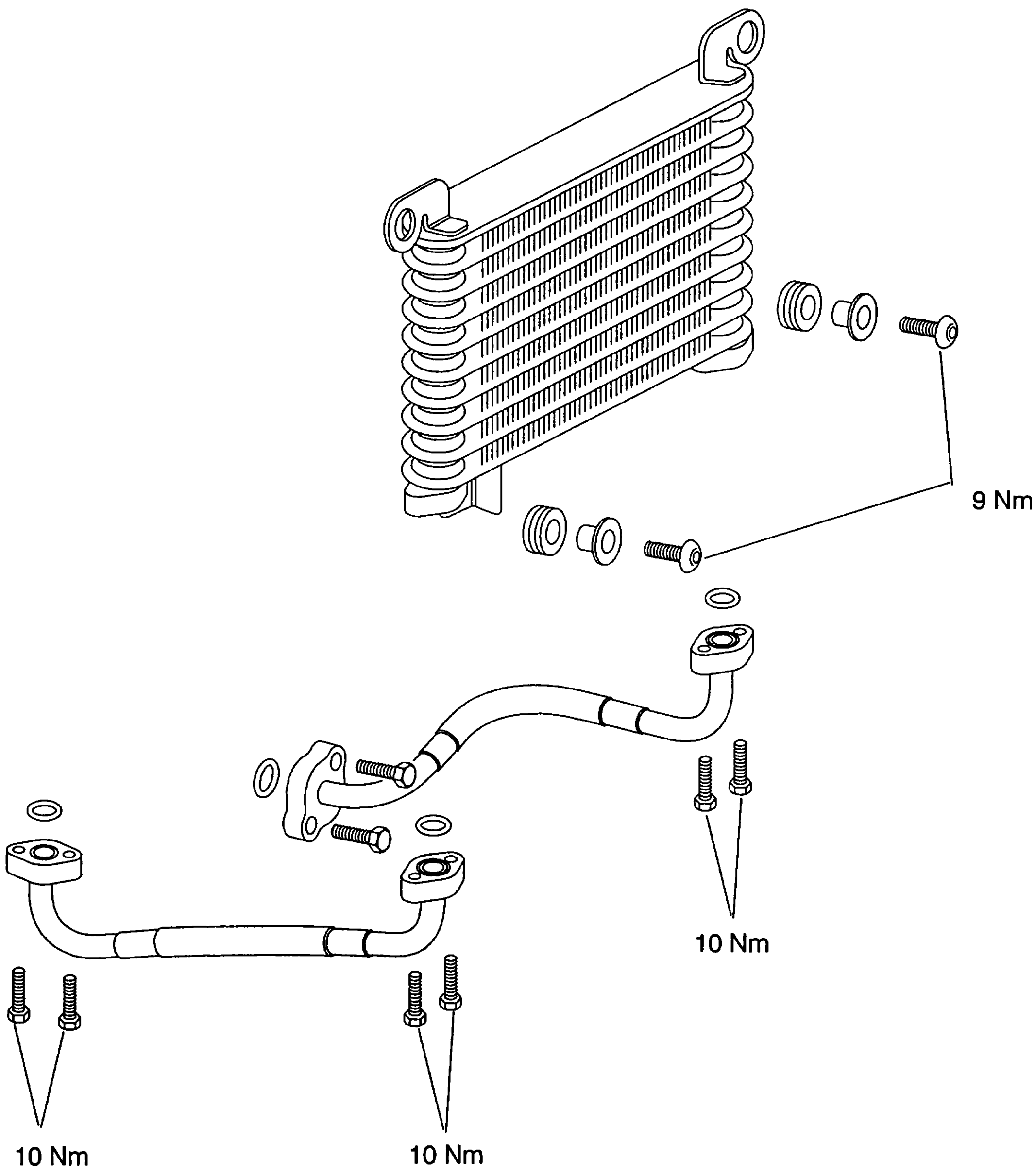
Exploded View - Sump



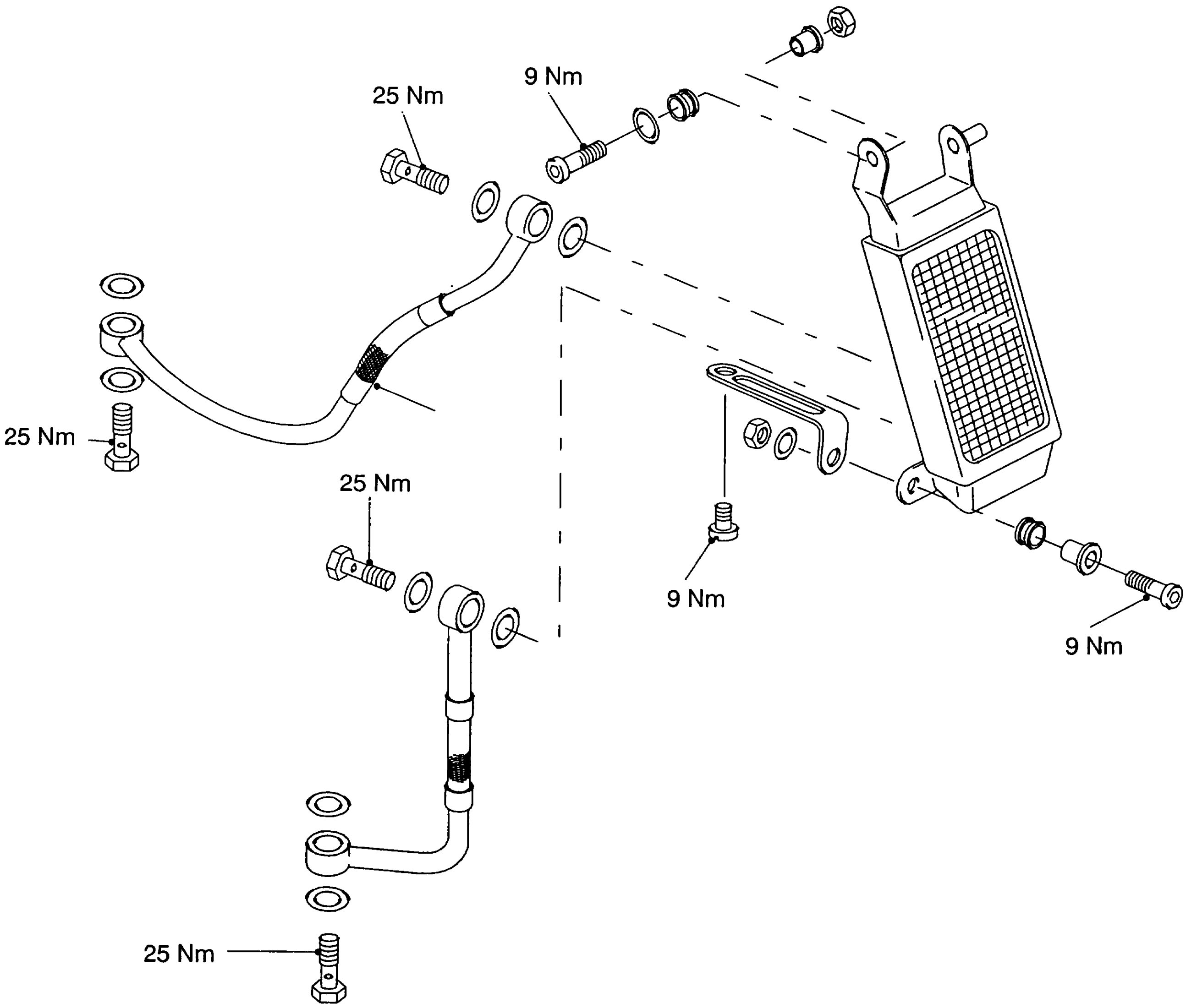
Exploded View - Oil Pump and Gears



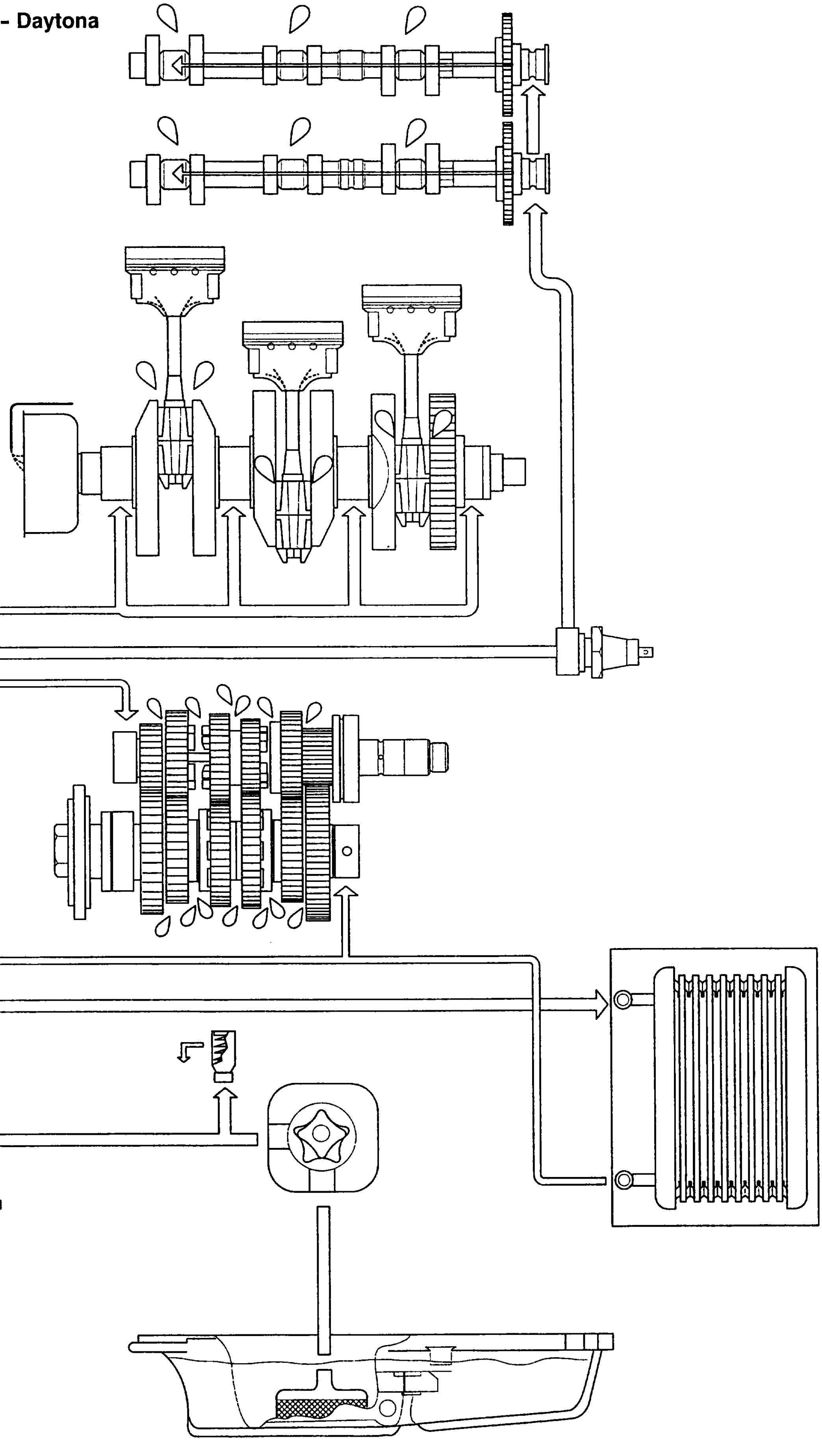
Exploded View - Daytona Oil Cooler



Exploded View - Speed Triple Oil Cooler



Engine Oil Circuit - Daytona



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ENGINE OIL CIRCUIT DESCRIPTION

Daytona

Oil is collected from the sump and is drawn through a mesh strainer into the oil pump rotor. The oil pump is fitted with a single pumping rotor which supplies pressurised oil to the lubrication circuit and the oil cooler.

Pressurised oil is delivered to the outside rim of the oil filter near to 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.

All pumped oil is sent into the oil filter for filtering. Filtered oil is then pushed from the centre of the oil filter, along the oil filter retaining tube, and passes into a gallery in the lower crankcase.

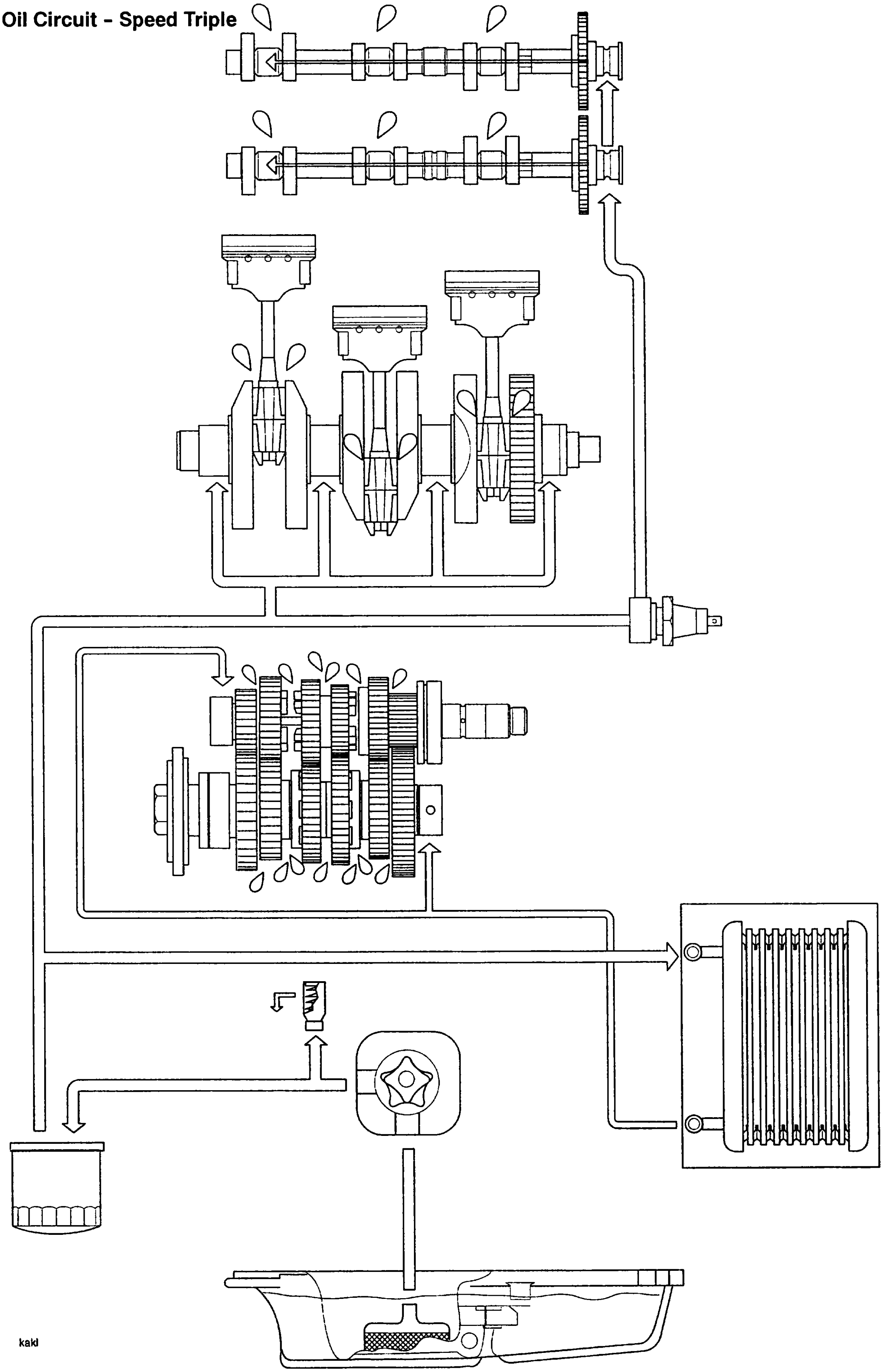
Once received in the crankcase gallery, some of the filtered oil is delivered to the cylinder head where it lubricates the cam chain, camshaft, camshaft bearings and tappets.

The remainder of the filtered oil is passed through a remote oil cooler (mounted beneath the radiator). Cooled oil is returned to drillings in the lower crankcase which deliver the cool oil directly to the end of each gearbox shaft and to the crankshaft.

Oil supplied to the transmission is circulated along the inside of the gearbox shafts to exit holes which feed directly onto the selectors, selector shafts, bearings and gears.

The remainder of the cooled oil is delivered to the crankshaft main bearings and, via drillings in the crankshaft, to the big end bearings. The pistons are lubricated by small spray jets which are also supplied with oil from the crankshaft oil feed. The jets are permanently inserted into the crankcase in the main bearing oil groove in the upper crankcase. A final squirt jet lubricates the alternator at the left hand end of the crankshaft.

Engine Oil Circuit - Speed Triple



ENGINE OIL CIRCUIT DESCRIPTION

Speed Triple

Oil is collected from the sump and is drawn through a mesh strainer into the oil pump rotor. The oil pump is fitted with a single pumping rotor which supplies pressurised oil to the lubrication circuit and the oil cooler.

Pressurised oil is delivered to the outside rim of the oil filter near to 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.

All pumped oil is sent into the oil filter for filtering. Filtered oil is then pushed from the centre of the oil filter, along the oil filter retaining tube, and passes into a gallery in the lower crankcase.

Once received in the crankcase gallery, some of the filtered oil is delivered to the crankshaft main bearings and, via drillings in the crankshaft, to the big end bearings. The pistons are lubricated by small spray jets which are also supplied with oil from the crankshaft oil feed. The jets are permanently inserted into the crankcase in the main bearing oil groove in the upper crankcase.

The remainder of the filtered oil is passed through a remote oil cooler (mounted beneath the radiator). Cooled oil is returned to drillings in the lower crankcase which deliver the cool 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 crankcase gallery which feeds the crankshaft also feeds the cylinder head and camshafts through an external link pipe which begins at the low oil pressure warning light switch and ends at its joint with the cylinder head. The head drilling supplies oil to the right hand camshaft bearings which, in turn, deliver oil through the hollow camshafts to the other camshaft bearings, the tappet buckets and the valves.

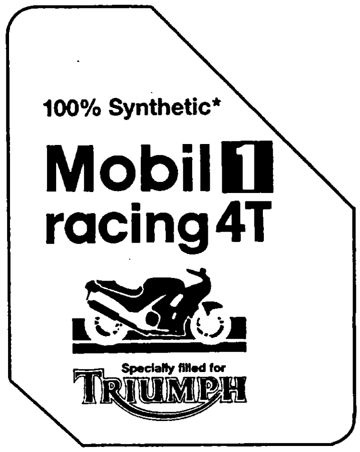
ENGINE OIL

Specification

Semi or fully synthetic 10W/40 or 15W/50 motorcycle engine oil which meets specification API SH (or higher) and JASO MA, such as Mobil 1 Racing 4T

> ⚠ **CAUTION: Triumph high performance fuel injected engines are designed to use semi or fully synthetic motorcycle engine oil which meets specification API SH (or higher) AND JASO MA.**
>
> **Do not add any chemical additives to the engine oil. The engine oil also lubricates the clutch and any additives could cause the clutch to slip.**
>
> **Do not use mineral, vegetable, non-detergent oil, castor based oils or any oil not conforming to the required specification. The use of these oils may cause instant, severe engine damage.**
>
> **Ensure no foreign matter enters the crankcase during an oil change or top-up.**

Triumph Engine Oil



Your Triumph Motorcycle is a quality engineered product which has been carefully built and tested to exacting standards. Triumph Motorcycles are keen to ensure that you enjoy optimum performance from your 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.

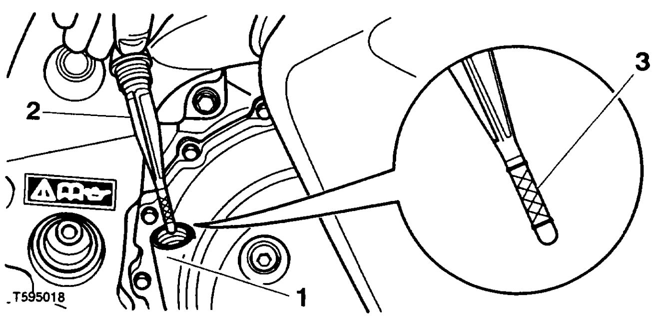
Mobil 1 Racing 4T, specially filled for Triumph, is available from your authorised Triumph dealer.

Oil Level Inspection

In order for the engine, transmission, and clutch to function correctly, maintain the engine oil at the correct level, and change the oil and oil filter in accordance with scheduled maintenance requirements.

WARNING: Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated engine wear and may result in engine or transmission seizure. Seizure of the engine or transmission may lead to loss of control and an accident.

1. Stop engine, then wait for at least 10 minutes to allow the oil to settle.
2. Remove the filler plug/dipstick, wipe the dipstick clean and screw the plug/dipstick fully home in the clutch cover.



1. Filler

2. Filler Plug/Dipstick

3. Hash-marked area

NOTE:

- **The actual level is indicated when the motorcycle is level and upright, not on the side stand, and when the filler has been screwed fully home.**

3. Remove the filler plug/dipstick.
4. The oil level is indicated by hash marks on the filler plug/dipstick. When full, the indicated oil level must level with the top of the hashed area.
5. If the oil level is too low, add oil a little at a time through the dipstick hole in the clutch cover.
6. After each small amount of oil has been added, check the oil level by fully inserting and removing the dipstick Continue to adjust as necessary until the oil level is correct.

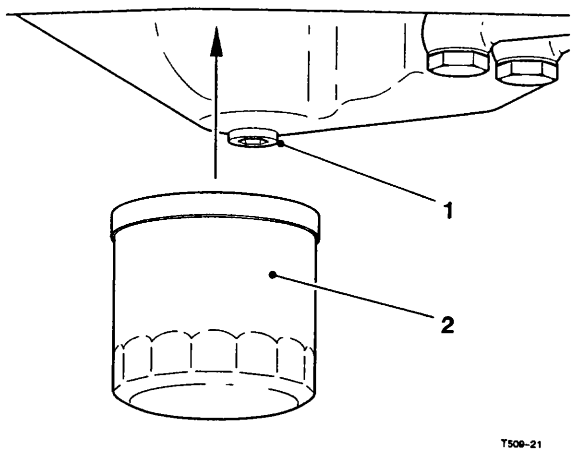
Oil and Oil Filter Change

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

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

1. Warm up the engine thoroughly, and then stop the engine.
2. Place an oil pan beneath the engine.
3. Remove the engine drain plug.

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

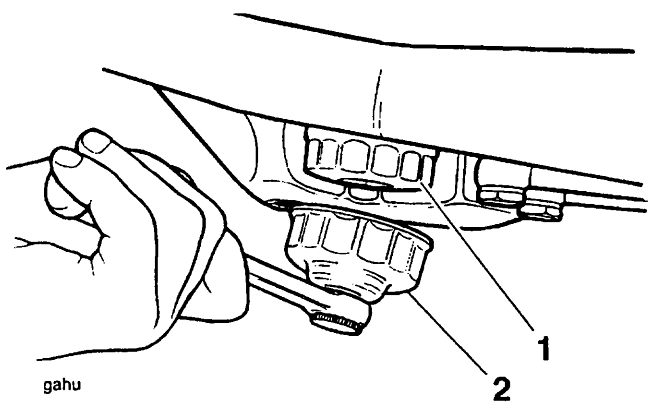


1. Oil Drain Plug

2. Oil Filter

3. With the motorcycle on level ground, and on the sidestand, allow the oil to completely drain.

4. Unscrew and remove the oil filter using Triumph service tool T3880311.



1. Oil Filter

2. Tool T3880311

5. Discard the oil filter.

6. Pre-fill a new oil filter with clean engine oil.

7. Apply a smear of clean engine oil to the sealing ring of the new oil filter.

8. Fit the oil filter and tighten to **8-12 Nm.**

9. After the oil has completely drained out, fit a new sealing washer to the engine drain plug. Fit and tighten the plug to **25 Nm.**

10. Fill the engine with new oil of the type and grade listed in the specification section.

11. Start the engine and allow to idle.

> ⚠ **CAUTION: Racing the engine before the oil reaches every part can cause engine damage or seizure.**

12. Ensure that the oil pressure warning light extinguishes shortly after starting.

> ⚠ **CAUTION: If the engine oil pressure is too low, the low oil pressure warning light will illuminate. If this light stays on when the engine is running, stop the engine immediately and investigate the cause. Running the engine with low oil pressure will cause engine damage.**

13. Stop the engine and check the oil level. Adjust if necessary.

Disposal of Used Engine Oil

To protect the environment, do not pour oil on the ground, down sewers or drains, or into water courses. Dispose of used oil sensibly. If in doubt contact your local authority.

OIL PUMP

NOTE:

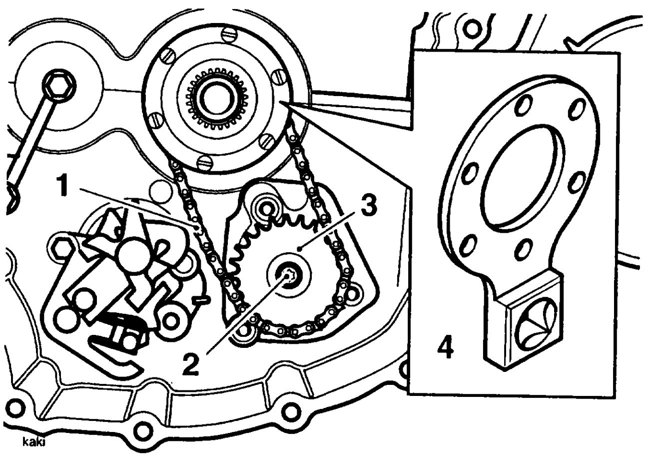
- **The oil pump may be removed after first removing the seat and disconnecting the battery, negative (black) lead first. The clutch must also be removed. Refer to the relevant sections for removal procedures.**

> **WARNING: Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. Furthermore, used engine oil contains potentially harmful contaminants which can cause cancer.**
>
> **When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.**

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

Removal

1. Remove the clutch (see the clutch section).
2. Fit tool T3880371 to the drive dogs on the upper oil pump drive sprocket. Hold the tool to prevent rotation and release the bolt securing the oil pump drive sprocket to the oil pump.



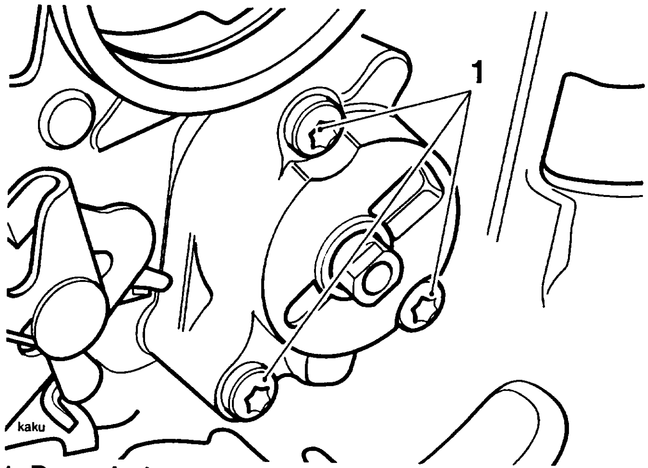
1. Oil pump drive chain

2. Pump drive sprocket fixing

3. Pump drive sprocket

4. Tool T3880371

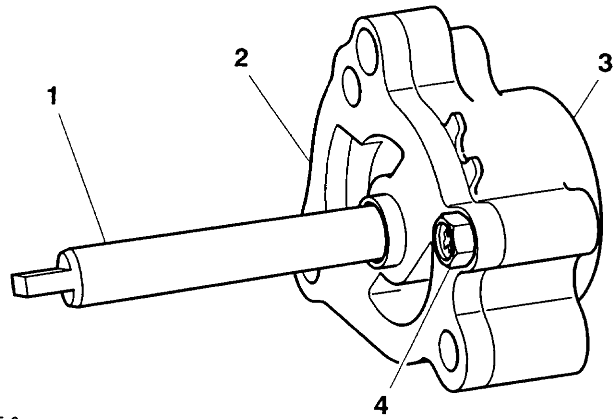
3. Remove the tool, upper and lower sprockets, upper sprocket bearing and the drive chain by sliding all components off the shaft together.
4. Release the bolts securing the oil pump to the crankcase and withdraw the oil pump.



1. Pump bolts

Inspection

1. Release the screw and withdraw the oil pump plate from the pump body.



07.15-2

1. Oil pump drive shaft

2. Oil pump plate

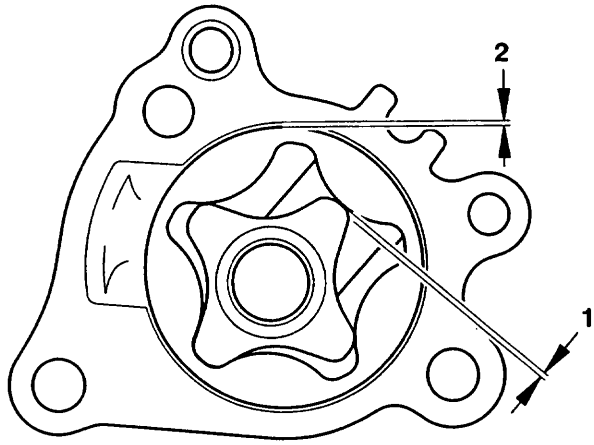
3. Oil pump body

4. Screw

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

2. Measure the rotor tip clearance using feeler gauges.

Standard:	**015 mm**
Service limit:	**0.20 mm**



07.15-3

1. Rotor tip clearance

2. Pump body clearance

3. Measure the pump body clearance using feeler gauges.

   Standard: 0.15 – 0.22 mm

   Service limit: 0.35 mm

4. Measure the pump end clearance.

   Standard: 0.02 – 0.07 mm

   Service limit: 0.10 mm

5. (a) If all clearances are within service limits, liberally apply clean engine oil to all internal components and refit the oil pump plate to the oil pump body.

   (b) If any clearance measured is outside the service limits, renew the complete pump.

6. Inspect all the sprocket and chain for wear and/or damage. Replace the sprocket and chain if wear and/or damage is found.

Installation

CAUTION: Before fitting the oil pump to the crankcase ensure the pump internal surfaces have been 'wetted' with clean engine oil. The pump may fail to pick-up oil from the sump if the surfaces have not been 'wetted'. This will cause the engine to run without engine oil pressure and will lead to severe engine damage.

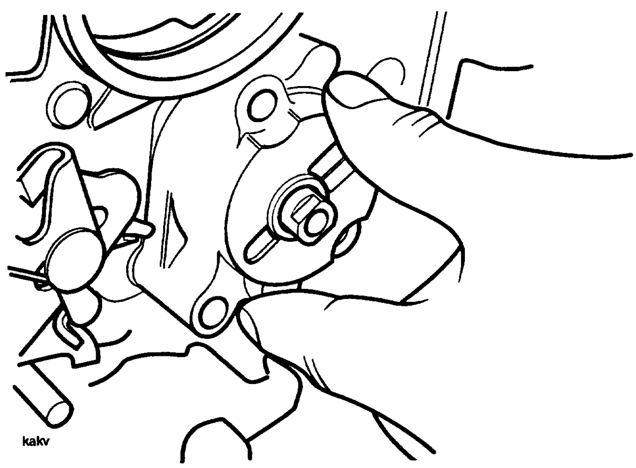
1. Fill the oil pump with new engine oil, turning the pump rotor as the oil is poured in to ensure all surfaces are coated with oil.

2. Position the oil pump to the crankcase and insert into the opening provided.

NOTE:

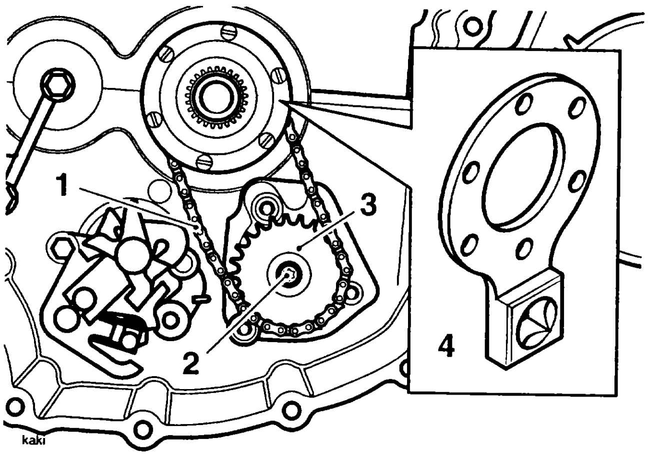
- **Use the sprocket end of the oil pump shaft to turn the drive peg into alignment with the drive on the water pump.**

3. Fit the oil pump to the crankcase, ensure the water pump drive peg locates into the drive on the water pump shaft. Tighten the bolts to **13.7 Nm.**



Pump Insertion

4. As an assembly, slide the upper drive sprocket bearing, upper drive sprocket, drive chain and pump sprocket onto the input shaft and oil pump.

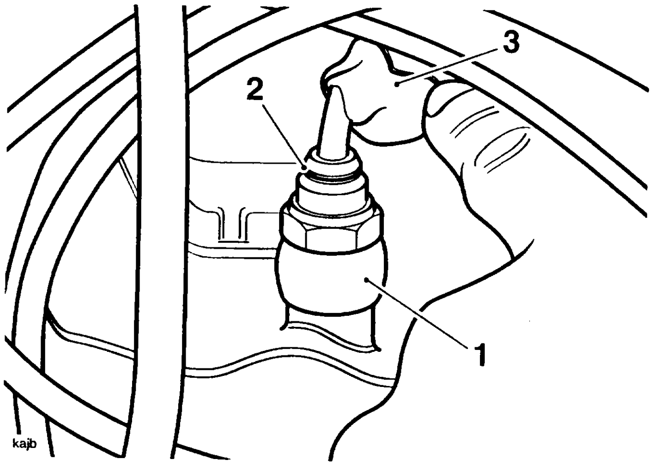


1. **Oil pump drive chain**
2. **Pump drive sprocket fixing**
3. **Pump drive sprocket**
4. **Tool T3880371**

5. Locate the pump drive sprocket onto the pump ensuring that the drive engages correctly.
6. Refit tool T3880371 to the upper drive sprocket and tighten a new oil pump drive sprocket centre bolt to **15 Nm.** Remove the tool.
7. Assemble the clutch as described in the clutch section.
8. Reconnect the battery, positive (red lead) first.
9. Refill the engine with oil.
10. Start the engine and ensure that the low oil pressure warning light goes out shortly after starting.
11. Stop the engine.
12. Adjust the engine oil level as necessary

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/Covering Boot**

1. Remove the seats and disconnect the battery negative (black) lead first.
2. Remove the right hand lower fairing as detailed in the body section.
3. Lift the covering boot and disconnect the electrical connection to the switch.
4. Remove the switch and collect the copper washers.

Installation

1. Using new copper washers on both sides of the oil pipe union, fit the switch and tighten to **13 Nm**.
2. Refit the electrical connection.
3. Refit the covering boot.
4. Refit the right hand lower fairing as detailed in the body section.
5. Reconnect the battery, positive (red) lead first.

SUMP

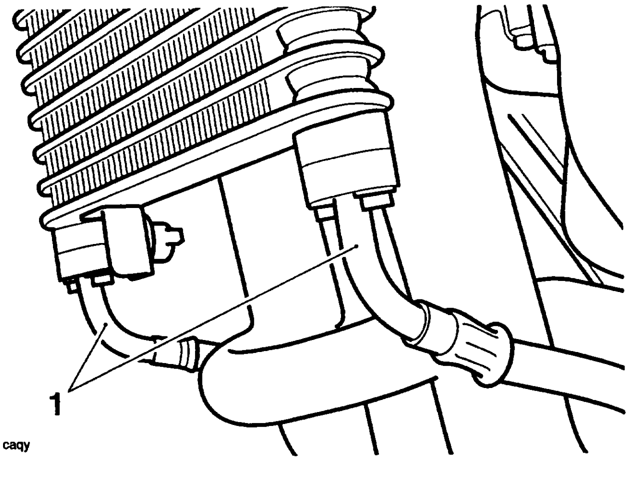
Removal

1. Remove the seats and disconnect the battery negative (black) lead first.
2. 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.

3. Remove the lower fairings as described in the body section.
4. Note the position of the oil cooler pipes prior to disconnecting the pipes from the sump.



1. Oil Cooler Pipes (Daytona illustrated)

5. Remove the exhaust system as described in the fuel system section.

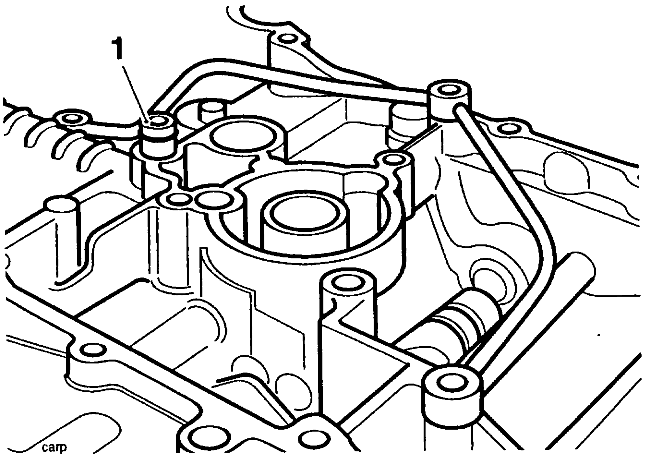
WARNING: The exhaust system will be hot if the engine has recently been running. Always allow sufficient time for the exhaust to cool before working on or near the exhaust system.

Contact with a hot exhaust could result in burn injuries.

6. Remove the oil filter.
7. Release the bolts securing the sump to the lower crankcase.
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

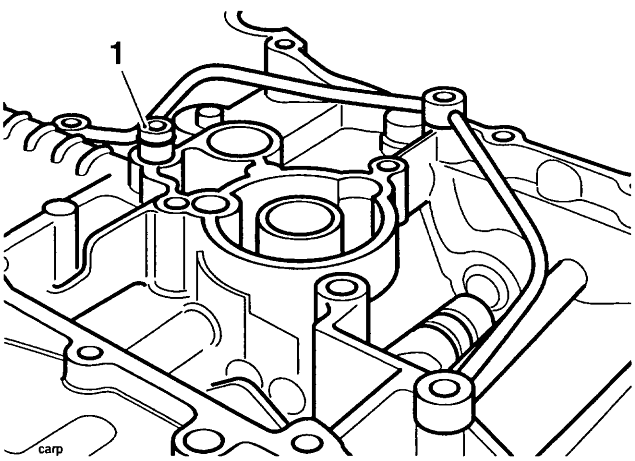
9. Remove the sump gasket.
10. If necessary, remove the oil transfer pipe and collect the sealing washer from either side of each joint.

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

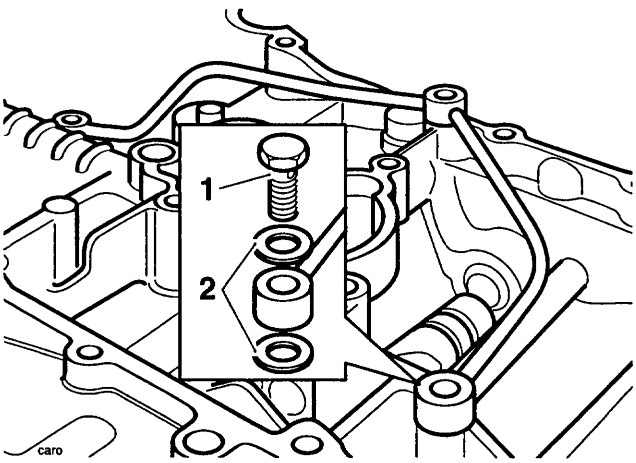
Installation

1. Fit the oil transfer tube to the crankcase.



1. Transfer Tube Location

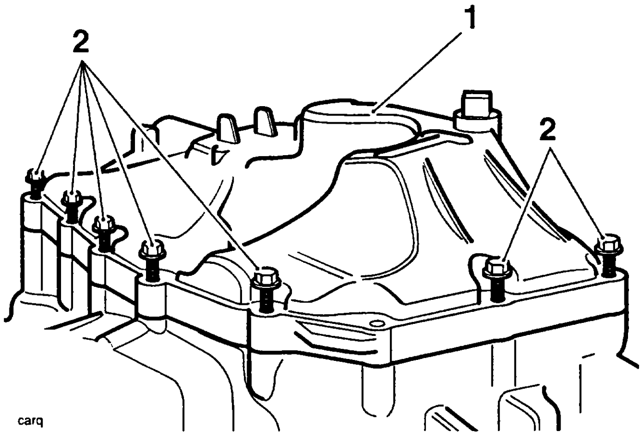
2. If removed, fit the oil transfer pipe incorporating new washers. Tighten the fixings to **8 Nm.**



1. Bolt (used at all 3 locations)

2. Sealing washers (used at all 3 locations)

3. Incorporating a new sump gasket, position the sump to the lower crankcase.
4. Tighten the sump fixings to **12 Nm.**



1. Sump

2. Fixings

5. **Speed Triple only:** Incorporating new sealing washers, reconnect the oil cooler pipes. Tighten the cooler pipe banjo bolts to **25 Nm.**
   Daytona only: Align the oil cooler pipes to the sump and, incorporating new O-rings, tighten the fixings to **10 Nm.**
6. Pre-fill a new oil filter with clean engine oil.
7. Apply a smear of clean engine oil to the seal of a new oil filter.
8. Fit the oil filter and tighten to **12 Nm** using tool T3880011.
9. Refit the exhaust system as described in the fuel system section.

NOTE:

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

10. Fill the engine with the correct grade of engine oil
11. Reconnect the battery positive (red) lead first.
12. Start the engine and ensure that the low oil pressure warning light goes out shortly after starting.
13. Stop the engine and adjust the engine oil level.
14. Refit the lower fairings as described in the body section.
15. Refit the seats.

OIL COOLER - DAYTONA

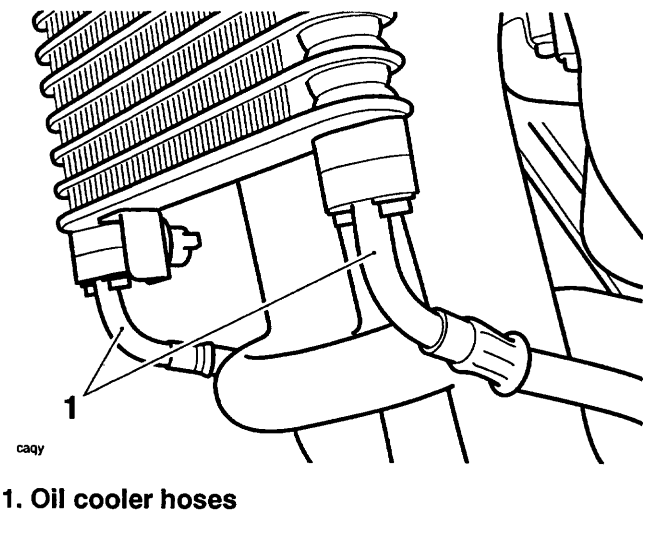
Removal

1. Remove the seats and disconnect the battery negative (black) lead first.
2. Remove both lower fairings as described in the body section.
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.**

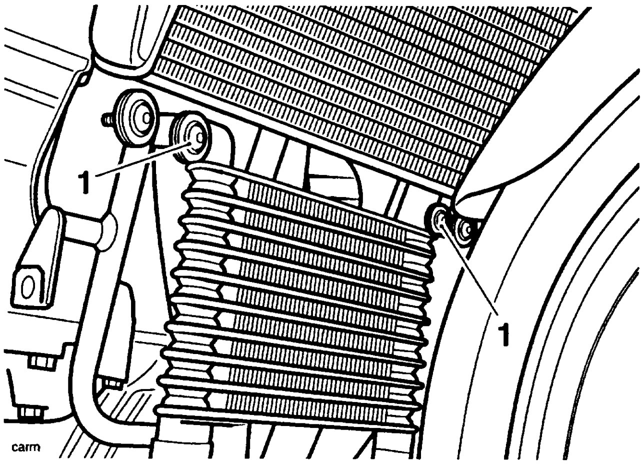
> **WARNING: Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.**

5. Disconnect the oil cooler feed and return hoses.



1. Oil cooler hoses

6. Release the oil cooler fixings.



1. Oil Cooler Mountings

7. Detach the oil cooler.

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. Position the oil cooler to the retaining brackets.
2. Refit and tighten the oil cooler fixings to **9 Nm**.
3. Align the oil cooler pipes to the cooler and, incorporating new O-rings, tighten the fixings to **10 Nm.**
4. Refill the engine with oil of the correct grade and viscosity.
5. Reconnect the battery positive (red) lead first.
6. 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.
7. Adjust the engine oil level.
8. Refit both lower fairings as described in the body section.
9. Refit the seats.

OIL COOLER - SPEED TRIPLE

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.
2. Position a suitable container beneath the oil cooler to catch any oil spillages.
3. Drain the engine oil as described elsewhere in this section.

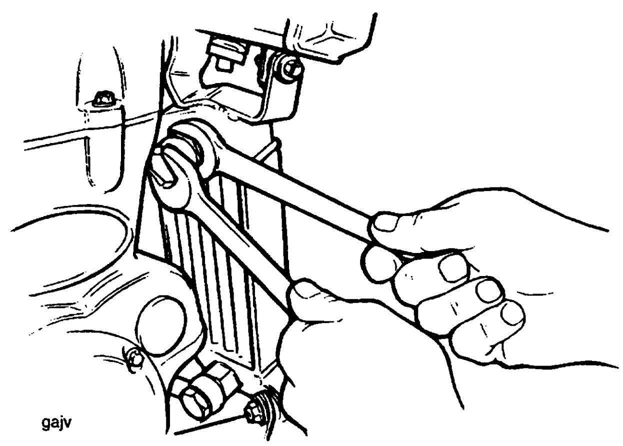
WARNING: The oil may be hot to the touch. Contact with hot engine oil may cause skin to be scalded or burnt.

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.

4. 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.

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



Oil Cooler Hose Disconnection

6. 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. Reconnect the battery positive (red) lead first.
8. Refit the seat.

FUEL SYSTEM/ENGINE MANAGEMENT

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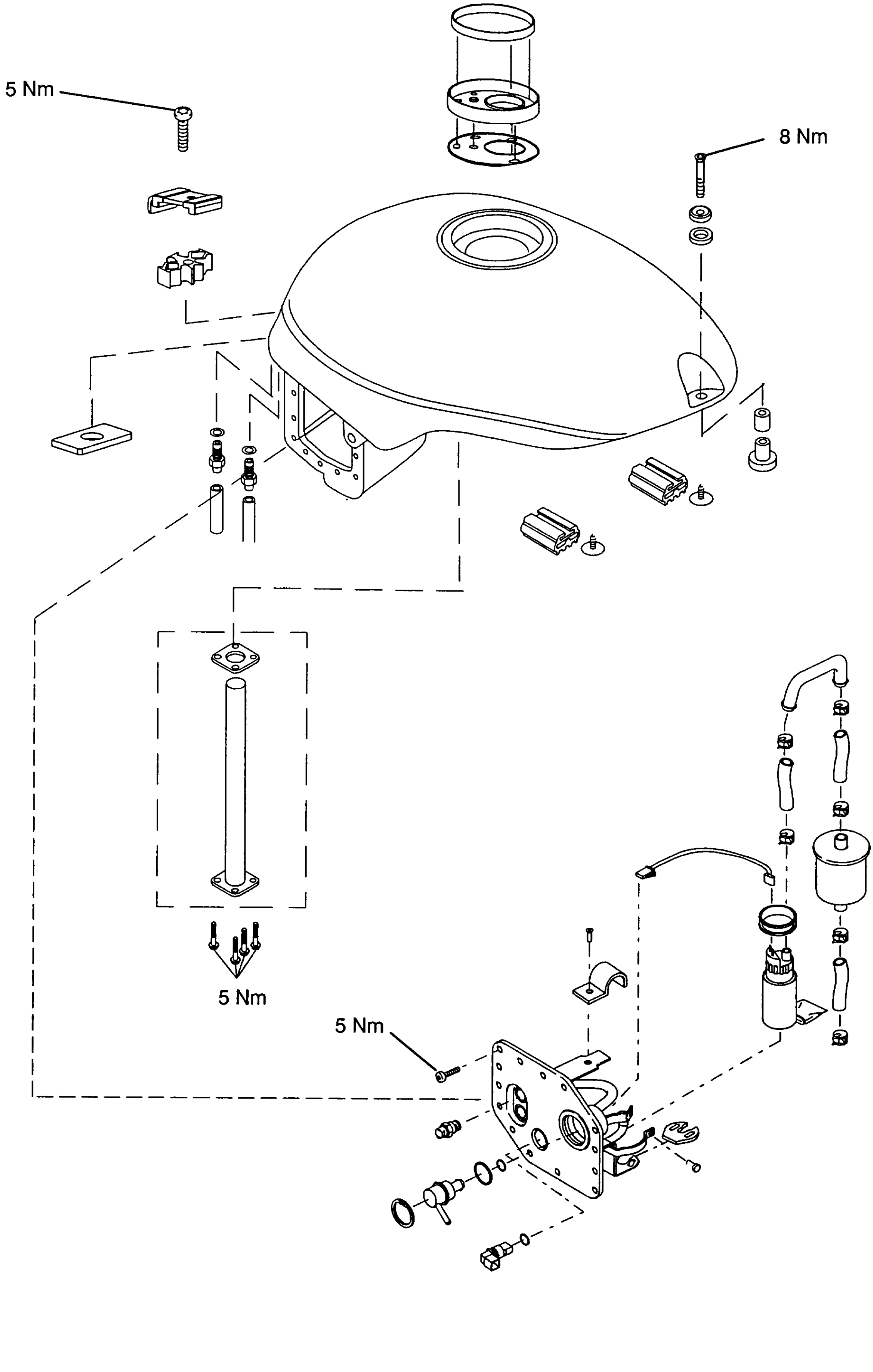
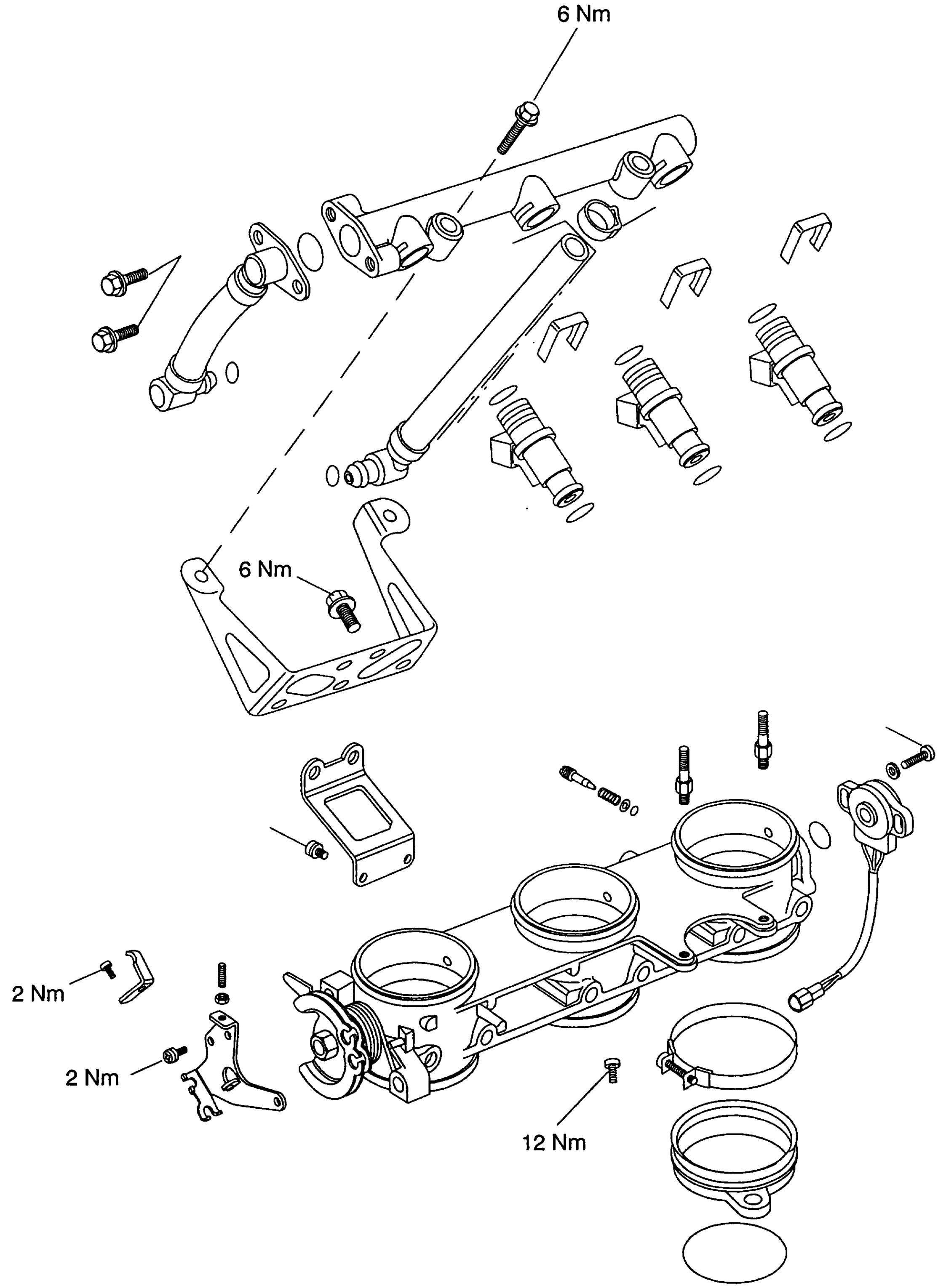
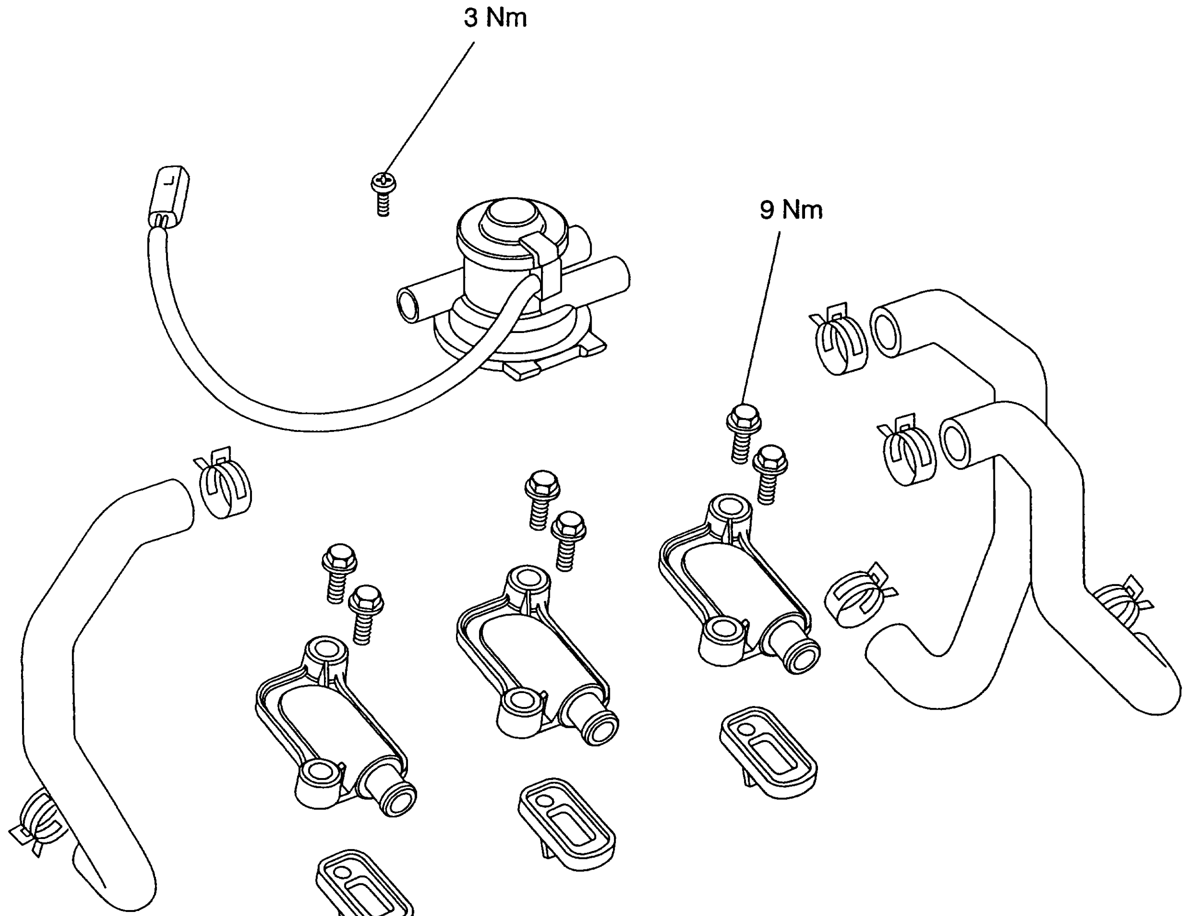
Exploded View - Fuel Tank and Pump



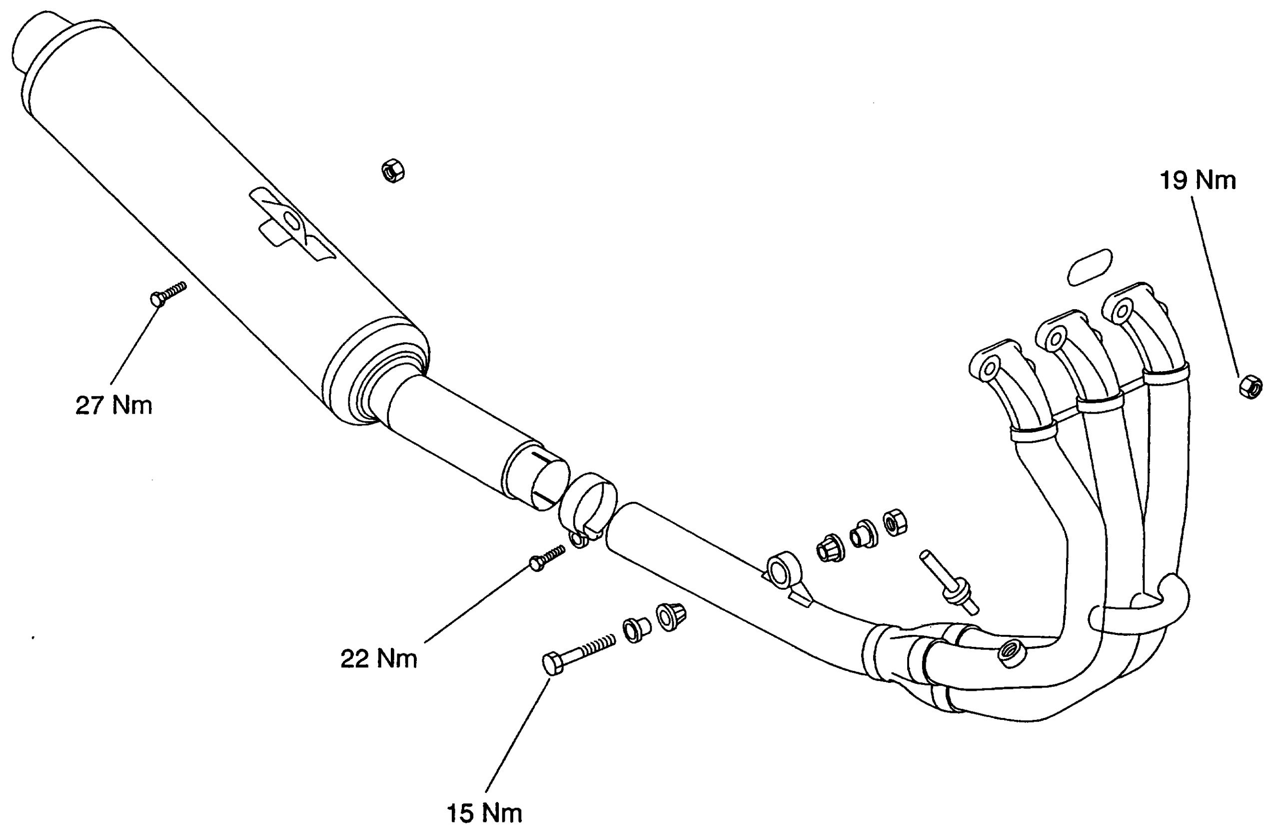
Exploded View - Fuel Rail, Throttles and Injectors



Exploded View - Secondary Air Injection Valves and Controls



Exploded View - Exhaust System



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.

Adaptive Stepper Position

The position of the idle air control valve stepper motor after adapting to a particular engine's operational characteristics.

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).

Catalyst

Device placed in the exhaust system which reduces exhaust emissions.

Closed loop fuelling

Fuel system incorporating an oxygen sensor which helps to maintain air fuel ratios within a specific band.

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.

Lambda sensor

See oxygen sensor.

Long term fuel trim

Fueling after adapting to the engine's long term fuelling requirements (closed loop only). See also short term fuel trim.

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.

Open loop

Fuel system without an oxygen sensor fitted or one which is operating in open loop mode due to a fault.

Over temp'

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

Oxygen sensor

Device in the exhaust system which senses the content of the exhaust gases and signals to the ECM to adjust the air-fuel ratio to within a specific parameter.

Purge valve duty cycle

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

Secondary Air Injection

An aid to reducing levels of pollutants in the exhaust gases through the addition of air to the combusted gasses entering the exhaust system, thus promoting secondary combustion.

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).

Short term fuel trim

A correction applied to the fuel mixture during closed loop catalyst operation. This, in turn has an effect on the long term fuel trim in that, if an engine constantly requires mixture correction, the long term fuel trim will adapt to this requirement thus reducing the need for constant short term adjustment.

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.

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.

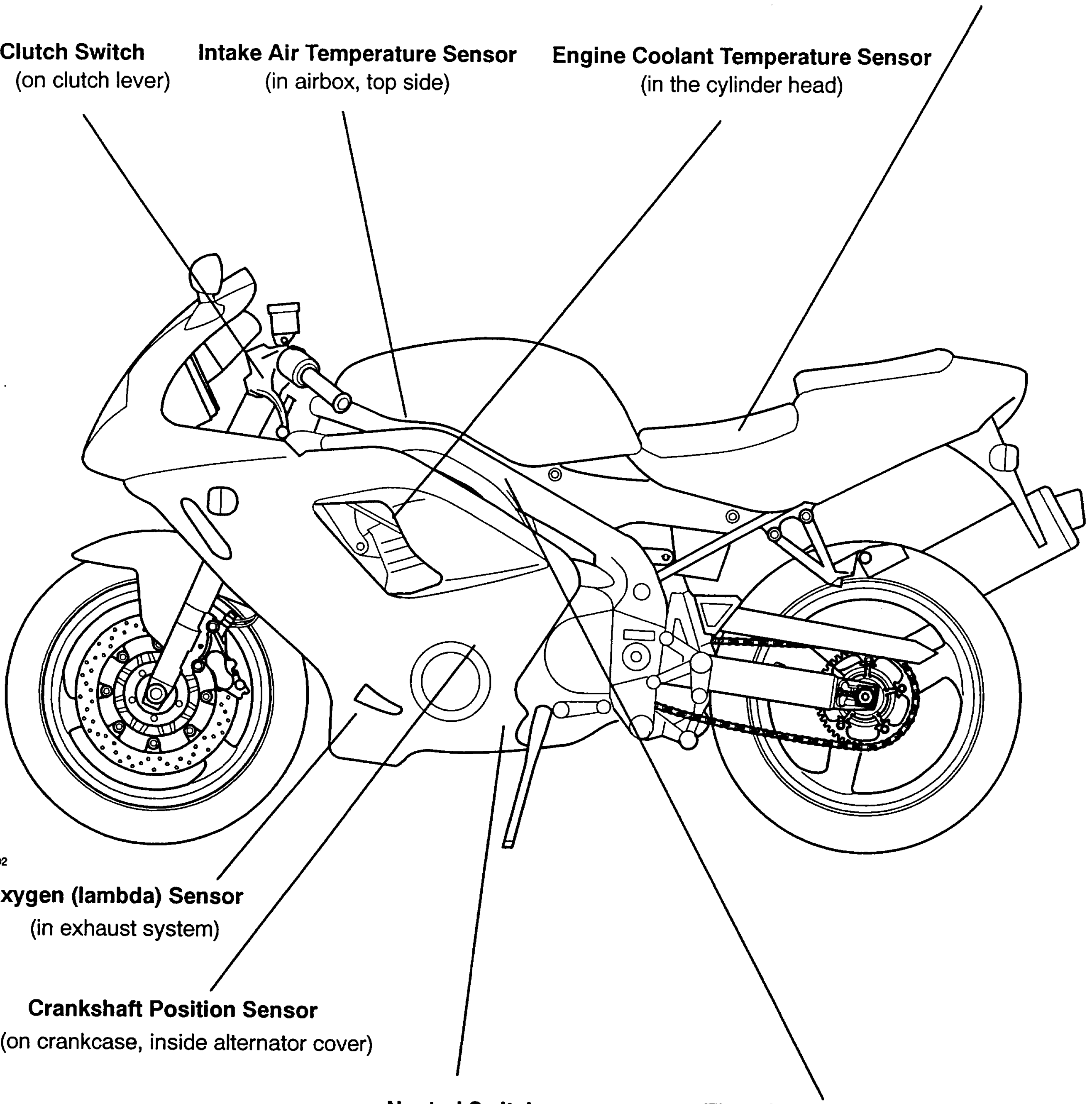
System Sensors

- **Intake air temperature sensor -** situated in the top of the airbox towards the rear. 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 -** the barometric pressure sensor is incorporated in the ECM itself and is connected to the airbox via a hose

  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 of fuel is adjusted to suit the prevailing conditions.
- **Crankshaft position sensor -** situated behind the alternator on the left side of the engine. The crankshaft position sensor detects movement of a toothed wheel attached to the left 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.
- **Oxygen (Lambda) Sensor -** situated in the exhaust system. At idle and other specified engine speeds, the oxygen sensor continuously senses the content of the exhaust gases and signals this information to the ECM. According to the signal received, the ECM adjusts the air/fuel ratio to within specific parameters thus controlling idle CO and eliminating the need for manual adjustment.
- **Engine coolant temperature sensor -** situated in the left side of the cylinder head. 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 left 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.
- **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 in to the handlebar.
- **Clutch Switch** - Situated on the clutch lever. The engine will not start unless the clutch lever is pulled to the handlebar.

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 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 idle 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.

- **Secondary Air Injection Control Valve (not all markets) -** situated in the airbox. At certain specific engine speeds above idle (determined by the factory programming of the engine management system), the secondary air injection control valve is opened by the ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the control valve, through the open reed valves, into the exhaust port. This air promotes secondary combustion of the exhaust gases in the ports and header system. Once the exhaust valves close, the depression is reduced and the reed valves close.

  At other engine speeds, the system is disabled by closing the control valve mounted in the airbox. This allows an oxygen sensor to control air to fuel ratios. If air was fed to the exhaust system when the oxygen sensor was operational, the incoming air would cause inaccuracies in the readings sensed by the oxygen sensor (which requires access to 'raw' combustion gases) which would lead to rough running.

- **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 cylinder head. The engine is fitted with 3 quadruple-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.

- **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.

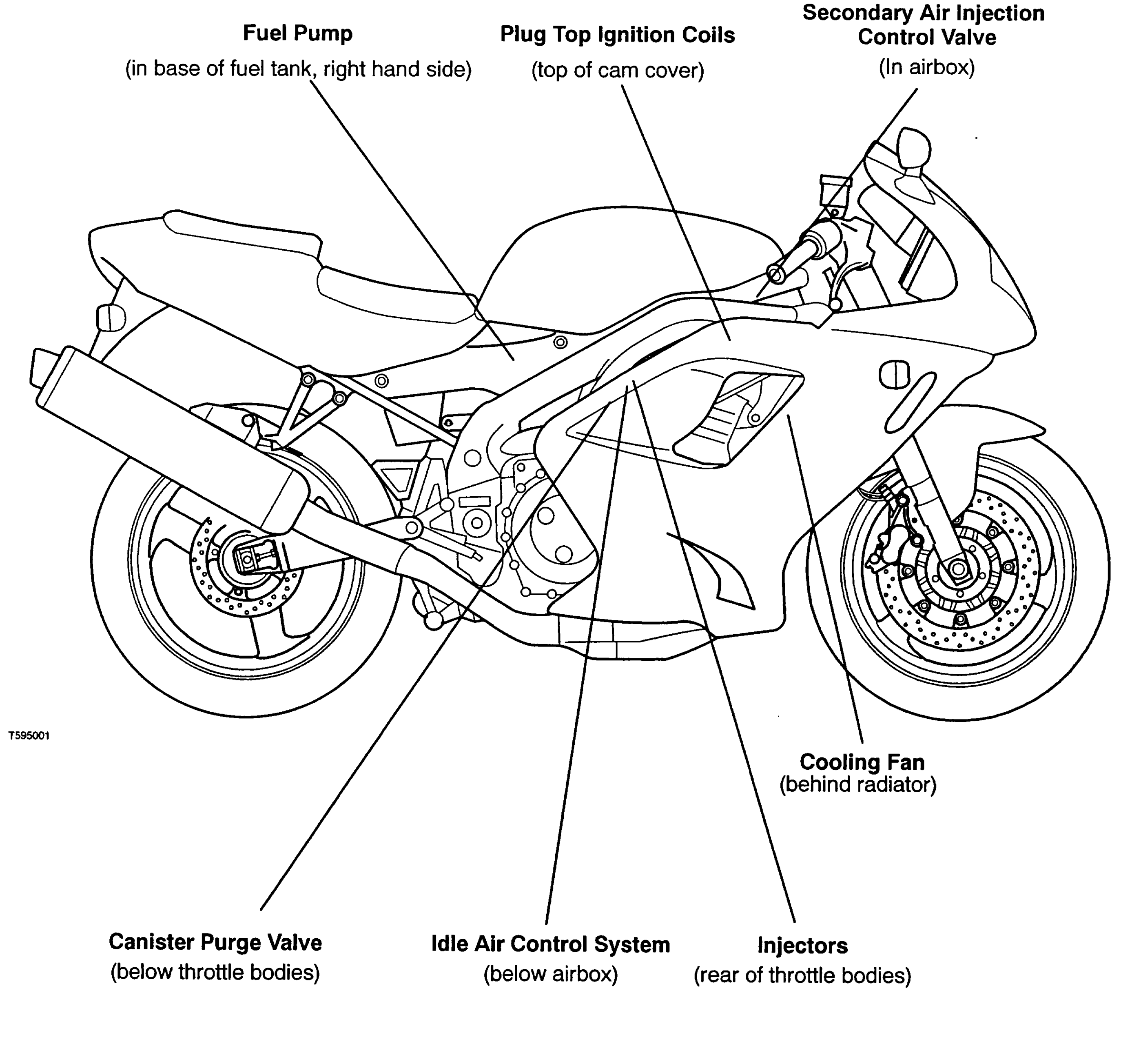
  Once all the power down procedures have been carried out, the main power relay is turned off.

- **Fuel pump -** located inside the fuel tank on the right hand side of the motorcycle. 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 running 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.

Engine Management System

Actuator Locations



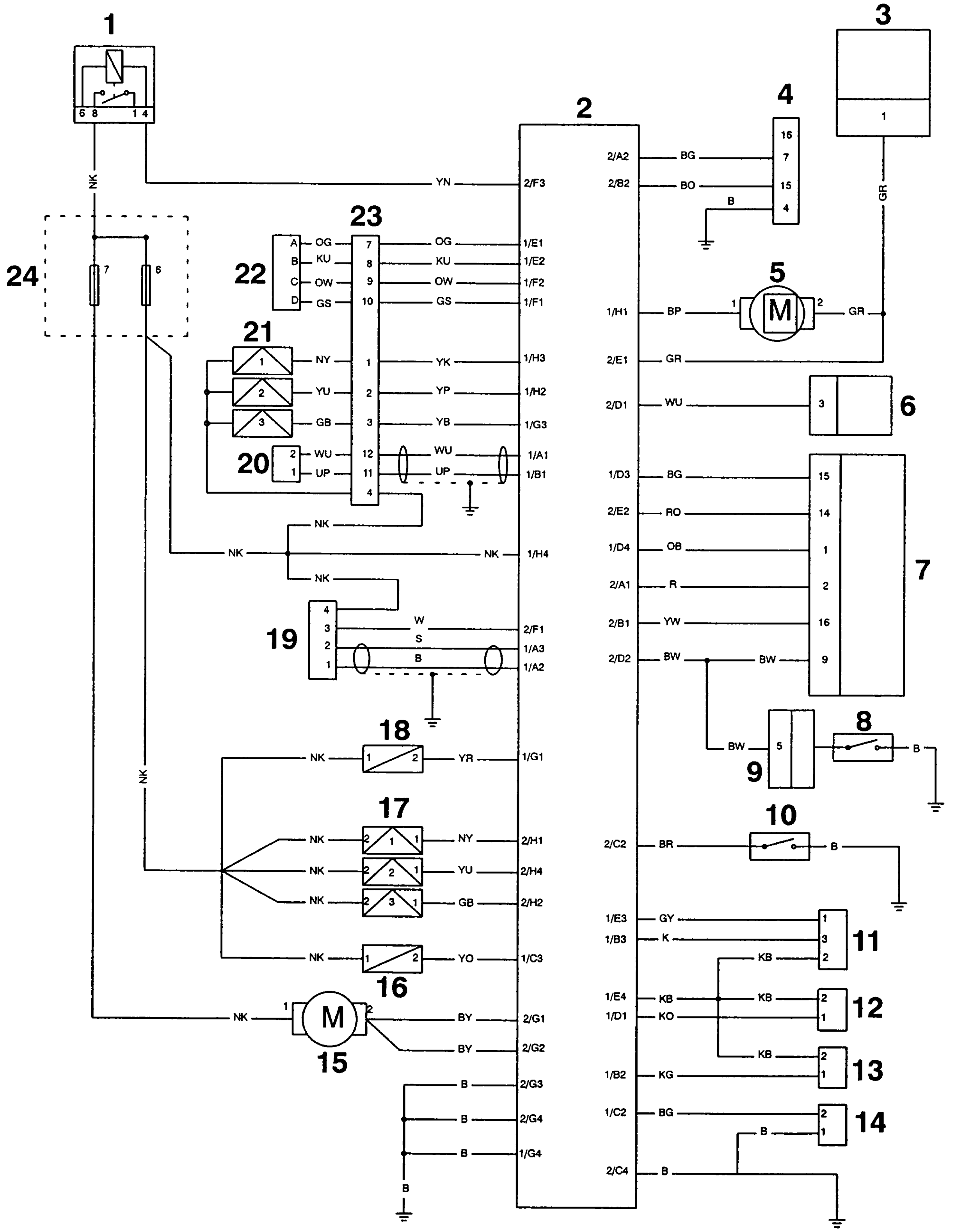
Key To Wiring Circuit Diagram

Key	Item
1	Main power relay
2	ECM
3	Alarm control unit (accessory)
4	Diagnostic connector
5	Fuel pump
6	Wheel speed sensor
7	Instruments
8	Neutral switch
9	Engine sub-harness connector
10	Throttle position sensor
11	Inlet air temperature sensor
12	Coolant temperature sensor
13	Fuel level sender
14	Sidestand switch
15	Cooling fan
16	Secondary air injection solenoid
17	Ignition coils
18	Canister purge valve
19	Heated oxygen sensor
20	Crankshaft sensor
21	Fuel injectors
22	Idle control stepper motor
23	Engine sub-harness connector
24	Fuses 6 and 7

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
LU	Light Blue
R	Red
P	Purple
W	White
Y	Yellow

Circuit Diagram - Engine Management System



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:

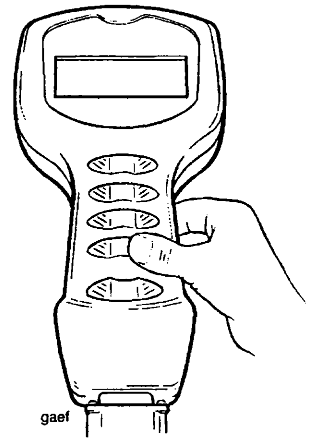
- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.
- A controlled power-down sequence must take place.

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.

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

The tool allows adjustment of some 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
Adaptive stepper position	IACV start point
Long term fuel trim	Exhaust emissions

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
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
P0118	Engine coolant temperature too low	3	40	Yes
P0119	Engine coolant sensor high voltage	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
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
P0132	Lambda sensor signal too high	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
P1552	Cooling fan relay short circuit/open circuit	3	40	Yes
P1553	Cooling fan relay short to battery voltage/over temperature	3	40	Yes
P0115	Coolant temperature sensor circuit malfunction	N/A	40	No
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

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
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
P1622	Fuel gauge short circuit to Vbatt	N/A	40	No
P1501	Speedometer driver, open circuit/short to ground	N/A	40	No
P1502	Speedometer driver, short to vbatt/over temperature	N/A	40	No
P0413	Secondary air injection open circuit fault	N/A	40	No
P0414	Secondary air injection short circuit fault	N/A	40	No

Checks

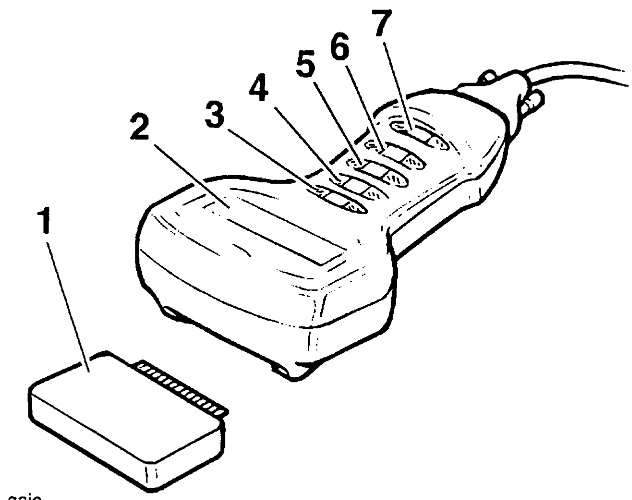
Sensor data

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.

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.

```
          DIAGNOSTICS
    CURRENT  DATA
▶   READ  STORED  DTCS
▼   FUNCTION  TESTS
```

Typical screen showing symbol examples

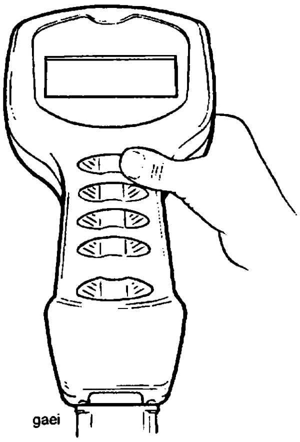
▲▼ Cursors to indicate that further lines of text are available to be seen above and/or below those already in view, by scrolling the text up or down using the 'Up' or 'Down' keys.

▶ Cursor to show which line of text is 'Active'.

? Indicates further help/guidance information available on that line by pressing the help key.

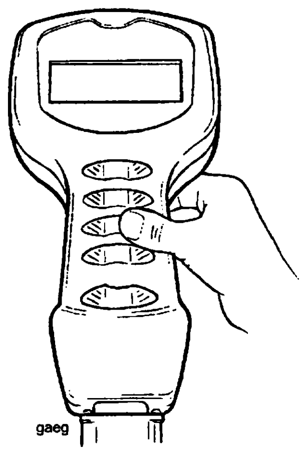
Tool Keys

In most cases, the **Return** key (↲) enables the user to return to the screen last displayed.



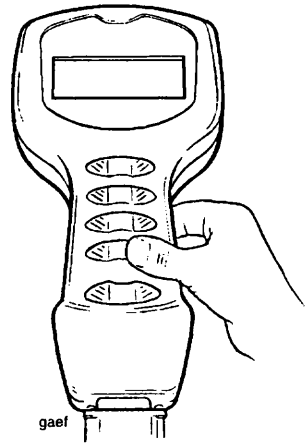
Return key

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.



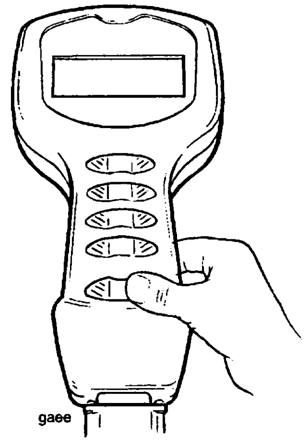
Up/down keys (2 separate keys)

Press the **Validation** key (✳) to move on to the next message.



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.



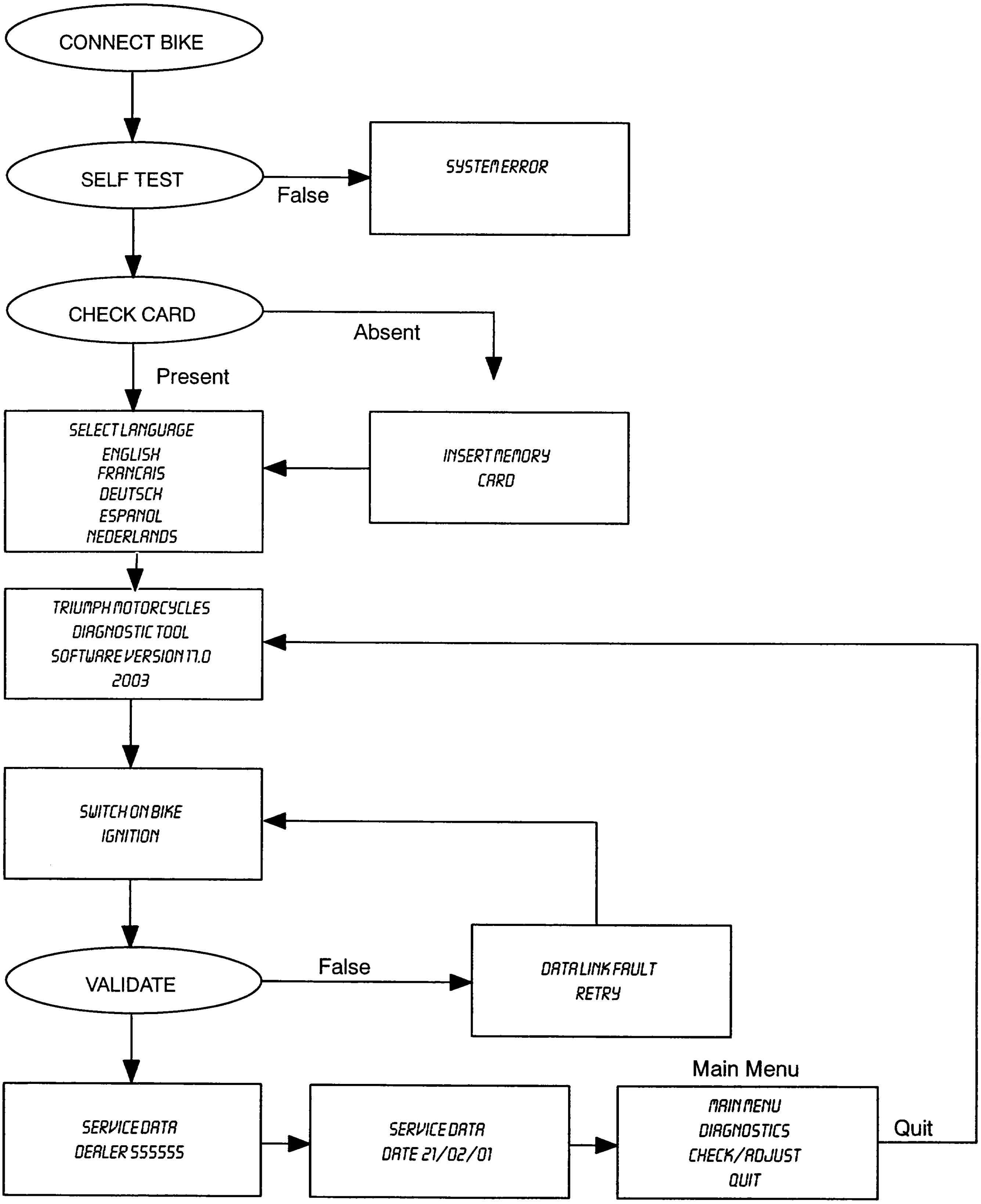
Help key

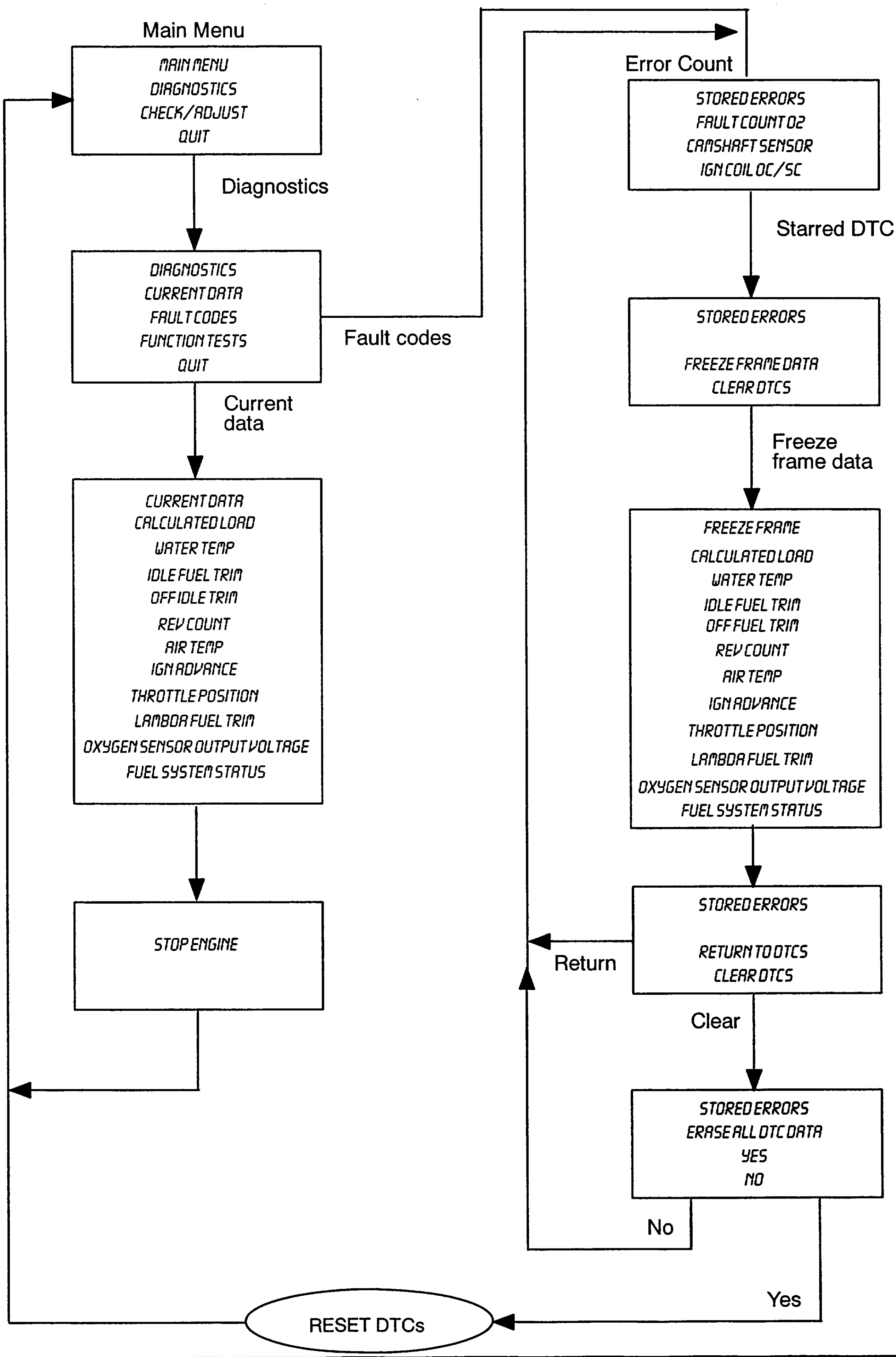
TEST PROCEDURE

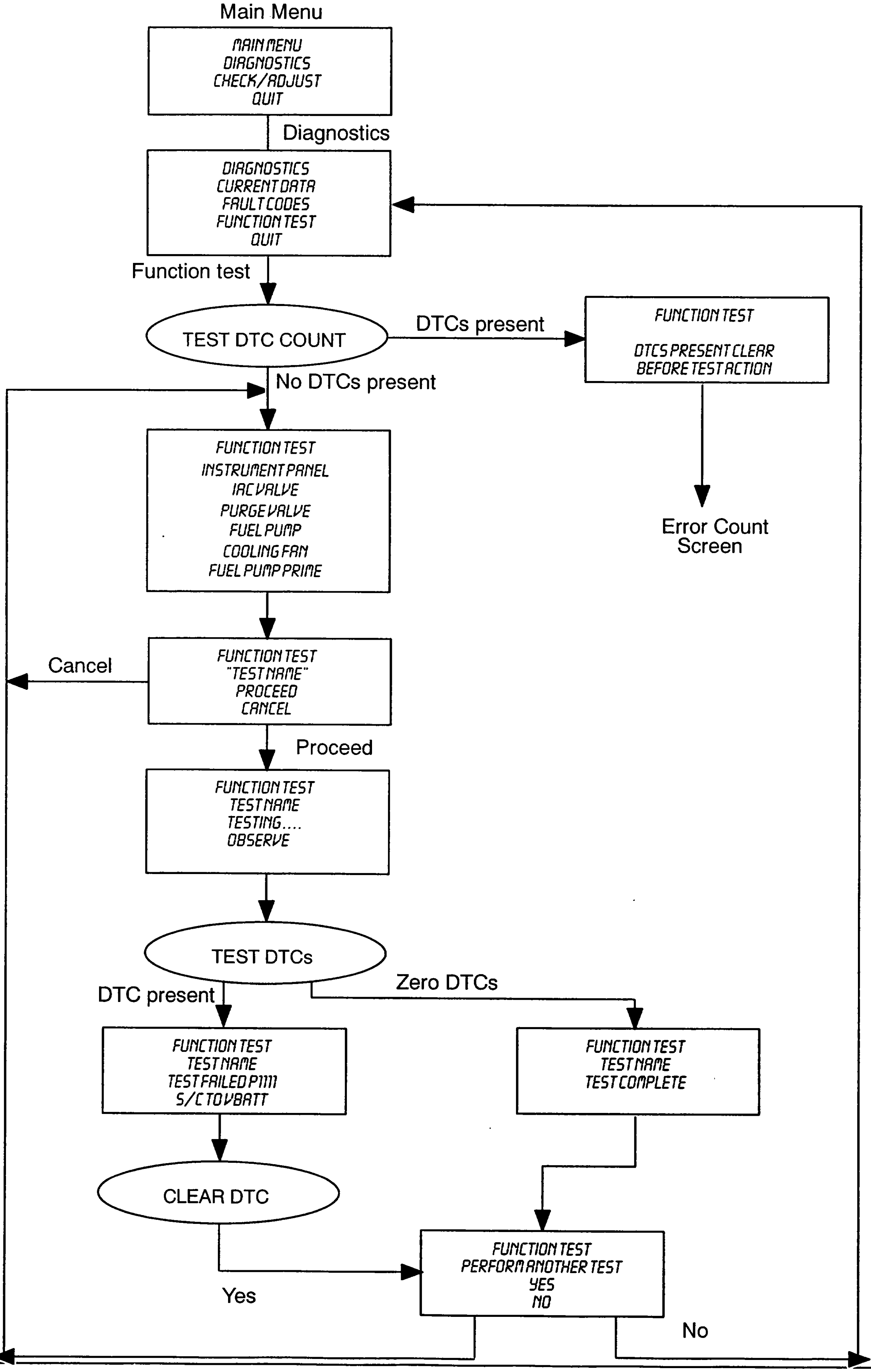
The following describes the procedure to follow when using the service diagnostic tool. It does not cover the further diagnosis that must be carried out once a fault area has been identified. For details of the procedure to follow when a fault area or fault code has been identified, refer to the diagnosis details later in this section.

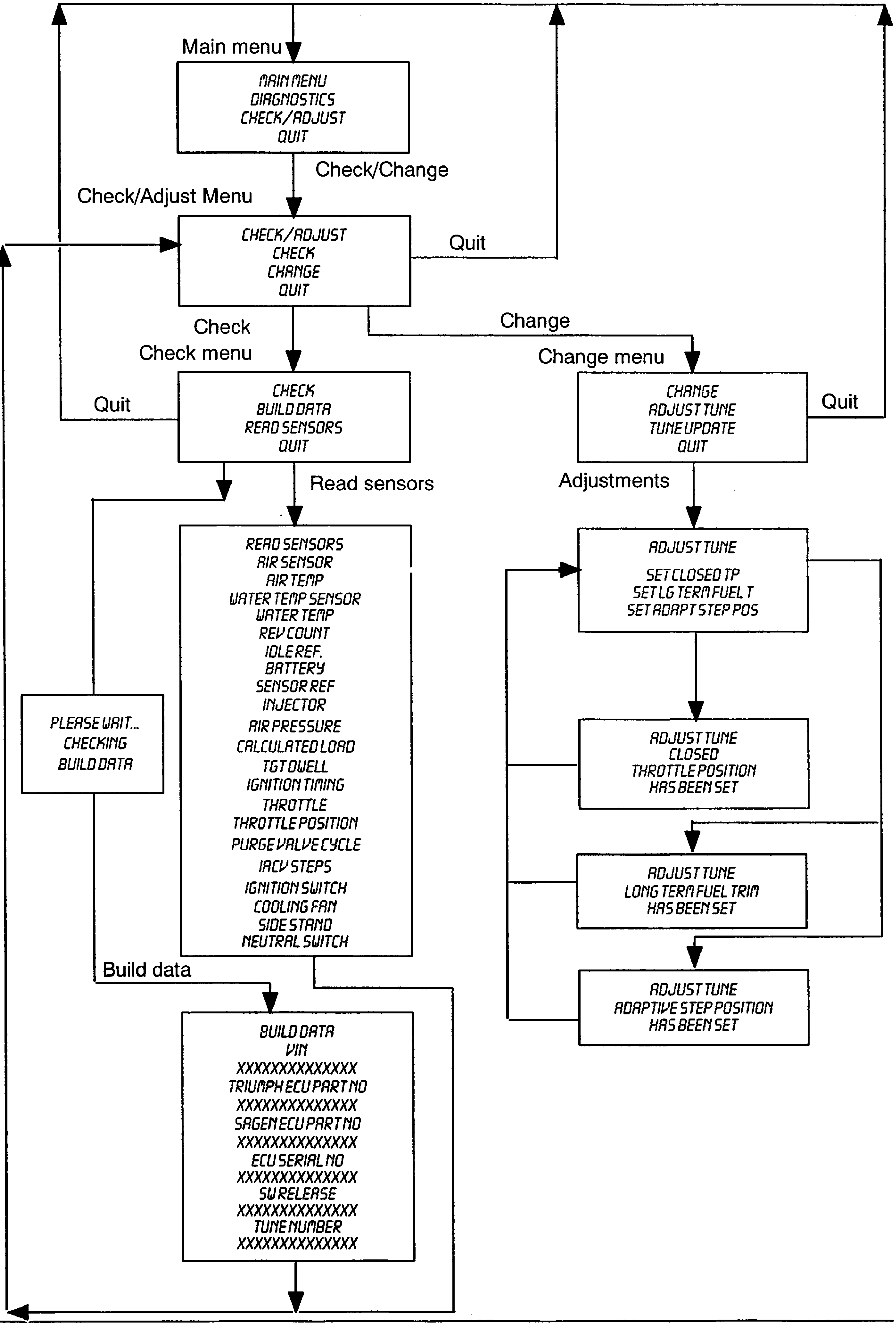
NOTE:

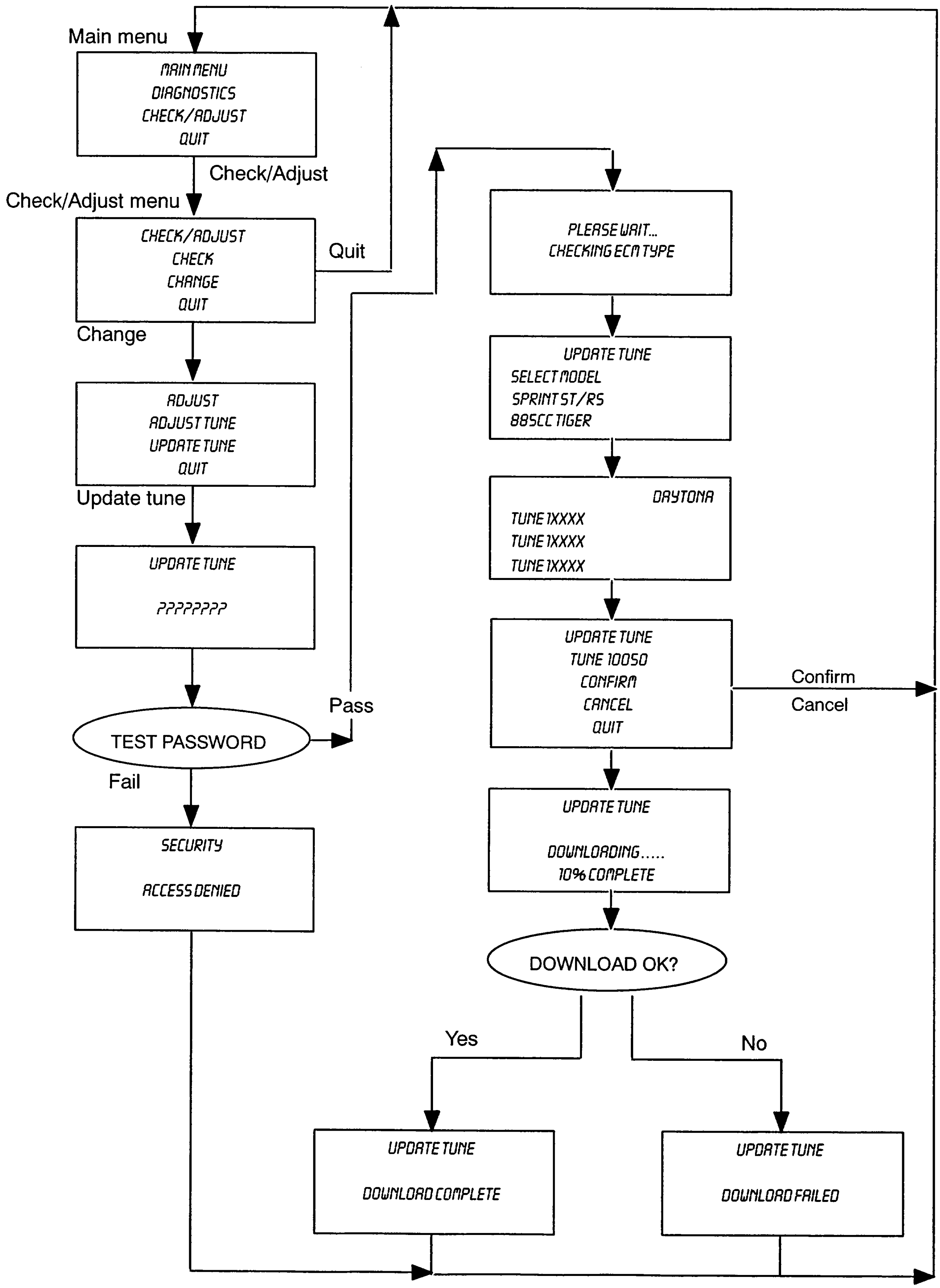
- **The tool does not retain any memory of faults, diagnosis etc. carried out on any particular motorcycle. Any such memory is only retained in the motorcycle's ECM.**
- **The following five pages describe the tool operations in flow chart form.**


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 17.0
2003
SWITCH ON BIKE
IGNITION
VALIDATE
False
DATA LINK FAULT
RETRY
Main Menu
SERVICE DATA
DEALER 555555
SERVICE DATA
DATE 21/02/01
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Quit

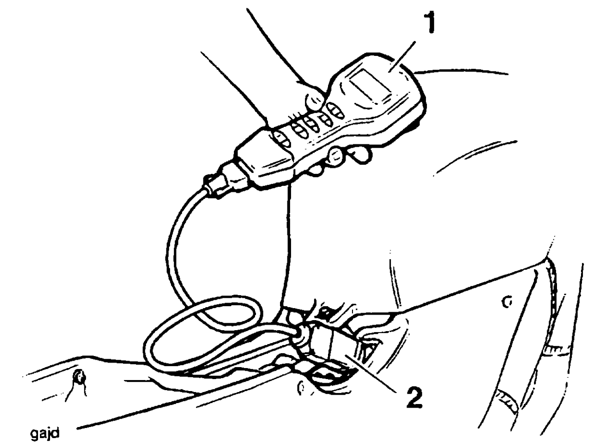

Main Menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Diagnostics
DIAGNOSTICS
CURRENT DATA
FAULT CODES
FUNCTION TESTS
QUIT
Fault codes
Current data
CURRENT DATA
CALCULATED LOAD
WATER TEMP
IDLE FUEL TRIM
OFF IDLE TRIM
REV COUNT
AIR TEMP
IGN ADVANCE
THROTTLE POSITION
LAMBDA FUEL TRIM
OXYGEN SENSOR OUTPUT VOLTAGE
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
Check menu
Change
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
SET CLOSED TP
SET LG TERM FUEL T
SET ADAPT STEP POS
PLEASE WAIT...
CHECKING
BUILD DATA
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
Build data
BUILD DATA
VIN
XXXXXXXXXXXXXX
TRIUMPH ECU PART NO
XXXXXXXXXXXXXX
SAGEM ECU PART NO
XXXXXXXXXXXXXX
ECU SERIAL NO
XXXXXXXXXXXXXX
SW RELEASE
XXXXXXXXXXXXXX
TUNE NUMBER
XXXXXXXXXXXXXX


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
PLEASE WAIT...
CHECKING ECM TYPE
UPDATE TUNE
SELECT MODEL
SPRINT ST/RS
885CC TIGER
DAYTONA
TUNE 1XXXX
TUNE 1XXXX
TUNE 1XXXX
UPDATE TUNE
TUNE 10050
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

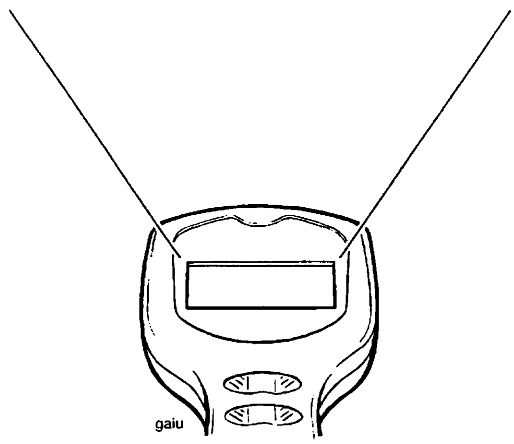
Connect the tool to the dedicated multiplug under the seat.

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

```
  SELECT LANGUAGE
▶ ENGLISH
  FRANCAIS
  DEUTSCH
  ESPANOL
  NEDERLANDS
```

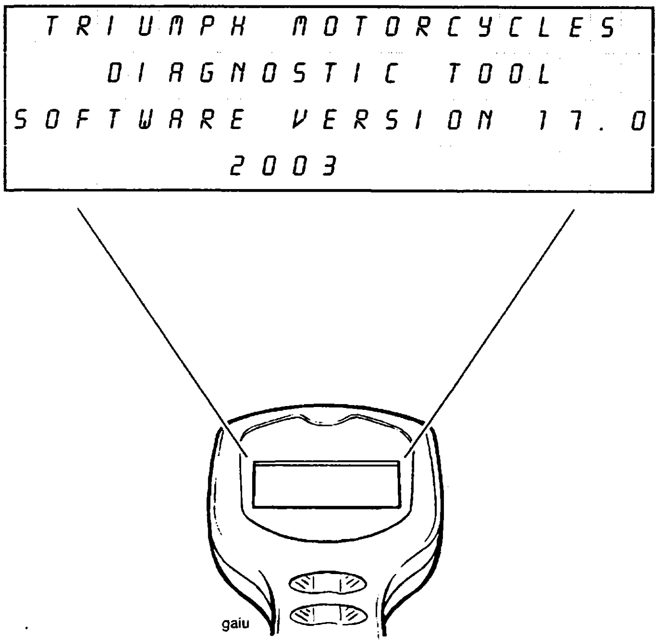


Use the 'Up' and 'Down' keys to move the cursor in column 1 and select the language required.

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

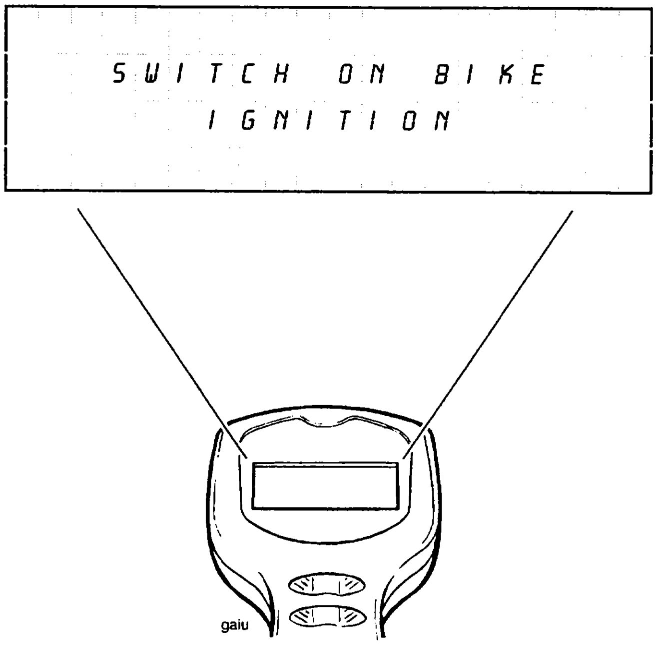


The screen will display the message 'Triumph Motorcycles Diagnostic Tool' and will also give the diagnostic software version and the software release year.

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



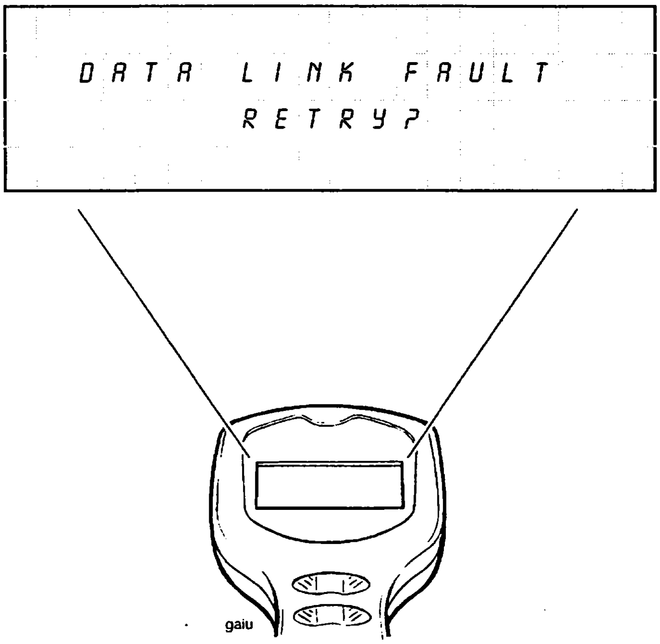
Switch on the ignition. Do NOT start the engine.

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.

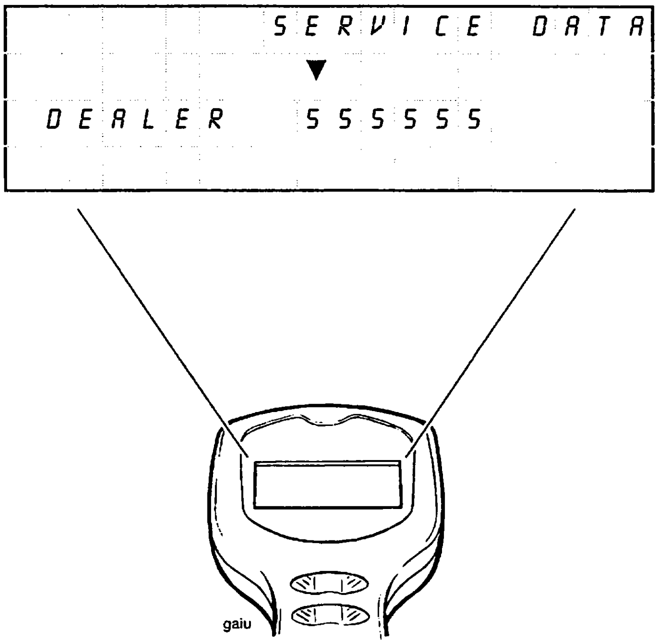
Press the **Help** key '**?**' for advice.

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.

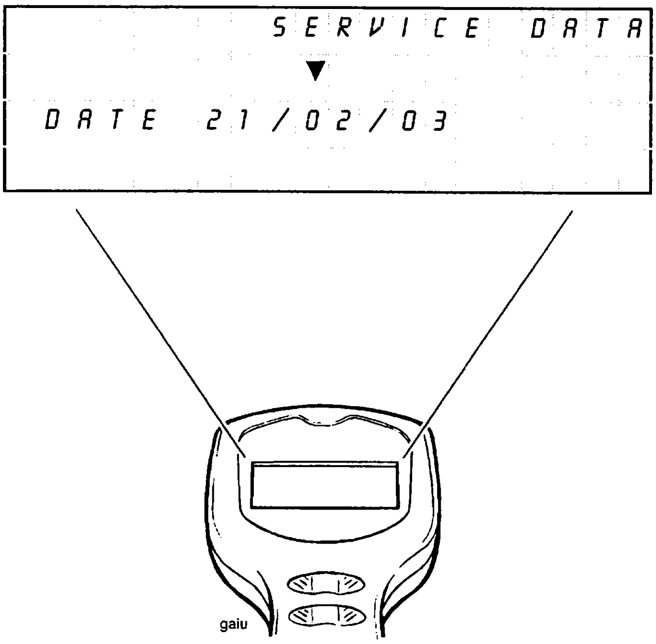
NOTE:

- **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



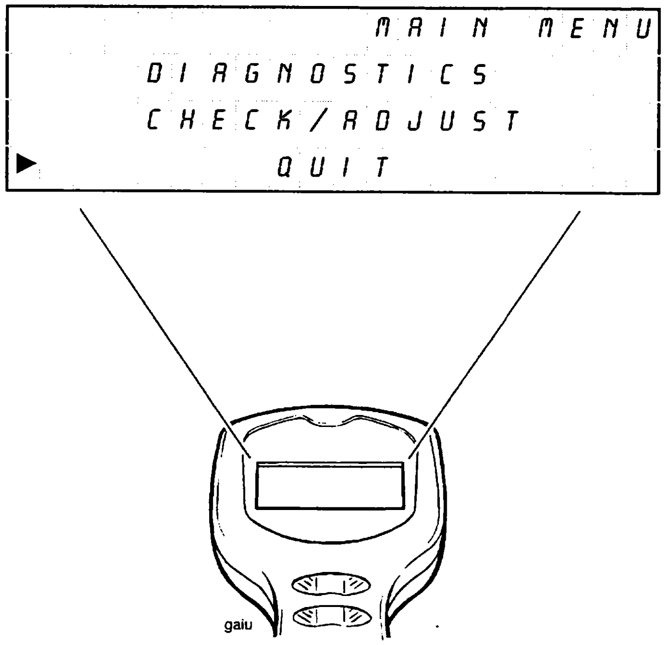
Enter the date using the 'Up' and 'Down' keys in the same way that the Dealer number was entered.

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 closed throttle, adaptive stepper position, and entry of software updates.

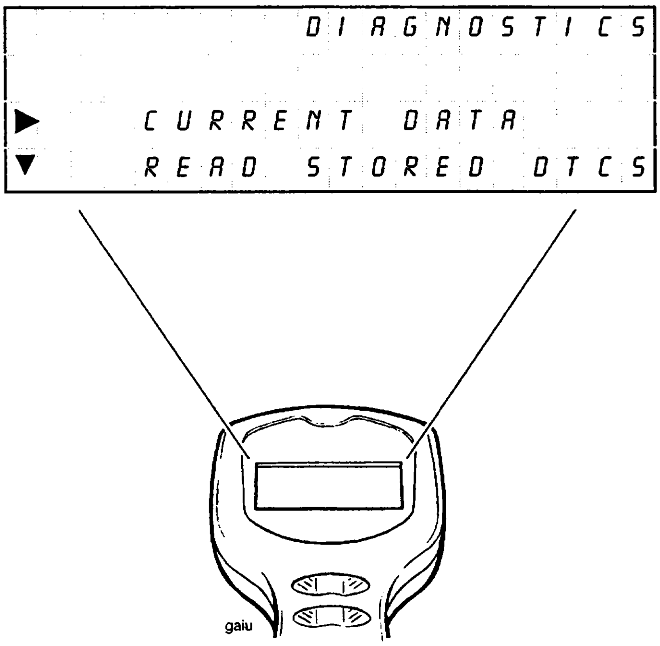
Use the 'Up and Down' keys to position the cursor opposite the desired choice, and press the Validation key '✳'.

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)*



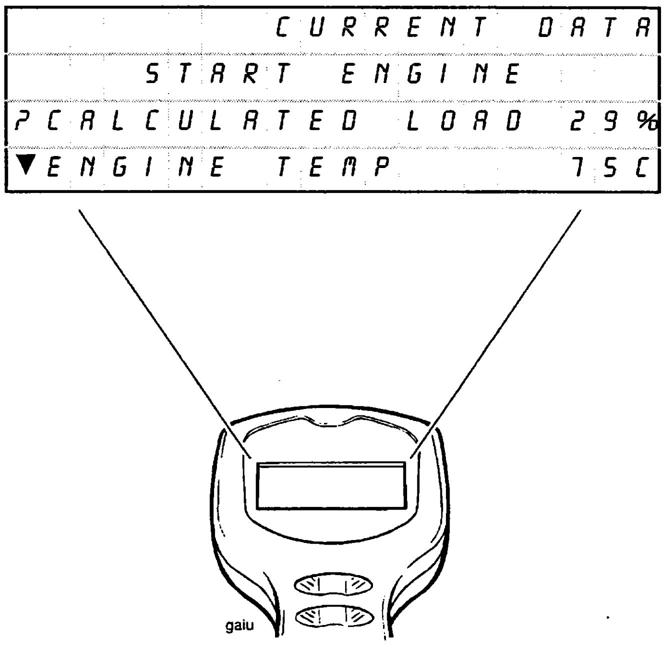
This display is the **'DIAGNOSTICS'** menu.

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'**.

10. CURRENT DATA



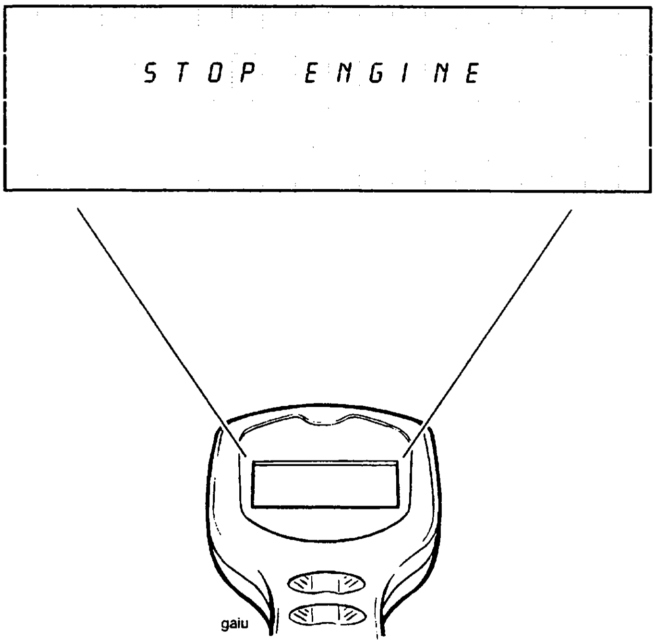
Start the engine. **'CURRENT DATA'** includes the information shown in the table below which can be accessed by scrolling, using the 'Up' and 'Down' keys. At the end of each line of text, the actual reading at that instant is provided to assist diagnosis e.g. **ENGINE TEMP 95C.**

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.

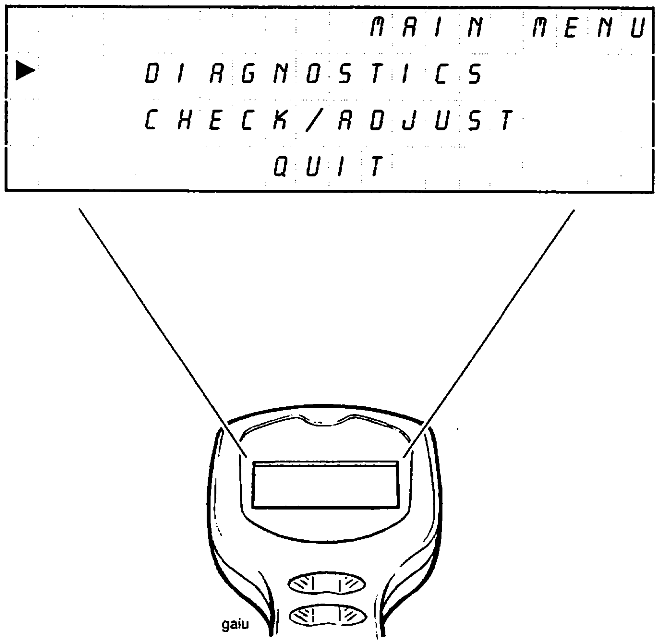
11. STOP ENGINE



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:–



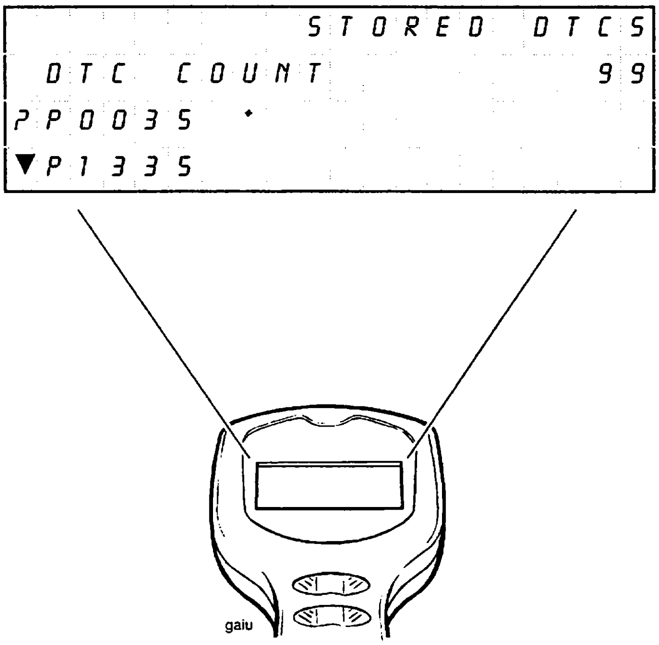
Use the 'Up' and 'Down' keys to position the cursor opposite **DIAGNOSTICS**.

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

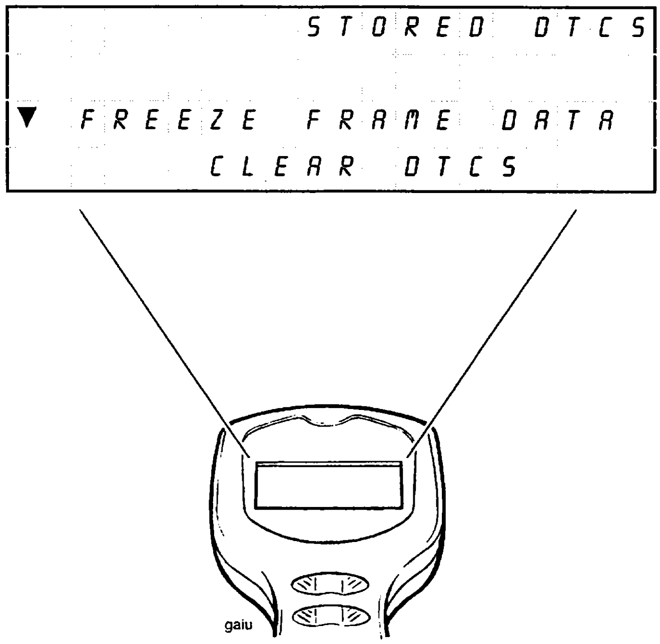
Help text CRANKSHAFT SENSOR
CIRCUIT MALFUNCTION

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:–

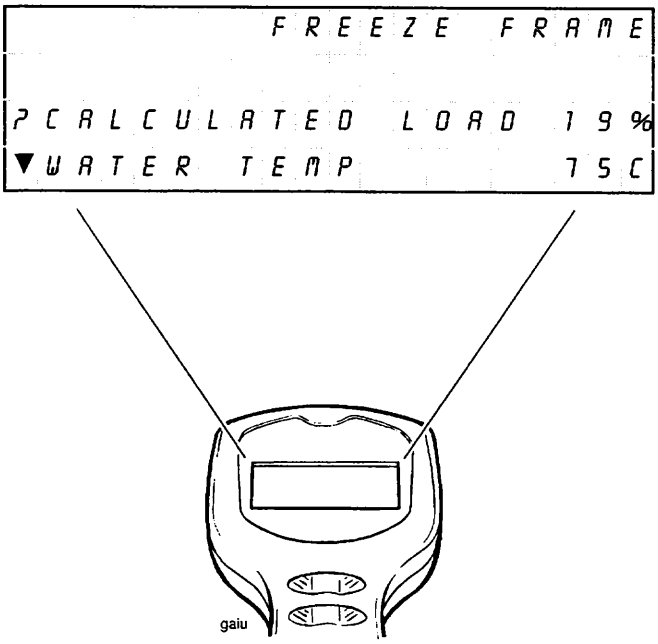


Align **'FREEZE FRAME DATA'** with the cursor, and press the validation key '✱' to display **'FREEZE FRAME'** (see 15).

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

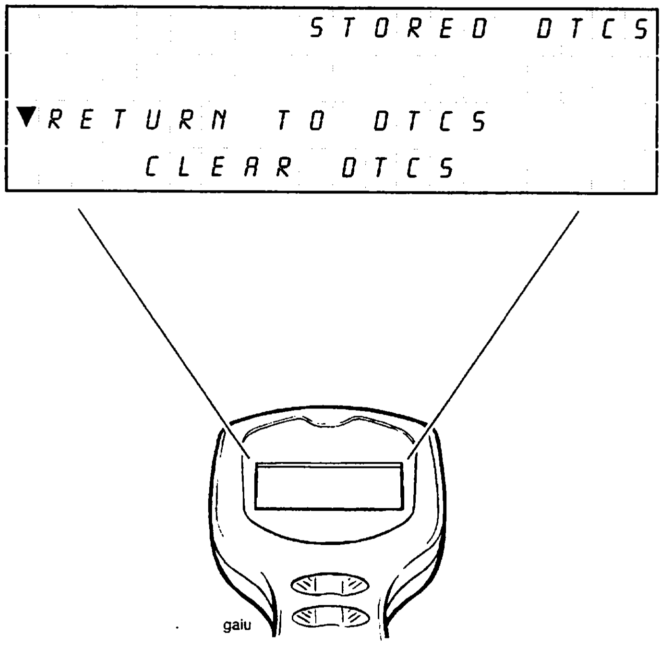


When a fault occurs which causes a DTC to be stored in the memory, the engine condition data at that instant is logged in the ECM. If another, more serious DTC is subsequently set, the original DTC data is automatically erased and new data associated with the latest DTC is logged in its place.

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:

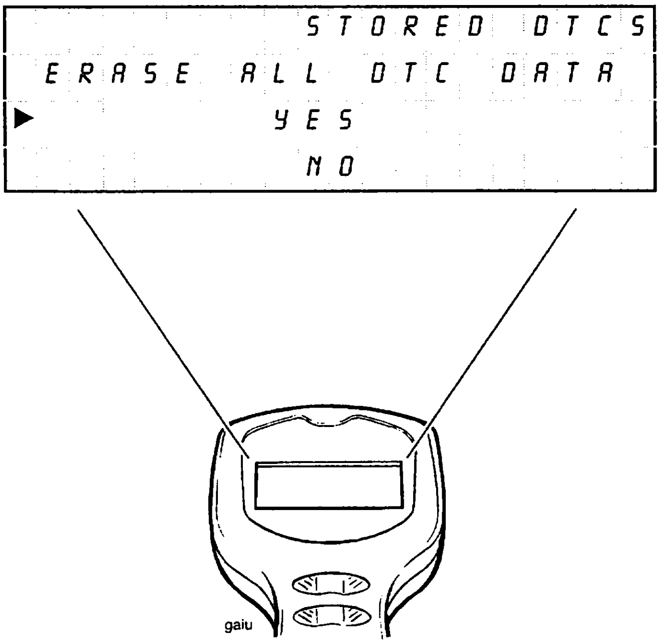
Scroll to **'RETURN TO DTCS'** and press the Validate key '✳' to return to operation 13.

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.**

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.

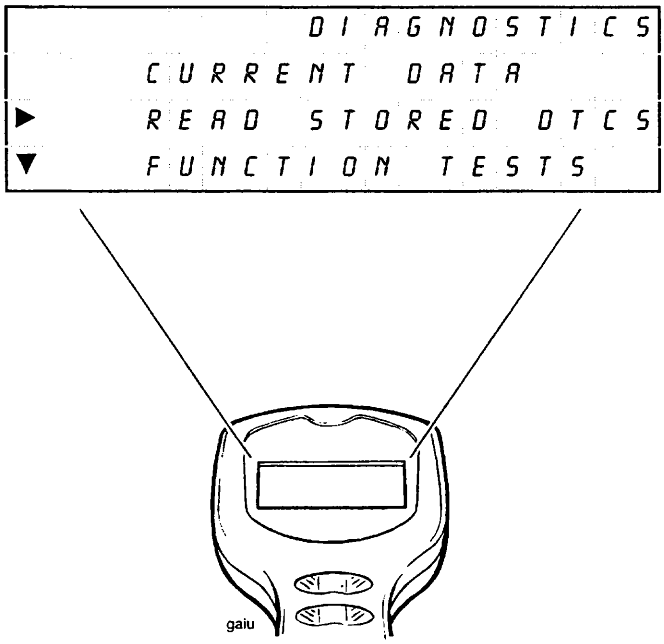
NOTE:

- **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 '✱'.

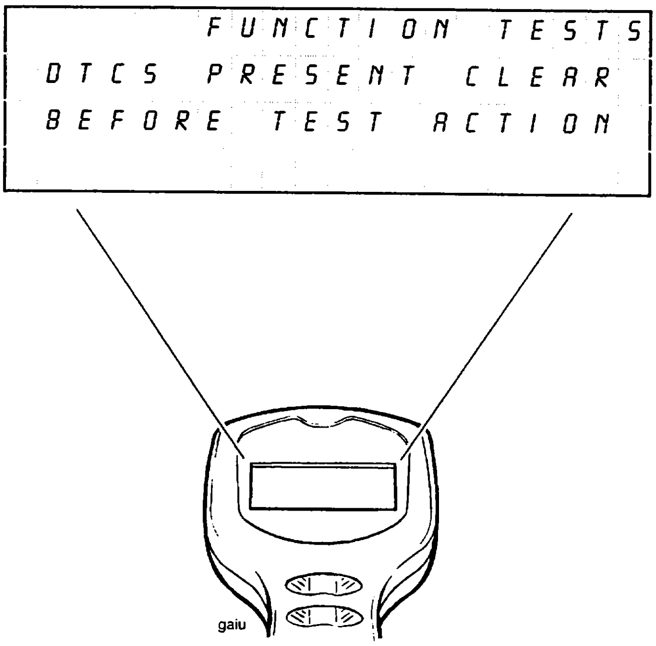
If no DTC'S are stored, **'FUNCTION TEST'** will be displayed (see operation 20).

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.

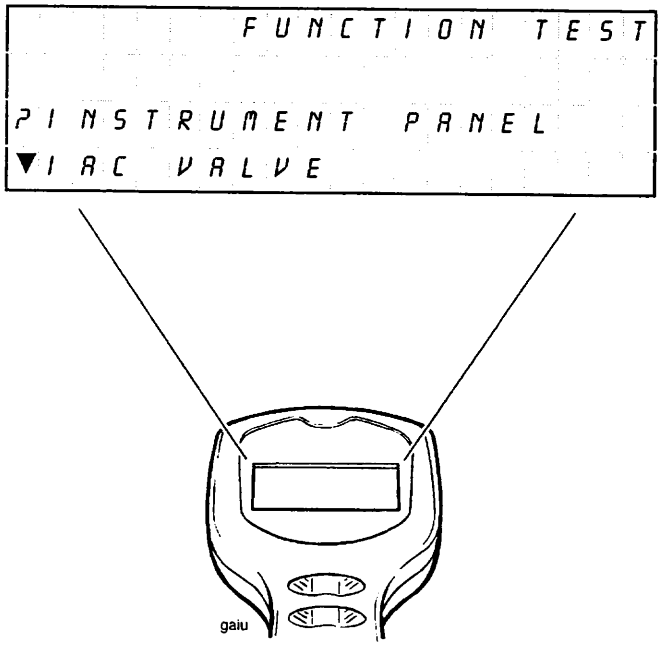
NOTE:

- **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.

<u>Instrument Panel test</u>: 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).

<u>Idle air control valve (IACV) test:</u> 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 **'?'**.

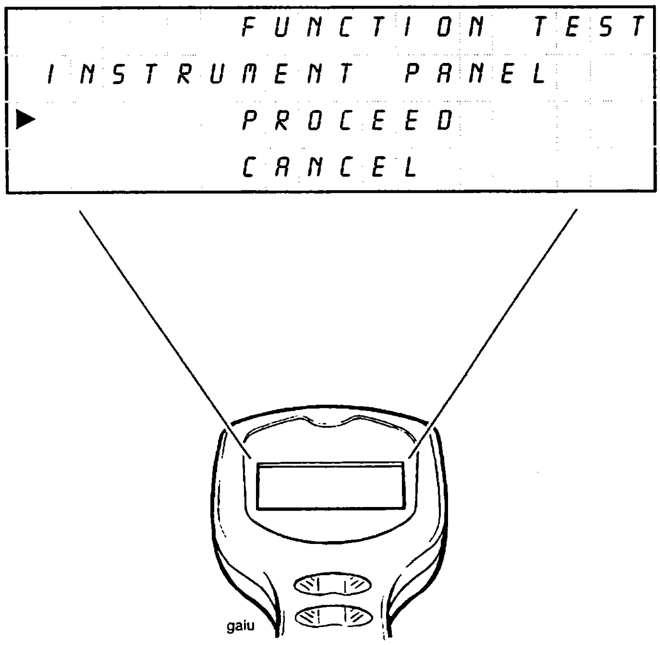
By pressing the Validation key '*', your selection will be noted and **'FUNCTION TEST'** (operation 21) will be displayed.

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.

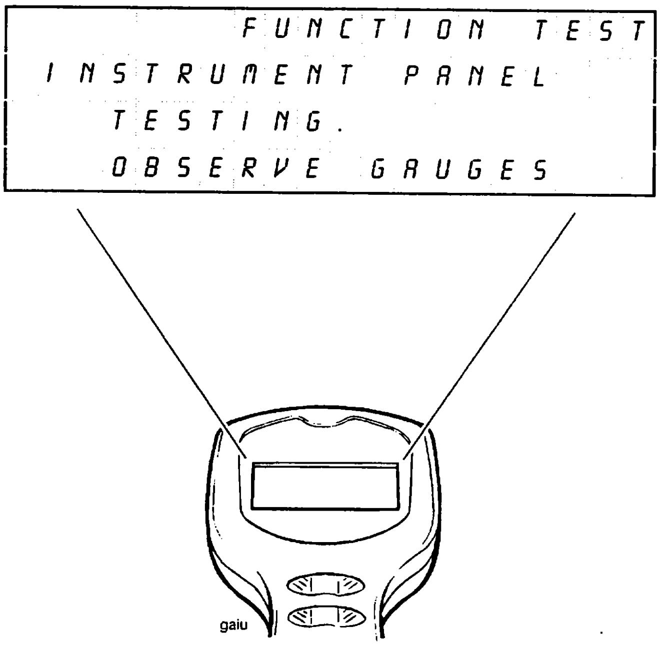
If you press the **Help** key (?). help relating to the specific test will be given. In this example, the screen will now read

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

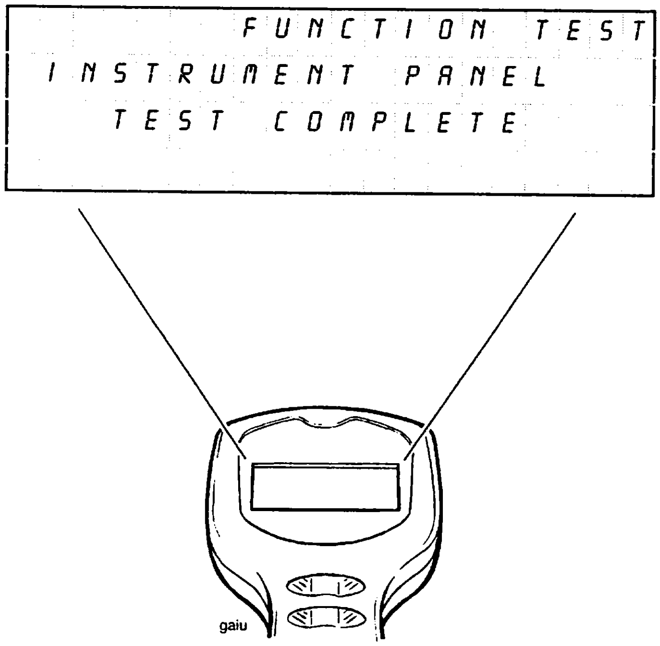


The screen now displayed will be specific to the component being tested:

In the example selected – **'INSTRUMENT PANEL'**, the instruction is to observe the gauges.

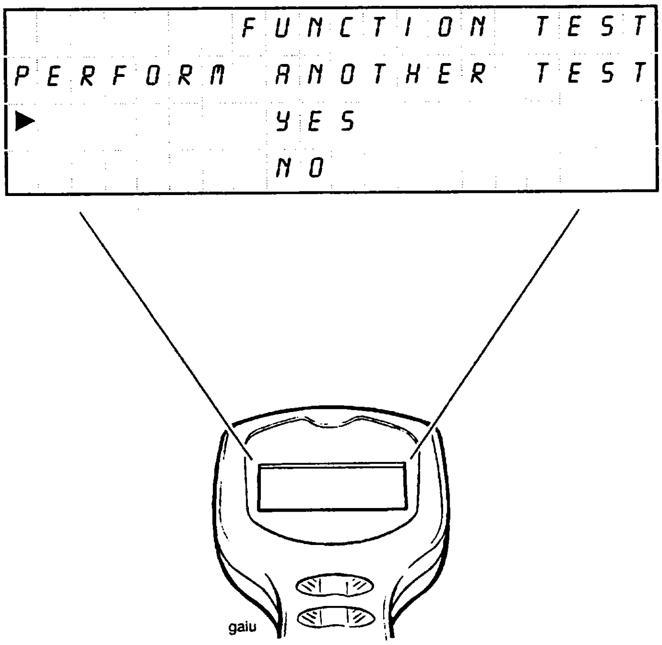
After a period of time, the screen will automatically change to either **'TEST COMPLETE'** (see operation 23) which will indicate a satisfactory completion, or to **'TEST FAILED'** (see operation 25) which will indicate failure.

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

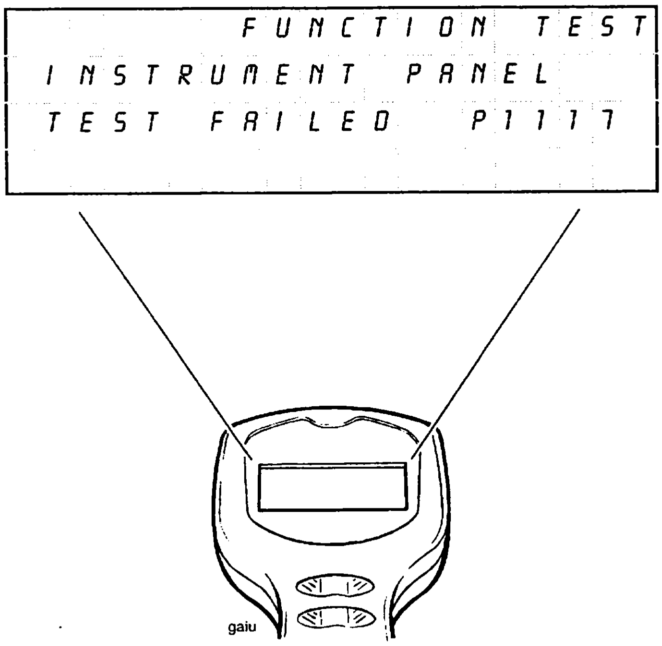


This display allows you to decide whether you wish to test another component.

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).

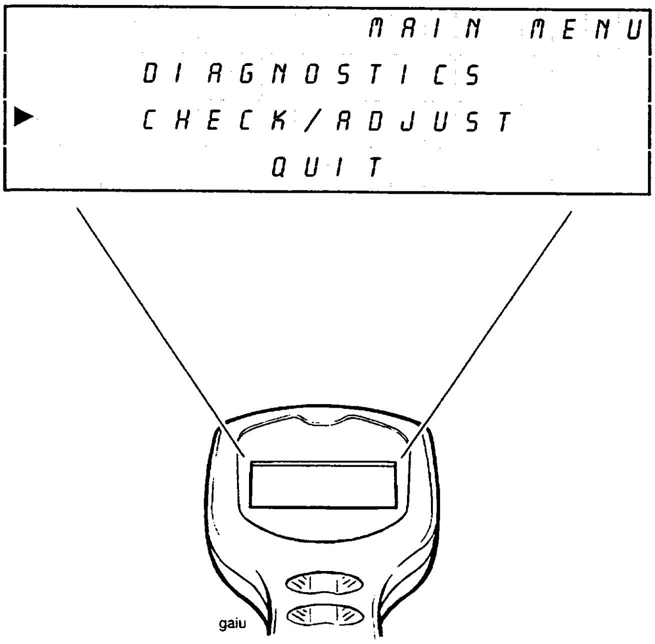
NOTE:

- **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.

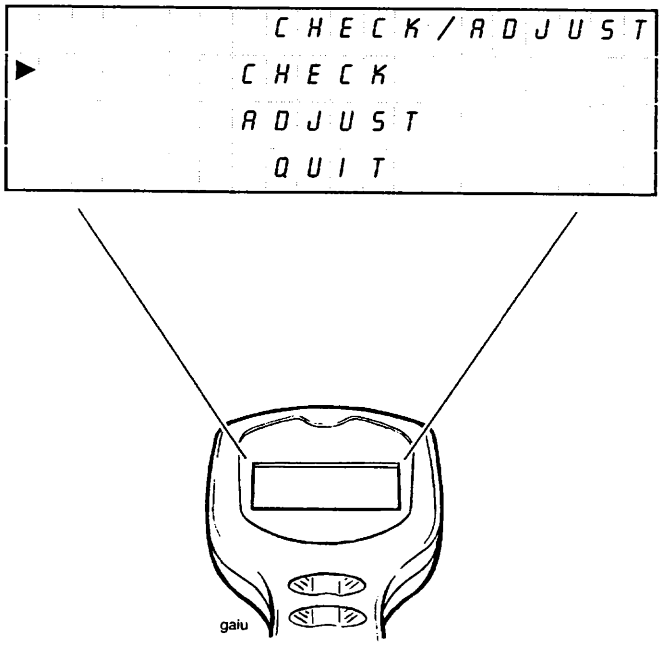
26. To select 'CHECKS/ADJUSTMENTS' from the MAIN MENU (operation 8):–



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.

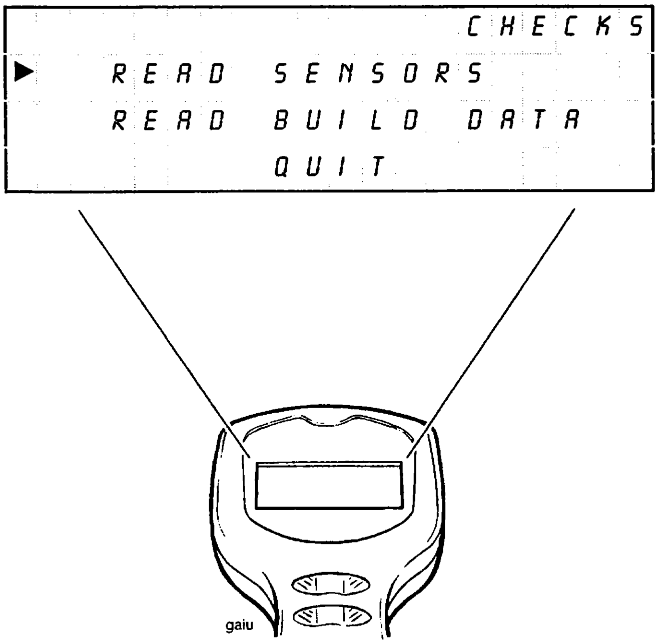
Use the 'Up' and 'Down' keys to position the cursor as follows, and then press the Validation key '✳':

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.

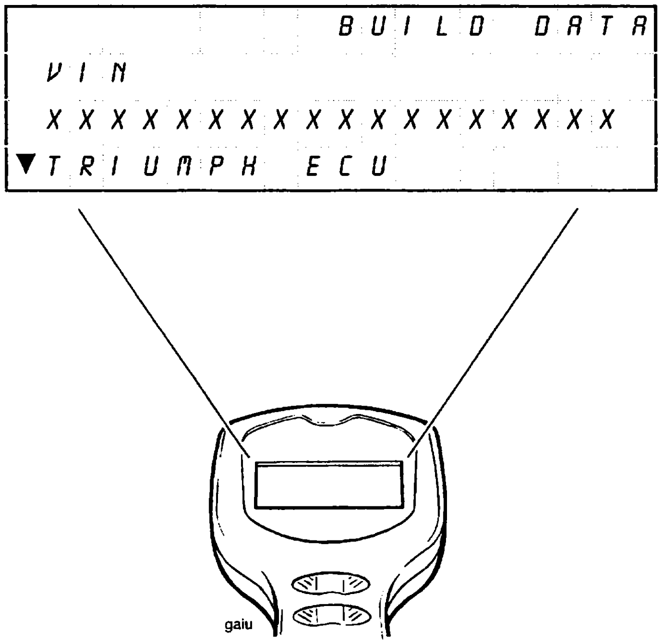
Position the cursor as follows and then press the Validation key '✳':

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

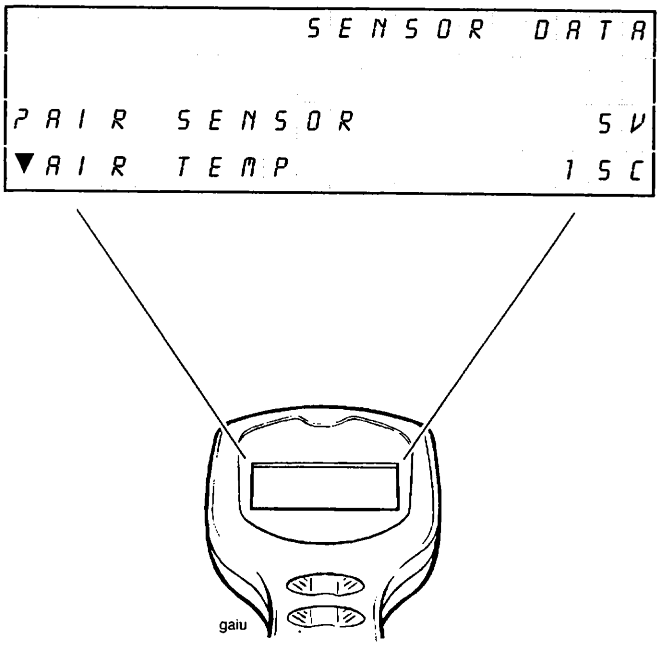


Providing the information was recorded at the time of build, the display will show the following information relating to the motorcycle under test by scrolling up and down: Before displaying the recorded information, the tool will briefly display the message, 'PLEASE WAIT, CHECKING BUILD DATA'.

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.

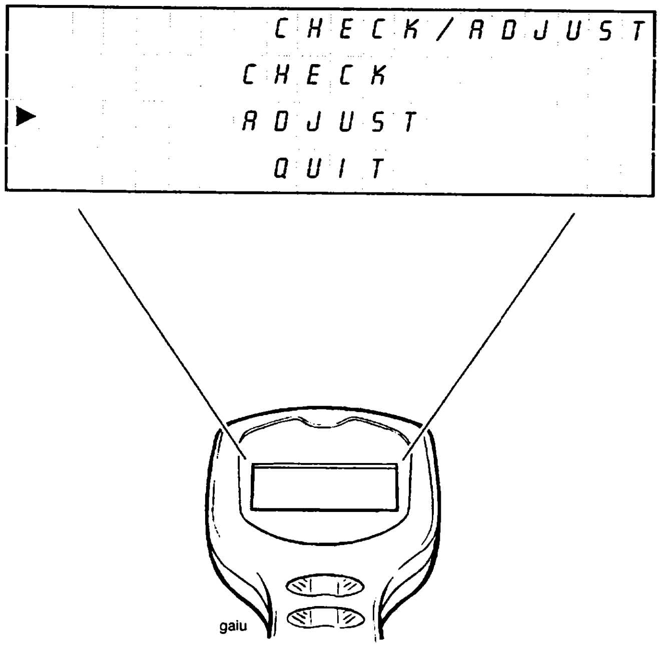
NOTE:

- **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.

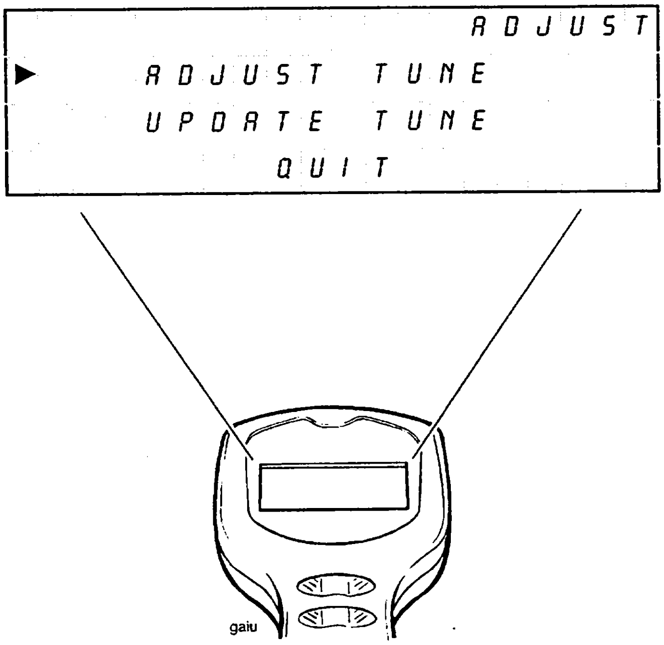


Use the 'Up' and 'Down' keys to position the cursor opposite **'ADJUST'**.

Press the Validation key '✳'; **'ADJUST'** will be displayed.

Start the engine.

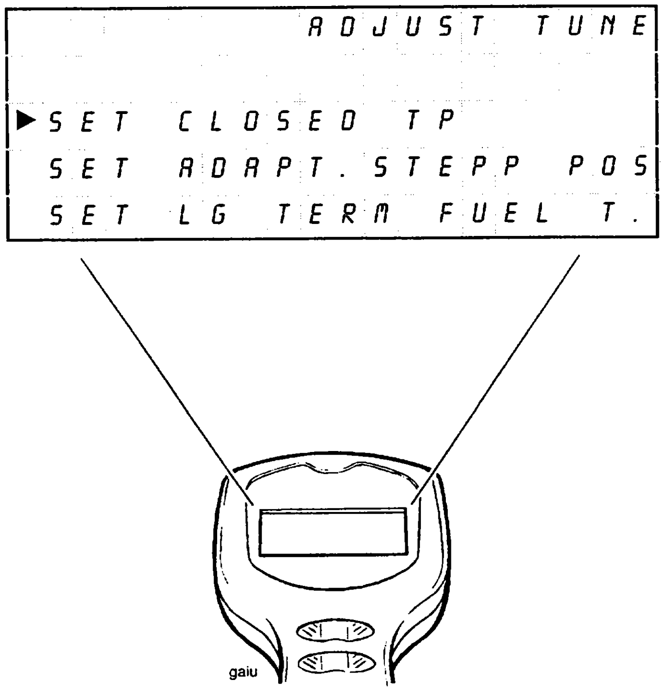
32. ADJUST



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

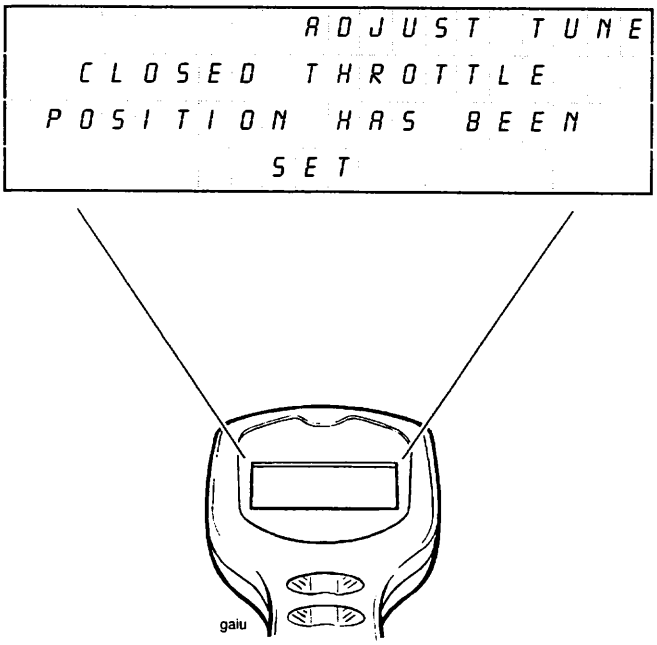
SET CLOSED TP (Closed throttle position)
– See operation 34

SET ADAPT STEPP POS (adaptive stepper position)
– See operation 35

SET LG TERM FUEL T (set long term fuel trim)
– See operation 36

Position the cursor opposite the setting you wish to adjust and press the Validation key '✳'.

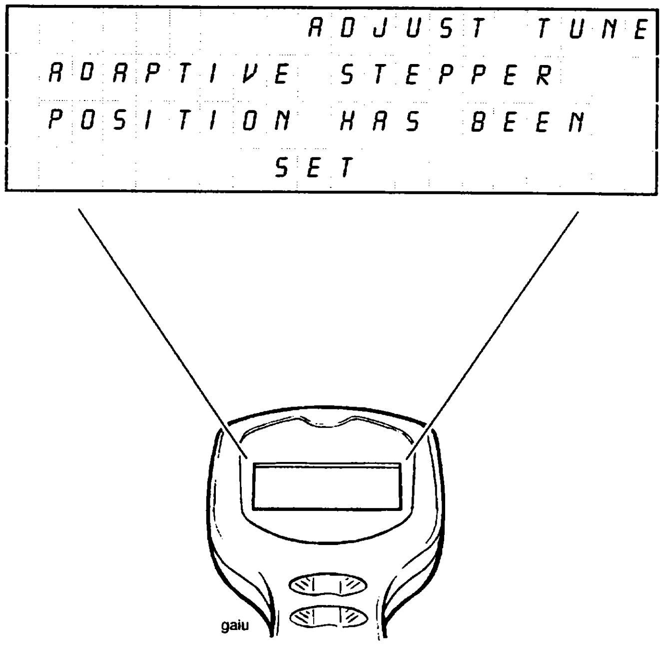
34. ADJUST TUNE (closed throttle position)



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.

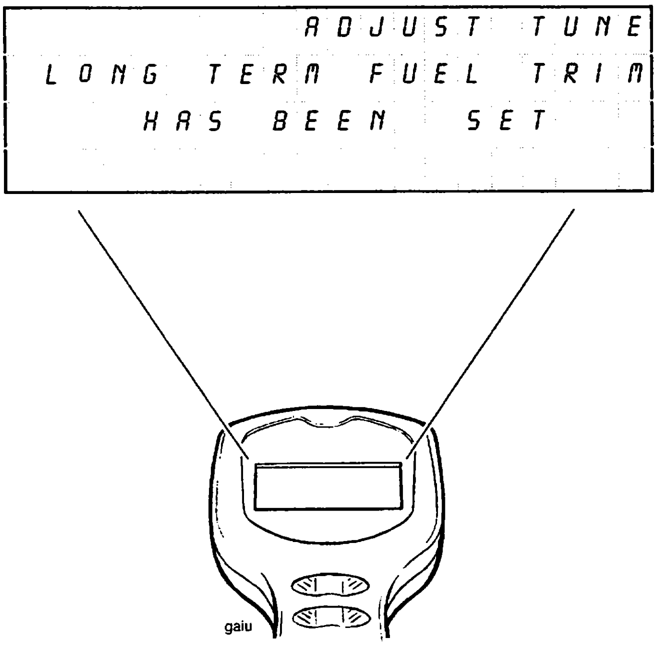
35. ADJUST TUNE (set adaptive stepper position)



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.

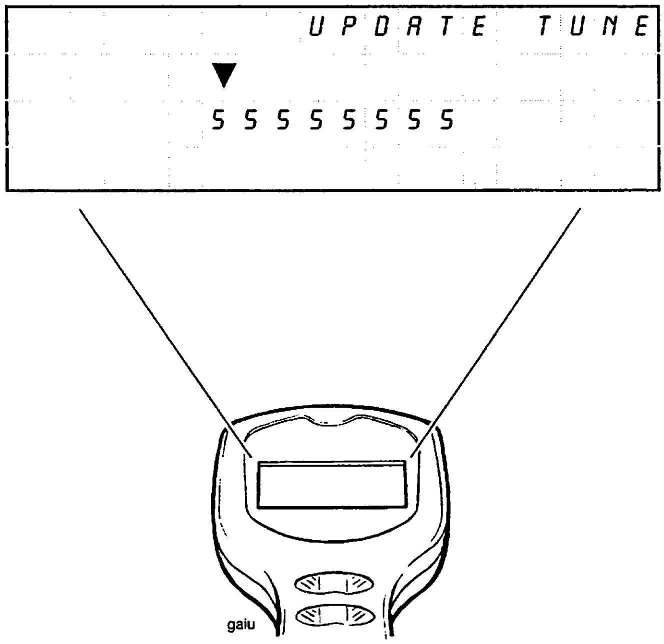
36. ADJUST TUNE (set long term fuel trim)



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.

37. 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.

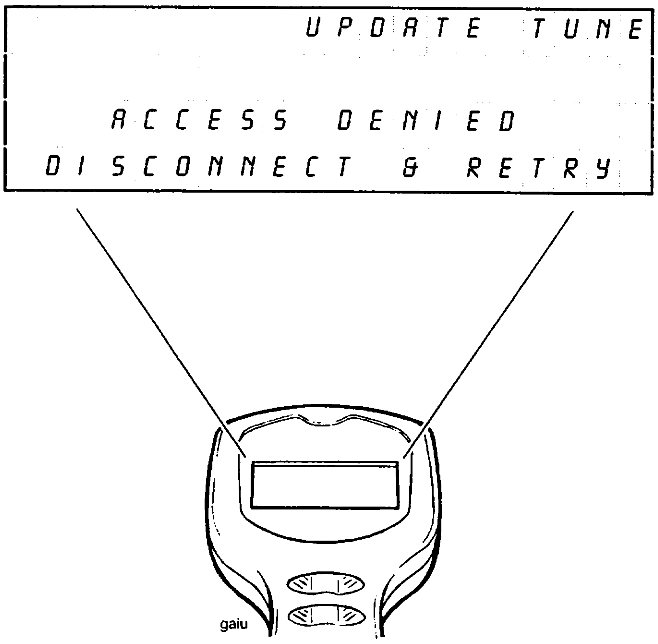
After entering the final digit, press the validation key '✻' again.

If the password number entered is invalid, the screen shown in operation 38 will be displayed.

If the password number is valid, the tool will briefly display the message, **'PLEASE WAIT, CHECKING ECM TYPE'.**

'UPDATE TUNE' (operation 39) will then be displayed.

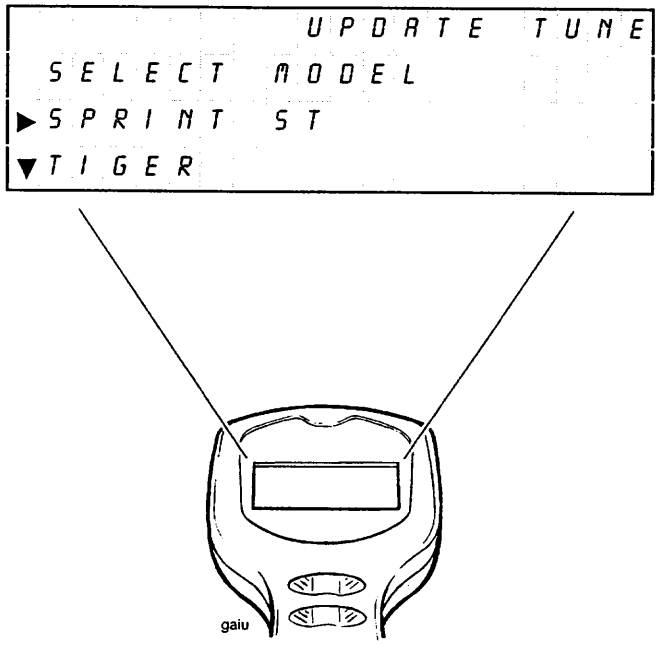
38. UPDATE TUNE



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.

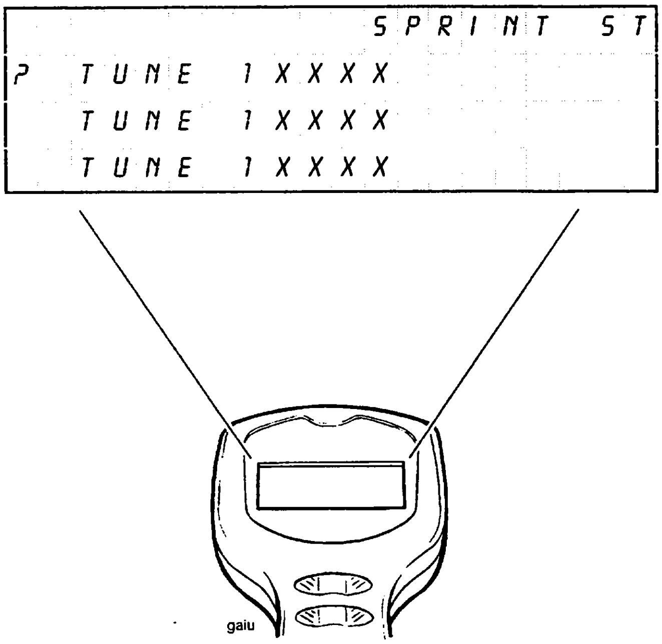
39. UPDATE TUNE



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 '✳'.

Once a model has been selected and the validation key pressed, screen 40 will be displayed.

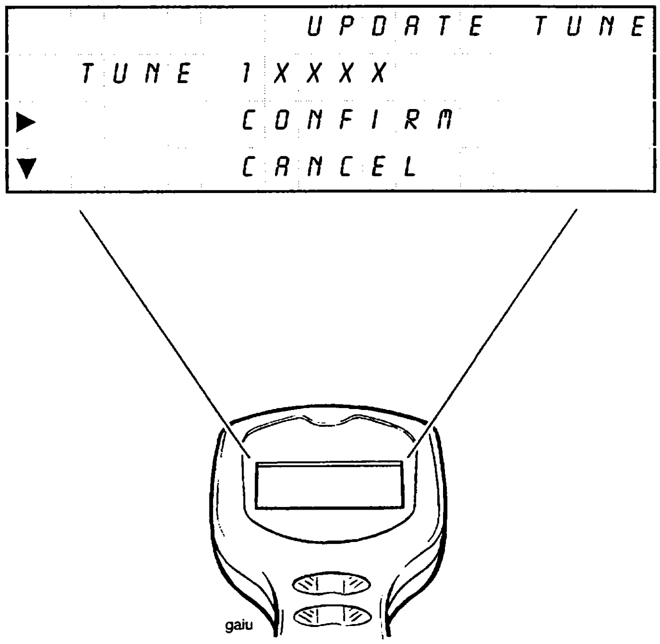
40. UPDATE TUNE



Scroll to the tune required and press the Validation key '✳' to move on to operation 41.

Press the help key for information on the applicability of each tune number.

41. 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 '✳'.

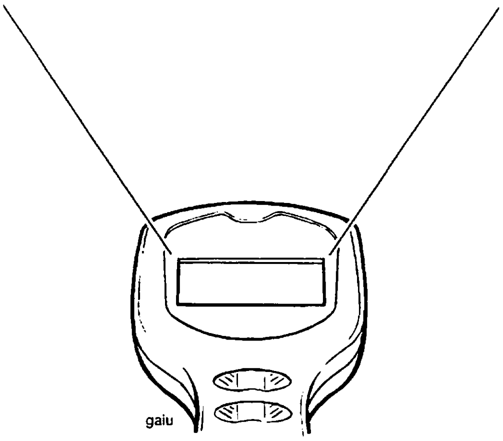
If **'QUIT'** has been selected – this will return to **MAIN MENU** (operation 8)

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 17.0
        2003
```

From this screen, use the following button press sequence:

HELP (?) - HELP (?) - RETURN (↲) - HELP (?) VALIDATE (*).

The dealer number 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 ECM 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.

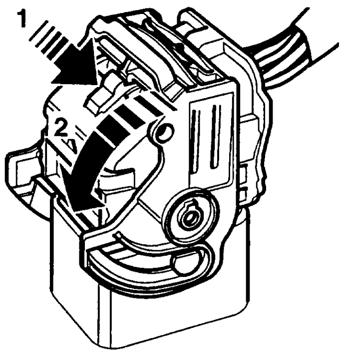
WHEN CONNECTING A CONNECTOR

- 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.

ENGINE CONTROL MODULE

Removal of ECM connectors

1. Press the locking tab in and rotate the clamping ring until a definite click is felt.



1. Locking tab

2. Clamping ring

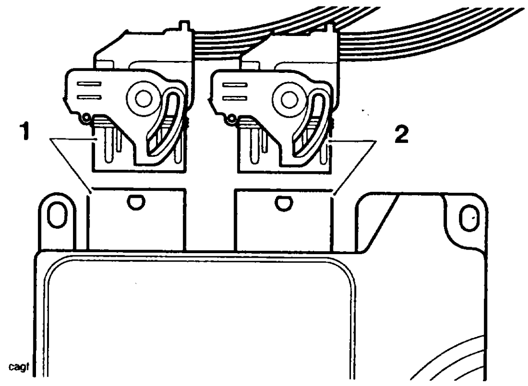
2. Remove the connector from the ECM socket.

Refitting of ECM connectors.

NOTE:

- **The connectors are both colour coded and individually shaped. The grey connector fits into the grey ECM socket and the black connector fits into the black ECM socket.**

CAUTION: Damage to the connector pins may result if an attempt to fit the connectors incorrectly is made.



1. Grey socket and connector

2. Black socket and connector

1. Fit the connector into its socket and, whilst holding the connector in place, rotate the clamping ring, locking it into place behind the locking tab.

2. Check that both connectors are correctly fitted and their clamping rings are fully rotated and locked.

ECM Connector Pin Numbering

The diagram below shows the pin sequence of the ECM main connectors. These pin numbers correspond directly with the pin numbers given in the diagnostic routines and schematic wiring diagrams used throughout this manual.

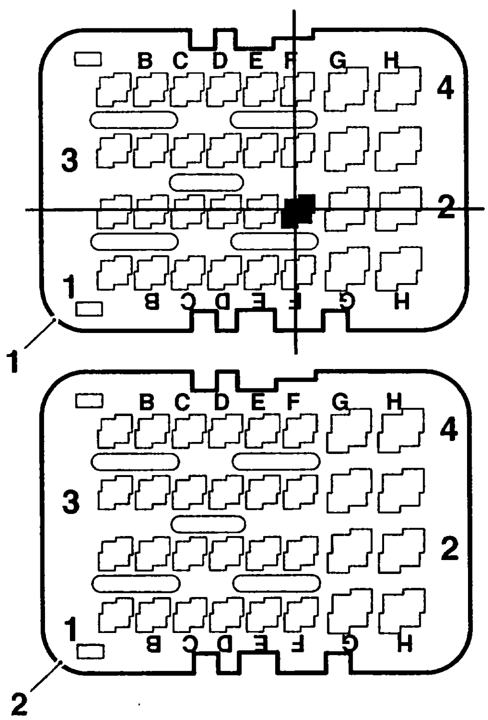
Each connector has 32 pins, arranged in four rows, marked 1, 2, 3 and 4 and eight columns as shown below. The first of these columns is column A and the eighth column is column H.

NOTE:

- **It is important to note that the first column is not marked with a letter A due to space constraints on the face of the connector.**

The diagram below shows the pin numbering as it appears on the connector.

Each ECM connector pin location is described throughout this manual by identifying the connector, 1 (black) or 2 (grey), followed by the row number, and then the column number in which it is situated. In the example below, pin 1/F2 is shown by the intersecting lines.



ECM Connector Pin Numbers

1. Black connector, 1/

2. Grey connector, 2/

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.

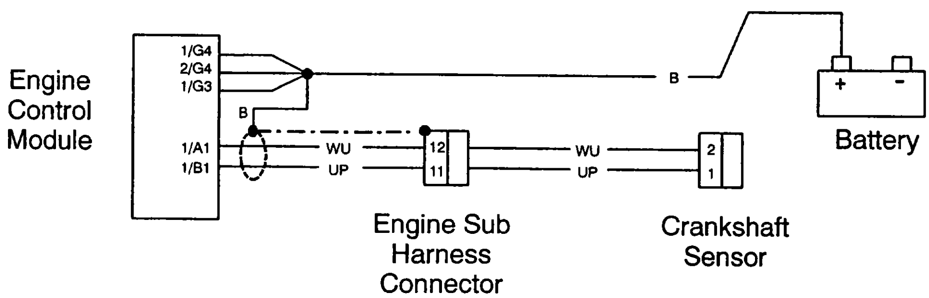
CRANKSHAFT SENSOR - MC 1000 ECM

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. Check for damaged teeth. Check for contamination by magnetic debris. Disconnect ECM and proceed to pinpoint test 1
P1335	Crank toothed wheel / screen cable fault	proceed to pinpoint test 6

Pinpoint Tests

	Test	Result	Action
1	Check terminal and cable integrity: - ECM pin 1/A1 - ECM pin 1/B1	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check cable for short circuit: - ECM pin 1/A1 to earth - ECM pin 1/B1 to earth	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 7
3	Check cable continuity: - ECM pin 1/B1 to engine subharness pin 11 - ECM pin 1/A1 to engine subharness pin 12	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - Engine subharness pin 11 to sensor pin 1 - Engine subharness pin 12 to sensor pin 2	OK	Proceed to test 5
		Open circuit	Renew engine sub harness and proceed to test 7
5	Check cable for short circuit: - ECM pin 1/A1 to ECM pin 1/B1	OK	Renew crankshaft sensor, proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check cable continuity: - Sensor screen cable to earth	OK	Proceed to test 7
		Open circuit	Locate and rectify wiring fault, proceed to test 7
7	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test.
		Fault still present	Contact Triumph service.

Circuit Diagram



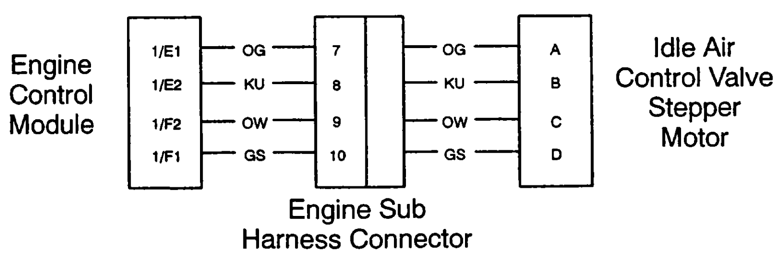
IDLE AIR CONTROL - MC 1000 ECM

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: - ECM pin 1/E1 - ECM pin 1/E2 - ECM pin 1/F1 - ECM pin 1/F2	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin 1/E1 to ECM pin 1/F1 - ECM pin 1/E2 to ECM pin 1/F2	47 to 59Ω	Disconnect stepper motor and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect stepper motor and proceed to test 6
3 Check cable for short circuit: - ECM pin 1/E1 to earth - ECM pin 1/E2 to earth - ECM pin 1/F1 to earth - ECM pin 1/F2 to earth	OK	Proceed to test 8
	Short circuit	Locate and rectify wiring fault, proceed to test 8
4 Check cable continuity: - ECM pin 1/E1 to engine subharness pin 7 - ECM pin 1/E2 to engine subharness pin 8 - ECM pin 1/F2 to engine subharness pin 9 - ECM pin 1/F1 to engine subharness pin 10	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring fault, proceed to test 8
5 Check cable continuity: - Engine subharness pin 7 to stepper motor pin A - Engine subharness pin 8 to stepper motor pin B - Engine subharness pin 9 to stepper motor pin C - Engine subharness pin 10 to stepper motor pin D	OK	Proceed to test 7
	Open circuit	Renew engine sub harness and proceed to test 8
6 Check cable for short circuit: - ECM pin 1/E1 to ECM pin 1/F1 - ECM pin 1/E2 to ECM pin 1/F2	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 8
7 Check stepper motor resistance: - Motor pin A to motor pin D - Motor pin B to motor pin C	47 to 59 Ω	Proceed to test 8
	Faulty	Renew stepper motor, proceed to test 8
8 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



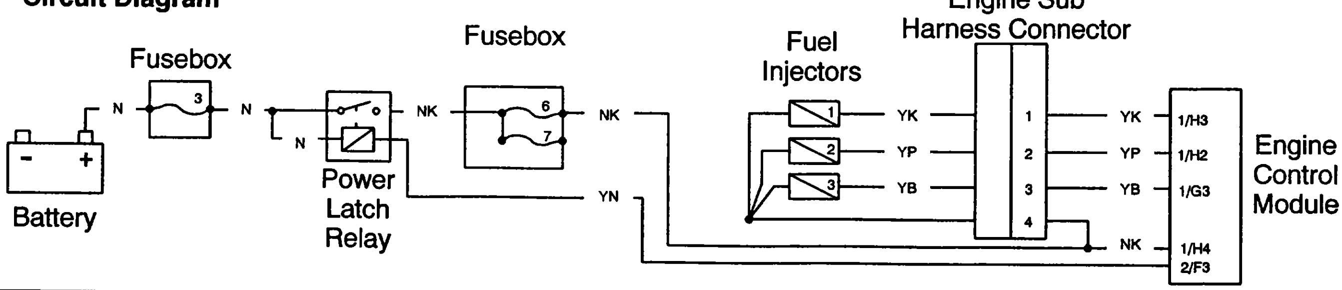
FUEL INJECTORS - MC 1000 ECM

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: - ECM pin 1/G3 - ECM pin 1/H3 - ECM pin 1/H2	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin 1/H4 to ECM pin 1/H3 (injector 1) - ECM pin 1/H4 to ECM pin 1/H2 (injector 2) - ECM pin 1/H4 to ECM pin 1/G3 (injector 3)	15.5 to 16.3Ω	Disconnect relevant injector and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect relevant injector and proceed to test 6
3 Check cable for short circuit: - ECM pin 1/H3 to earth - ECM pin 1/H2 to earth - ECM pin 1/G3 to earth	OK	Proceed to test 8
	Short circuit	Locate and rectify wiring fault, proceed to test 8
4 Check cable continuity: - ECM pin 1/H4 to engine subharness pin 4 - ECM pin 1/H3 to engine subharness pin 1 - ECM pin 1/H2 to engine subharness pin 2 - ECM pin 1/G3 to engine subharness pin 3	OK	Proceed to test 7
	Open circuit	Locate and rectify wiring fault, proceed to test 8
5 Check cable continuity: - Engine subharness pin 4 to relevant injector pin 2 - Engine subharness pin 1 to injector 1 pin 1 - Engine subharness pin 2 to injector 2 pin 1 - Engine subharness pin 3 to injector 3 pin 1	OK	Proceed to test 7
	Open circuit	Renew engine subharness and proceed to test 8
6 Check cable for short circuit: - ECM pin 1/H4 to ECM pin 1/H3 (injector 1) - ECM pin 1/H4 to ECM pin 1/H2 (injector 2) - ECM pin 1/H4 to ECM pin 1/G3 (injector 3)	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 8
7 Check relevant injector resistance: - Injector pin 1 to injector pin 2	15.5 to 16.3Ω	Proceed to test 8
	Faulty	Renew relevant injector, proceed to test 8
8 Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test.
	Fault still present	Contact Triumph service.

Circuit Diagram



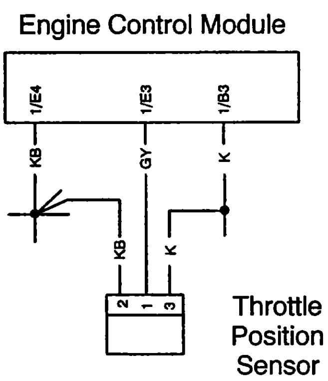
THROTTLE POSITION SENSOR - MC 1000 ECM

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 1/B3 - ECM pin 1/E3 - ECM pin 1/E4	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin 1/E3 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/E4 to sensor pin 1 - ECM pin 1/E3 to sensor pin 2 - ECM pin 1/B3 to sensor pin 3	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin 1/E3 to ECM pin 1/B3 - ECM pin 1/E3 to ECM pin 1/E4	OK	Renew throttle position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



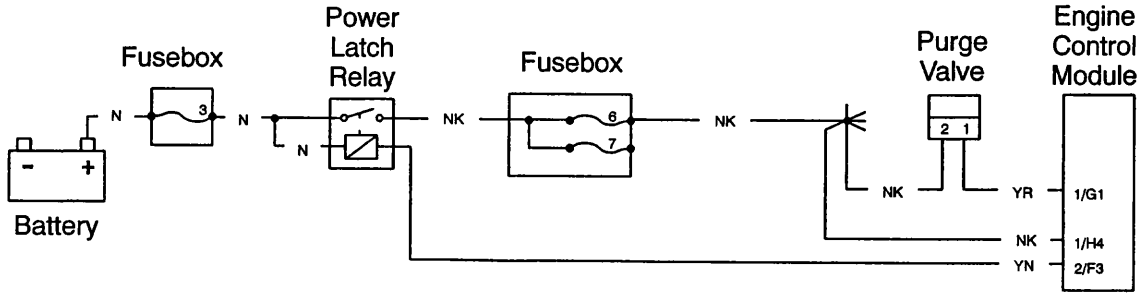
PURGE VALVE - MC 1000 ECM

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 1/G1	Faulty	Rectify fault, proceed to test 7
2 Check resistance value:	26Ω	Disconnect purge valve and proceed to test 3
- ECM pin 1/H4 to ECM pin 1/G1	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 1/G1 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/G1 to valve pin 1 - ECM pin 1/H4 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/H4 to ECM pin 1/G1	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



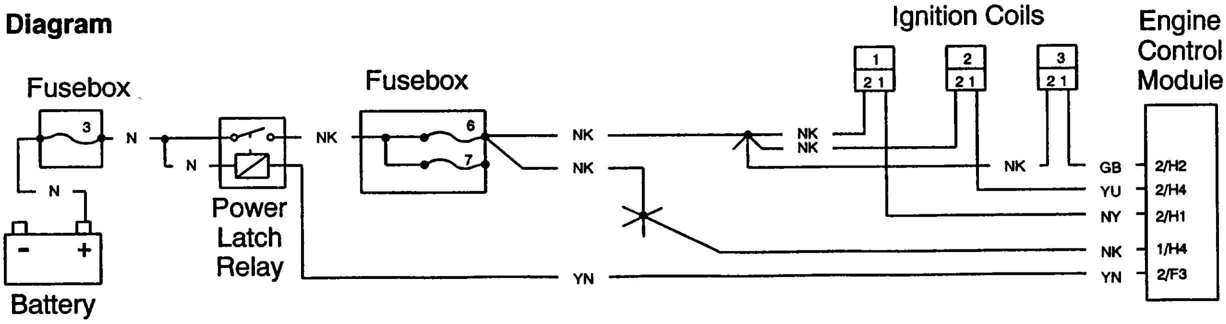
IGNITION COILS - MC 1000 ECM

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:	OK	Proceed to test 2
- ECM pin 2/H1 - ECM pin 2/H2 - ECM pin 2/H4	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: ECM pin 1/H4 to:-	0.8Ω	Disconnect relevant ign coil and proceed to test 3
- ECM pin 2/H1 (ign coil 1) - ECM pin 2/H4 (ign coil 2) - ECM pin 2/H2 (ign coil 3)	Open circuit	Proceed to test 4
	Short circuit	Disconnect relevant ign coil and proceed to test 5
3 Check cable for short circuit:	OK	Proceed to test 7
- ECM pin 2/H1 to earth - ECM pin 2/H2 to earth - ECM pin 2/H4 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity:	OK	Proceed to test 6
Power latch relay pin 8 to any ign coil pin 2 - ECM pin 2/H1 to ign coil 1 pin 1 - ECM pin 2/H4 to ign coil 2 pin 1 - ECM pin 2/H2 to ign coil 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
Power latch relay pin 8 to - ECM pin 2/H1 (ign coil 1) - ECM pin 2/H4 (ign coil 2) - ECM pin 2/H2 (ign coil 3)	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant ign coil resistance:	0.8Ω	Proceed to test 7
- Ign coil pin 1 to ign coil pin 2	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 - MC 1000 ECM

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:	OK	Proceed to test 2
- ECM pin 1/B2 - ECM pin 1/E4	Faulty	Rectify fault, proceed to test 7
2 Check resistance value:	OK	Disconnect temp sensor and proceed to test 6
- ECM pin 1/B2 to ECM pin 1/E4 (Temperature dependent,-see below)	Open circuit	Proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity:	OK	Proceed to test 5
- ECM pin 1/B2 to sensor pin 1 - ECM pin 1/E4 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 1/B2 to ECM pin 1/E4	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 below)	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit:	OK	Proceed to test 7
- ECM pin 1/B2 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

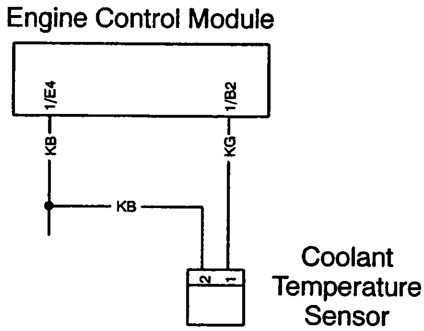
Resistance data under typical conditions:

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 - MC 1000 ECM

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

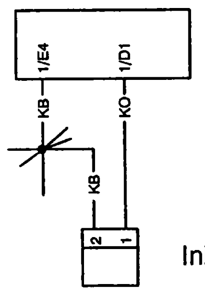
Test	Result	Action
1 Check cable and terminal integrity: - ECM pin 1/D1 - ECM pin 1/E4	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin 1/D1 to ECM pin 1/E4 (Temperature dependent-see below)	OK	Disconnect temp sensor and proceed to test 6
	Open circuit	Proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin 1/D1 to sensor pin 1 - ECM pin 1/E4 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 1/D1 to ECM pin 1/E4	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 below)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin 1/D1 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

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



Engine Control Module

Inlet Air Temperature Sensor

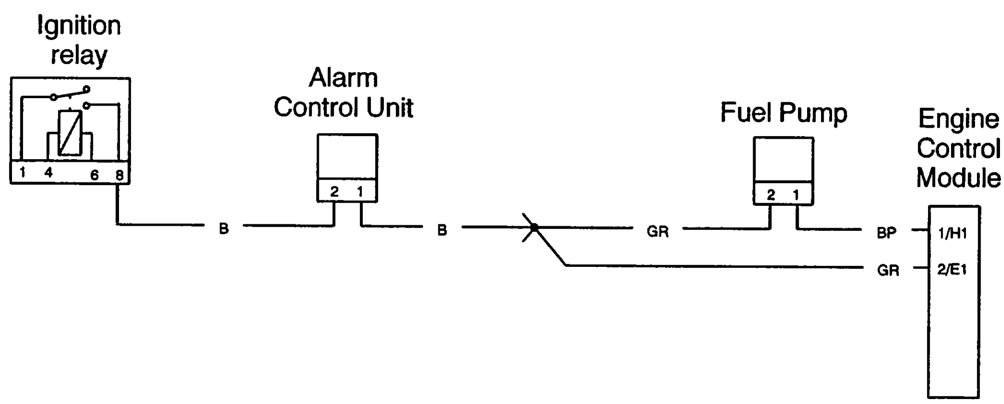
FUEL PUMP - MC 1000 ECM

Fault Code	Possible cause	Action
P0230	Fuel pump system fault	Check if pump runs briefly when ignition is switched on. Ensure fuel pump connector is secure. Disconnect ECM and proceed to pinpoint test 1:-
P1231	Open circuit, or short circuit to earth	
P1232	Short circuit to battery+	Disconnect fuel pump and proceed to pinpoint test 4

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin 1/H1	OK	Disconnect fuel pump and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin 1/H1 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/H1 to fuel pump pin 1 - Fuel pump pin 2 to alarm control unit pin1	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin 1/H1 to ECM pin 2/E1	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run diagnostic tool function test to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



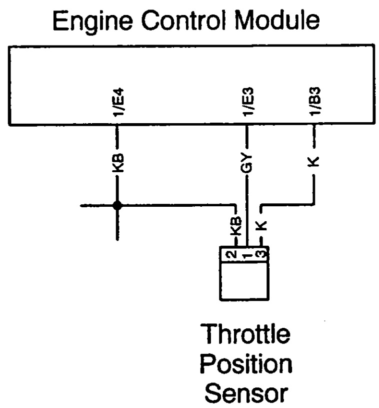
SENSOR SUPPLY VOLTAGE - MC 1000 ECM

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	OK	Disconnect throttle position sensor and air pressure sensor, proceed to test 2
- ECM pin 1/E4 - ECM pin 1/B3	Faulty	Rectify fault, proceed to test 4
2 Check for short circuit:	OK	Reconnect ECM, proceed to test 3
- ECM pin 1/B3 to ECM pin 1/E4	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 With ignition 'on', check voltage at:	4.5 to 5.5v	Proceed to test 4
- ECM pin 1/B3	Faulty	Check for wiring fault between ECM and sensors. If wiring is okay, 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



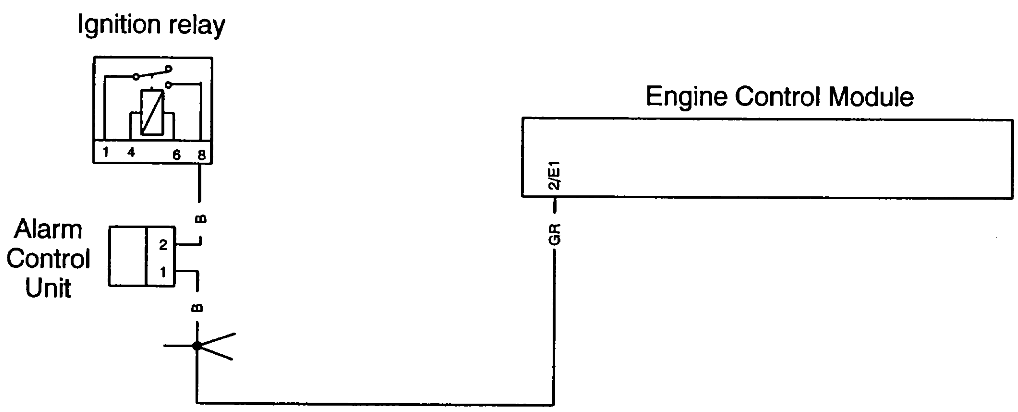
SYSTEM VOLTAGE - MC 1000 ECM

Fault Code	Possible cause	Action
P0560	Bike voltage system fault	View & note diagnostic tool 'sensor' data. Ensure voltage across battery is acceptable, note voltage.
P0562	Wiring / alternator / battery fault - low voltage	Disconnect ECM and proceed to pinpoint test 1
P0563	Alternator fault - high voltage	Ensure alternator output voltage is acceptable, note voltage.

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Proceed to test 2
- ECM pin 2/E1	Faulty	Rectify fault, proceed to test 3
2 With Ignition 'on', check voltage at:	Same as 'across battery' voltage	Proceed to test 3
- ECM pin 2/E1	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



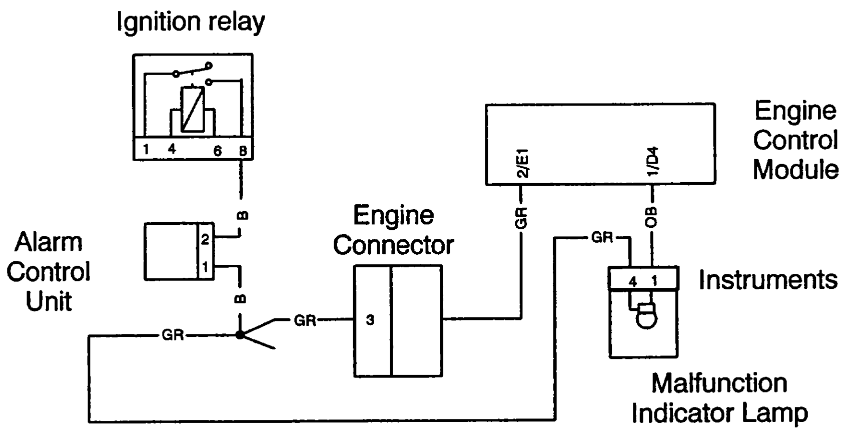
MALFUNCTION INDICATION LAMP - MC 1000 ECM

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 1/D4	OK	Disconnect warning lamp and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin 1/D4 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Instrument pin 1 to ECM 1/D4 - Instrument pin 4 to alarm pin 1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check for short circuit: - ECM pin 1/D4 to ECM pin 2/E1 - Instruments pin 4 to instruments pin 1	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



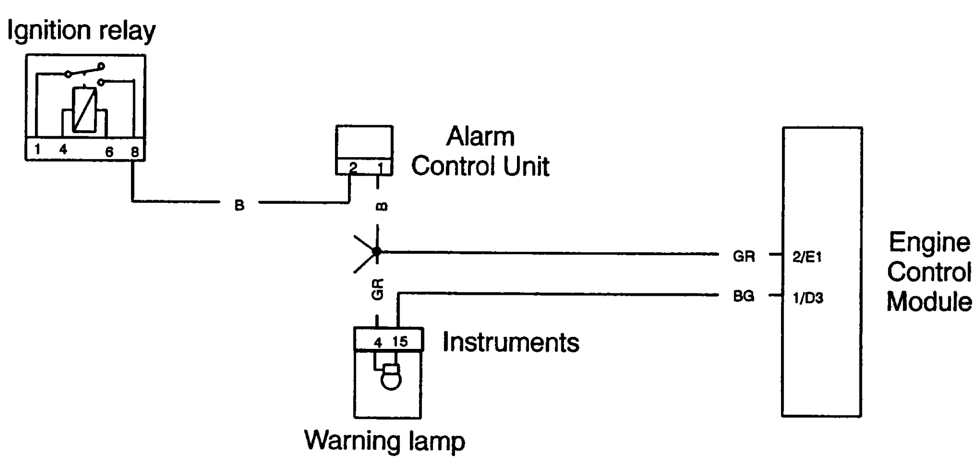
LOW FUEL LEVEL WARNING LAMP - MC 1000 ECM

Fault Code	Possible cause	Action
P1610	Low fuel warning lamp - system fault	Ensure warning lamp connector is secure and bulb is operational - renew if faulty. Disconnect ECM and proceed to pinpoint test 1:-
P1611	Open circuit, or short circuit to earth	
P1612	Short circuit to battery+	Disconnect instrument connector, remove bulb and proceed to test 4

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity:	OK	Disconnect instrument connector and proceed to test 2
	- ECM pin 1/D3	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit:	OK	Remove bulb and proceed to test 3
	- ECM pin 1/D3 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity:	OK	Proceed to test 4
	- Instrument pin 15 to ECM pin 1/D3 - Instrument pin 4 to alarm pin 1	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check for short circuit:	OK	Proceed to test 5
	- ECM pin 1/D3 to ECM pin 2/E1 - Instrument plug pin 4 to instrument plug pin 15	Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, refit bulb, clear fault code and switch ignition 'on' to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



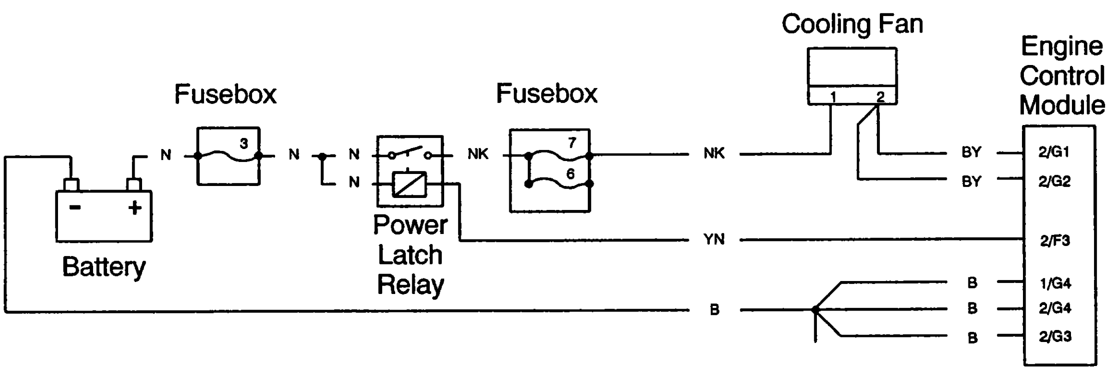
COOLING FAN - MC 1000 ECM

Fault Code	Possible cause	Action
P1551	Cooling fan system fault	View & note diagnostic tool 'sensor' data. Ensure fan connector is secure. Disconnect ECM and proceed to pinpoint test1:-
P1552	Open circuit, or short circuit to earth	
P1553	Short circuit to battery+	Disconnect fan and proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity:	OK	Disconnect fan and proceed to test 2
- ECM pin 2/G1 & 2/G2	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit:	OK	Proceed to test 3
- ECM pin 2/G1 to earth - ECM pin 2/G2 to earth	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity:	OK	Proceed to test 4
- Fan pin 2 to ECM pin 2/G1 & 2/G2 - Fan pin 1 to power latch relay pin 8	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit:	OK	Proceed to test 5
- ECM pin 2/G1 & 2/G2 to ECM pin 1/H4	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



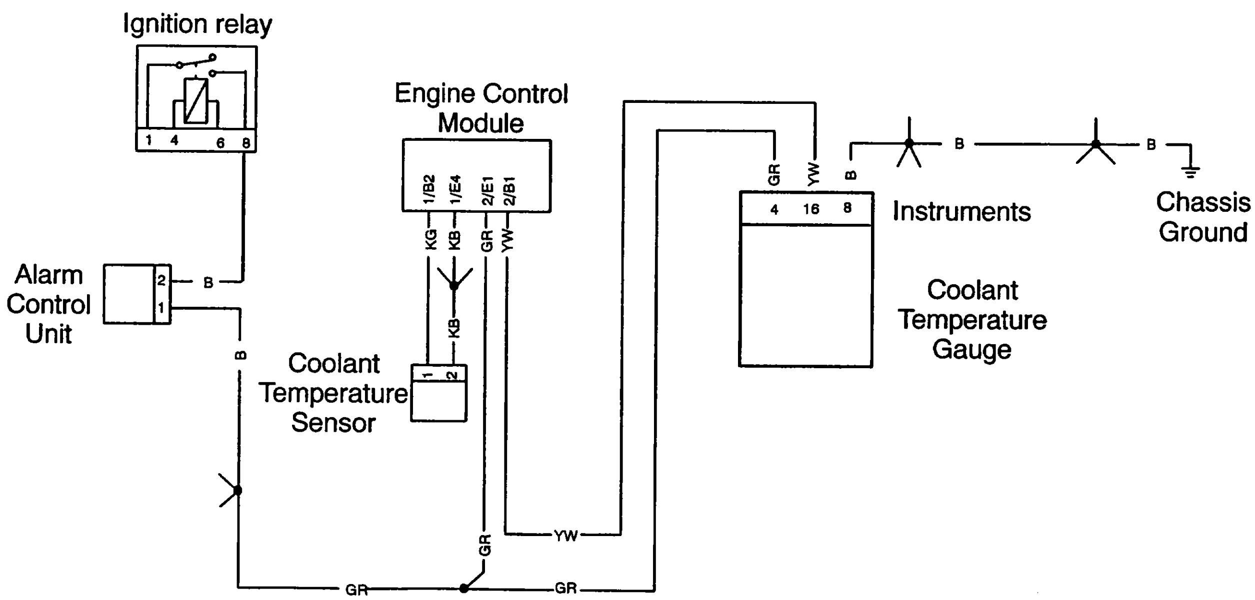
COOLANT TEMPERATURE GAUGE - MC 1000 ECM

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 2/B1	OK	Disconnect temp gauge and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin 2/B1 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Instruments pin 16 to ECM 2/B1 - Instruments pin 4 to alarm pin1	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: ECM pin 2/B1 to ECM pin 2/E1	OK	Renew temp gauge, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of temp gauge	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



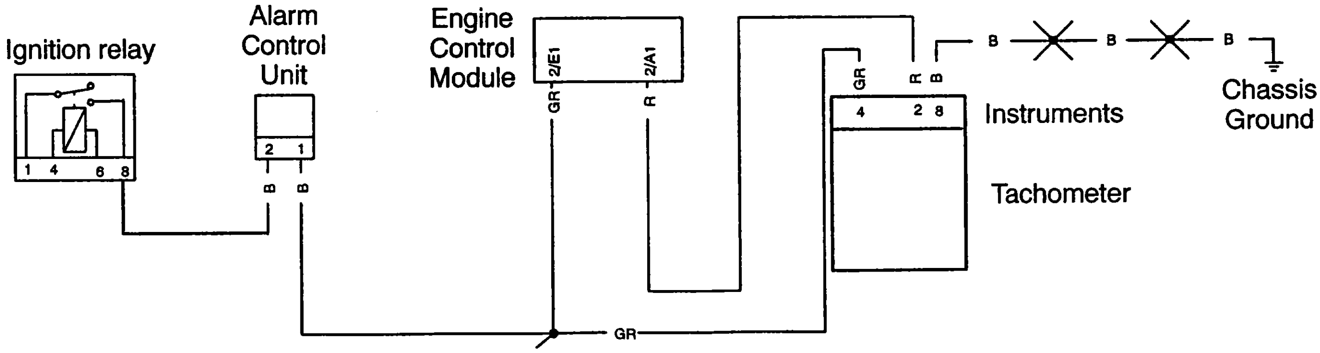
TACHOMETER - MC 1000 ECM

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 2/A1	OK	Disconnect tachometer and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin 2/A1 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable resistance: - ECM pin 2/A1 to ECM pin 2/E1	1.1 to 1.3KΩ	Proceed to test 4
	Faulty	Locate and rectify wiring fault. Proceed to test 6
4 Check cable continuity: - Instruments pin 2 to ECM pin 2/A1 - Instruments pin 8 to earth - Instruments 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 2/A1 to ECM pin 2/E1	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



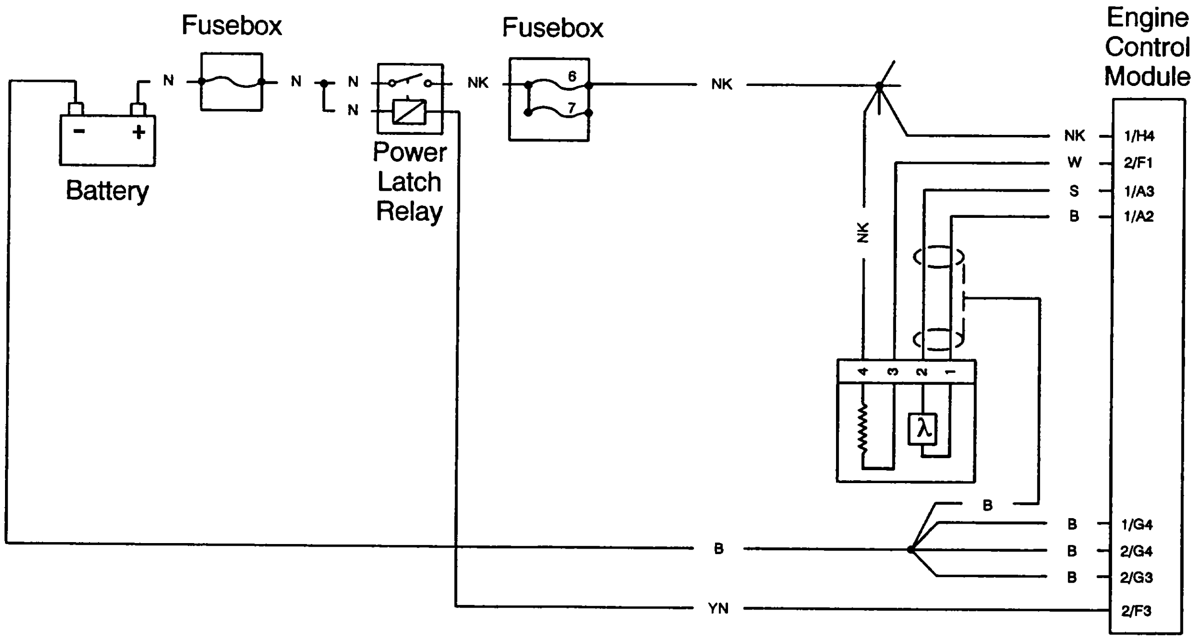
LAMBDA SENSOR (Long Term Feedback) - MC 1000 ECM

Fault Code	Possible Cause	Action
P1178	Air Leak, Low fuel pressure, Faulty purge system, Poor throttle balance.	View and note freeze frame data. Proceed to test 1.
P1179	Blocked idle air control system, High fuel pressure, Faulty purge system	Proceed to test 2

Pinpoint Tests

Test	Result	Action
1. Check throttle balance	OK	Proceed to test 2
	Faulty	Reset and proceed to test 7.
2. Check idle air control system is not blocked.	OK	Proceed to test 3
3. Check for air leaks into the intake system	OK	Proceed to test 4.
	Faulty	Rectify air leak and proceed to test 7.
4. Check fuel rail pressure.	OK	Proceed to test 5.
5. Check integrity of purge system pipes, valve and canister.	OK	Proceed to test 6.
6. Check purge valve is not stuck open.	OK	Proceed to test 7
	Faulty	Replace purge valve and proceed to test 7.
7. Reconnect harness, clear fault code and switch ignition key 'ON' to verify fault cleared.	OK	Action complete – Quit test.
	Fault still present	Contact Triumph Service

Circuit Diagram



LAMBDA SENSOR - MC 1000 ECM

Fault Code	Possible Cause	Action
P0131	Open Circuit or Short Circuit to Battery. Poor electrical contact between exhaust and ECM ground.	View and note freeze frame data. Ensure Lambda sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1.
P0132	Open Circuit or Short Circuit to Battery.	Proceed to pinpoint test 1.
P1133	Faulty Lambda Sensor	Replace Lambda Sensor
P0135	Open Circuit or Short circuit	Proceed to test 6

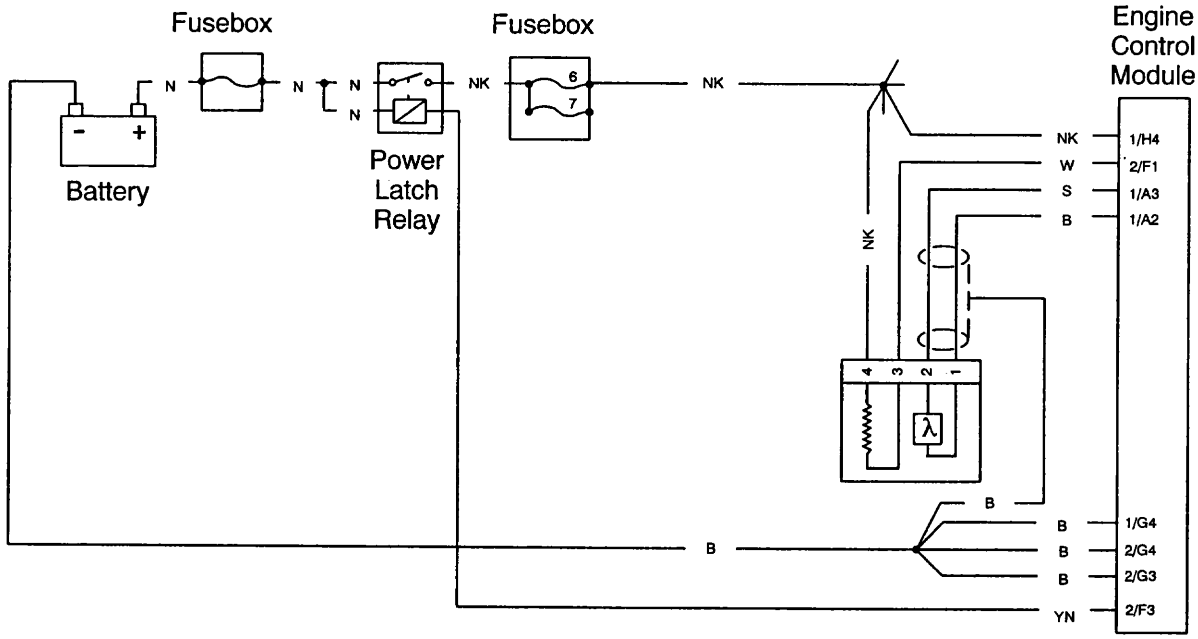
Pinpoint Tests

Test	Result	Action
1. Check cable and terminal integrity.	OK	Disconnect Sensor and proceed to test 2.
- ECM Pin 1/A2- ECM Pin 1/A3	Faulty	Rectify Fault and proceed to test 11.
2. Check cable continuity	OK	Proceed to test 3.
- ECM Pin 1/A2 to Sensor Pin 1 - ECM Pin 1/A3 to Sensor Pin 2	Faulty	Locate and rectify wiring fault. Proceed to test 11.
3. Check for short circuit to ground.	OK	Proceed to test 4.
- ECM Pin 1/A2 - ECM Pin 1/A3	Faulty	Locate and rectify fault. Proceed to test 11.
4. Check for short circuit to battery.	OK	Proceed to test 5
- ECM Pin 1/A2 - ECM Pin 1/A3	Faulty	Locate and rectify fault. Proceed to test 11.
5. Check continuity between sensor boss and battery negative terminal.	OK	Replace Lambda Sensor and proceed to test 11.
	Faulty	Locate and rectify fault and proceed to test 11.
6. Check cable and terminal integrity.	OK	Disconnect sensor and proceed to test 7.
- ECM Pin 2/F1	Faulty	Rectify and proceed to test 11.
7. Check cable continuity	OK	Proceed to test 8.
- ECM Pin 2/F1 to Sensor Pin 3 - Power Latch Relay Pin 8 to Sensor Pin 4	Faulty	Rectify wiring fault and proceed to test 11.
8. Check for short circuit to ground	OK	Proceed to test 9.
- ECM Pin 2/F1	Faulty	Rectify wiring fault and proceed to test 11.

Pinpoint Tests(continued)

Test	Result	Action
9. Check for short circuit to battery - ECM Pin 2/F1	OK	Proceed to test 10.
	Faulty	Rectify wiring fault and proceed to test 11.
10. Check resistance of Lambda sensor heater Sensor pin 3 to sensor pin 4	4Ω to 8Ω	Proceed to test 11.
	Faulty	Replace Lambda Sensor and proceed to test 11.
11. Reconnect harness, clear fault code and switch ignition key 'ON' to verify fault cleared.	OK	Action complete – Quit test.
	Fault still present	Contact Triumph Service

Circuit Diagram



LAMBDA SENSOR (Short Term Feedback) - MC 1000 ECM

Fault Code	Possible Cause	Action
P0170	Fault Code P1171 or P1172 will be present.	View and note freeze frame data. Ensure sensor connector is secure.
P1171	Wiring fault, Air leak, low fuel pressure, faulty purge system, faulty sensor.	Disconnect ECM connector and proceed to test 1.
P1172	Wiring fault, high fuel pressure, faulty purge system, faulty sensor.	Disconnect ECM connector and proceed to test 1.

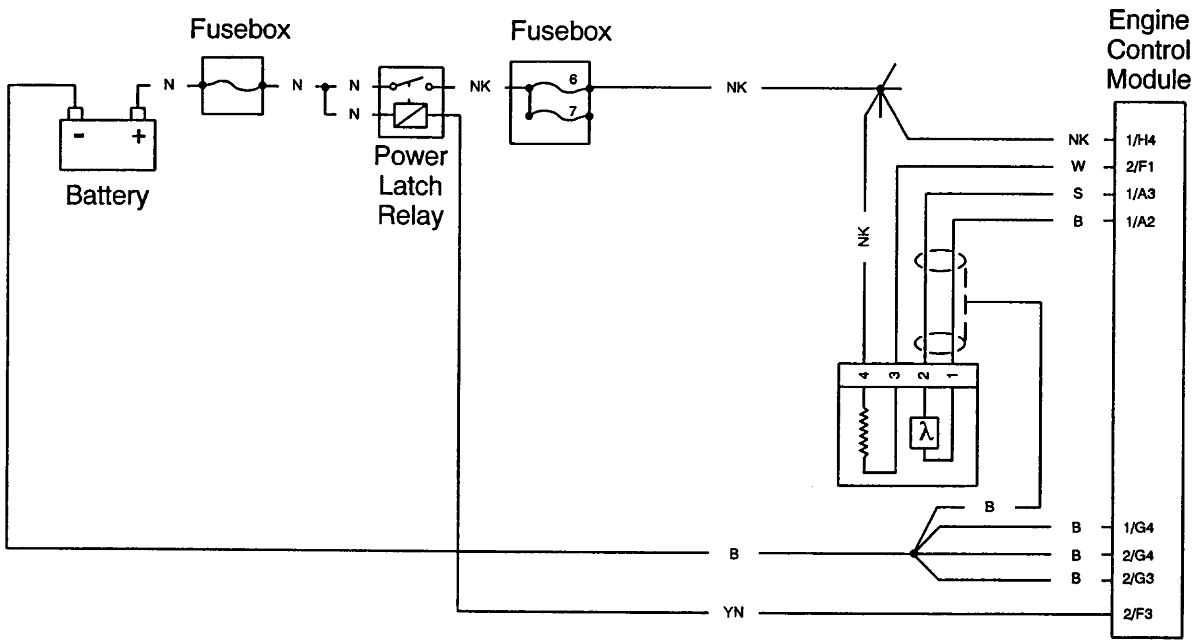
Pinpoint Tests

Test	Result	Action
1. Check cable and terminal integrity. - ECM Pin 1/A2 - ECM Pin 1/A3	OK	Disconnect Sensor and proceed to test 2.
	Faulty	Rectify Fault and proceed to test 10.
2. Check cable continuity - ECM Pin 1/A2 to Sensor Pin 1 - ECM Pin 1/A3 to Sensor Pin 2	OK	Disconnect Sensor and proceed to test 3.
	Faulty	Locate and rectify wiring fault. Proceed to test 10.
3. Check for short circuit to ground. - ECM Pin 1/A2 - ECM Pin 1/A3	OK	Proceed to test 4.
	1.Faulty	Locate and rectify fault. Proceed to test 10.
4. Check for short circuit to battery. - ECM Pin 1/A2 - ECM Pin 1/A3	OK	Proceed to test 5
	Faulty	Locate and rectify fault. Proceed to test 10.
5. Check continuity between sensor boss and battery negative terminal.	OK	Proceed to test 6.
	Faulty	Locate and rectify fault and proceed to test 10.
6. Check for air leaks into the intake system	OK	Proceed to test 7.
	Faulty	Rectify air leak and proceed to test 10.
7. Check fuel rail pressure.	OK	Proceed to test 8.
	Faulty	Rectify and proceed to test 10.
8. Check integrity of purge system pipes, valve and canister.	OK	Proceed to test 9
	Faulty	Rectify and proceed to test 10.

Pinpoint Tests(continued)

Test	Result	Action
9. Check purge valve is not stuck open.	OK	Replace Lambda Sensor and proceed to test 10
	Faulty	Replace purge valve and proceed to test 10
10. Reconnect harness, clear fault code and switch ignition key 'ON' to verify fault cleared.	OK	Action complete – Quit test.
	Fault still present	Contact Triumph Service

Circuit Diagram



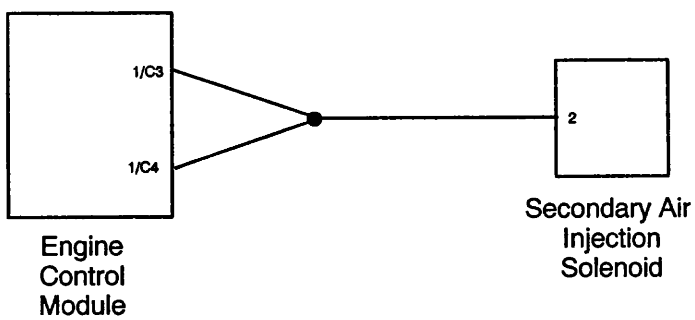
SECONDARY AIR INJECTION SOLENOID

Fault Code	Possible Cause	Action
P0413 (See note below)	Open circuit or short circuit to ground	View & note diagnostic tool 'freeze frame ' data if available Disconnect ECM and proceed to pinpoint test 1.
P0414	Short circuit to Vbatt	Proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity - ECM Pin 1/C3 - ECM Pin 1/C4 - Solenoid Pin 2	OK	Code P0413 Proceed to test 2 Code P0414 Proceed to test 4
	Faulty	Rectify fault & proceed to test 5
2 Check cable for short circuit to ground - ECM Pin 1/C3 - ECM Pin 1/C3 - Solenoid Pin 2	OK	Proceed to test 3
	Faulty	Rectify fault & proceed to test 5
3 Check cable continuity - ECM Pin 1/C3 to Solenoid Pin 2 - ECM Pin 1/C4 to Solenoid Pin 2	OK	Proceed to test 5
	Faulty	Rectify fault & proceed to test 5
4 Check for short circuit to Vbatt - ECM Pin 1/C3 - ECM Pin 1/C3 - Solenoid Pin 2	OK	Proceed to test 5
	Faulty	Rectify fault & proceed to test 5
5 Reconnect harness, clear fault code and run bike to very fault cleared	OK	Action Complete – Quit test
	Fault still present	Contact Triumph Service

Circuit Diagram



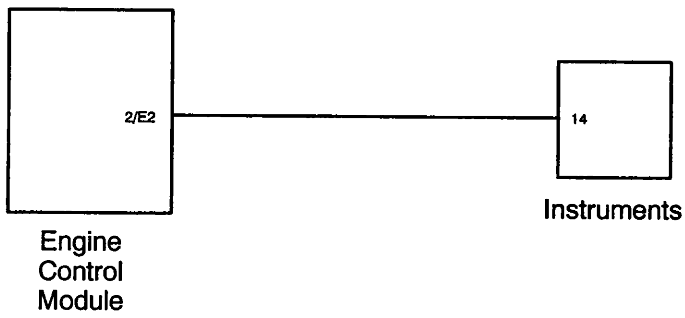
SPEEDOMETER OUTPUT

Fault Code	Possible Cause	Action
P1501	Open circuit or short circuit to ground	View & note diagnostic tool 'freeze frame ' data if available Disconnect ECM and proceed to pinpoint test 1
P1502	Short circuit to Vbatt	Proceed to pinpoint test 1

Pinpoint Test

Test	Result	Action
1 Check terminal and cable integrity - ECM Pin 2/E2 - Instruments Pin 14	OK	Code P0501 Proceed to test 2 Code P0502 Proceed to test 4
	Faulty	Rectify fault & proceed to test 5
2 Check cable for short circuit to ground - ECM Pin 2/E2 - Instruments Pin14	OK	Proceed to test 3
	Faulty	Rectify fault & proceed to test 5
6 Check cable continuity - ECM Pin 2/E2 to Instruments Pin 14	OK	Proceed to test 5
	Faulty	Rectify fault & proceed to test 5
7 Check for short circuit to Vbatt - ECM Pin 2/E2 - Instruments Pin 14	OK	Proceed to test 5
	Faulty	Rectify fault & proceed to test 5
8 Reconnect harness, clear fault code and run bike to very fault cleared	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	Oxygen sensor problem
	Low fuel pressure caused by filter blockage/leaks
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter
	System not adapted correctly
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.
	Oxygen sensor problem
	Low fuel pressure
	Damaged/dirty/corroded ECM wiring connection
	System not adapted correctly.
Rev limitation cutting in too early	Crankshaft sensor air gap too wide
Idle speed too low/high	IACV (Idle Air Control Valve) sticking
	Incorrect closed throttle position setting
	Mechanical fault with the throttle linkage
	Air bypass pipes disconnected
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
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.
Idle control air pipes whistling	Incorrect/poor fitment of pipes to the idle control housing
	Non-California models only: Connection of an air hose to a non-drilled port on the idle control housing (only 3 of 4 ports are drilled in non-California housings).
Lack of engine performance	Incorrectly fitted airbox rubbers/poor airbox sealing at the throttle body
	System not adapted correctly

FUEL SYSTEM ADAPTION

The fuel system fitted to Daytona and Speed Triple is automatically adaptive. This means that the engine management system will self-adjust air fuel ratio (i.e. the mixture setting) to its optimum level in order to ensure differing running conditions do not result in poor running. Conditions where adaptation is necessary include, when the engine is new (i.e. where internal friction is higher than when the engine is run-in), extremes of ambient temperature, high or low altitude etc.

During an adaption, the engine management system examines the air-fuel ratio as measured by the oxygen sensor in the exhaust system and, if necessary, makes an adjustment. In some cases, a single adaption may be sufficient to restore normal running but in others, more adaptions will be necessary.

An adaption take place entirely automatically and requiring no operator intervention, when all the following conditions are met:

Gearbox in neutral, clutch engaged.

Coolant temperature 80 - 100 °C

Airbox temperature 21°C minimum

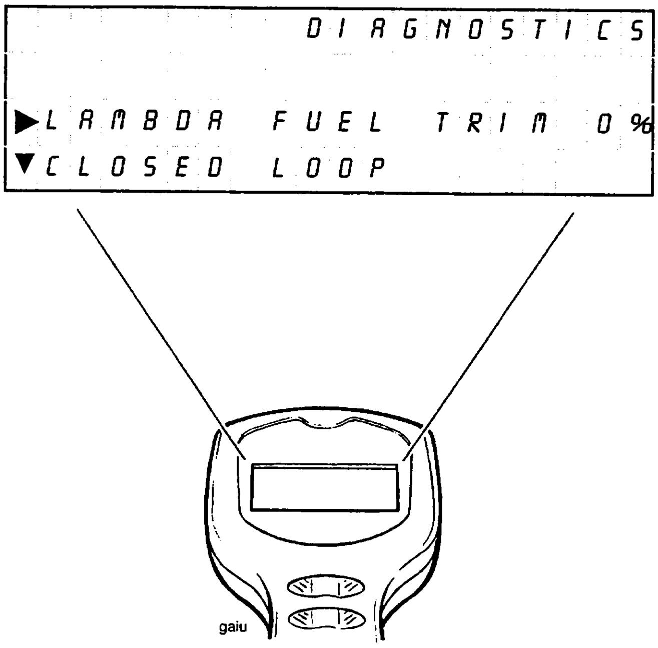
Engine idling for 10 - 30 seconds

Once adaption has taken place, the new settings are retained ensuring that adaption is not necessary every time the engine is started.

Particularly for new bikes, where the engine has not been run-in, it may be necessary to ensure adaption has taken place. This can, of course, apply at any other times as well.

To force adaption to take place, start the engine and warm it up until the above conditions are met, adaption will then take place automatically. Blip the throttle every 30 seconds to start another adaption cycle. When coolant or airbox temperatures are above or below adaption thresholds, allow the engine to cool or warm-up before continuing.

To check that adaption has been completed, scroll the Triumph diagnostic tool to DIAGNOSTICS-CURRENT DATA-LAMBDA FUEL. in a correctly adapted bike, the lambda fuel reading should show 0.0% (though operators should note that the figure will continue to change during engine operation but will settle at 0% briefly but regularly.



If reading higher than +3% or -3% are seen continuously, adaption is necessary and can be brought about in the conditions mentioned earlier (remembering that more than one adaption will be needed on occasions).

If a stationary LAMBDA FUEL figure of -19.6% is seen, download the correct tune for the model in question and begin the adaption process as described.

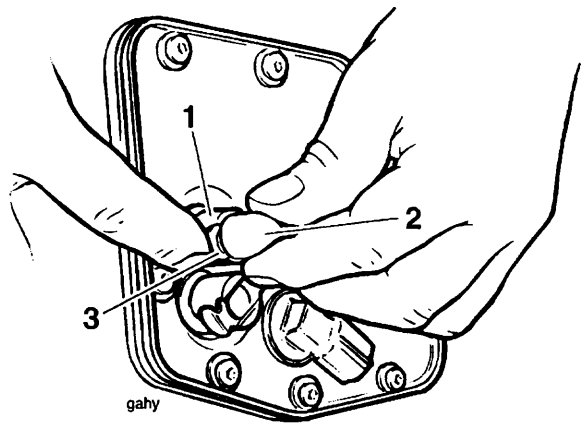
Finally, use of the SET LONG TERM FUEL TRIM adjustment in the Triumph diagnostic tool should be reserved solely for when replacement ECMs are newly fitted.

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 and fuel tank infill panels as described in the body section.
3. 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

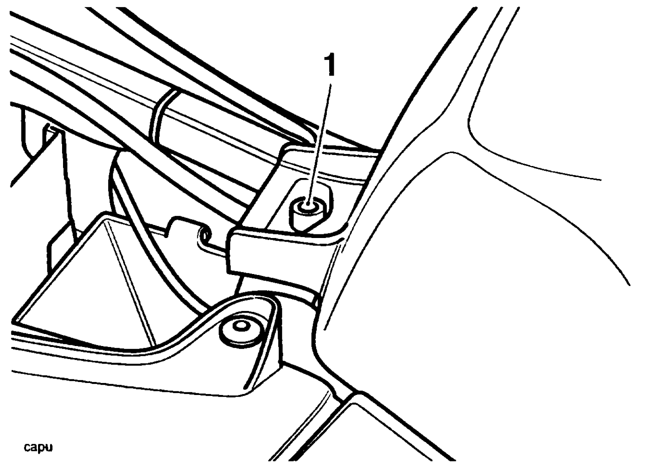
2. Hose

3. Metal tag

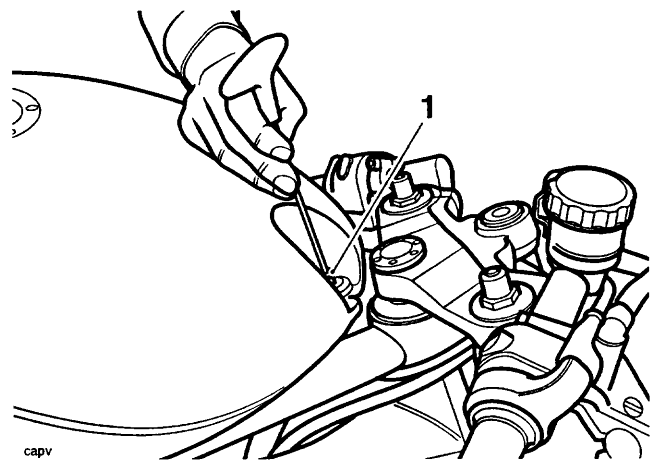
NOTE:

- **When disconnected, the fuel hoses are self-sealing.**

4. Disconnect the hose leading to the fuel pressure regulator.
5. Release the bolts securing the fuel tank to the frame.

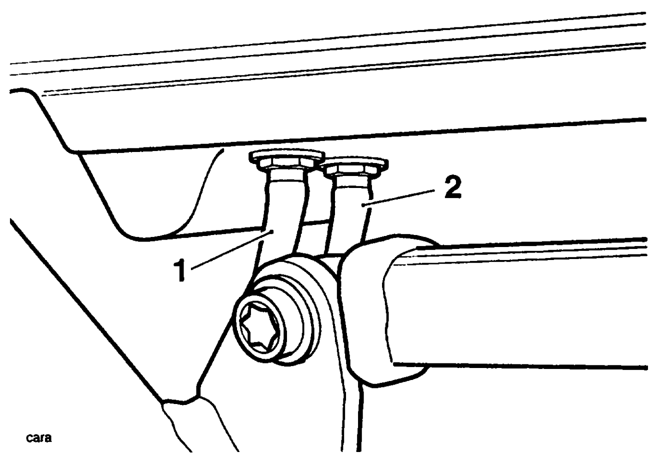


1. Fuel tank to frame bolt (rear)



1. Fuel tank to frame bolt (front)

6. Disconnect the hoses from the fuel filler drain and fuel tank vent (or roll-over valve where fitted) from the left hand side of the tank.



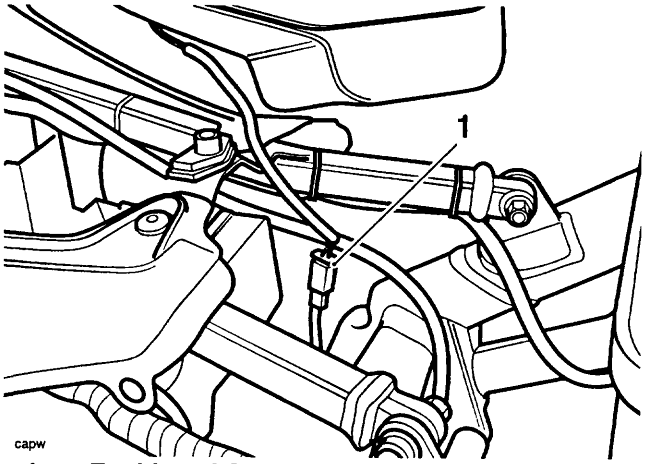
1. Fuel tank drain

2. Vent/Roll over valve connection (where fitted)

7. Raise the fuel tank and disconnect the electrical connections from the fuel pump and low fuel level sensor.
8. Remove the tank from the frame.

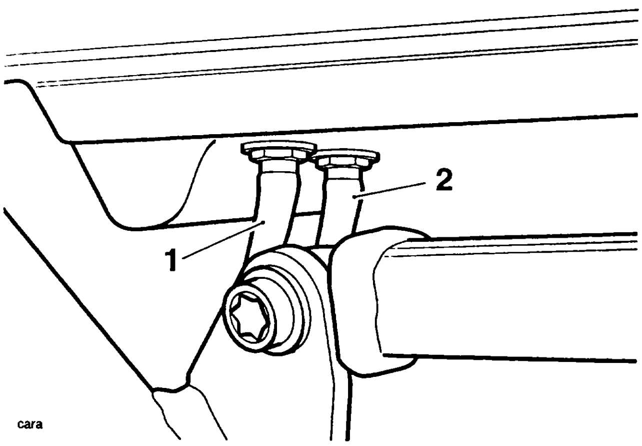
Installation

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. Reconnect the hoses to the fuel filler drain and fuel tank vent (or roll-over valve where fitted) on the left side of the tank.



1. Fuel tank drain

2. Vent/Roll over valve connection (where fitted)

3. Align the fuel tank to the mounting points and tighten the front mounting bolt to **8 Nm** and the rear to **5 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.

> ⚠ **CAUTION: When inserting the fuel hoses, do not tip/tilt the connector in the socket as this will damage the O-ring on the connector tip resulting in a fuel leak.**

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

7. Start the engine and check carefully for fuel leaks. Rectify as necessary.

8. Refit the body side panels as described in the bodywork section.

9. Refit the seat.

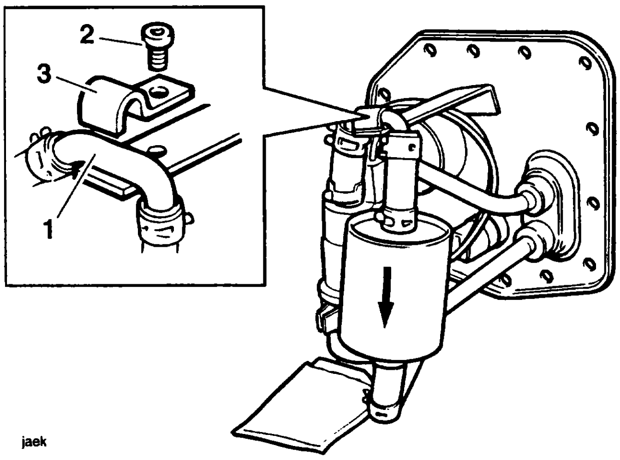
FUEL PUMP

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.

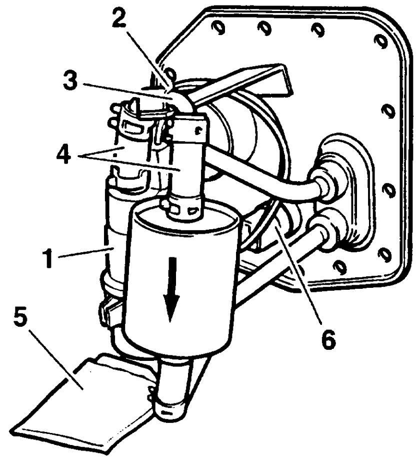
> **WARNING: Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.**
>
> **A fire, causing personal injury and damage to property, could result from spilled fuel or fuel not handled or stored correctly.**

4. Release the ring of bolts securing the fuel pump mounting plate to the fuel tank.
5. Remove the mounting plate and discard the gasket.
6. Release the clamp bolt securing the fuel hose link pipe to the bracket. Collect the clamp.



1. Link Pipe
2. Retaining Bolt
3. Clamp

7. Release the clips securing the fuel hoses to the pump and filter. Remove the link pipe and hoses as an assembly.
8. Disconnect the fuel pump electrical connection at the pump.
9. Undo the fuel pump clamp screw and ease the pump from the bracket ensuring the gauze pick-up filter is not damaged during removal.
10. Collect the fuel pump support rubber.



1. Fuel Pump
2. Clamp Screw
3. Link Pipe
4. Fuel Hoses
5. Gauze Pick-up Filter
6. Fuel Pump Connection

Assembly

1. Locate the pump to the mounting bracket ensuring that the rubber support ring is in place at the base of the pump.
2. Tighten the fuel pump clamp screw to **4 Nm.**
3. Refit the fuel hoses and link pipe to the pump and filter and secure with the clips.
4. Refit the link pipe clamp and secure with the clamp bolt.
5. Reconnect the fuel pump cable.
6. 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 **5 Nm.**

> **CAUTION: Never overtighten the fuel pump mounting plate bolts as this will damage the threaded inserts in the fuel tank.**

7. Refit the fuel tank as described elsewhere in this section.
8. Refill the fuel tank with the fuel drained earlier.
9. Reconnect the battery, positive (red) lead first.
10. Refit the seat.

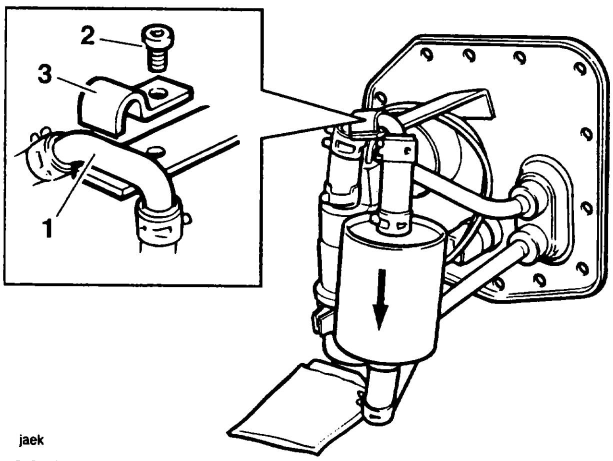
FUEL FILTER

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 clamp bolt securing the fuel hose link pipe to the bracket. Collect the clamp.



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1. Link Pipe

2. Retaining Bolt

3. Clamp

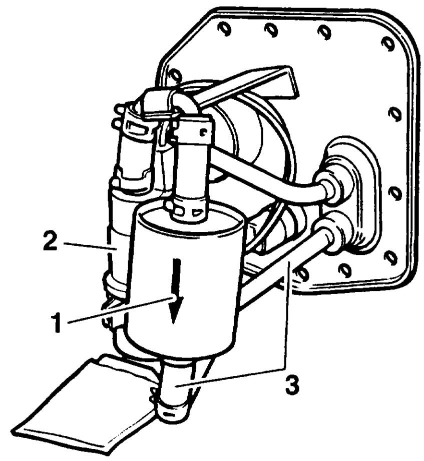
7. Release the clips securing the fuel hoses and link pipe to the pump and filter. Remove the link pipe and hoses as an assembly.
8. Release the clip at the exit side of the filter.
9. Ease the filter from the exit hose and discard it.

NOTE:

- **Renew the fuel filter in accordance with the scheduled maintenance chart.**

Assembly

1. Locate the filter to the lower (exit) fuel hose with the arrow on the filter pointing downwards into the hose (i.e. away from the fuel pump).



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1. Arrow

2. Fuel Pump

3. Lower (exit) Fuel Hose

2. Refit the fuel hoses and link pipe to the filter and pump and secure with the hose clips.
3. Refit the link pipe clamp and secure with the clamp bolt.
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 **5 Nm**.

> **CAUTION: Never overtighten the fuel pump mounting plate bolts as this will damage the threaded inserts in the fuel tank.**

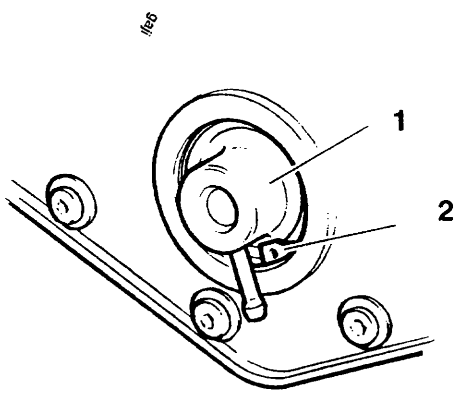
5. Refit the fuel tank as described elsewhere in this section.
6. Refill the fuel tank with the fuel drained earlier.
7. Reconnect the battery, positive (red) lead first.
8. Refit the seat.

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, with the hose spigot pointing downwards, 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 PRESSURE CHECKING

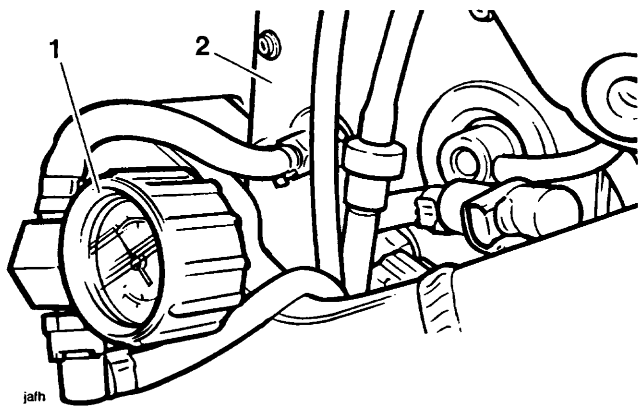
Using Triumph service tool T3880048, allows diagnosis of fuel pump, fuel pressure relief valve and hose related problems without first removing the component concerned.

Test Procedure

1. In order to connect the gauge, turn the ignition to the OFF position and remove the 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.



1. Gauge (Tool part number T3880048)

2. Mounting Plate

3. Start the engine and check the gauge reading.

NOTE:

- **If the fuel pressure is being checked because the engine will not start, use the fuel pump test facility on the diagnostic service tool.**
- **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

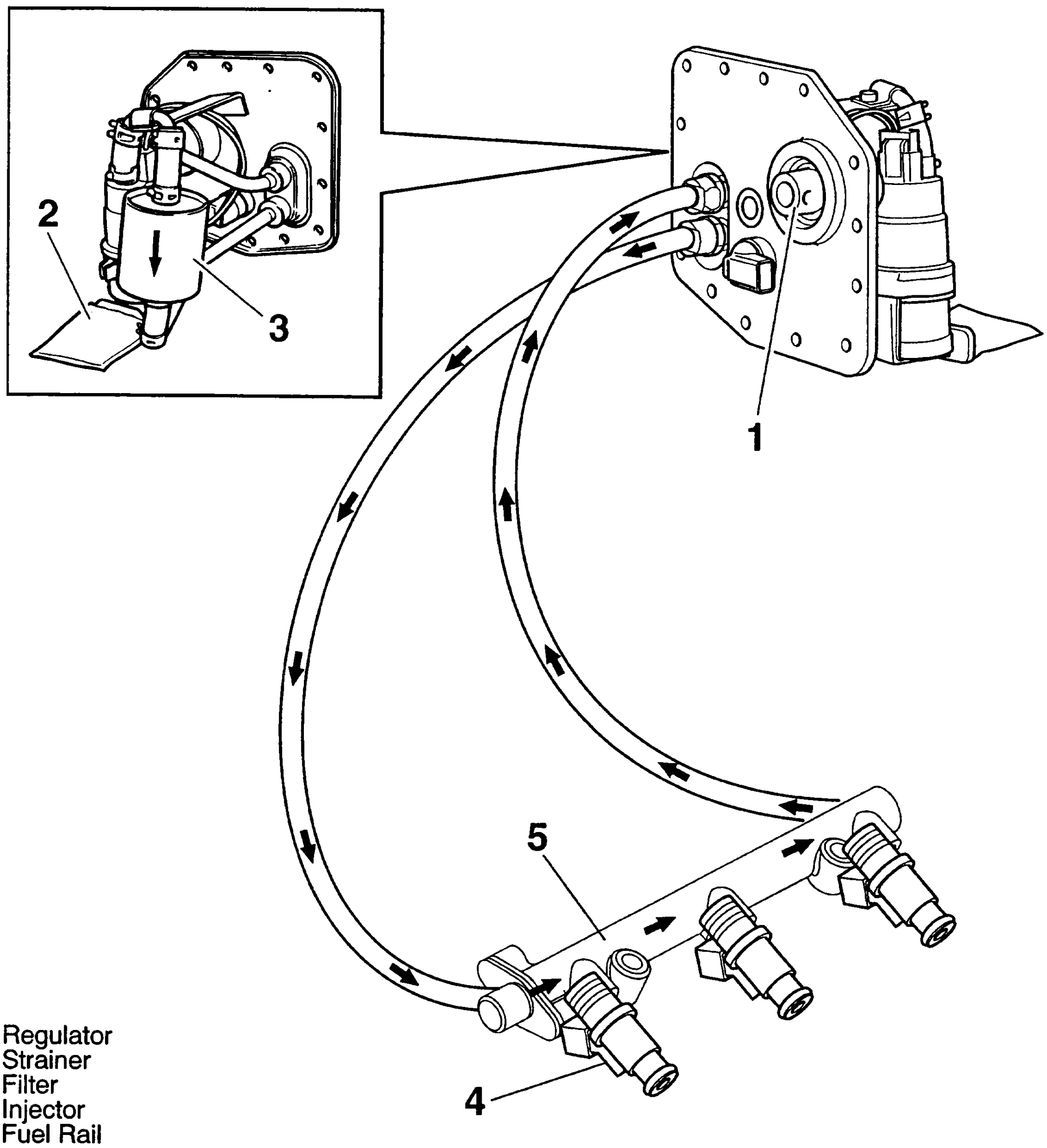
Fuel is delivered to the injectors by a fully submerged pump located inside the fuel tank. Fuel flows in the direction of the arrows shown in the diagram below.

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.

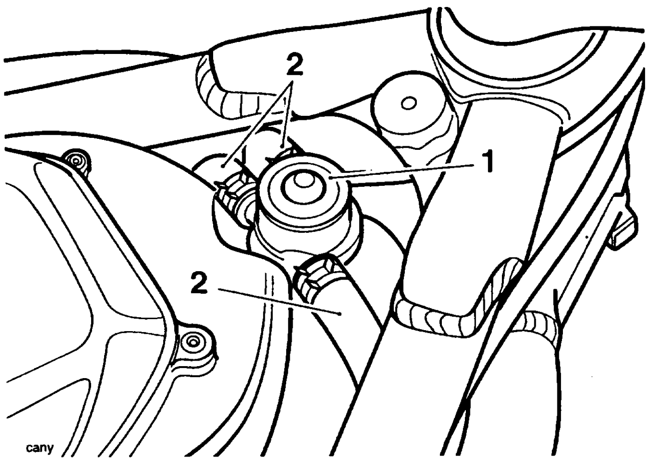


1. Regulator
2. Strainer
3. Filter
4. Injector
5. Fuel Rail

AIRBOX

Removal

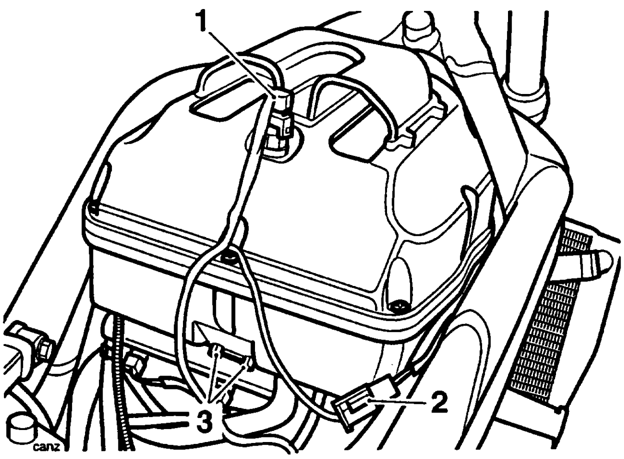
1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the fuel tank as described elsewhere in this section.
3. On models fitted with secondary air injection, disconnect the three air hoses at the control valve and the disconnect the valve's electrical connection.



1. Secondary air injection control valve

2. Hoses

4. Disconnect the air temperature sensor connector.
5. Release the fixings securing the airbox to its bracket.

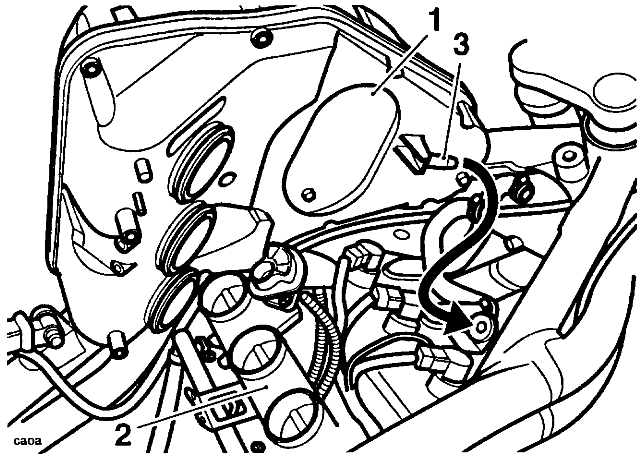


1. Intake air temperature connector

2. Secondary air injection valve connector

3. Airbox fixings

6. Disconnect the drain hoses etc. from the rear of the airbox.
7. Gently lift the rear of the airbox to release it from the throttle bodies.
8. Once the airbox has cleared the throttle bodies, slide it rearwards to release it from its forward locating peg



1. Airbox

2. Throttle bodies

3. Forward locating peg

Inspection

1. Inspect the intake rubbers for splits, damage and distortion.
2. Inspect the intake rubber retaining rings loss of elasticity.
3. Check the airbox itself for cracks, splits etc.

Installation

1. Position the airbox to the forward location and push home into the locating grommet.
2. Press down on the rear of the airbox to locate the intake rubbers to the throttle bodies.

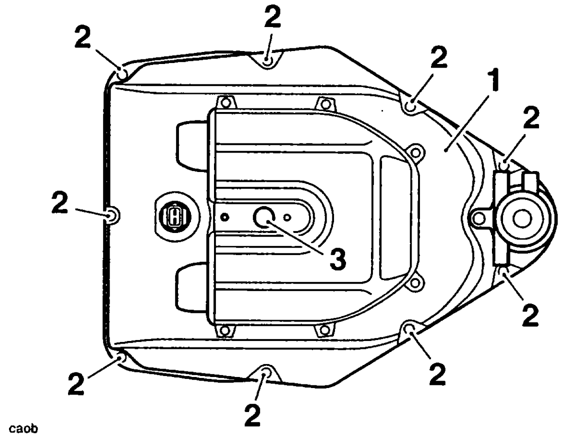
> **CAUTION: Always ensure that all 3 intake rubbers seal to the throttles through 360° as poor performance and lack of power can result from incorrect sealing.**

3. Fit and tighten the airbox fixings to **5 Nm.**
4. Reconnect the air temperature sensor.
5. On models fitted with secondary air injection, reconnect and secure the air hoses at the valve and the electrical connector beneath the fuel rail.
6. Reconnect the airbox drain hoses to their original locations
7. Refit the fuel tank as described earlier in this section.
8. Reconnect the battery, positive (red) lead first.
9. Refit the seat.

AIR FILTER ELEMENT

Removal

1. Remove the airbox as described earlier in this section.
2. Release the ring of bolts securing the upper half of the airbox to its corresponding lower section.
3. Release the airbox centre fixing which is accessed through the centre hole in the airbox upper section.

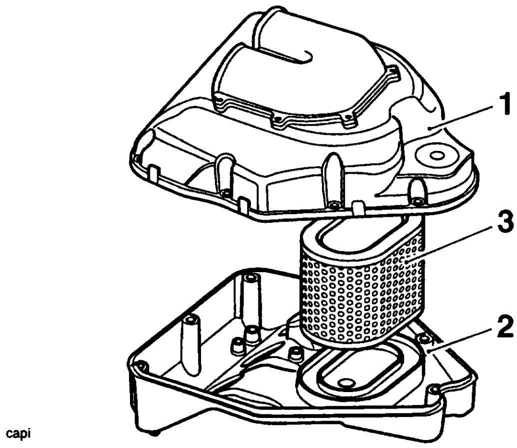


1. Airbox

2. Ring of bolts

3. Centre fixing location

4. Separate the two halves of the airbox and recover the air filter element



1. Airbox upper section

2. Airbox lower section

3. Air filter element

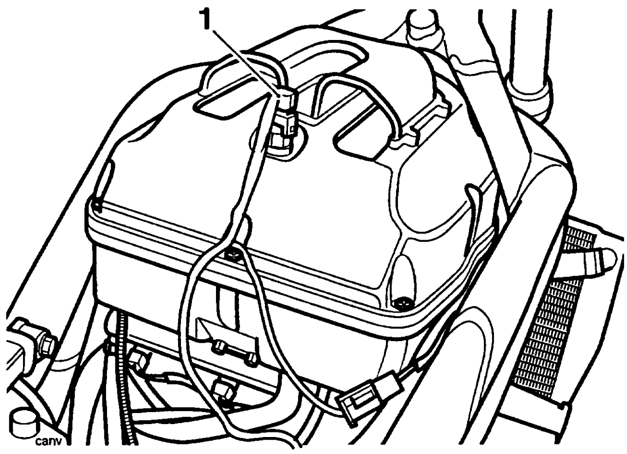
Installation

1. Thoroughly clean the inside and outside of the airbox.
2. Seat the air filter element in the lower section.
3. Locate the upper section to the lower and secure with the fixings. Tighten to **4 Nm.**

INTAKE AIR TEMPERATURE SENSOR

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 multiplug from the air temperature sensor.



1. Intake air temperature connector

NOTE:

- **The intake air temperature sensor has a threaded base which retains it to the airbox.**

4. Unscrew the sensor to remove it from the airbox.

Assembly

1. Fit the temperature sensor to the airbox taking care not to overtighten.
2. Reconnect the air temperature sensor.
3. Refit the fuel tank as described elsewhere in this section
4. Reconnect the battery, positive (red) lead first.
5. Refit the seat.

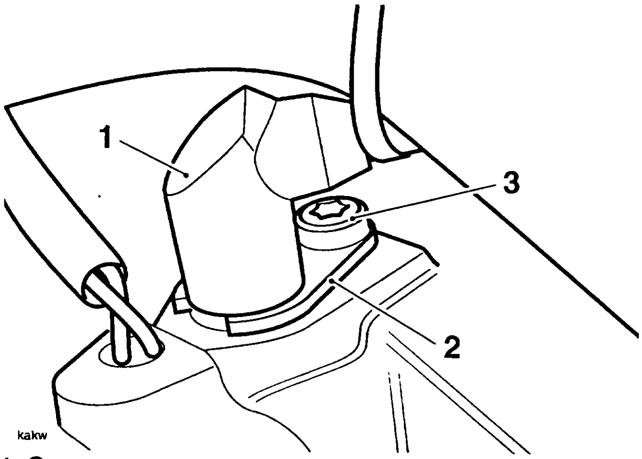
CRANKSHAFT POSITION SENSOR

NOTE:

- **The air gap for the crankshaft position sensor is not adjustable.**

Removal

1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the left hand lower fairing.
3. Remove the fixing securing the sensor bracket to the crankcase.



1. Sensor

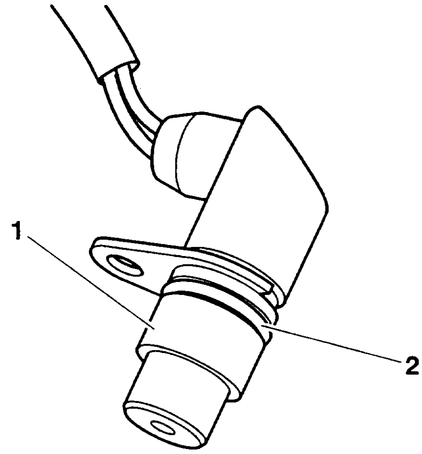
2. Sensor bracket

3. Sensor bracket fixing

4. Disconnect the sensor multi-plug.
5. Remove the sensor from the crankcase.

Installation

1. Check the sensor O ring for damage or deterioration. Renew as necessary.



1. Sensor

2. O ring

2. Apply a smear of oil to the sensor O ring to aid assembly.
3. Refit the sensor taking care to not damage to damage the O ring.
4. Refit the sensor bracket. Fit and tighten the fixing to **10 Nm.**
5. Reconnect the sensor multi-plug.
6. Refit the left hand lower fairing.
7. Reconnect the battery positive (red) lead first.
8. Refit the seat.

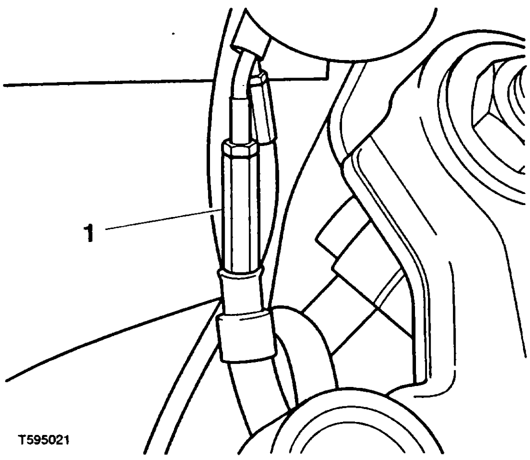
THROTTLE CABLE

Adjustment

NOTE:

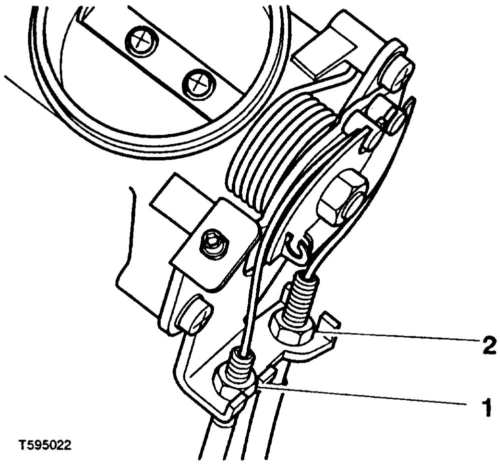
- **Minor adjustments to the opening cable can be made using the adjuster near the twist grip end of the throttle. Where a correct setting cannot be achieved in this way, the adjusters at the throttle end of both cables must be used. The opening cable must be set first followed by the closing cable.**

1. Remove the seat.
2. Disconnect the battery negative (black) lead first.
3. Set the 'opening' cable adjuster at the twist grip end such that it has an equal amount of adjustment in each direction. Tighten the locknut.



1. 'Opening' cable adjuster (twist-grip end)

2. Remove the right hand lower fairing to give access to the throttle cable adjusters.
3. Set the 'opening' cable adjuster at the throttle end to give 2-3 mm of play at the twist grip. Tighten the locknut.



1. 'Opening' Cable Adjuster (Throttle End)
2. 'Closing' Cable Adjuster (Throttle End)

3. With the throttle fully closed, ensure that there is 2-3mm of free play in the 'closing' cable. Adjust if necessary ensuring that the locknut is secure afterwards.

WARNING: Operation of the motorcycle with incorrectly adjusted, incorrectly routed or damaged throttle cables 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. Cables or harness that bind will restrict the steering and may cause loss of control and an accident.

WARNING: Ensure that all adjuster locknuts of both cables are correctly tightened.

A loose throttle cable adjuster on either throttle cable could cause the throttle to stick leading to loss of motorcycle control and an accident.

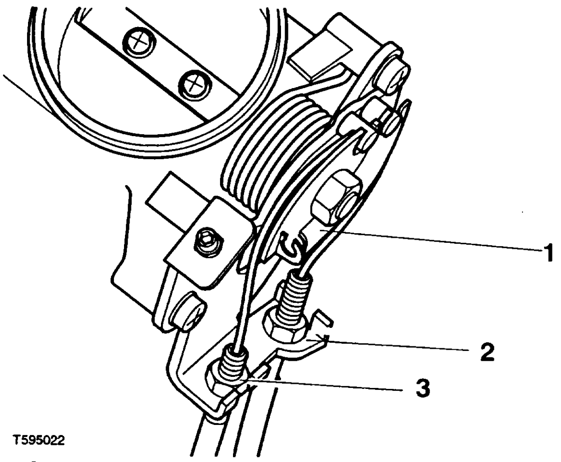
4. Refit the right hand lower fairing.
5. Reconnect the battery, positive (red) lead first.
6. Refit the seat.

Removal

NOTE:

- **Before beginning to remove the throttle cables, note the exact routing and location of both cables to help ensure that they are returned to the same locations and routing on assembly.**

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. Remove the right hand lower fairing as described in the bodywork section.
4. Slacken the adjuster locknuts at the throttle body end of the cables such that they will allow the outer cables to be detached from the cable bracket.
5. Detach the inner portion of the cables from the throttle cam.

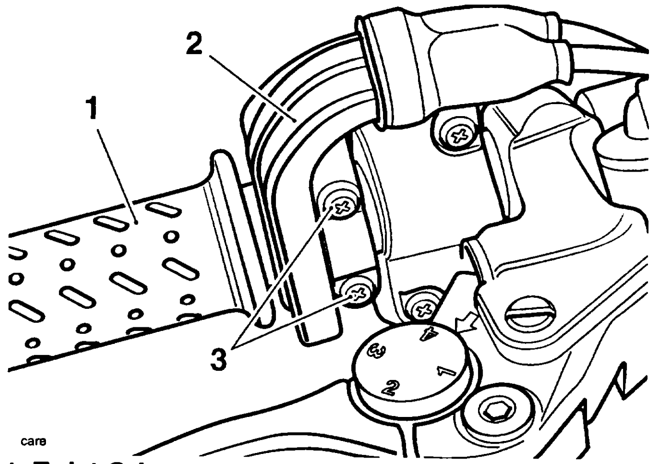


1. Throttle cam

2. Closing cable

3. Opening cable

6. 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.

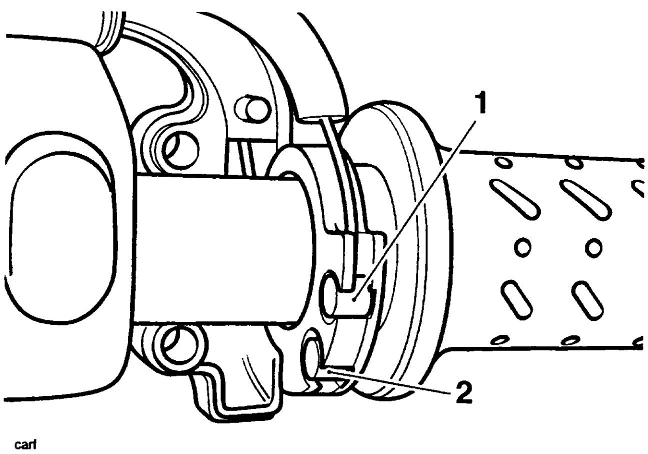


1. Twist Grip

2. Twist Grip Guide

3. Screws

7. Separate the two halves of the guide then release the inner cables from the twist grip.



1. Opening cable

2. Closing cable

8. Detach the cables from the motorcycle.

Examination

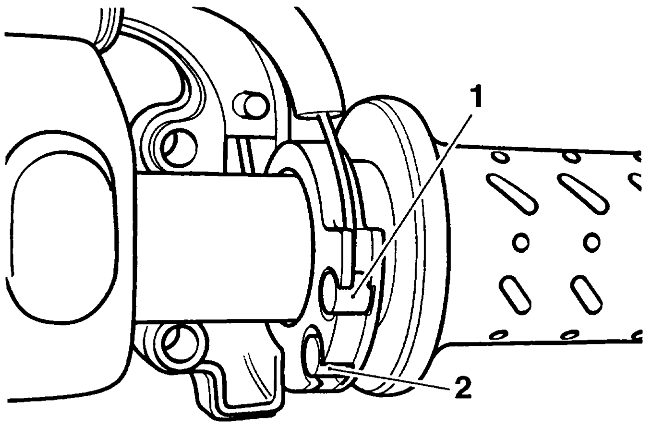
1. Check that both the throttle cables operate smoothly, without sticking or binding. Replace the cables if there is any doubt as to their correct operation.

Installation

1. Locate the cables to the frame following the routing noted during removal.

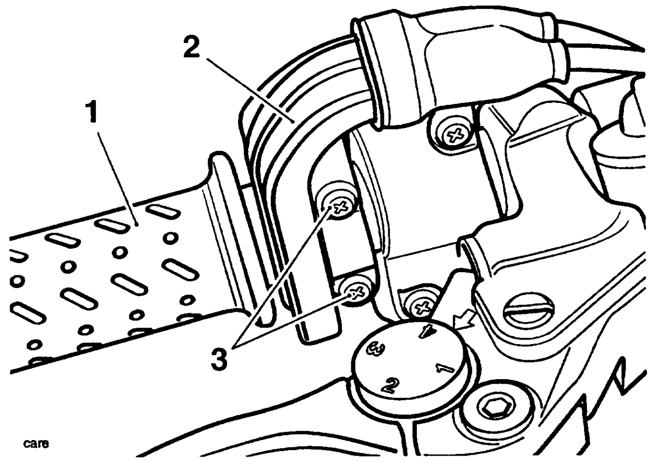
2. Engage the inner cable nipples to the twist grip.

3. Assemble the two halves of the cable guide ensuring that the outer cables are correctly located in the guide and the guide is positioned on the handlebars as prior to removal.



1. Opening cable

2. Closing cable



1. Twist Grip

2. Twist Grip Guide

3. Screws

4. Refit the boot.

5. Attach the other end of the inner cables to the throttle cam ensuring the opening cable is fitted to the rearward side of the throttle cam and the closing cable to the forward position.

6. Locate the outer cables to the bracket and secure with the adjuster and locknuts.

7. Set the cable adjustment as described previously.

WARNING: Operation of the motorcycle with incorrectly adjusted, incorrectly routed or damaged throttle cables 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. Cables or harness that bind will restrict the steering and may cause loss of control and an accident.

WARNING: Ensure that all adjuster locknuts of both cables are correctly tightened.

A loose throttle cable adjuster on either throttle cable could cause the throttle to stick leading to loss of motorcycle control and an accident.

8. Refit the right hand lower fairing (if removed).

THROTTLE BODIES/INJECTORS

Removal

NOTE:

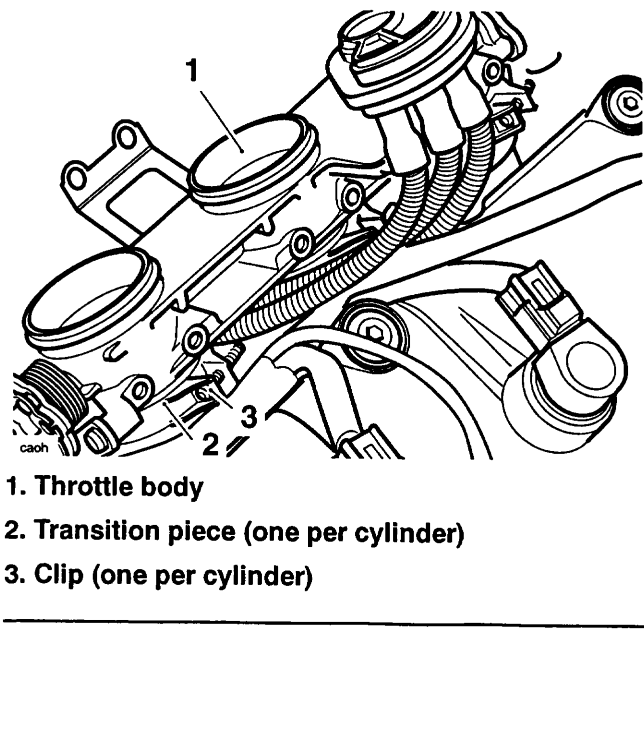
- **If the fuel rail is to be removed, select neutral, disconnect the wiring connection to the fuel pump and crank the engine briefly to reduce fuel pressure in the fuel rail.**

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 fuel rail takes place.

If the fuel rail is 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. Remove the rear body work and lower fairings (where fitted).
4. Disconnect the throttle position sensor.
5. Slacken the adjusters and release both throttle cables from the throttle cam.
6. Release the clips securing the throttle bodies to the transition pieces.

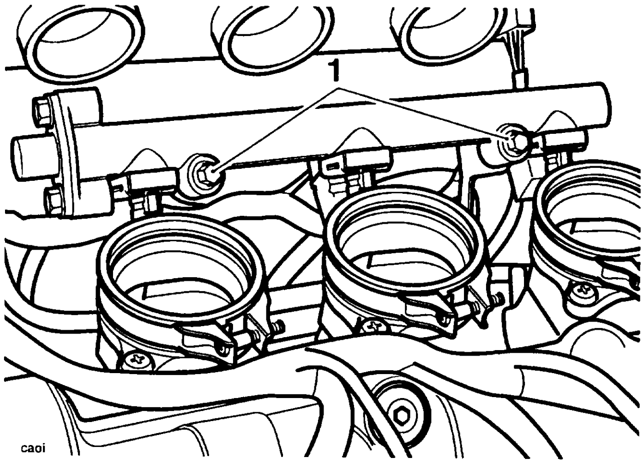


1. Throttle body

2. Transition piece (one per cylinder)

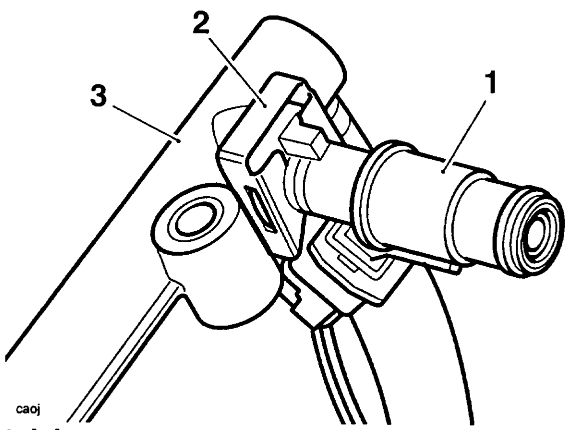
3. Clip (one per cylinder)

7. Detach the idle air bleed hoses from their connections at the cylinder head.
8. Disconnect the idle air control valve multiplug.
9. Ease the throttle bodies from the transition pieces and lay the complete assembly on the crankcase.
10. Release the bolts securing the fuel rail to its bracket.



1. Fuel rail bolts

11. Ease the fuel rail and injectors from the cylinder head.
12. To detach the injectors from the fuel rail, release the clip at the fuel rail end of each injector and ease the injector from the rail.



1. Injector

2. Clip

3. Fuel rail

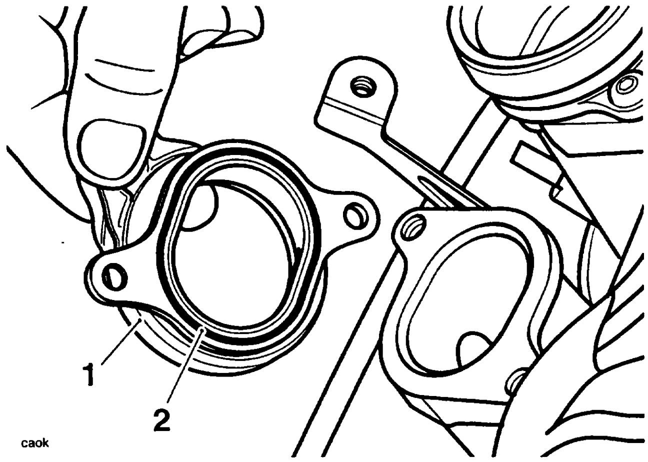
13. To detach the transition pieces from the head, release the screws, raise the transition pieces and collect the O-rings.

Inspection

1. Check all joints and seals for splits, cuts and damage.
2. Check the throttles for sticking, loose or damaged throttle plates.
3. Check the transition pieces and O-rings for damage.

Installation

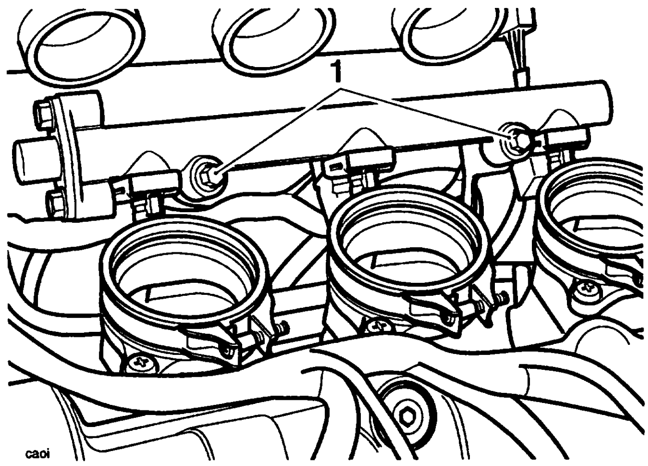
1. Thoroughly clean the transition piece to cylinder head mating faces.
2. Refit the transition pieces to the head incorporating new O-rings to the joint face. Tighten the transition piece fixings to **12 Nm.**



1. Transition piece

2. O-ring

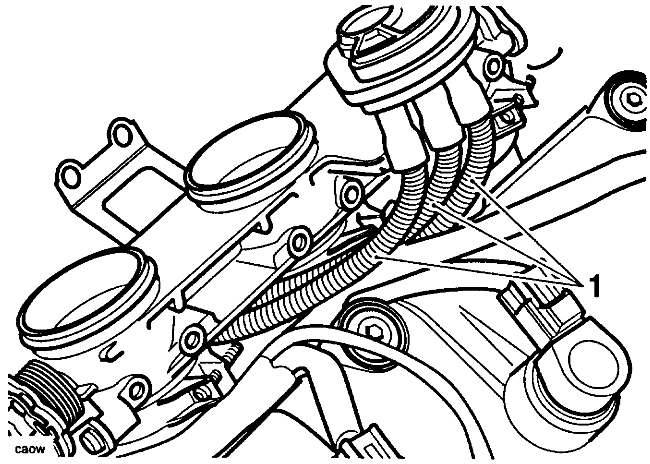
3. If the injectors have been removed from the fuel rail, refit them to the rail and secure with the clips.
4. Check the injector O-rings for splits and other damage. Replace as necessary.
5. Refit the injectors and fuel rail to the cylinder head. Tighten the fuel rail fixings to **6 Nm.**



1. Fuel rail bolts

6. Refit the throttle bodies to the transition pieces and secure with the clips.

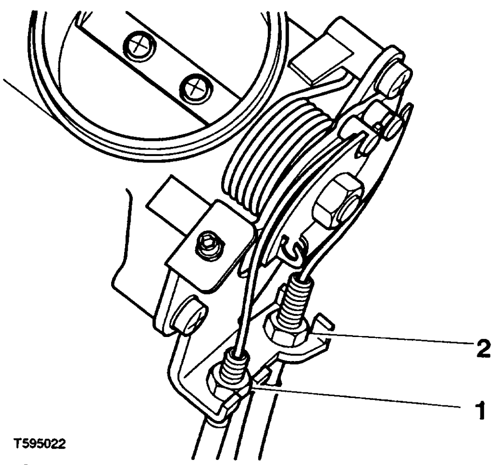
7. Reconnect the air bleed hoses to the cylinder head.



1. Air bleed hoses

8. Reconnect the idle air control valve multiplug.

9. Attach the ends of the inner cables to the throttle cam ensuring the opening cable is fitted to the rearward side of the throttle cam and the closing cable to the forward position.



1. Opening cable

2. Closing cable

10. Locate the outer cables to the bracket and secure with the adjuster and locknuts.

11. Set the cable adjustment as described previously in this section.

WARNING: Operation of the motorcycle with incorrectly adjusted, incorrectly routed or damaged throttle cables 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. Cables or harness that bind will restrict the steering and may cause loss of control and an accident.

WARNING: Ensure that all adjuster locknuts of both cables are correctly tightened.

A loose throttle cable adjuster on either throttle cable could cause the throttle to stick leading to loss of motorcycle control and an accident.

12. Refit the airbox and fuel tank as described earlier in this section.

13. Refit the rear body work and lower fairings (where fitted).

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

15. Refit the seat.

THROTTLE BODY BALANCING

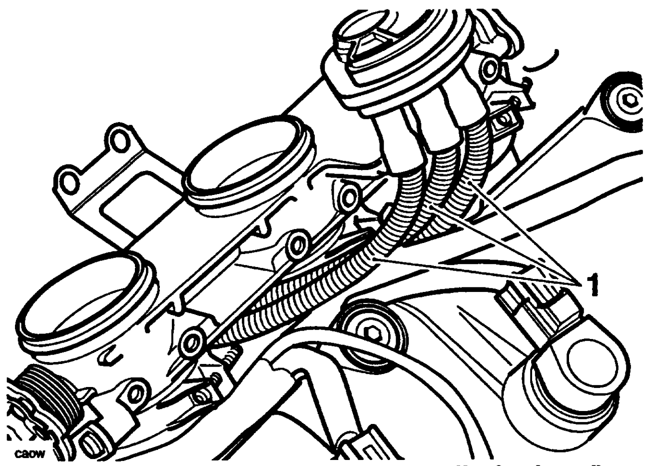
NOTE:

- **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.

> **WARNING: If the engine has recently been running, the components beneath the fuel tank 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.**

2. Disconnect the air bleed hoses from the ports on the idle control valve and insert suitable 'T' pieces between the hoses and valve.

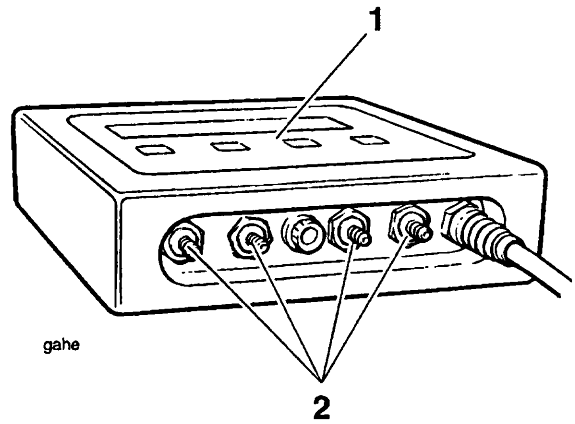


1. Air bleed hoses (disconnect at cylinder head)

3. Attach the analyser hoses to the 'T' pieces.
4. Position the analyser in a location that will allow it to be easily read.

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

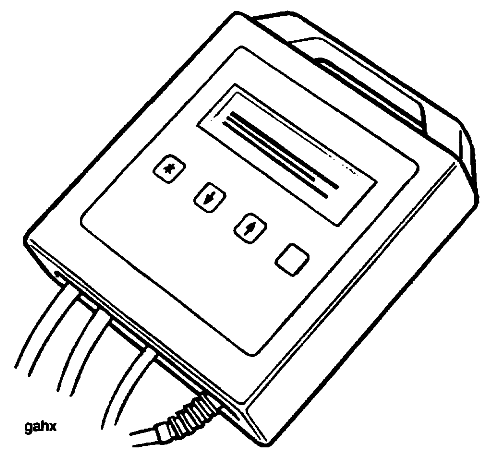
2. Throttle body connections

5. Temporarily refit the fuel tank and reconnect the fuel hoses and fuel pump connection.

NOTE:

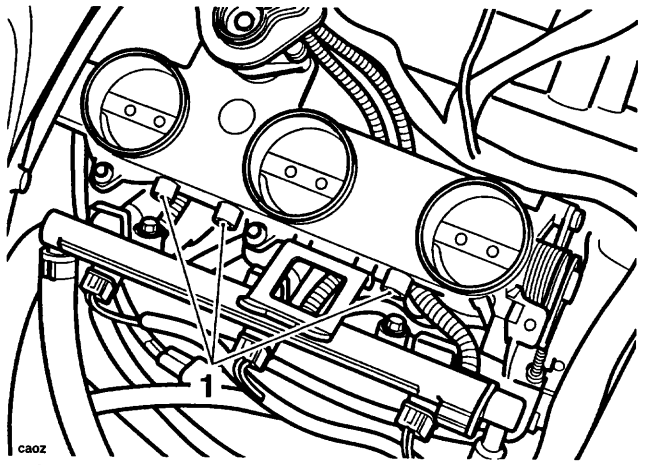
- **A fuel hose and extension lead kit is available from Triumph to allow remote connection of the fuel tank. Order part numbers T3880124 and T3880127.**

6. Attach an exhaust extraction hoses to the silencer.
7. Start the engine.
8. Select the bar chart display on the analyser and assess which cylinders require adjustment.



Typical display of imbalanced throttles.

9. Set all adjusters such that all three throttle bodies have an equal vacuum reading.



1. Adjusters

10. Connect the Triumph diagnostic tool. Scroll to "SENSOR DATA" and check the read-out for IACV stepper position.

11. If the read-out is in the range 30-35 steps, no further adjustment is needed. If the value is outside this range, make equal adjustment on all three throttle adjusters to bring the IACV read-out to within 30-35 steps.

12. Check the throttle balance and readjust if necessary (subject to maintaining the IACV in the 30-35 step range).

13. Stop the engine.

14. Remove the fuel tank.

15. Remove the "T' pieces and reconnect the air bleed hoses.

16. Refit the air box and fuel tank as described earlier in this section.

17. Start the engine and check that the idle speed is in the range 1200 $\pm$ 50 rpm.

NOTE:

- **If the idle speed now falls outside the above range, adjust the closed throttle position using the Triumph diagnostic tool.**

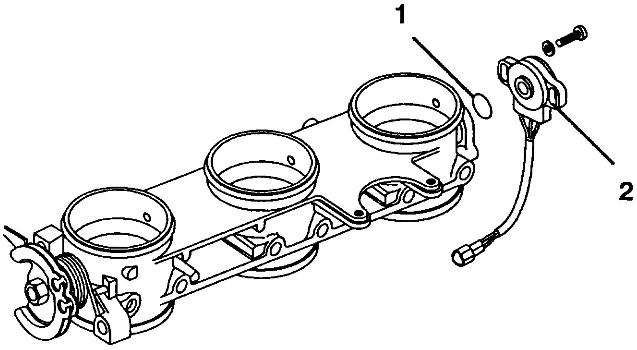
THROTTLE POSITION SENSOR

Removal

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

2. Remove the throttle body assembly as described earlier in this section.

3. Remove the throttle position sensor from the left hand end of the throttle body. Collect the O-ring on disassembly.



1. O-ring

2. Throttle position sensor

Installation

1. Fit the replacement throttle position sensor ensuring the O ring is positioned correctly between the sensor and throttle body.

2. Engage the new screws and washers supplied and part-tighten such that the sensor can still be rotated.

3. Position the throttle body assembly near to its fitted position and reconnect the sensor.

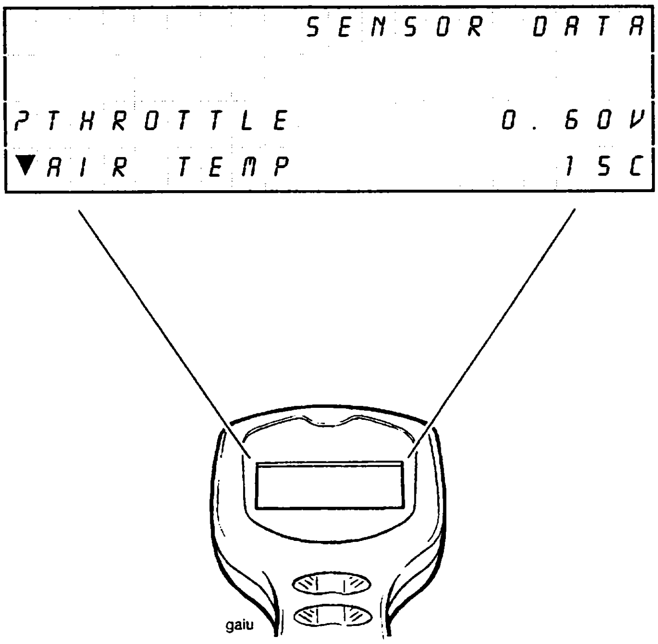
4. Reconnect the battery, positive (red) lead first.

5. Attach the Triumph service diagnostic tool to the dedicated plug.

6. Turn the ignition to the on position

7. Scroll through the tools screens to 'read sensors' then scroll down until the throttle position sensor voltage is in screen.

11. Adjust the position of the throttle position sensor (by gently rotating it within its adjustment range) until the diagnostic tool shows a throttle position sensor voltage of between 0.55 and 0.65 volts.



12. With the correct voltage displayed, tighten the sensor screws to 2.1 Nm +/- 0.5 Nm. Release, adjust and retighten if the voltage has changed after tightening the screws.

13. Disconnect the battery negative (black) lead first.

14. Fully refit the throttle body assembly, airbox and fuel tank as described earlier in this section.

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

16. Using the Triumph service diagnostic tool, reset the closed throttle position.

17. Check and clear any stored faults using the same tool.

EXHAUST SYSTEM

Removal

WARNING: If the engine has recently been running, the exhaust components may be hot to the touch.

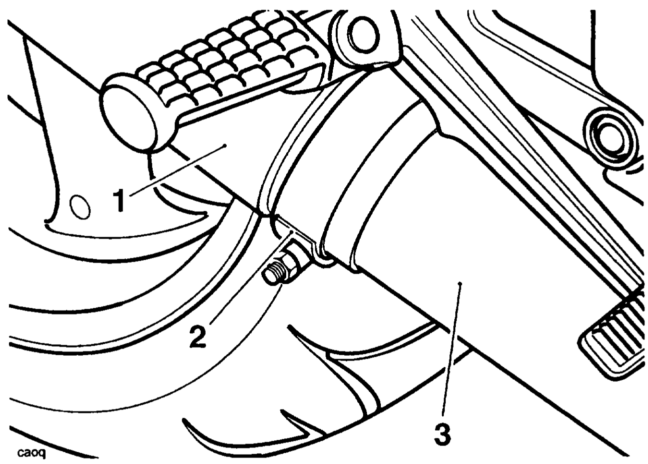
Contact with the hot components may cause damage to exposed skin. To avoid skin damage, always allow the hot parts to cool before working on the exhaust system.

1. Remove the seat.

2. Disconnect the battery, negative (black) lead first.

3. Remove the lower fairings as described in the bodywork section.

4. Release the clamp securing the silencer to the downpipe.

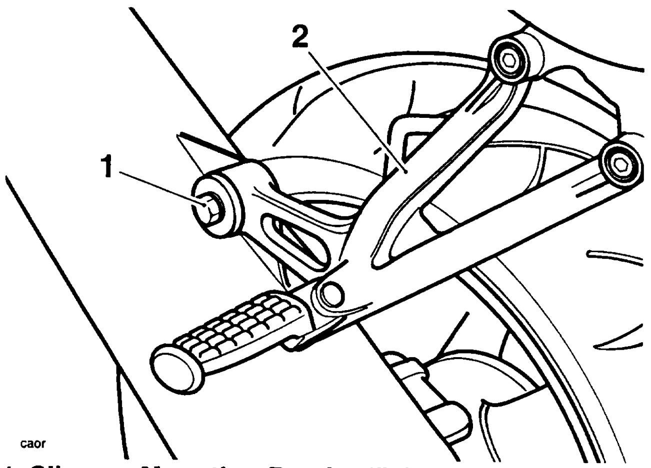


1. Silencer

2. Clamp

3. Downpipe

5. Support the silencer and release the bolt securing the silencer mounting bracket to the right hand rear footrest support.



1. Silencer Mounting Bracket/fixing

2. Rear Footrest Support

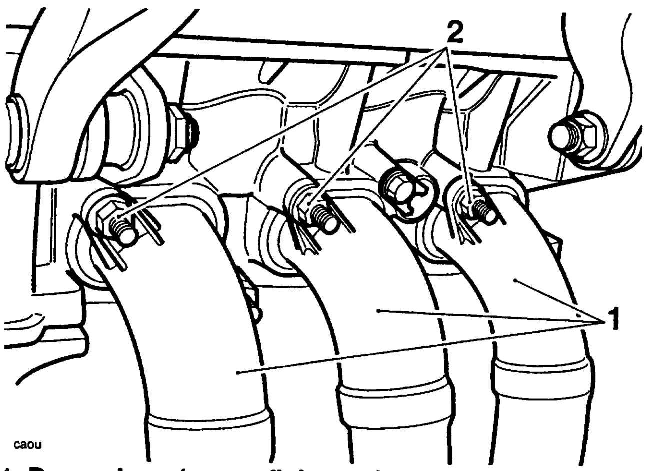
6. Remove the silencer.

7. Remove the oil cooler as described in the lubrication section.

8. Drain the cooling system and remove the radiator 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 radiator is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.**

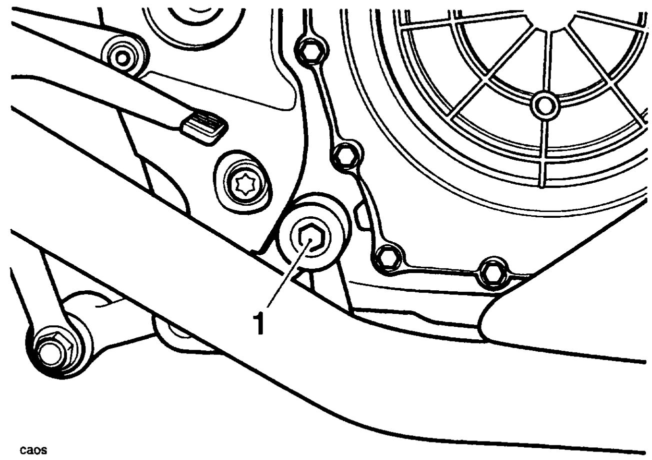
9. Release the fixings securing the downpipe joints to the cylinder head.



1. Downpipes (upper fixings shown, there are three others diagonally opposite)

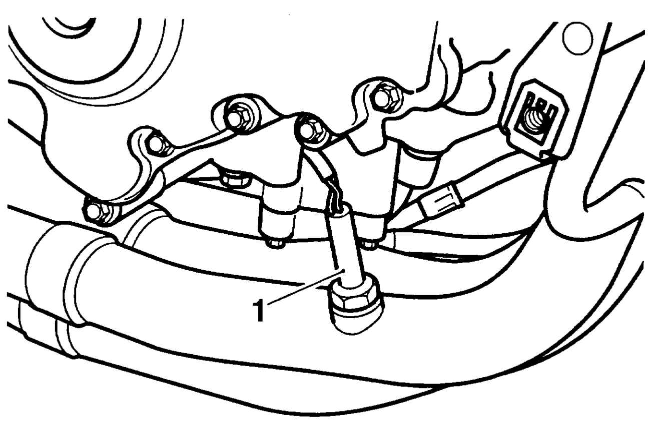
2. Fixings

10. Remove the bolt from the downpipe rear mounting point.



1. Downpipe rear mounting point

11. Disconnect the oxygen sensor.

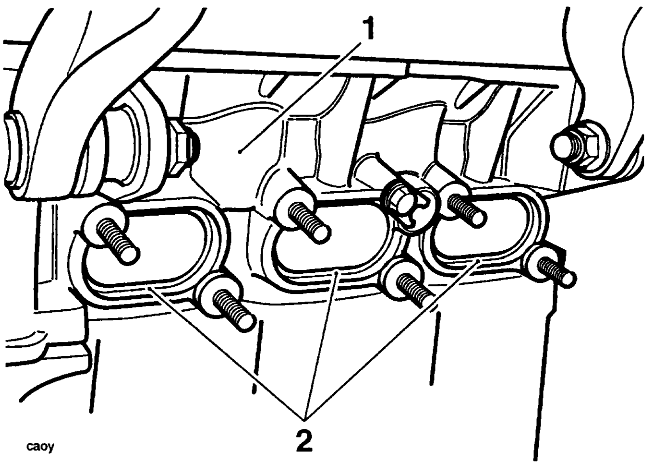


1. Oxygen sensor

12. 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 fixing points.

3. Assemble the rear mounting point fixings but do not tighten at this stage.

4. Tighten the downpipe to cylinder head fixings in the following sequence:
a) Working from left to right, tighten the upper row of nuts to **19 Nm.**
b) Working from left to right, tighten the lower row of nuts to **19 Nm.**
c) Working from left to right, retighten the upper row of nuts to **19 Nm.**

5. Tighten the rear mounting point fixing to **15 Nm.**

6. Reconnect the oxygen sensor.

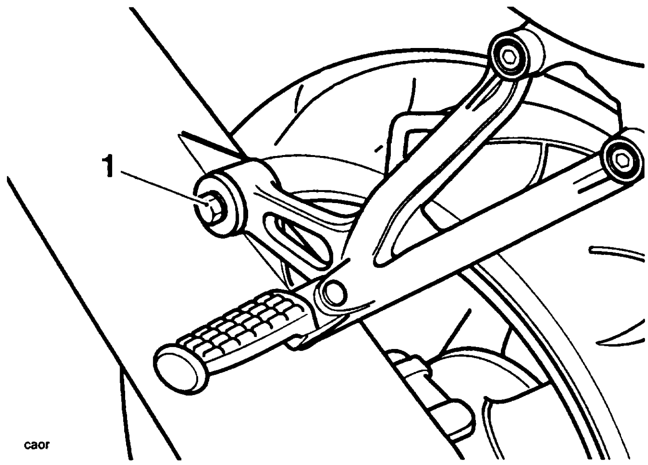
7. Refit the radiator and refill the cooling system as described in the cooling section.

8. Refit the oil cooler as described in the lubrication section.

9. Position and engage the silencer to the downpipe.

10. Align the silencer mounting bracket to the rear footrest support.

11. Fit the silencer mounting bolt and tighten to **27 Nm.**



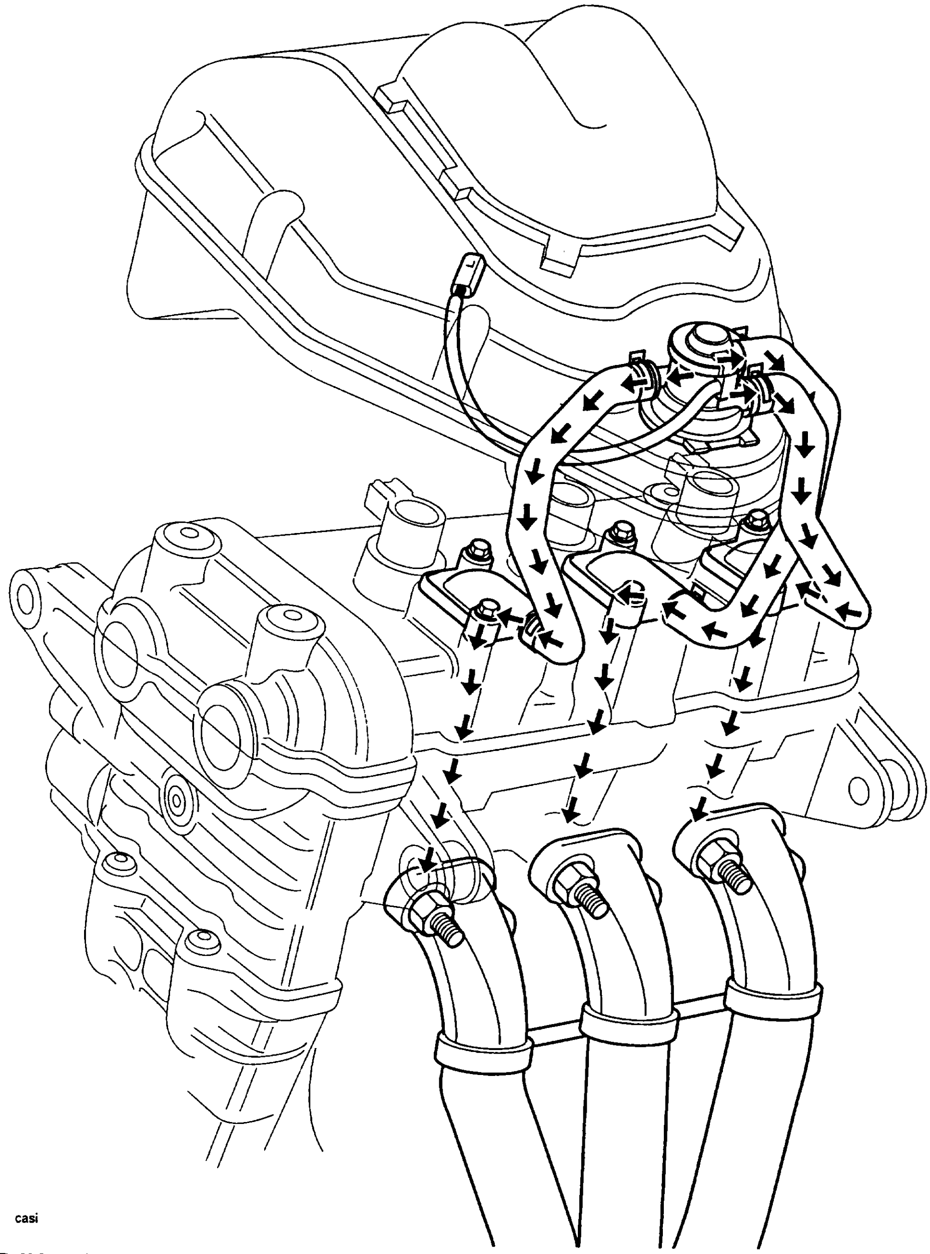
1. Silencer Mounting Bolt

12. Align the silencer clamp to the silencer to downpipe joint and tighten to **22 Nm.**

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

14. Refit the seat.

15. Start the engine and check for exhaust gas leaks etc. Rectify as necessary.



SECONDARY AIR INJECTION (not fitted in some markets)

System Purpose and Operation

The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber.

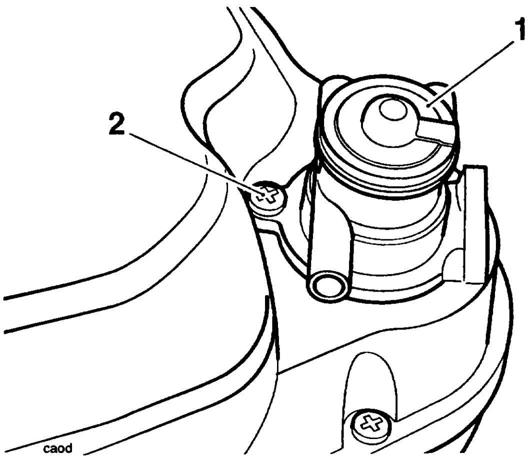
At certain specific engine speeds above idle (determined by the factory programming of the engine management system), the secondary air injection control valve is opened by the ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the control valve, through the open reed valves, into the exhaust port. This air promotes secondary combustion of the exhaust gases in the ports and header system. Once the exhaust valves close, the depression is reduced and the reed valves close.

At other engine speeds, the system is disabled by closing the control valve mounted in the airbox. This allows an oxygen sensor to control air to fuel ratios. If air was fed to the exhaust system when the oxygen sensor was operational, the incoming air would cause inaccuracies in the readings sensed by the oxygen sensor (which requires access to 'raw' combustion gases) which would lead to rough running.

Secondary Air Injection Solenoid Valve

Removal

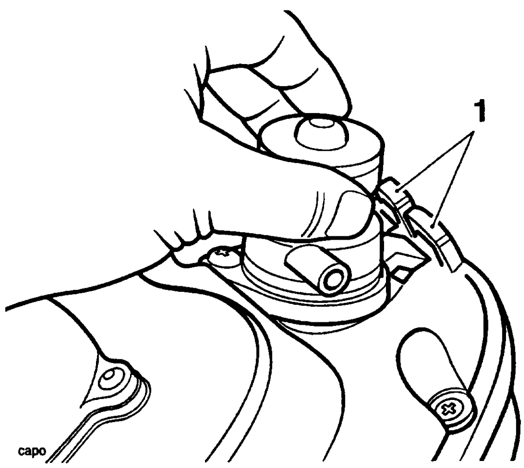
1. Remove the seat and disconnect the battery negative (black) lead first.
2. Remove the fuel tank and airbox as described elsewhere in this section.
3. Release the screw securing the valve to the airbox.



1. Solenoid valve

2. Retaining screw

4. Lift and tilt the valve to detach from the retainer at the front edge of the airbox.



1. Retainer

5. Collect the valve O-ring

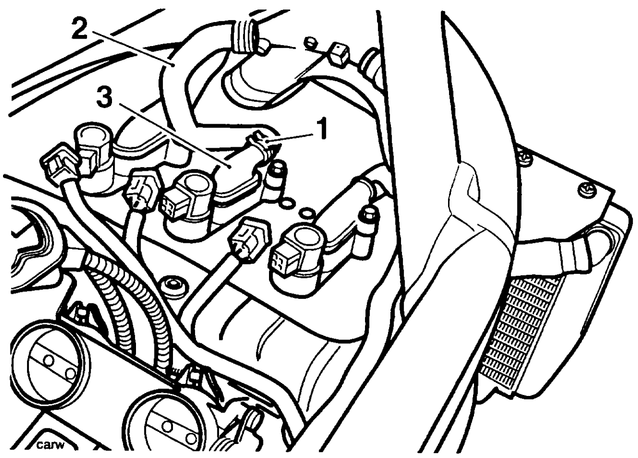
Installation

1. Fit a new O-ring to the groove provided in the airbox.
2. Locate the valve to the airbox and position it beneath the forward retainer. Ensure that the O-ring does not become dislodged or damaged.
3. Secure the valve tightening the retaining screw to **3 Nm.**
4. Refit the airbox and fuel tank as described earlier in this section.
5. Reconnect the battery, positive (red) lead first.
6. Refit the seat.

Secondary Air Injection Reed Valves

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) as detailed in the body section.
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.
6. Detach the secondary air injection air feed hoses from the reed valves on the cam cover.

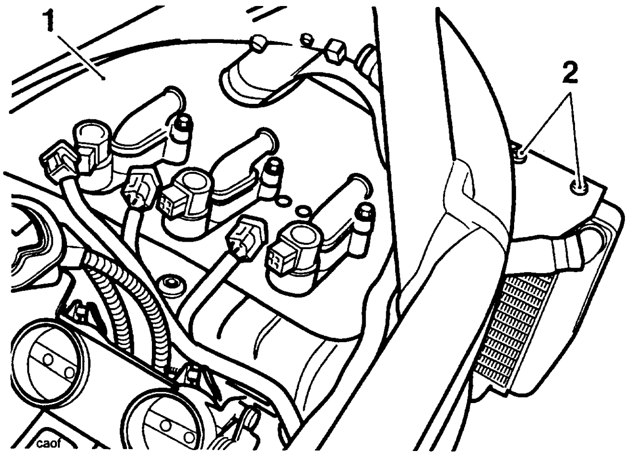


1. Spring-close hose clip

2. Secondary air injection hose

3. Reed valve assembly

7. Remove the airbox front bracket from the cam cover.
8. Release the clips from the air deflector shield above the cam cover.

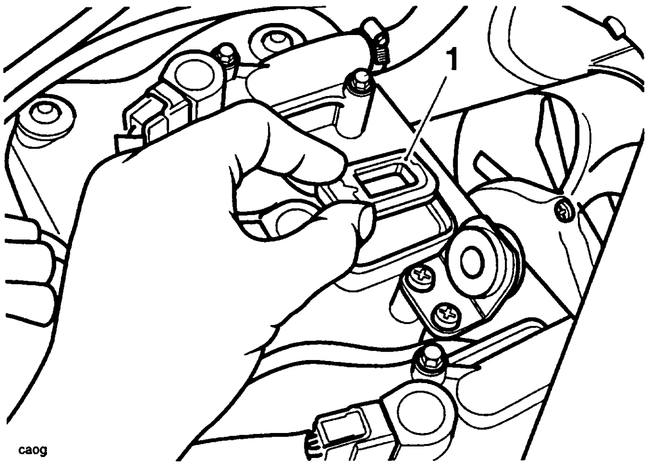


1. Air deflector shield

2. Clip locations

9. Release the clutch cable at the clutch end and pass the loose end through the air deflector shield, then remove the shield.
10. Release the bolts securing the valve covers to the cam cover.
11. Ease the valve covers from the valves.

12. Detach the valves from the cam cover.



1. Valve

Inspection

1. Check for cracks, bending or other damage to the valve flaps. Replace as necessary.
2. Check for damage to the seal areas. Replace as necessary.
3. Check the valve body to cylinder head seal damage.

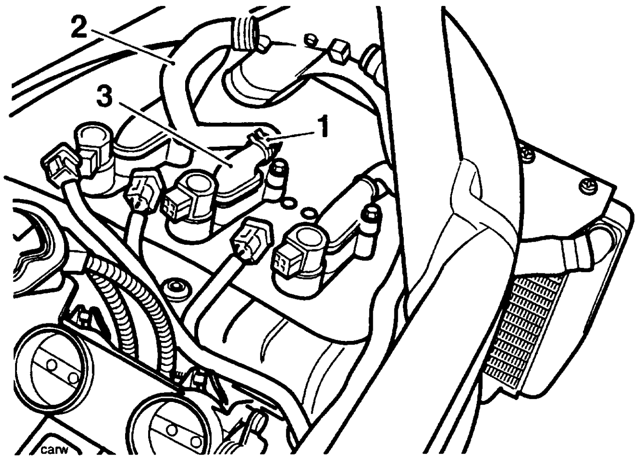
Installation

1. Fit the reed valves to the cam cover.

NOTE:

- **The valves fit with the flap-stop facing downwards (into the cover).**

2. Fit the valve covers and tighten the fixings to **9 Nm.**
3. Refit the air deflector shield to the cam cover and retain with the clips.
4. Pass the clutch cable through the hole provided in the air deflector shield.
5. Refit the clutch cable to the clutch and adjust as detailed in the clutch section.
6. Refit the airbox front bracket and tighten the fixings to **10 Nm.**
7. Refit the secondary air injection hoses to the reed valves. Position the spring-close hose clips over the hose ends using pliers.

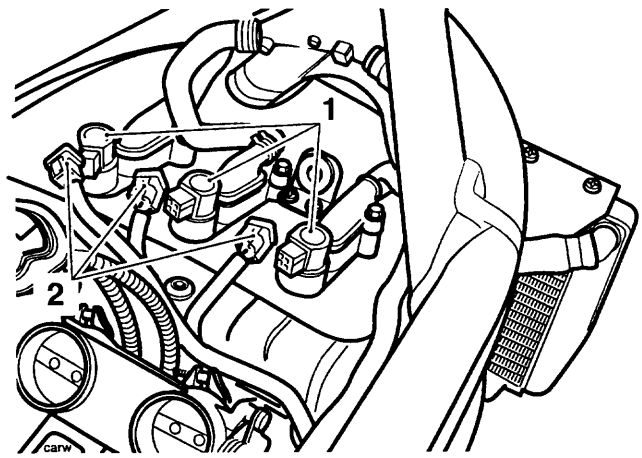


1. Spring-close hose clip

2. Secondary air injection hose

3. Reed valve assembly

8. Fit the ignition coils and reconnect.



1. Coils

2. Coil connections

9. Refit the fuel tank and airbox as described in this section.
10. Refit the lower fairings (if previously removed) as described in the body section.
11. Refit the side panel assembly.
12. Reconnect the battery positive (red) lead first.

EVAPORATIVE EMISSIONS CONTROL SYSTEM

California Models Only

All California models are fitted with a system to control the evaporation of fuel vapour into the atmosphere.

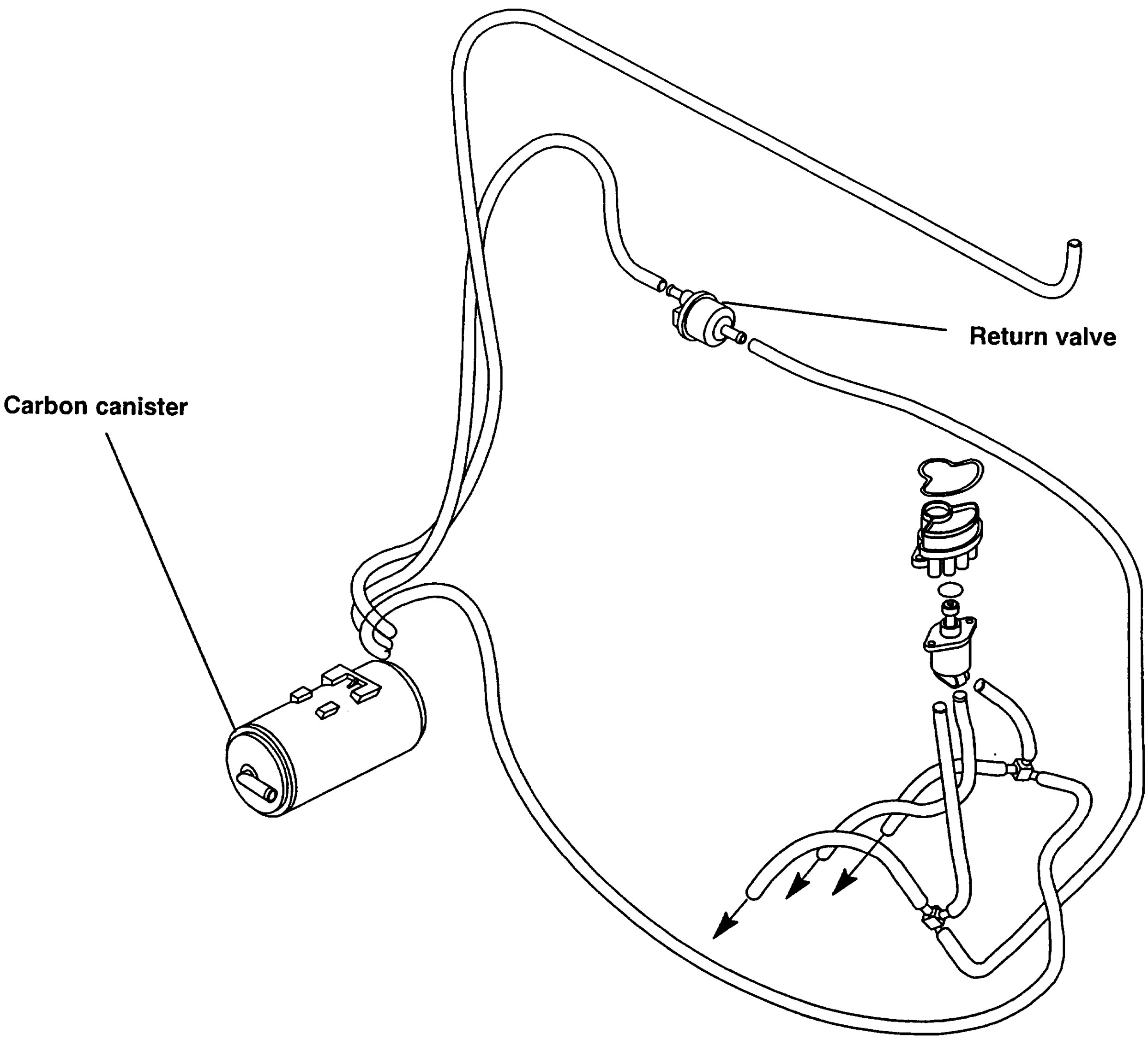
A carbon canister absorbs vapour while the engine is not running. When the engine is started, the vapour is returned to the engine and is burnt.

There are two distinct phases to the system's operation, engine off and engine running. These two conditions are explained overleaf.

Component Locations

Carbon Canister - behind the throttle bodies.

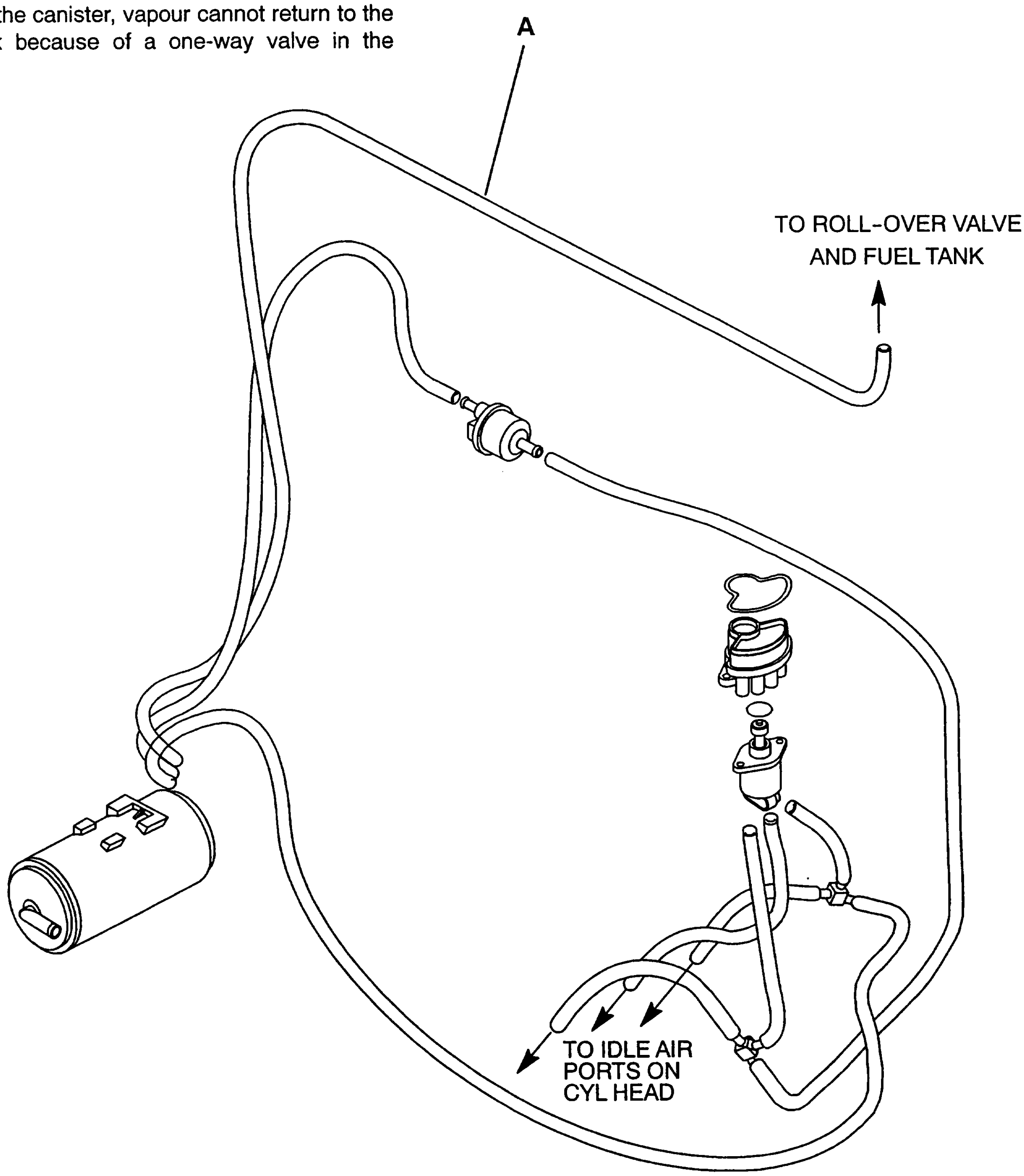
Return Valve - adjacent to frame, left hand side (electronically controlled by the ECM).



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, via the roll over valve to a carbon filled canister which stores the vapour.

Once in the canister, vapour cannot return to the fuel tank because of a one-way valve in the canister

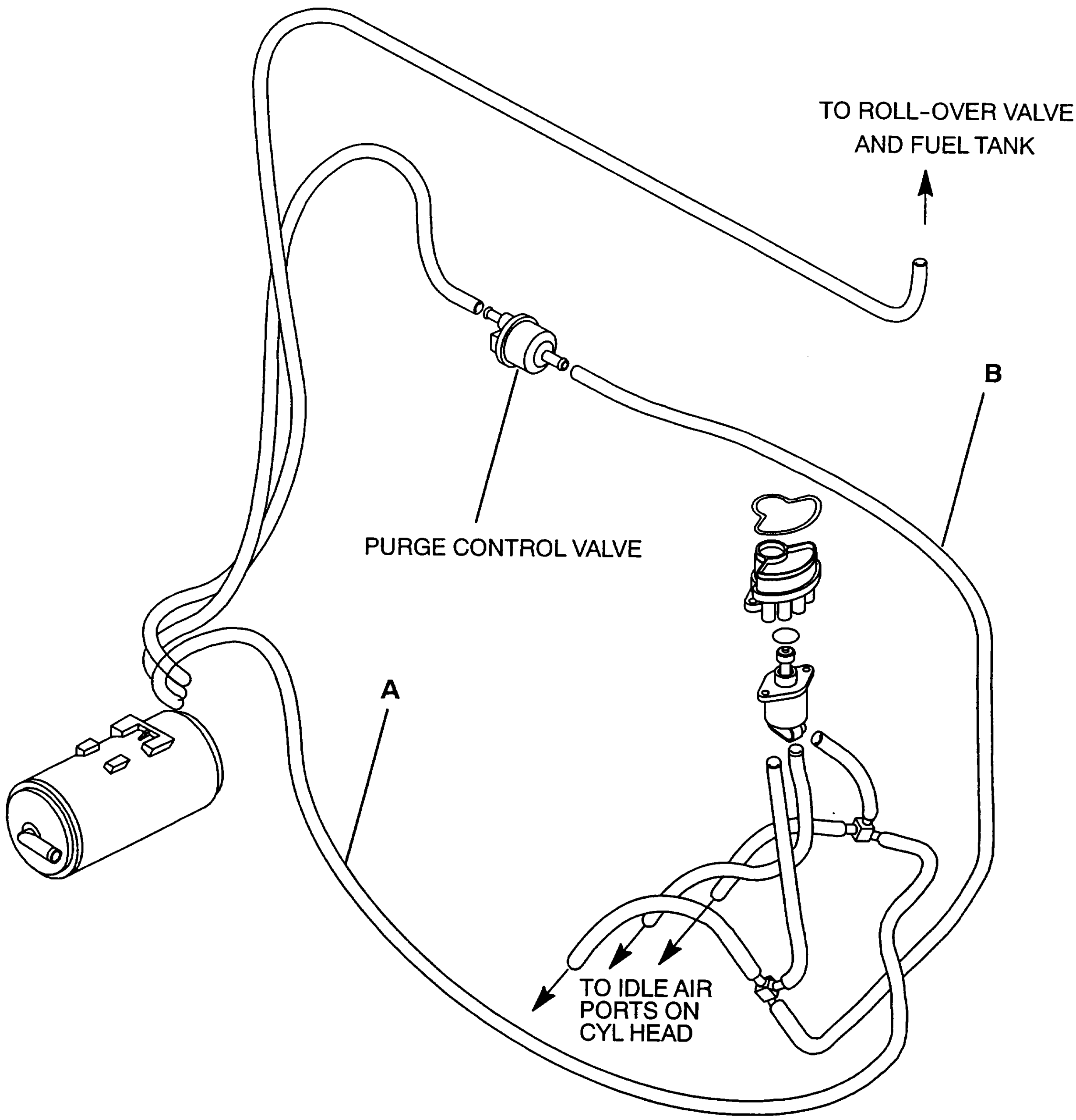


Evaporative Control System - Engine Running

When the engine is started, vacuum is applied via pipe A to a vent valve on the canister, causing it to open. Simultaneously, vacuum is applied along pipe B, via the purge control valve to the canister vent port.

Because the vent valve has been opened, the vacuum applied at point B begins to suck stored vapour from the carbon filled area of the canister via the vent port.

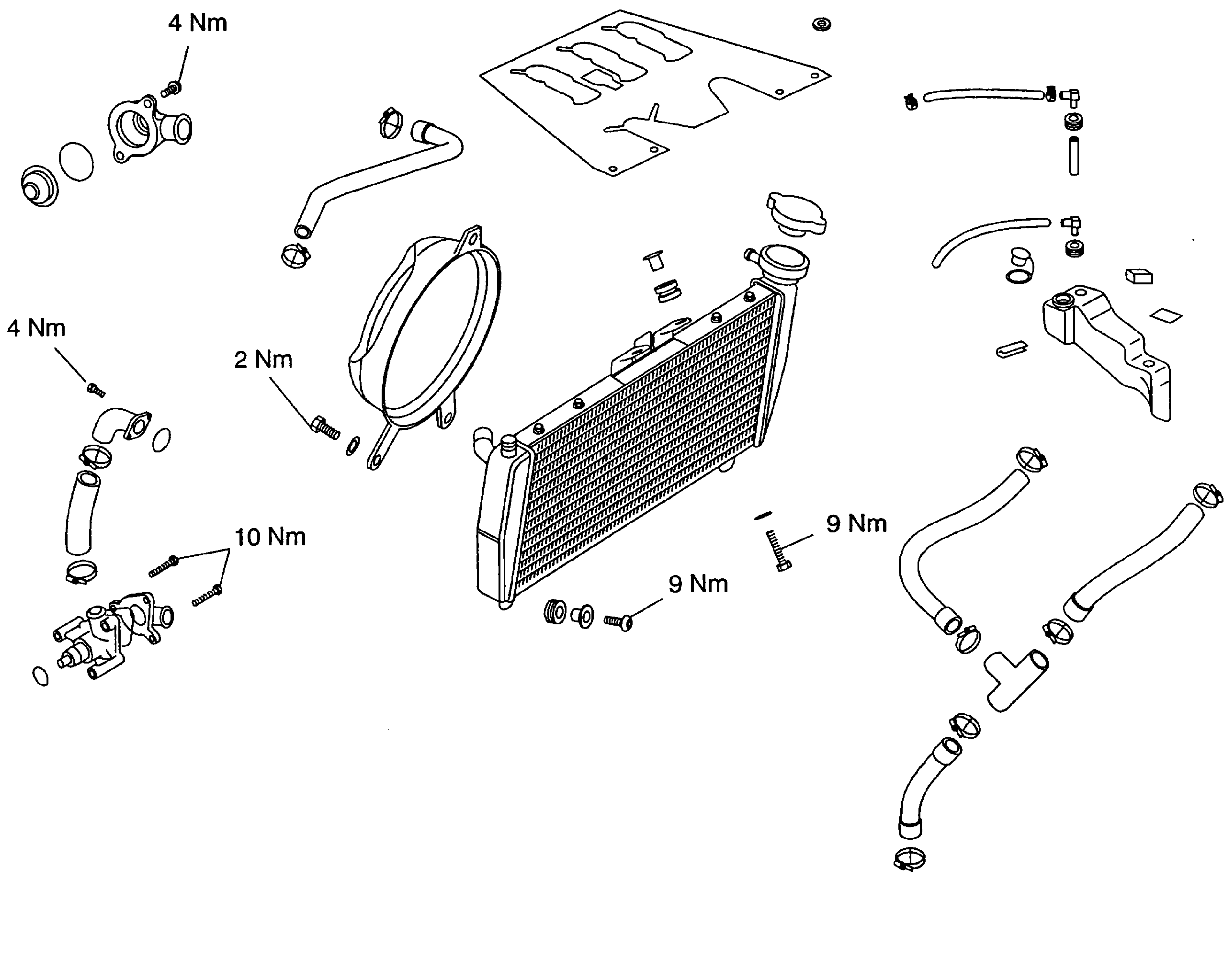
In order to control the speed at which vapour is purged from the canister, the engine management system regularly shuttles the purge control valve between the open and closed positions.



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.

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.

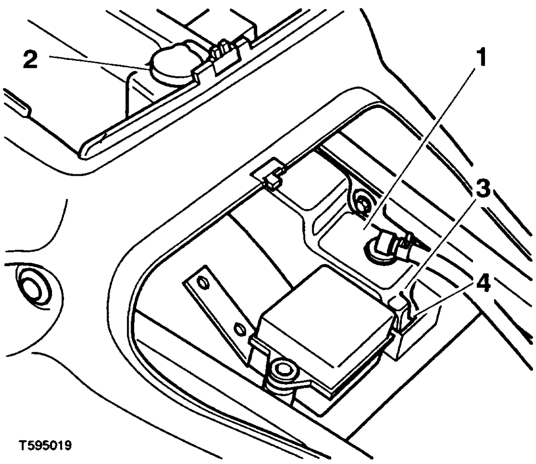
CAUTION: Using high-pressure water, as from a car-wash facility, can damage the radiator fins and impair the radiator's efficiency.

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 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.

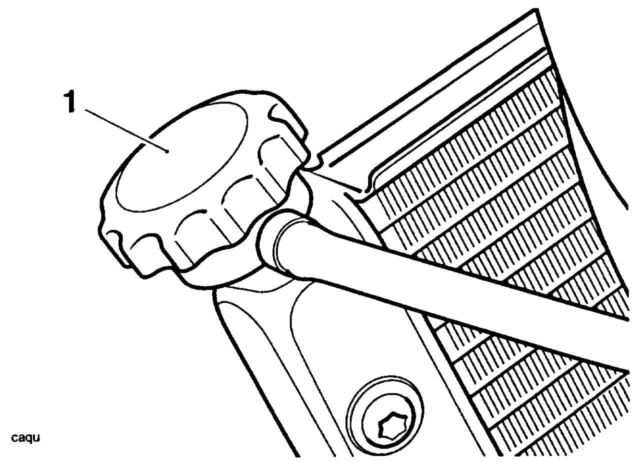
COOLANT REPLACEMENT

Drainage (all models)

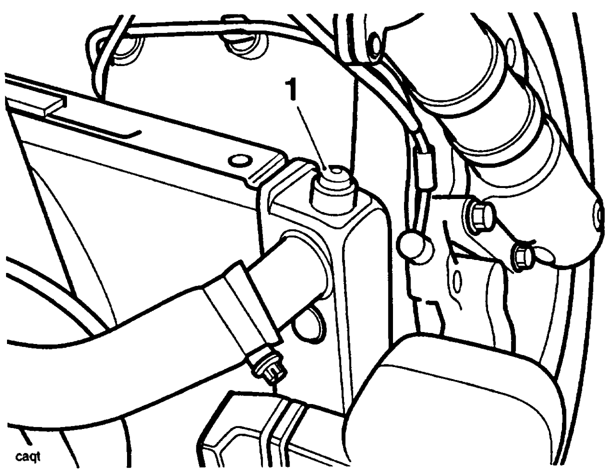
1. Remove the seat.
2. Disconnect the battery negative (black) lead first.
3. Remove both lower fairings (where fitted).

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 radiator and remove the bleed screw and washer to help drainage.

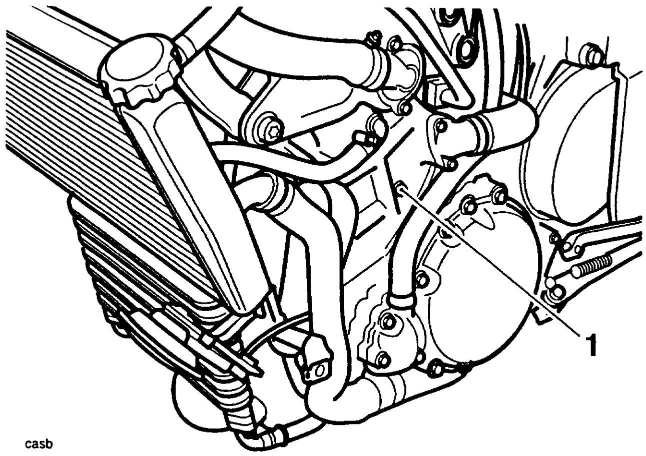


1. Radiator cap



1. Bleed Screw

5. Position a container to collect the displaced coolant.
6. Remove the coolant drain plug to allow the coolant to drain-out.



1. Coolant Drain Plug

7. To ensure full drain-out of the system, release the bottom hose from the water pump.

Filling

1. Refit the crankcase drain plug and tighten to **13 Nm**.
2. Reconnect the bottom hose and tighten the clip.
3. Slowly add coolant mixture to the system, through the filler opening in the radiator, 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.
4. 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 into the bleed screw side of the radiator.

NOTE:

- **A hand operated vacuum pump or similar should be used to syphon the coolant through the system.**

5. If necessary, top up the system through the filler and refit the pressure cap.
6. Refit the bleed screw and washer and tighten to **12 Nm.**
7. Refit the coolant pressure cap.
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.

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.

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 lower fairings (where fitted).
14. Refit the seat.

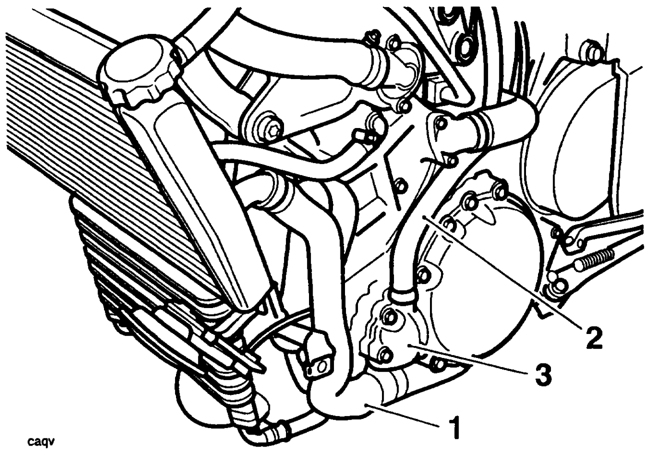
WATER PUMP

Removal

1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the 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

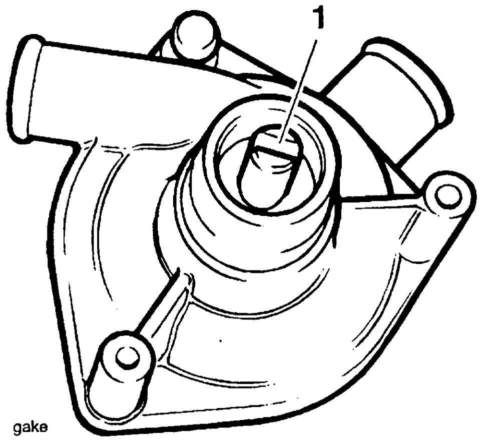
1. Check the water pump shaft and shaft bearings for side and end float. Renew if necessary
2. Check for corrosion and scale build-up around the impellor and in the pump body. Renew if necessary.

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)

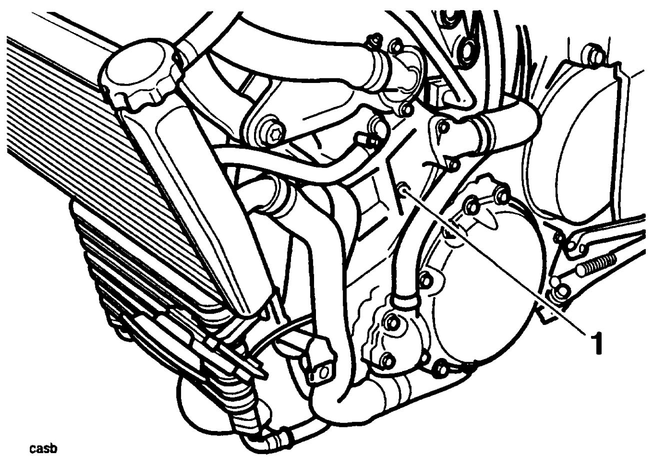
NOTE:

- **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.

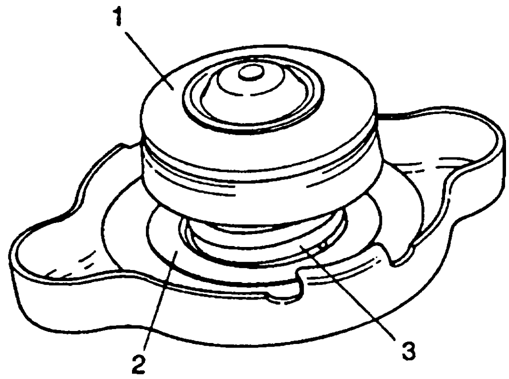
8. Start the motorcycle and allow the engine to idle for a short period of time to allow any air to be expelled from the system.
9. Stop the engine and top up the coolant level as necessary.
10. Fit the coolant pressure cap.
11. Check the expansion tank level and top up if necessary.
12. Refit the seat.
13. Refit the left lower fairing (where removed earlier).

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.

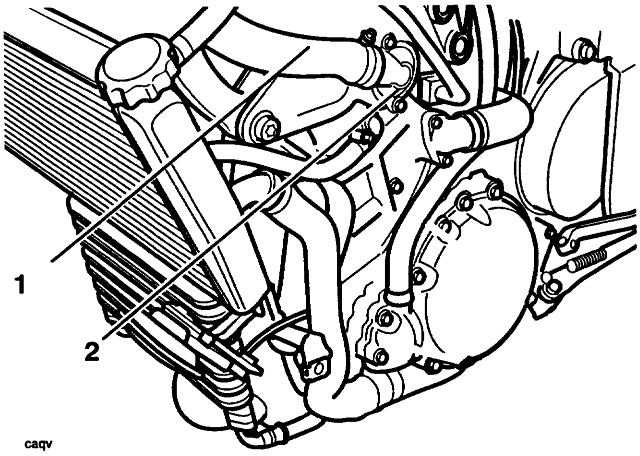
THERMOSTAT

Removal

1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the 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 top hose at the thermostat housing.



1. Top hose

2. Thermostat housing

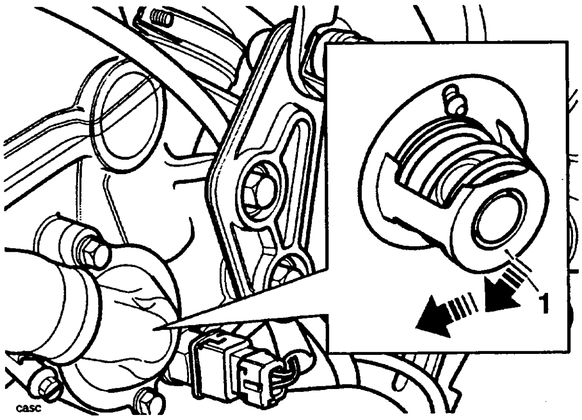
6. Release the fixings securing the thermostat housing to the cylinder head.
7. Withdraw the housing and collect the thermostat.

Inspection

1. Inspect the thermostat at room temperature. If the valve is open, the thermostat must be replaced.
2. To check the valve opening temperature, suspend the thermostat in a container of water and raise the temperature of the water until the thermostat opens. **The thermostat should start to open at 88°C +/- 5°C.**
3. If the temperature at which thermostat opening takes place is incorrect, replace the thermostat.

Installation

1. Clean the mating surfaces of the cylinder head and thermostat housing.
2. Locate the thermostat into the head with the jiggle pin 15 degrees to the left of the fully upright position.
3. Rotate the thermostat until the jiggle pin is in the fully upright position.

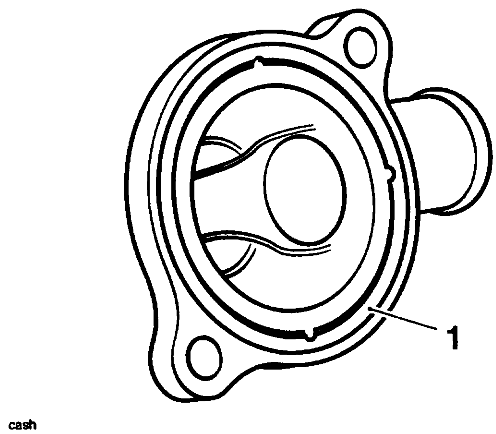


1. Thermostat (face shown inserted into the head)

NOTE:

- **When correctly positioned, the thermostat will fit snugly into the head, the jiggle pin will be in the twelve O-clock position and the thermostat will not turn any further clockwise.**

4. Position a new O-ring to the thermostat housing and seat into the groove.



1. O-ring/groove

5. Locate the housing to the head, ensuring that the O-ring does not become detached. Tighten the fixings to **4 Nm.**

6. Reconnect the top hose and secure with the hose clip.

7. Refill the cooling system as described earlier in this section.

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

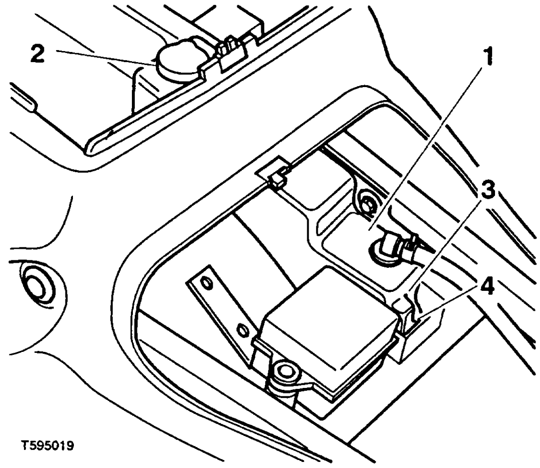
9. Start the motorcycle engine and allow the engine to idle for a short period of time to allow any air to be expelled from the system.

> **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.**

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.



1. Expansion Tank

2. Expansion Tank Filler Cap

3. 'Max' Mark

4. 'Min.' Mark

13. Refit the lower fairing (where fitted).

14. Refit the seat.

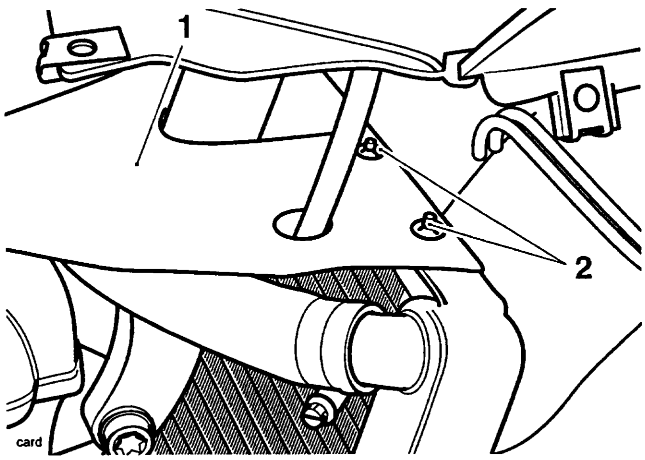
RADIATOR

Removal

1. Remove the seats.
2. Disconnect the battery negative (black) lead first.
3. Remove the lower fairings (where fitted).

> **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.**

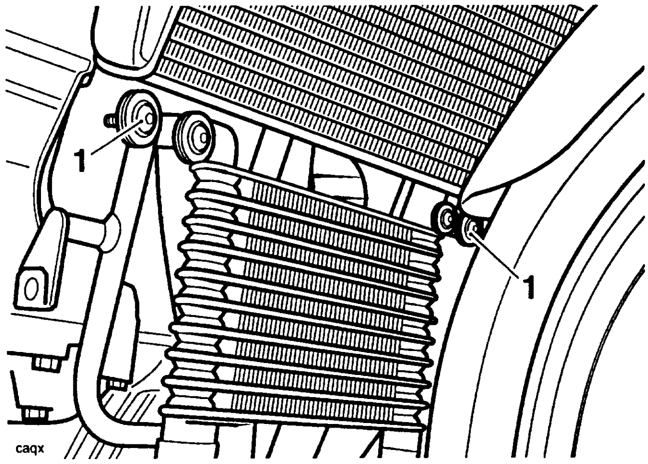
4. Drain the coolant as described earlier.
5. Disconnect the top and bottom hoses at the radiator.
6. Release the clips securing the air deflector shield to the top edge of the radiator.



1. Air deflector shield

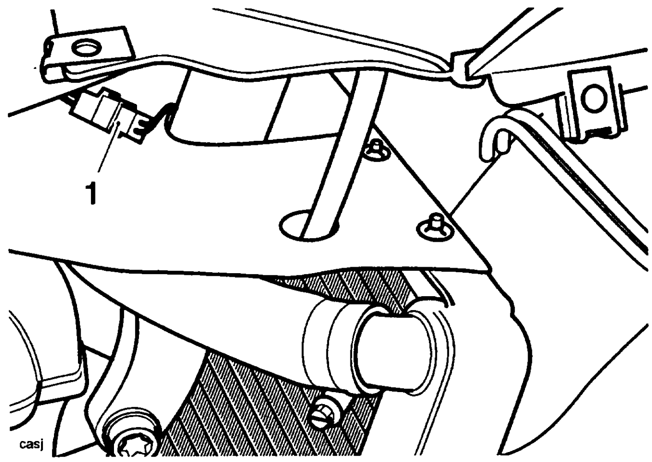
2. Clips

7. Release the radiator lower mounting bolts.



1. Radiator lower mounting bolts.

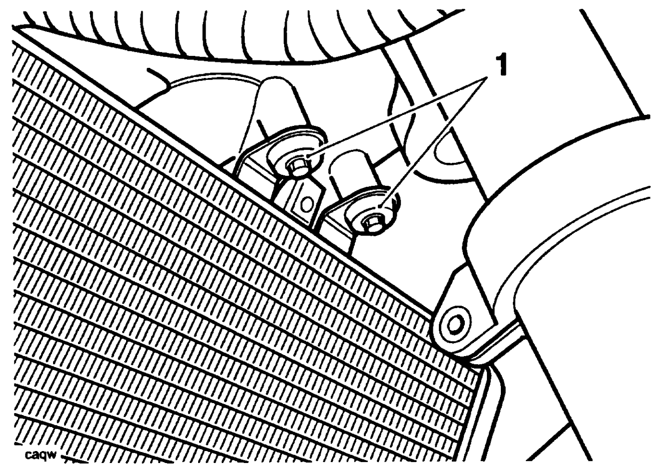
8. Disconnect the cooling fan.



1. Radiator

2. Cooling fan connection

9. Release the bolts securing the radiator to the frame.



1. Radiator to frame bolts

10. Remove the radiator.

Inspection

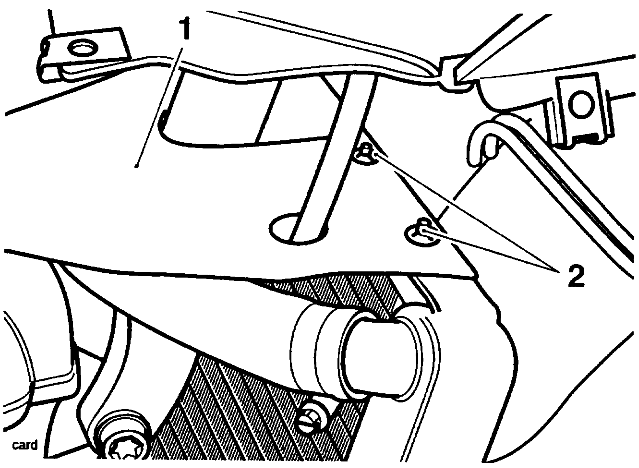
1. Check the radiator for stone damage.
2. Check the radiator core, for damage to fins or obstructions to air flow.
3. Repair any damage and clear all obstructions.

CAUTION: To avoid overheating and consequent engine damage, replace the radiator if the cores are blocked or if the fins are badly deformed or broken.

4. Check that the fan spins freely and without tight spots.
5. Check the fan blades for signs of heat distortion.

Installation

1. Align the radiator to the frame and fit the upper mounting bolts. Tighten the bolts to **9 Nm**.
2. Reconnect the cooling fan.
3. Fit the lower mounting bolts and tighten to **9 Nm.**
4. Reconnect the top and bottom hoses to the radiator. Tighten the hose clips.
5. Align the air deflector shield to the top edge of the radiator.
6. Refit the clips.



1. Air deflector shield

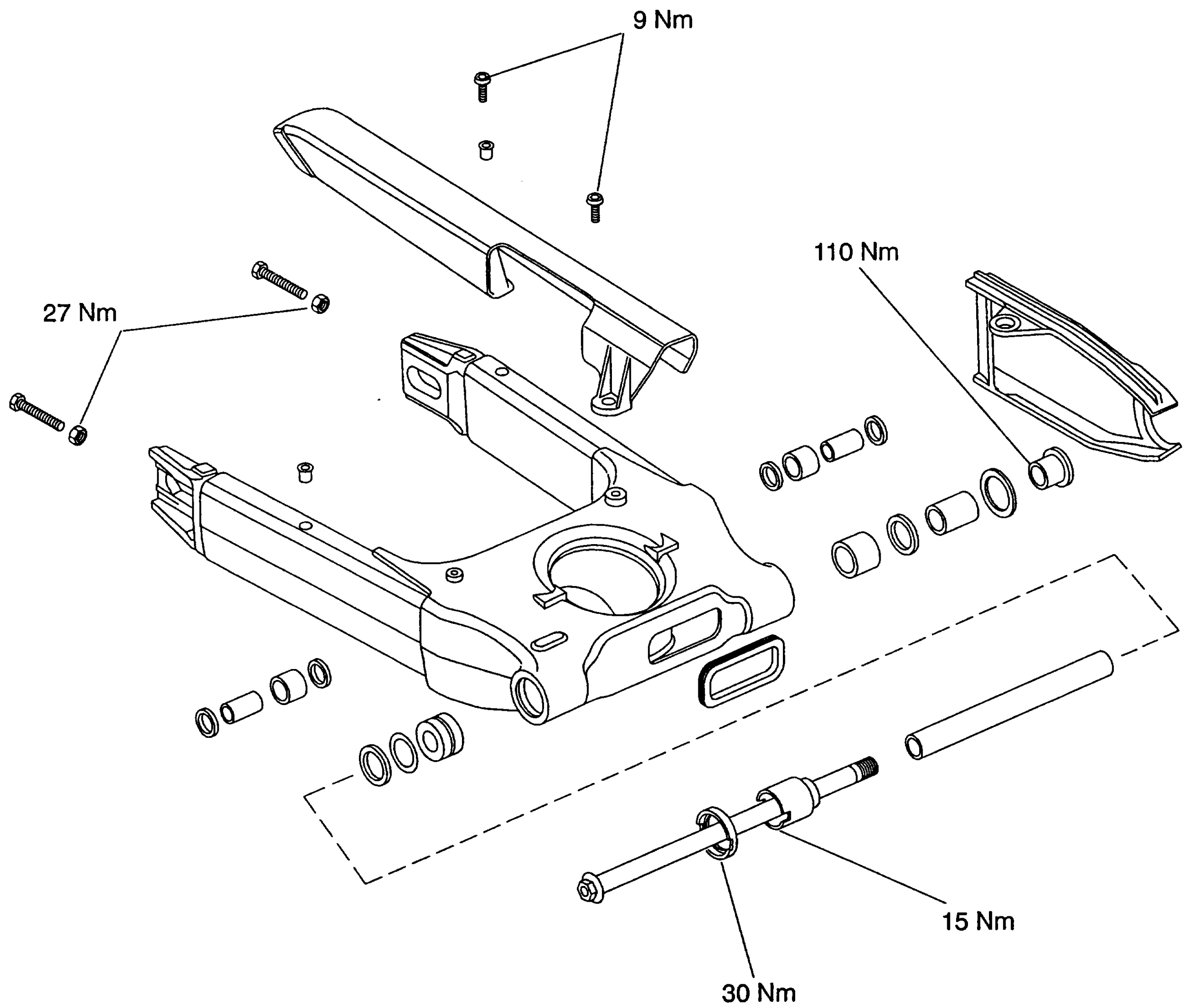
2. Clips

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. Fill the cooling system as described earlier in this section.
11. Refit the lower fairings (where fitted) as described in the body section.

REAR SUSPENSION - TWIN SIDED SWINGING ARM VERSIONS

CONTENTS

Exploded View - Swinging Arm



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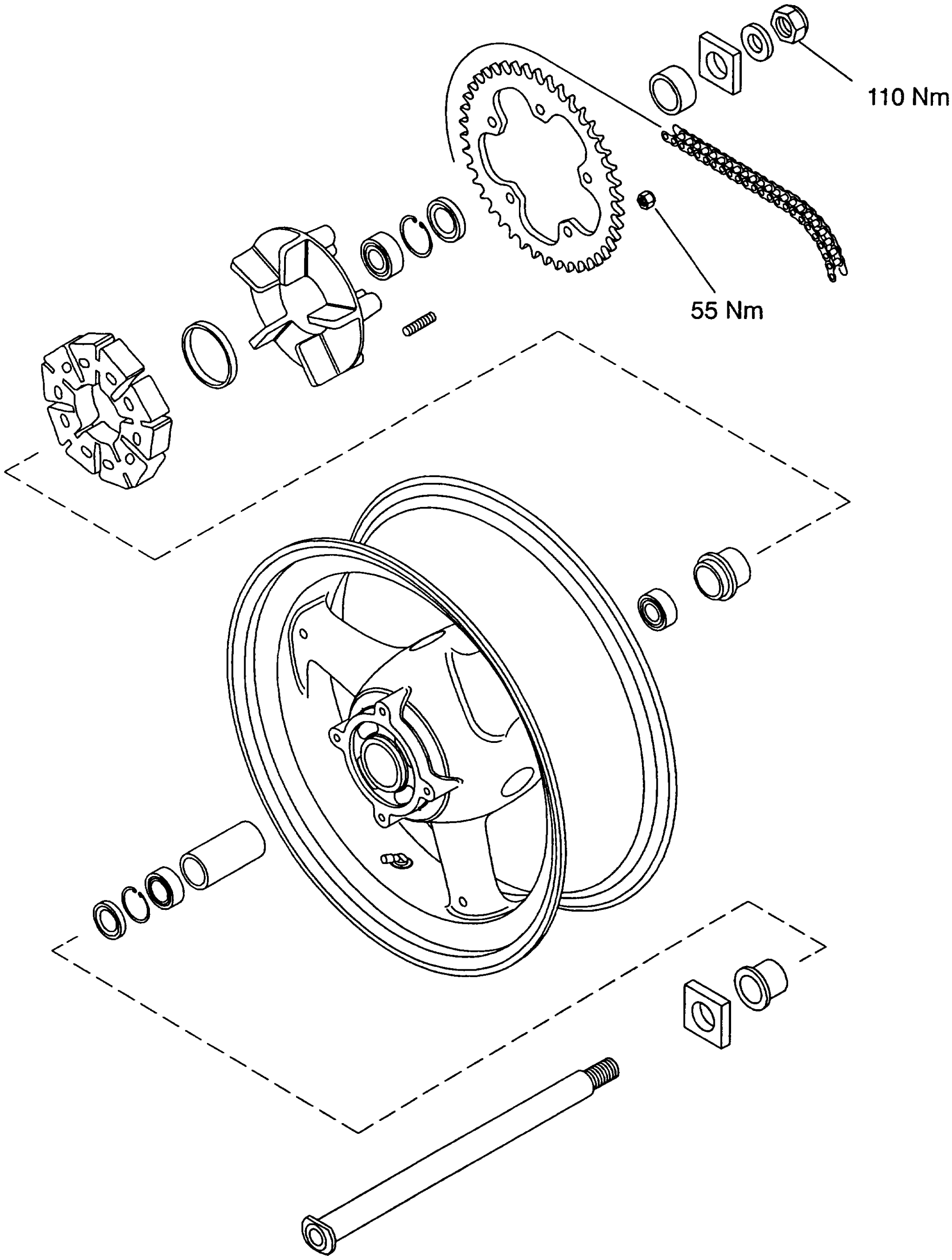

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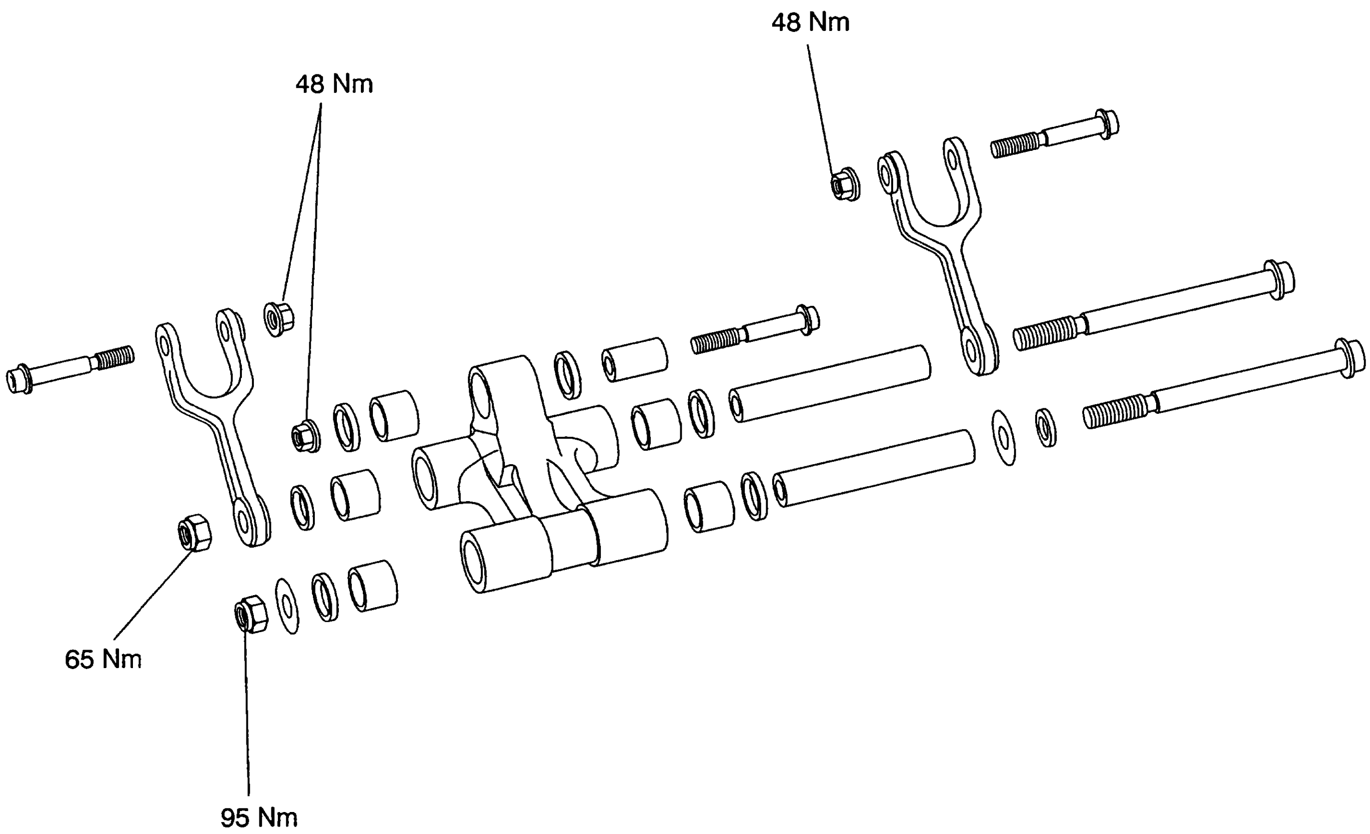

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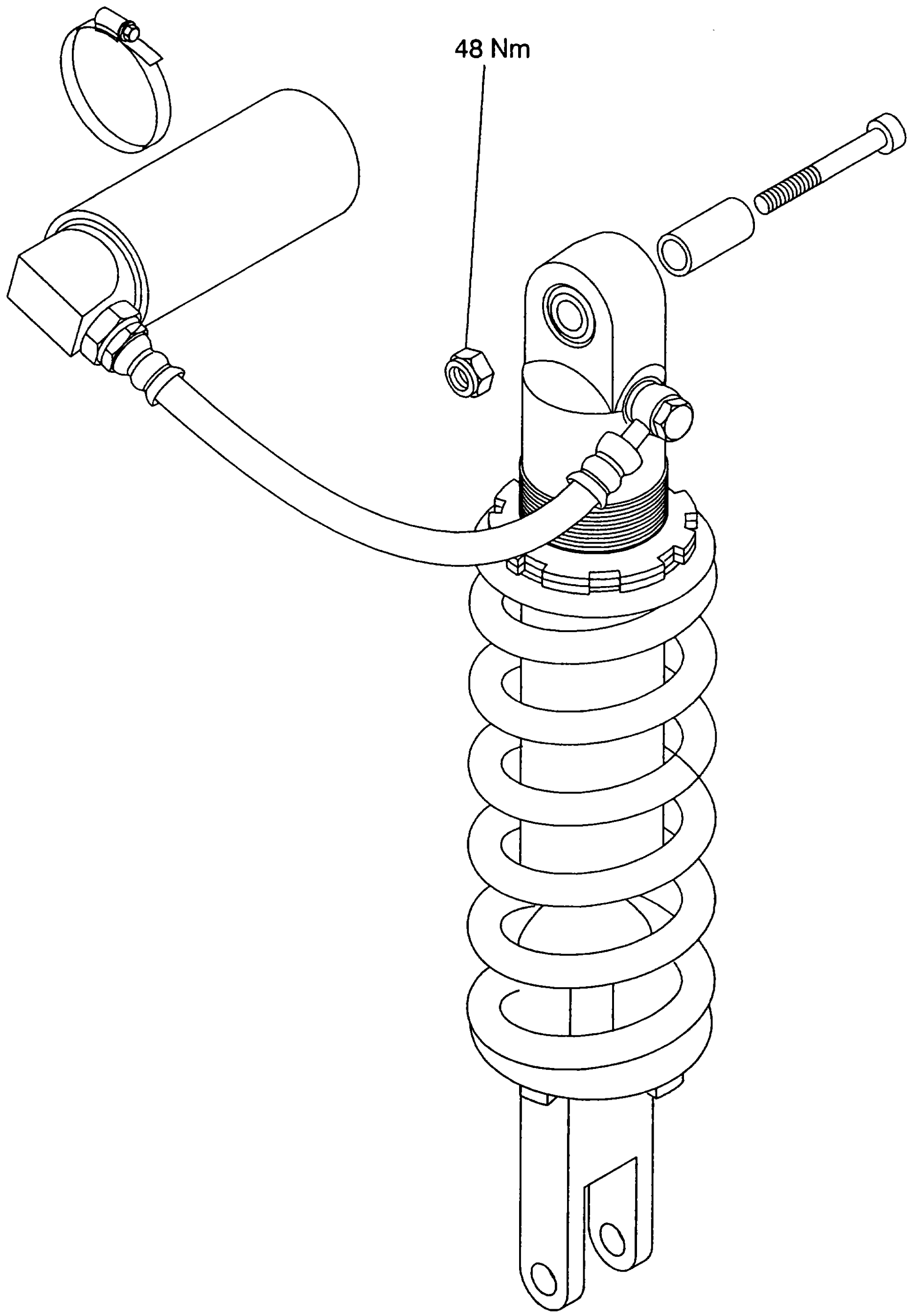


DRIVE CHAIN

For safety and to prevent excessive wear, the drive chain must be checked, adjusted, and lubricated in accordance with scheduled maintenance requirements. Checking, adjustment and lubrication must be carried out more frequently for extreme conditions such as salty or heavily gritted roads.

If the chain is badly worn or incorrectly adjusted (either too loose or too tight) the chain could jump off the sprockets or break.

WARNING: 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 an accident. Never neglect chain maintenance.

NOTE:

- **Checking, adjustment and lubrication of the drive chain must ideally be carried out with the motorcycle set up on a paddock stand so that the rear suspension hangs free.**
  Alternatively, the chain may be adjusted with the motorcycle parked on the side stand

Chain Lubrication

Lubrication is necessary every 500 miles and also after riding in wet weather, on wet roads, or any time that the chain appears dry.

Use the special chain lubricant as recommended in the specification section.

Correct application method is critical for chain lubricant. Apply the lubricant for one full chain revolution only, then leave for eight hours before riding. This allows the lubricant's solvent (used to thin the oil) to evaporate and the oil to 'soak' into all parts of the chain. If the lubricant is applied and the motorcycle is ridden shortly afterwards, the lubricant is unlikely to reach the internal rollers and bushes and the majority will be flung off and wasted. Applying excessive amounts is not helpful under any circumstances.

It should be noted that the lubricant is applied to the chain to lubricate its action across the sprockets. In an 'O' ring chain, external lubrication does not penetrate to the bushes and rollers as the 'O' ring seal prevents this from happening.

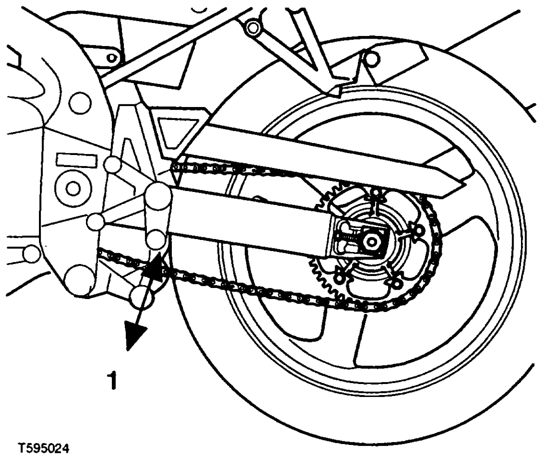
CAUTION: Do not use a power 'jet' wash to clean the chain as this may cause damage to the chain components.

CHAIN ADJUSTMENT

NOTE:

- **The correct adjustment setting for twin sided swinging arm models is 30-35 mm.**

Chain Free-movement Inspection

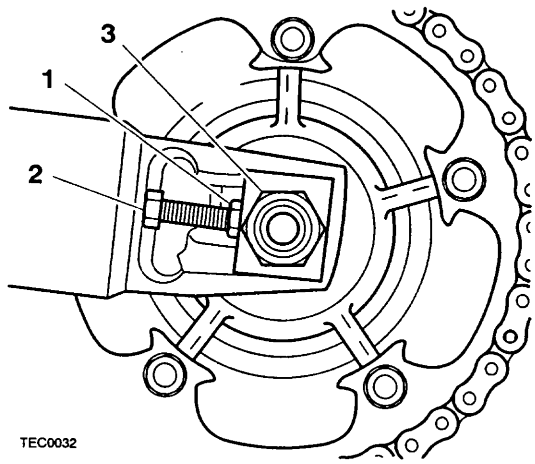


1. Maximum Movement Position

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

1. Park the motorcycle on the sidestand.
2. Rotate the rear wheel to find the position where the chain is tightest, and measure the vertical movement of the chain midway between the sprockets.
3. The vertical movement of the drive chain must be 30-35 mm.
4. If the chain free-movement measurement is incorrect, adjustments must be made.

Chain Free-movement Adjustment (twin-sided swinging arm version)



1. Adjuster Bolt

2. Adjuster Bolt Locknut

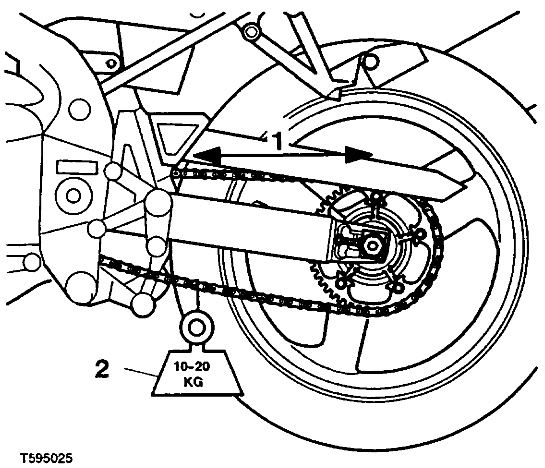
3. Rear Wheel Spindle Nut

1. Loosen the wheel spindle nut.
2. Release the locknuts on the left and right chain adjuster bolts.
3. Moving both adjusters by an equal amount, turn the adjuster bolts clockwise to increase chain free-movement and anti-clockwise to reduce chain free-movement.
4. When the correct amount of chain free-movement has been set, push the wheel into firm contact with the adjuster. Tighten both adjuster locknuts to **27 Nm** and the rear wheel spindle nut to **110 Nm.**
5. Rotate the rear wheel and repeat the chain adjustment check. Re-adjust if necessary

> **WARNING: Operation of the motorcycle with insecure adjuster locknuts or a loose wheel spindle may result in impaired stability and handling of the motorcycle. This impaired stability and handling may lead to loss of control or an accident.**

6. Check the rear brake effectiveness.

Chain Wear Inspection



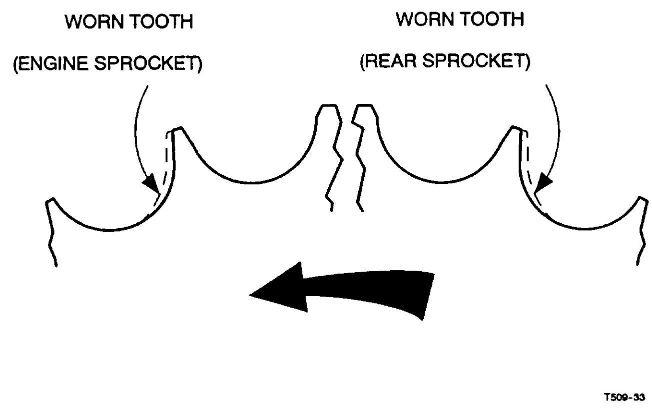
1. Measure Across 20 Links

2. Weight

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

1. Remove the chain guard(s).
2. Stretch the chain taut by hanging a 10-20 kg (20-40 lb) weight on the chain.
3. Measure the length of 20 links on the straight part of the chain from pin centre of the 1st pin to the centre of the 21st pin. Since the chain may wear unevenly, take measurements at several places.
4. If the length exceeds the maximum service limit of 321 mm, the chain must be replaced.

> **WARNING: 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 control and an accident.**



NOTE:

- **Sprocket wear is exaggerated for illustration.**

> **WARNING: The use of non-approved chains may result in a broken chain or may cause the chain to jump off the sprockets.**
>
> **Use a genuine Triumph supplied chain as specified in the Triumph Parts Catalogue.**
>
> **Never neglect chain maintenance and always have chains installed by an authorised Triumph dealer.**

5. Rotate the rear wheel and inspect the drive chain for damaged rollers, and loose pins and links.
6. Also inspect the sprockets for unevenly or excessively worn or damaged teeth.
7. If there is any irregularity, have the drive chain and/or the sprockets replaced by an authorised Triumph dealer.
8. Replace the chain guard.

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.

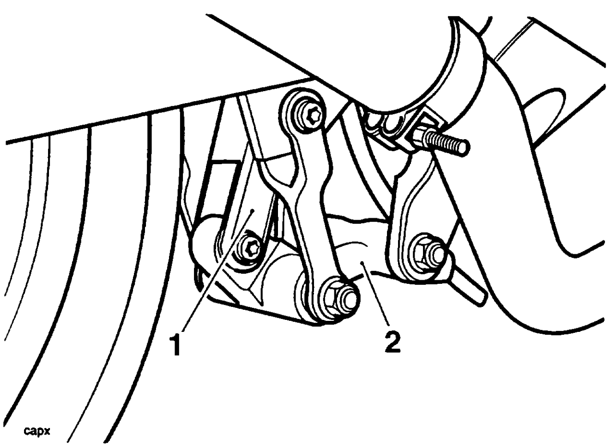
WARNING: Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the rear of the motorcycle under the frame or engine. Position a block to support the rear wheel.
2. Remove the seat.
3. Disconnect the battery, negative (black) lead first.
4. Remove the rear bodywork as described in the body section.
5. Remove the fuel tank as described in the fuel system section.

WARNING: Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.

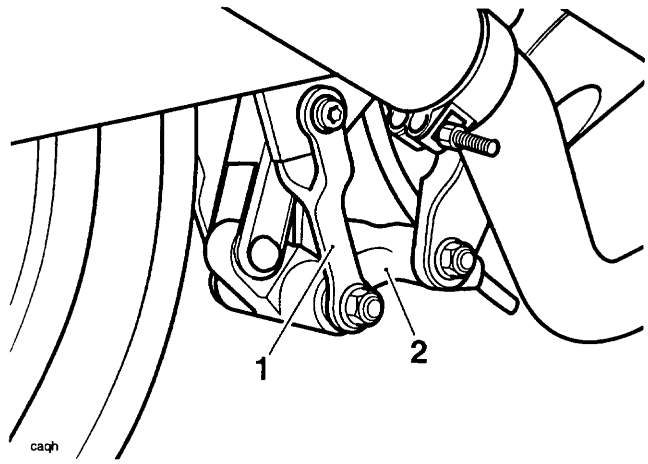
A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

6. Remove the nut and bolt securing the rear suspension unit lower mounting to the drag link.



1. Rear suspension unit
2. Drag link

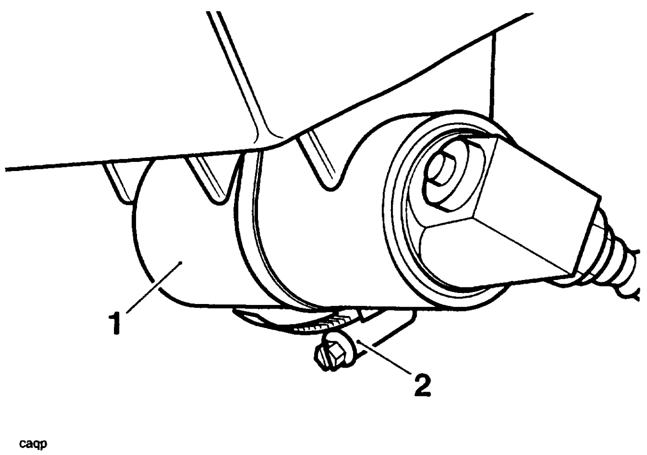
7. Release the nut and bolt securing the left and right hand drop links to the drag link.



1. Drop link (right hand)

2. Drag link

8. Pivot the drag link forward and down to allow room for the rear suspension unit to be removed.
9. Remove the rear suspension unit upper mounting nut and bolt. Collect the spacer.
10. Detach the rear suspension unit reservoir from the battery box by releasing it from the re-usable clip.



1. Reservoir

2. Clip

11. Withdraw the rear suspension unit and reservoir downwards through the frame and swinging arm.

NOTE:

- **Depending upon the height of the motorcycle above the ground, it may be necessary to lift the rear wheel and swinging arm to allow room for the suspension unit to be withdrawn.**

Inspection

1. Clean all components and inspect for damage and wear to:

- rear suspension unit upper and lower mountings,
- lower mounting sleeve in the drag link.

Renew parts as necessary.

Installation

1. Locate the rear suspension unit to the frame/swinging arm and loosely fit the upper mounting bolt, spacer and nut.

NOTE:

- **For ease of access, the bolt should be fitted from the left side of the motorcycle.**

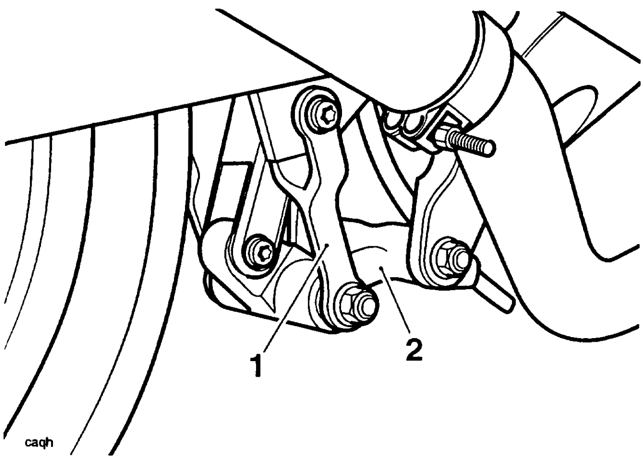
2. Position the reservoir to the battery box and secure with the clips.
3. Pivot the drag and drop links until the drop links can be refitted to the swinging arm. Loosely fit the bolts and nuts.
4. Align the rear suspension unit to the drag link and loosely fit the securing bolt and nut.
5. Tighten the rear suspension unit upper mounting to **48 Nm**.
6. Tighten the rear suspension unit lower mounting to **48 Nm**.
7. Tighten the drop link nuts and bolts to **65 Nm.**
8. Refit the fuel tank as described in the fuel system section.
9. Refit the rear bodywork.
10. Connect the battery, red (positive) lead first.
11. Refit the seat.
12. Lower the motorcycle to the ground and park on the sidestand.

DRAG LINK

Removal

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

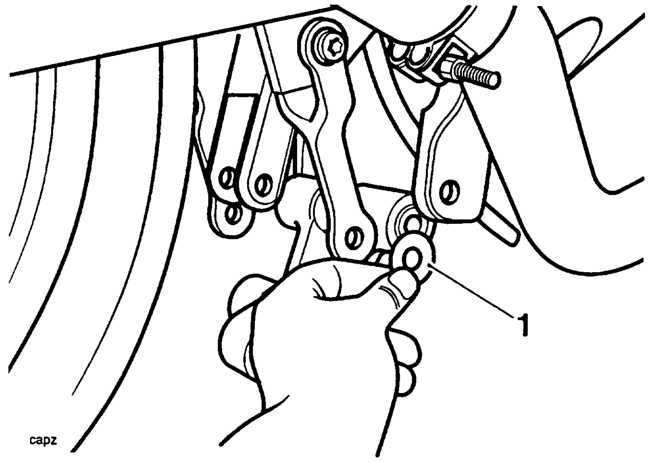
1. Raise and support the rear of the motorcycle under the frame or engine. Position a block to support the rear wheel.
2. Remove the nut and bolt securing the the drop links to the drag link.



1. Drop link (right hand)

2. Drag link

3. Remove the bolt and nut securing the drag link to the rear suspension unit lower mounting point.
4. Remove the bolt and nut securing the drag link to the frame.
5. Detach the drag link from the frame collecting the drag link thrust washer and any additional shims from the right hand side.



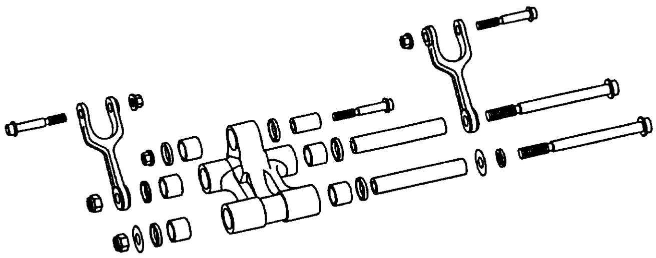
1. Thrust washer

Inspection

1. Clean all components and inspect for damage and wear to:

- drag link bearing, sleeve and seals,
- fixing bolts,

Renew as necessary.



Exploded view - drop/drag link components

Installation

1. Pack the drag link bearings with grease.
2. Fit the drag link sleeves and seals.
3. Position the drag link to the frame relocating the shims (if any) and the thrust washer to the right hand side of the link.

NOTE:

- **The shims and thrust washer must be fitted between the drag link and frame.**

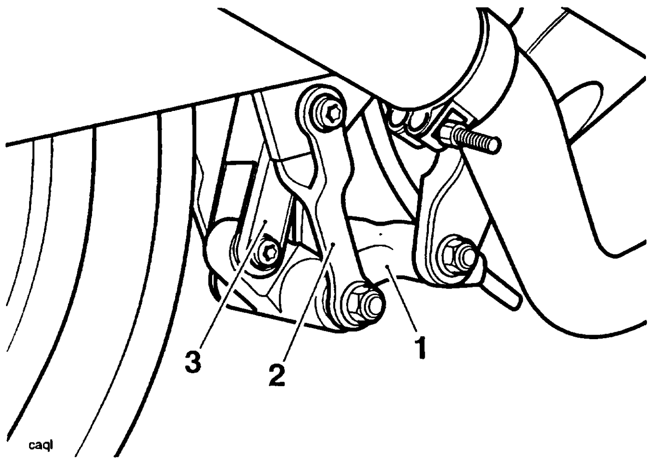
4. Loosely fit the drag link to frame fixing.
5. Pivot the drop links until they can be refitted to the drag link. Loosely fit the bolt and nut.
6. Align the rear suspension unit to the drag link and loosely fit the securing bolt and nut.
7. Tighten the drag link fixing to **95 Nm.**
8. Tighten the drop link to drag link nut and bolt to **65 Nm.**
9. Tighten the rear suspension unit lower mounting to **48 Nm.**
10. Lower the motorcycle to the ground and park on the sidestand.

DROP LINKS

Removal

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

1. Raise and support the rear of the motorcycle beneath the frame or engine. Position a block to support the rear wheel.



1. Drag Link

2. Drop Link

3. Rear Suspension Unit

2. Remove the nut and bolt securing the the drop links to the drag link.
3. Detach the drop links from the drag link.
4. Release the bolts securing the drop links to the swinging arm.
5. Release the drop links from the swinging arm.

Inspection

1. Clean all components and inspect for damage and wear. Renew parts as necessary.

Installation

1. Position the drop links to the swinging arm and loosely secure with the bolts and nuts.
2. Align the drop links to the drag link and secure with the bolt and nut.
3. Tighten the drop link to drag link nut and bolt to **65 Nm.**
4. Tighten the drop link to swinging arm bolts and nuts to **48 Nm.**
5. Lower the motorcycle to the ground and park on the sidestand.

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.

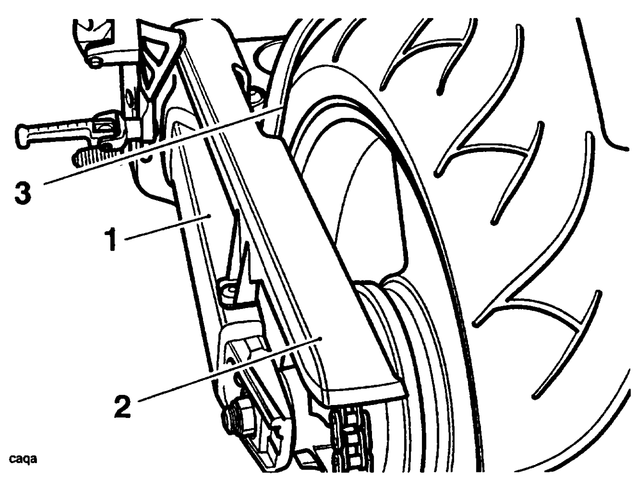
4. Raise and support the rear of the motorcycle under the frame or engine.

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

5. Detach the brake hose from its clip.
6. Remove the rear wheel as described in the wheel section.

CAUTION: To prevent damage to the brake pipe and caliper, do not allow the caliper to hang on the brake pipe.

7. Remove the chain guard and wheel hugger.

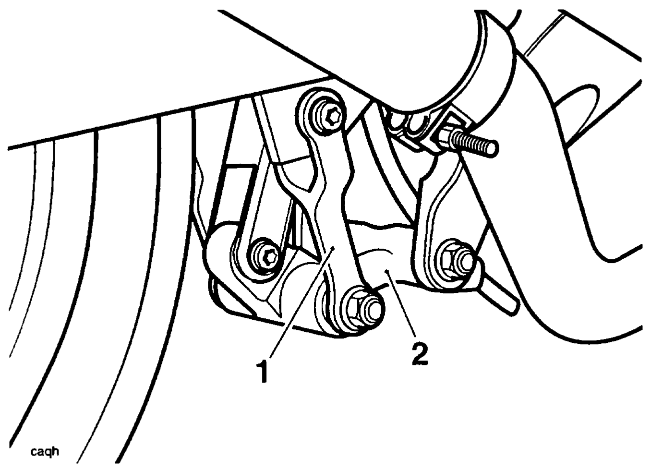


1. Swinging arm

2. Chain guard

3. Wheel hugger

8. Support the swinging arm.
9. Remove the drop link bolts and nuts from the swinging arm.



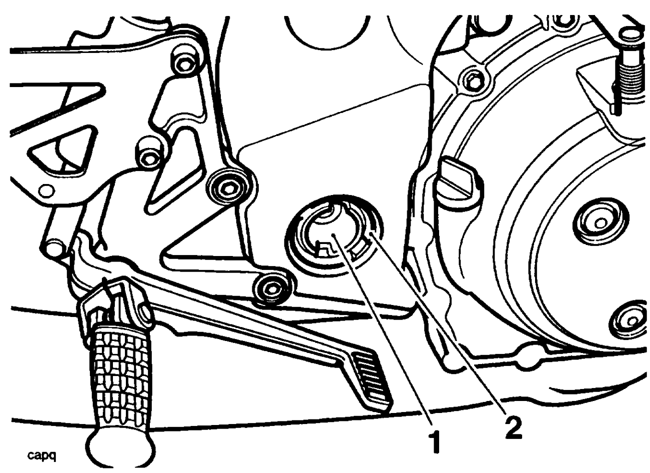
1. Drop link (right hand)

2. Swinging arm

10. Remove the rear suspension unit as described earlier in this section.

NOTE:

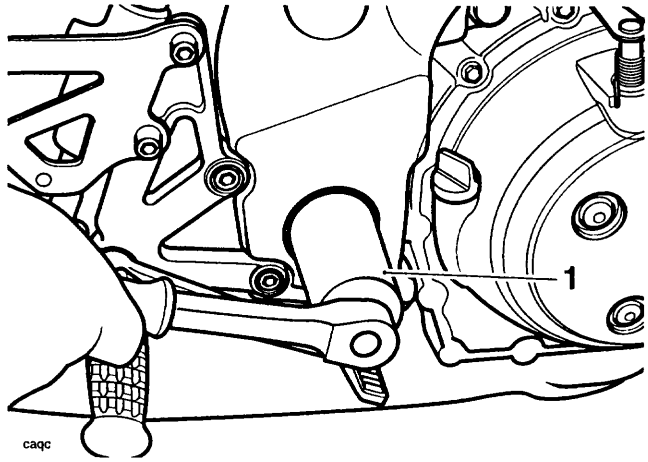
- **To remove the swinging arm, tools T3880295 and T3880290 must be used to release the lateral-float adjuster and lock-ring on the right hand side of the motorcycle.**



1. Adjuster ring

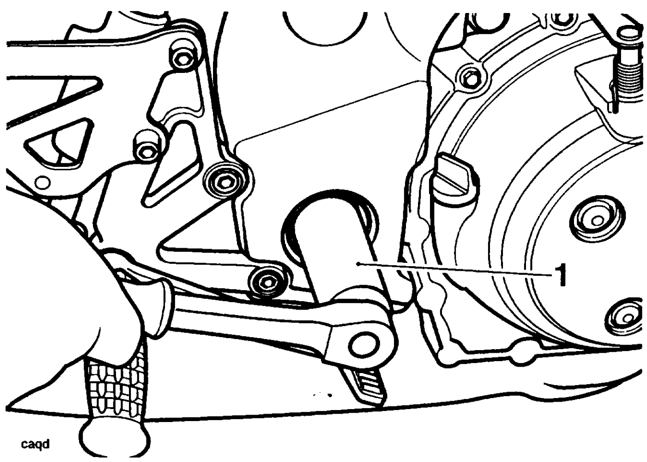
2. Lock ring

11. Using tool T3880295, slacken the locking ring from the right hand side of the swinging arm spindle.



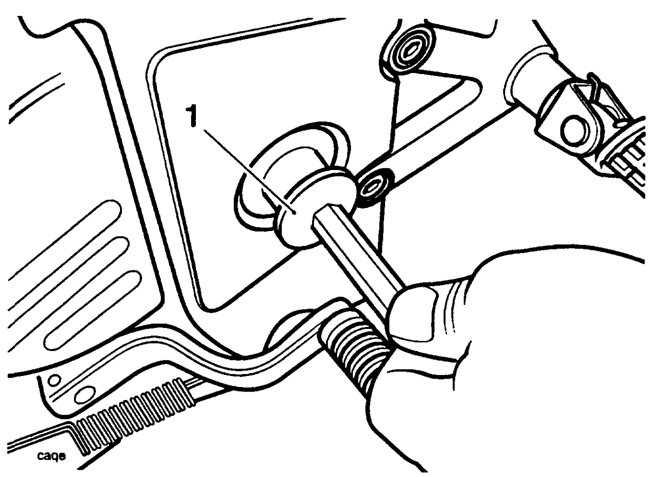
1. Tool T3880295

12. Using tool T3880290, slacken the swinging arm adjuster ring on the right hand side of the swinging arm spindle.



1. Tool T3880290

13. Support the swinging arm and remove the swinging arm spindle nut from the left hand side of the frame.



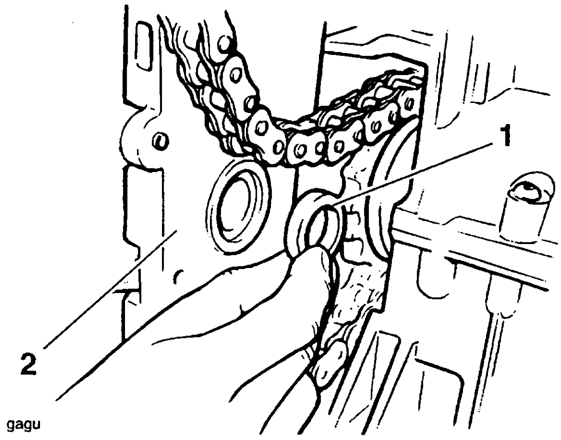
1. Swinging arm spindle nut

14. Support the swinging arm.

15. Withdraw the swinging arm spindle from the right hand side of the frame.

16. Carefully detach the swinging arm from the frame.

17. Collect the spacer from the recess inside the left hand frame outrigger.



1. Spacer

2. Frame outrigger

NOTE:

- **If the drive chain is being replaced, but not the swinging arm, proceed through paragraphs 19 to 20.**

18. Remove the sprocket cover.

19. 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 all bearing seals for damage, splits etc. Replace as necessary.

4. Check the chain for wear, damage etc. Replace as necessary.

5. Check both chain sprockets for wear, damage etc. Replace as necessary.

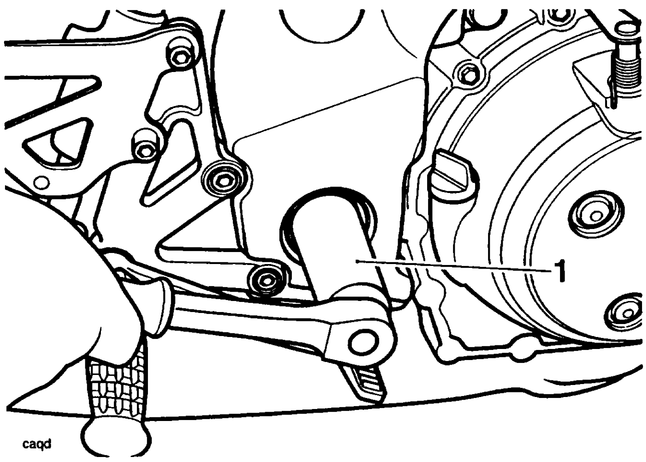
Installation

1. Fit the drive chain to the output sprocket.
2. Apply Loctite A1388 to the sprocket cover bolt threads then refit the sprocket cover and tighten the bolts to **9 Nm.**
3. 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.**

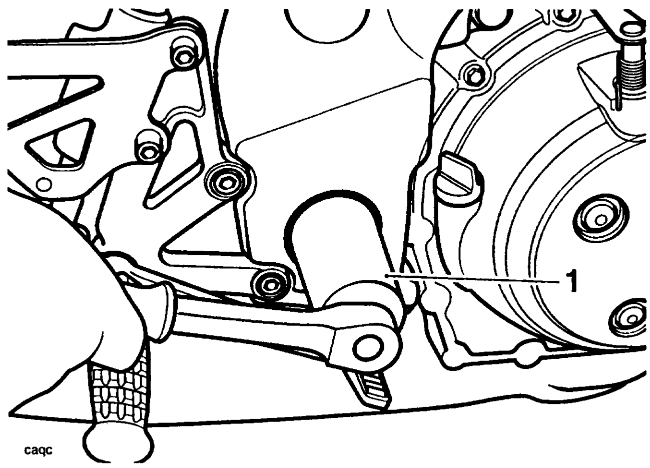
4. Position the swinging arm to the frame.
5. Refit the swinging arm spindle and fit the domed nut to the left hand side.
6. Using tool T3880290, tighten the swinging arm adjustment ring to **15 Nm.**



1. Tool T3880290

> **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.**

7. Tighten the locking ring to **30 Nm** using tool T3880295.



1. Tool T3880296

8. Check that the adjustment has not changed, re-adjust if necessary.
9. Tighten the swinging arm spindle bolt to **110 Nm.**
10. Apply a smear of grease to the drop link bearings in the swinging arm.
11. Align the drop links to the swinging arm and fit the drop link bolts and nuts.
12. Tighten the drop link bolts and nuts to **48 Nm.**
13. Refit the rear suspension unit as described earlier in this section.
14. Refit the chainguard and wheel hugger tightening the fixings to **9 Nm.**
15. Refit the exhaust silencer as described in the fuel system section.
16. Refit the rear wheel as described in the wheel section.
17. Secure the brake hose to its press-in clip.
18. Check, and if necessary adjust, the chain free movement.
19. Support the motorcycle and remove the paddock stand. Park the motorcycle on the side stand.
20. Pump the rear brake pedal to ensure correct function after detachment of the brake caliper.
21. Reconnect the battery positive (red) lead first.
22. Refit the seat.

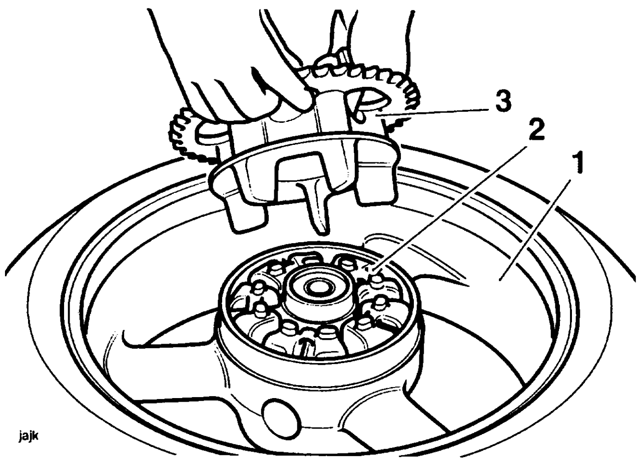
FINAL DRIVE

Removal

1. Raise and support the rear of the motorcycle under the frame or engine.

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

2. Remove the seat.
3. Disconnect the battery, negative (black) lead first.
4. Remove the rear wheel as described in the wheel section.
5. Gently lever the drive flange from the wheel hub and remove the cush drive rubbers.



1. Rear Wheel

2. Cush Drive Rubbers

3. Drive Flange

Inspection

1. Check the rubbers for deterioration, cracks etc.
2. Check the wheel and drive flange for cracks.

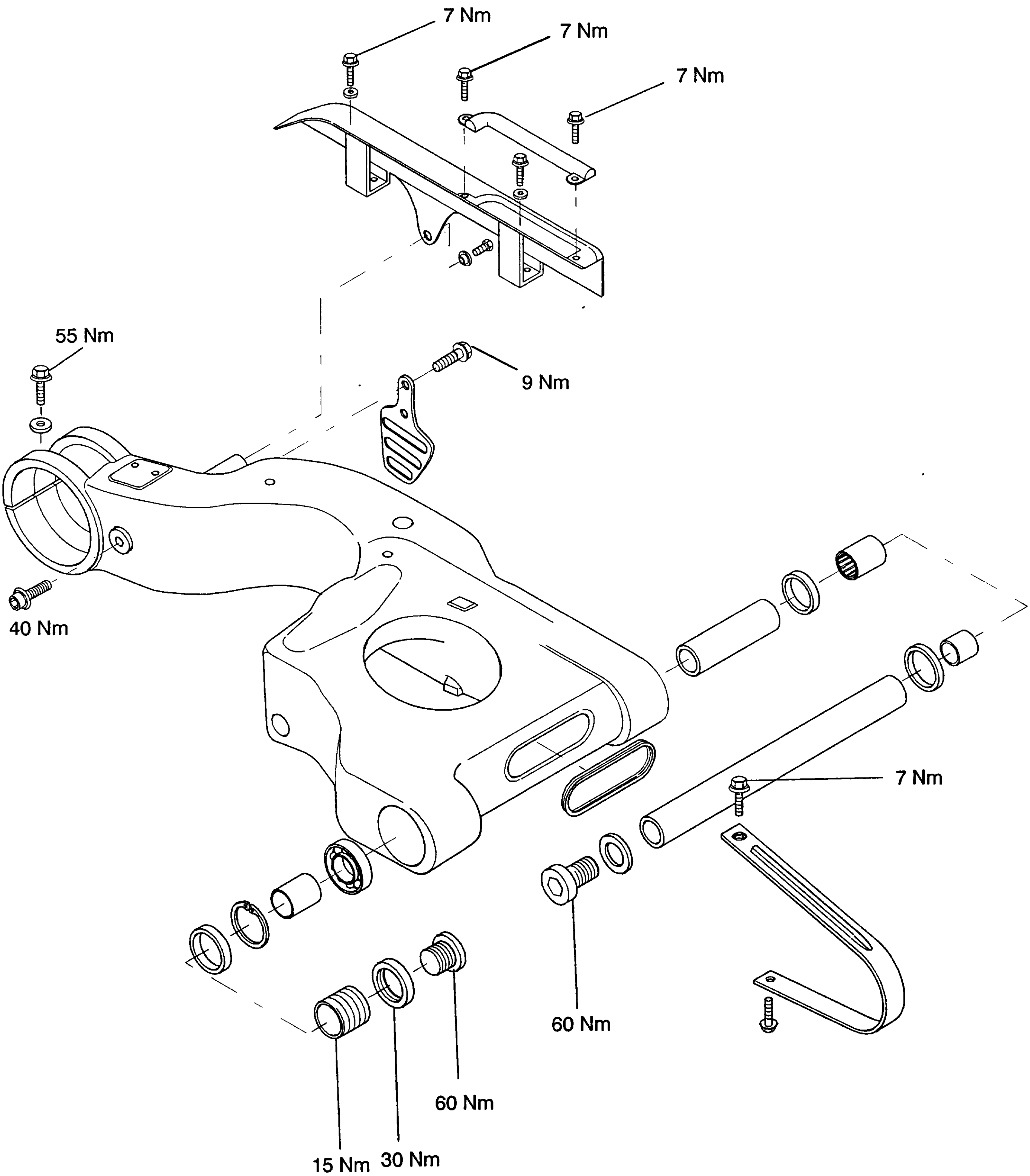
Installation

1. Install the cush drive rubbers into the wheel.
2. Refit the drive flange to the rubbers/wheel.
3. Refit the wheel as described in the wheel section.
4. Lower the motorcycle to the ground and place on the side or centre stand.
5. Reconnect the battery positive (red) lead first.
6. Refit the seat.

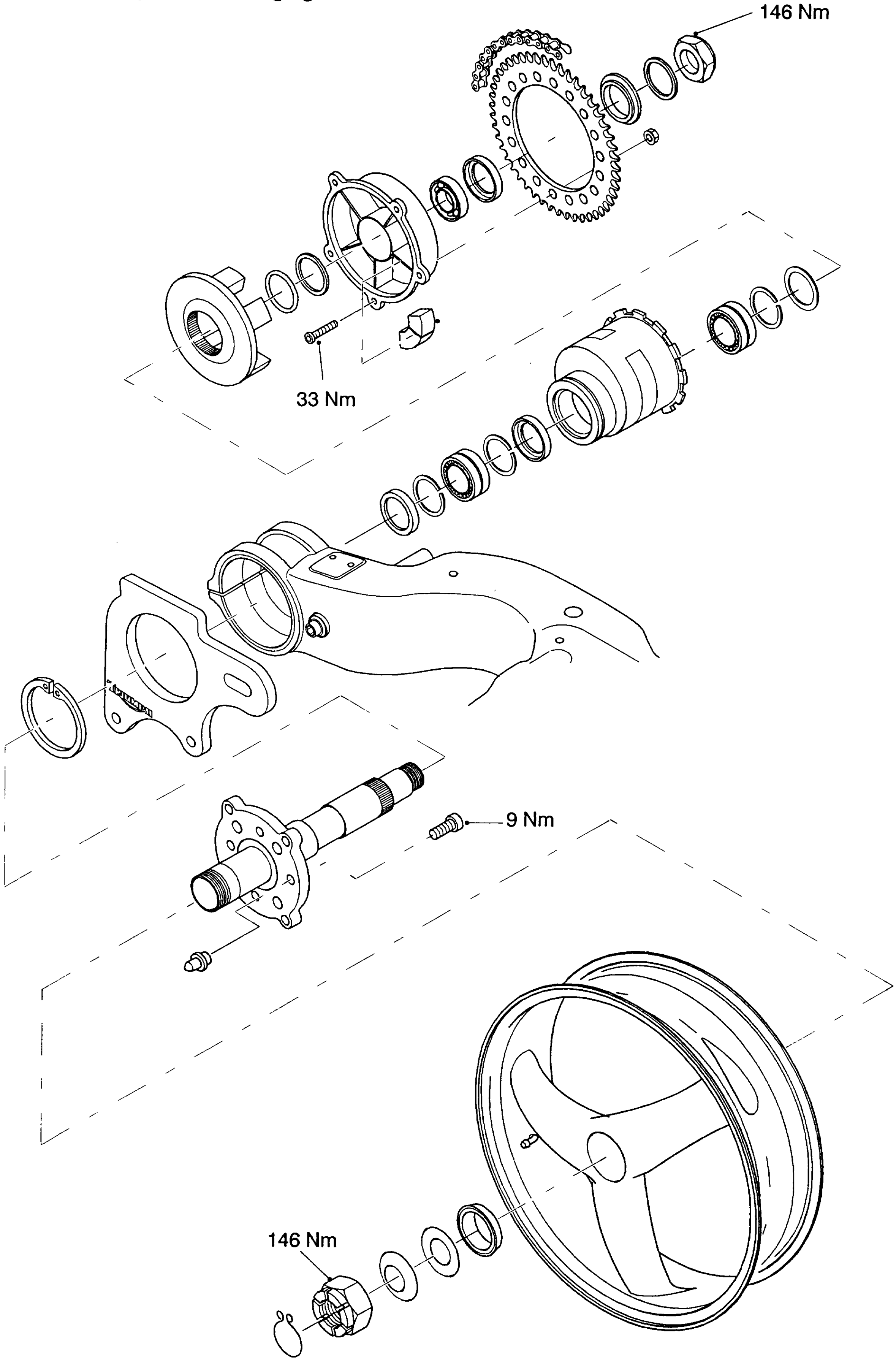
REAR SUSPENSION - SINGLE SIDED SWINGING ARM VERSIONS

CONTENTS

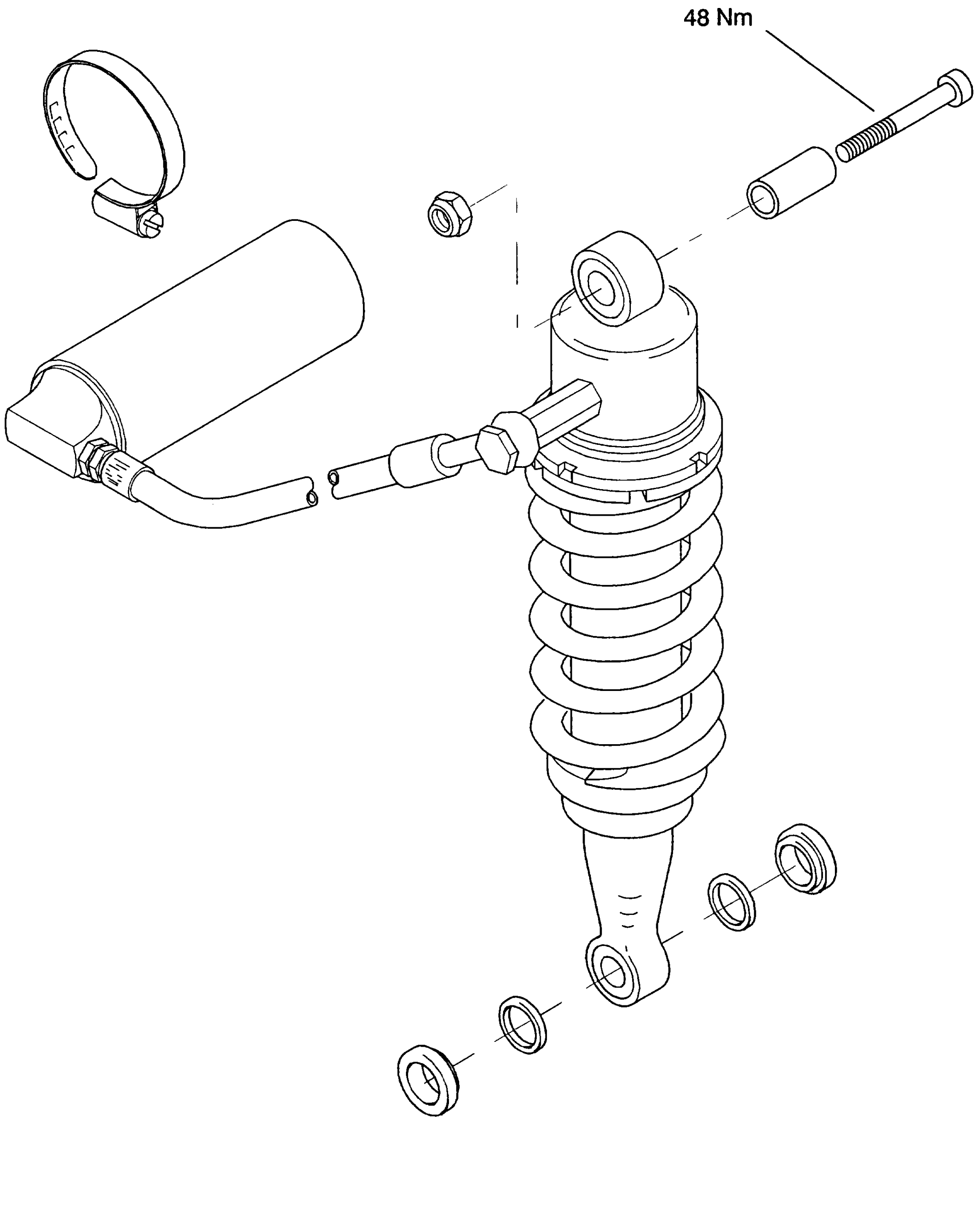
Exploded View - Single Sided Swinging Arm



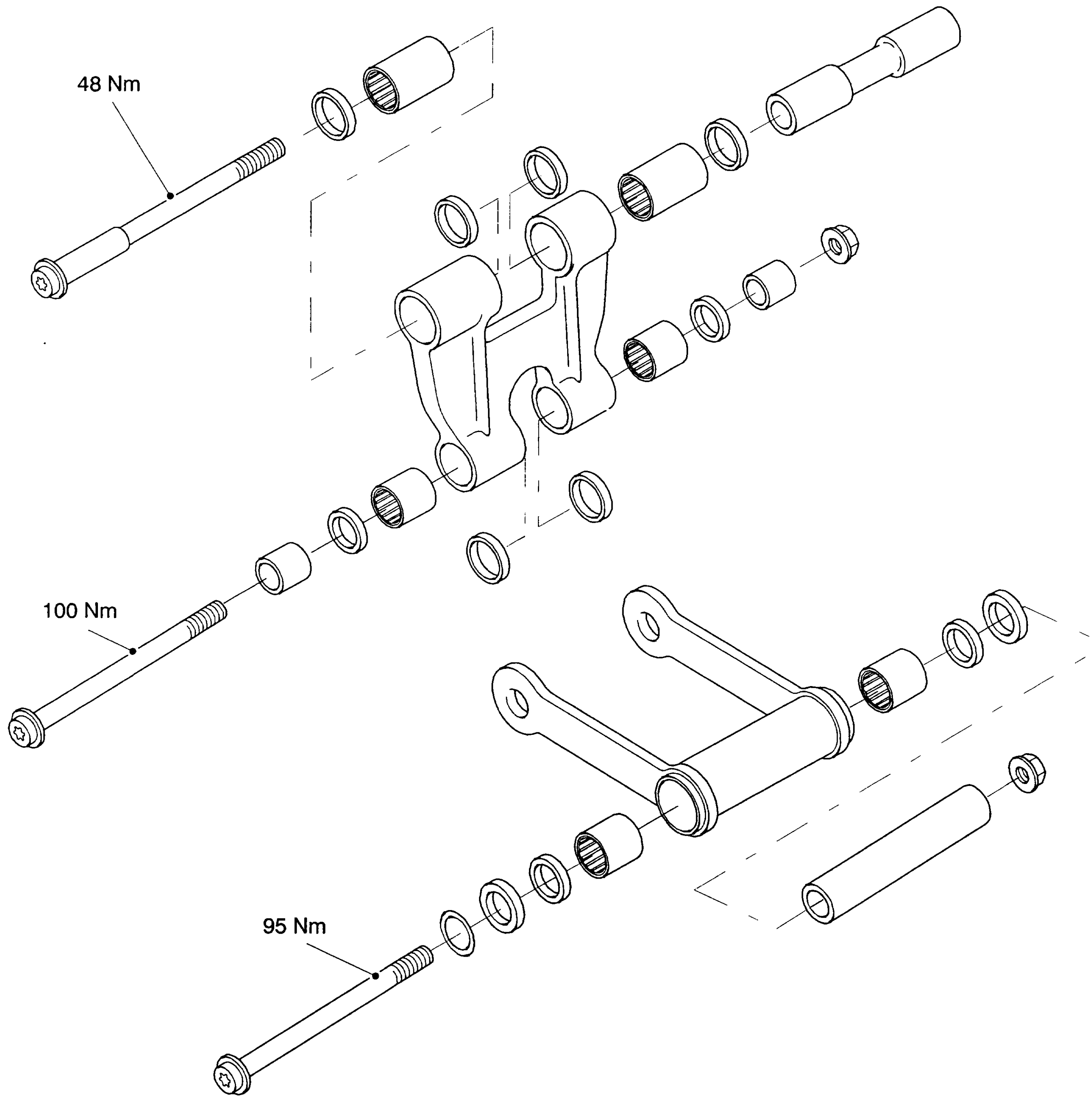
Exploded View - Single sided swinging arm rear hub



Exploded View - Rear Suspension Units



Exploded View - Single sided swinging arm drop/drag link



DRIVE CHAIN

For safety and to prevent excessive wear, the drive chain must be checked, adjusted, and lubricated in accordance with scheduled maintenance requirements. Checking, adjustment and lubrication must be carried out more frequently for extreme conditions such as salty or heavily gritted roads.

If the chain is badly worn or incorrectly adjusted (either too loose or too tight) the chain could jump off the sprockets or break.

WARNING: 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 an accident. Never neglect chain maintenance.

NOTE:

- **Checking, adjustment and lubrication of the drive chain must ideally be carried out with the motorcycle set up on a paddock stand so that the rear suspension hangs free.**
  Alternatively, the chain may be adjusted with the motorcycle parked on the side stand

Chain Lubrication

Lubrication is necessary every 500 miles and also after riding in wet weather, on wet roads, or any time that the chain appears dry.

Use the special chain lubricant as recommended in the specification section.

Correct application method is critical for chain lubricant. Apply the lubricant for one full chain revolution only, then leave for eight hours before riding. This allows the lubricant's solvent (used to thin the oil) to evaporate and the oil to 'soak' into all parts of the chain. If the lubricant is applied and the motorcycle is ridden shortly afterwards, the lubricant is unlikely to reach the internal rollers and bushes and the majority will be flung off and wasted. Applying excessive amounts is not helpful under any circumstances.

It should be noted that the lubricant is applied to the chain to lubricate its action across the sprockets. In an 'O' ring chain, external lubrication does not penetrate to the bushes and rollers as the 'O' ring seal prevents this from happening.

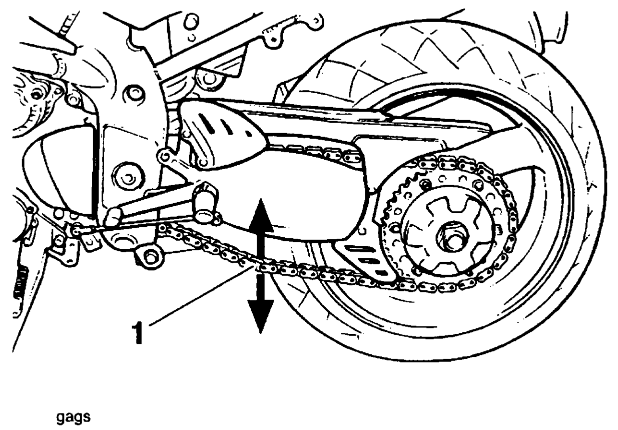
CAUTION: Do not use a power 'jet' wash to clean the chain as this may cause damage to the chain components.

CHAIN ADJUSTMENT

NOTE:

- **The correct adjustment setting for twin sided swinging arm models is 35-40 mm.**

Chain Free-movement Inspection



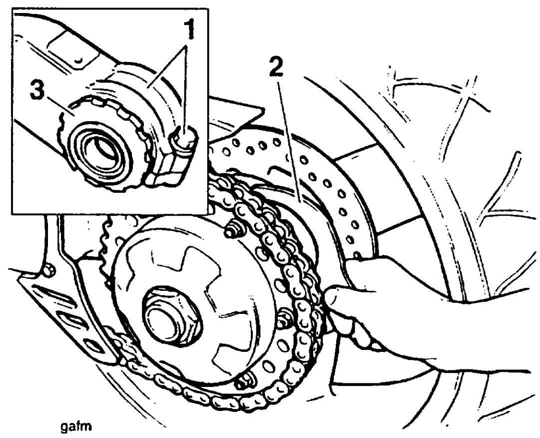
1. Maximum movement position

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

1. 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.

Chain Free-movement 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.



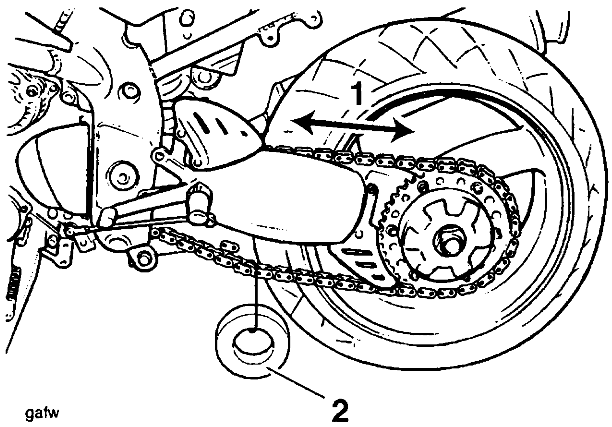
1. Pinch bolt

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 Wear Inspection



1. Measurement across 20 links

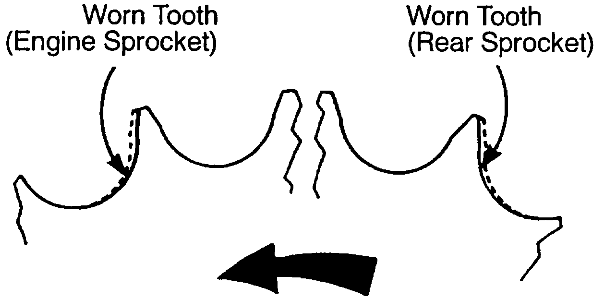
2. 10-20kg Weight

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

1. Remove the 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.
4. If the length exceeds the service limit of 321 mm, the chain must be replaced.

> **WARNING: 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 control and an accident.**

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.**

> **WARNING: The use of non-approved chains may result in a broken chain or may cause the chain to jump off the sprockets.**
>
> **Use a genuine Triumph supplied chain as specified in the Triumph Parts Catalogue.**
>
> **Never neglect chain maintenance and always have chains installed by an authorised Triumph dealer.**

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 tighten ing the fixings to **7 Nm**.

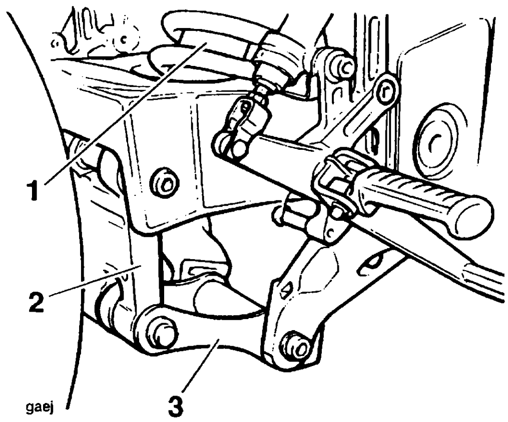
REAR SUSPENSION UNIT

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

1. Raise and support the rear of the motorcycle 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 two spacers.

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, spacer and bolt, and lower the unit clear of the motorcycle.

Inspection

1. Clean all components and inspect for damage / wear to:

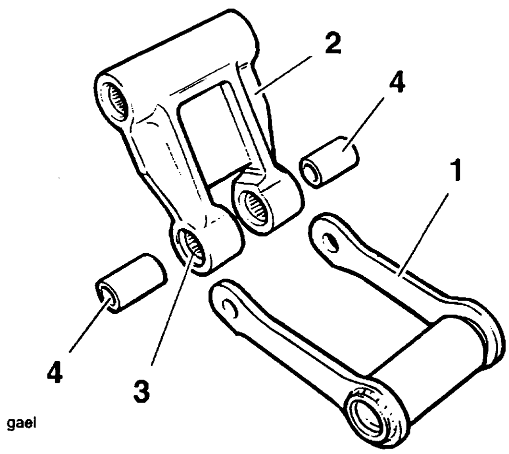
- rear suspension unit upper and lower mountings,
- lower mounting spacers and 'O' rings,
- drop link bearings, sleeves and seals.

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, spacer and 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.



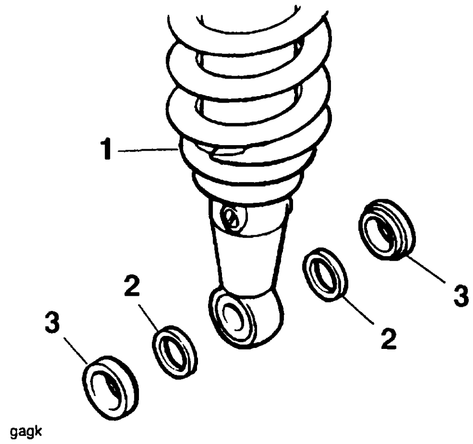
1. Drag Link

2. Drop Link

3. Drop Link Bearings

4. Sleeves

4. 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

*** 'O' rings are permanently attached to the RSU but shown detached for identification)**

5. Pivot the drag link and drop link into position and loosely fit the securing bolt / nut.
6. With the weight of the motorcycle on its wheels, tighten the rear suspension unit upper mounting to **48 Nm**.
7. Tighten the rear suspension unit lower mounting to **100 Nm**.
8. Connect the battery, red (positive) lead first.
9. Fit the rear body panels and the seat.

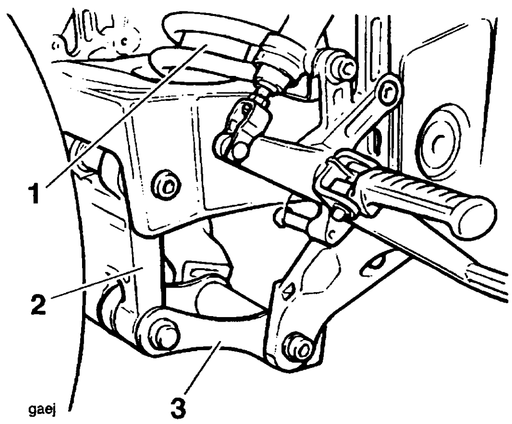
DROP LINK

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

1. Raise and support the rear of the motorcycle under the frame or engine. Position a block to support the rear wheel.



1. Rear suspension unit

2. Drop link

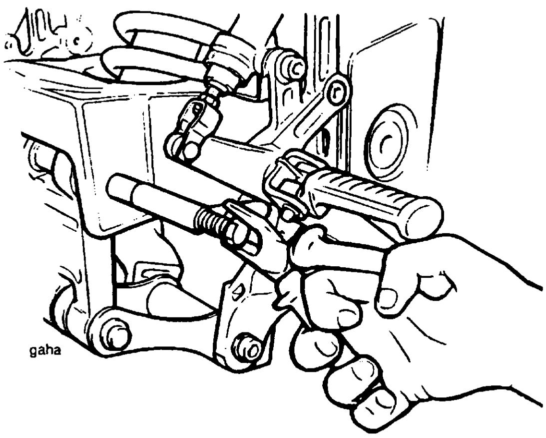
3. Drag link

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 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.**



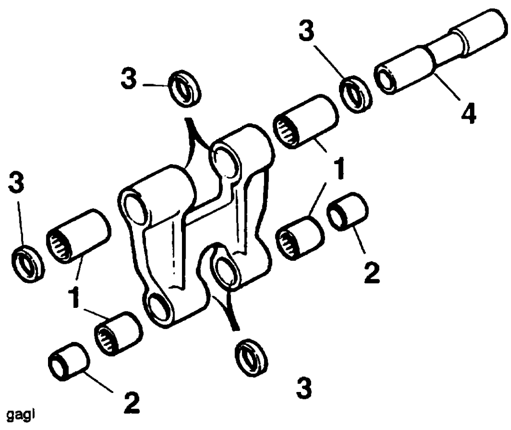
Removing drop link spindle

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

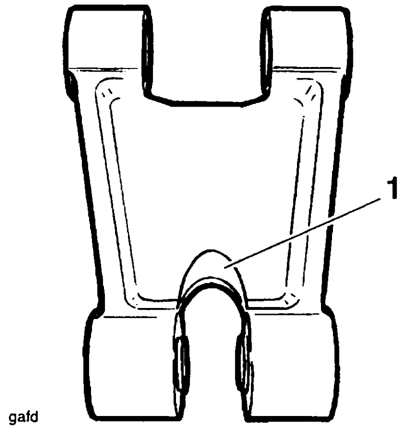
2. Check the drag link bearings for wear.

Installation

1. Pack all the drop link bearings with grease.

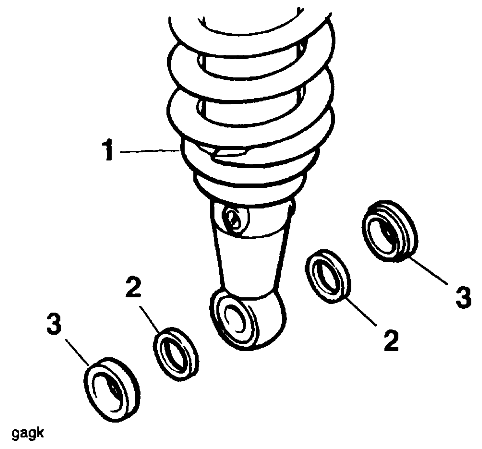
NOTE:

- **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. 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

*** 'O' rings are permanently attached to the RSU but shown detached for identification)**

7. Pivot the drag link and drop link into position and fit the rear suspension unit lower securing bolt / nut. Tighten to **100 Nm**.

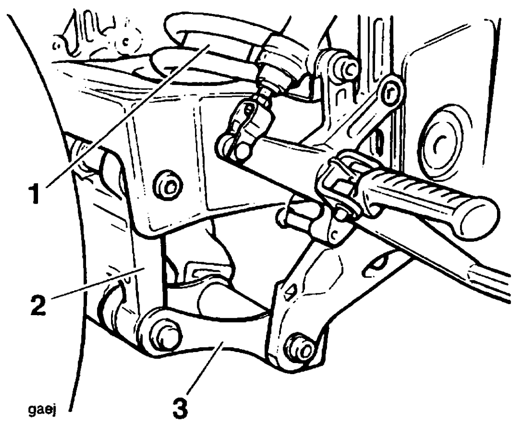
DRAG LINK

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

1. Raise and support the rear of the motorcycle 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 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:

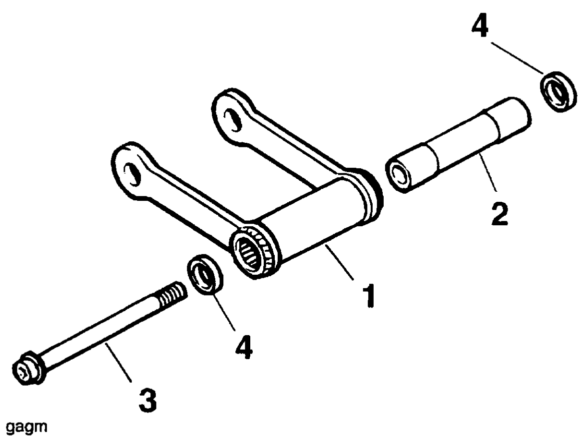
- drag link and bearings,
- drag link spindle,
- rear suspension unit lower mounting bush, spacers and 'O' rings,
- drop link bearings, seals and sleeves.

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

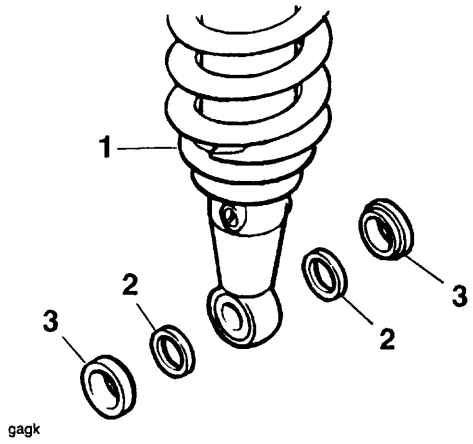
2. Spindle

3. Spindle securing bolt

4. Spacers

2. If slackened during removal, tighten the engine lower mounting bolts to **80 Nm.** Check the drag link for freedom of movement; rectify as necessary.

3. 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

*** 'O' rings are permanently attached to the RSU but shown detached for identification)**

4. Pivot the drag link and drop link into position and fit the rear suspension unit lower securing bolt / nut. Tighten to **100 Nm**.

SWINGING ARM/DRIVE CHAIN

Removal

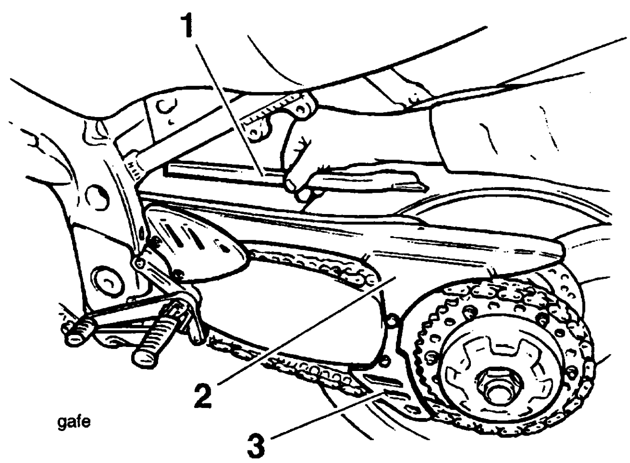
1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear bodywork as described in the body section.
4. Remove the silencer as described in the fuel system section.

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.

5. Raise and support the rear of the motorcycle under the frame or engine.

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

6. Remove the rear wheel as described in the wheel section.
7. Remove the rear brake hose cover from the upper chain guard, then remove the upper chain guard.

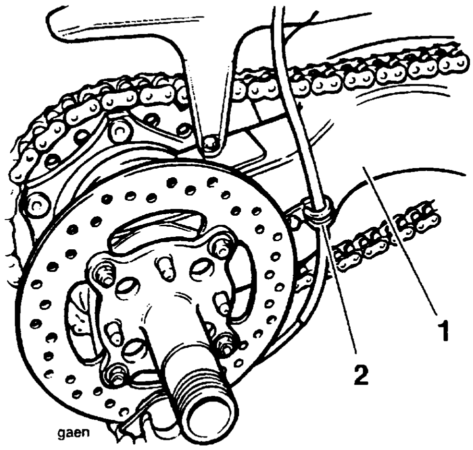


1. Brake hose cover

2. Upper chain guard

3. Lower chain guard

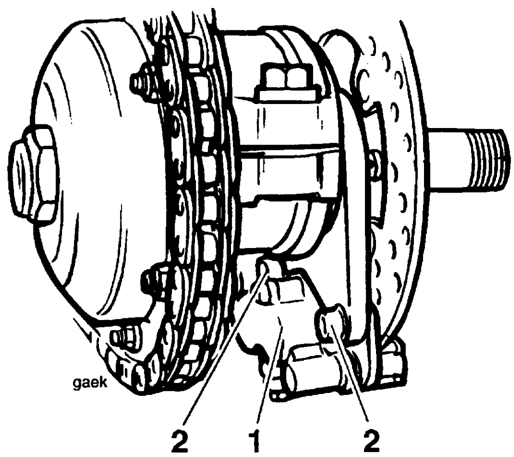
8. Remove the lower chain guard.
9. Release the bolt securing the brake pipe clip to the right hand side of the swinging arm.



1. Swinging arm

2. Brake pipe clip

10. Without disconnecting the brake hose, detach then support the rear brake caliper.

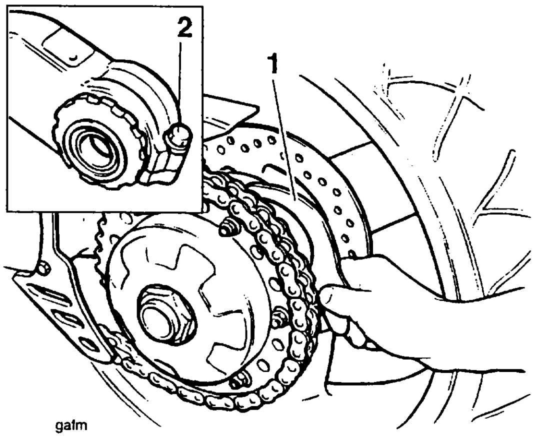


1. Rear brake caliper

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.

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

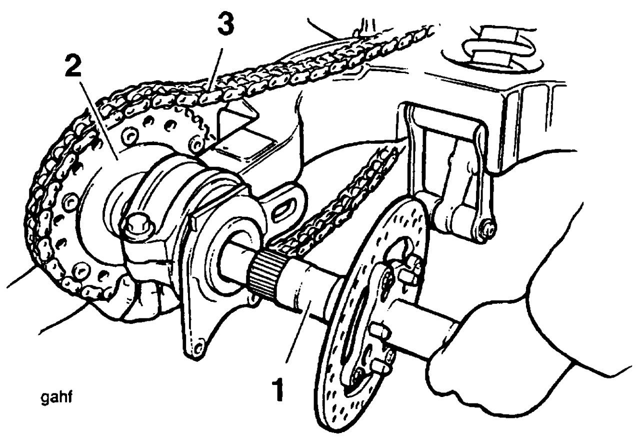
13. De-stake then slacken the nut securing the final drive unit to the axle shaft.

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.**

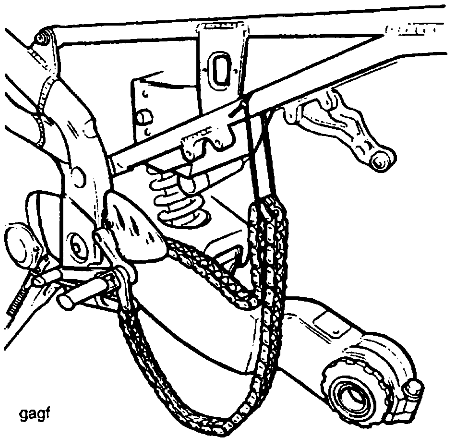


1. Axle shaft

2. Final drive

3. Chain

16. Place the axle shaft/brake disc assembly to one side.



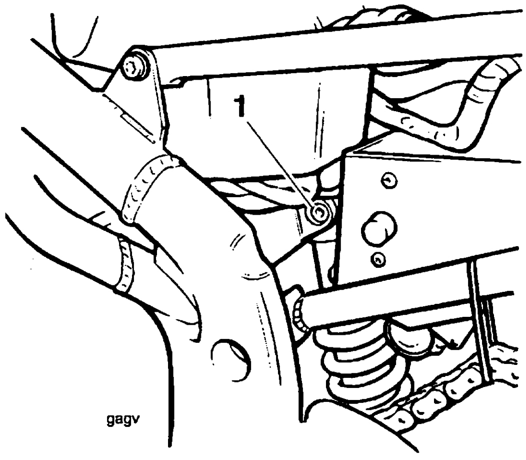
Typical Drive Chain Support

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, spacer and nut. Allow the swinging arm to pivot downwards after removing the bolt.



1. Rear suspension unit top bolt

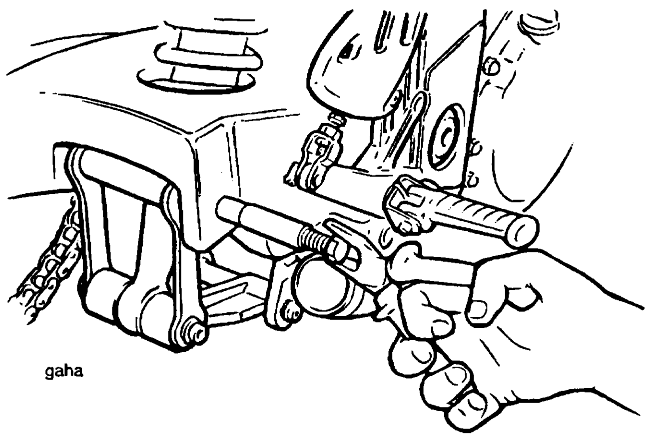
19. Release the clip securing the rear suspension unit reservoir to the battery box. Detach the reservoir but leave the clip in place around the battery box.

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.

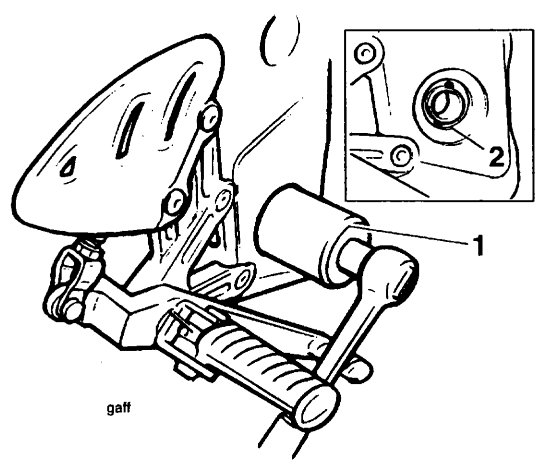
NOTE:

- **If tight, an M14 (1.5 mm thread pitch) bolt can be threaded into the spindle to assist extraction.**



Removing drop link spindle

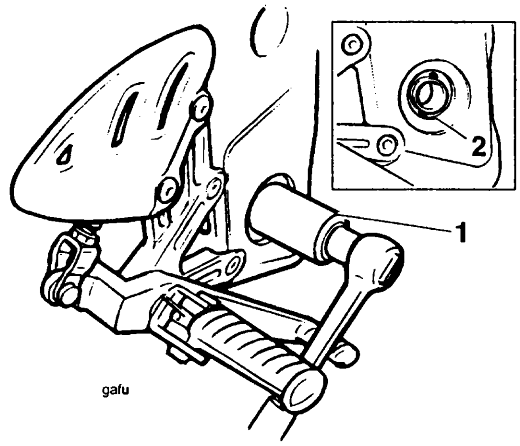
22. Release the swinging arm spindle bolts from both sides of the motorcycle.
23. Using tool T3880295, remove the locking ring from the right hand side of the swinging arm spindle.



1. Tool T3880295

2. Locking ring

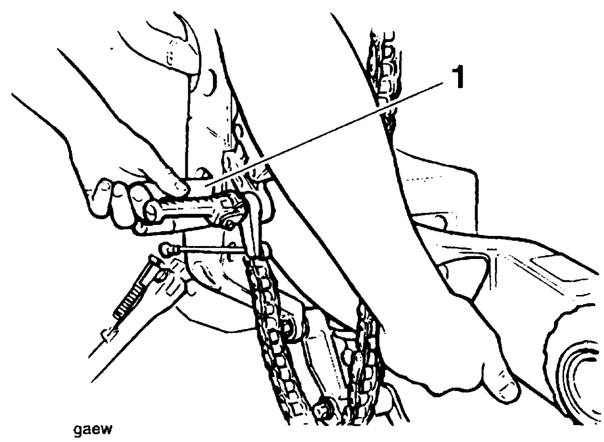
24. Using tool T3880290, slacken the swinging arm clamping ring from the right hand side of the swinging arm spindle.



1. Tool T3880290

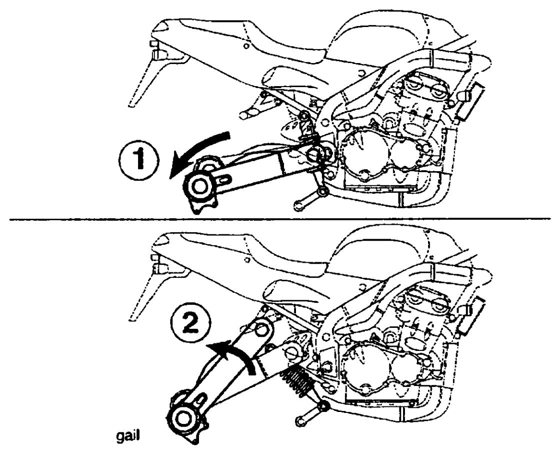
2. Clamping ring

25. Support the swinging arm and remove the swinging arm spindle.



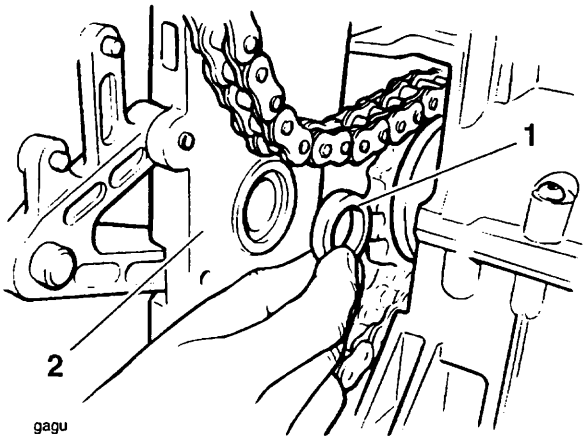
1. Swinging arm spindle

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

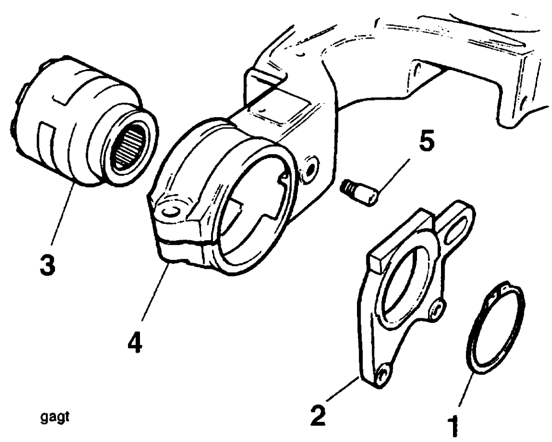
NOTE:

- **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 wheel bearing/hub from the left hand side of the swinging arm.

30. Remove the caliper carrier positioning stud.



1. Circlip

2. Caliper carrier

3. Hub

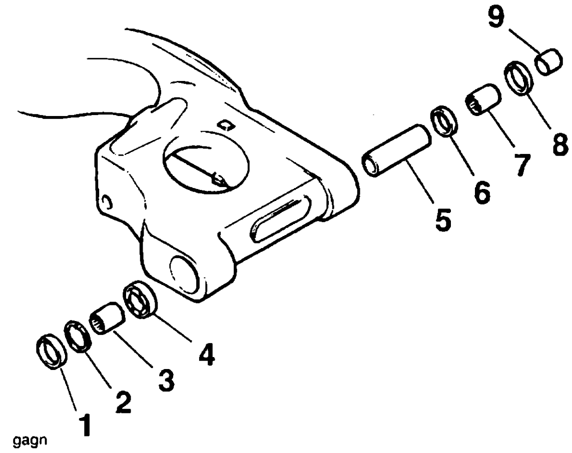
4. Swinging arm

5. Caliper carrier positioning stud

31. Remove the bearing sleeves from both sides.

32. Remove the right hand bearing by drifting through from the left.

33. 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.**

34. Remove the drive chain rubbing strip.

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 wheel/hub 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.
7. Check the drive chain rubbing strip for wear and damage. Replace as necessary.

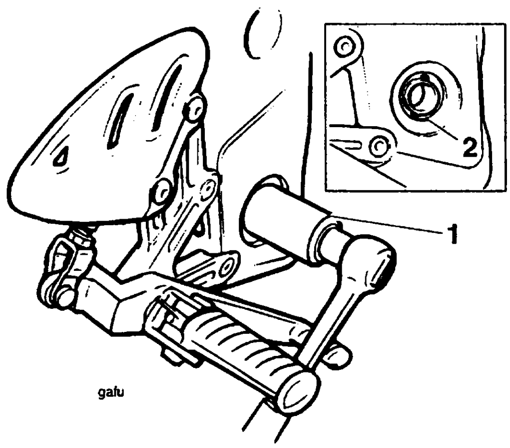
Assembly

1. Fit the drive chain to the output sprocket.
2. Apply Loctite A1388 to the sprocket cover bolt threads then refit the sprocket cover and tighten the 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. Fit the drive chain rubbing strip and tighten the fixing to **7 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 **15 Nm.**



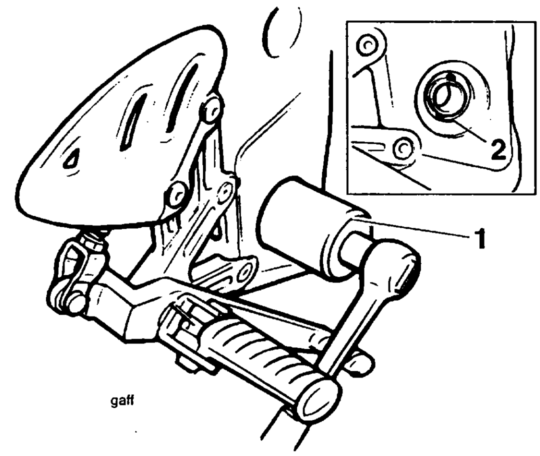
1. Tool T3880290

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 **30 Nm** using tool T3880295.

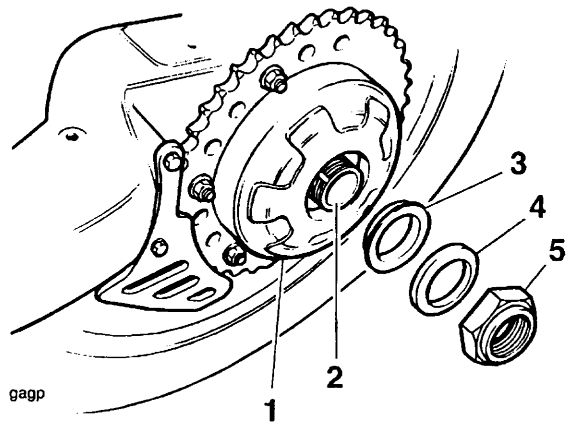


1. Tool T3880295

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 and spacer. 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, tightening the fixing to **7 Nm.**
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

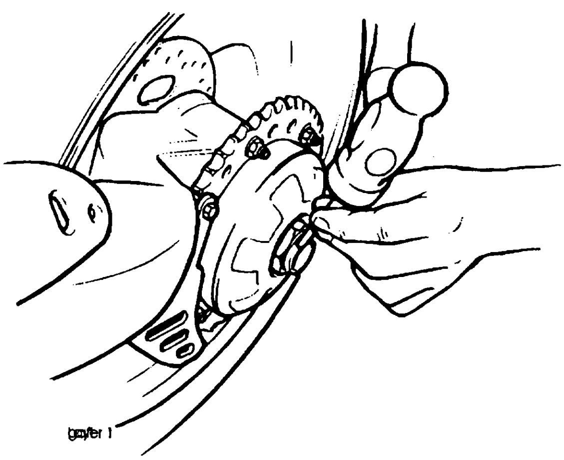
2. Axle shaft

3. Stepped washer

4. Belleville washer

5. Retaining stake-nut

24. Prevent the axle from turning and tighten the nut to **146 Nm**. Stake to secure.



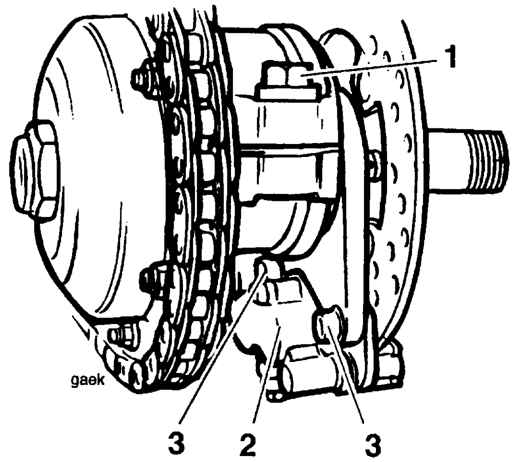
Staking the nut

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 to **9 Nm**.

30. Refit the upper and lower chain guards. Tighten the fixings to **7 Nm.**

31. Align the rear brake hose to to the chain guard and refit the hose cover. Tighten the hose cover fixings to **7 Nm**.

32. Refit the rear wheel as described in the wheel section.

33. Refit the silencer as described in the fuel system section.

34. Lower the motorcycle to the ground and place on the side stand.

35. Refit the rear bodywork as described in the body section.

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

37. Refit the seat.

38. Pump the rear brake pedal several times to position the brake pads in the caliper. Rectify as necessary if correct brake operation is not restored.

FINAL DRIVE/REAR HUB AND BEARINGS

Removal

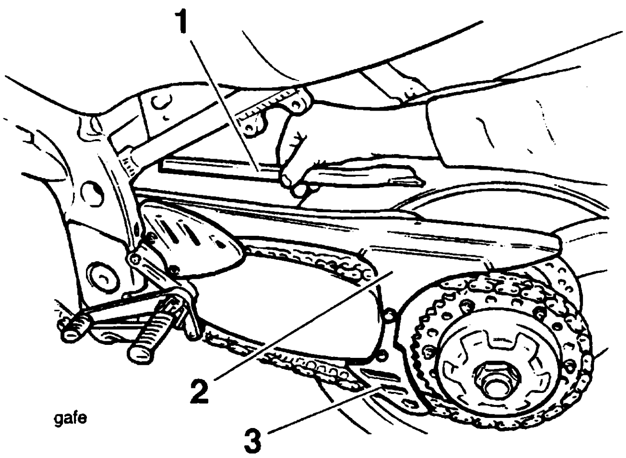
1. Remove the seat.
2. Disconnect the battery, negative (black) lead first.
3. Remove the silencer as described in the fuel system section.

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

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.

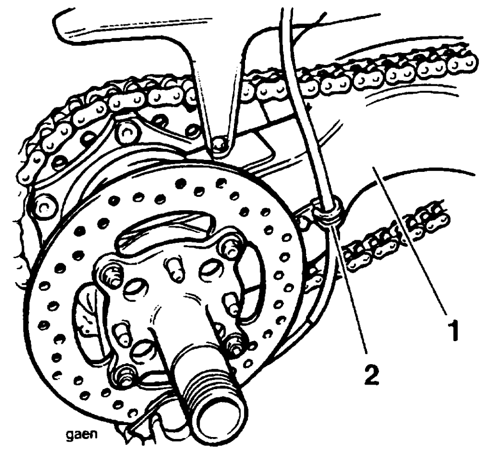


1. Brake hose cover

2. Upper chain guard

3. Lower chain guard

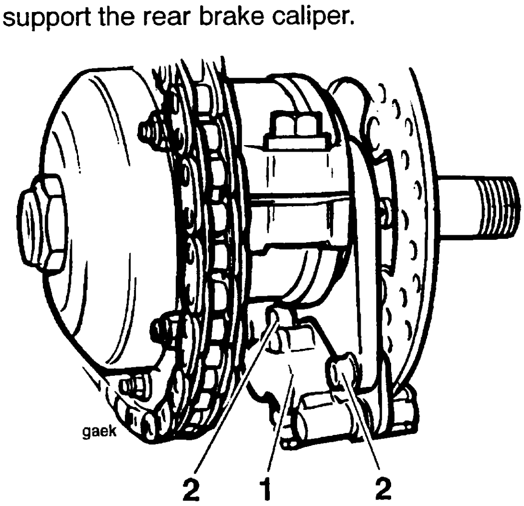
7. Remove the lower chain guard.
8. Release the bolt securing the brake pipe clip to the right hand side of the swinging arm.



1. Swinging arm

2. Brake pipe clip

9. Without disconnecting the brake hose, detach then support the rear brake caliper.

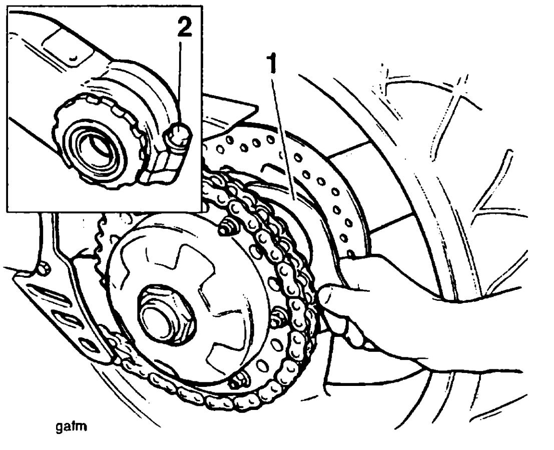


1. Rear brake caliper

2. Caliper mounting bolts

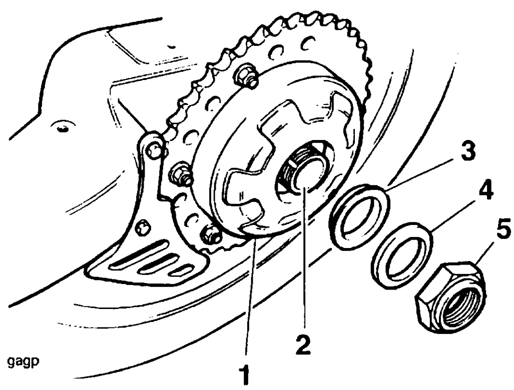
> **CAUTION: To prevent damage to the brake pipe and caliper, do not allow the caliper to hang on the brake pipe.**

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

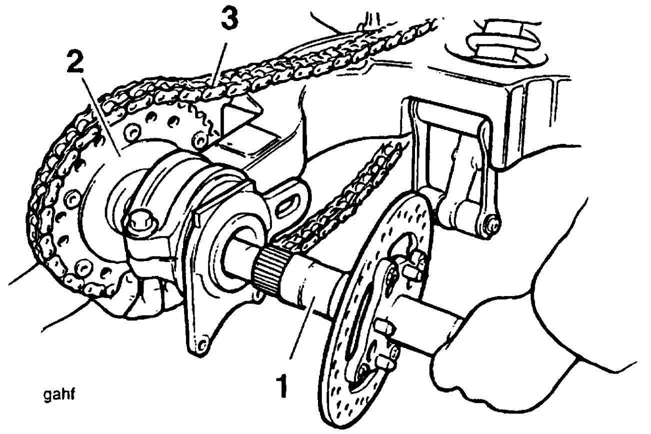
13. To release the final drive unit, remove the staked nut (discard the nut), belleville washer and stepped washer.



1. Final drive unit
2. Axle shaft
3. Stepped washer
4. Belleville washer
5. Retaining nut

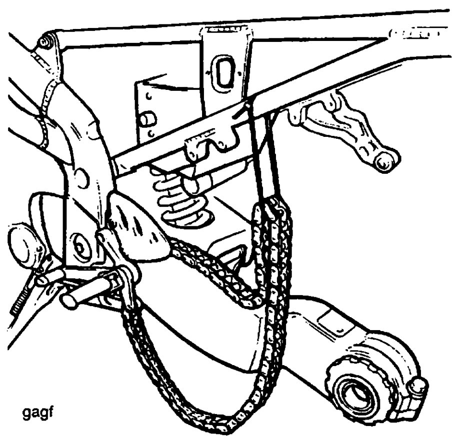
14. Pull the axle shaft through the hub to the right hand side such that the shaft clears the final drive assembly. Remove the final drive unit disconnecting the chain at the same time.

NOTE:
- **Collect the spacer fitted between the final drive and the hub.**



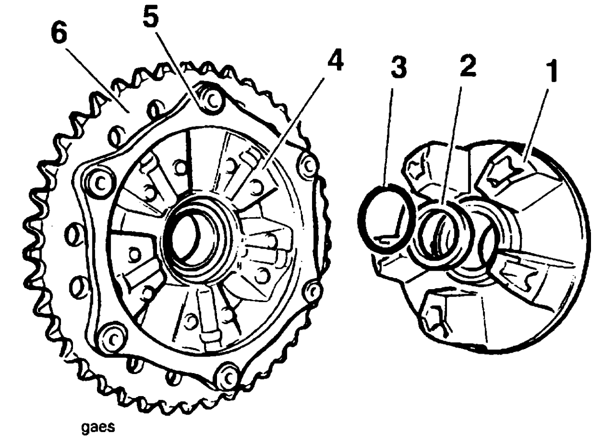
1. Axle shaft
2. Final drive
3. Chain

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.
18. To detach the rear hub and bearings, remove the large circlip securing the caliper carrier to the hub and detach the carrier.
19. Remove the wheel bearing hub from the left hand side of the swinging arm.



1. Cush drive hub

2. Spacer

3. 'O' ring

4. Cush drive rubbers

5. Cush drive housing

6. Sprocket

Inspection - All Parts

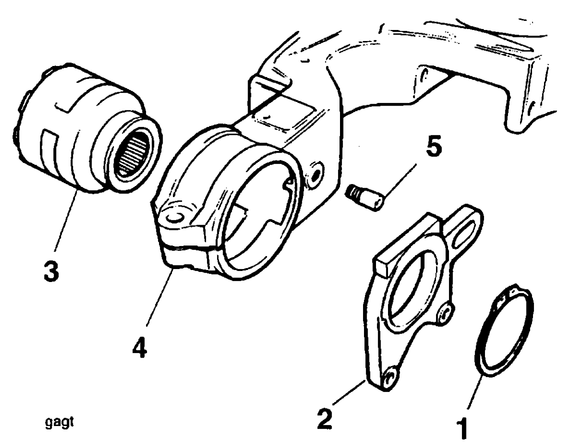
1. Thoroughly clean all components and inspect for damage, wear etc. Renew as necessary.
2. Pay particular attention to the condition of the cush rubbers, examining for splits, damage, softness etc.
3. Check the final drive bearing for wear or rough running, and the seal for damage.
4. Inspect the 'O' ring in the cush drive hub for damage.
5. Inspect the sprocket teeth for wear, damage and chips.
6. Check the wheel/hub bearings for damage, pitting, and cracks. Replace as necessary.
7. Check all bearing seals for damage, splits etc. Replace as necessary.

Assembly - Final Drive

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 - All Parts

1. Refit the wheel bearing hub 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.



1. Circlip

2. Caliper carrier

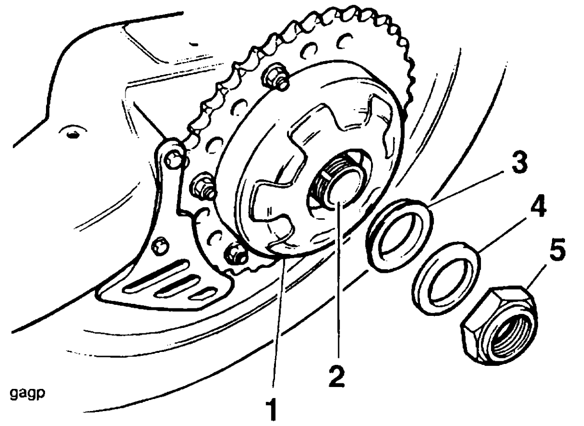
3. Hub

4. Swinging arm

5. Caliper carrier positioning stud

3. Refit the axle shaft and align the spacer to the final drive side.
4. Locate the final drive on the shaft and refit the chain to the sprocket.
5. Fit:

- collar, stepped side inwards,
- belleville washer, dished side out,
- a new stake nut.



1. Final drive unit

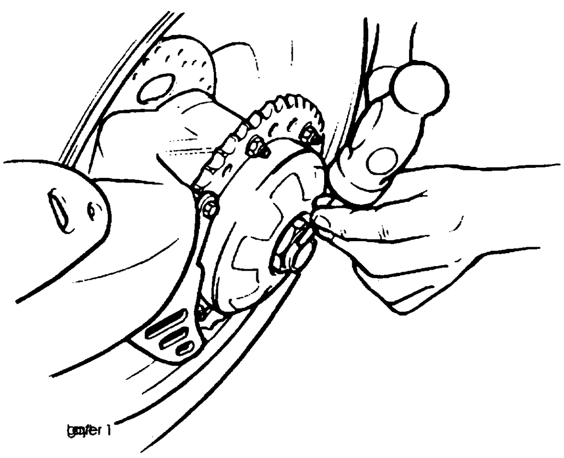
2. Axle shaft

3. Stepped washer

4. Belleville washer

5. Retaining stake-nut

6. Tighten the nut to **146 Nm**, and stake to secure.

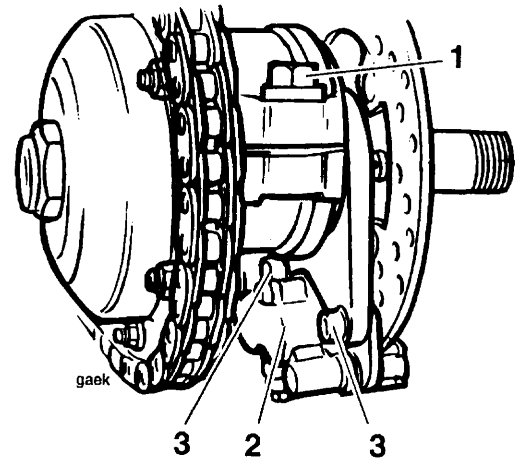


Staking the nut

7. Adjust the chain tension to give 35-40 mm of slack by turning the hub with the 'C' spanner

8. Tighten the swinging arm / hub pinch bolt to **55 Nm.**

9. 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

10. Align the rear brake pipe and clip to the right hand side of the swinging arm and tighten the clip fixing to **9 Nm**.

11. Refit the upper and lower chain guards. Tighten the fixings to **7 Nm.**

12. Align the rear brake hose to to the chain guard and refit the hose cover. Tighten the hose cover fixings to **7 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.

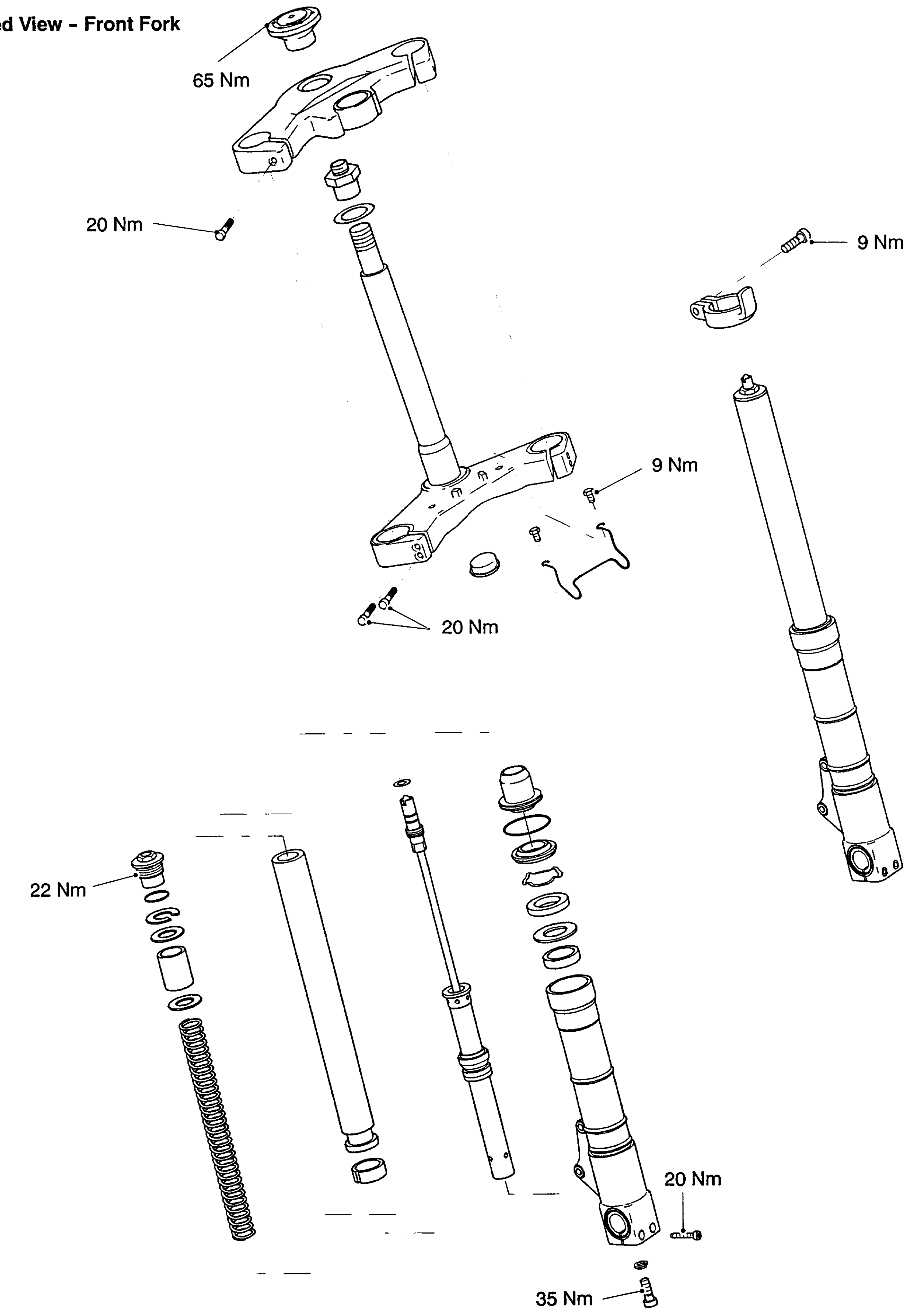
17. Refit the seat.

18. Pump the rear brake pedal several times to position the brake pads in the caliper. Rectify as necessary if correct brake operation is not restored.

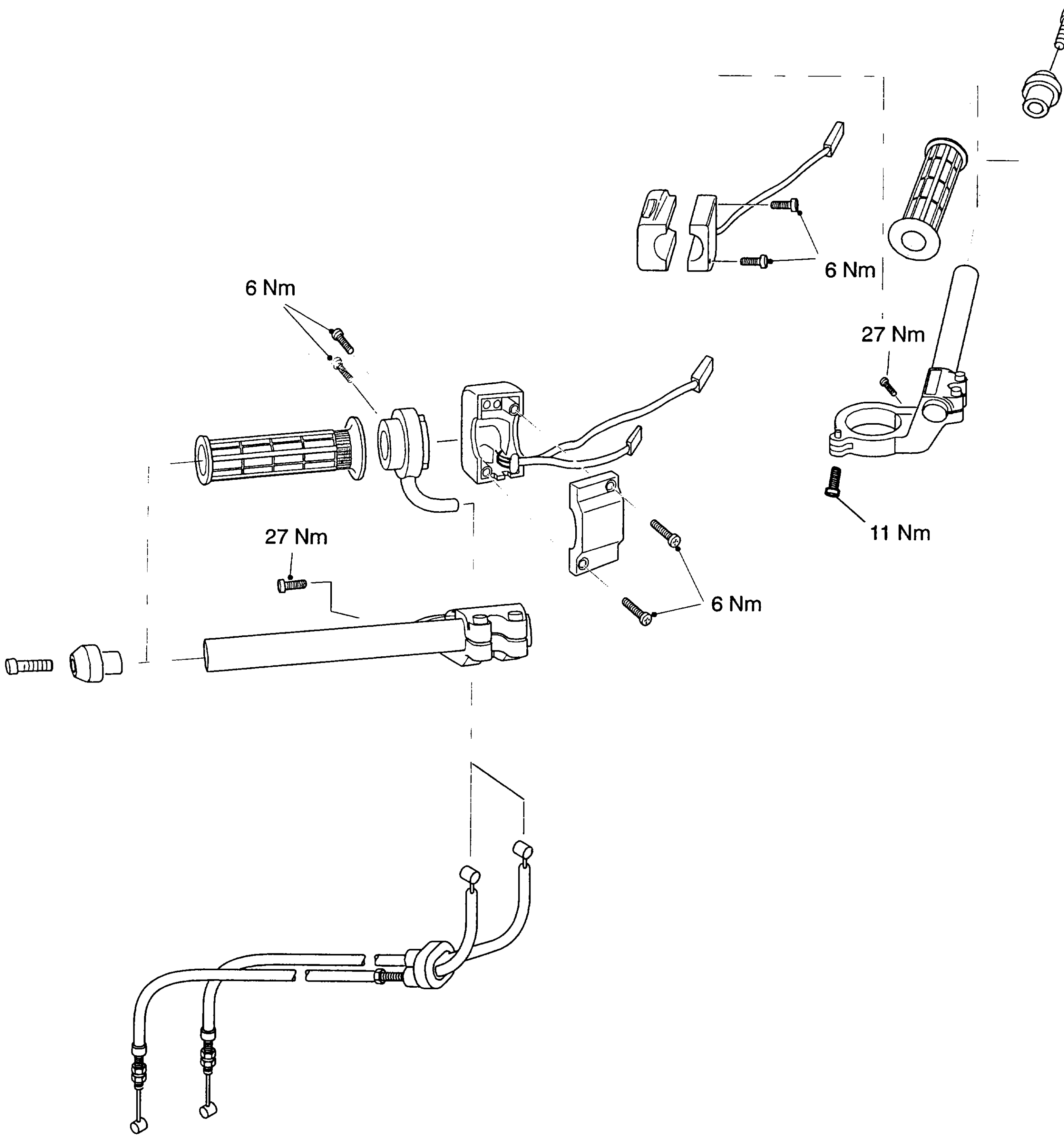
FRONT SUSPENSION

CONTENTS

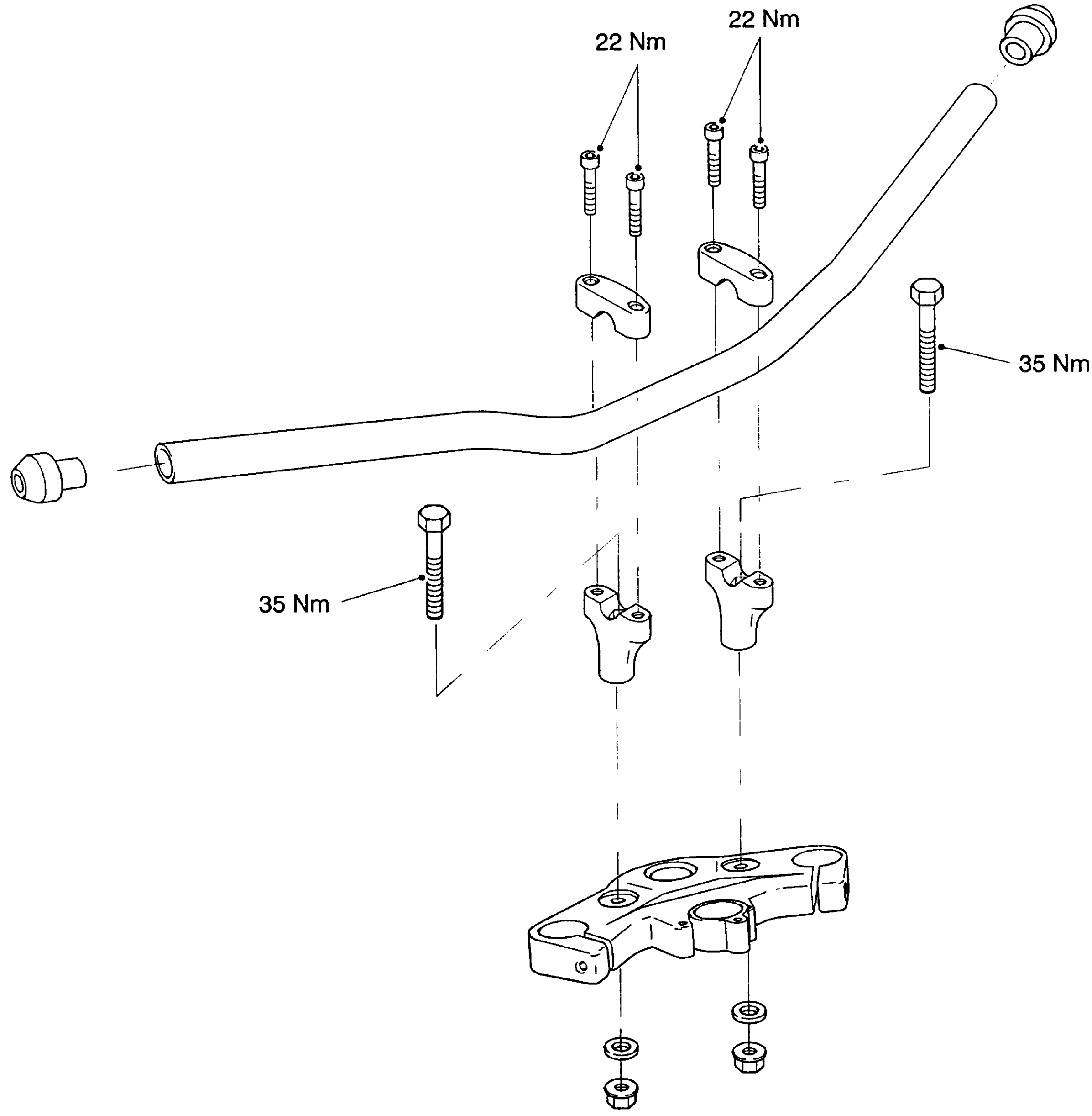
Exploded View - Front Fork



Exploded View - Low Handlebars



Exploded View - Tall Handlebars

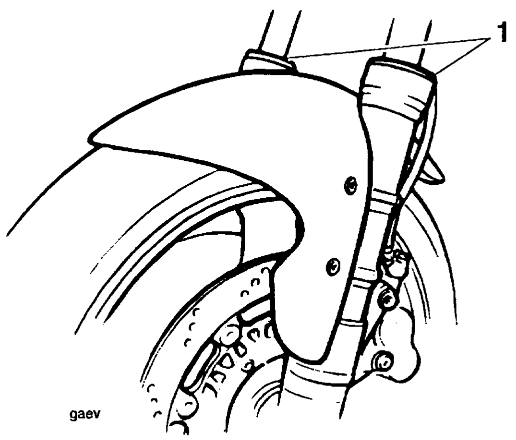


FRONT SUSPENSION

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:

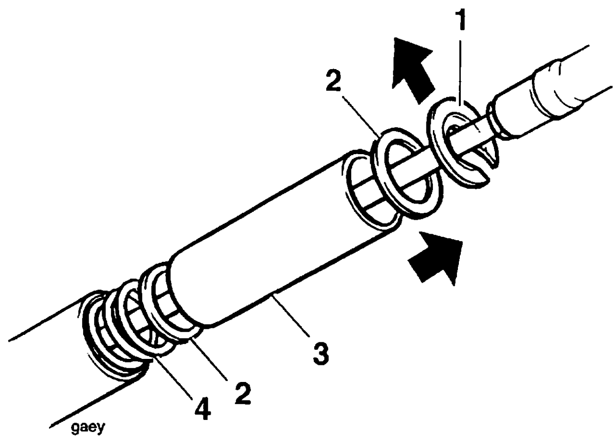
- **To aid removal, slacken but do not remove the top cap before releasing the fork from the yoke.**

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

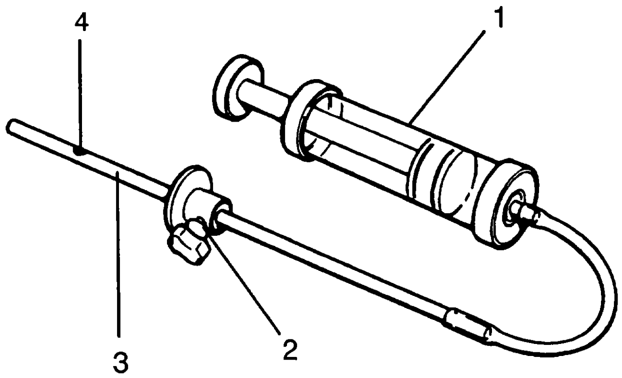
3. Guide tube

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).

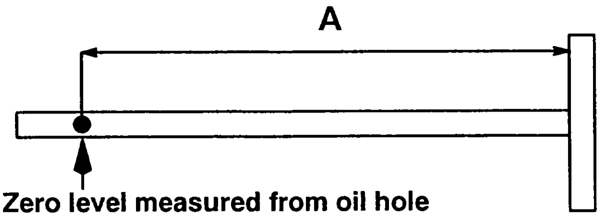
10. The fluid level in the fork is now set to the height set on the tool scale. Check the tool scale setting and repeat the process if incorrectly set.

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

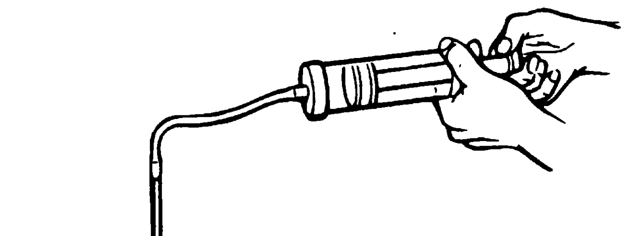
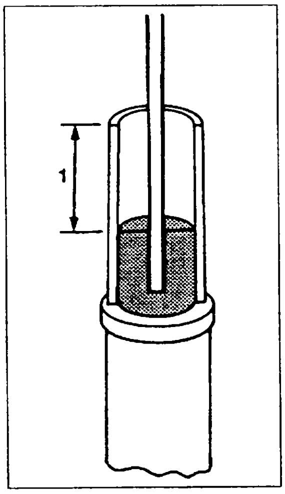


Plate arrowed must be level with fork slider

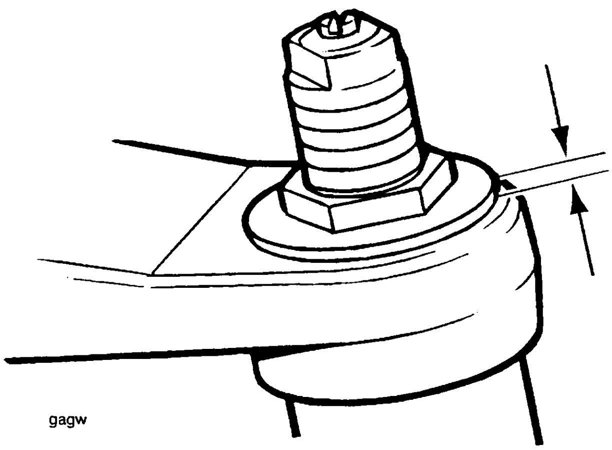


1. Fork Oil Level Setting (fork fully compressed)

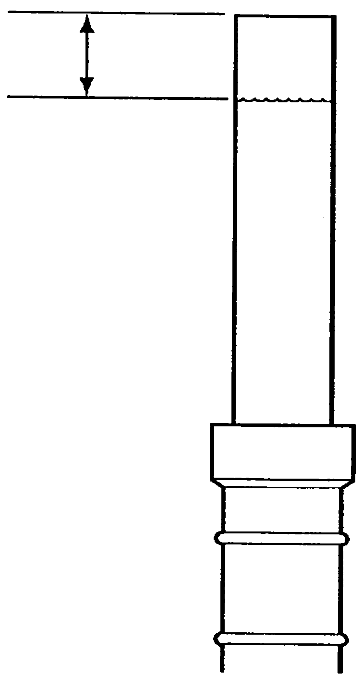
FORK OIL LEVEL CHART

Model	Oil Level*	Oil Volume	Oil Grade	Fork Pull Through
Daytona 955i	78 mm	586 cc	Showa SS8	Inner tube flush with upper face of top yoke
955cc Speed Triple	78 mm	586 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

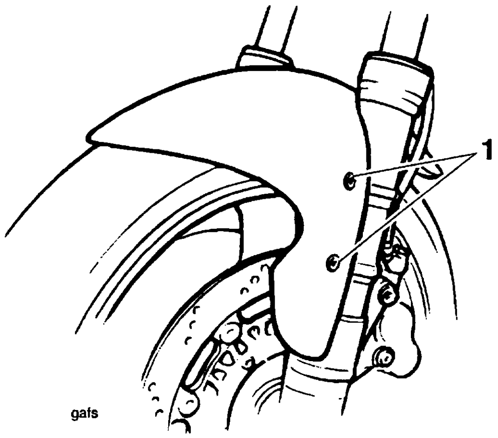
Removal

1. Raise and support the front of the motorcycle.

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

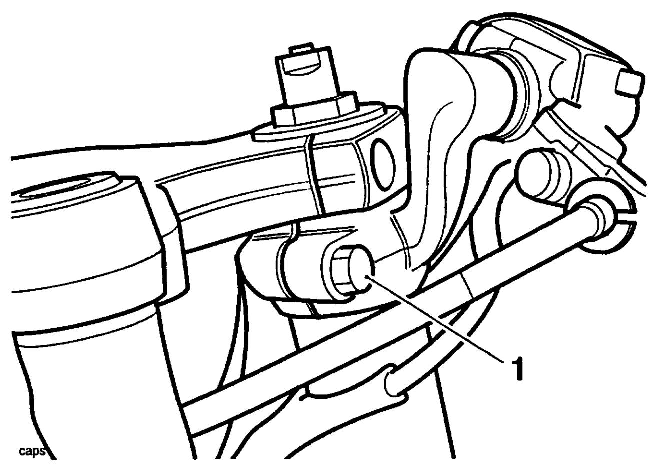
2. Remove the front wheel as described in the wheels and tyres section.

3. Remove the front mudguard.



1. Mudguard fixings

4. Low handlebar models only: Release the handlebar clamp screw and handlebar to yoke retaining bolt. 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.**

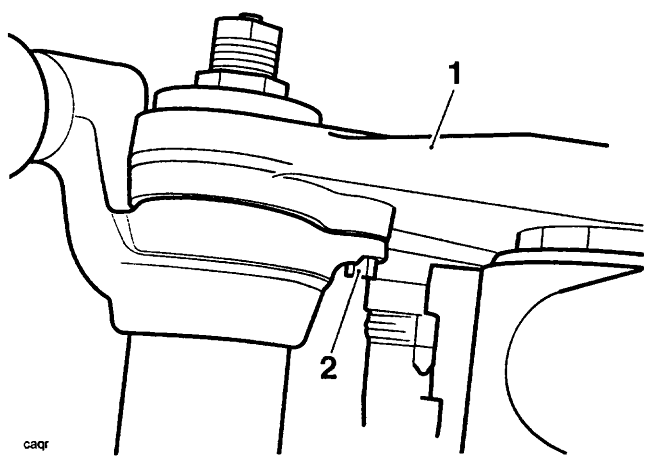
5. Slacken but do not remove the pinch bolts on the top and bottom yokes and, using a downward twisting motion, slide the fork out of the yokes.

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**.

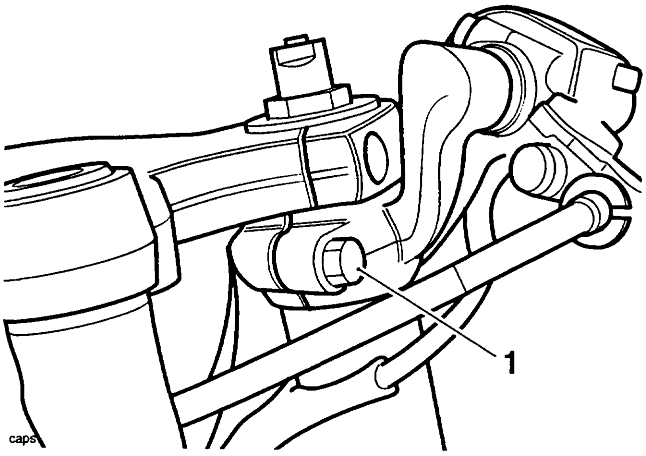
3. Fit the handlebar and tighten the retaining bolt to **11 Nm.**



1. Top yoke

2. Retaining bolt

4. Tighten the handlebar clamp bolt to **27 Nm.**



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

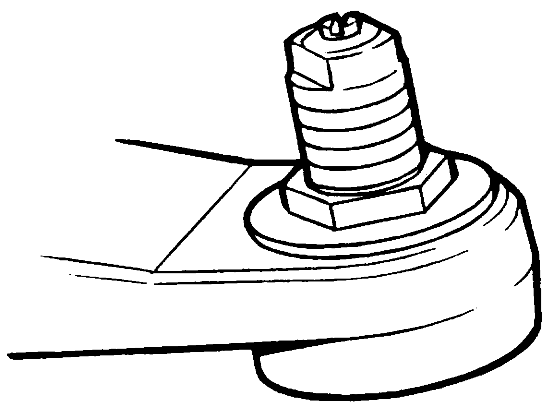
Dismantling

> **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.

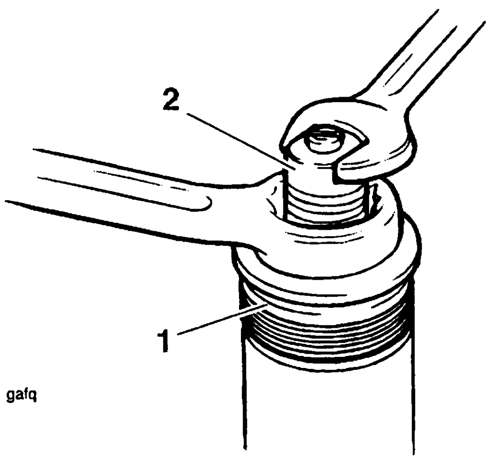
3. Note the position of the preload adjuster relative to the fork cap to ensure the setting is retained on re-assembly.



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.

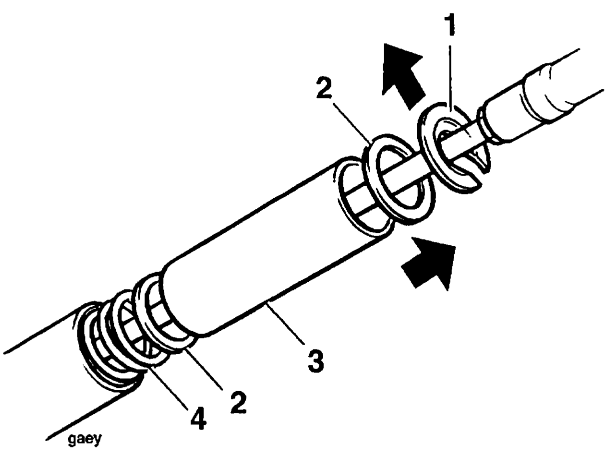


1. Fork cap

2. Preload adjuster / damper

5. Raise the damping cylinder rod slightly and remove:

- dished, slotted washer,
- guide washer
- guide tube
- guide washer
- damping spring.
- inner rod.



1. Dished, slotted washer

2. Guide washers

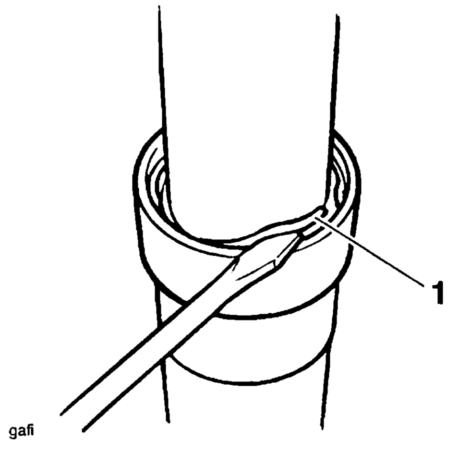
3. Guide tube

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.

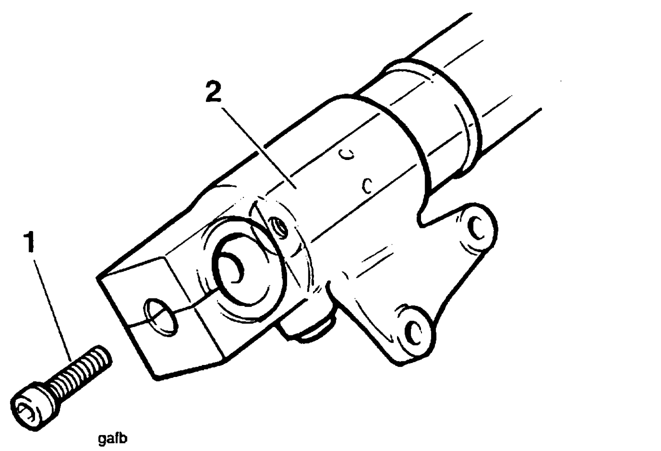
8. Prise out the dust seal from the outer tube and remove the circlip from beneath the seal.



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.

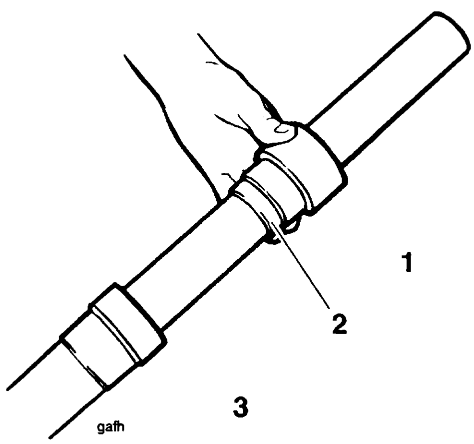
Assembly

> **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

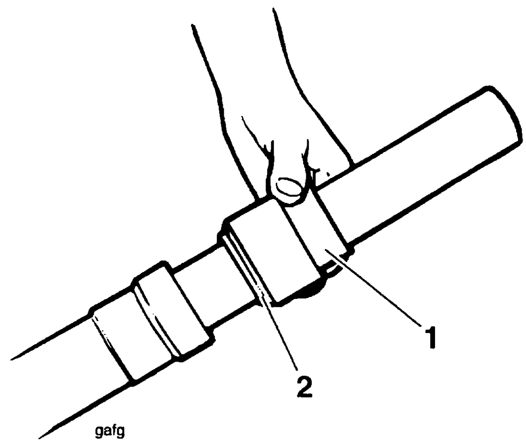
3. Outer tube

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'.

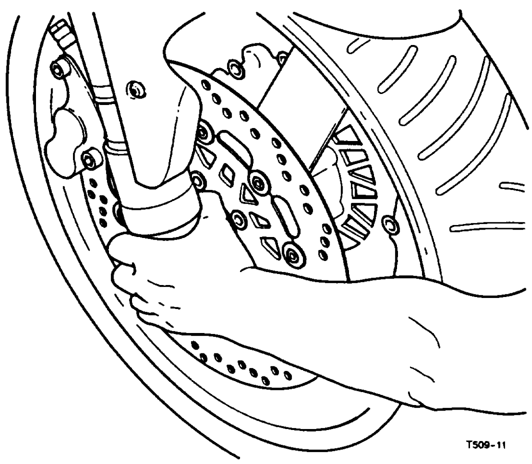
15. Tighten the fork cap to **22 Nm**. Check that the preload height adjustment remains at the mark noted prior to dismantling.

HEADSTOCK BEARING CHECK / ADJUSTMENT

Check

1. Raise and support the front of the motorcycle.

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



Checking headstock bearing adjustment

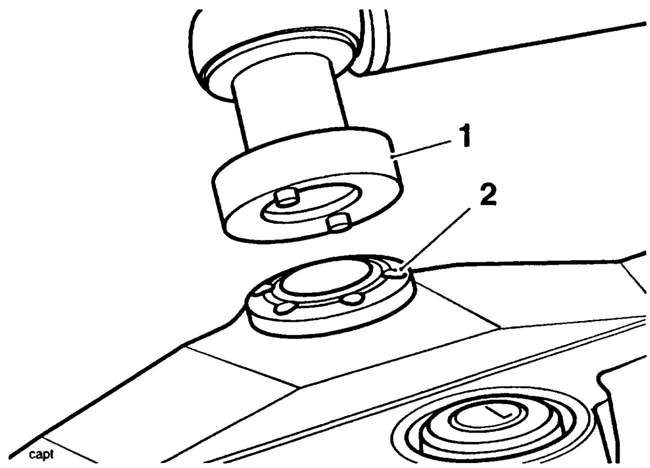
2. Hold the lower end of the front forks as illustrated and 'rock' with a front-to-rear motion. If free play can be detected, the headstock bearings require adjustment.

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.**

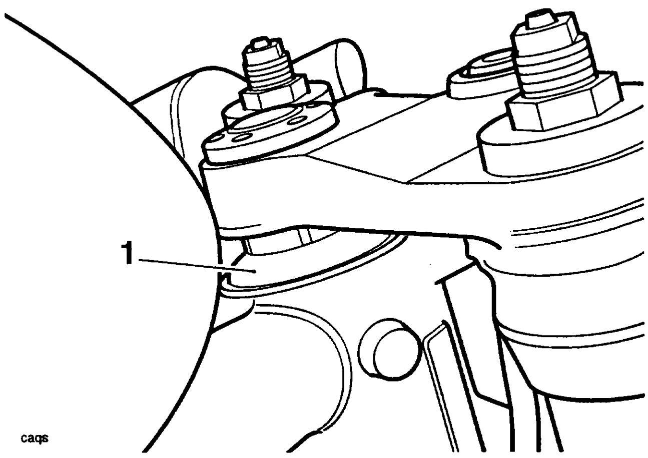
4. Slacken the headstock top nut using tool T3880300.



1. Tool T3880300
2. Headstock top nut

5. Adjust the bearing free-play as follows:-
   - Tighten the adjuster nut to **40 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.**



1. Adjuster nut

NOTE:

- **When the bearing is correctly adjusted the handlebars should, with the wheel off the ground, fall to full lock automatically (i.e. without being forced or pushed) but with all bearing play eliminated.**

- **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. Tighten the top nut to **65 Nm.**

7. Tighten the top yoke pinch bolts to **20 Nm**.

8. Tighten the handlebar clamp bolts to **27 Nm** (low handlebar models only).

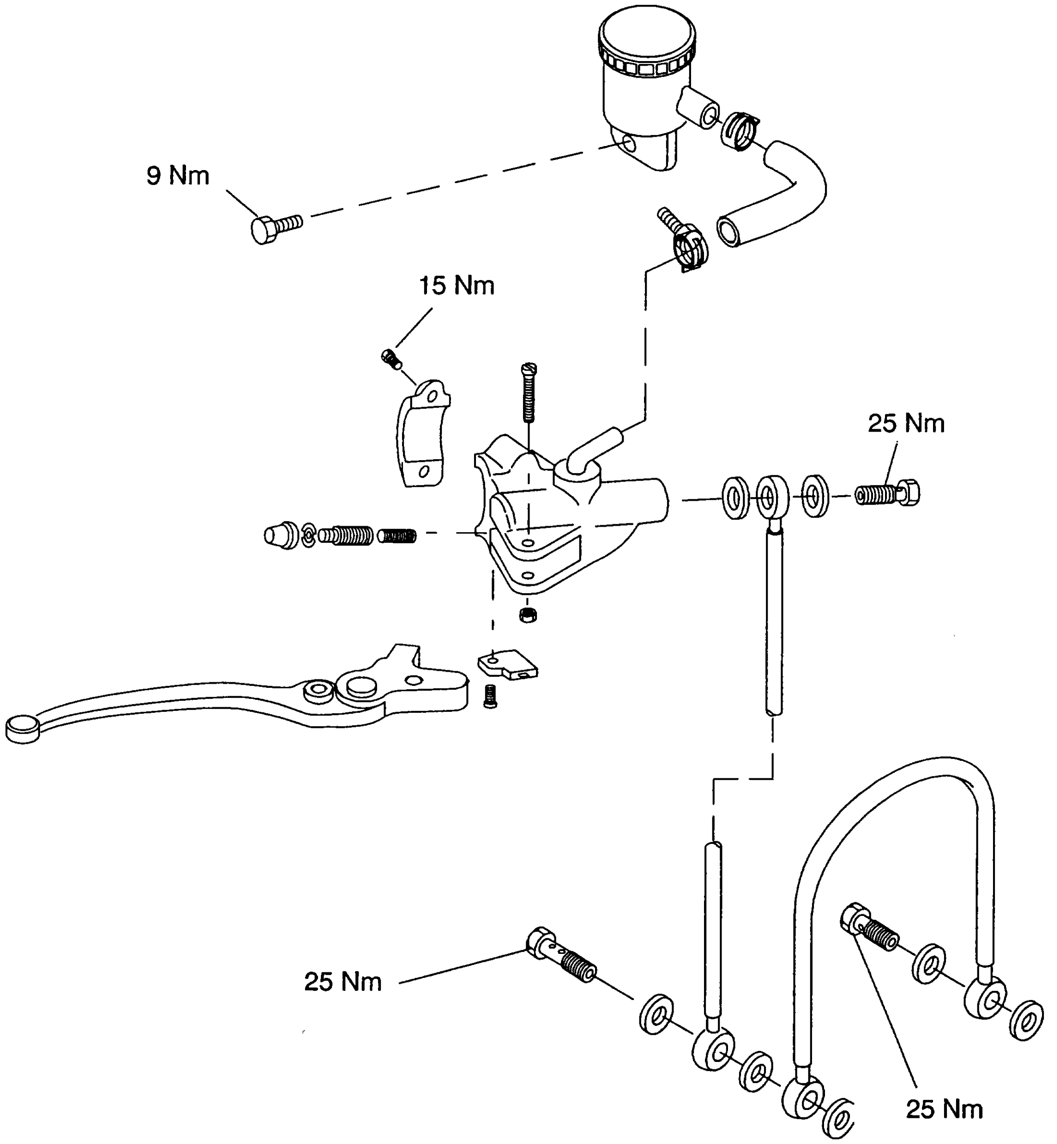
9. Recheck the bearing as described under paragraph 2 of the 'check' procedure and make further adjustments if necessary.

BRAKING SYSTEM

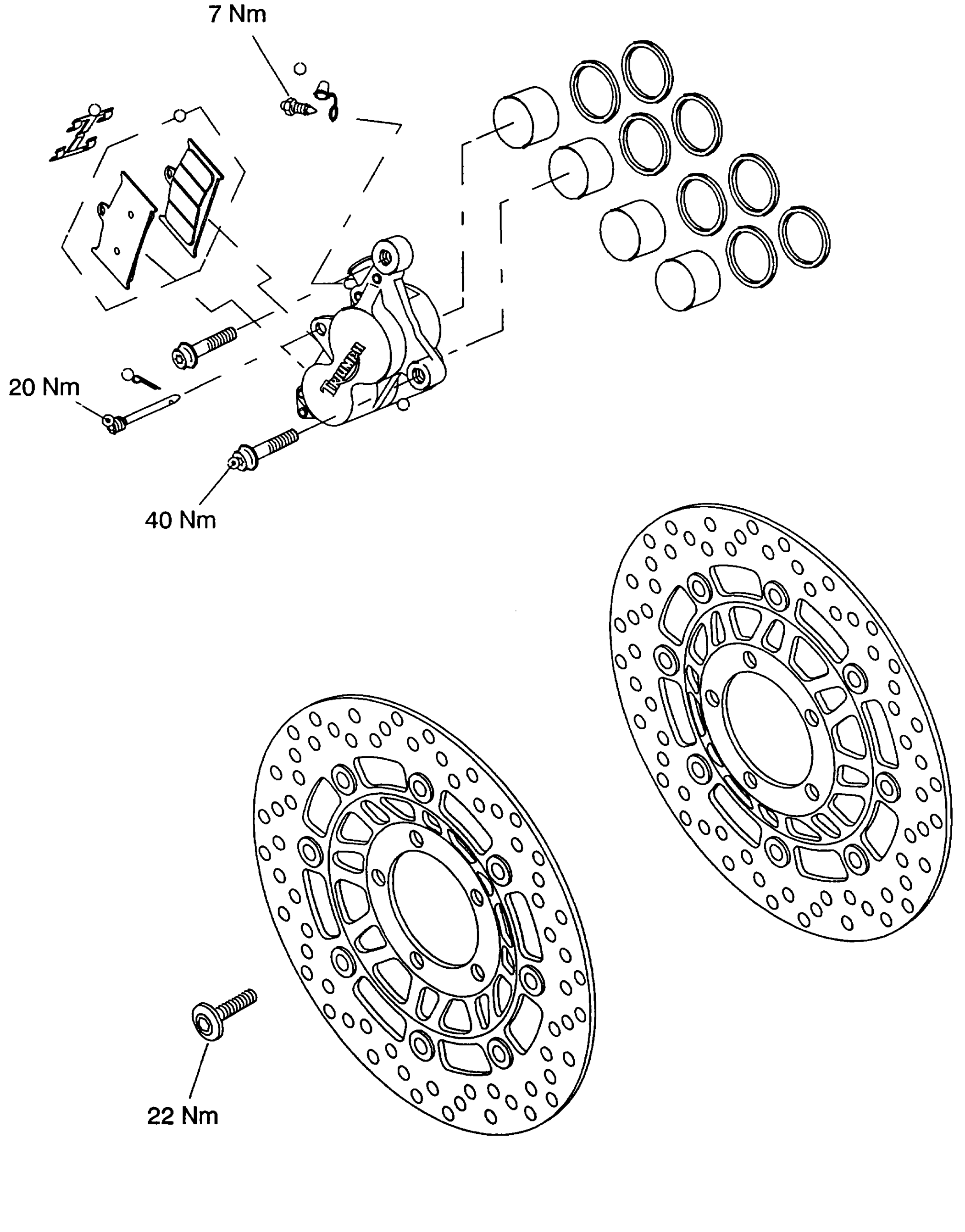
CONTENTS

CONTENTS

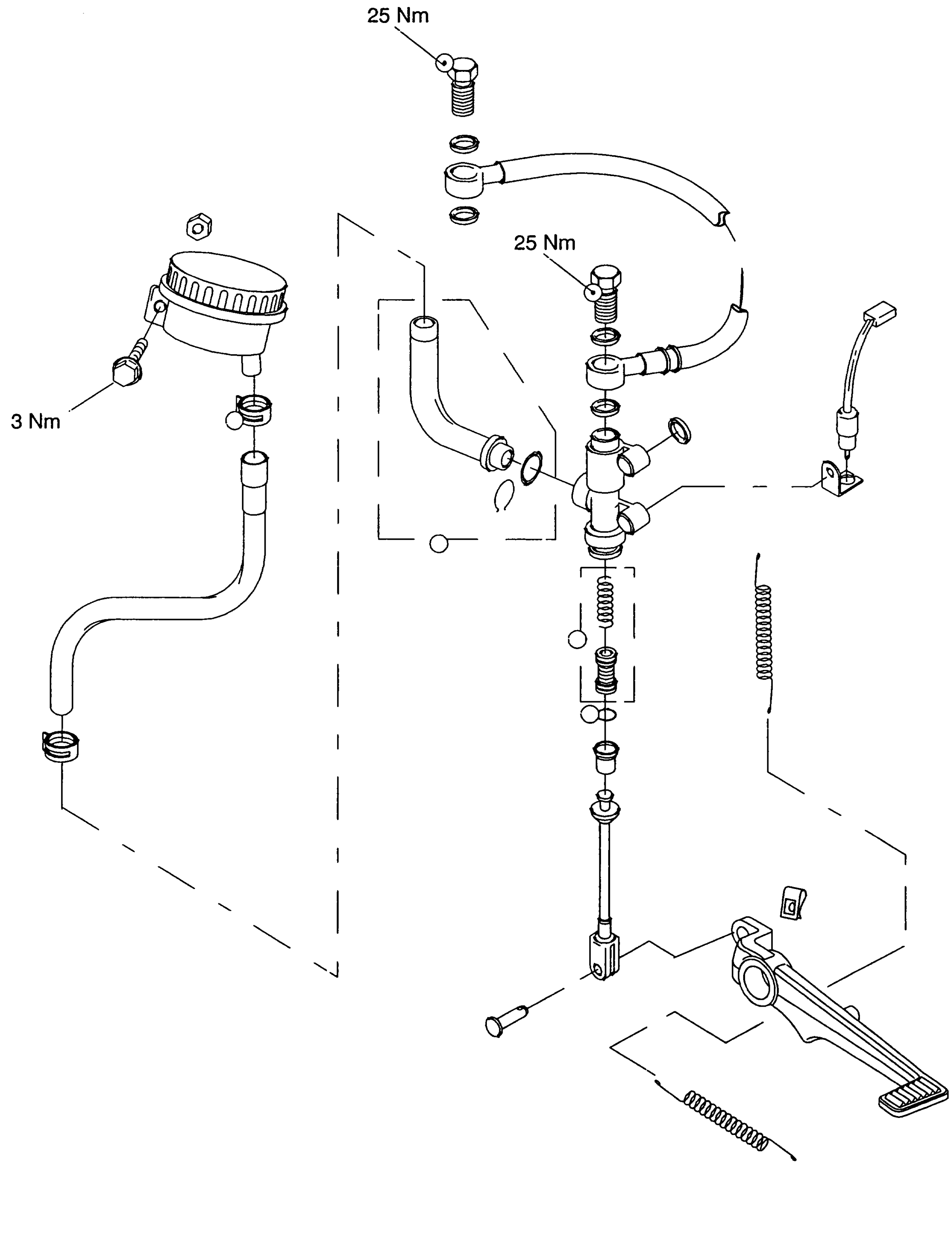
Exploded View - Front Brake Master Cylinder



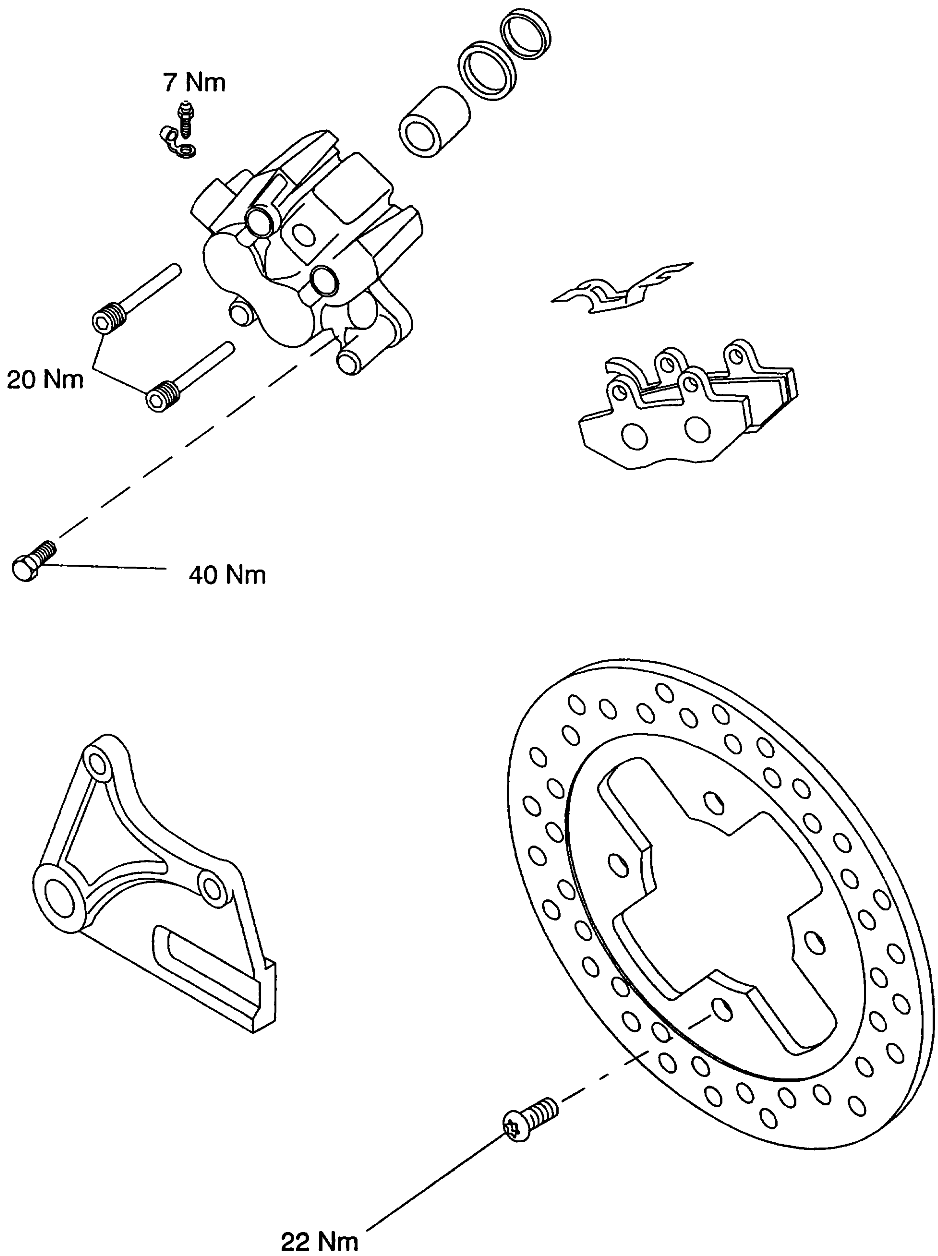
Exploded View - Front Brake Caliper



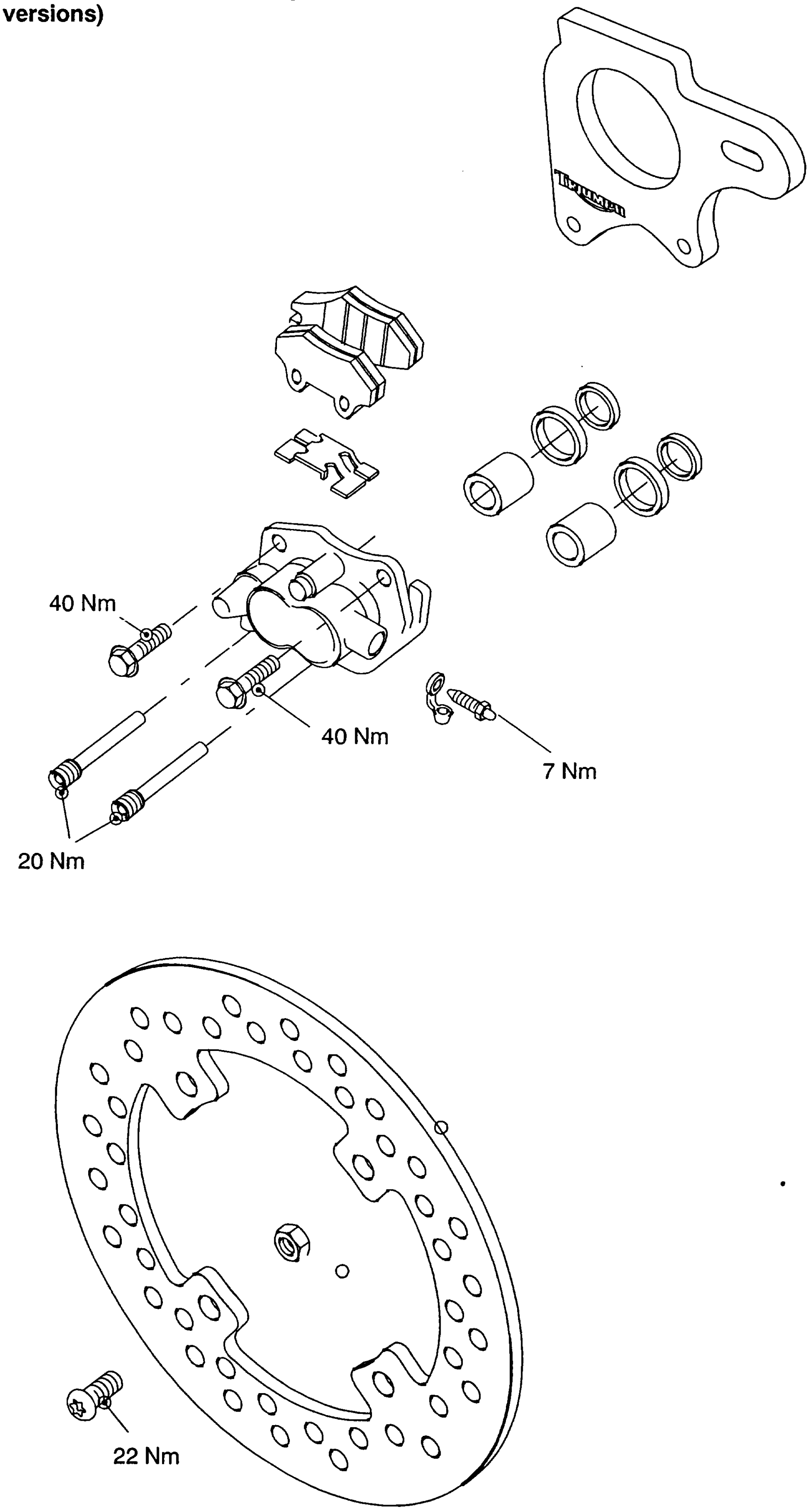
Exploded View - Rear Brake Master Cylinders



Exploded View - Rear Brake Caliper (twin sided swinging arm versions)



Exploded View - Rear Brake Caliper (single sided swinging arm versions)



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.

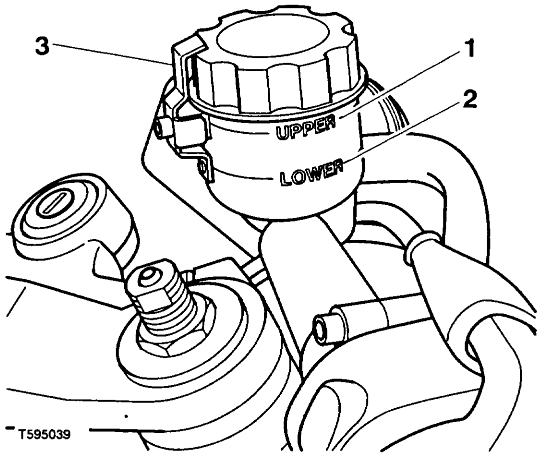
Damage caused by contact with mineral based grease may reduce braking efficiency resulting in an accident.

FLUID LEVEL INSPECTION

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

In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

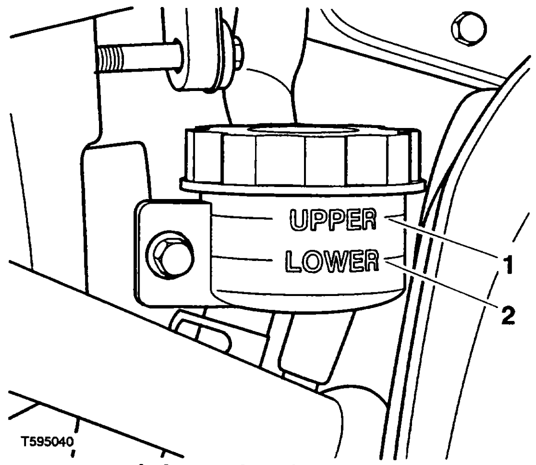
1. Ensure that the brake fluid level in the front and rear brake fluid reservoirs is between the upper and lower level lines (reservoir held horizontal).



1. Front reservoir lower level

2. Front reservoir upper level

3. Safety clip



1. Rear reservoir lower level

2. Rear reservoir upper level

CHANGING BRAKE FLUID

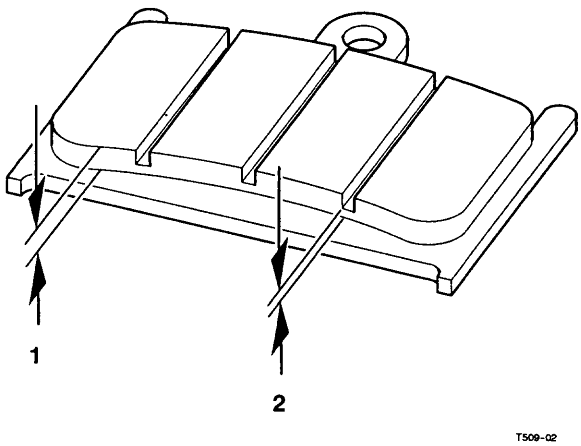
Brake fluid should be changed at the interval specified in the scheduled maintenance chart.

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

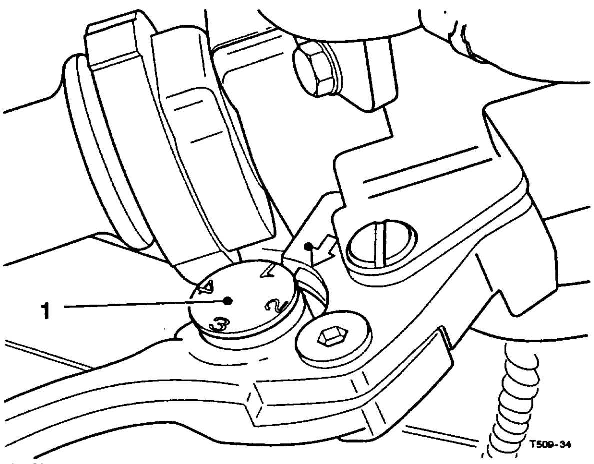
2. Centre groove

> **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

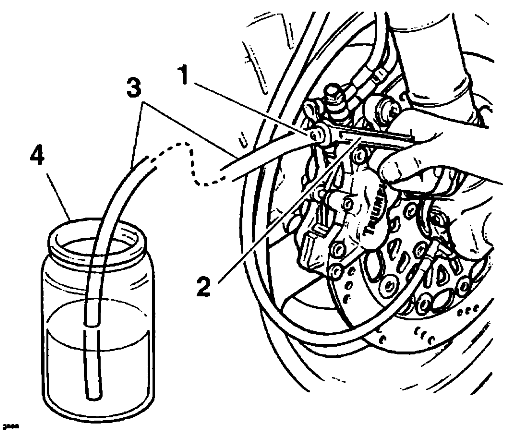
WARNING: Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. **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.



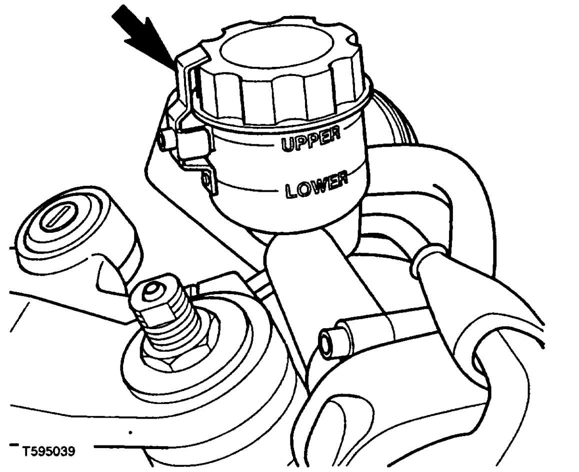
1. Bleed Nipple

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.

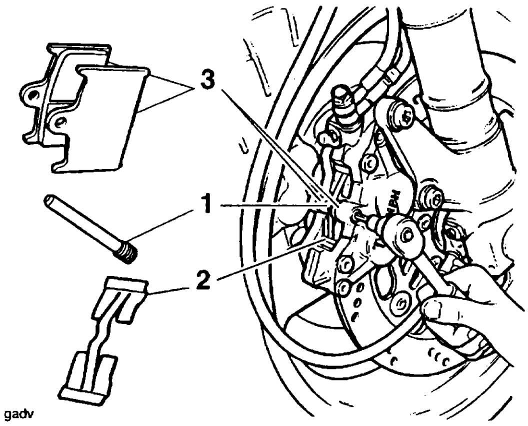
WARNING: Always return the lever adjuster to the original setting as noted in paragraph 1. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of control or an accident.

18. Reset the brake lever adjuster to the original setting.
19. Check that the brake operates correctly.

FRONT BRAKE PADS

Removal

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



1. 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 **20 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.

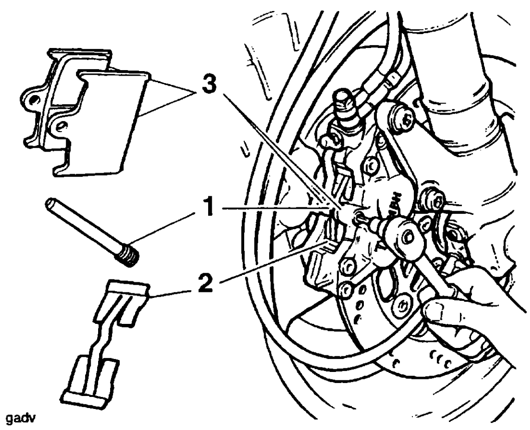
FRONT BRAKE CALIPER

Removal

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

CAUTION: To prevent 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.

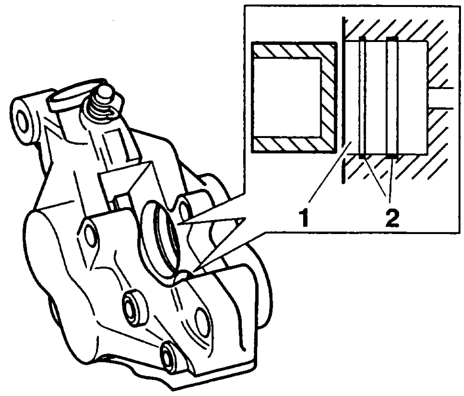
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

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.



12.11-1

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 **20 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

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

Wear

1. Replace any brake disc if worn beyond the service limit or exceeds the disc run-out limit.

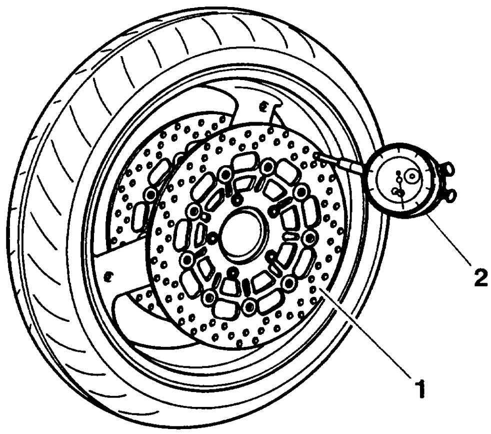
Front Disc Thickness

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.



12.12-1

1. Disc

2. Dial Gauge

Removal

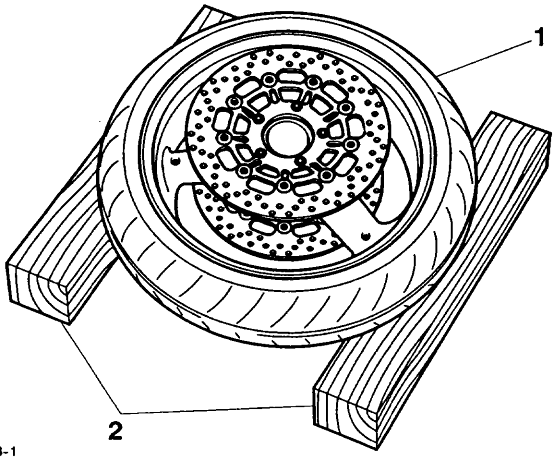
WARNING: Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable.

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 disc securing bolts. 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

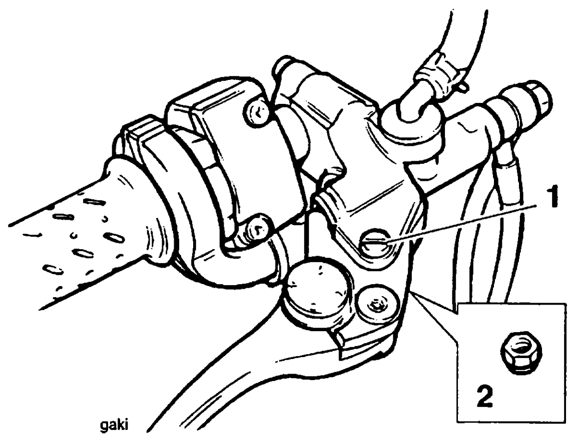
Removal

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

1. Remove the 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

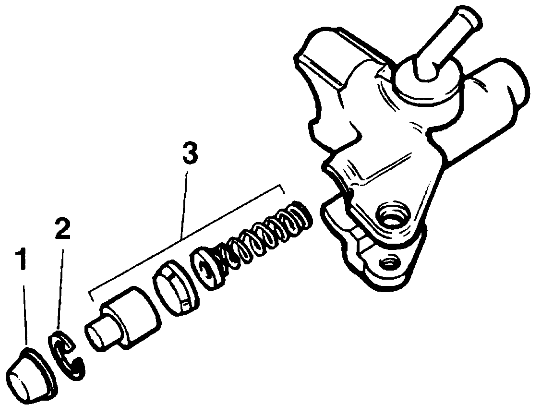
5. Disconnect from the master cylinder:

- 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.



gakj

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.

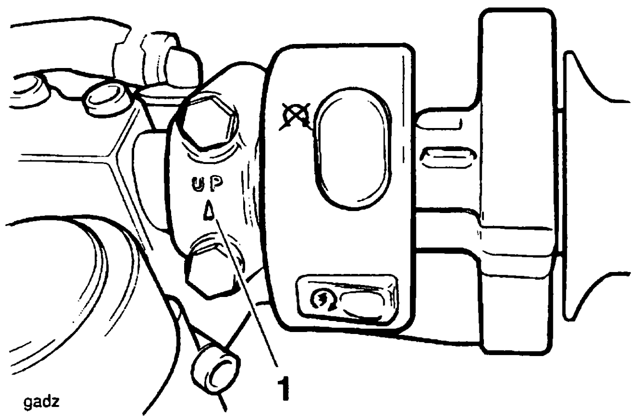
A dangerous riding condition leading to an accident could result if this warning is ignored.

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



gadz

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.

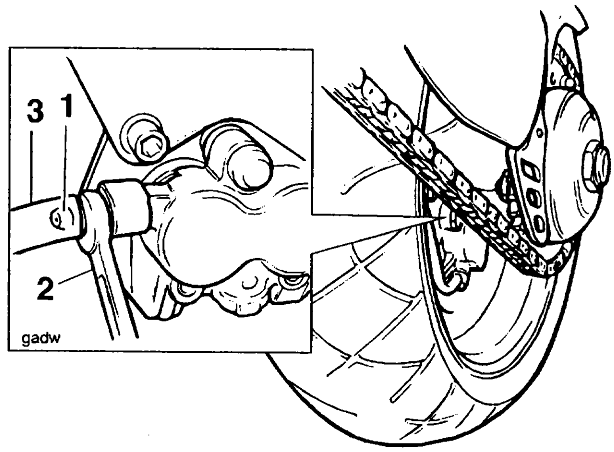
WARNING: Always return the lever adjuster to the original setting noted during removal. Operating the motorcycle with lever settings which are unfamiliar may lead to loss of control or an accident.

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

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

1. Remove the 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
(single sided swinging arm version illustrated)

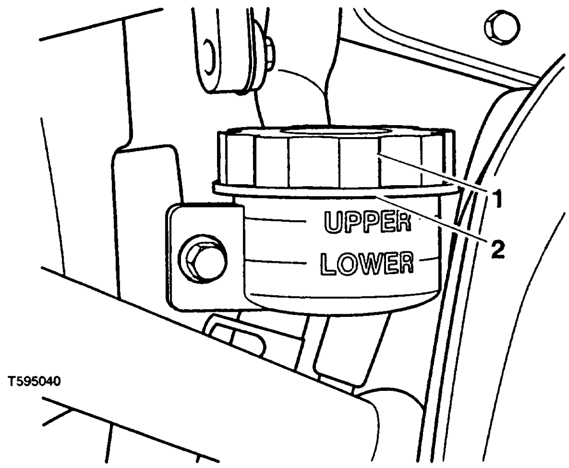
2. Spanner

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.

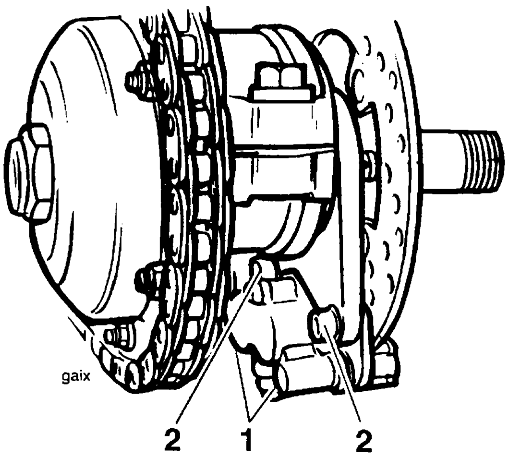
REAR BRAKE PADS

Single sided swinging arm versions

Removal

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

1. Remove the rear wheel as described in the wheel section.



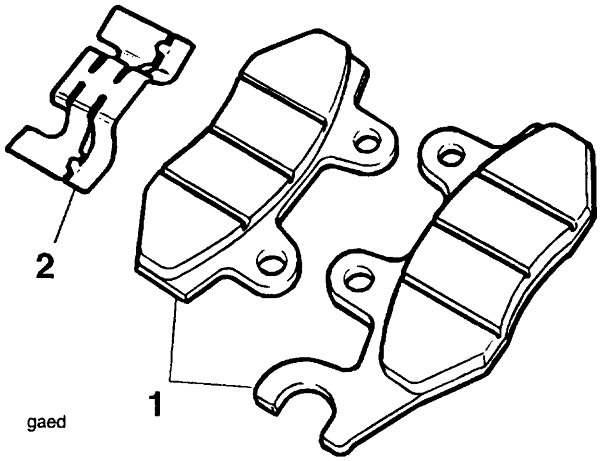
1. Pad Retaining Pins

2. Caliper Mounting Bolts

2. 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.**

3. Remove the caliper mounting bolts and position the caliper to allow withdrawal of the pad retaining pins.
4. Press downwards on both pads and remove the pad retaining pins.
5. Remove the brake pads and inspect for damage or wear beyond the service limit.



1. Brake Pads

2. Anti Rattle Spring

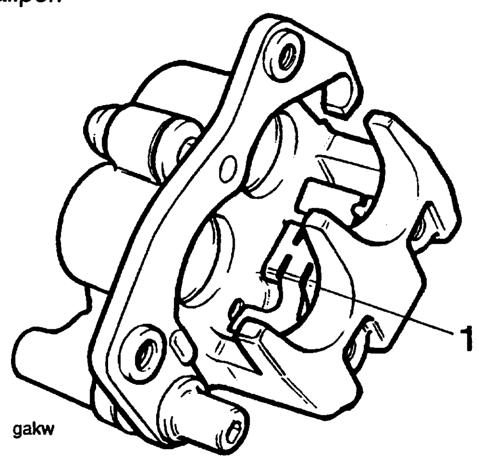
6. Remove the anti-rattle spring and inspect for damage.

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. Install the anti-rattle spring into the caliper.



1. Anti Rattle Spring

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.
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.
10. Refit the rear wheel as described in the body section.

REAR BRAKE CALIPER

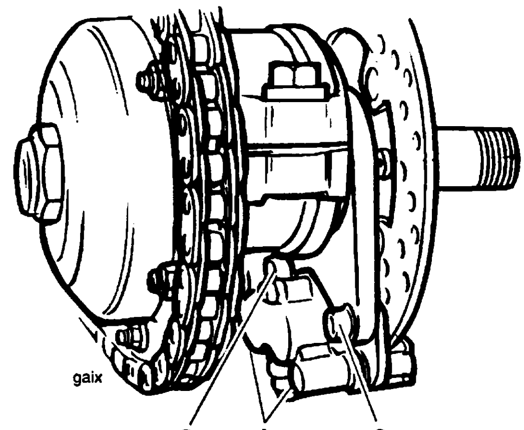
Single sided swinging arm versions

Removal

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

> **CAUTION: To prevent body damage, do not allow brake fluid to contact any area of the bodywork or the rear wheel.**

1. Remove the rear wheel as described in the wheel section.
2. Disconnect the rear brake hose at the caliper and place the free end of the hose in a suitable container to collect brake fluid.
3. Slacken the two pad retaining pins.
4. Remove the caliper mounting bolts.
5. 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.**

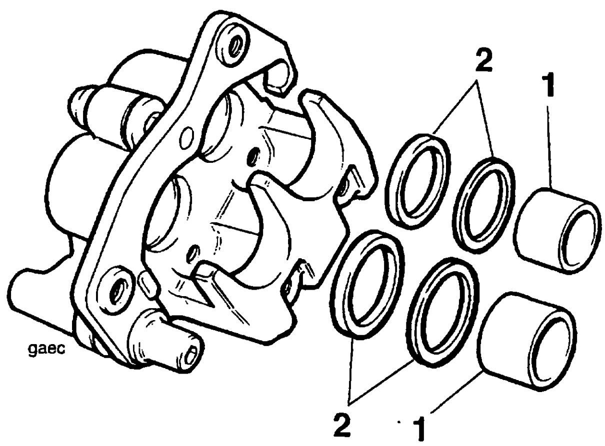
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

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.



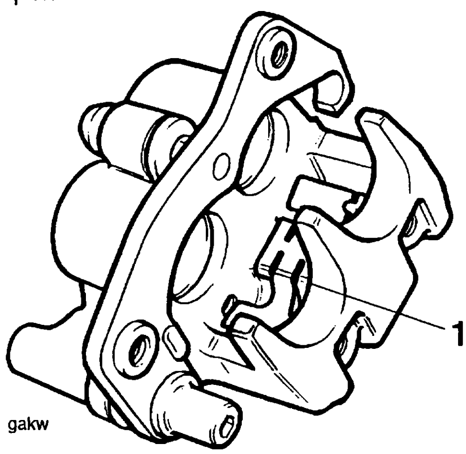
1. Pistons

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 rear brake as described earlier.
8. Refit the rear wheel as described in the body section.

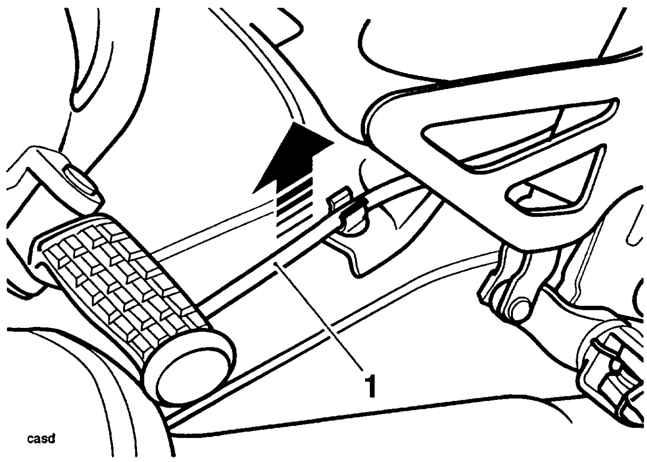
REAR BRAKE PADS

Twin sided swinging arm versions

Removal

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

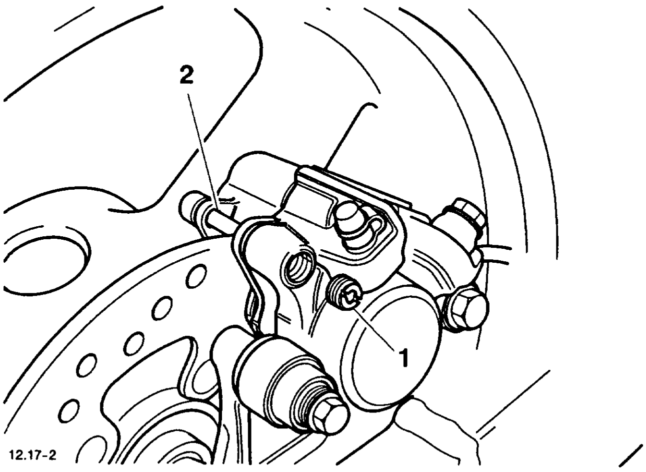
1. Remove the seat to give access to the rear brake fluid reservoir.
2. Detach the brake hose from its clip on the swinging arm.



1. Hose

CAUTION: Operation 3 (below) will cause the level of fluid in the reservoir to rise above normal levels leading to seepage from the cap area. To prevent body/paint damage, do not spill brake fluid onto any area of the bodywork or other painted or plastic surface.

3. Push the brake caliper inwards towards the wheel in order to displace the caliper piston.
4. Remove the plug protecting the pad retaining pin.



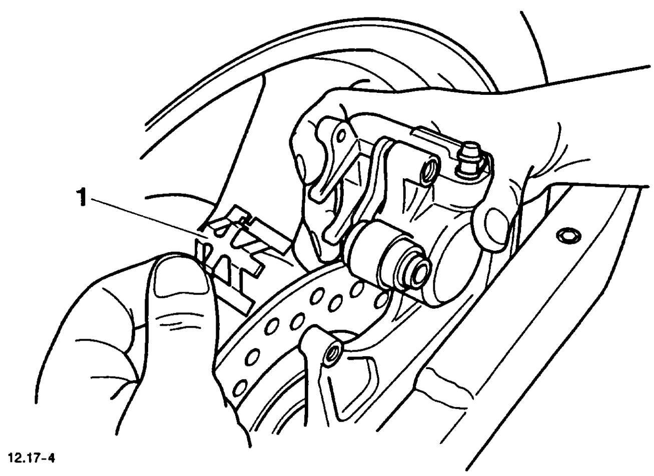
1. Plug

2. Pad retaining pin

NOTE:

- **Before removing the brake pads, note the relationship of the pads to the caliper and ensure that, on assembly, they are fitted in the same way.**

5. Remove the brake caliper bolts, raise the caliper.



1. Brake caliper bolt

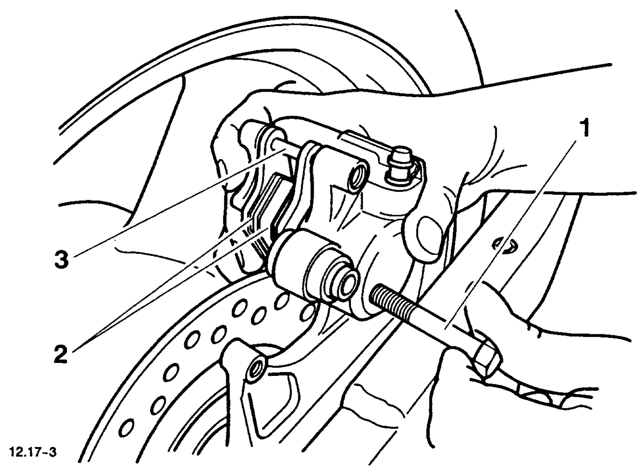
2. Brake pads

3. Pad retaining pin

6. Remove the pad retaining pin and detach the pads.

> **WARNING: Do not allow the caliper to hang on the brake hoses as this may damage the hoses and could lead to an accident.**

7. Remove the anti-rattle spring and inspect for damage, replace if necessary.



1. Anti-rattle spring

Installation

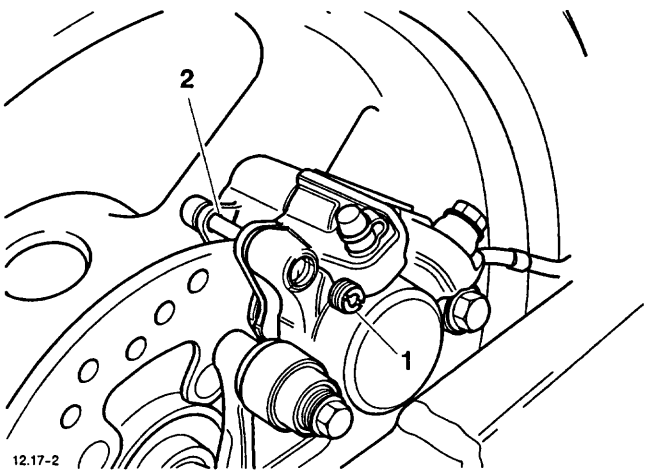
> **WARNING: Never use mineral based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral based grease will damage the hydraulic seals in the calipers and master cylinders.**
>
> **Damage caused by mineral based grease may reduce braking efficiency 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. Fit the anti-rattle spring into the caliper.
2. Renew the brake pads as a pair or, if both pads are in a serviceable condition, clean the pad grooves before fitting them back into the caliper.

> **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. Fit the brake pads to the caliper in the positions noted during removal.
4. Lubricate the pad retaining pin using a minimum amount of proprietary high temperature 'Copperslip' type grease.
5. Lower the caliper over the brake disc ensuring that the pads remain in the correct positions.
6. Install the pad retaining pin.



1. Plug

2. Pad retaining pin

7. Fit the caliper bolts and tighten to **24 Nm** (M8 bolt) and **29 Nm** (M12 bolt).

8. Tighten the pad retaining pin to **17 Nm**.

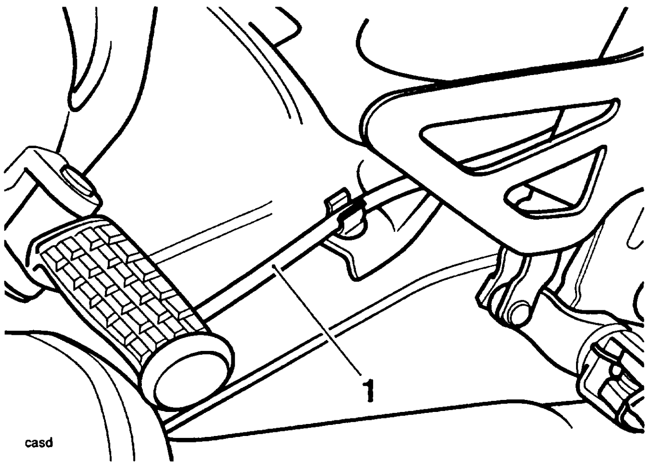
9. Fit the protector plug and tighten to **17 Nm.**

10. Pump the brake pedal to correctly position the caliper pistons.

11. Check the brake fluid level in the rear reservoir and top-up as required with new D.O.T. 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. Refit the brake hose to its push-in clip.



1. Hose

13. Refit the seat.

REAR BRAKE CALIPER

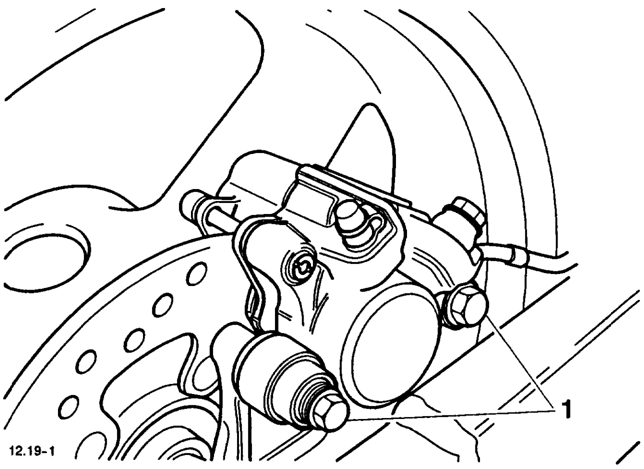
Twin sided swinging arm versions

Removal

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

CAUTION: To prevent body/paint damage, do not spill brake fluid onto any area of the bodywork or other painted or plastic surface.

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. Release the brake hose from its clip on the swinging arm.
3. Remove the caliper mounting bolts.
4. Remove the brake caliper assembly.



1. Caliper Mounting Bolts

Disassembly

1. Remove the plug protecting the pad retaining pin.
2. Remove the pad retaining pin.
3. Remove the brake pads and anti-rattle spring.

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.

4. Cover the caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake pedal, remove the piston.

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

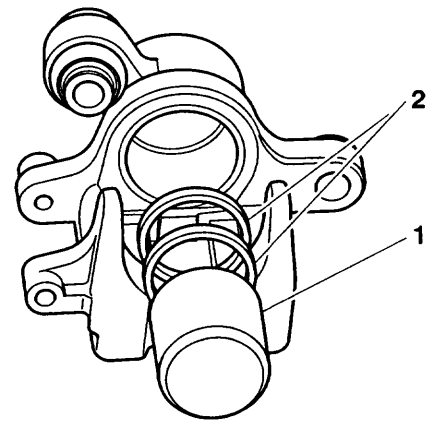
WARNING: Never use mineral based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral based grease will damage the hydraulic seals in the calipers and master cylinders.

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 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.

1. Fit new fluid seals to the caliper. Apply brake fluid to the outside of the caliper piston and fluid seal.



1. Piston

2. Seals

2. Carefully push the piston into the caliper by hand.
3. Install the anti-rattle spring into the caliper.

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.
5. Lubricate both the pad retaining pin and plug with a minimum amount of proprietary high temperature 'Copperslip' type grease.
8. Fit the pad retaining pin and plug and tighten both to **17 Nm**.

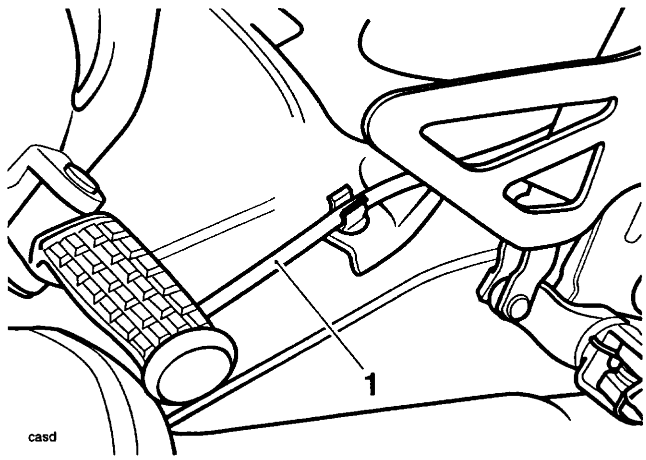
Installation

1. Position the caliper to the motorcycle ensuring the pads are correctly aligned on both sides of the disc.
2. Fit the caliper retaining bolts and tighten to **20 Nm** (M8 bolt) and **29 Nm** (M12 bolt).
3. Connect the brake hose to the caliper incorporating new washers on each side of the banjo bolt.
4. Tighten the banjo bolt to **25 Nm.**

WARNING: Use only 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.

5. Refit the brake hose to its push-in clip.



1. Hose

6. Fill the master cylinder with new D.O.T. 4 brake fluid from a sealed container.
7. Bleed the rear brake as described earlier in this section.

REAR BRAKE DISC

Wear

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

1. Replace any brake disc if worn beyond the service limit or exceeds the disc run-out limit.

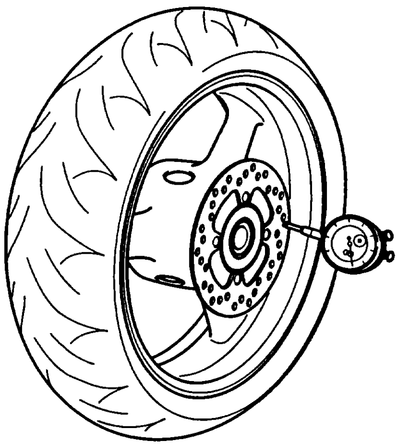
Rear Disc Thickness

Standard: .... 5.0 mm
Service Limit: .... 4.5 mm

Disc Run-out

Service Limit: .... 0.15 mm

Measure disc run out using an accurate dial gauge mounted on a surface plate.



1. Disc

2. Dial Gauge

REAR MASTER CYLINDER

Removal

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

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

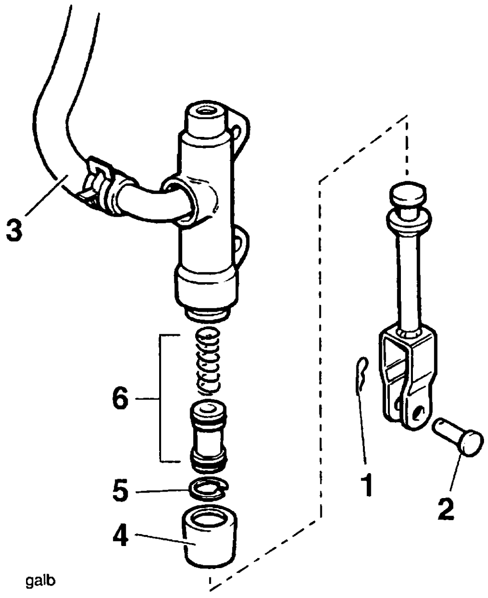
WARNING: Never use mineral based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral based grease will damage the hydraulic seals in the calipers and master cylinders.

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.
6. 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.

REAR BRAKE DISC

TWIN sided swinging arm versions

NOTE:

- **Details of brake disc replacement can be found in the wheel section (14)**

SINGLE sided swinging arm versions

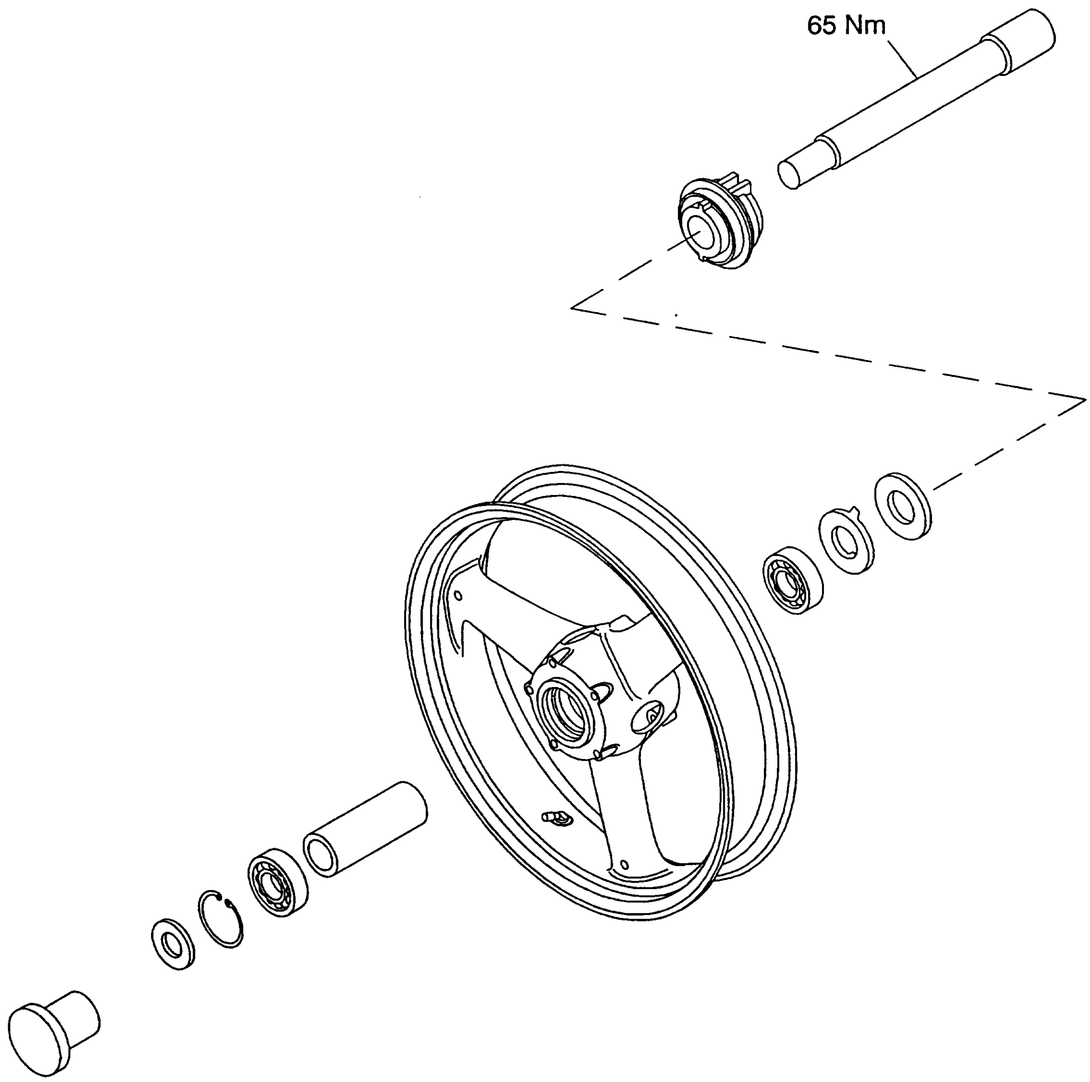
NOTE:

- **Details of brake disc replacement can be found in the rear suspension section (11B).**

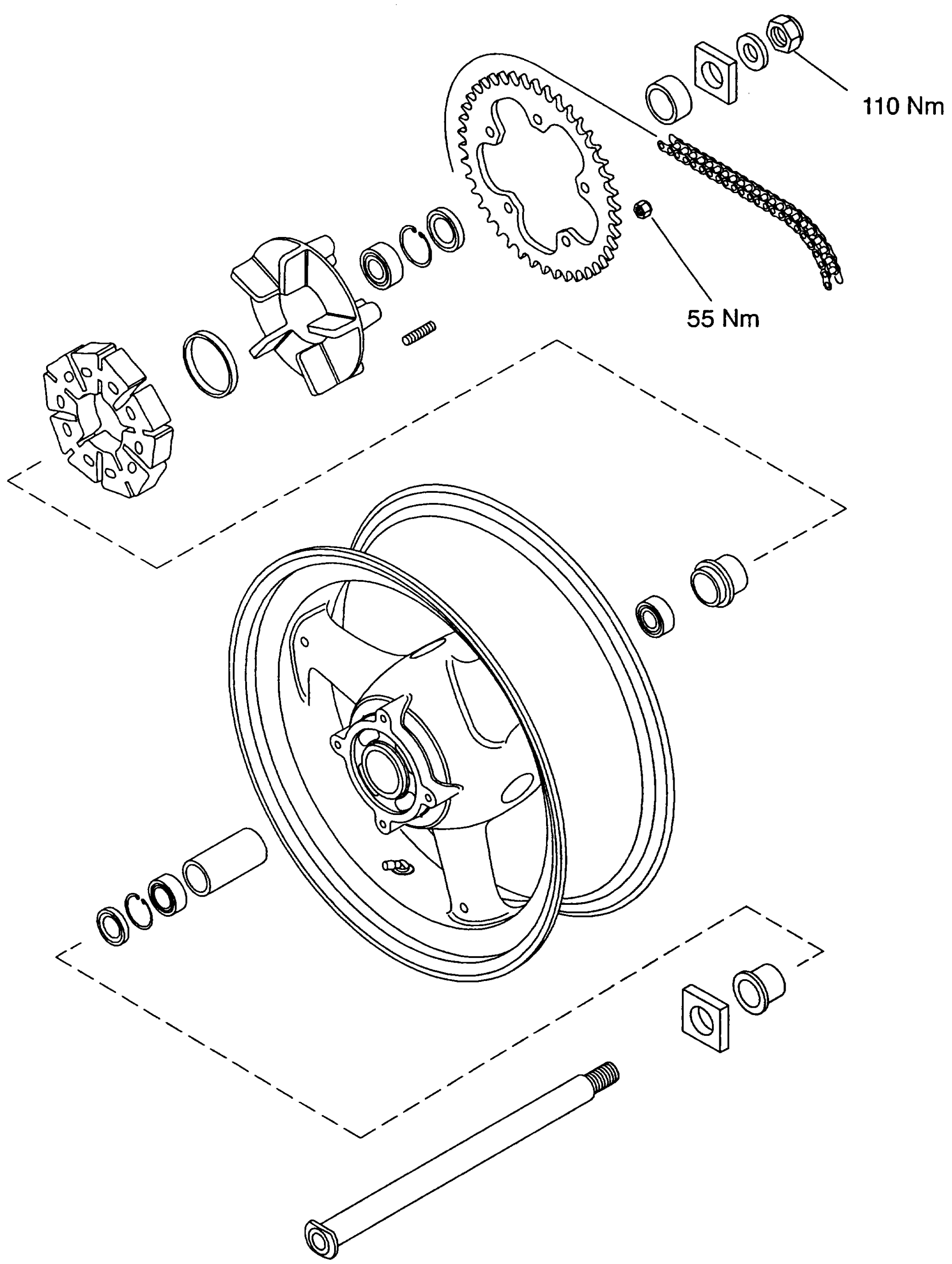
TYRES

CONTENTS

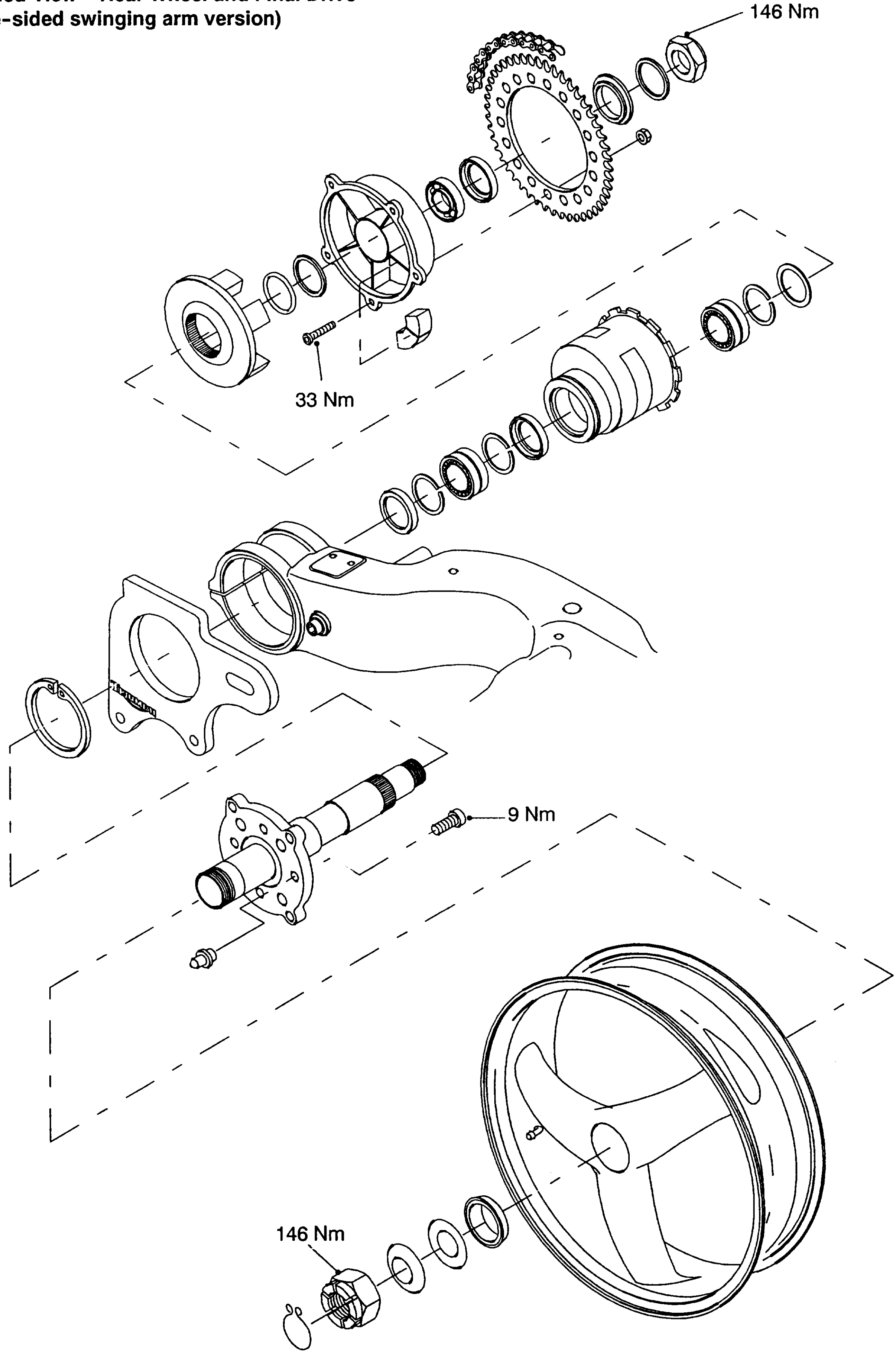
Exploded view - Front Wheel



Exploded View - Rear Wheel and Final Drive (twin-sided swinging arm version)

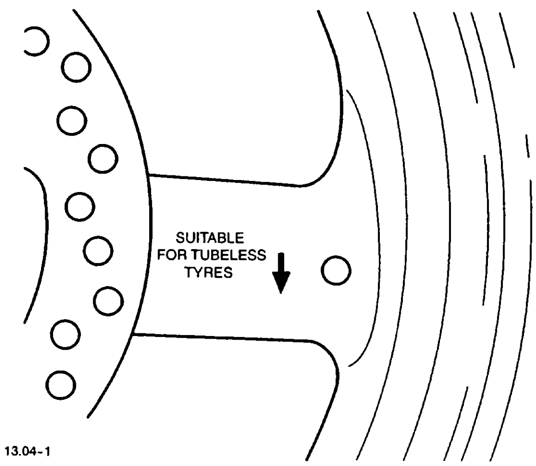


Exploded View - Rear Wheel and Final Drive (single-sided swinging arm version)

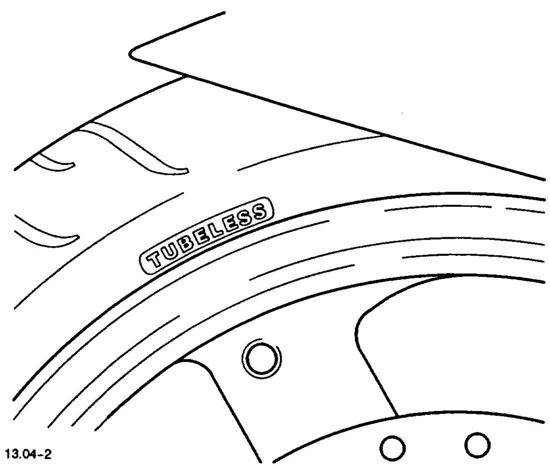


TYRES

This model is 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.



Wheel 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

Correct inflation pressure will provide maximum stability, rider comfort and tyre life.

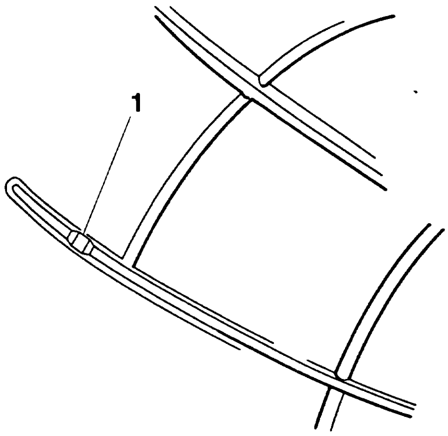
Tyre pressures should be checked frequently and adjusted as necessary. See the owner's handbook or the specification section for the correct inflation pressures for this model.

> **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

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.



13.05-1

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 having become damaged.

WARNING: Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control 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.
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

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

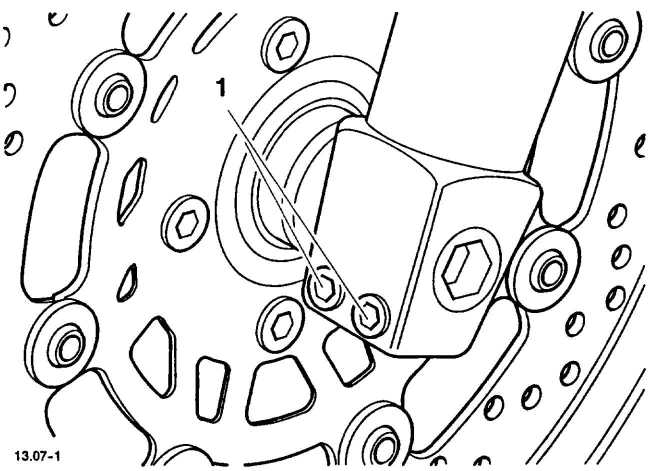
1. Position the motorcycle on a paddock stand.
2. Detach both brake calipers.

NOTE:

- **It is not necessary to disconnect the brake hoses.**

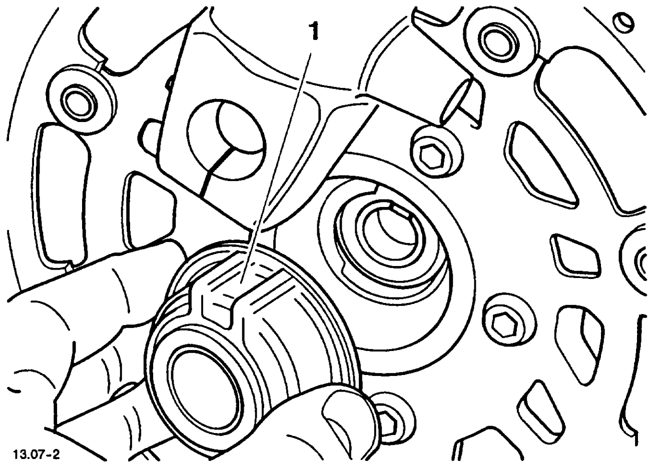
> **WARNING: Do not allow the calipers to hang on the brake hoses as this may damage the hoses.**
>
> **Damaged hoses could cause brake failure leading to loss of control and an accident.**

3. Raise and support the front of the motorcycle.
4. Slacken both pinch bolts at the lower end of both forks.

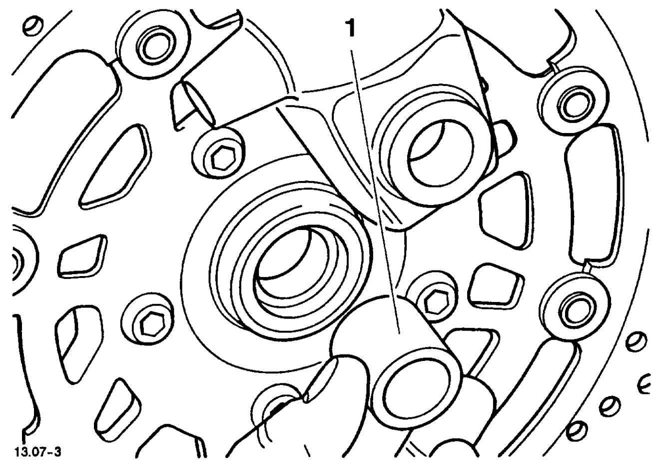


1. Fork pinch bolts

5. Release and remove the wheel spindle which is threaded into the right hand fork.
6. Remove the wheel, recovering the speedometer drive from the left hand side, and the spacer from the right.



1. Speedometer drive



1. Spacer

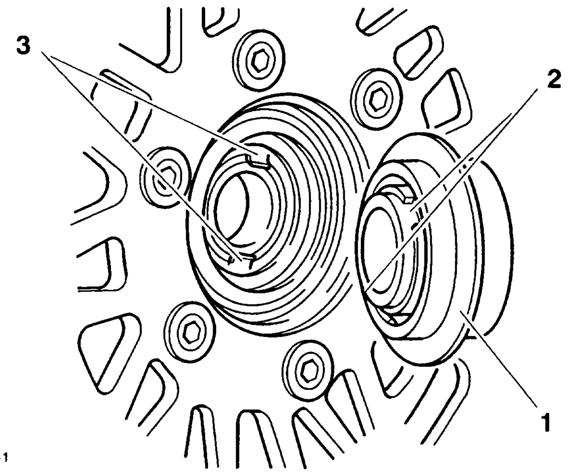
7. Place the wheel on wooden blocks.

> **WARNING: Do not allow the wheel to rest on either brake disc as this may damage the disc and could lead to an accident.**

> **CAUTION: To prevent wheel and bearing damage, observe absolute cleanliness and ensure there is no dirt ingress to the wheel bearings while the wheel is removed.**
>
> **Never allow the speedometer drive to hang on the cables. Always support the speedometer drive during the period that the wheel is removed.**

8. Thoroughly clean all components and inspect for wear or damage.

Installation



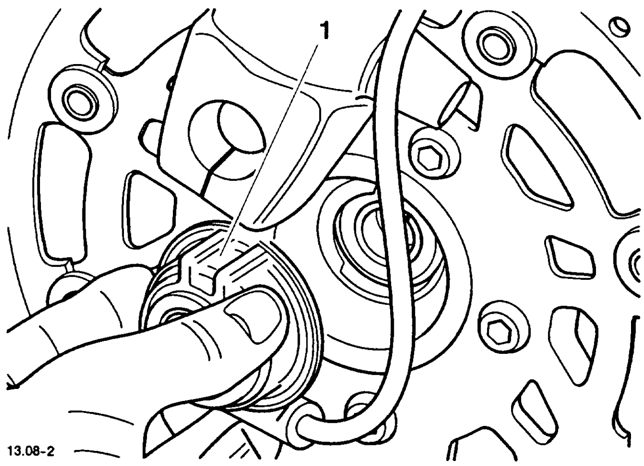
13.08-1

1. **Speedometer drive**
2. **Drive cut-outs**
3. **Drive tongues**

1. Position the speedometer drive into the left side of the wheel hub. Ensure the two drive cut-outs engage with the drive tongues in the wheel.

2. Lightly smear the spacer with grease and locate in the right hand side of the hub.

3. Position the wheel between the forks, locating the slot in the speedometer drive with the lug on the inside face of the left hand fork.



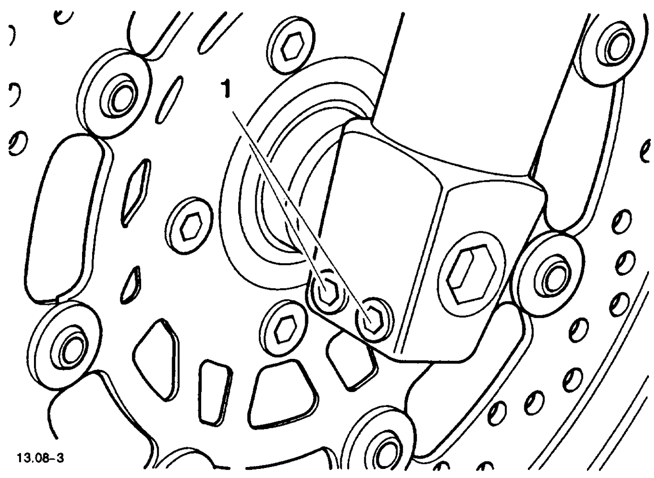
13.08-2

1. Speedometer drive locating slot

4. Refit the wheel spindle from the left hand side and tighten to **65 Nm.**

5. Lower the motorcycle to the ground and pump the front suspension to allow the left hand fork to 'float' to its natural position on the wheel spindle.

6. Tighten the fork pinch bolts to **20 Nm**.



13.08-3

1. Fork pinch bolts

7. Thoroughly clean and degrease the brake discs.

8. Fit the brake calipers, tightening the mounting bolts to **40 Nm**.

9. Check the operation of the front brake. Rectify as necessary.

REAR WHEEL

Twin sided swinging arm versions

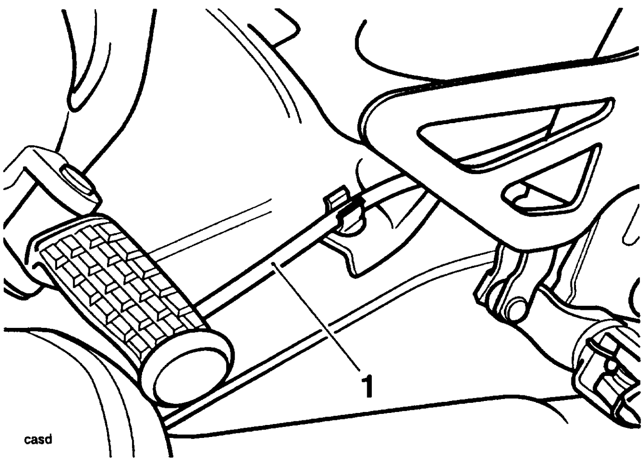
Removal

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

1. Support the motorcycle on a paddock stand such that it does not prevent removal of the wheel.

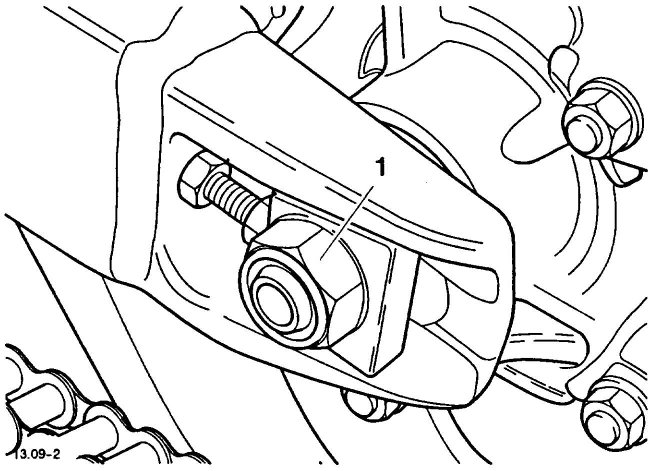
> **WARNING: If the engine has recently been running, the exhaust system will be hot to the touch.**
>
> **Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.**

2. Release the rear brake hose from its clip on the swinging arm.



1. Hose

3. Remove the nut from the rear wheel spindle.



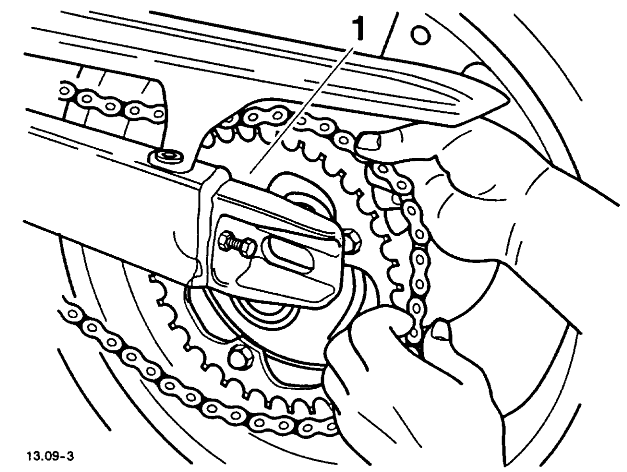
1. Rear wheel spindle nut.

4. Support the wheel and withdraw the wheel spindle.
5. Raise the brake caliper and carrier and roll the wheel forward until the chain can be detached from the rear sprocket.
6. Withdraw the wheel and collect the flanged spacer from the right hand side and the plain spacer from the left.
7. Place the wheel on wooden blocks with the drive sprocket uppermost.
8. If required, remove the rear brake disc and discard the disc bolts.
9. Remove the final drive as described in the rear suspension section.

Installation

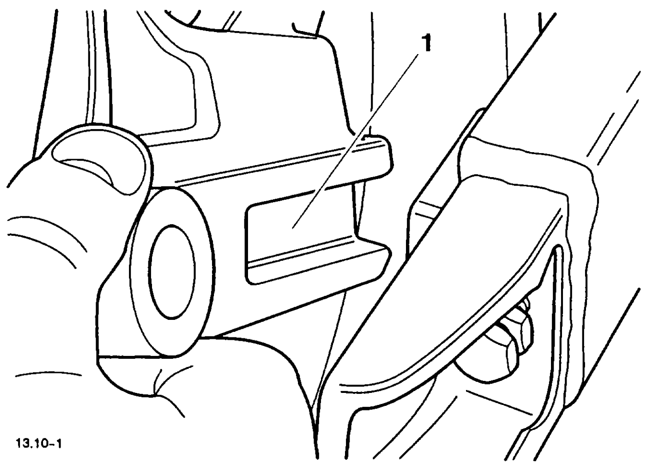
1. Thoroughly clean and degrease the brake disc.
2. Fit the brake disc and tighten new disc bolts to **22 Nm.**
3. Refit the final drive assembly as described in the rear suspension section.

4. Position the wheel within the swinging arm and refit the chain to the final drive sprocket.



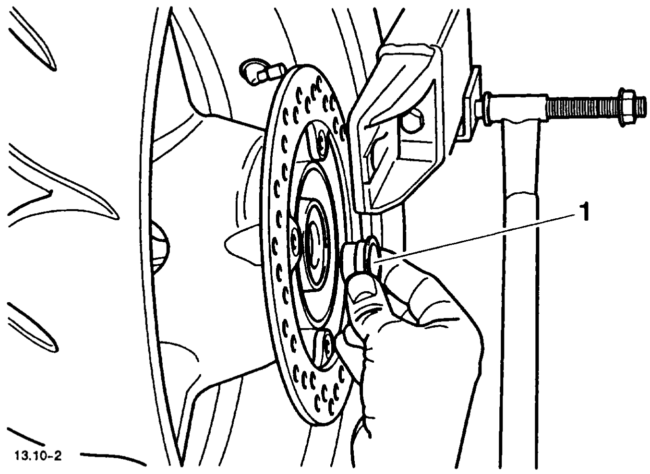
1. Fitting the chain

5. Position the rear brake calliper and carrier into its correct location. Align the slot in the carrier with the boss on the swinging arm.



1. Carrier locating slot

6. Refit the wheel sleeves, flanged spacer to the right hand side (flange facing outwards) and plain spacer to the left.



1. Flanged spacer (right side)

7. Lift the rear wheel into position, aligning the wheel, caliper carrier and swinging arm.

8. Fit the wheel spindle with the threaded end facing to the left.

> **CAUTION: Check that the spacers are still correctly positioned. In correctly fitted wheel spacers will cause a dangerous riding condition leading to loss of motorcycle control and an accident.**

9. Keeping the chain adjuster blocks in contact with the adjuster bolts, tighten the wheel spindle nut to **110 Nm.**

9. Refit the brake hose to its push-in clip.

10. Remove the paddock stand.

11. Check the operation of the rear brake.

12. Place the motorcycle on its side stand.

13. Check and, if necessary, adjust the chain.

REAR WHEEL

Single sided swinging arm versions

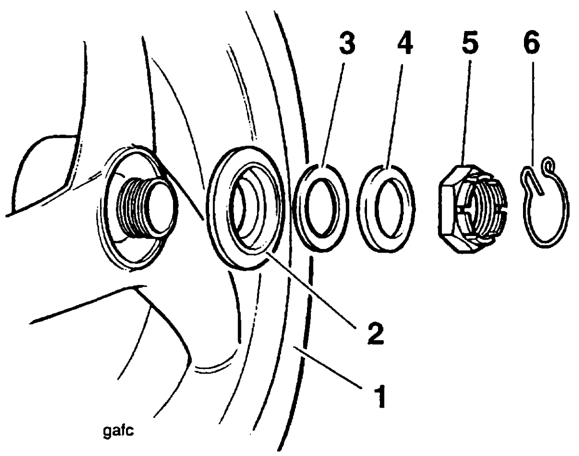
Removal

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

1. Raise and support the rear of the motorcycle to allow removal of the rear wheel.

WARNING: If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

2. 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.

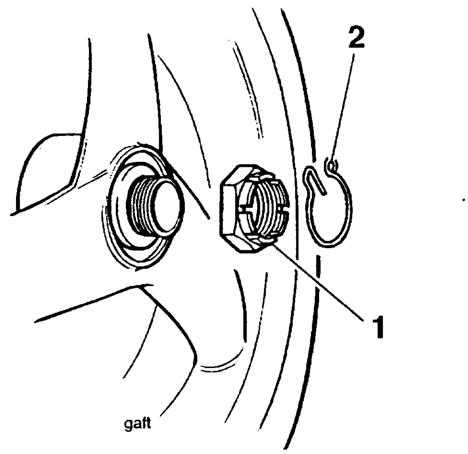
4. Remove the wheel (at a slight angle to avoid contact with the rear footrest).

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

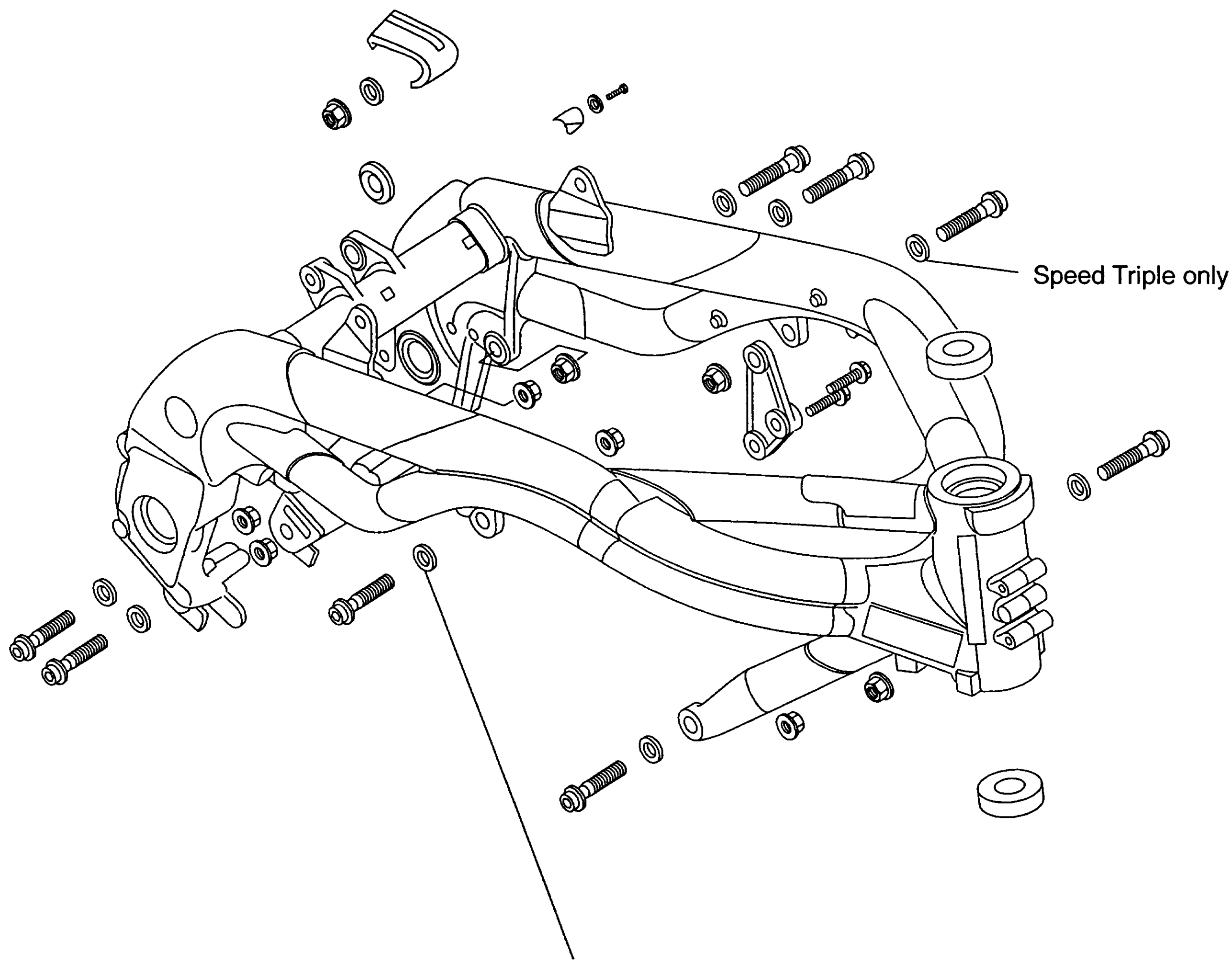
4. Refit the silencer as described in the fuel system/engine management section.

BODYWORK & FRAME

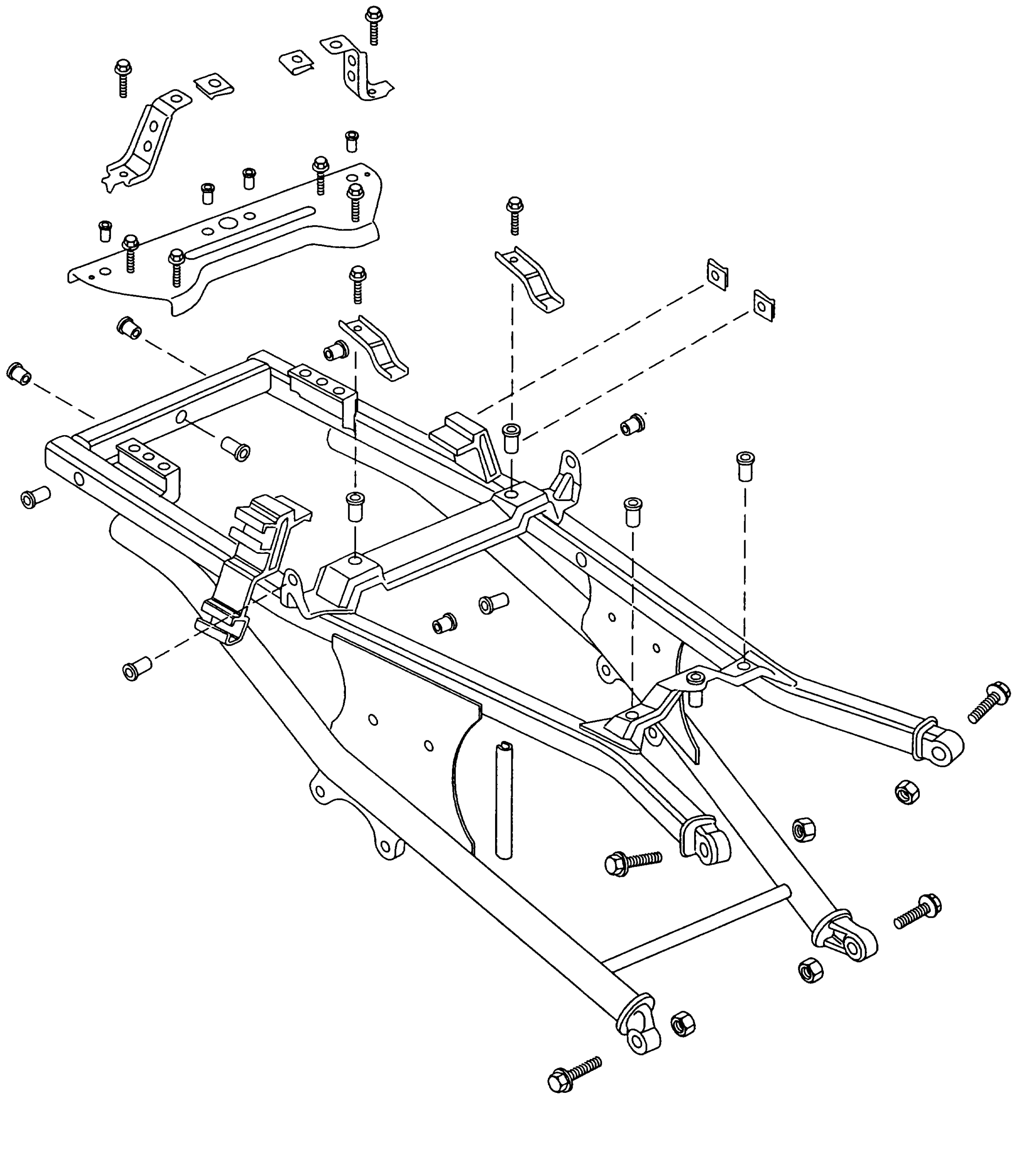
CONTENTS

Exploded View - Frame

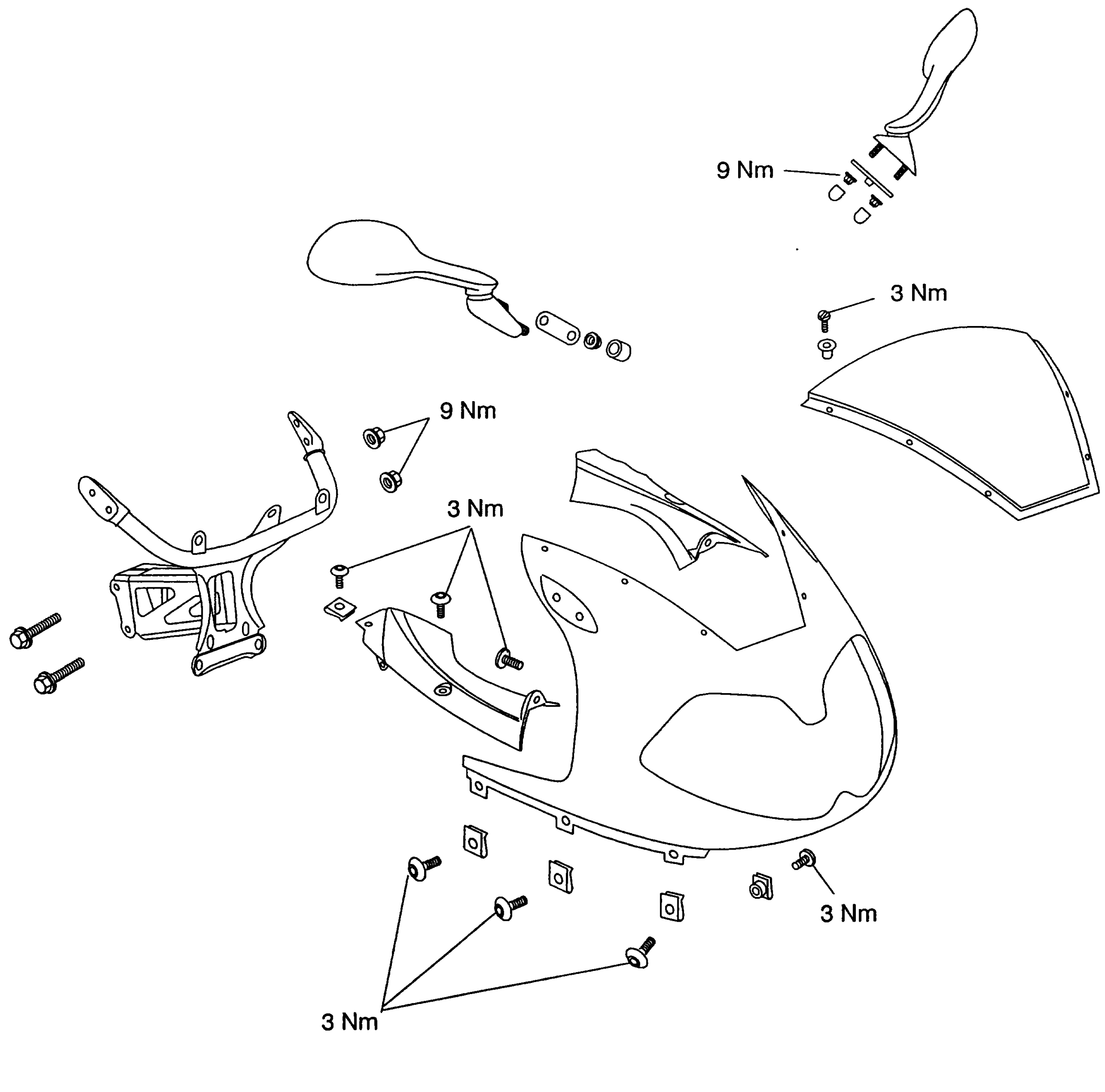
All Fixings - See Text



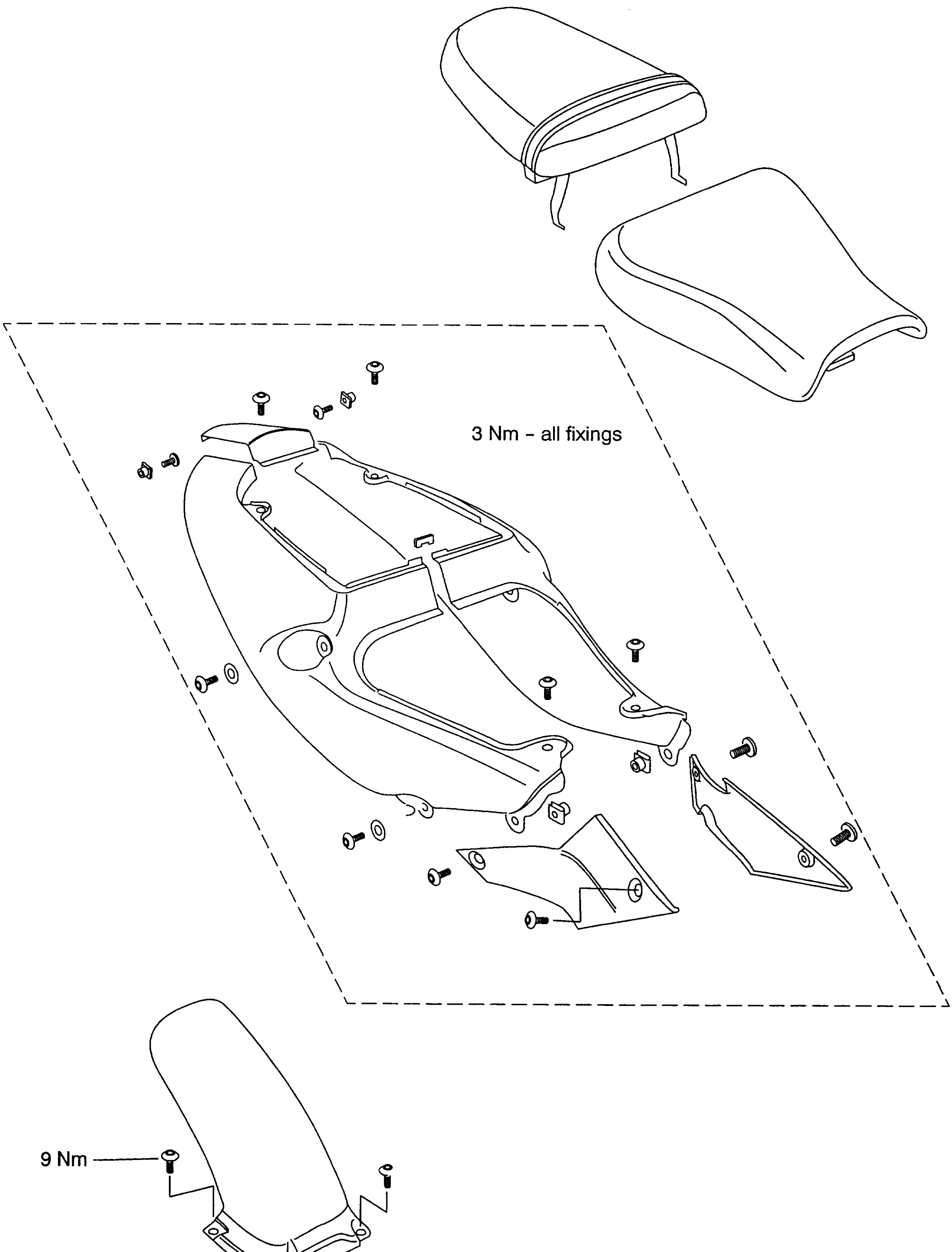
Exploded View - Seat Rails



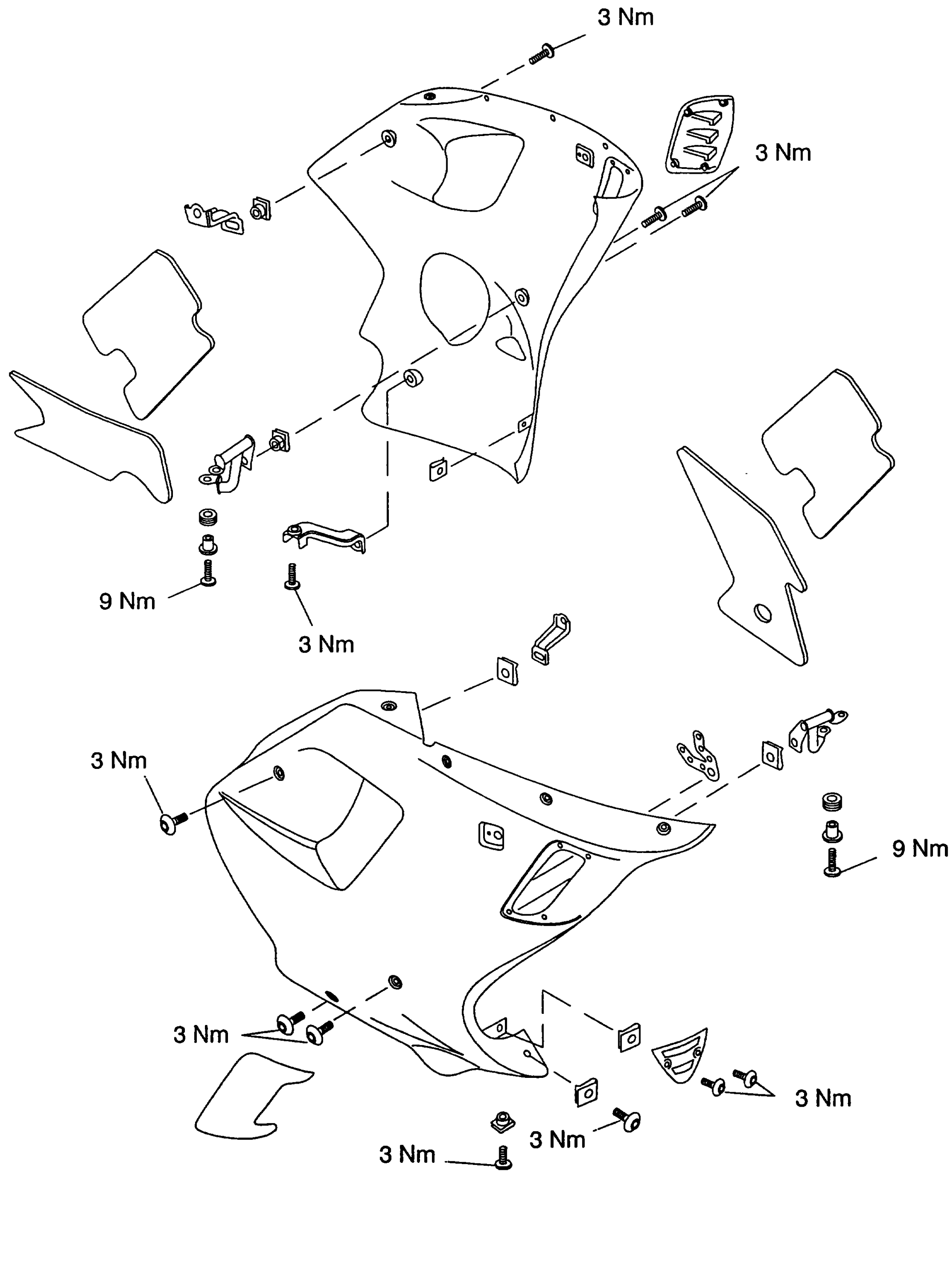
Exploded View - Cockpit and Mountings



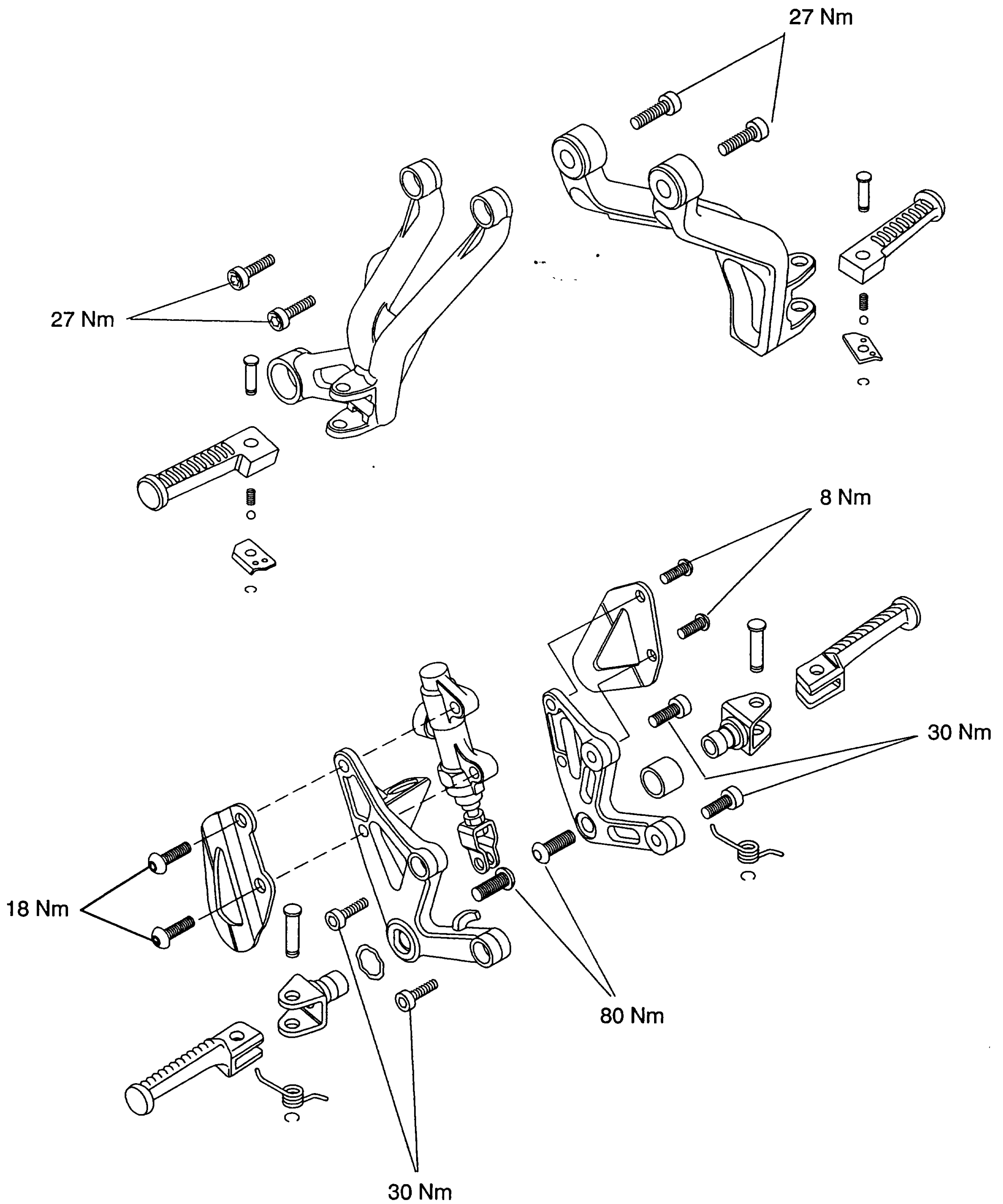
Exploded View - Rear Panels



Exploded View - Rear Panels



Exploded View - Footrests and Mountings

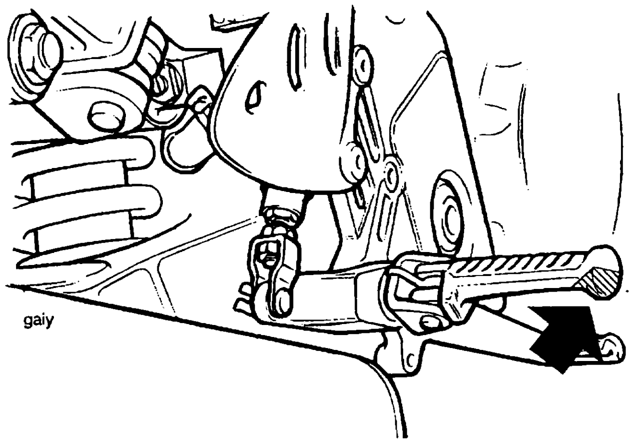


FRAME, FOOTRESTS AND FIXINGS

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.

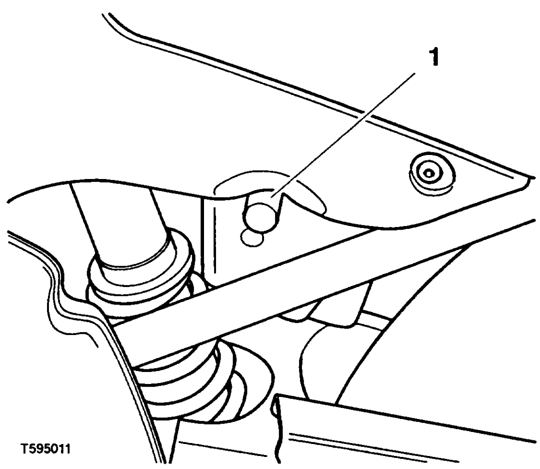
SEAT

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 is retained by the seat lock. The front seat is held in place by two brackets retained by two threaded fixings.**

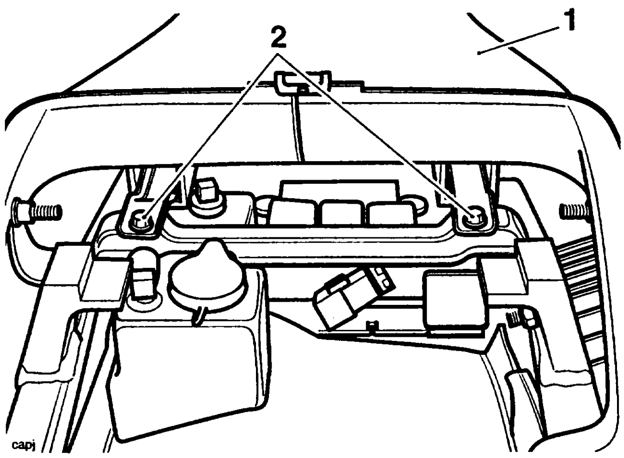
1. Insert the ignition key into the seat lock and turn the key anti-clockwise while pressing down on the rear part of the rear seat.



1. Seat Lock

2. To detach the seat, lift the rear of the seat and slide it away from the front seat.

3. Release the screws securing the front seat brackets to the frame.



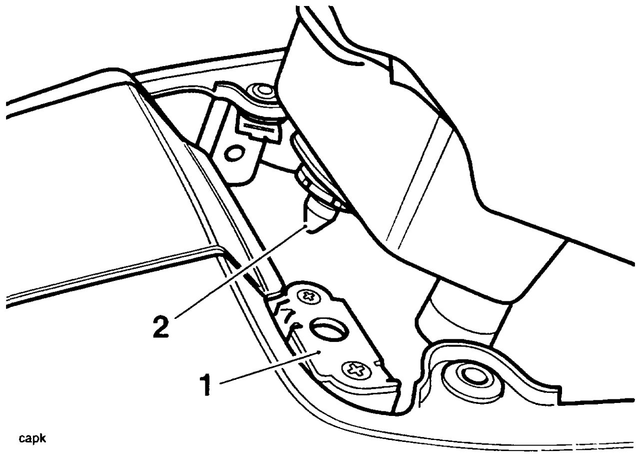
1. Front Seat

2. Seat Bracket 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, position the brackets and tighten the seat fixings to **6 Nm.**
3. Engage the front section of the rear seat under the seat bracket and press down on the rear to engage in the seat lock.



1. Seat Lock

2. Seat Engagement Point

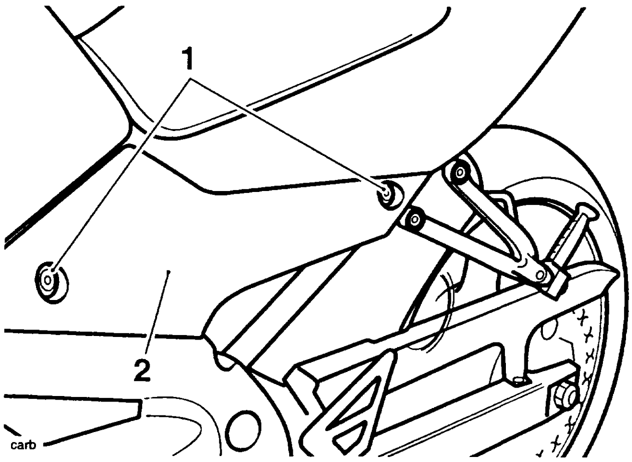
4. Grasp the seat and ensure that it is securely retained.

NOTE:
- **An audible 'click' can be heard when the seat/seat cover is correctly engaged in the lock.**

SIDE PANEL

Removal

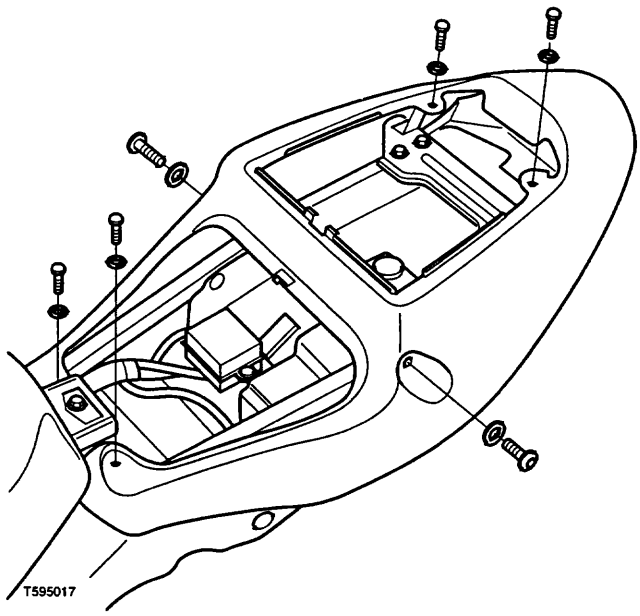
1. Unlock the rear seat, and lift clear.
2. Remove the front seat.
3. Disconnect the battery, negative (black) lead first.
4. Release the screws securing the fuel tank infill panels.



1. Screws

2. Infill panel

5. To release the side panel assembly, remove the fixings shown in the illustration below.



Side panel fixings

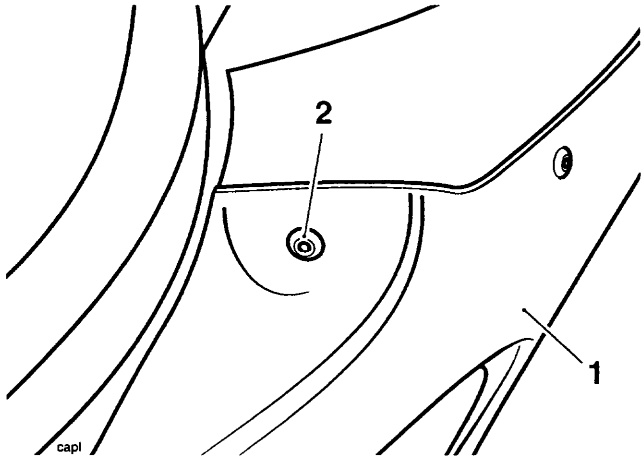
Installation

1. Installation is the reverse of removal except reconnect the battery, positive (red) lead first.

LOWER FAIRINGS

Removal

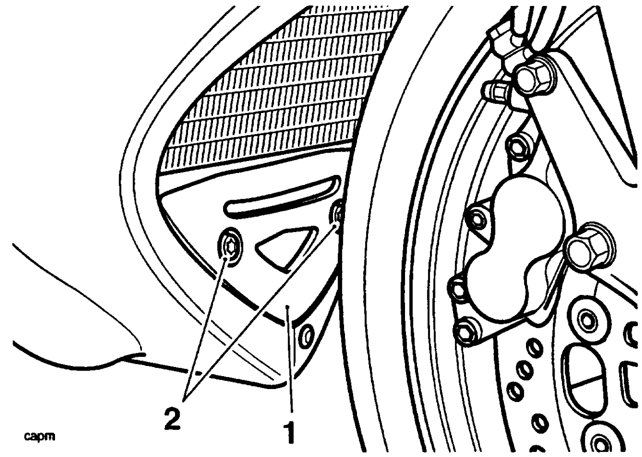
1. Unlock the rear seat and lift clear.
2. Remove the front seat.
3. Disconnect the battery, negative (black) lead first.
4. Remove the screw securing the upper face of the fairing to the cockpit infill panel.



1. Lower Fairing

2. Cockpit infill panel fixing

5. Remove the lower radiator infill panel.



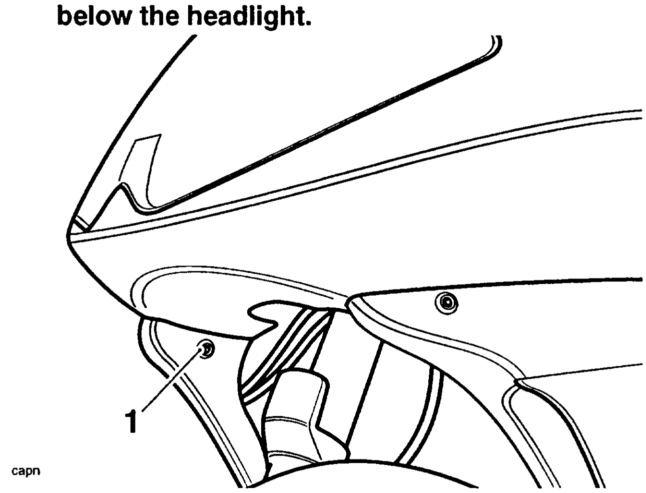
1. Lower radiator infill panel

2. Fixings

6. Release the remaining fixings securing the fairing to the cockpit and fairing brackets.

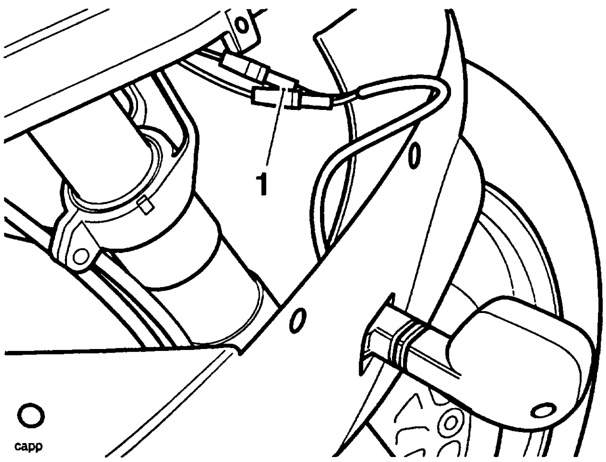
NOTE:

- **There is a fixing on the inner face of the fairing, below the headlight.**



1. Cockpit 'inner' fixing

7. Ease the fairing from its fitted position and disconnect the indicator light.



1. Indicator connection

8. The fairing may now be removed from the motorcycle taking care not to damage the painted surfaces.

Installation

1. Installation is the reverse of removal noting the following points.

NOTE:

- **Reconnect the battery, positive (red) lead first.**
- **Check for correct operation of the indicators**

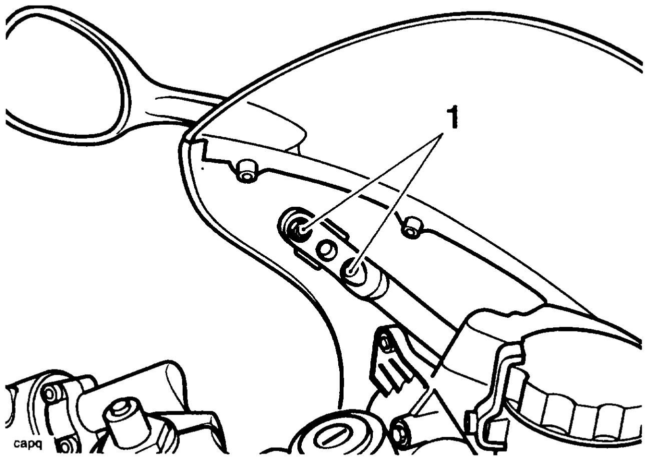
COCKPIT

Removal

NOTE:

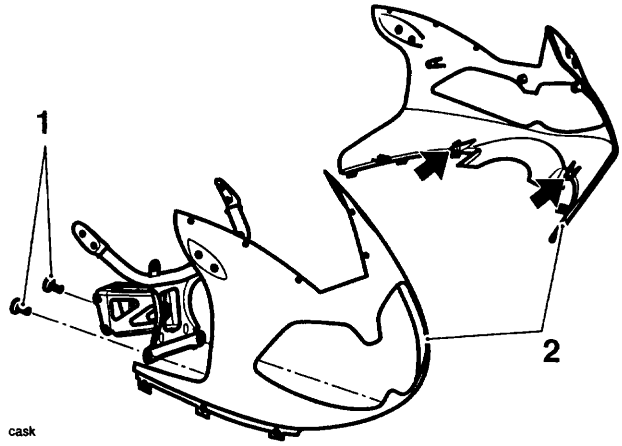
- **Although it is possible to remove the cockpit with the lower fairings fitted, it is strongly advised that the lower fairings be removed in order to reduce the risk of paint damage.**

1. Unlock the rear seat 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 cockpit infill panels.
6. Release the series of outer screws which secure the cockpit to the lower fairings.
7. Release the four screws which secure the headlight body to the cockpit.



1. Headlight to cockpit screws

2. Lower screw locations

8. The cockpit may now be eased from the motorcycle taking care not to damage the painted surfaces.

Installation

1. Refitting is the reverse of removal.

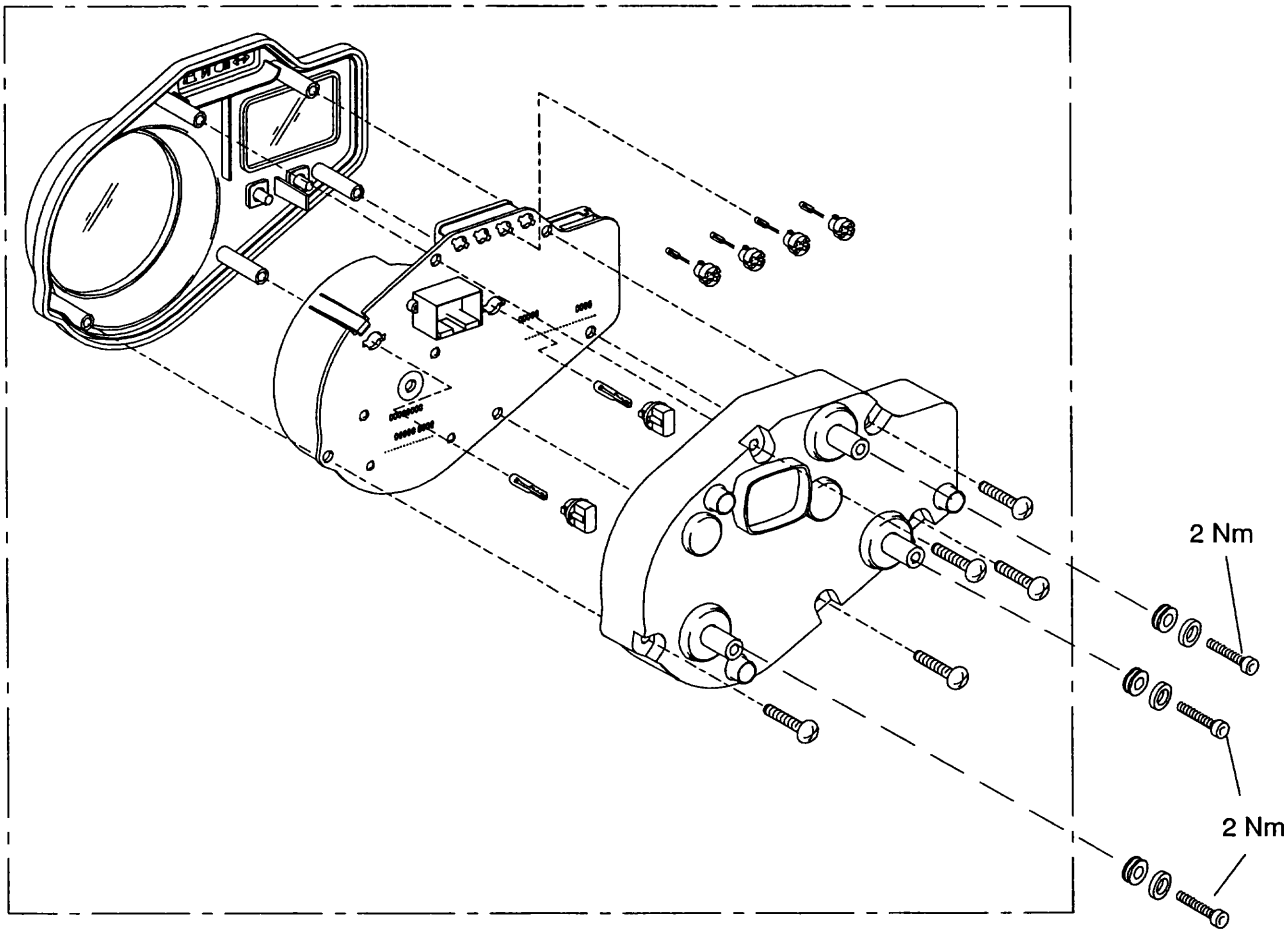
NOTE:

- **Reconnect the battery, positive (red) lead first.**

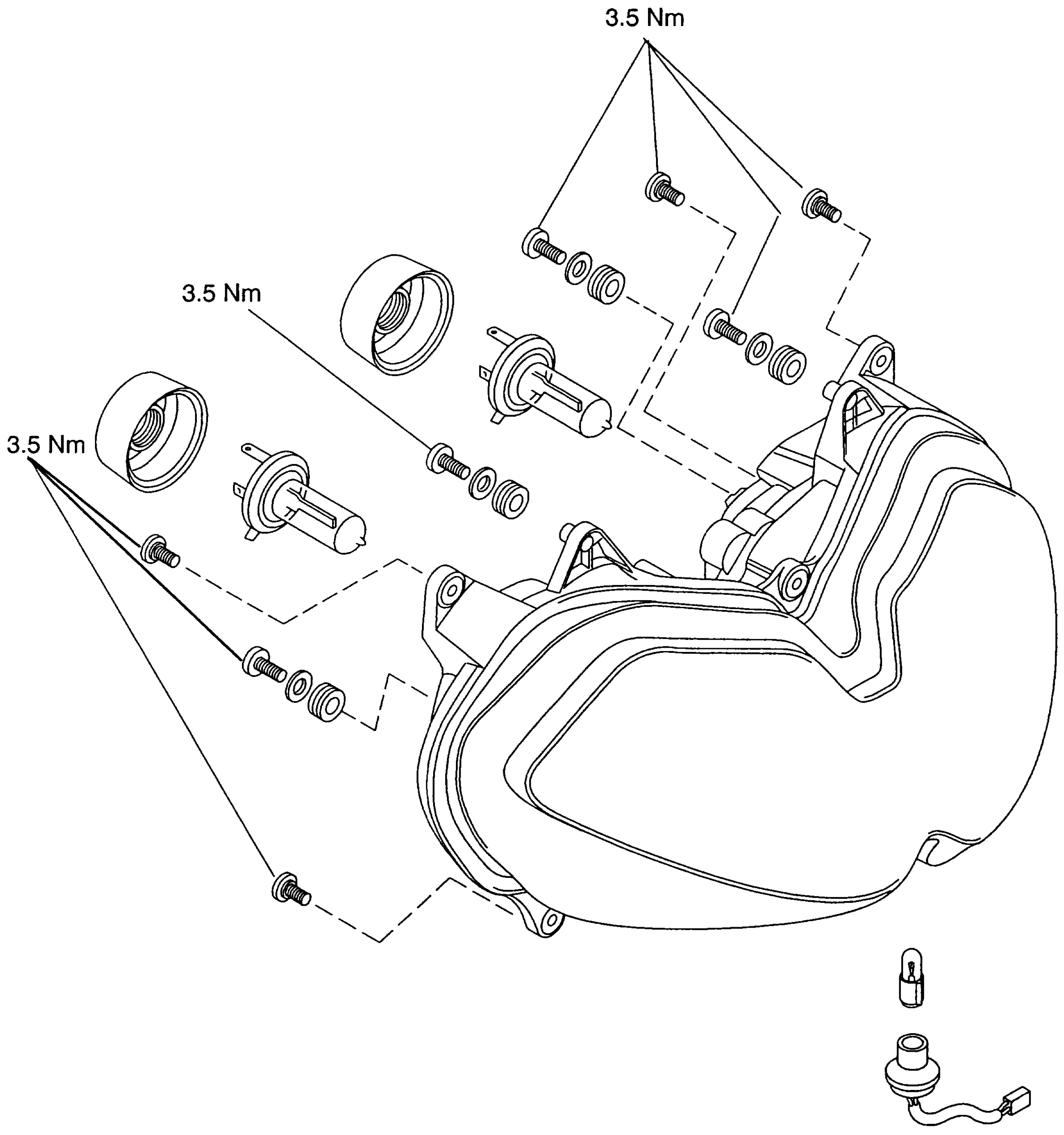
ELECTRICAL SYSTEM

CONTENTS

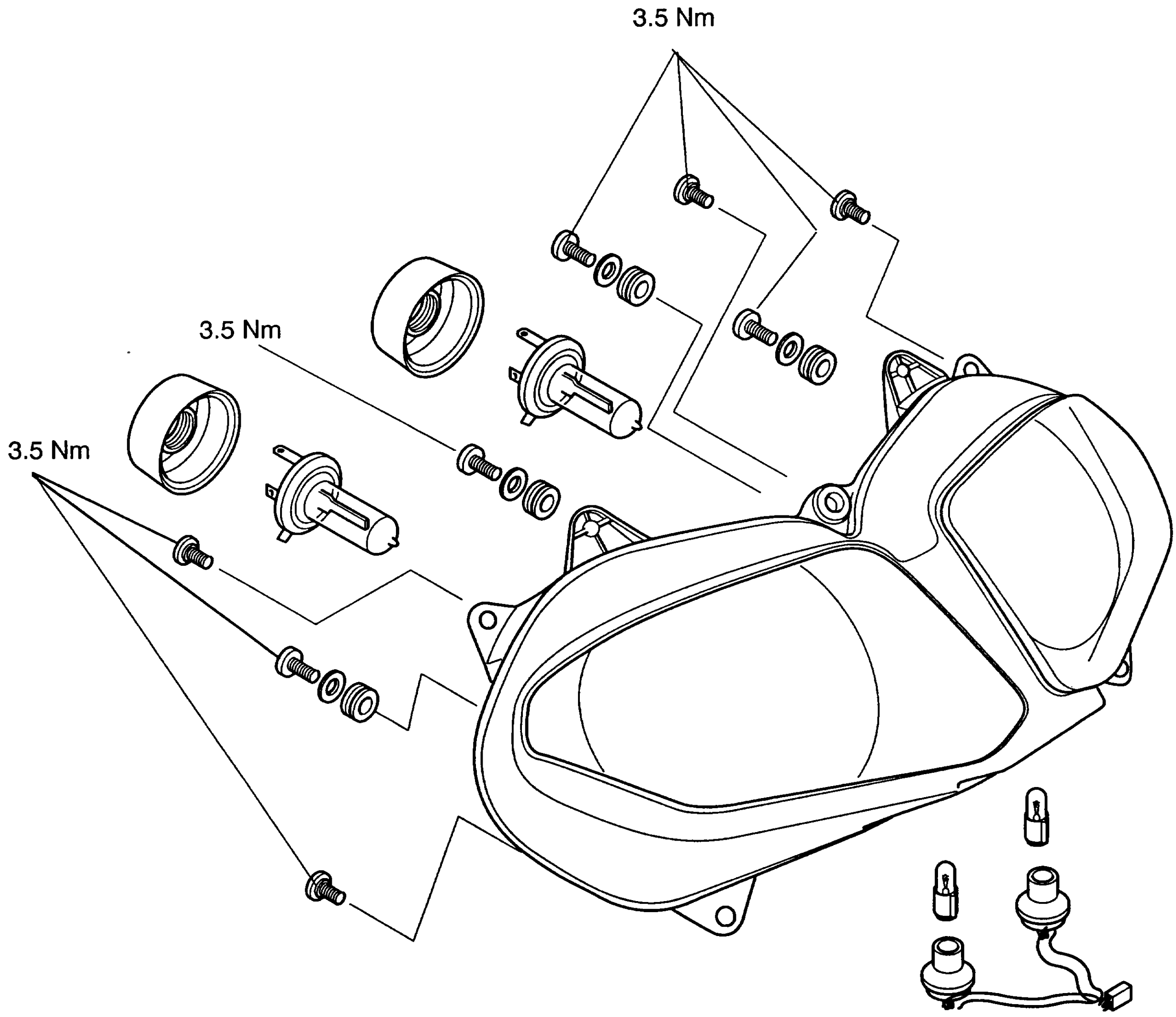
Exploded View - Instruments



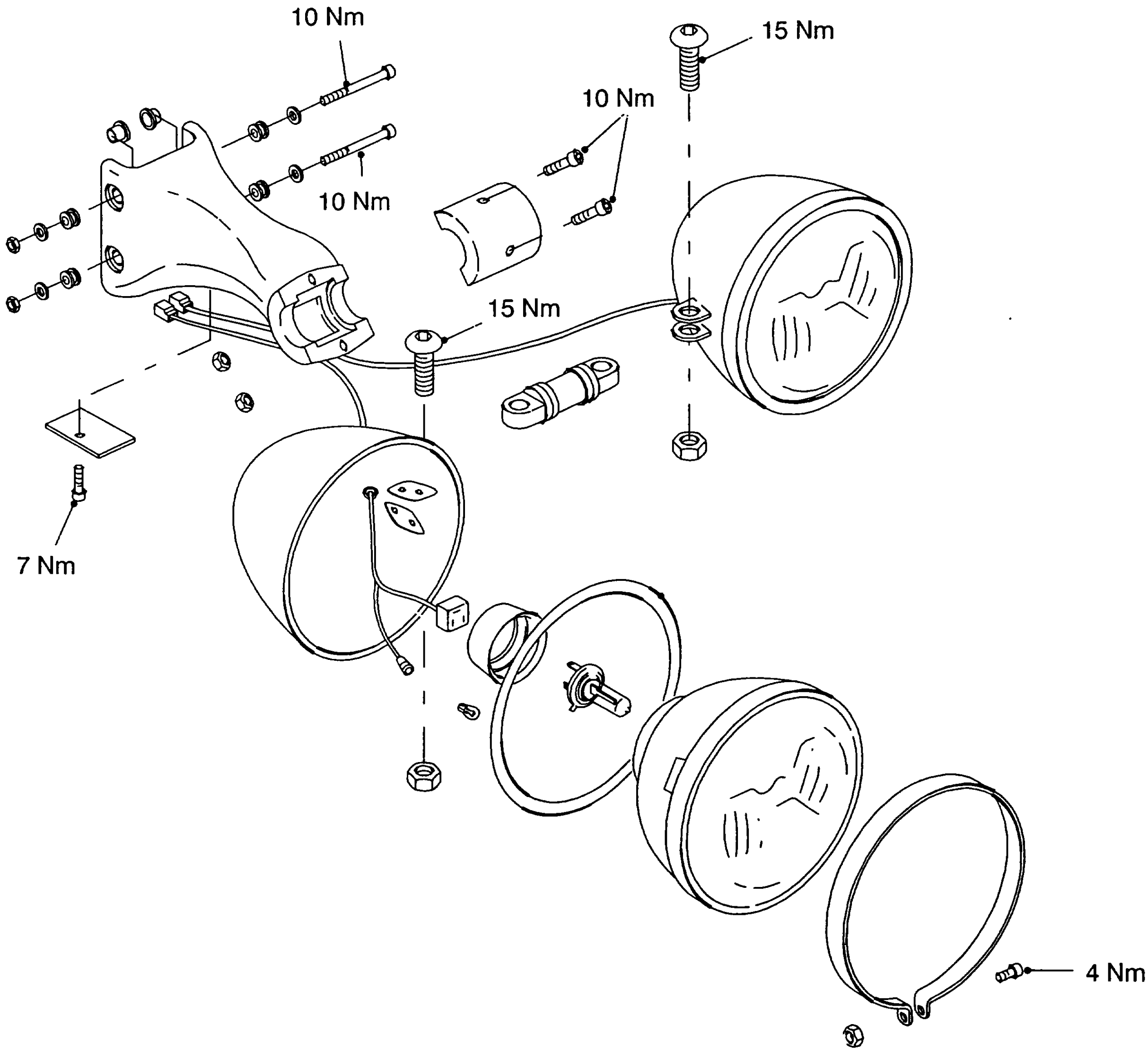
Exploded View - Daytona Headlight (to 2003 model year)



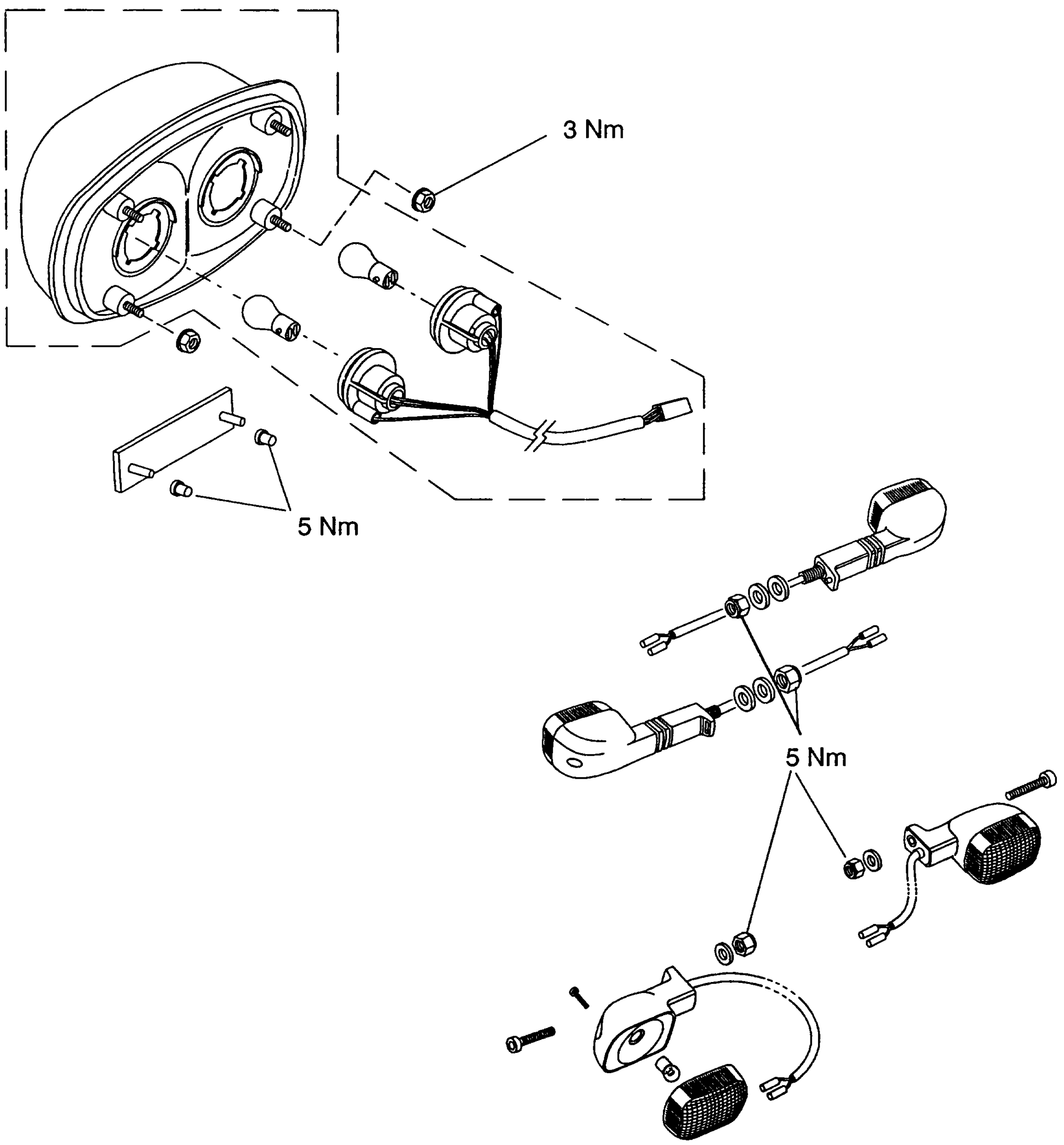
Exploded View - Daytona Headlight (from 2004 model year)



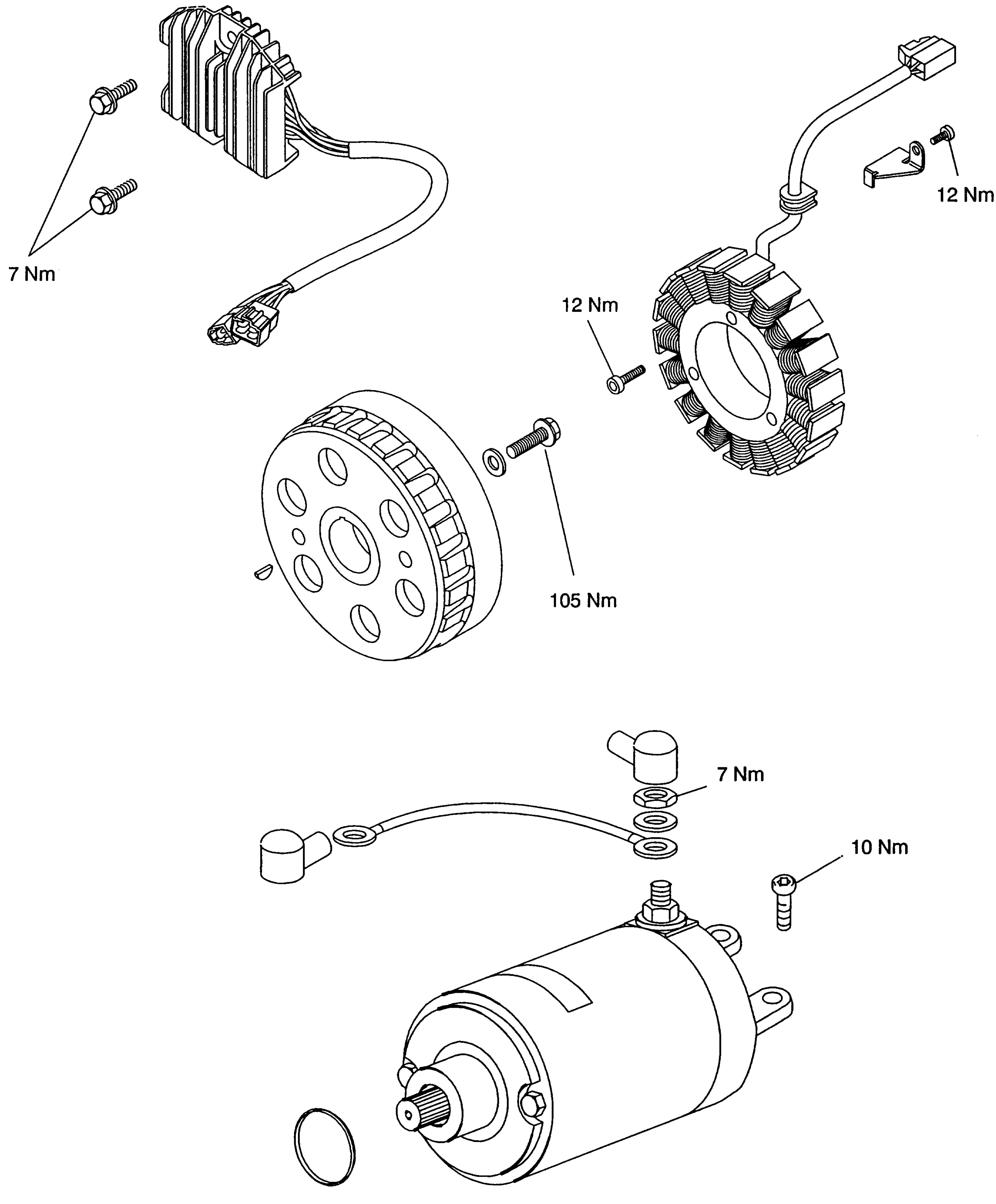
Exploded View - Speed Triple Headlight



Exploded View - Rear Light and Indicators



Exploded View - Alternator and Starter



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.

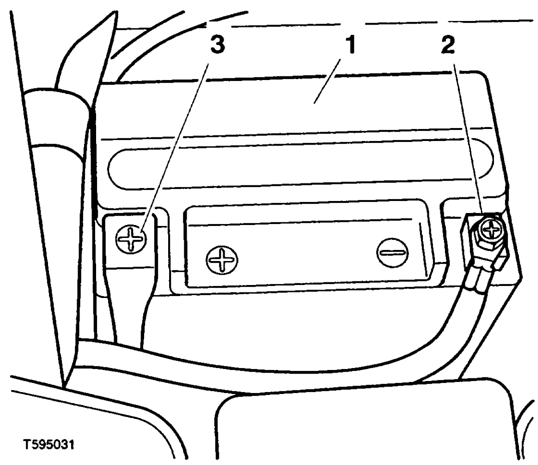
WARNING: The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.
Do not jump start the battery, touch the battery cables together or reverse the polarity of the cables as any of these actions may cause a spark which would ignite 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.

Battery Removal

1. Unlock and remove the seats.
2. Disconnect the battery, negative (black) lead first.
3. Remove the battery strap.
4. Take the battery out of the case.

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. Battery

2. Negative (-) terminal

3. Positive (+) terminal

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.
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.
6. Refit the seats.

BATTERY COMMISSIONING AND CHARGING

New Battery

To ensure that a new battery is correctly commissioned and will deliver maximum capacity for starting, the following procedure must be followed.

In order to correctly and safely commission a new battery, the battery commissioning procedure listed below must be carefully followed. This is the only battery commissioning procedure that Triumph recommends. The procedure is designed to ensure that the battery is at its best when fitted to the motorcycle, and will provide the best possible performance and reliability.

Failure to comply with this procedure may lead to reduced battery performance and/or shorten the life of the battery.

WARNING: The electrolyte solution is SULPHURIC ACID. Ensure that you read all the warnings supplied with the battery and are familiar with the necessary safety precautions and remedial actions should a spillage or contamination occur.

1. Read the instructions and warnings delivered with the battery.
2. Place the battery on a flat level surface and remove the sealing foil.
3. Remove the battery sealing strip from the electrolyte container (if applicable) and save for later in this procedure. Do not break the seal on the electrolyte container.
4. Place the electrolyte container and adapter (if applicable) on the battery and fill the battery according to the manufacturers instructions.
5. After starting to fill the battery with electrolyte, allow the battery to stand for 30 minutes with the filling container in place.
6. Check that all of the electrolyte has drained from the container. Do not remove container at this point. If the container has not completely drained, tap the sides of the container to start the electrolyte flowing again.
7. After the electrolyte has drained into the battery, allow the battery to stand with the electrolyte container in place, for a further 30 minutes for batteries 3Ah - 12Ah or 1 hour for batteries greater than 12Ah.
8. Remove the electrolyte container and adapter carefully, and dispose of immediately.
9. Fit the sealing caps to the battery according to the manufacturers instructions.
10. Measure the terminal voltage on the battery to assess the battery condition and charge the battery as necessary using a suitable charger (i.e. a charger with a suitably controlled charging current and appropriate cut off voltage). Charging current should be controlled to 10% of the nominal capacity (i.e. for a 10Ah battery charging current I = 0.1 x 10 = 1Ah)

Table of charging times

Terminal Voltage	Charge Time	Charger Cut off Voltage
>12.8 V	2 hours	14.5 V
>12.7 V	3 hours	14.5 V
>12.6 V	4 hours	14.5 V
>12.5 V	6 hours	14.5 V
<12.5 V	8 - 10 hours	14.5 V

11. Disconnect the charger and allow the battery to stand for 1 hour before fitting to the motorcycle.
12. Fit the battery to the motorcycle, positive (Red) lead first.

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.

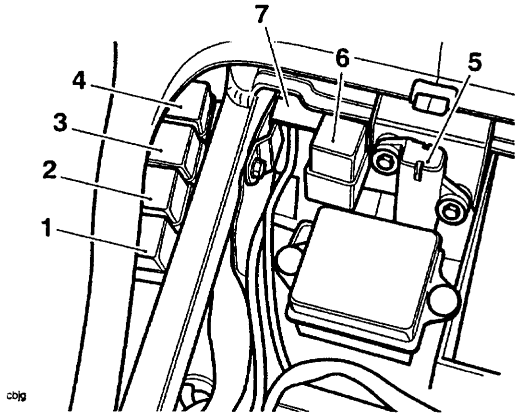
Battery Maintenance

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.

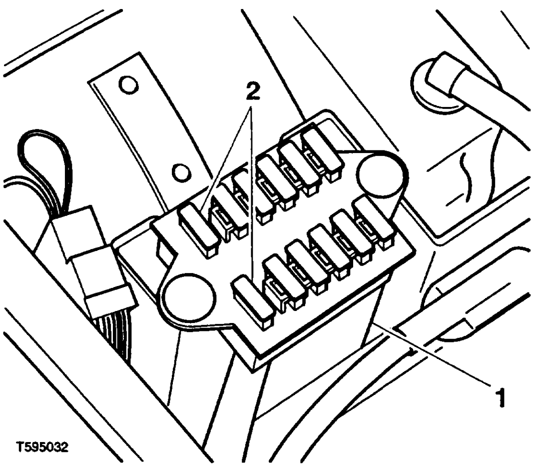
RELAYS

Relay identification



1. Main beam relay
2. Dip beam relay
3. Headlight cut-out relay
4. Main power relay
5. Fall detection switch
6. Ignition relay
7. Direction indicator unit

FUSES



1. Fuse Box
2. Spare Fuses

Fuses are arranged in the fuse box located under the front seat.

If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of correct current rating.

WARNING: Always replace blown fuses with new ones of the correct current rating (as specified on the fuse box cover) and never use a fuse of higher rating. Although no spare 5 Amp. fuse is supplied in the fuse box, it is strongly recommended that a spare 5 Amp. fuse be carried.

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 (A.)
1	Dip and main beam headlights.	15
2	Ignition switch.	30
3	Main fuse.	30
4	Horn, indicators, brake lights, instrument memory, diagnostics.	15
5	Engine kill switch, fuel pump, ECM, starter.	10
6	Engine management system.	15
7	Cooling fan.	15
8	Instrument illumination.	5
9	Lighting.	15
10	Sidelights.	5

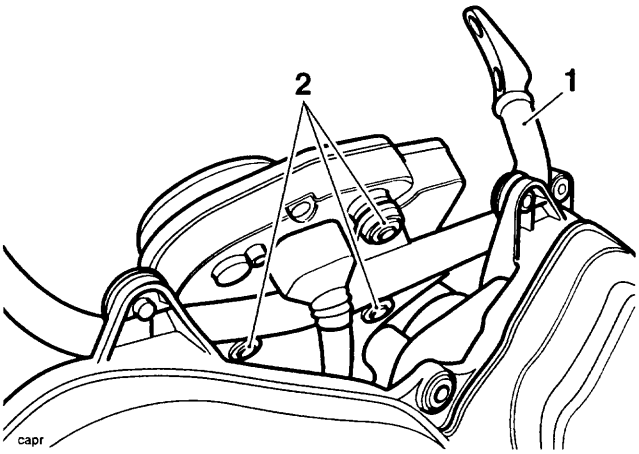
NOTE:

The fuse identification numbers listed above correspond with those printed on the fuse box cover.

INSTRUMENT PACK

Removal

1. Remove the seat.
2. Disconnect the battery negative (black) lead first.
3. Remove the cockpit as described in the bodywork section.
4. Remove the headlight assembly.
5. Release the fixings securing the instrument pack to the cockpit subframe.



1. Cockpit Subframe

2. Instrument Pack Fixings

6. Raise the instrument pack and disconnect the connections to the main harness.
7. The pack can now be removed.

Installation

1. Position the instrument pack to the cockpit subframe.
2. Connect the instruments to the main harness.
3. Place the pack in position.
4. Tighten the pack retaining fixings to 7 **Nm.**
5. Refit the cockpit as described in the bodywork section.
6. Refit the headlight assembly and tighten the fixings to **3.5 Nm**.
7. Reconnect the battery positive (red) lead first.
8. Refit the seat.

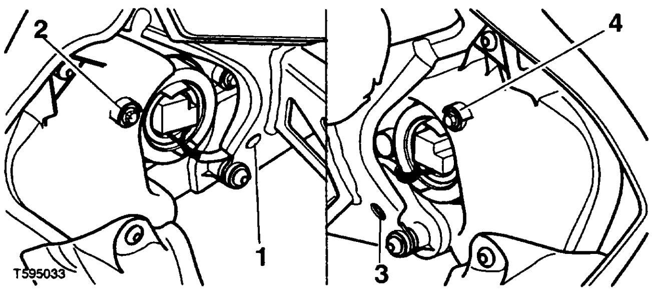
HEADLIGHTS - DAYTONA 955i

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.



1. Vertical Adjustment Screw (LH)

2. Horizontal Adjustment Screw (LH)

3. Vertical Adjustment Screw (RH)

4. Horizontal Adjustment Screw (RH)

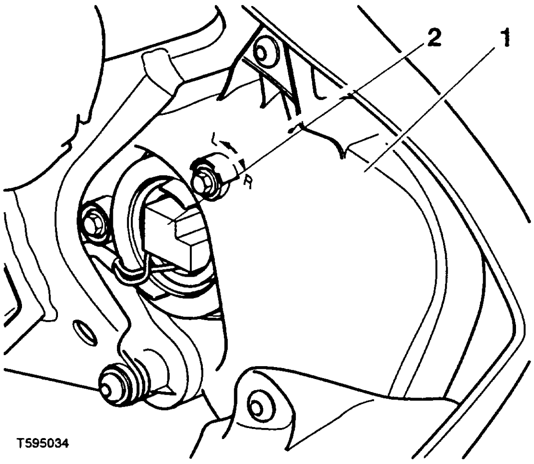
Headlight Adjustment

1. Each headlight can be adjusted by means of vertical and horizontal adjustment screws located on the rear of each headlight.
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 right hand 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 left hand 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

NOTE:

- **It is not necessary to remove the headlight when bulb replacement becomes necessary. To replace a bulb**



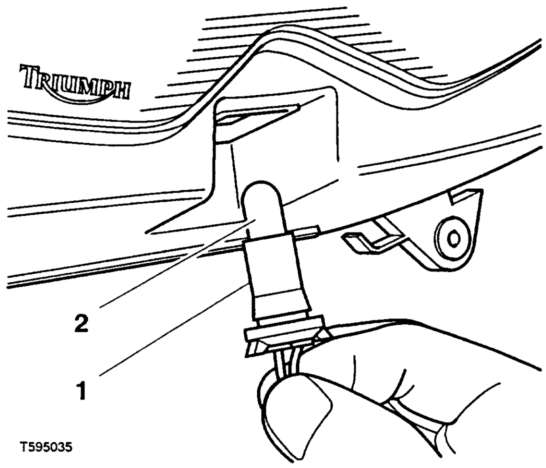
1. Headlight Unit

2. Bulb Retainer

1. Remove the seat(s).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the multi-pin electrical connector from the bulb to be replaced and remove the rubber cover.
4. Detach the wire bulb retainer from the clip. It is not necessary to undo the screw.
5. Remove the bulb from the headlight unit.
6. Installation is the reverse of the removal procedure.

NOTE:

- **When reconnecting the battery, connect the positive (red) lead first.**



1. Position Light

2. Position Light Bulb

WARNING: Do not reconnect the battery until the assembly process has been completed. Premature battery reconnection could result in ignition of the battery gases causing risk of injury.

WARNING: The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling.

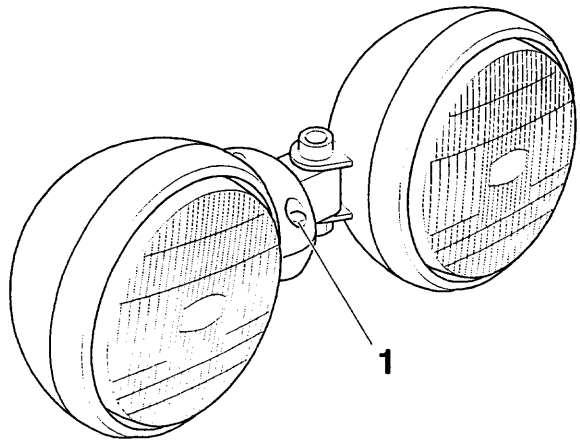
Avoid touching the glass part of the bulb. If the glass is touched or gets dirty, clean with alcohol before re-use.

Position Lamp Bulb Replacement

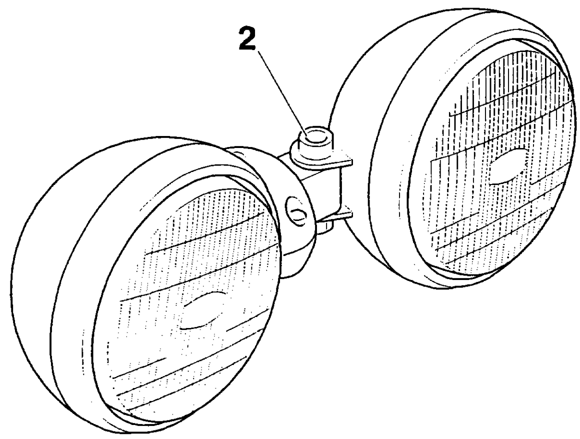
The position lamp is fitted to the base of the headlight. To replace the bulb, detach the rubber holder from the headlight base and pull out the bulb.

Installation is the reverse of removal.

HEADLIGHTS - SPEED TRIPLE



1. Vertical Adjustment Clamp



2. Horizontal Adjustment Clamp

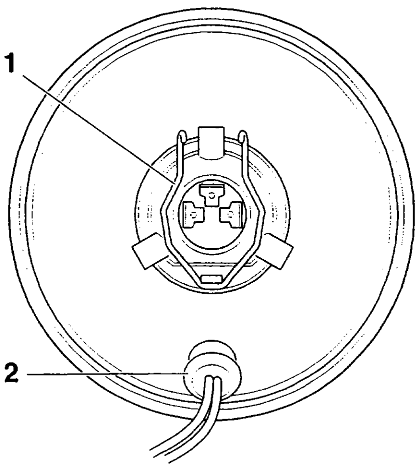
WARNING: Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated.

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.

Headlight Adjustment

The horizontal beam of each headlight can be adjusted individually. The vertical beams are adjusted as a pair.

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.



1. Bulb Retainer

2. Position Lamp

Headlight Bulb Replacement

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.**

> **WARNING: Do not reconnect the battery until the assembly process has been completed. Premature battery reconnection could result in ignition of the battery gases causing risk of injury.**

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 is the reverse of the removal procedure.

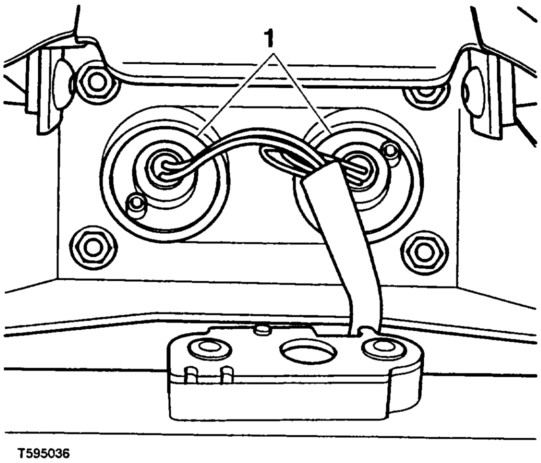
NOTE:

- **When reconnecting the battery, connect the positive (red) lead first.**

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.

REAR LIGHT

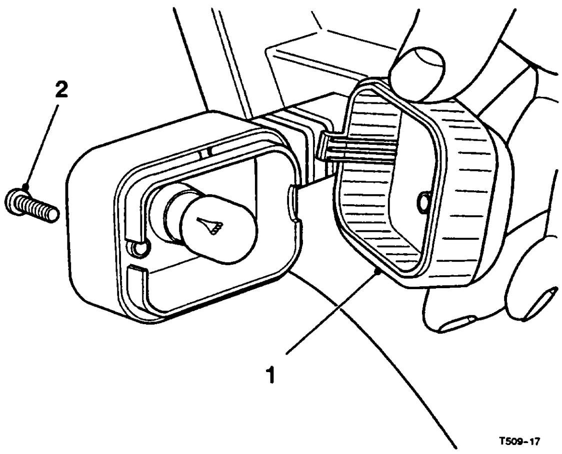


1. Rear Light Bulb Retainer

Bulb Replacement - All Models

1. Remove the rear seat to gain access to the tail light unit.
2. Rotate the bulb holder anti-clockwise to release.
3. Replace the bulb. Fit the bulb holder to the tail light unit and rotate clockwise to secure.
4. Refit the seat/cover.

INDICATOR LIGHT



1. Indicator Lens

2. Securing Screw

Bulb Replacement - All Models

The lens on each indicator light is held in place by a securing screw located in the body of the light.

Release the screw and remove the amber lens to gain access to the bulb for replacement.

LICENCE PLATE LIGHT

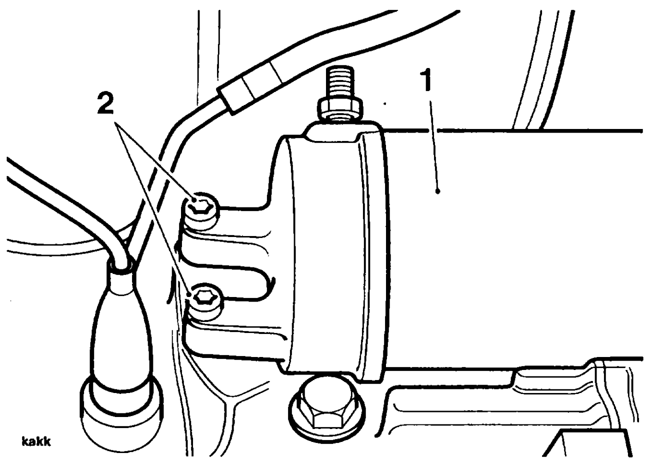
Bulb Replacement - All Models

1. Remove the side panels.
2. Remove the rear light together with its bracket.
3. Carefully remove the rubber bulb holder from the back of the light unit and detach the bulb.
4. Installation is the reverse of the removal procedure.

STARTER MOTOR

Removal

1. Remove the seats and disconnect the battery negative (black) lead first.
2. Remove the right hand lower fairing (if fitted).
3. Remove the low oil pressure warning light switch as described in the lubrication section.
4. Ease the boot from the starter lead and then release the lead nut.
5. Detach the lead.
6. Release the bolts securing the starter to the crankcase.



1. Starter motor

2. Bolts

7. Ease the starter motor from the right hand engine cover while gently moving the camshaft oil feed pipe out of the way.

Inspection

1. Ensure the motor turns freely and without binding.
2. Check the starter 'O' ring for damage and deterioration. Replace as necessary.

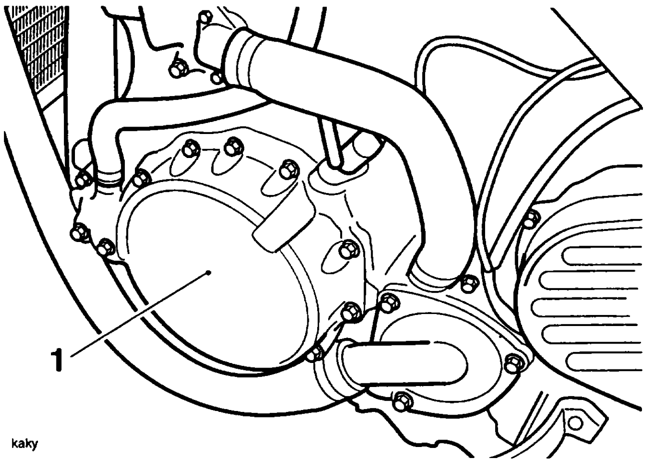
Installation

1. Fit the starter motor to the right hand engine cover ensuring that the 'O' ring does not become damaged during installation.
2. Fit and tighten the starter bolts to **10 Nm.**
3. Refit the lead and secure with the nut. Tighten to **7 Nm.**
4. Refit the lead boot.
5. Refit the low oil pressure warning light switch as described in the lubrication section.
6. Refit the left hand lower fairing.
7. Reconnect the battery positive (red) lead first.
8. Refit the seat.

ALTERNATOR

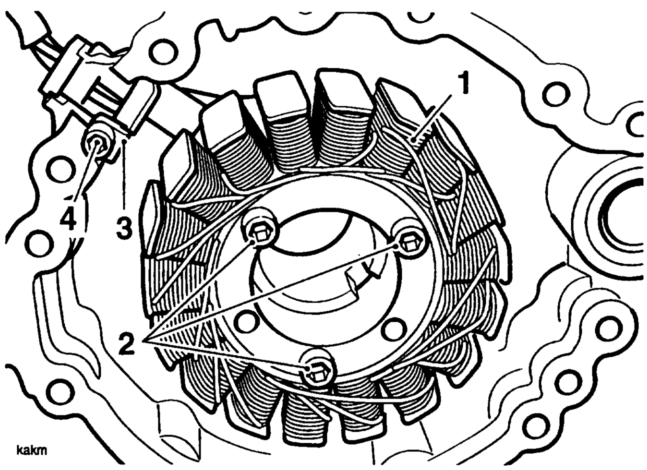
Removal

1. Remove the seats.
2. Remove the left hand lower fairing.
3. Disconnect the battery negative (black) lead first.
4. Release the bolts securing the left hand crankshaft cover to the engine.



1. Left hand engine cover

5. Remove the cover.
6. Withdraw the cover from the crankcase against the pull of the alternator magnet.
7. To remove the stator from the cover, release the three bolts in the centre of the cover and release the bolt securing the cable bracket.



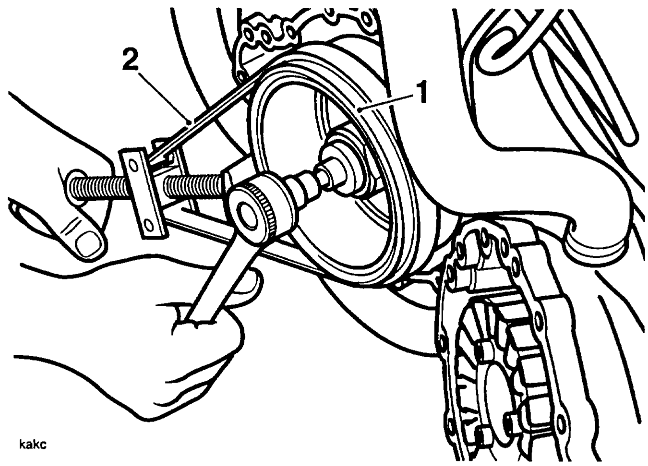
1. Stator

2. Stator bolts

3. Cable bracket

4. Cable bracket bolt

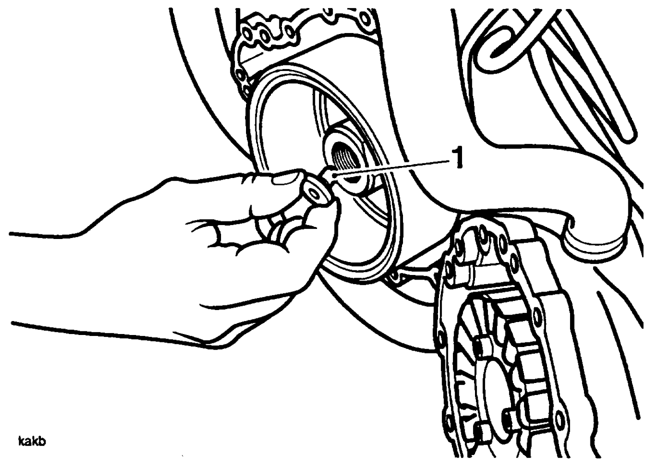
8. Withdraw the stator.
9. To remove the rotor, prevent the crankshaft from rotating using tool T3880375, and remove the centre bolt from the left hand end of the crankshaft.



1. Rotor

2. Tool T3880375

10. With the rotor bolt removed, locate the spigot from the larger of the two thrust pads supplied with tool T3880365 to the crankshaft.



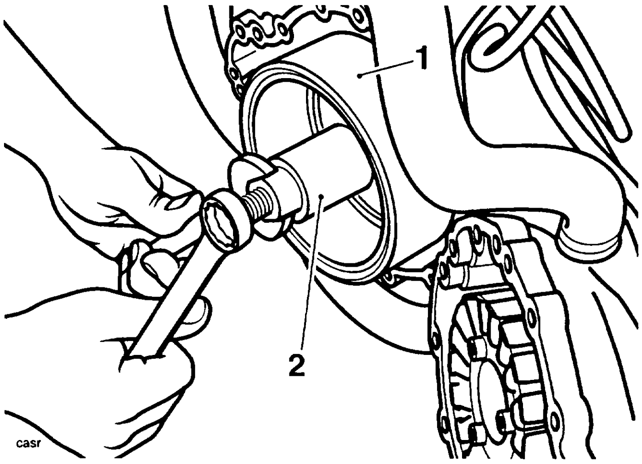
1. Thrust pad

11. Assemble tool T3880365 to the threaded centre section of the rotor.

NOTE:

- **Ensure that the thrust pad does not fall out during assembly of the tool.**

12. Hold the centre of the tool to prevent rotation then tighten the draw-bolt in the centre of the tool to release the taper seating of the rotor from the crankshaft.



1. Rotor

2. Tool T3880365

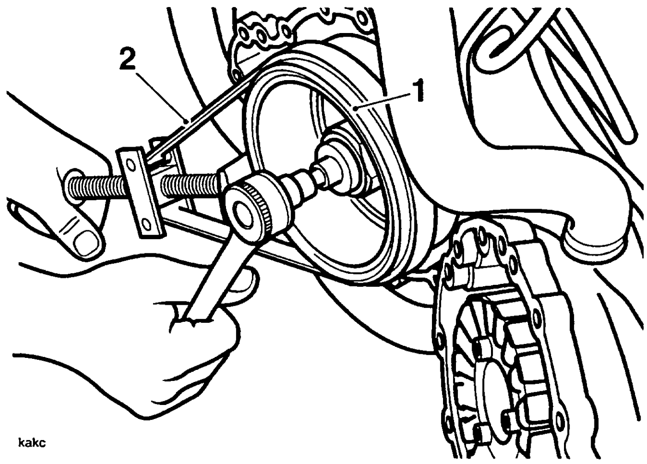
13. Withdraw the rotor and tool as an assembly and then separate the tool from the rotor.

Assembly

1. Assemble the rotor to the keyway on the crankshaft.

2. Refit tool T3880375 to prevent the crankshaft from rotating.

3. Tighten the rotor retaining bolt to **105 Nm.**



1. Rotor

2. Tool T3880375

4. Remove tool T3880375.

5. Locate the stator to the engine cover.

6. Apply silcone sealer to the cable grommet and align the cable to the exit slot.

7. Fit the cable retainer bracket and tighten the retainer bolt to **12 Nm.**

8. Tighten the stator bolts to **12 Nm.**

9. Refit the left hand engine cover incorporating a new gasket. Tighten the cover fixings to **9 Nm.**

10. Refit the left hand lower fairing (if previously removed).

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

12. Refit the seat.

ALTERNATOR RECTIFIER

NOTE:

- **The alternator rectifier is located beneath the rear bodywork on the right hand side of the motorcycle. The rectifier does not contain any serviceable parts and must be replaced if faulty.**

Lighting circuit diagram - Daytona

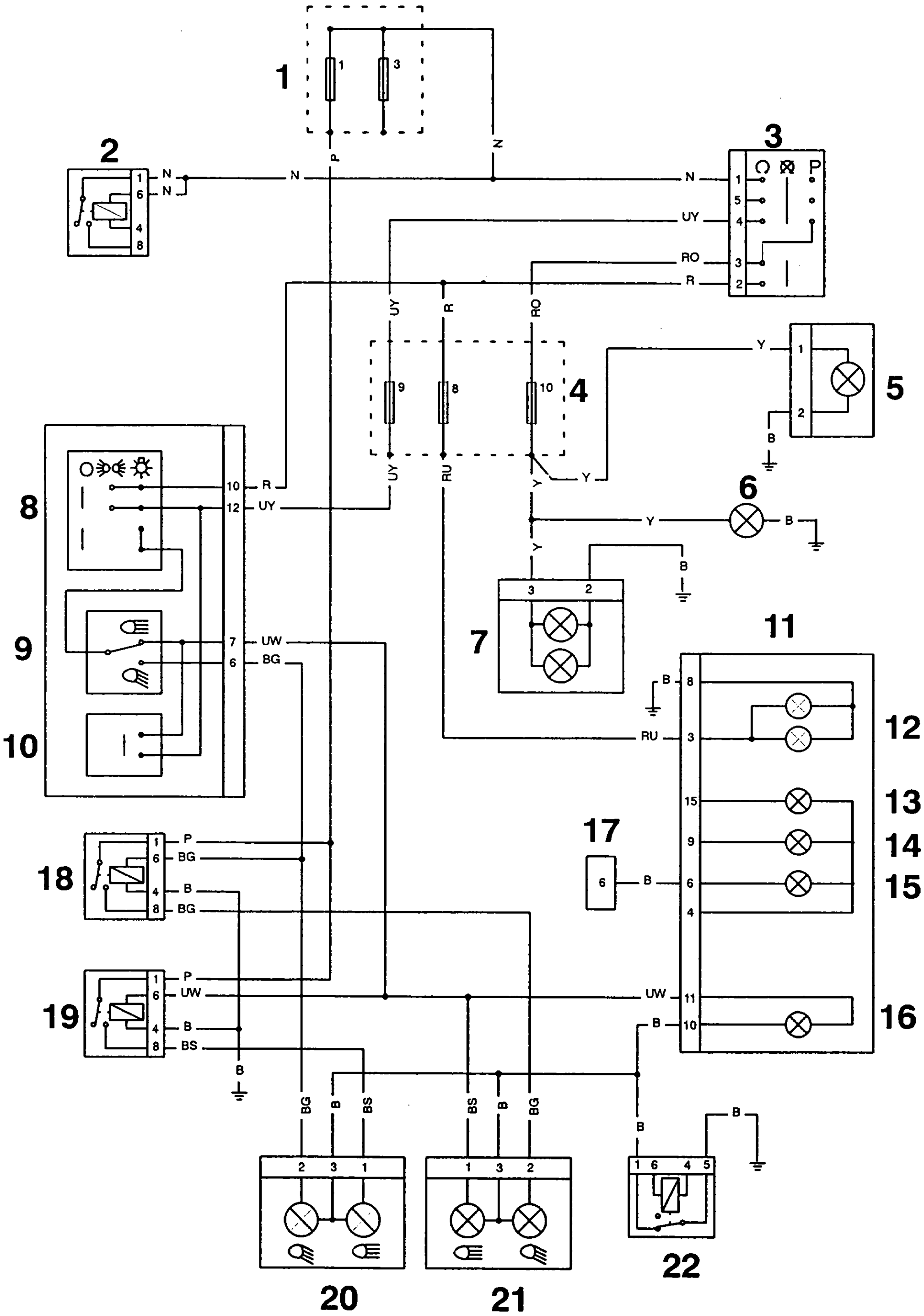
The key found below must be used for identification of components.

Key	Description
1	Fuses 1 and 3
2	Main power relay
3	Ignition switch
4	Fuses 8, 9 and 10
5	Position lamp
6	Number plate lamp
7	Rear lamp
8	Lighting switch
9	Headlamp dip switch
10	Passing switch
11	Instrument assembly
12	Instrument illumination
13	Low fuel warning lamp
14	Neutral lamp
15	Oil pressure warning lamp
16	Main beam warning lamp
17	Engine sub-harness connector
18	Dip beam relay
19	Main beam relay
20	Headlamp 1
21	Headlamp 2
22	Headlamp cut-out relay

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
LU	Light Blue
R	Red
P	Purple
W	White
Y	Yellow

Lighting circuit diagram - Daytona



Lighting circuit diagram - Speed Triple

The key found below must be used for identification of components.

Key	Description
1	Fuses 1 and 3
2	Main power relay
3	Ignition switch
4	Fuses 8, 9 and 10
5	Rear lamp
6	Number plate lamp
7	Lighting switch
8	Headlamp dip switch
9	Passing switch
10	Instrument assembly
11	Instrument illumination
12	Low fuel warning lamp
13	Neutral lamp
14	Oil pressure warning lamp
15	Main beam warning lamp
16	Engine sub-harness connector
17	Dip beam relay
18	Main beam relay
19	Headlamp 1
20	Headlamp 2
21	Headlamp cut-out relay

Key to wiring colour codes

Code	Wiring Colour
B	Black
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N	Brown
G	Green
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O	Orange
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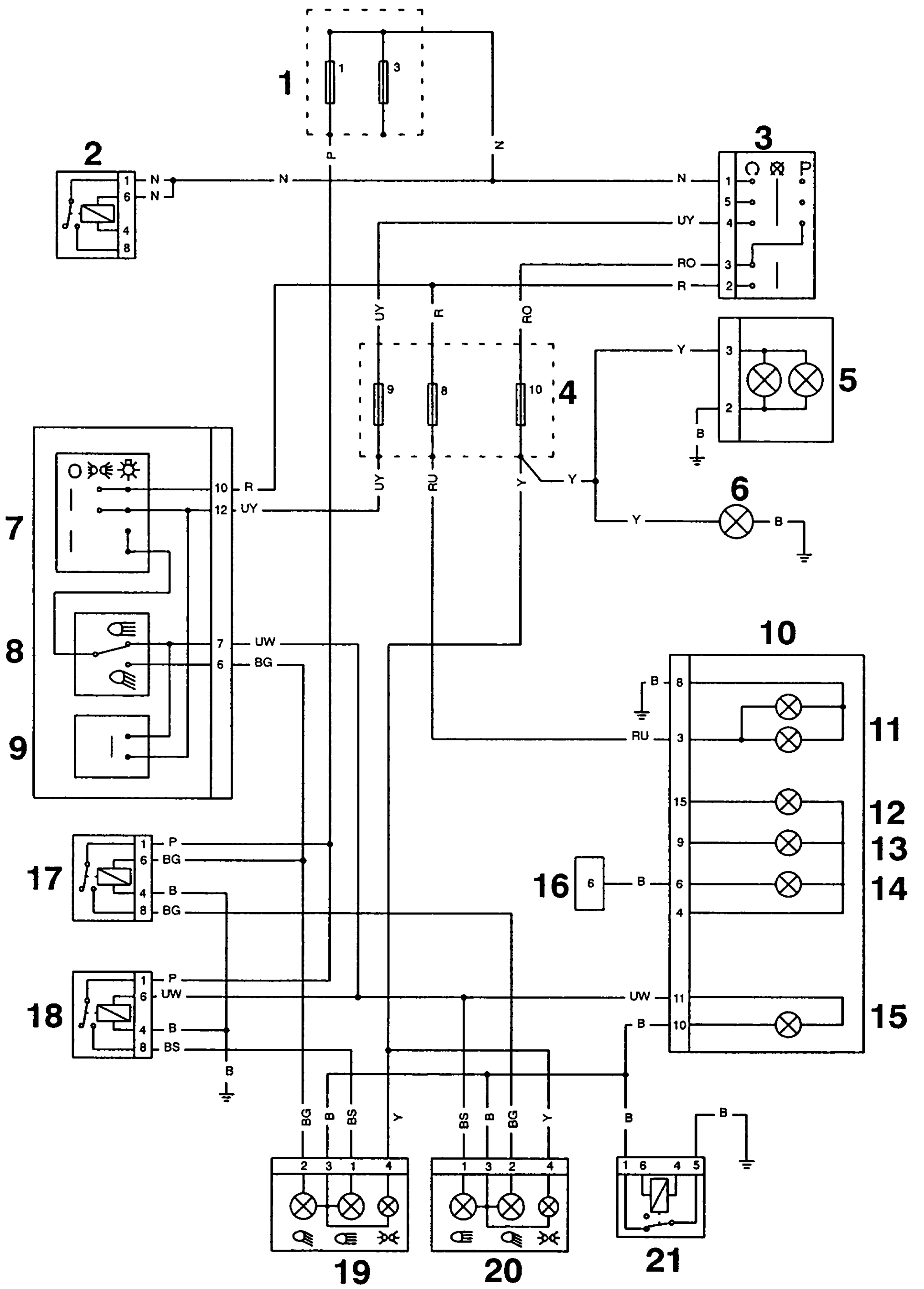
LG	Light Green
LU	Light Blue
R	Red
P	Purple
W	White
Y	Yellow

Lighting circuit diagram - Speed Triple



Starting and charging circuit diagram

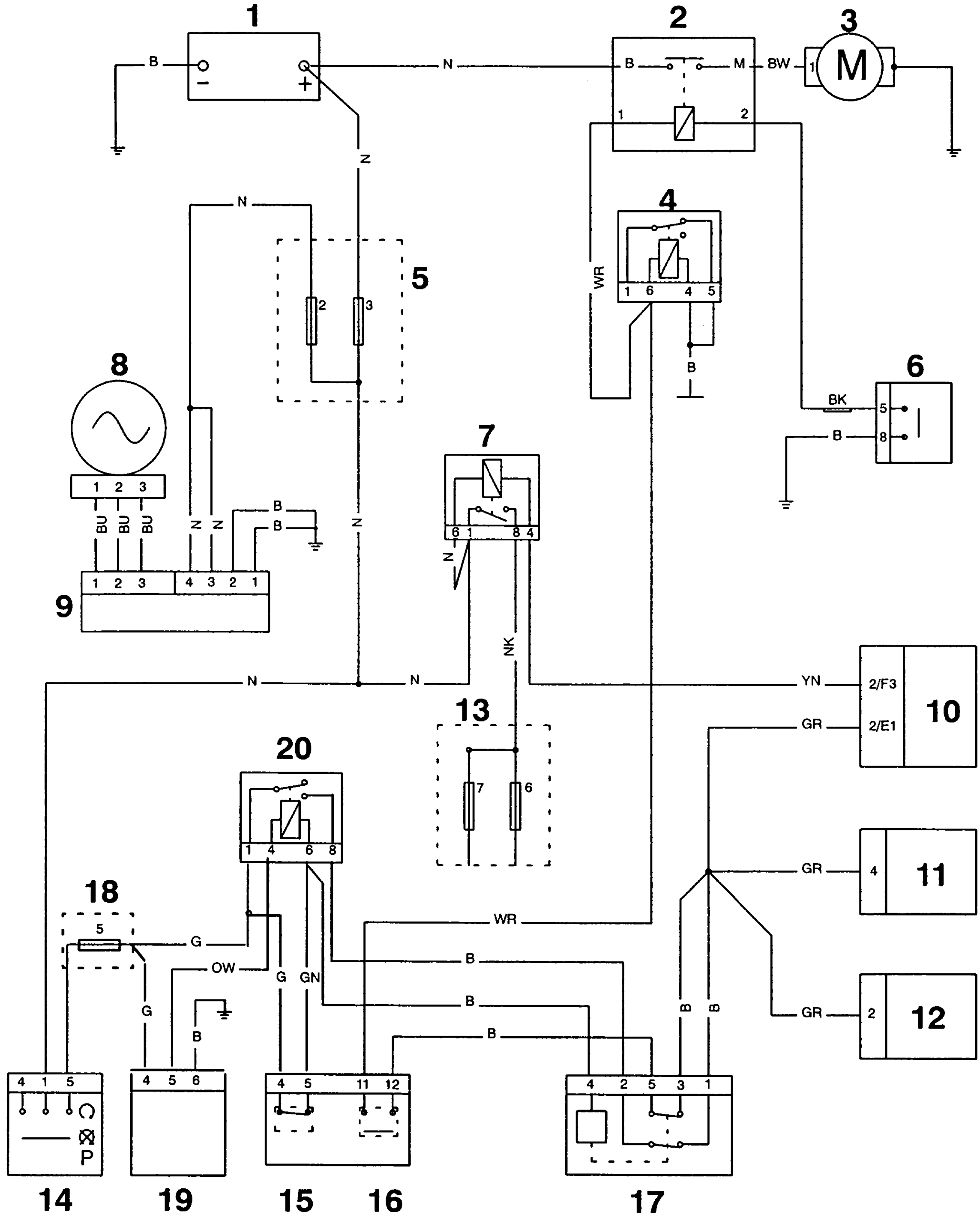
The key found below must be used for identification of components.

Key	Description
1.	Battery
2.	Starter solenoid
3.	Starter motor
4.	Headlight cut-out relay
5.	Fuses 2 and 3
6.	Clutch switch
7.	Main power relay
8.	Alternator
9.	Regulator rectifier
10.	ECM
11.	Instrument assembly
12.	Fuel pump
13.	Fuses 5, 6 and 7
14.	Ignition switch
15.	Engine kill switch
16.	Starter button
17.	Alarm control unit (accessory)
18.	Fuse 5
19.	Fall detection switch
20.	Alarm control unit

Key to wiring colour codes

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

Starting and charging circuit diagram



Auxiliary circuit diagram

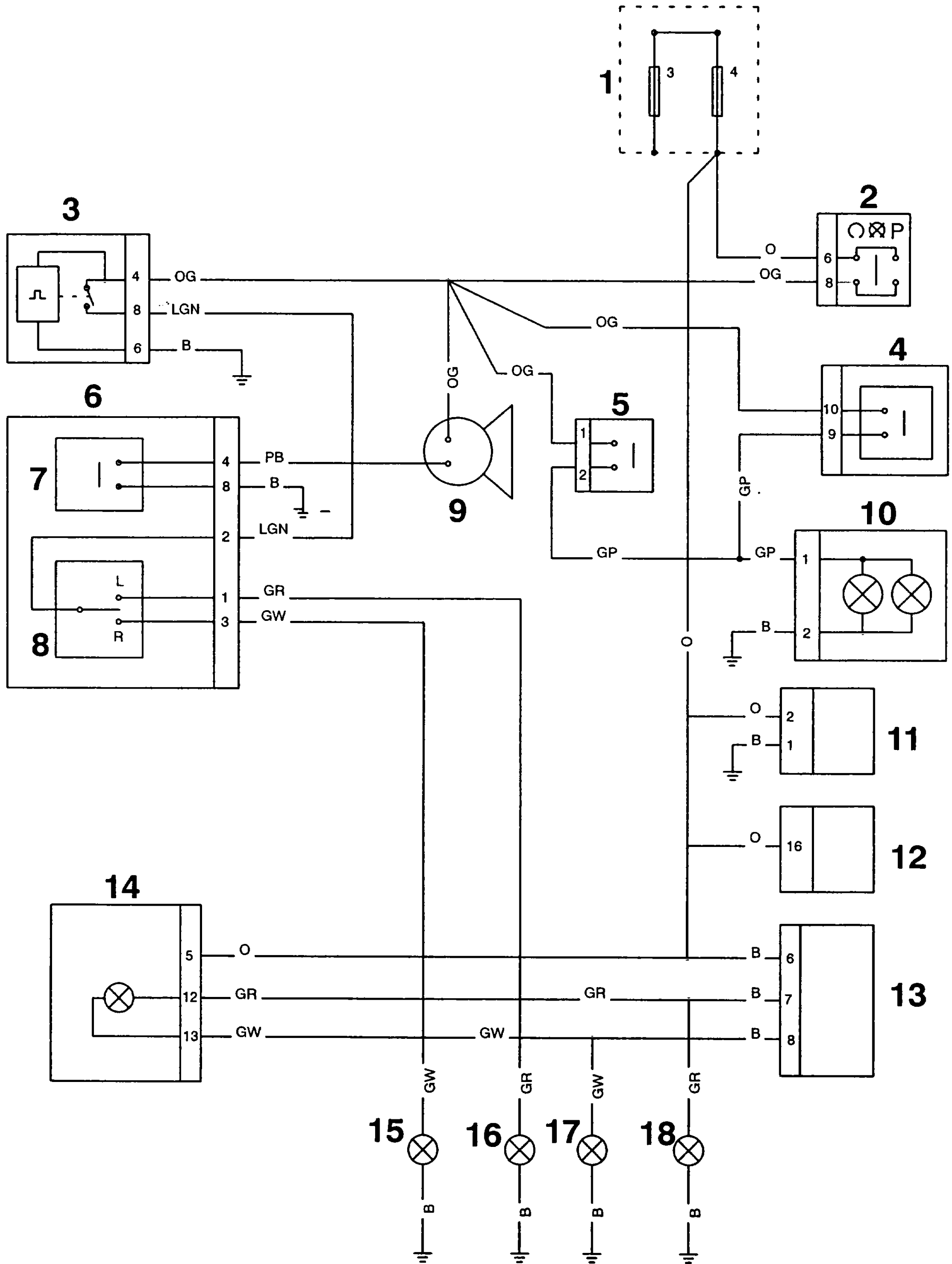
The key found below must be used for identification of components.

Key	Description
1	Fuses 3 and 4
2	Ignition switch
3	Indicator unit
4	Front brake light switch
5	Rear brake light switch
6	Left hand switch cube
7	Horn button
8	Direction indicator switch
9	Horn
10	Brake lamp
11	Accessory socket
12	Diagnostic connector
13	Alarm control unit
14	Instrument assembly
15	Right hand front indicator
16	Left hand front indicator
17	Right hand rear indicator
18	Left hand rear indicator

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
LU	Light Blue
R	Red
P	Purple
W	White
Y	Yellow

Auxiliary circuit diagram



Key to wiring circuit diagram - Daytona

Key	Description
1	Instrument assembly
2	Instrument illumination
3	Neutral lamp
4	Low fuel warning lamp
5	Direction indicator warning lamp
6	Main beam warning lamp
7	Horn
8	Alarm LED
9	Right hand front indicator
10	Headlamp 2
11	Position lamp
12	Headlamp 1
13	Left hand front indicator
14	Main beam relay
15	Dip beam relay
16	Headlamp cut-out relay
17	Wheel speed sensor
18	Front brake lamp switch
19	Engine kill switch
20	Starter button
21	Indicator unit
22	ECM
23	Heated oxygen sensor
24	Fuel injector 1
25	Fuel injector 2
26	Fuel injector 3
27	Crankshaft position sensor
28	Idle control valve stepper motor
29	Neutral switch
30	Oil pressure switch
31	Engine sub-harness connector
32	Canister purge valve (California only)
33	Ignition coil 1
34	Ignition coil 2
35	Ignition coil 3
36	Secondary air injection cut-out solenoid
37	Fuel pump
38	Cooling fan
39	Low fuel level sensor

Key	Description
40	Diagnostic connector
41	Side stand switch
42	Coolant temperature sensor
43	Air temperature sensor
44	Throttle position sensor
45	Rear brake lamp switch
46	Right hand rear indicator
47	Rear lamp assembly
48	Left hand rear indicator
49	Number plate lamp
50	Alarm control unit (accessory)
51	Starter motor
52	Starter solenoid
53	Battery
54	Engine earth
55	Generator
56	Alternator rectifier/regulator
57	Main power relay
58	Fuse box
59	Accessory socket
60	Ignition switch
61	Clutch switch
62	Horn button
63	Direction indicator switch
64	Lighting switch
65	Passing button
66	Headlamp dip switch
67	Ignition relay
68	Fall detection switch
Wiring Colour	
B	Black
U	Blue
N	Brown
G	Green
S	Grey
O	Orange
K	Pink
LG	Light Green
LU	Light Blue
R	Red
P	Purple
W	White
Y	Yellow

ALPHABETICAL INDEX

CONTENTS

A

B

C

D

E

F

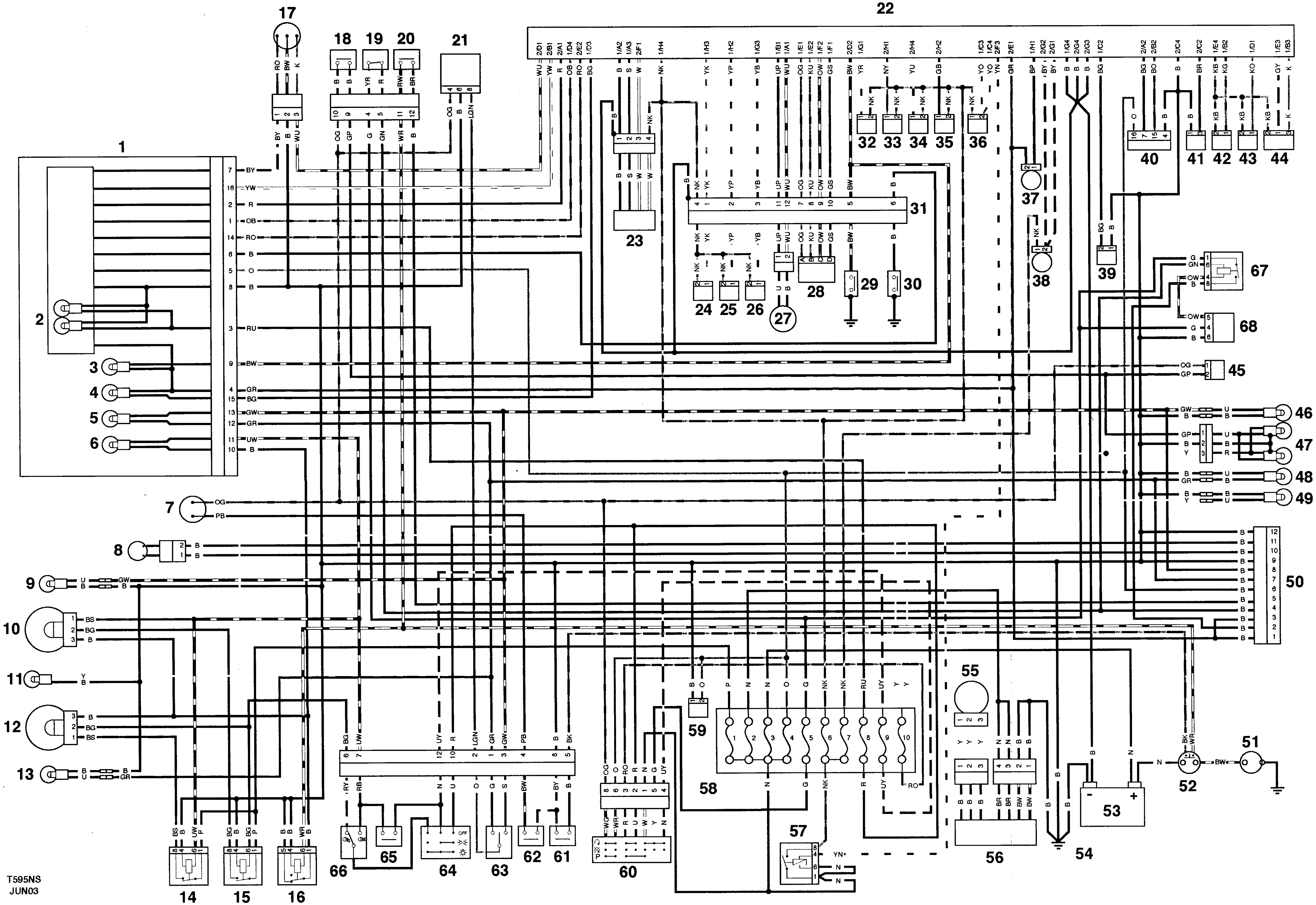
G

S (Cont'd)

T

V

W



T595NS
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Key to wiring circuit diagram - Speed Triple

Key	Description
1	Instrument assembly
2	Instrument illumination
3	Neutral lamp
4	Low fuel warning lamp
5	Direction indicator warning lamp
6	Main beam warning lamp
7	Horn
8	Alarm LED
9	Right hand front indicator
10	Headlamp 2
11	Position lamp
12	Headlamp 1
13	Left hand front indicator
14	Main beam relay
15	Dip beam relay
16	Headlamp cut-out relay
17	Wheel speed sensor
18	Front brake lamp switch
19	Engine kill switch
20	Starter button
21	Indicator unit
22	ECM
23	Heated oxygen sensor
24	Fuel injector 1
25	Fuel injector 2
26	Fuel injector 3
27	Crankshaft position sensor
28	Idle control valve stepper motor
29	Neutral switch
30	Oil pressure switch
31	Engine sub-harness connector
32	Canister purge valve (California only)
33	Ignition coil 1
34	Ignition coil 2
35	Ignition coil 3
36	Secondary air injection cut-out solenoid
37	Fuel pump
38	Cooling fan
39	Low fuel level sensor

Key	Description
40	Diagnostic connector
41	Side stand switch
42	Coolant temperature sensor
43	Air temperature sensor
44	Throttle position sensor
45	Rear brake lamp switch
46	Right hand rear indicator
47	Rear lamp assembly
48	Left hand rear indicator
49	Number plate lamp
50	Alarm control unit (accessory)
51	Starter motor
52	Starter solenoid
53	Battery
54	Engine earth
55	Alternator
56	Alternator rectifier/regulator
57	Main power relay
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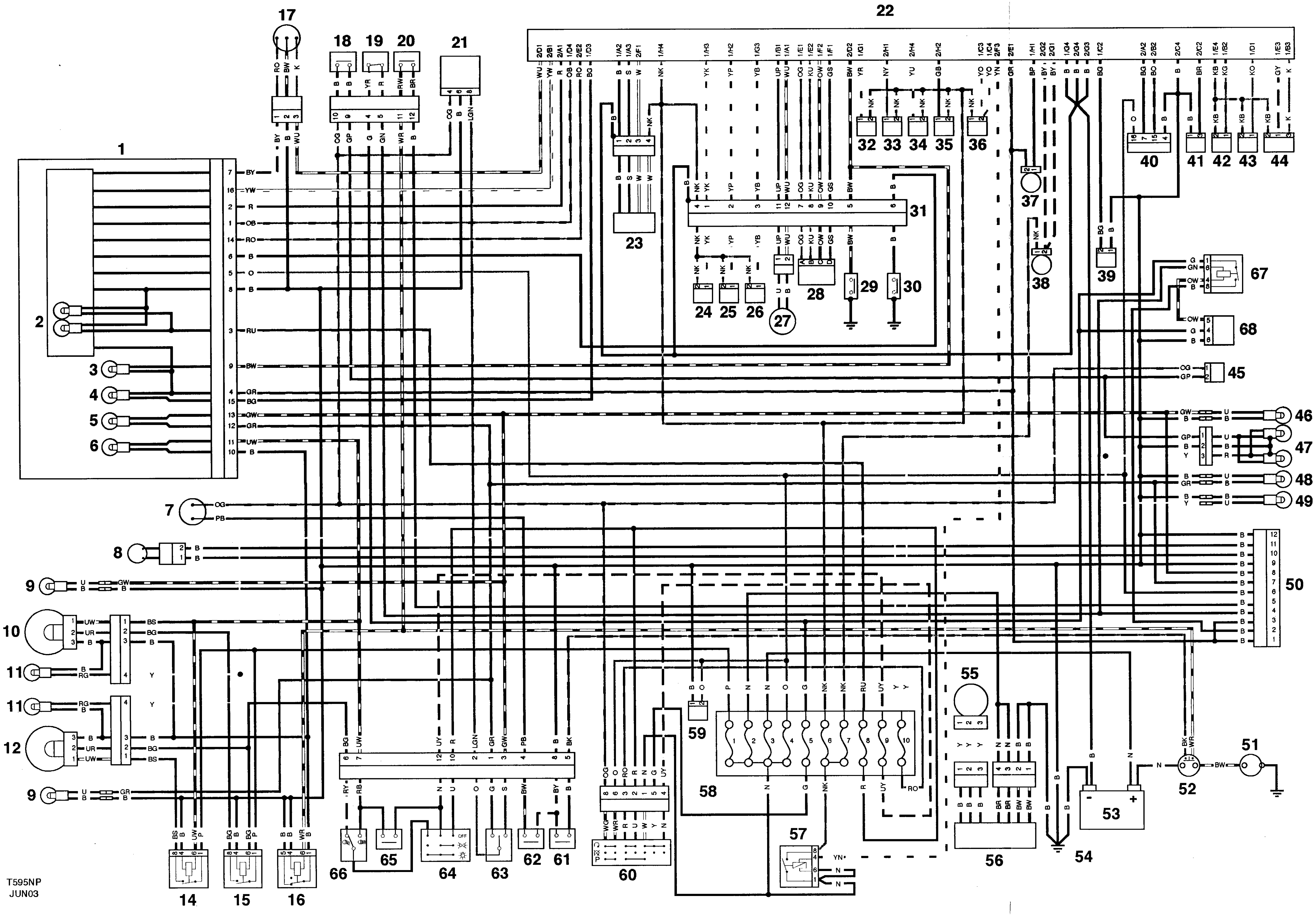

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