Table of Contents

Introduction	v
General Information	1
Scheduled Maintenance	2
Cylinder Head	3
Clutch	4
Crankshaft	5
Balancer	6
Transmission	7
Lubrication	8
Engine Removal and Refit	9
Fuel System/Engine Management	10
Cooling	11
Front Suspension	12
Rear Suspension	13
Rear Bevel Box and Drive Shaft	14
Brakes	15
Wheels/Tyres	16
Frame and Bodywork	17
Electrical System	18

Introduction

Table of Contents

How to Use This Manual vi
Warnings, Cautions and Notes vi
Tampering with Noise Control System Prohibited vii
References vii
Dimensions vii
Repairs and Replacements vii
Force vii
Edges vii
Tightening procedure vii

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 or her 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, an authorised Triumph dealer must undertake all adjustments, maintenance, and repair work.

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

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

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

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

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

To maximise the life of your motorcycle:

- Accurately follow the maintenance requirements of the periodic maintenance chart in the service manual.
- Do not allow problems to develop. Investigate unusual noises and changes in the riding characteristics of the motorcycle. Rectify all problems as soon as possible (immediately if safety related).
- Use only genuine Triumph parts as listed in the 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 of each page.

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

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

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

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

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

Warnings, Cautions and Notes

Particularly important information is presented in the following form:

⚠ Warning

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

⚠ Caution

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:

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

References

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

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

Dimensions

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

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

Repairs and Replacements

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

Force

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

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

Edges

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

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

Safety features and corrosion prevention treatments embodied in the motorcycle may be impaired if 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 a turn and then removed.

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

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

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

This page intentionally left blank

1 General Information

Table of Contents

Ignition System Safety Precautions 1.4
Dangerous Substances 1.4
Third Party Products 1.4
Fluoroelastomers 1.4
Oils 1.4
Health Protection Precautions 1.5
Environmental Protection Precautions 1.5
Brakes/Clutch 1.5
Safety Instructions 1.6
- Jacking and Lifting 1.6
- Precautions Against Damage 1.6
- Coolant 1.6
- Cleaning Components 1.7
- Lubrication 1.7
- Joints and Joint Faces 1.7
- Gaskets, O-rings 1.7
- Liquid Gasket, Non-permanent Locking Agent 1.7
- Screw Threads 1.7
- Locking Devices 1.8
- Fitting a Split Pin 1.8
- Circlips, Retaining Rings 1.8
- Self-Locking Nuts 1.8
- Encapsulated Bolts 1.8
- Oil and Grease Seals 1.8
- Press 1.8
- Ball Bearings 1.8
- Chassis Bearing Lubrication 1.8

Fuel Handling Precautions 1.10
- General 1.10
- Petrol - Gasoline 1.10
- Fuel Tank Removal 1.11

Chassis Repairs 1.11
Electrical Precautions 1.12
- Battery Disconnecting 1.12

Disciplines 1.12
Electrical Wires 1.12
Electrical Testing 1.13
Ohm's Law 1.13
Basic Electrical Circuits 1.13
Circuit Diagrams 1.14
Glossary of Circuit Diagram Symbols 1.14
Tracing Circuits 1.16
To Check Continuity: 1.16
Splices 1.17
CAN (Controller Area Networking) 1.18
Alternator/Charging System 1.19
Starting Circuit 1.20
General Fault Finding - Starter Motor and Relay 1.20
Diagnosis - Starter Circuit 1.21
Specification 1.22
Replacement Parts 1.22
Service Data 1.22
Inspection 1.22
Service Tools and Garage Equipment 1.23
Special Service Tools 1.23
Specifications 1.31
Engine 1.31
Cylinder Head and Valves 1.31
Camshafts 1.32
Pistons 1.33
Connecting Rods 1.33
Crankshaft 1.33
Transmission 1.34
Final Drive 1.34
Lubrication 1.34
Ignition System 1.35
Fuel System 1.35
Fuel Injection System 1.35
Emissions Controls 1.35
Coolant System 1.36
Suspension 1.36
Brakes 1.36
Wheels and Tyres 1.37
Frame 1.37
Electrical Equipment 1.37
Torque Wrench Settings 1.38
Cylinder Head Area 1.38
Clutch 1.38
Crankshaft and Crankcases 1.39
Engine Covers 1.39

Transmission 1.40
Lubrication System 1.40
Cooling System 1.41
Fuel System, Exhaust System and Airbox 1.42
Front Suspension 1.43
Rear Suspension 1.43
Rear Bevel Box and Drive Shaft 1.44
Wheels 1.44
Front Brakes 1.44
Rear Brakes 1.45
ABS System 1.45
Frame, Footrests, Control Plates and Engine Mountings 1.46
Electrical 1.47
Bodywork 1.48
Clutch Hose Routing 1.49
Main Wiring Harness Routing 1.50
ABS and Brake Hose Routing 1.51
Fuel Tank Breather Hose Routing 1.52

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 and clutch fluid, fuel, lubricants, and various adhesives. Always pay close attention to any warnings and instructions printed on the container labels and obey the instructions contained within. These instructions are included for your safety and well-being.

NEVER DISREGARD THESE INSTRUCTIONS!

Third Party Products

Warning

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

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

Fluoroelastomers

Warning

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

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

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

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

Oils

Warning

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

Warning

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 first aid equipment is 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 licenced waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact your local authority for advice on disposal facilities.

Brakes/Clutch

⚠ Warning

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

Replace brake and clutch 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 or clutch fluid onto any area of the bodywork as this will damage any painted or plastic surface.

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

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

Check regularly for brake or clutch 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 the brake or clutch fluid reservoirs, consult your authorised Triumph dealer for advice before riding.

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

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

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

⚠ Warning

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

Failure to change the brake and clutch 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 brake or clutch system or in any area where contact with the brake or clutch system is possible. Mineral based grease will damage the hydraulic seals in the calipers, master cylinders or clutch slave cylinders.

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

Warning

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

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

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

Safety Instructions

Jacking and Lifting

Warning

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

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

Do not leave tools, lifting equipment, 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, clutch fluid or battery acid on any part of the bodywork. Wash spillages off with water immediately.

Disconnect the battery earth lead before starting work. See **ELECTRICAL PRECAUTIONS**.

Always use the recommended service tool where specified.

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

Coolant

Warning

Coolant mixture, which is blended with 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 engine 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

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

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

Joints and Joint Faces

Assemble joints dry unless otherwise specified in this manual.

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

Gaskets, O-rings

Do not 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 during vehicle operation 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 castellated nuts when fitting split pin, except in those recommended cases when this forms part of an adjustment.

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

Circlips, Retaining Rings

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

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

Self-Locking Nuts

Self-locking nuts can be re-used, if 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 Bolts

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

Unless a specified repair procedure states otherwise, encapsulated bolts cannot be re-used 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 appropriate grease.

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

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

Press

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

Ball Bearings

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.

When installing an oil seal, always install the seal with the sealing lip facing the lubricant to be retained. Press or drift the seal to the depth of its housing if the housing is shouldered, or flush with the face of the housing where no shoulder is provided.

Chassis Bearing Lubrication

Note:

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

General

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

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

Note:

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

New Bearings

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

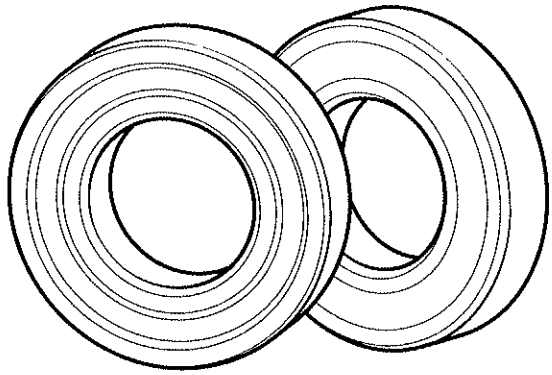
When lubricating a new bearing with grease the following steps should be taken:

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

Lubrication and Checks While Servicing a Bearing

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

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

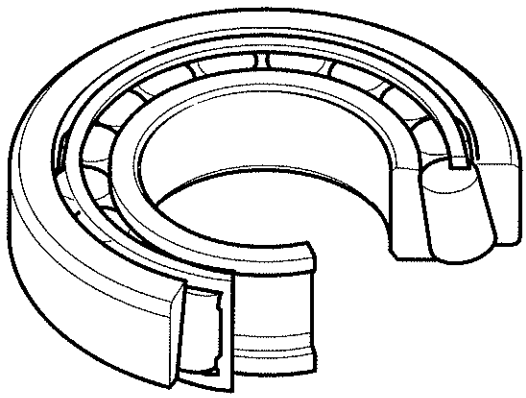


ceon

Sealed Bearings (wheel bearings and swinging arm, depending on the model)

Note:

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

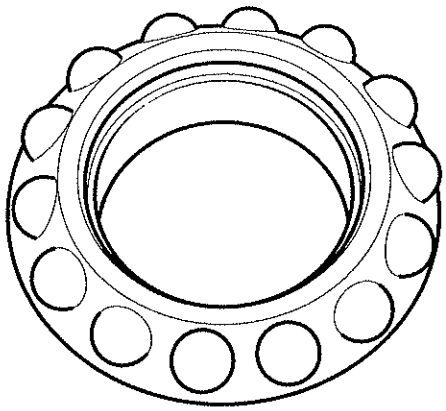


ceon

Taper Bearings (swinging arm and headstock, depending on the model)

1. Grease must be forced between the inner race and the roller carrier.
2. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.

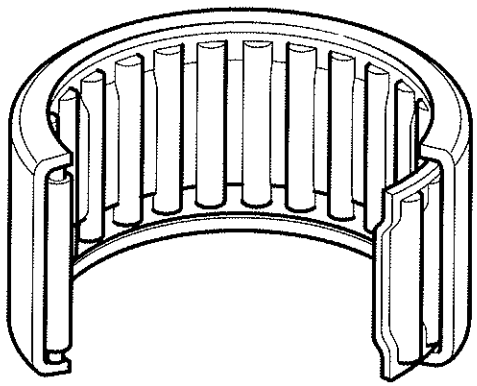
3. Any excess grease should be smeared on the outside of the rollers.



ceon

Angular Contact and Ball Bearings (headstock)

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



ceop

Needle Roller Bearings (swinging arm, rear hub, rear suspension linkages, depending on the model)

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

Metal Bushes

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

Fuel Handling Precautions

General

The following information provides basic precautions which must be observed if petrol (gasoline) is to be handled safely. It also outlines other areas of risk which must not be ignored. This information is issued for basic guidance only and, if in doubt, appropriate enquiries should be made 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 any indoor environment by air currents, consequently, even a small spillage of petrol (gasoline) is potentially very dangerous.

⚠ Warning

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

Turn the motorcycle ignition switch OFF.

Do not smoke.

Always have a fire extinguisher containing FOAM, 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, 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 gases causing a risk of personal injury.

High Voltage Circuits - Whenever disconnecting live High Tension (HT) circuits always use insulated pliers. Exercise caution when measuring the voltage on the coil terminals while the engine is running as 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, which can damage electronic components, can be caused by disconnecting 'live' connections.

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.

Electrical Testing

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

Ohm's Law

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

- The potential of a battery is measured in Volts (V).
- The flow of current in a circuit (I) is measured in Amperes.
- The power rating of a consumer is measured in Watts (W).
- The resistance (R) of a circuit is measured in Ohms (Ω).

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

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

Power is calculated by multiplying Volts x Amps -

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

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

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

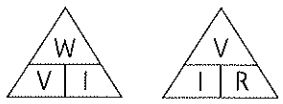
- the current flowing in the circuit can be calculated by using -

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

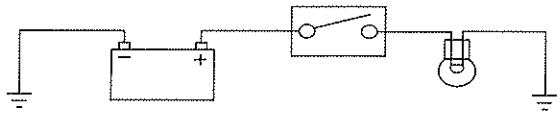
- the bulb resistance can be calculated by using -

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

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



Basic Electrical Circuits



Basic Circuit Diagram

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

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

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

Circuit Diagrams

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

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

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

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

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

Glossary of Circuit Diagram Symbols

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

Connector



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

Diode



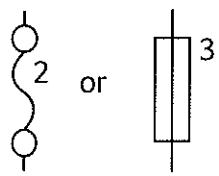
An electrical one-way valve. Diodes allow current to flow in one direction but will not allow it to return. The arrow, which forms part of the diode symbol, indicates the direction of current flow.

Electromagnetic Winding (solenoid)



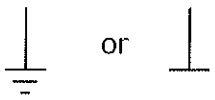
An electromagnetic winding (or solenoid) is used to convert an electrical current into a lateral movement. This can then be used to operate switches (as used in relays) or other components such as fuel injectors or secondary air injection solenoids.

Fuse



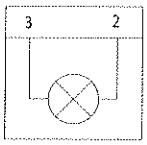
A fuse is a device which protects a circuit in the event of a fault. The fuse will 'blow' if a short circuit occurs, protecting that circuit from further damage. The number next to the fuse on the circuit diagram indicates the position of the fuse in the fusebox.

Ground or Earth Point



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

Lamp or Bulb



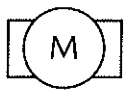
This symbol is used to show all types of light bulbs. The numbers in the box relate to the terminal numbers of the connector pins. An additional number outside the box will identify the component.

LED (Light Emitting Diode)



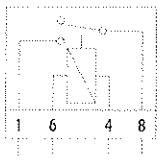
Triumph use LEDs for the alarm warning light, instrument illumination and warning lights, gear change lights and rear light/brake lights on various models.

Motor



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

Relay



A relay is effectively an electromagnetic switch. To close the relay contacts and complete the circuit, an electromagnet in the relay is energised which causes the relay contacts to close, making the circuit complete.

Relays are used when the electrical current is too great for a mechanical switch, usually when the switching must be done quickly to prevent arcing across the switch contacts. If a mechanical switch were used, the mechanical switch contacts would quickly burn away.

Resistor



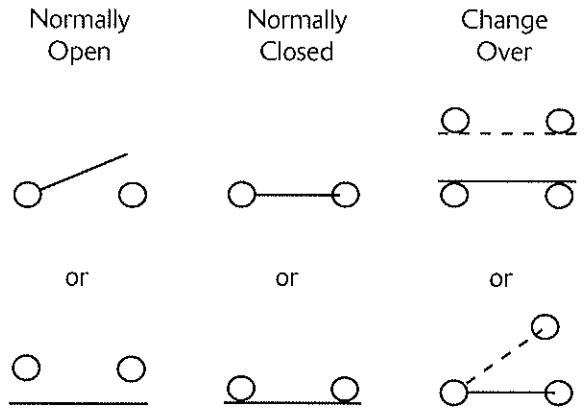
A device placed in a cable to reduce a voltage or restrict the maximum current a device can draw.

Splice



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

Switches

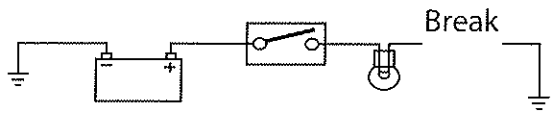


A mechanical device for completing or breaking a circuit. There are three common types of switch: Normally Open, Normally Closed and Change Over.

Tracing Circuits

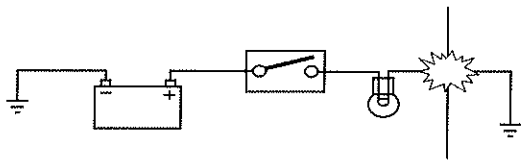
The following is a description of two types of common electrical failures, and some of the methods which may be used to find them.

Open circuit



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

Short Circuit



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

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

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

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

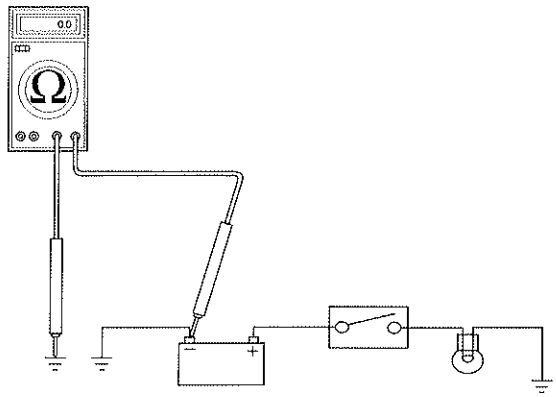
- a wire may diverge at a splice and go off to feed other circuits. If these circuits are working, check for wiring faults from the splice onwards.
- the circuit diagram is not an accurate guide to the actual location of the parts when fitted on the bike. It is a schematic diagram of the circuits.
- particularly where engine management items are concerned, the circuit is only completed by the ECM. If the ECM is not connected, the circuit may register as open.

To Check Continuity:

⚠ Caution

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

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

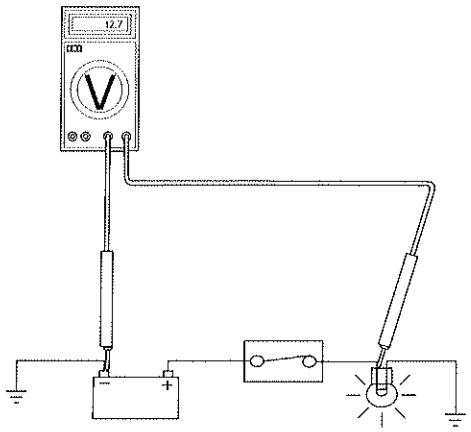


Continuity (resistance) Check

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

To Measure Voltage:

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



Voltage Check

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

Splices

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

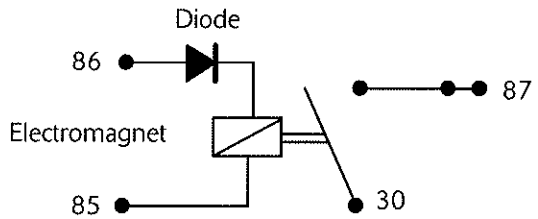
To locate a splice, it is necessary to peel back the insulation and examine the splice for its integrity. The most common fault is where one of the wires at the joint has come adrift usually causing the circuit it feeds or earths to become 'dead'.

Switches

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

Relays

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



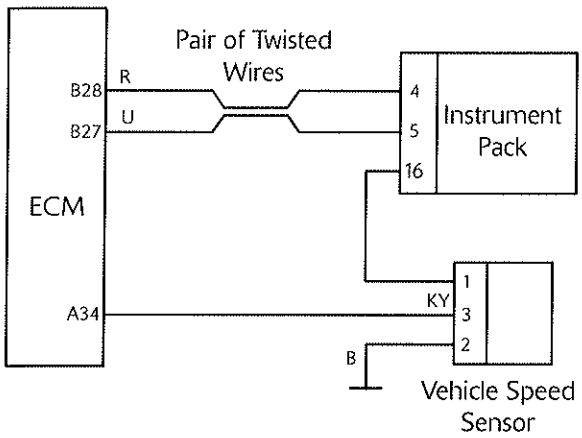
Make continuity checks across the electromagnet first, usually from pin 86 (positive) to pin 85 (negative). If a diode appears in the circuit use the diode check on the multimeter (Volts scale) in the direction of current flow. If there is no diode, use the resistance check facility. An open circuit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

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

CAN (Controller Area Networking)

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

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



Extract from the Circuit Diagram Showing CAN Connection Between ECMs

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

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

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

Triumph currently use CAN for communication between the engine ECM, ABS ECM, and the instruments.

Alternator/Charging System

If the charging circuit does not operate correctly, the following basic checks must be carried out before further diagnosis is performed:

- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating (see page *18-11*).

Rectify any defects as necessary.

To check the alternator output carry out the alternator pinpoint tests as described on page *18-24*.

Note:

- **The alternator is located under the fuel tank. It does not contain any serviceable parts and must be replaced if faulty.**

Starting Circuit

All Triumph models are equipped with an electric start system. This system consists of a starter relay, starter motor, starter switch, sidestand switch, engine stop switch, clutch switch and the sprag clutch. The starter motor is connected to the starter relay and the battery by heavy duty cables in order to supply the large currents required by the motor to start the engine. When the starter button is pressed the relay is energised, which then allows battery current to flow to the starter motor. The starter motor will not operate unless the clutch lever is pulled in. Also, the starter will not operate if the sidestand is down, unless the transmission is in neutral. If the starter motor does not operate, the following basic checks must be carried out before further diagnosis is performed:

- Check the engine stop switch is in the 'RUN' position.
- Check the battery terminals are clean and tight.
- Check the frame and engine earth connections are clean, tight and free from corrosion.
- Ensure the battery is fully charged and in good condition.
- Check that any fuse in the circuit is not blown and is of the correct rating.
- Using the Triumph diagnostic tool, check the operation of the neutral switch or gear position sensor (if fitted), sidestand and clutch switches.

Note:

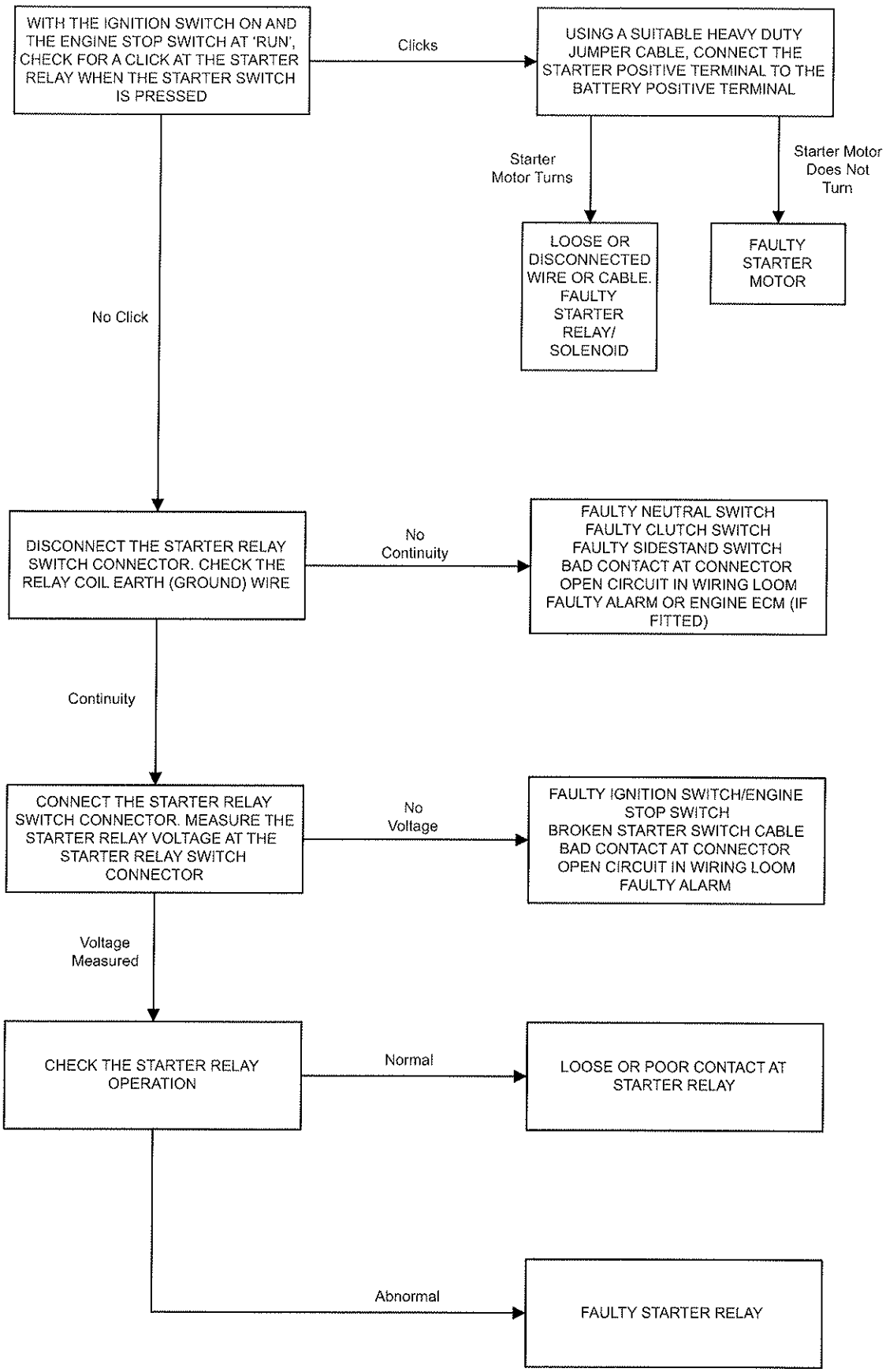
- **On all new models from Daytona 675 onwards, which use a CAN connection between the instruments and the ECM, the engine will not crank if the instruments are disconnected.**

Rectify any defects as necessary.

General Fault Finding - Starter Motor and Relay

Symptom	Possible cause(s)
Starter relay does not click, starter motor does not turn	Battery discharged or defective
	Blown main or starter relay fuse
	Defective starter relay wiring or starter switch
	Check that the sidestand, transmission and clutch lever are positioned for engine starting i.e. transmission in neutral, clutch lever pulled in and the sidestand down
	Defective alarm system - ensure any alarm fitted is working correctly
Starter motor turns slowly	Battery discharged or defective
	Loose, corroded or dirty battery connections
	Loose, corroded or dirty starter motor or starter relay connections
	Defective starter motor
	Loose, corroded or dirty battery ground connections
Starter relay clicks but engine does turn over	Battery discharged or defective
	Crankshaft does not turn due to engine defect
	Defective starter motor
	Starter cable open circuit
	Defective starter relay
Starter motor turns but engine does not turn over	Defective sprag clutch
	Defective idler gear, reduction gear or starter motor

Diagnosis - Starter Circuit



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.

Replacement Parts

Warning

Only Triumph genuine parts should be used to service, repair or convert Triumph motorcycles. To ensure that Triumph genuine 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 genuine 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.

Inspection

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

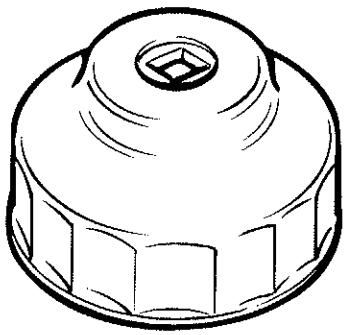
Abrasions, cracks, hardening, warping, bending, dents, scratches, colour changes, deterioration, seizure or damage of any nature.

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.

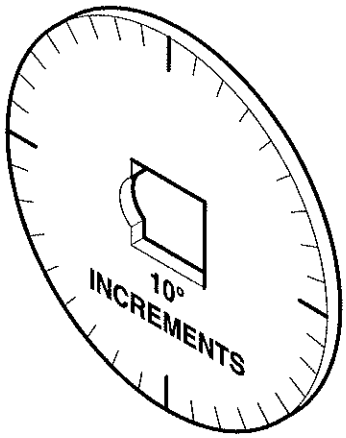
Special Service Tools

Oil Filter Wrench T3880313



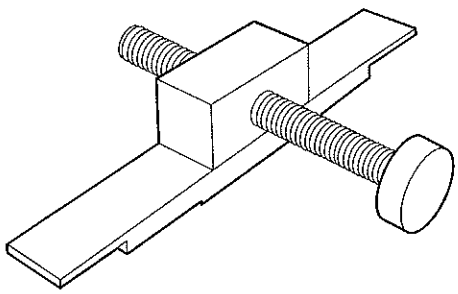
gahc

Angular Torque Gauge T3880105

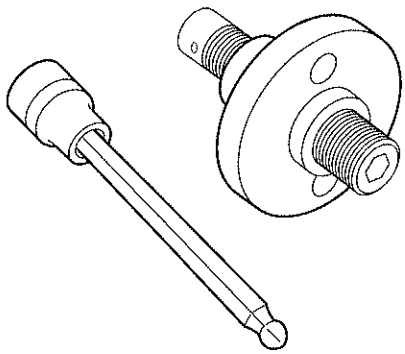


cbxt

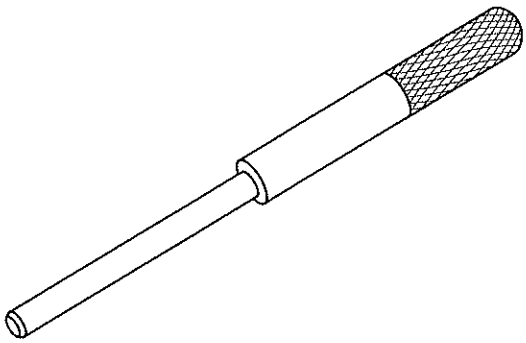
Camshaft Timing Plate T3880600



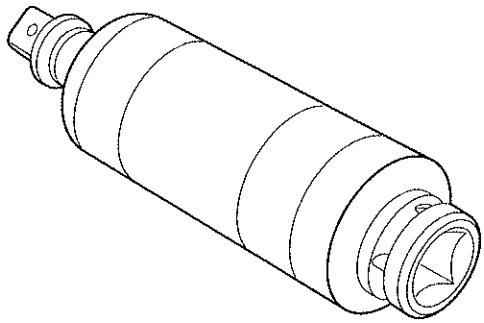
Camshaft Timing Tensioner T3880607



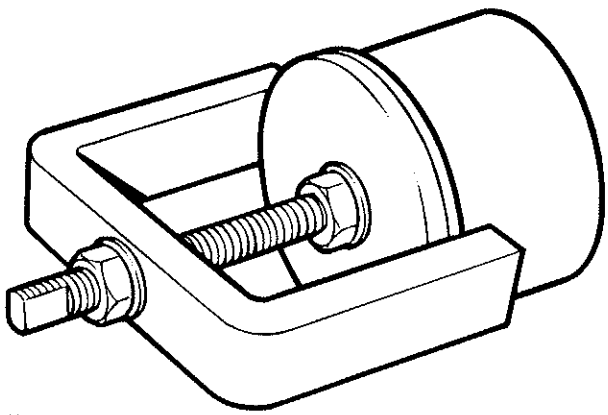
Crankshaft Timing Pin T3880601



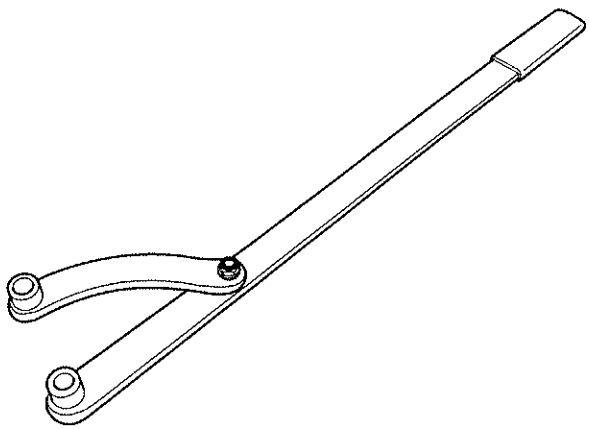
Torque Limiter T3880609



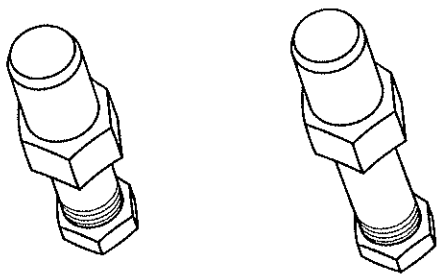
Cylinder Liner Extractor T3880605 (use with the frame from Cylinder Liner Extractor T3880315)



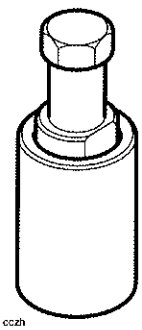
Flywheel Restraint T3880606



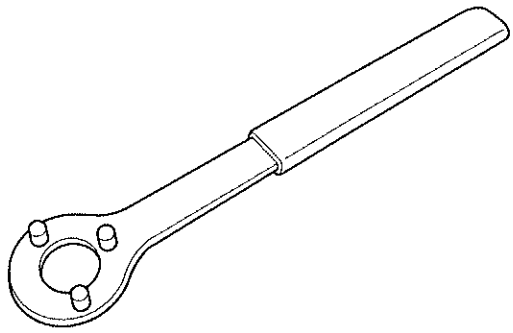
Flywheel Pin Set T3880608



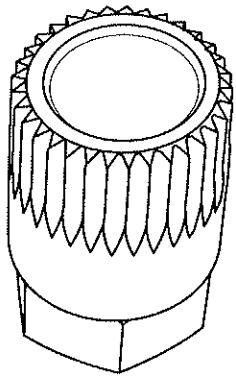
Alternator/Flywheel Rotor Puller T3880365



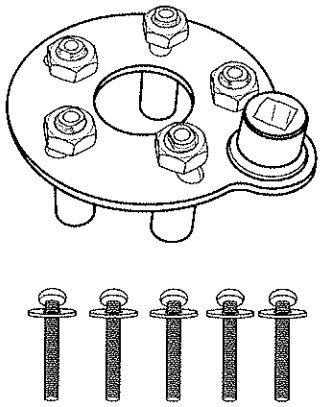
Oil Pump Restraint T3880603



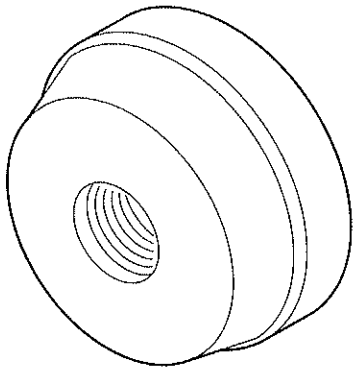
Alternator Wrench T3880602



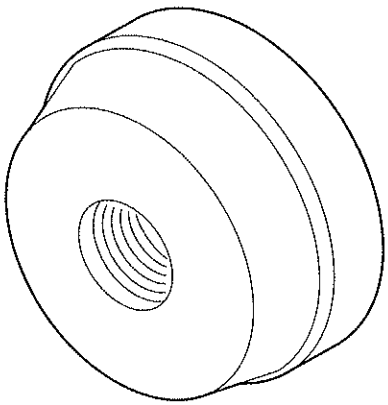
Clutch Restraint T3880604



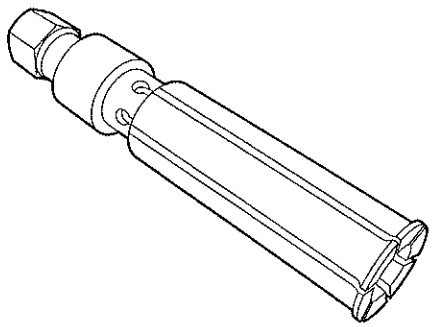
Bearing Installer, 39 mm T3880625



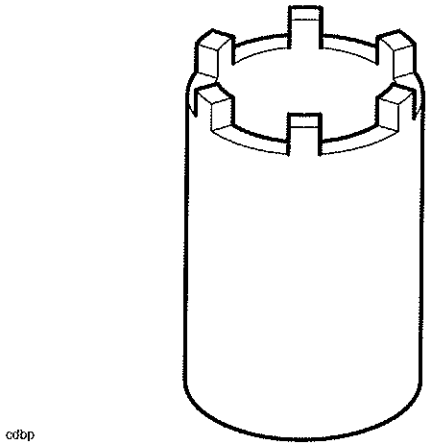
Bearing Installer, 46 mm T3880626



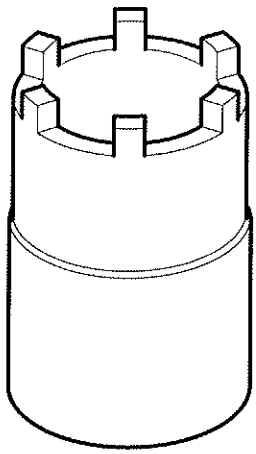
Bearing Puller 32-42 mm T3880627



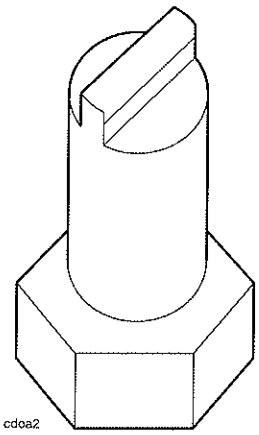
Adjuster Socket, 50 mm T3880023



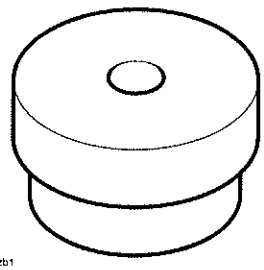
Adjuster Socket, 48 mm T3880620



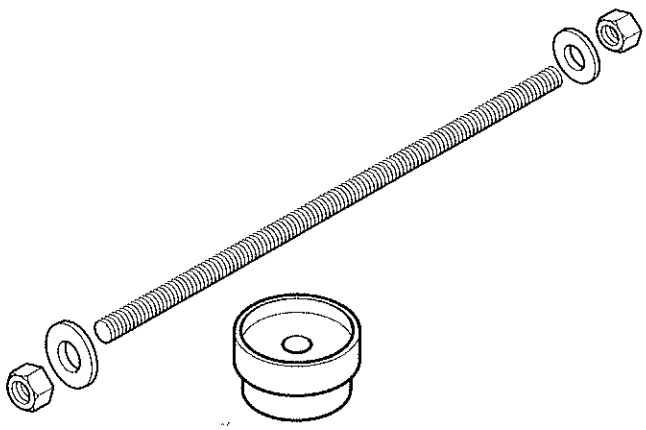
Engine Mounting Adjuster Wrench T3880377



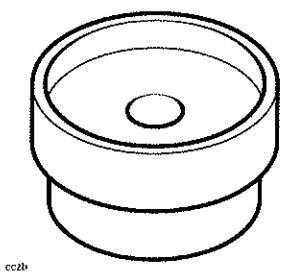
Bearing Installer 3880070 - T0301



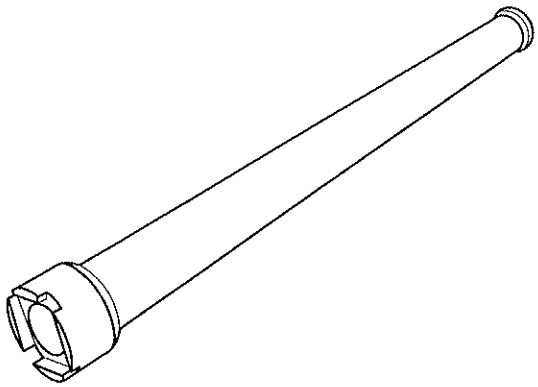
Wheel Bearing Extraction Kit T3880053



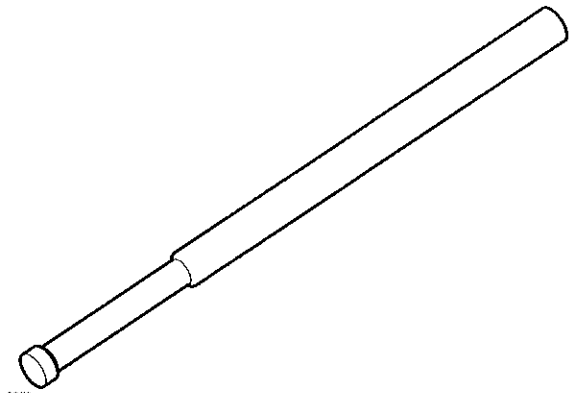
Bearing Installer 3880070 - T0301



Damper Tube Wrench T3880622

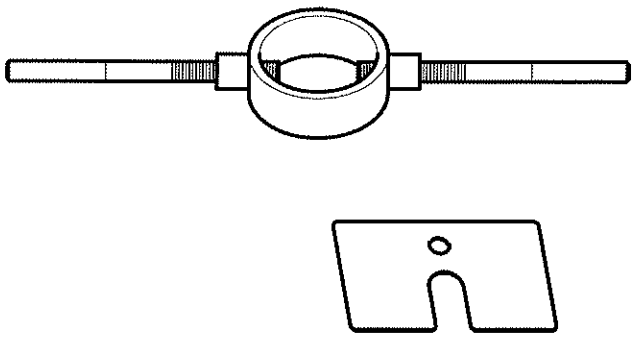


Fork Piston Holder 3880085-T0301



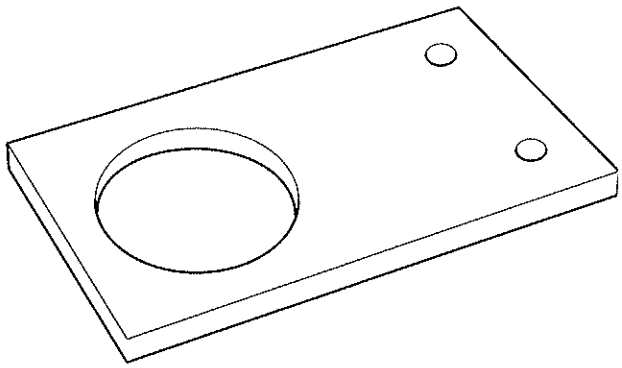
ccgs

Fork Spring Compressor T3880067



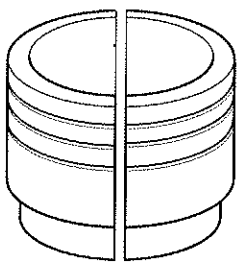
ccgw

Support Plate T3880153

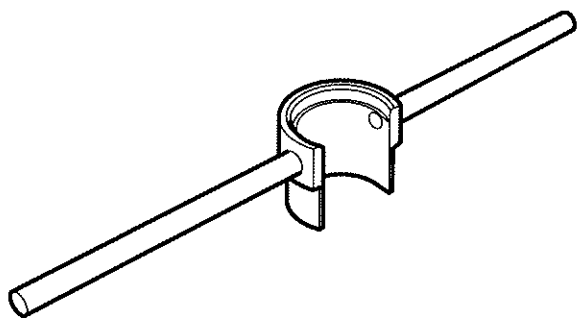


ccxa_1

Nylon Fork Support Collets T3880621

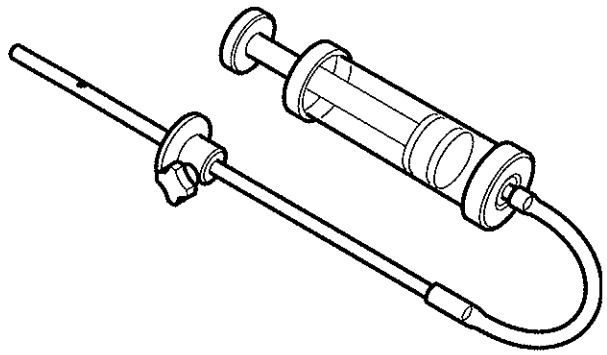


Fork Seal Installer T3880623



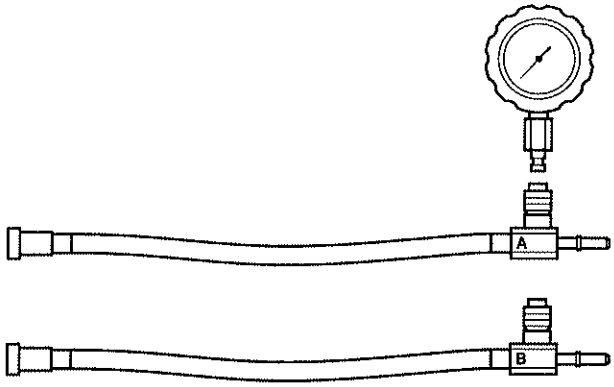
ccxb

Fork Filler/Evacuator 3880160 - T0301



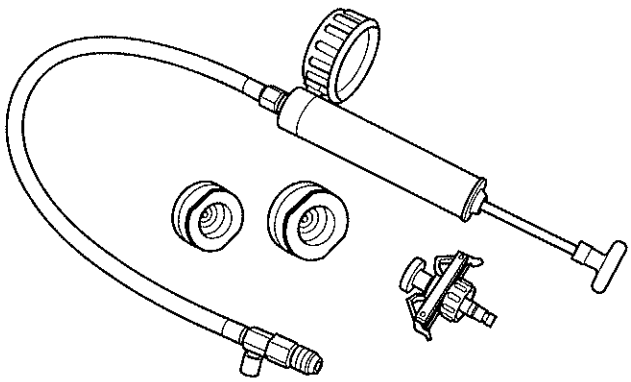
coha

Fuel Pressure Gauge T3880001



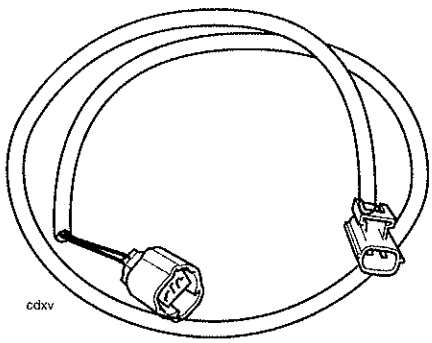
cdgh

Radiator and Cap Tester T3880147



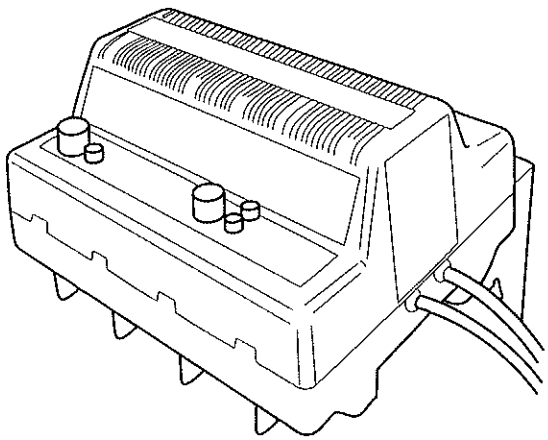
cgwp

Extension Cable T3880123

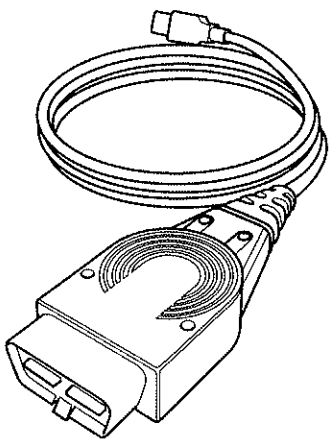


cdxv

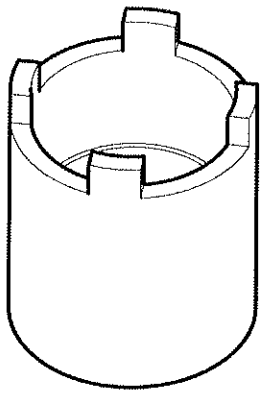
BatteryMate Battery Charger - See Latest Parts Catalogue for Part Number Information



Engine Managemant Diagnostics T3880057

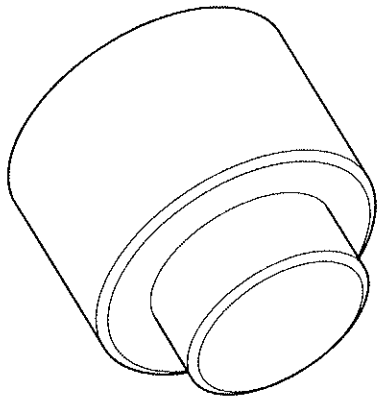


Lock Ring Wrench, 38 mm T3880062

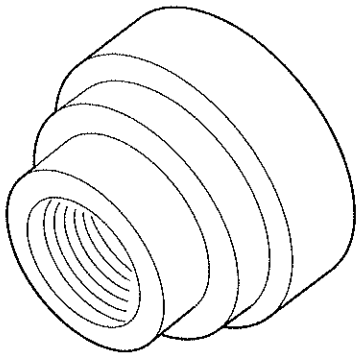


ccgu

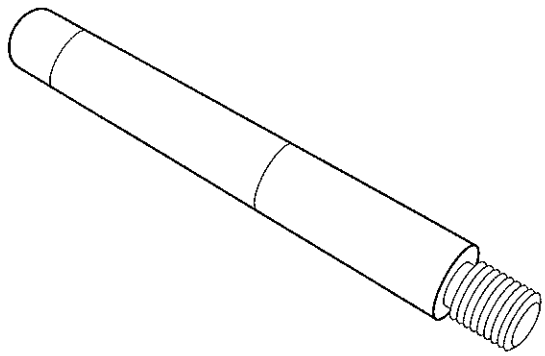
Housing Support T3880624



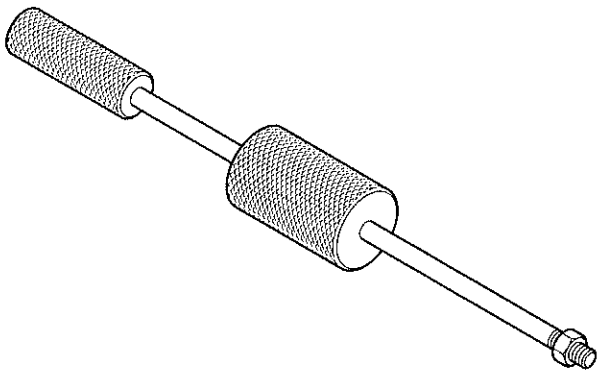
Bearing Installer, 26 mm T3880628



Bearing Installer Handle T3880629

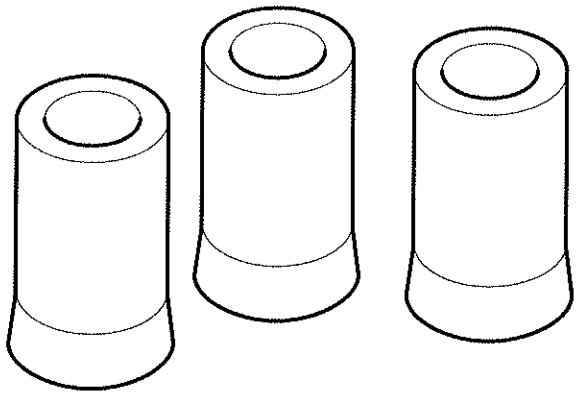


Slide Hammer T3880208

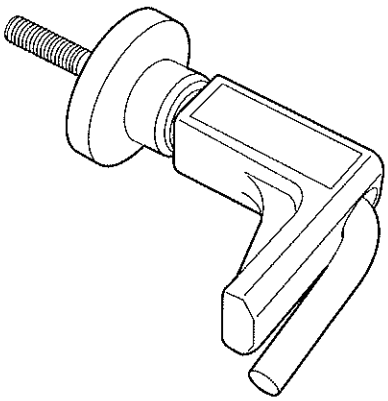


cemy4

Blanking Cap T3880631



Fuel Hose Clamp T3880630



Specifications

Full Specification — Tiger Explorer

Engine

Engine Configuration	3 Cylinder 12 valve DOHC
Arrangement	Transverse in-line
Displacement	1215 cc
Bore x Stroke	85 x 71.4 mm
Compression Ratio	11:1
Cylinder Numbering	Left to right (no. 3 adjacent to camshaft drive chain)
Cylinder Sequence	Number 1 at left
Firing Order	1-2-3
Maximum Power (95/1/EC)	100.74 kW (137 PS/135 bhp) at 9,000 rpm
Maximum Torque	121 Nm (89 lb-ft) at 6,400 rpm

Cylinder Head and Valves

Valve Head Diameter	Inlet	35.600 mm
	Exhaust	28.600 mm
Valve Lift	Inlet	8.75 mm
	Exhaust	8.00 mm
Valve Stem Diameter	Inlet	4.975 - 4.990 mm (Standard)
		4.965 mm (service limit)
	Exhaust	4.955 - 4.970 mm (Standard)
		4.945 mm (service limit)
Valve Guide Bore Diameter	Inlet	5.000 - 5.015 mm (Standard)
		5.043 mm (service limit)
	Exhaust	5.000 - 5.015 mm (Standard)
		5.083 mm (service limit)
Valve Stem to Guide Clearance	Inlet	0.068 mm
	Exhaust	0.128 mm
Valve Seat Width (in head)	Inlet	1.0 mm (Standard)
		1.5 mm (service limit)
	Exhaust	1.2 mm (Standard)
		1.7 mm (service limit)
Valve Seat Width (valve)	Inlet	1.03 mm
	Exhaust	1.33 mm
Valve Seat Angle		45°
Inlet/Exhaust Valve Spring 'Load at Length'		580 N±29 N at 26.8 mm
Valve Clearance	Inlet	0.10 - 0.15 mm
	Exhaust	0.275 - 0.325 mm
Valve Bucket Diameter	Inlet and Exhaust	28.476 - 28.49 mm (Standard)
		28.468 mm (service limit)

Full Specification **Tiger Explorer**

Cylinder Head and valves (continued)

Valve Bucket Bore Diameter	Inlet and Exhaust	28.515 - 28.535 mm
		28.549 mm (service limit)

Camshafts

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

Clutch / Primary Drive

Primary Drive	Type	Gear
Reduction Ratio		(98/61)
Clutch	Type	Wet multi-plate
No. of Friction Plates		9
Plate Flatness		Within 0.15 mm
Friction Plate Thickness (inner and outer)		3.80 mm (standard)
		3.60 mm (service limit)
Friction Plate Thickness (all others)		3.80 mm (standard)
		3.60 mm (service limit)
Clutch Actuation Method		Hydraulic
Recommended Fluid		DOT 4 brake and clutch

Full Specification **Tiger Explorer**

Pistons

Cylinder Bore Diameter (15 mm from top of bore)	Grade A	84.995 - 85.003 mm (standard)
	Grade B	84.985 - 84.994 mm (standard)
	Service Limit (all grades)	85.100 mm
Piston Diameter (at 90° to gudgeon pin, 12.5 from bottom of piston)	Grade A	84.981 - 84.984 mm (standard)
	Grade AB	84.972 - 84.980 mm (standard)
	Grade B	84.968 - 84.971 mm (standard)
	Service Limit (all grades)	84.928 mm
Piston Ring to Groove Clearance	Top	0.000 - 0.040 mm (standard)
		0.085 mm (service limit)
	Second	0.020 - 0.060 mm (standard)
		0.075 mm (service limit)
Piston Ring End Gap	Top	0.150 - 0.350 mm (standard)
		0.470 mm (service limit)
	Second	0.350 - 0.550 mm (standard)
		0.670 mm (service limit)
	Oil	0.200 - 0.700 mm (standard)
		0.84 mm (service limit)
Gudgeon Pin Bore Diameter in Piston		19.010 - 19.015 mm (standard)
		19.043 mm (service limit)
Gudgeon Pin Diameter		19.000 - 19.005 mm (standard)
		18.985 mm (service limit)

Connecting Rods

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

Crankshaft

Crankshaft Big End Journal Diameter	38.020 - 38.036 mm (standard)
	37.996 mm (service limit)
Crankshaft Big End Bearing Clearance	0.030 - 0.056 mm (standard)
	0.061 mm (service limit)
Crankshaft Main Bearing Journal Diameter	37.960 - 37.976 mm (standard)
	37.936 mm (service limit)
Crankshaft End Float	0.075 - 0.175 mm (standard)
	0.375 mm (service limit)
Crankshaft Run-out	0.020 mm or less (standard)
	0.050 mm (service limit)

Full Specification **Tiger Explorer**

Transmission

Type		6 Speed, Constant Mesh
Gear Ratios	1st	2.846:1 (13/37)
	2nd	2.056:1 (18/37)
	3rd	1.583:1 (24/38)
	4th	1.2916:1 (24/31)
	5th	1.138:1 (29/33)
	6th	1.037:1 (27/28)
Gear Selector Fork Thickness	Input shaft	5.8 - 5.9 mm (standard)
		5.7 mm (service limit)
	Output shaft	6.3 - 6.4 mm (standard)
		6.2 mm (service limit)
Gear Selector Groove Width	Input shaft	6.0 - 6.1 mm (standard)
		6.2 mm (service limit)
	Output shaft	6.5 - 6.6 mm (standard)
		6.7 mm (service limit)
Gear Selector Fork to Groove Clearance		0.500 mm max.

Final Drive

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

Lubrication

Type	Pressure Lubrication, Wet Sump
Oil Capacity (dry fill)	4.5 litres
Oil Capacity (wet fill including filter)	4.0 litres
Oil Capacity (wet fill excluding filter)	3.85 litres
Oil pressure (in main gallery)	40.0 lb/in² min. @ 80°C oil temperature @ 5,000 rpm
Oil Pump Rotor Tip Clearance	0.050 - 0.150 mm (standard)
	0.200 mm (service limit)
Oil Pump Body Clearance	0.050 - 0.139 mm (standard)
	0.35 mm (service limit)
Oil Pump Rotor End Float	0.040 - 0.090 mm (standard)
	0.170 mm (service limit)

Full Specification **Tiger Explorer**

Ignition System

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

Fuel System

Fuel Type	Unleaded, 91 RON (U.S. 87 CLC/AKI)
Fuel Tank Capacity	20.0 litres (motorcycle upright)
Low Level Warning Lamp	4 litres remaining
Fuel Pump Type	Submerged
Fuel Pressure (nominal)	3.5 bar
Purge Control System	Electronic, via fuel system ECM

Fuel Injection System

Type	Electronic, sequential
Idle Speed	1,000 rpm
Injector Type	Twin jet, solenoid operated plate valve
Throttle	Butterfly, electronically controlled
Control Sensors	Barometric pressure, throttle position, twist grip position, coolant temperature, crankshaft position, oxygen sensor, induction air temperature, manifold absolute pressure (MAP), gear position, road speed (from ABS system)

Emissions Controls

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

Full Specification **Tiger Explorer**

Coolant System

Coolant Mixture	Pre-mixed
Anti-Freeze Type	Triumph HD4X Hybrid OAT coolant
Cooling System Capacity	2.4 litres
Radiator Cap Opening Pressure	1.1 Bar
Thermostat Opening Temperature	71°C (nominal)
Cooling Fan Switch On Temperature	103°C
Temperature Gauge Sensor Resistance	2.9 – 3.3 KW @ 15°C

Suspension

Front Fork Travel	120 mm
Recommended Fork Oil Grade	KHL15-10
Oil Level (fork fully compressed spring removed)	117 mm
Oil Volume (dry fill)	664 cc
Front Fork Pull Through	Groove on the outer tube is 5 mm below the lower surface of the top yoke
Rear Wheel Travel	130 mm

Brakes

Front Type	Two four piston calipers acting on twin discs
Front Caliper Piston Diameter	34.0 mm
Front Disc Diameter	305.0 mm
Front Disc Thickness	4.5 mm (standard)
	4.0 mm (service limit)
Front Disc Run-out Max.	0.3 mm
Recommended Fluid	DOT 4 brake and clutch
Rear Type	Twin piston sliding caliper acting on single disc
Rear Caliper Piston Diameter	27.0 mm
Rear Disc Dia.	255.0 mm
Rear Disc Thickness	6.0 mm (standard)
	5.0 mm (service limit)
Rear Disc Run-out Max.	0.25 mm
Rear Master Cylinder Diameter	14.0 mm
Recommended Fluid	DOT 4 brake and clutch

Full Specification **Tiger Explorer**

Wheels and Tyres

Front Wheel Size		MT 2.5 x 19
Front Tyre Size		110/80 - R19
Front Tyre Pressure		2.48 bar (36 lb/in²)
Recommended Front Tyre	Option 1	Metzler Tourance EXP
	Option 2	Pirelli Scorpion Trail
	Option 3	Bridgestone BW501
Front Wheel Rim Axial Run-out		0.5 mm
Front Wheel Rim Radial Run-out		0.5 mm
Rear Wheel Size		MT 4.0 x 17
Rear Tyre Size		150/70 - R17
Rear Tyre Pressure		2.90 bar (42 lb/in²)
Recommended Rear Tyres	Option 1	Metzler Tourance EXP - M specification
	Option 2	Pirelli Scorpion Trail
	Option 3	Bridgestone BW502
Rear Wheel Rim Axial Run-out		0.5 mm
Rear Wheel Rim Radial Run-out		0.5 mm

Frame

Frame Type	Steel trellis
Overall Length	2,248 mm (88.5 in)
Overall Width	885 mm (34.8 in)
Overall Height	1,410 mm (55.5 in)
Wheelbase	1,530 mm (60.2 in)
Seat Height	837 mm (32.9 in)
Rake	23.9°
Trail	105.5 mm
Wet Weight	259 kg
Max. Payload (rider, passenger, luggage & accessories)	222 kg

Electrical Equipment

Battery Type	YTX20L-BS
Battery Rating	12V - 18 Amp. Hour
Alternator Rating	70 Amp
Tail/Brake Light	LED
Fuses	See page *18-11*

Torque Wrench Settings

Cylinder Head Area

Application	Torque (Nm)	Notes
Camshaft cover to cylinder head	14	Fit new sealing washer(s). Apply engine oil to seals
Secondary air injection valve covers to camshaft cover	8	
Camshaft drive chain tensioner to crankcase	9	
Camshaft bearing ladder to head	10	Lubricate threads with engine oil
Camshaft sprocket to camshaft	22	Replace fixing(s) if removed
Camshaft drive chain top pad to cylinder head	10	Replace fixing(s) if removed
Cylinder head to crankcase (M6 screws)	10	Replace fixing(s) if removed
Cylinder head to crankcase bolts	*	Refer to section 3
Cylinder head dry seal plug	22	Apply ThreeBond 1360 to threads
Spark plugs	12	
Cylinder head exhaust stud	10	Replace fixing(s) if removed
Wire guide	20	

Clutch

Application	Torque (Nm)	Notes
Clutch cover to crankcase	11	See text
Clutch centre nut	160	Replace fixing(s) if removed
Clutch pressure plate to centre drum	10	
Clutch master cylinder clamp bolts	12	
Clutch lever nut	6	
Clutch lever pivot bolt	1	
Clutch slave cylinder to clutch cover	10	
Clutch slave cylinder bleed screw	8	
Clutch hose union to master cylinder and slave cylinder	25	Fit new sealing washer(s)
Clutch master cylinder cover	1.5	

Crankshaft and Crankcases

Application	Torque (Nm)	Notes
Crankcase upper to lower (M8 fixings)	*	Refer to section 5
Crankcase upper to lower (M6 fixings)	*	Refer to section 5
Connecting rod big end nut	*	Refer to section 5
Balancer gear to crankshaft	35	
Big end bearings	*	Refer to section 5
Crankcase coolant drain plug	8	Fit new sealing washer(s)
Breather plate to crankcase	12	Replace fixing(s) if removed
Flywheel to crankshaft	*	Refer to section 5
Crankcase dry seal plug	22	Apply ThreeBond 1305 to threads

Engine Covers

Application	Torque (Nm)	Notes
Clutch cover to crankcase	11	See text
Clutch slave cylinder cover	4	Replace fixing(s) if removed
Selector cover to crankcase (28 mm fixing)	11	See text
Selector cover to crankcase (90 mm fixing)	11	See text
Flywheel cover	11	See text
Crankcase cover to crankcase	11	See text
Balancer cover to crankcase	11	See text
Breather cover to crankcase	11	
Crankcase harness guide left hand fixing	8	Use new fixing(s)
Crankcase harness guide right hand fixing	8	Use new fixing(s)
Sump cable tidy	3	

Transmission

Application	Torque (Nm)	Notes
Transmission housing to crankcase	20	Replace fixing(s) if removed
Input shaft bearing retainer	12	Replace fixing(s) if removed
Detent wheel to selector drum	12	Replace fixing(s) if removed
Detent arm bolt	12	Replace fixing(s) if removed
Selector drum bearing retaining screw	12	Replace fixing(s) if removed
Gear position sensor	5	Replace fixing(s) if removed
Gear pedal crank pinch bolt	9	
Gear change rod lock nuts	6	
Gear pedal pivot bolt	9	Replace fixing(s) if removed
Bevel box front cover bolts	25	Replace fixing(s) if removed
Bevel box side cover bolts	9	Replace fixing(s) if removed

Lubrication System

Application	Torque (Nm)	Notes
Sump to crankcase	12	
Sump drain plug to sump	25	Fit new sealing washer(s)
Oil pressure relief valve	15	Apply ThreeBond 1305 to threads
Low oil pressure warning light switch to crankcase	13	Fit new sealing washer(s)
Oil filter adapter	10	
Oil filter to adapter	10	
Oil pump to crankcase	8	Replace fixing(s) if removed
Oil pump drive sprocket to pump shaft	12	Replace fixing(s) if removed
Oil pump drive chain guide	6	Replace fixing(s) if removed
Oil feed pipe casting	8	Replace fixing(s) if removed
Heat exchanger to oil pump	10	Replace fixing(s) if removed
Oil level sensor to sump	9	
Breather drain tube	9	Replace fixing(s) if removed

Cooling System

Application	Torque (Nm)	Notes
Radiator upper mountings to frame	9	
Radiator lower mountings to brackets	9	
Radiator lower brackets to engine	18	
Radiator drain plug	1.5	
Hose clips	2	
Thermostat housing to head	9	
Crankcase coolant drain plug	8	
Water temperature sensor	18	
Radiator fan cowl fixings	8	
Expansion tank bracket to frame	9	
Expansion tank cover upper fixing	3	
Expansion tank cover lower fixing	7	

Fuel System, Exhaust System and Airbox

Application	Torque (Nm)	Notes
Fuel tank to frame	12	
Fuel cap to fuel tank	4	
Fuel pump mounting plate to fuel tank	9	
Throttle body transition piece to cylinder head	9	
Throttle body to transition piece clip	1.5	
Throttle balance blanking screw	5	
Fuel rail to throttle bodies	3.5	
Throttle position sensor	3.5	
Exhaust downpipe to cylinder head	19	Refer to section 10
Exhaust downpipe to frame	15	
Exhaust downpipe clamp to silencer	10	Torque every service
Silencer to frame	30	
Silencer front and rear end caps	5	
Oxygen sensor	25	
Secondary air injection solenoid	2	
Air filter housing	3	
Airbox bracket to throttle bodies	3	
Airbox to mounting bracket	5	
Air temperature sensor	4	
MAP sensor	2	
Barometric pressure sensor	6	
Fall detection switch	3	Replace fixing(s) if removed
Crankshaft position sensor	6	Replace fixing(s) if removed
ECM security bracket	7	
Immobiliser and TPMS module	2	
Evaporative cannister	8	
Gear position sensor	5	
Sump cable tidy	3	

Front Suspension

Application	Torque (Nm)	Notes
Upper yoke pinch bolt	25	
Lower yoke pinch bolt	25	
Fork top cap	30	
Headstock upper nut	90	
Damping cylinder bolt	22.5	Fit a new washer
Damping rod lock nut	15	
Handlebar clamp base to top yoke (M10 bolt)	35	
Handlebar upper clamp to lower clamp (M8 bolt)	26	
Handlebar grip, left hand side	3	
Handlebar end weights	5	
Headstock adjuster nut	40	Refer to section 12
Headstock lock nut	40	Refer to section 12
Throttle grip guide	3	
Switch cube screws, left hand side	2.5	
Switch cube screws, right hand side	2.5	
Cable guide, lower yoke	6	
Cable guide, upper yoke	7	
Clutch switch	2	
Front brake light switch	2	

Rear Suspension

Application	Torque (Nm)	Notes
Swinging arm to frame left hand pivot pin	170	Refer to section 13
Swinging arm to frame right hand pivot pin	45	Refer to section 13
Swinging arm to frame Pivot locking ring	110	Refer to section 13
Rear suspension unit upper mounting bolt	48	
Rear suspension unit lower mounting bolt to drop link	85	
Remote reservoir clamp	3	
Drag link to frame	85	
Drop links to swinging arm	85	
Torque arms to rear bevel box	48	
Torque arms to frame	48	
Hose guide on torque arm	5	

Rear Bevel Box and Drive Shaft

Application	Torque (Nm)	Notes
Filler/level plug	25	
Drain plug	25	
Left hand pivot pin	100	
Right hand pivot pin	48	
Locking ring - right hand pivot pin	100	
Back plate to bevel box housing	30	
Rubber boot clip	1.5	

Wheels

Application	Torque (Nm)	Notes
Front wheel spindle/axle bolt	65	
Front wheel spindle pinch bolts	22	
Rear wheel to the final drive unit	70	
Tyre valve - models without tyre pressure monitoring system	6	
Tyre valve - models with tyre pressure monitoring system	5	

Front Brakes

Application	Torque (Nm)	Notes
Front brake caliper to fork	50	
Front brake caliper bolts	24	
Front brake pad retaining pin	18	
Front brake caliper bleed screw	5	
Front brake hose to caliper	25	
Front brake master cylinder to handlebar	12	
Front brake hose to master cylinder	25	
Front brake hose to clamp on front fork	3	
Front brake disc to wheel	22	Replace fixing(s) if removed
Brake lever pivot bolt	1	
Brake lever pivot bolt lock nut	6	
Brake light switch	2	
Front caliper hose support to front fork	3	
Front brake light switch	2	

Rear Brakes

Application	Torque (Nm)	Notes
Rear brake caliper	40	Replace fixing(s) if removed
Rear brake pad retaining pin	17	
Rear brake caliper bleed screw	6	
Rear brake hose to caliper	25	
Rear brake master cylinder	18	
Rear brake master cylinder reservoir	6	
Rear brake hose to master cylinder	25	
Brake pedal pivot bolt	22	Replace fixing(s) if removed
Brake hose P-clip bolt	6	Replace fixing(s) if removed
Brake line cover	6	Replace fixing(s) if removed
Rear brake disc	22	Replace fixing(s) if removed
Lock nut, master cylinder push rod	18	

ABS System

Application	Torque (Nm)	Notes
ABS module to bracket	9	
ABS bracket to frame lower fixing	9	
ABS rear pulser ring	5	Replace fixing(s) if removed
ABS front and rear sensors	9	Replace fixing(s) if removed
ABS lines to modulator	25	
ABS hard line to front brake hose	17	
Rear brake line to crankcase tidy	8	Replace fixing(s) if removed

Frame, Footrests, Control Plates and Engine Mountings

Application	Torque (Nm)	Notes
Upper crankcase to frame	105	Refer to section 9
Lower crankcase to frame	105	Refer to section 9
Cylinder head rear mountings to frame	85	Refer to section 9
Cylinder head front left hand mounting initial torque	24	Refer to section 9
Cylinder head front left hand mounting to frame	115	Refer to section 9
Cylinder head front right hand mounting to frame	100	
Control plate to frame	18	
Heel guard to control plate	7	
Rear footrest hanger	27	
Engine to frame adjuster - except cylinder head adjuster	5	Refer to section 9
Engine to frame adjuster - cylinder head adjuster	5	Refer to section 9
Handguard to its bracket	8	
Handguard to spacer	8	
Side stand mounting bolts	70	
Side stand pivot	20	
Side stand pivot bolt nut	20	
Side stand switch	7	Replace fixing(s) if removed
Centre stand mounting bolts	50	
Centre stand spring upper mounting bracket	18	
Centre stand spring lower mounting bracket	30	
Centre stand bump stop	7	
Seat bridge to frame	30	
Seat lock barrel to frame	4	Apply ThreeBond 1360 to threads
Seat lock to frame	9	
Cockpit subframe	30	
Right hand heel guard	7	
Pannier rail	27	
Headstock brace to frame bolts	12	
Headstock brace to frame lock nuts	12	
Right hand engine protector bar to lower crankcase lock nut	105	
Engine bar to radiator mounting bracket	18	
Engine bar centre mounting	23	
Engine bars link bar	5	
Pannier third mount fixings	8	
Pannier link bar lock nuts	8	

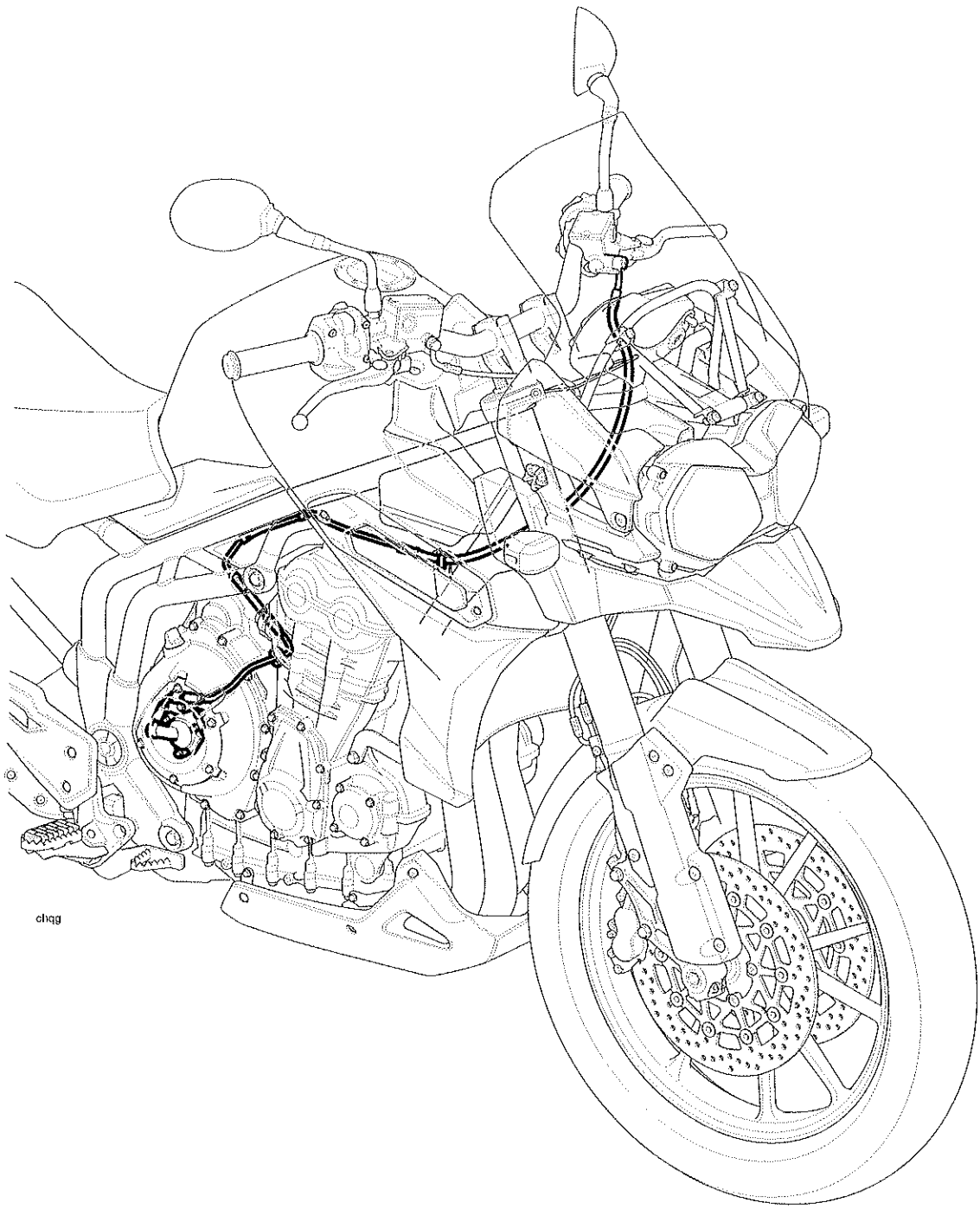
Electrical

Application	Torque (Nm)	Notes
Alternator to crankcase	28	
Alternator drive gear	54	Replace fixing(s) if removed
Alternator de-coupler to drive gear	3	
Alternator power lead connection	10	
Starter motor to crankcase	9	
Starter motor power lead connection	7	
Starter motor cover	4	
Starter motor solenoid lead connection	5	
Spark plug to cylinder head	12	
Horn	18	
Immobiliser ECU	2	
Ignition switch	12	Replace fixing(s) if removed
Instrument pack	2	
Headlight surround	3	
Rear light	4	
Front and rear indicator	5	
ECM Security bracket	7	Replace fixing(s) if removed
Fog light subframe to chin panel	5	
Fog light frame adjustment fixings	8	
Fog light shroud to sub frame	6	
Fog light to its shroud	3	
Fog light switch bracket	5	
Fog light switch to bracket	4	
Front brake light switch	2	
Clutch switch	2	
Front auxiliary socket	2	

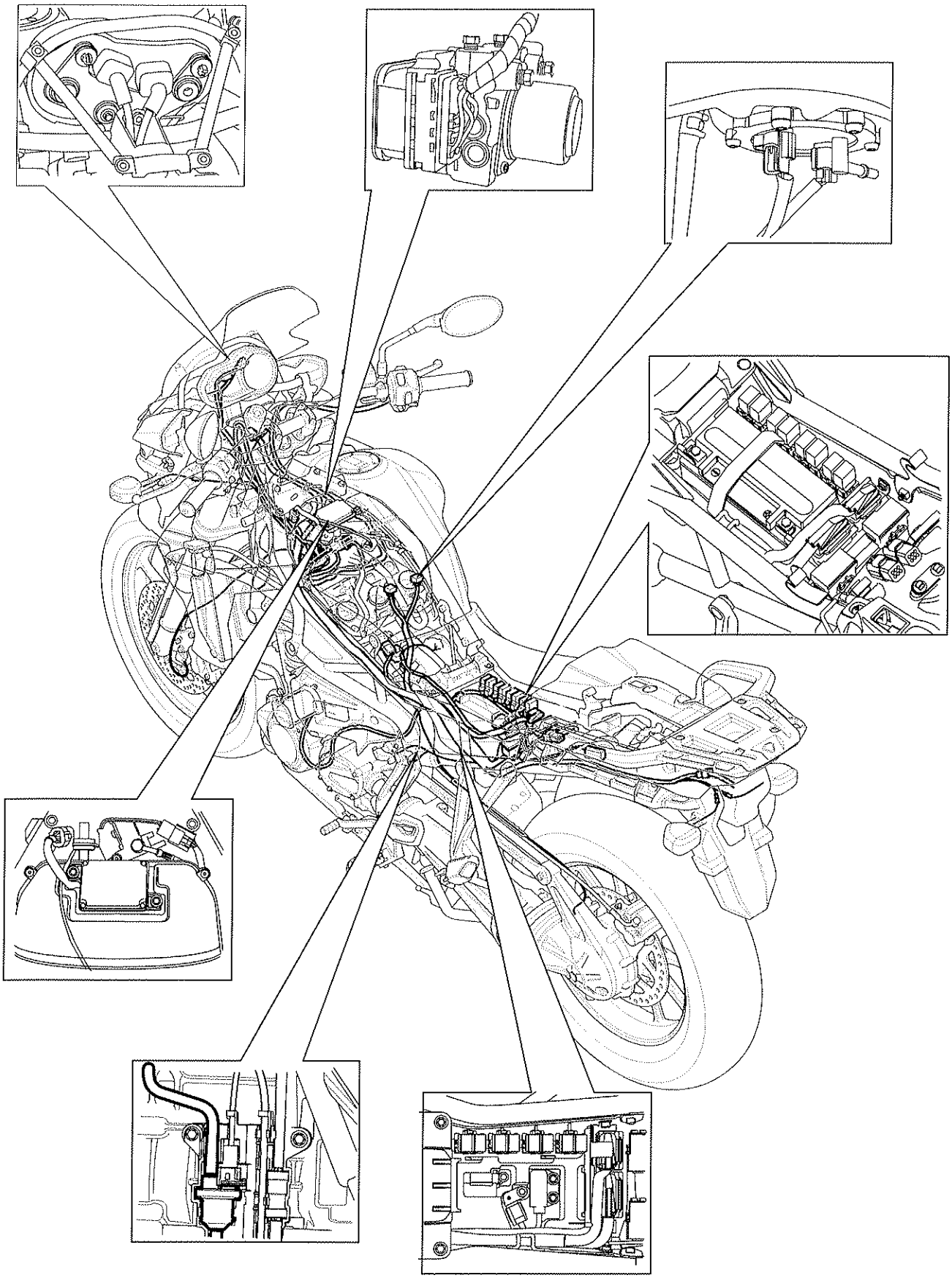
Bodywork

Application	Torque (Nm)	Notes
Mirror	25	
Rear panel to frame	7	
Front fork protectors	5	
Front mudguard to front forks	7	
Under seat tray	7	
Rear mudguard upper fixings	7	Replace fixing(s) if removed
Rear mudguard lower fixings	5	
Fuel tank front panel fixings	3	
Side fairings to fuel tank	3	
Radiator infill panel	3	
Fuel tank infill panels	3	
Badge housing to side fairing	3	Replace fixing(s) if removed
Windsceen to its frame	4	
Windscreen frame to its support	4	
Windscreen support	15	
Cockpit infill panel	3	
Cockpit side panel front fixing	5	
Handguard to spacer	8	
Handguard to bracket	8	
Upper mudguard to chin panel	7	
Upper mudguard infill panels	4	
Chin panel to headlight support	5	
Cockpit subframe	30	
Headlight to cockpit subframe	4	
Headlight support to cockpit frame	5	
Upper mudguard mounting bracket	5	
Seat infill panel	3	
Sump guard to its mounting brackets	6	
Sump guard brackets to engine	6	
Pannier rail	27	
Luggage rack	27	
Luggage rack cover	7	
Mirror boss	25	
Mirror lock nut	25	

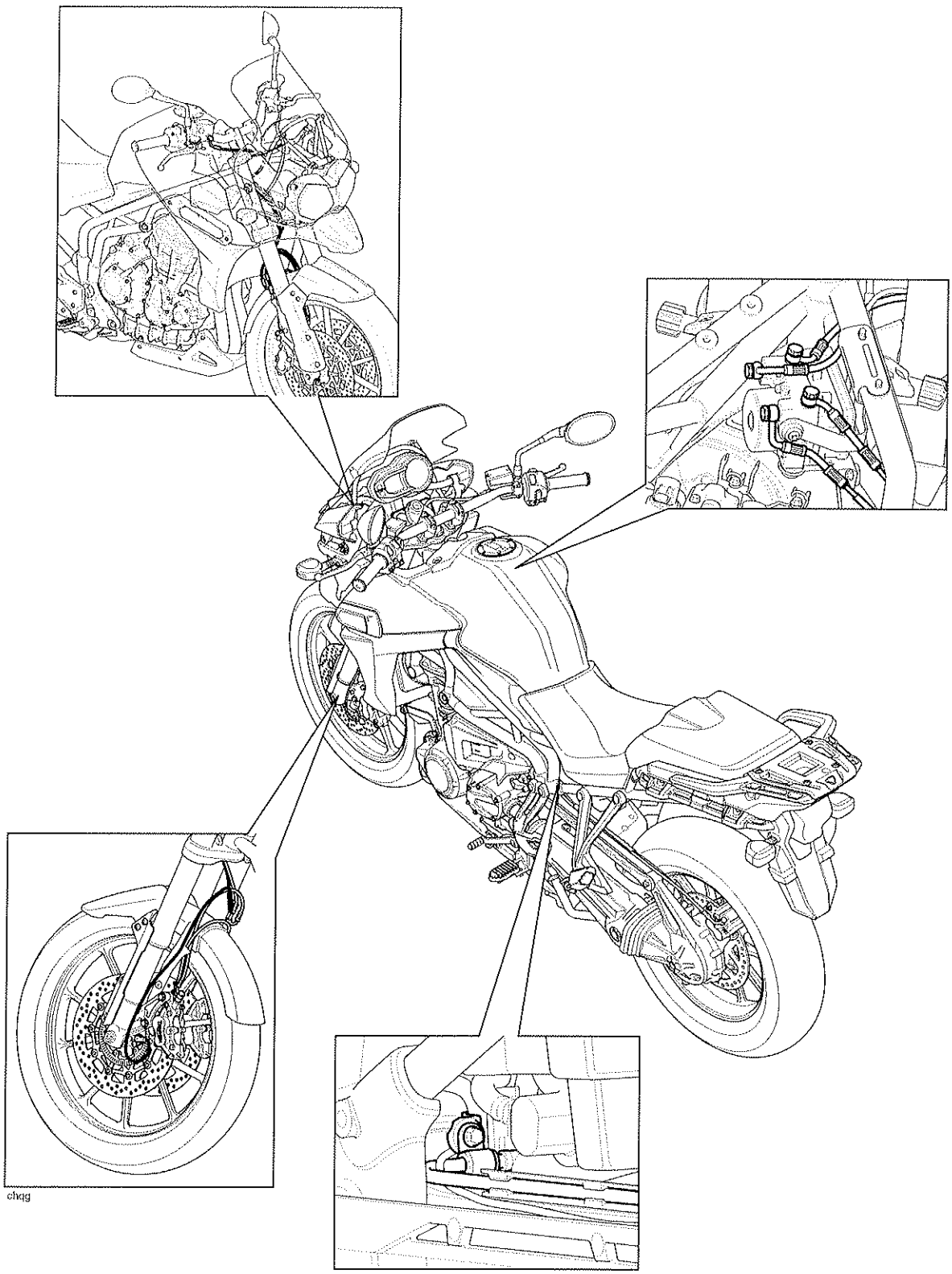
Clutch Hose Routing



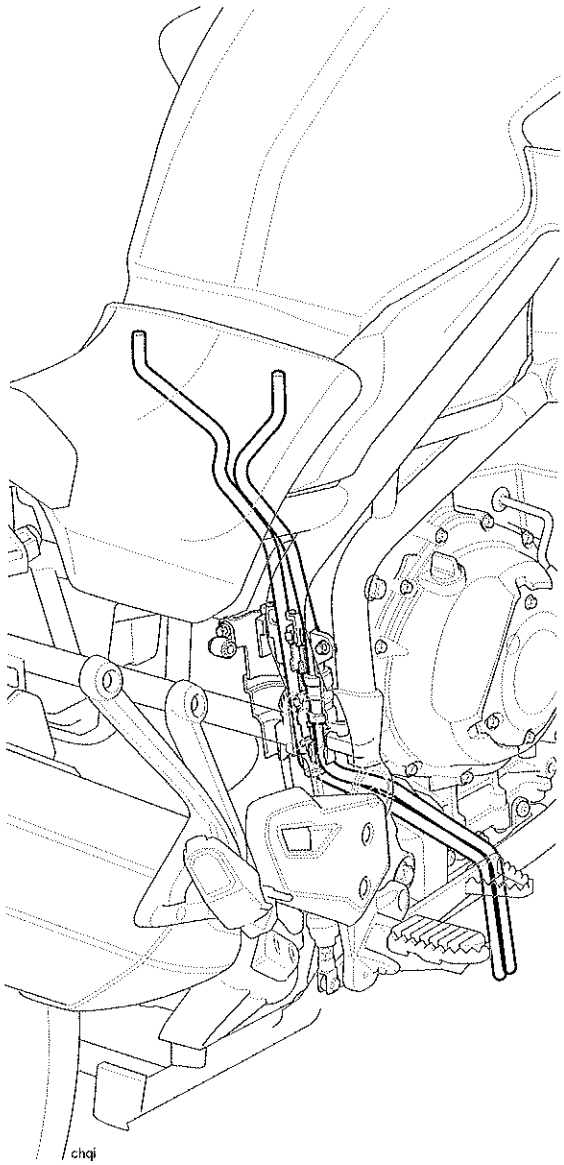
Main Wiring Harness Routing



ABS and Brake Hose Routing



Fuel Tank Breather Hose Routing



2 Scheduled Maintenance

Table of Contents

Introduction 2.2
Scheduled Maintenance Chart 2.3

Introduction

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

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

Warning

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

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

Warning

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

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

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

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

Warning

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

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

Scheduled Maintenance Chart

Odometer Reading in Miles (Kms) or time period, whichever comes first						
Operation Description	Every	First Service 500 (800) 1 month	Annual Service year	Mileage based service 10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Engine- check for leaks	Day	•	•	•	•	•
Engine oil - renew	-	•	•	•	•	•
Engine and oil filter - renew	-	•	•	•	•	•
Valve clearances - check/adjust	-			•		
Camshaft timing - adjust - **only first 10,000 mile (16,000 km) service**	-			•		
Air cleaner - renew	-			•	•	•
Autoscan - carry out a full Autoscan using the Triumph Diagnostic tool (print a customer copy)	-	•	•	•	•	•
ABS and immobiliser ECMs - check for stored DTCs	-	•	•	•	•	•
Spark plugs - check	-			•		
Spark plugs - renew	-				•	•
Throttle bodies - balance	-			•	•	•
Throttle body plate (butterfly) - check/clean	-			•	•	•
Cooling system - check for leaks	Day	•	•	•	•	•
Coolant level - check/adjust	Day	•	•	•	•	•
Coolant - renew	Every 3 years regardless of mileage					
Fuel system - check for leaks, chafing etc.	Day	•	•	•	•	•
Lights, instruments and electrical systems - check	Day	•	•	•	•	•
Steering - check for free operation	Day	•	•	•	•	•
Headstock bearings - check/adjust	-	•	•	•	•	•
Headstock bearings - lubricate	-				•	•
Forks - check for leaks/smooth operation	Day	•	•	•	•	•
Fork oil - renew	-					•
Brake fluid levels - check	Day	•	•	•	•	•
Brake fluid - renew	Every 2 years regardless of mileage					
Brake pad - check wear levels	Day	•	•	•	•	•
Brake master cylinders - check for fluid leaks	Day	•	•	•	•	•
Brake calipers - check for fluid leaks and seized pistons	Day	•	•	•	•	•
Rear suspension linkage - check/lubricate	-				•	•
Fasteners - inspect visually for security	Day	•	•	•	•	•

Odometer Reading in Miles (Kms) or time period, whichever comes first						
Operation Description	Every	First Service 500 (800) 1 month	Annual Service year	Mileage based service 10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Wheels - inspect for damage	Day	•	•	•	•	•
Wheel bearings - check for wear/smooth operation	-	•	•	•	•	•
Tyre wear/tyre damage - check	Day	•	•	•	•	•
Tyre pressures - check/adjust	Day	•	•	•	•	•
Clutch - check operation	Day	•	•	•	•	•
Clutch master cylinder - check for leaks	-	•	•	•	•	•
Clutch fluid levels - check	Day	•	•	•	•	•
Clutch fluid - renew	Every 2 years regardless of mileage					
Final drive - check for oil leaks	Day	•	•	•	•	•
Final drive oil - renew - **only first service**	-	•				
Stands - check operation	Day	•	•	•	•	•
Exhaust clamp bolts - check/adjust	-	•	•	•	•	•
Accessory rack sliding carriage - check for correct operation‡	-		•	•	•	•
Accessory pannier link bar - check for correct operation and adjustment‡	-	•	•	•	•	•
Secondary air injection system - check					•	•
Fuel and evaporative loss* hoses - renew	Every 4 years regardless of mileage					

*Evaporative system fitted to models for certain markets only.

‡Only if fitted.

3 Cylinder Head

Table of Contents

Exploded View - Cylinder Head and Valves 3.2
Exploded View - Camshaft Cover 3.3
Exploded View - Camshaft, Camshaft Drive and Valves 3.4
Cylinder Head Description 3.5
Camshaft Cover 3.5
- Removal 3.5
- Installation 3.7

Camshaft Drive Chain Tensioner 3.9
- Removal 3.9
- Inspection 3.10
- Installation 3.10

Camshafts and Camshaft Timing 3.12
- Removal 3.12
- Camshaft and Sprocket Identification 3.14
- Camshaft and Bearing Cap Inspection 3.14
- Camshaft Installation and Timing 3.15

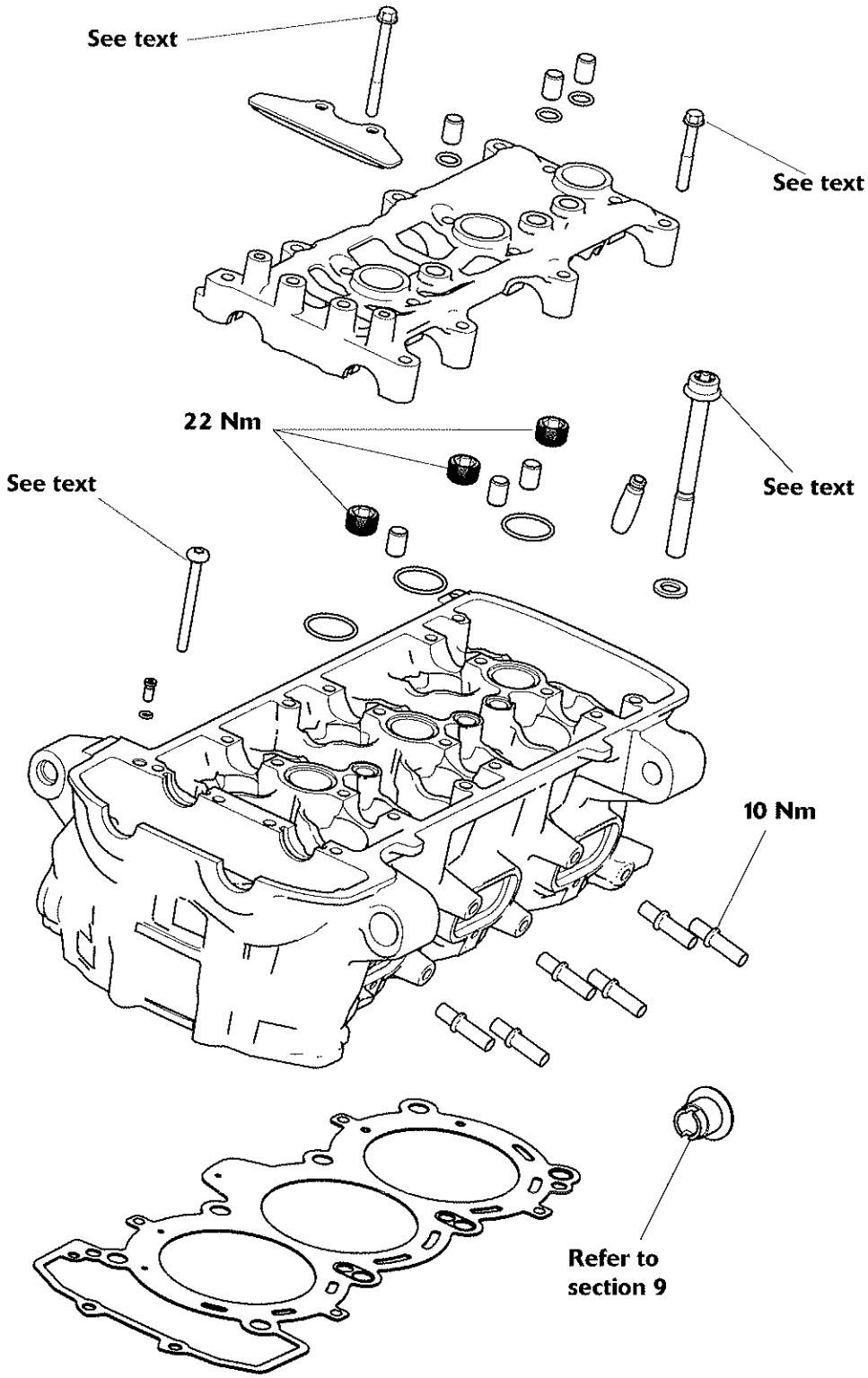
Valve Clearances 3.18
- Valve Clearance Measurement 3.18
- Valve Clearance Adjustment 3.19

Camshaft Drive Chain, Tensioner Blade and Rubbing Strip 3.20
- Removal 3.20
- Inspection - Camshaft Drive Chain 3.20
- Inspection - Camshaft Drive Chain Tensioner and Rubbing Blade 3.21
- Disassembly - Camshaft Drive Chain Tensioner Blade 3.21
- Assembly 3.22
- Installation 3.22

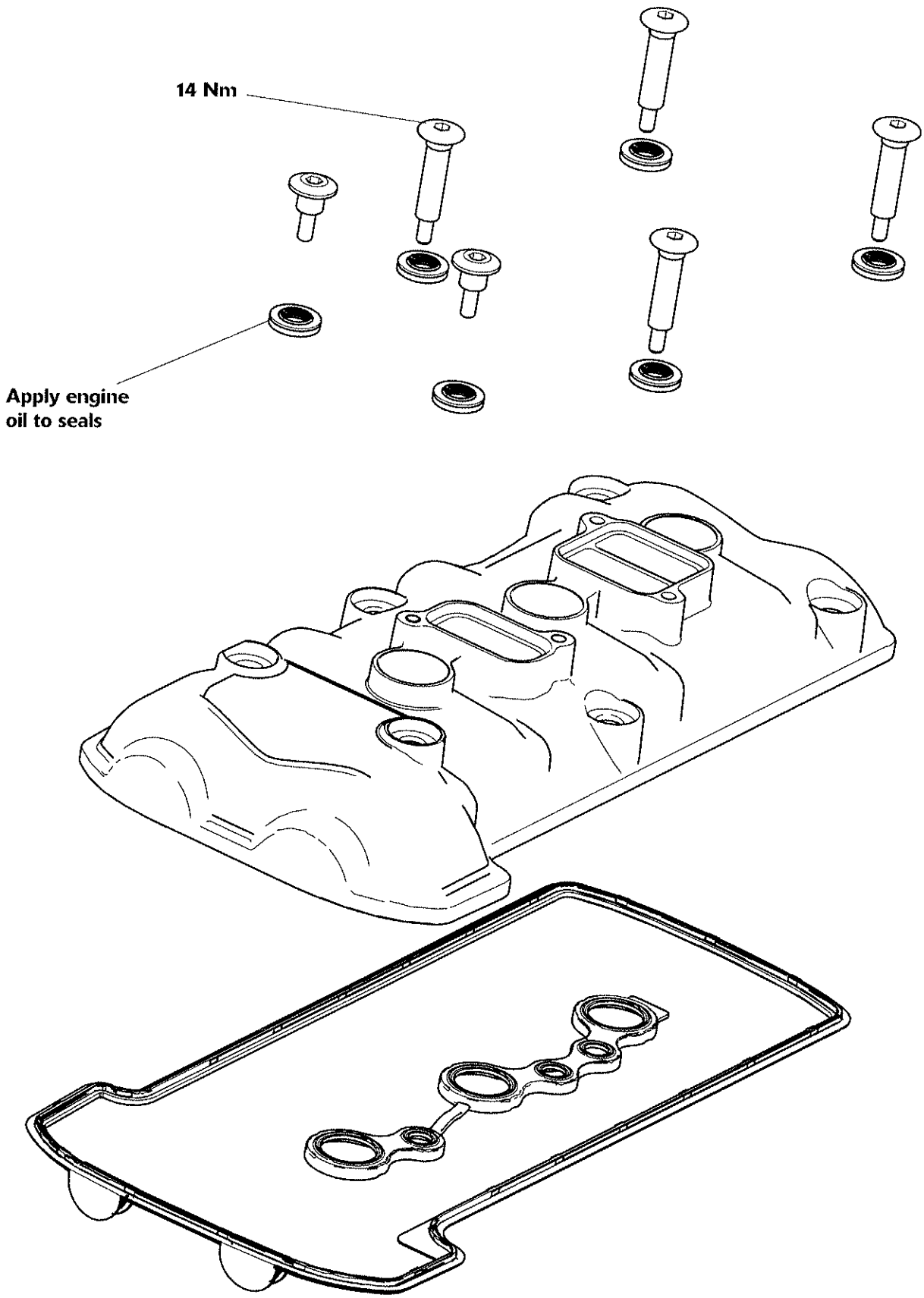
Cylinder Head 3.23
- Removal 3.23
- Inspection 3.23
- Installation 3.24

Valves and Valve Stem Seals 3.25
- Removal from the Cylinder Head 3.25
- Installation 3.26
- Valve to Valve Guide Clearance 3.26
- Valve Face Inspection 3.26

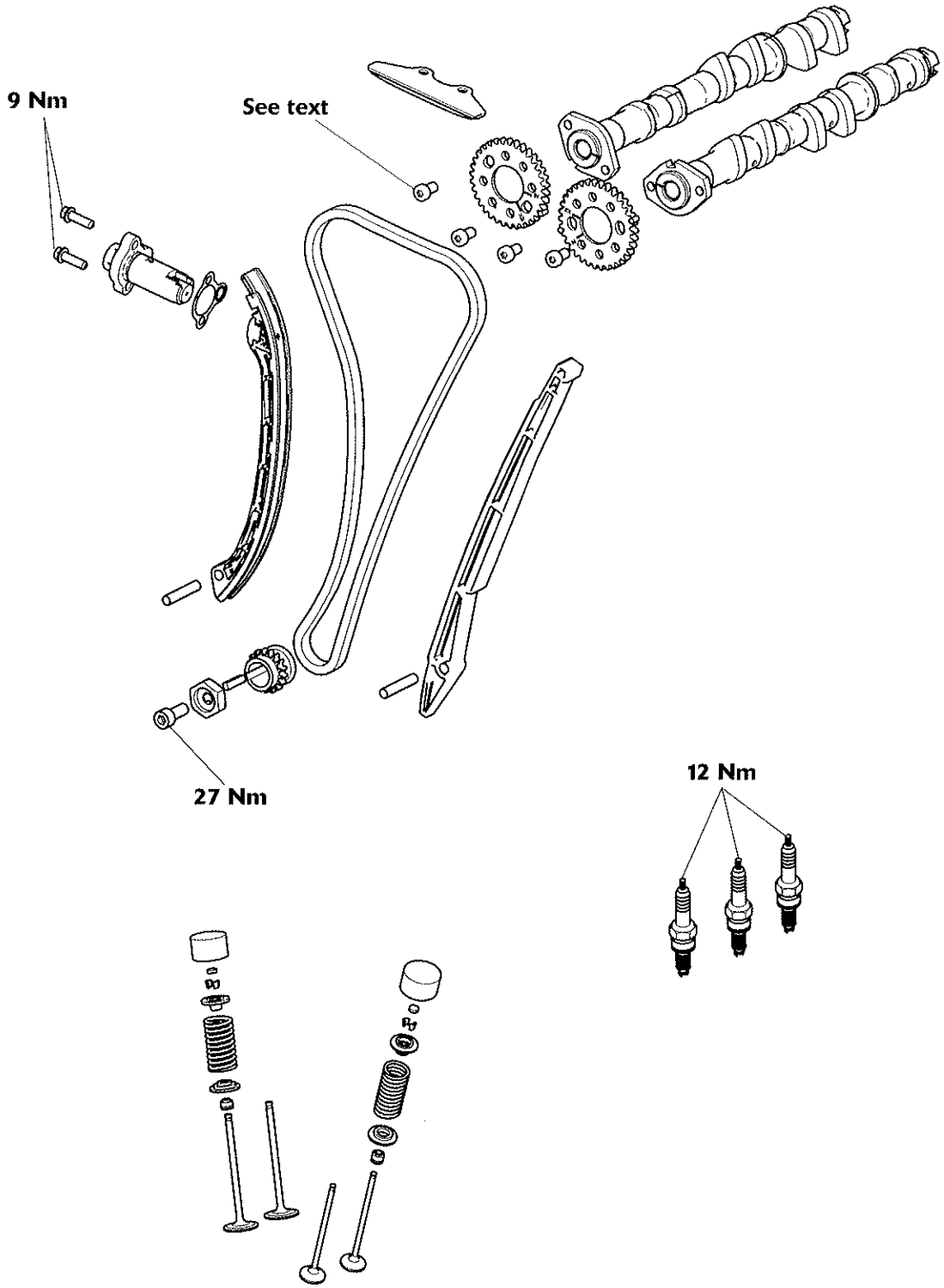
Exploded View - Cylinder Head and Valves



Exploded View - Camshaft Cover



Exploded View - Camshaft, Camshaft Drive and Valves



Cylinder Head Description

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

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

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

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

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

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

Single 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 seat and valve guides to the head, these parts cannot be replaced.

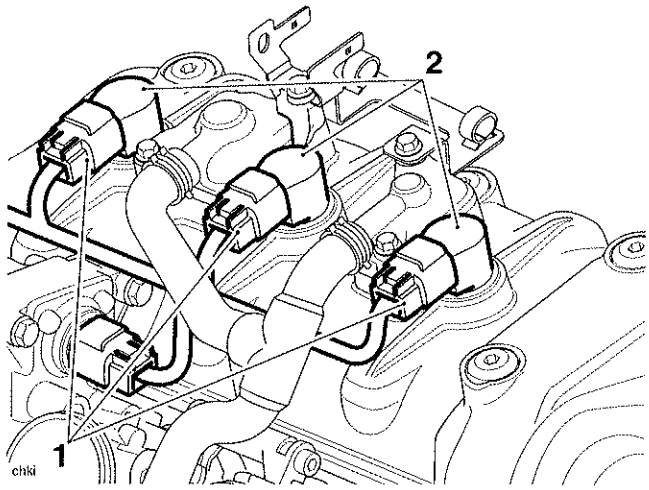
⚠ Caution

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

Camshaft Cover

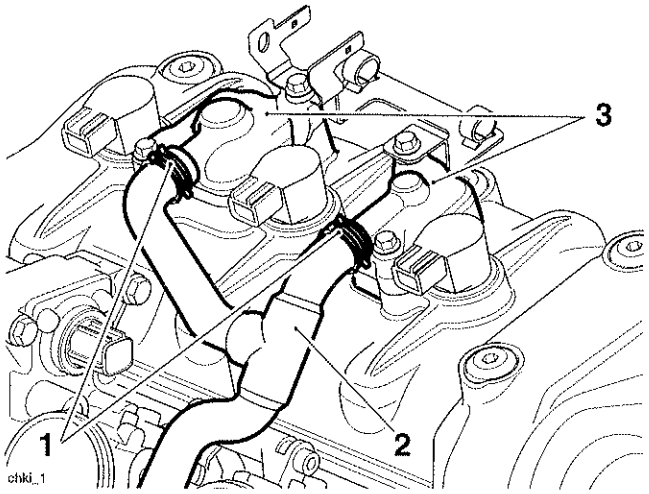
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the airbox (see page *10-126*).
5. Drain the coolant (see page *11-6*).
6. Disconnect the right hand coolant hose at the radiator and position aside.
7. Disconnect the electrical connections to the ignition coils and remove the coils.



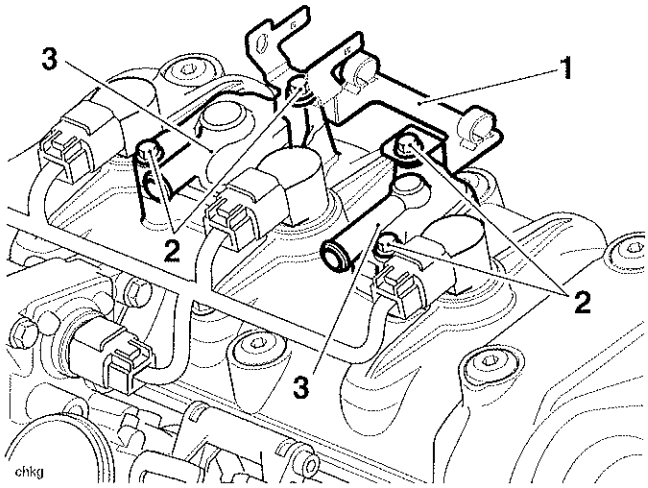
1. Electrical connectors
2. Ignition coils

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



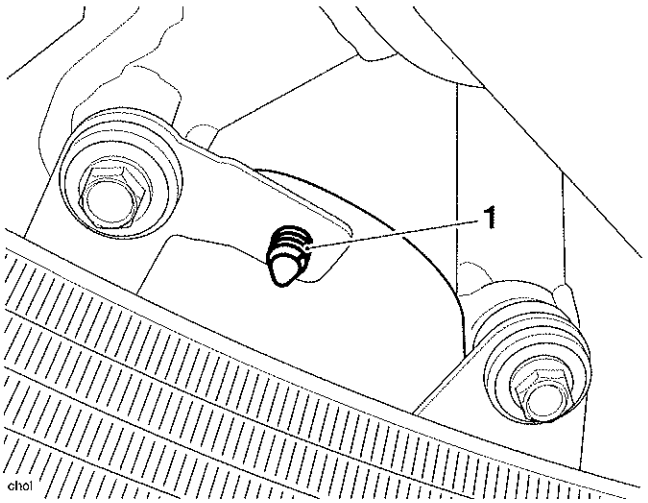
1. Spring-close clip
2. Secondary air injection hose
3. Reed valve assemblies

9. Note the position of the connector bracket and release the fixings securing the valve covers to the camshaft cover.



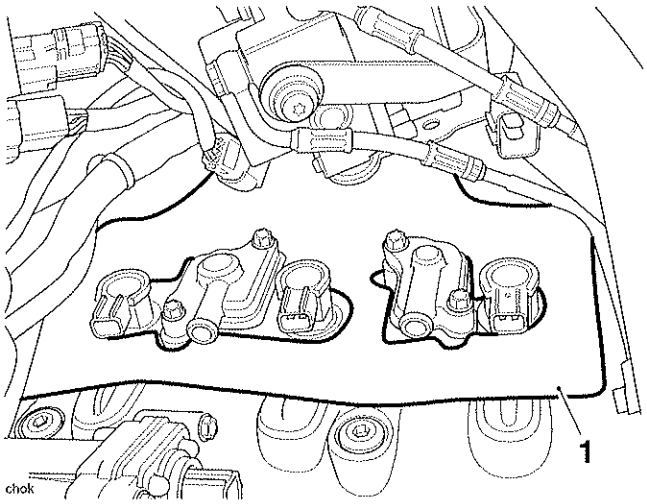
1. **Connector bracket**
2. **Fixings**
3. **Reed valve assemblies**

10. Ease the valve covers from the valves.
11. Remove the air deflector fir-tree clip.



1. **Fir-tree clip**

12. Noting its position, remove the air deflector towards the rear of the motorcycle. Discard the fir-tree clip.

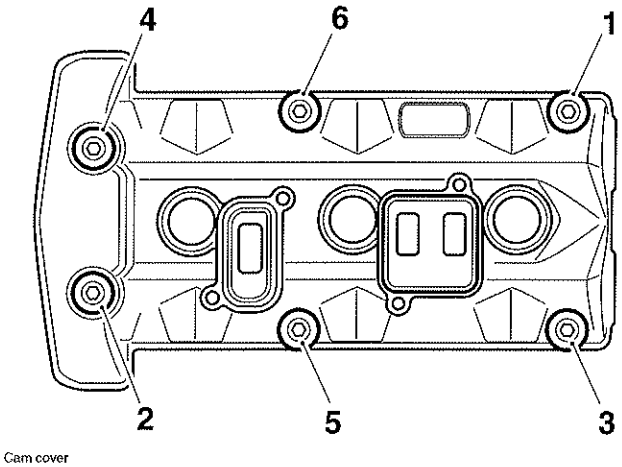


1. **Air deflector**

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

Note:

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



Camshaft Cover Bolt Release Sequence

14. Carefully manoeuvre the camshaft cover towards the front of the motorcycle, clear of the throttle bodies. Then manoeuvre the cover to the right to remove it from the motorcycle.

⚠ Caution

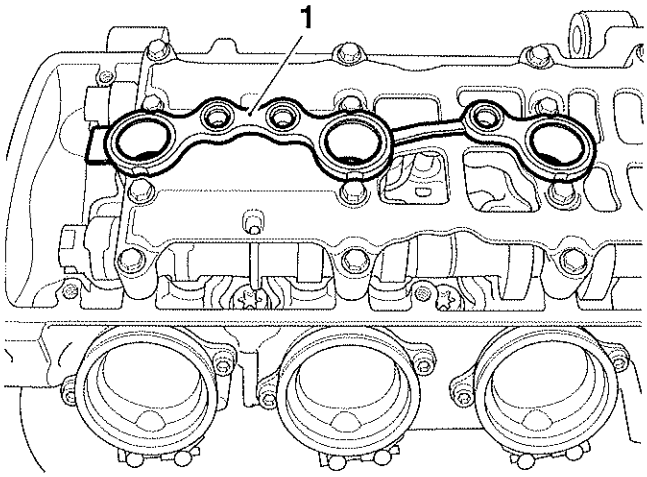
Never use a lever to remove the camshaft cover from the cylinder head.

Using a lever will cause damage to the head and camshaft cover which could lead to an oil leak.

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

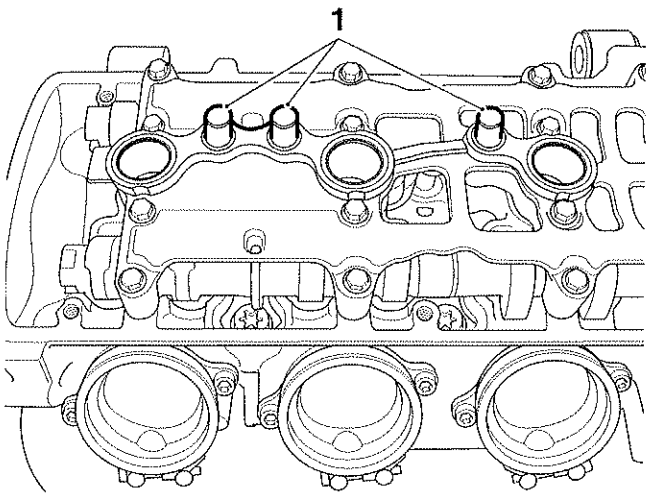
Installation

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



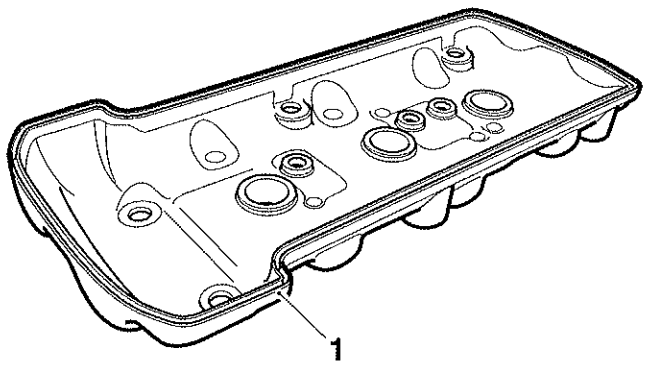
1. Plug tower seals

2. Refit the dowels to the cylinder head.



1. Dowels

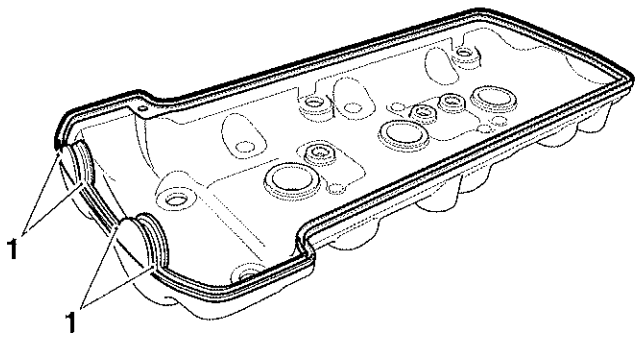
3. Fit a new camshaft cover seal to the groove in the camshaft cover.



chdk

1. Camshaft cover seal groove

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

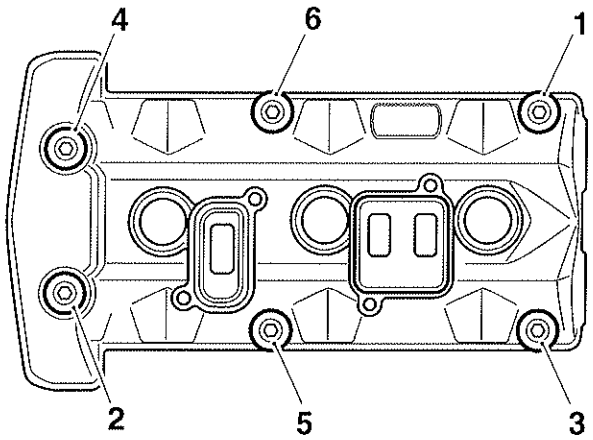


chdk

1. Silicone sealer areas

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

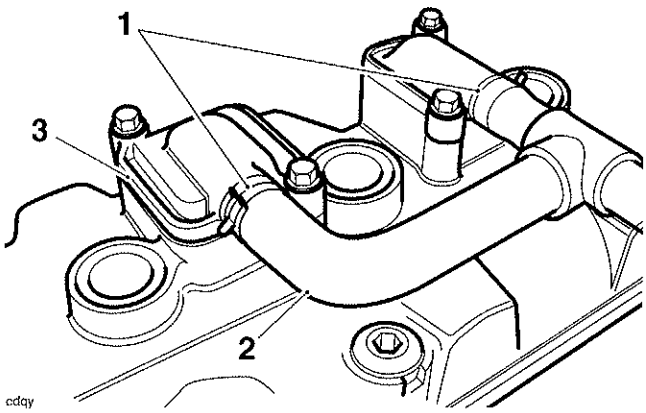
8. Finally, tighten the camshaft cover bolts to **14 Nm** in the sequence shown below.



Cam cover

Camshaft Cover Bolts Tightening Sequence

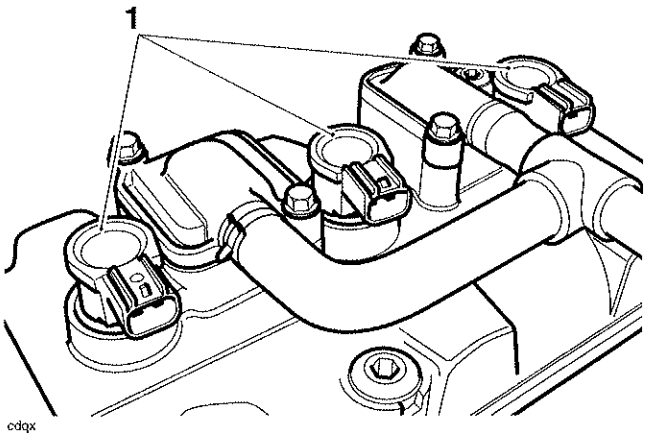
9. Refit the air deflector, installing a new fir-tree clip as you do so.
10. Refit the secondary air injection hose to the reed valves.



cdqy

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

11. Fit the ignition coils and reconnect.



cdqx

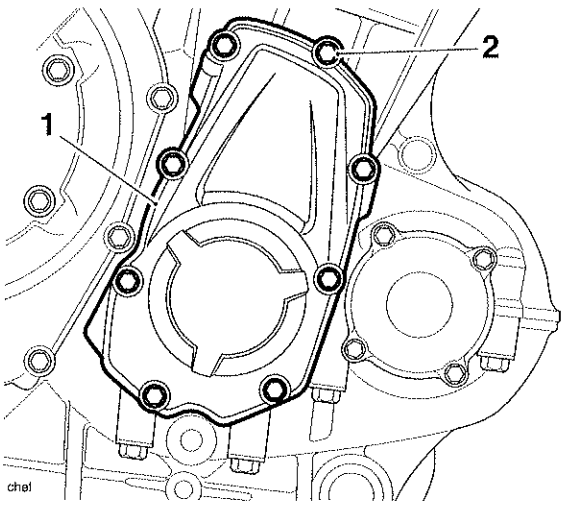
1. **Coils**

12. Reconnect the right hand coolant hose, refit the hose clip and tighten to **2 Nm**.
13. Refill the cooling system (see page *11-7*).
14. Refit the airbox (see page *10-127*).
15. Refit the fuel tank (see page *10-119*).
16. Reconnect the battery positive (red) lead first.
17. Refit the seats (see page *17-16*).

Camshaft Drive Chain Tensioner

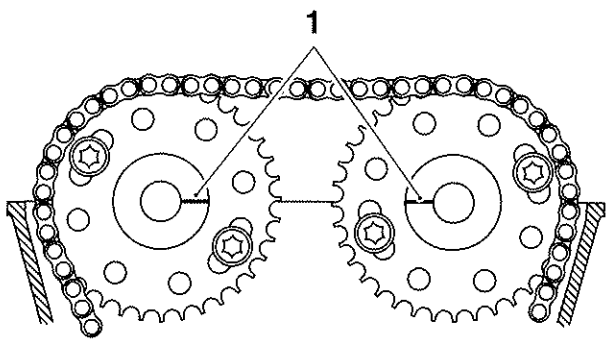
Removal

1. Remove the camshaft cover (see page 3-5).
2. Remove the right hand crankshaft cover, noting the position of the patch-locked bolt. Discard the patch-locked bolt.



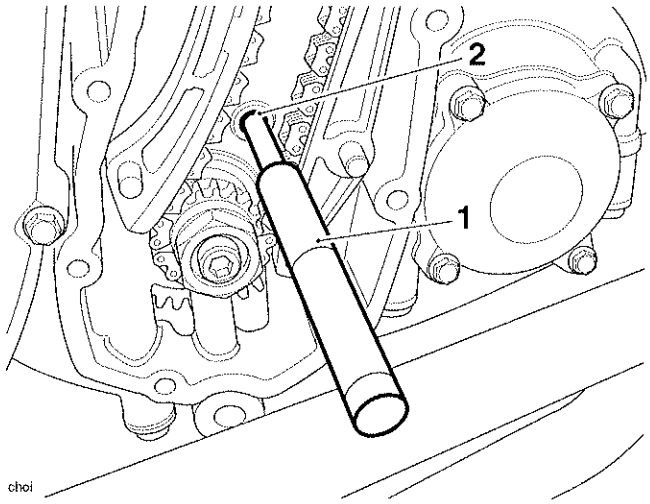
1. Right hand crankshaft cover
2. Patch-locked bolt

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



1. Alignment marks

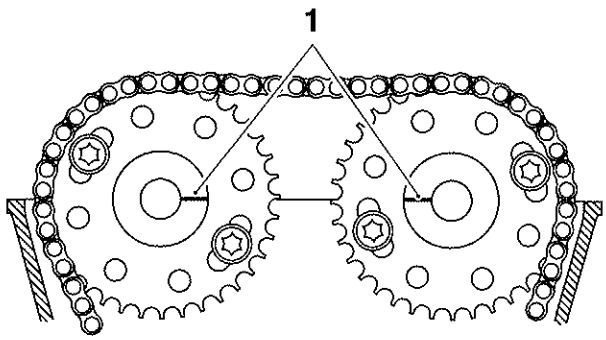
4. Insert the Crankshaft Timing Pin T3880601 in to the timing hole in the crankcase.
5. Turn the engine clockwise until the pin can be inserted fully in to the crankshaft.



1. Crankshaft Timing Pin T3880601
2. Timing hole in crankcase

Note:

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



1. Alignment marks

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

Warning

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

Note:

- **Note the orientation of the tensioner before removal.**

7. Evenly release the camshaft drive chain tensioner mounting bolts until the plunger spring tension has been released.
8. Remove the camshaft drive chain tensioner and discard the O-ring and gasket.

Inspection

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

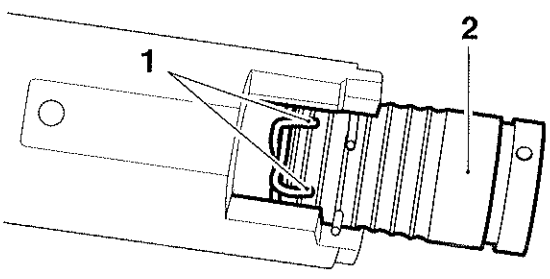
Installation

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

Note:

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

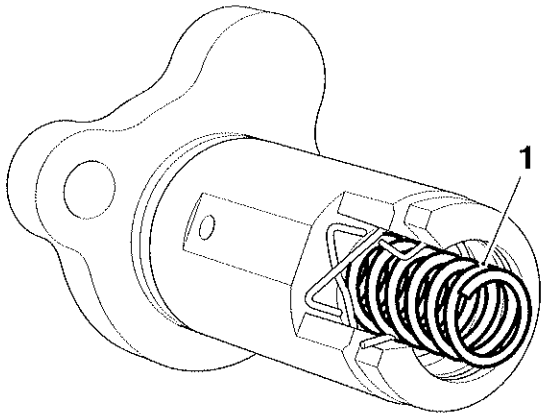
a) Hold the resister ring ends together and pull out the plunger.



clei_2

1. Resister ring ends
2. Plunger

b) Remove the spring.

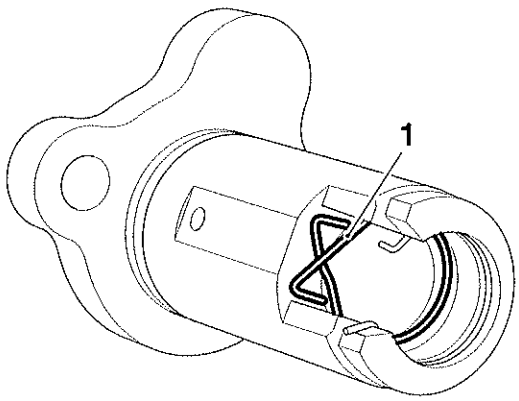


clhp

1. Spring

c) While holding the resister ring in place, pour out the engine oil into a suitable container.

d) Ensure the resister ring is correctly located as shown in the illustration below.

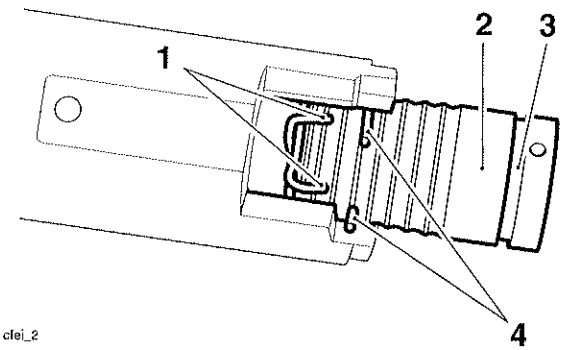


clho

1. Resister ring

e) Refit the spring.

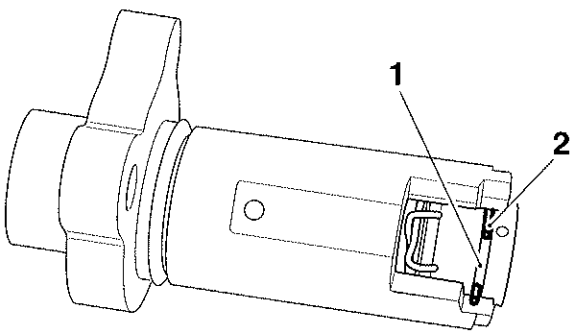
f) Hold the resister ends together and push the plunger through the resister ring until the groove for the snap ring aligns with the snap ring.



cfei_2

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

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



cfej

1. **Groove for snap ring**
2. **Snap ring**

h) Fit a new O-ring and gasket to the camshaft drive chain tensioner.

i) Fit the camshaft drive chain tensioner to the cylinder head as noted for removal. Tighten the bolts to **9 Nm**.

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

k) Remove the Crankshaft Timing Pin T3880601.

l) To release the hydraulic tensioner, rotate the crankshaft 90° (¼ turn) anti-clockwise using the bolt fitted to the end of the crankshaft. Then rotate the crankshaft clockwise until the Crankshaft Timing Pin T3880601 can be inserted into the crankshaft.

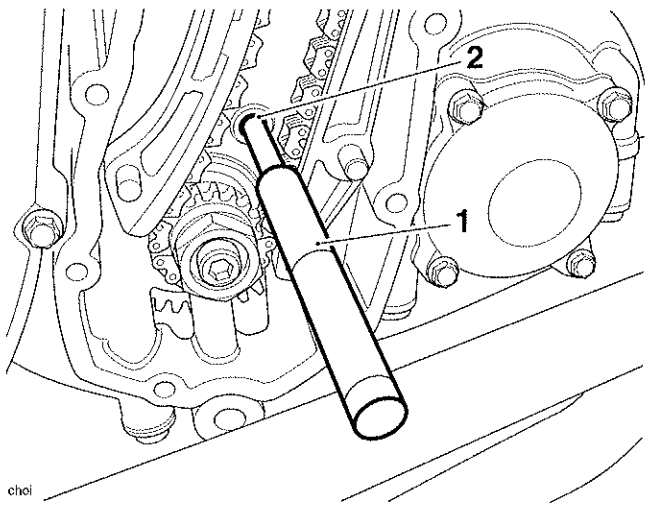
m) Check that there is tension in the camshaft drive chain and the timing marks on the camshaft bosses are correctly aligned.

Note:

- **After fitting to the engine, the hydraulic tensioner will be empty of engine oil. After starting the engine, the camshaft drive chain and tensioner blade will be noisy until full oil pressure is felt at the tensioner plunger. This could take up to 5 seconds.**

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

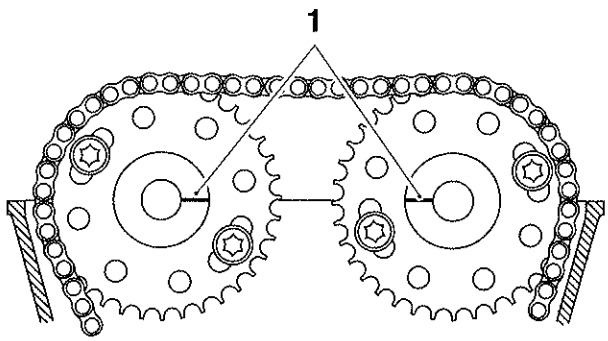
o) Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC. Ensure that the Crankshaft Timing Pin T3880601 can be inserted fully into the timing hole in the crankcase and crankshaft.



choi

1. **Crankshaft Timing Pin T3880601**
2. **Timing hole in crankcase**

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



gaaa_2

Camshaft Boss to Cylinder Head Alignment Marks

1. Alignment marks

q) Re-check the tensioner plunger location against the tensioner blade.

r) Remove the Crankshaft Timing Pin T3880601.

s) Refit the camshaft cover (see page *3-7*).

t) Refit the crankshaft cover (see page *5-22*).

Camshafts and Camshaft Timing

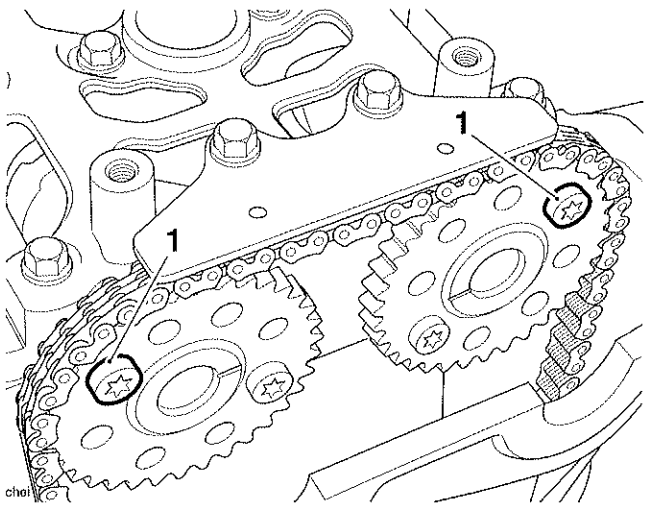
Removal

1. Remove the camshaft cover (see page *3-5*).
2. Remove the crankshaft cover (see page *5-22*).
3. Remove the spark plugs to reduce compression resistance when turning the engine.
4. Rotate the engine using the 24 mm hexagon on the end of the crankshaft so any two camshaft sprocket fixings are accessible.

Note:

- **The camshaft sprocket fixings need only be loosened sufficiently to allow the sprockets to rotate on the camshafts.**
- **The camshaft sprocket fixings are patch locked and must never be re-used if loosened or removed; however new fixings should only be installed during final tightening after the timing procedure has been completed.**
- **If the sprockets are to be removed from the camshafts, temporarily refit the sprockets for timing adjustment using the old fixings, and only install new fixings during final tightening.**

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



chai

1. Fixings

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

⚠ Caution

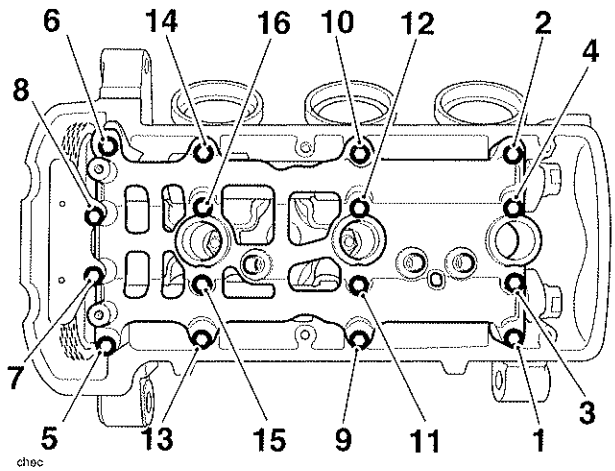
Do not rotate the engine further once the four camshaft sprocket bolts have been loosened. Rotation of the engine with the four sprocket bolts loose will result in valve to piston contact and serious engine damage.

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

Note:

- **Note the orientation of the tensioner before removal.**

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



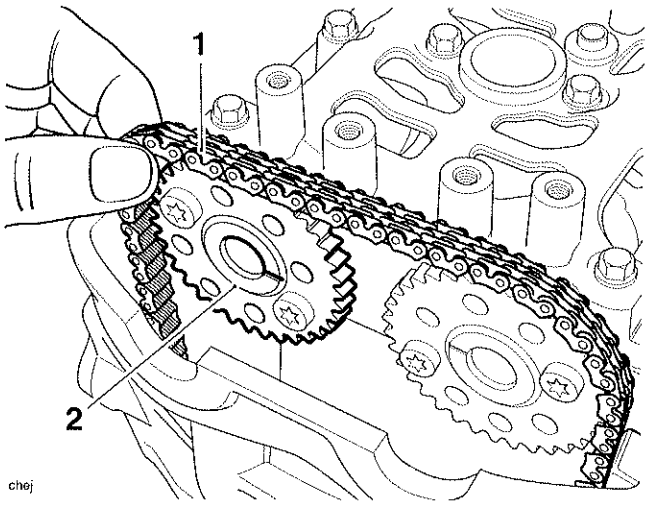
Camshaft Ladder Bolt Release Sequence

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

Note:

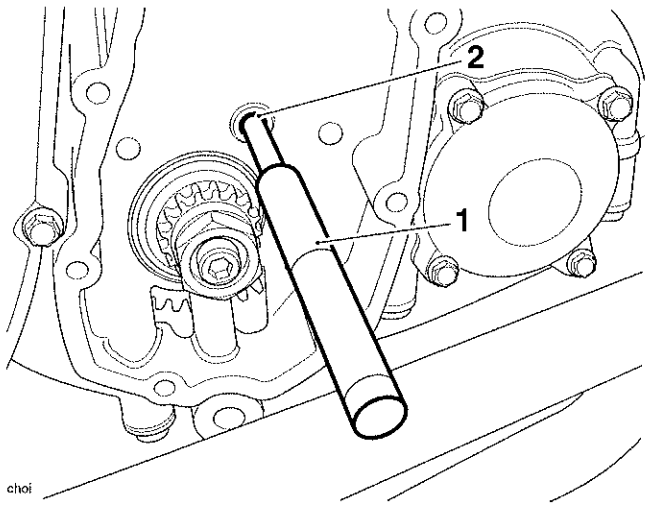
- **Each camshaft and sprocket is removed as an assembly.**

13. Lift the camshaft drive chain from the inlet camshaft sprocket and remove the inlet camshaft.
14. Lift the camshaft drive chain from the exhaust camshaft sprocket and remove the exhaust camshaft.



1. Camshaft drive chain
2. Inlet camshaft

15. Remove the camshaft drive chain and if necessary the tensioner blade and rubbing strip (see page *3-20*).
16. Rotate the crankshaft and insert the Crankshaft Timing Pin T3880601. Ensure the crankshaft can no longer rotate.



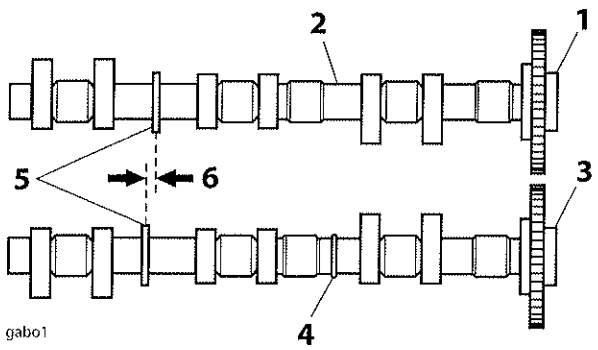
1. Crankshaft Timing Pin T3880601
2. Timing hole in crankcase

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

Camshaft and Sprocket Identification

Note:

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



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

⚠ Caution

Never fit a camshaft sprocket to a camshaft using incorrectly identified bolt holes. Severe engine damage will result from incorrect attachment.

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

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

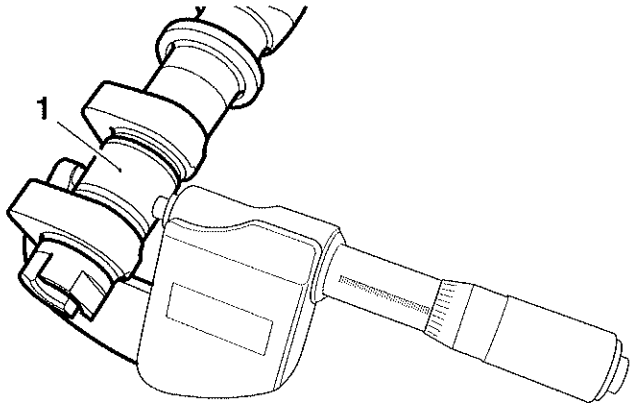
Accurate camshaft timing can only be obtained using the correct timing method and service tools as described on page *3-15* in this chapter.

Camshaft and Bearing Cap Inspection

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

Camshaft Journal Diameters

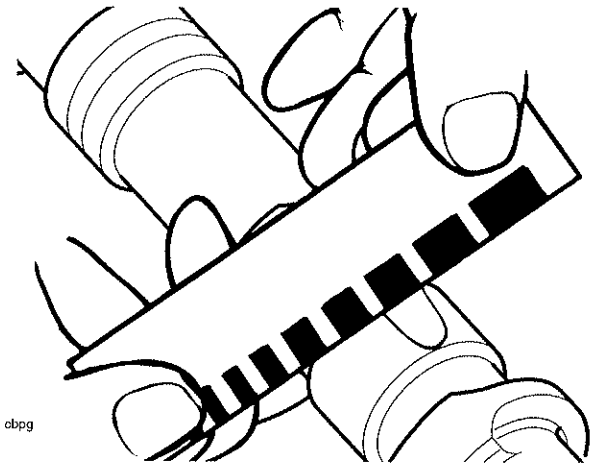
Standard:	23.93 - 23.96 mm



1. **Camshaft journal**

3. Examine all camshaft and camshaft bearing caps for excessive wear and damage.
4. Check the journal-to-head clearances, using 'Plastigauge' (Triumph part number 3880150-T0301) as follows:
   - 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 Plastigauge to fit across the camshaft journal. Fit the Plastigauge to the camshaft journal using the grease to hold the strip in place.
   - Ensuring that the camshaft sprocket alignment marking is located as for removal, refit the camshaft cap ladder then evenly and progressively tighten the ladder bolts to **10 Nm** in the correct sequence (see camshaft installation).

- Release the bolts and remove the ladder. Using the gauge provided with the Plastigauge kit, measure the width of the now compressed Plastigauge.



Measuring the Compressed Plastigauge

Note:

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

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

Camshaft Journal Clearance, Standard

Standard:	0.040 - 0.091 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 Plastigauge. Assemble the camshafts (see page *3-15*).

Note:

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

⚠ Caution

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

Camshaft Installation and Timing

⚠ Caution

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

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

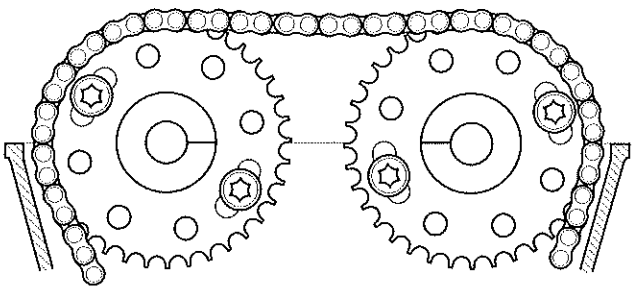
1. Check that the Crankshaft Timing Pin T3880601 is installed. Ensure the crankshaft cannot rotate.
2. Thoroughly clean the camshafts and journals. Inspect the ends of the camshafts for correct fitment of the sealing plugs. Lubricate the camshafts with clean engine oil before fitting to the cylinder head.
3. If removed, refit the camshaft sprockets noting their orientation, and secure using the original bolts. DO NOT tighten the fixings at this stage, the sprockets must be free to rotate.
4. Refit the camshaft drive chain and if removed the tensioner blade and rubbing strip (see page *3-20*).

Note:

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

5. Refit the exhaust camshaft to the cylinder head, hooking the camshaft drive chain over the sprocket as you do so.
6. Ensure there is no slack between the crankshaft and exhaust sprocket when the sprocket fixings are centrally located within the slotted holes.
7. Refit the inlet camshaft to the cylinder head, hooking the chain over the sprocket as you do so.
8. Ensure the fixings on the inlet sprocket are also centrally located within the slotted holes when there is no slack between the exhaust and inlet sprockets.
9. Check that the chain is correctly located around the crankshaft, and both camshaft sprockets.

10. Rotate the camshafts until the alignment marks on the end of the camshaft journals are pointing towards one another.

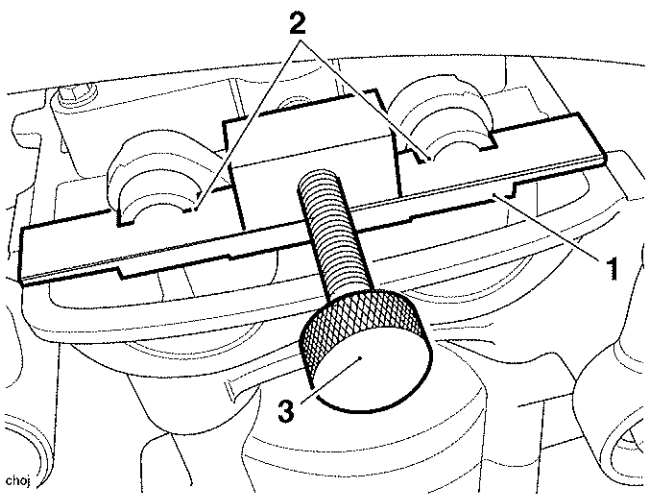


Camshaft Boss to Cylinder Head Alignment Marks

⚠ Caution

The Camshaft Timing Plate T3880600 must be located centrally between the camshafts. Incorrect positioning of the tool may prevent the camshaft ladder locating correctly to the cylinder head during fixing tightening, resulting in incorrect valve timing being set. Severe engine damage will result from incorrect valve timing adjustment.

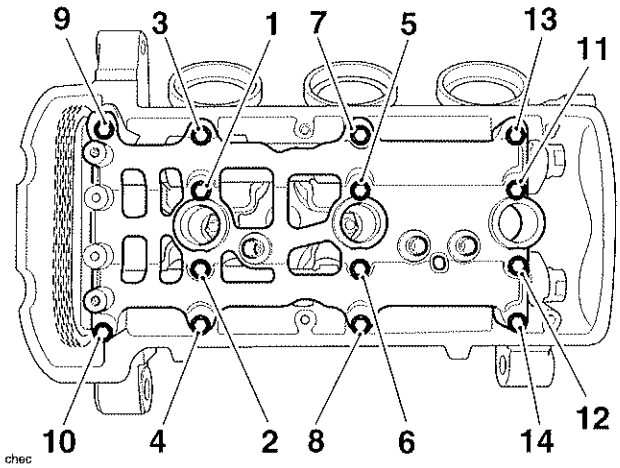
11. Insert the Camshaft Timing Plate T3880600 into the camshaft slots, ensuring the removal screw is unscrewed fully, as shown below. Ensure that the tool is centrally located between the camshafts.



1. **Camshaft Timing Plate T3880600**
2. **Camshaft slots**
3. **Removal screw**

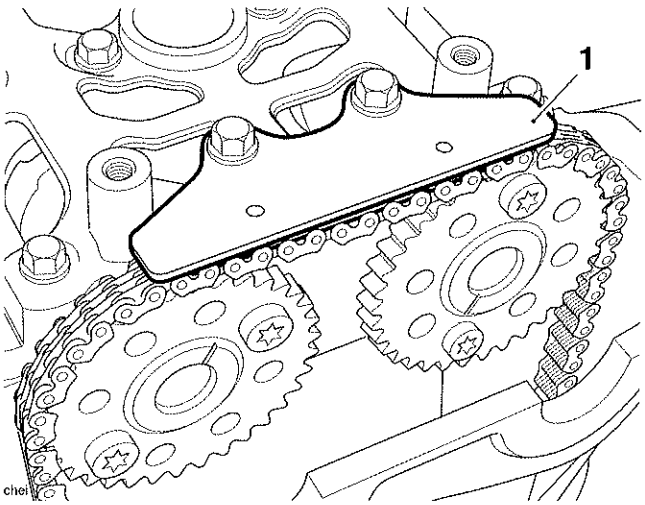
12. Assemble the camshaft ladder in the same location and orientation as prior to removal. Do not fit the top pad at this stage.

13. Fit and evenly tighten the camshaft ladder fixings to **10 Nm**, in the sequence shown below, ensuring that the Camshaft Timing Plate T3880600 remains centrally located between the camshafts.



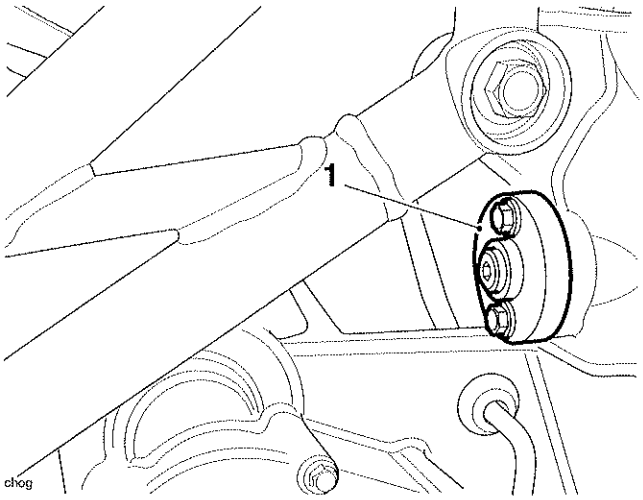
Camshaft Ladder Fixing Tightening Sequence

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



1. **Camshaft drive chain top pad**

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

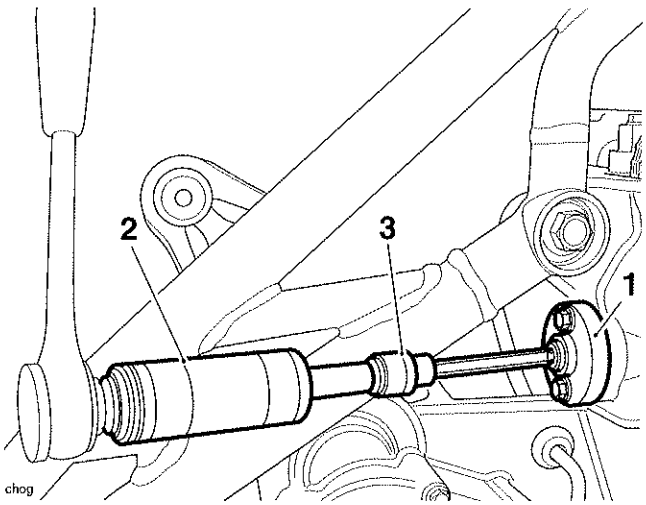


1. Camshaft Timing Tensioner T3880607

Caution

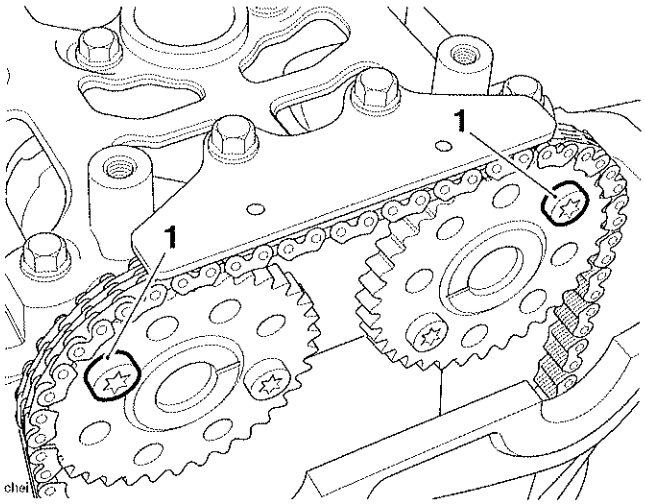
The torque value stated is very important to accurate timing. Always use the correct value of **0.6 Nm**, as set using the Torque Limiter T3880609. Using an incorrect torque value will result in incorrect valve timing being set, or damage to the tensioner blade or other valve train components. Either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

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



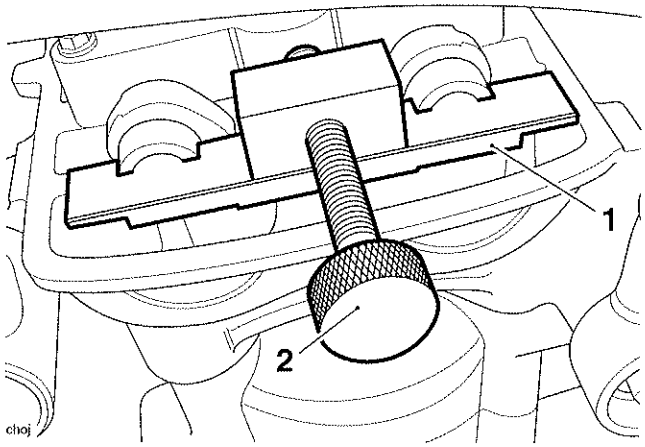
1. Camshaft Timing Tensioner T3880607
2. Torque Limiter T3880609
3. 6 mm Ball Ended Allen Key

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



1. Uppermost fixings

18. Remove the Camshaft Timing Plate T3880600 by rotating the removal screw clockwise as shown below.



1. Camshaft Timing Plate T3880600
2. Removal screw

19. Remove the Crankshaft Timing Pin T3880601.

Caution

Always check that the Camshaft Timing Plate T3880600 has been removed before rotating the engine. Severe damage will result to the camshafts or Camshaft Timing Plate T3880600 if engine rotation is attempted with the tool installed.

20. Rotate the engine until the remaining two sprocket fixings are accessible.
21. Remove and discard the two remaining camshaft sprocket fixings, and replace with new fixings. Tighten to **22 Nm**.

22. Place a suitable wedge between the camshaft drive chain tensioner blade and crankcase, to hold the camshaft drive chain taut during removal of the Camshaft Timing Tensioner T3880607.
23. Release the tension on Camshaft Timing Tensioner T3880607 and remove it.
24. Refit the timing chain tensioner, incorporating a new gasket and O-ring (see page *3-10*).
25. Rotate the engine until the Crankshaft Timing Pin T3880601 can be refitted.
26. Re-check that the timing marks are still approximately aligned (to check that the camshaft timing has not moved during Camshaft Timing Tensioner T3880607 removal).
27. Remove the Crankshaft Timing Pin T3880601.
28. Check the valve clearances. Adjust as necessary (see page *3-19*).

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 camshaft cover (see page *3-5*).
2. Remove the crankshaft cover (see page *5-22*).
3. Remove the spark plugs to reduce compression resistance when turning the engine.
4. Rotate the engine using the 24 mm hexagon on the end of the crankshaft until a pair of camshaft lobes are positioned pointing away from the valves.
5. Using feeler gauges, measure and record the clearances for this pair of valves only.
6. 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.**
- **The correct valve clearances are in the range given below.**

Inlet:	0.10 - 0.15 mm
Exhaust:	0.275 - 0.325 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.

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

Typical Valve Clearance Chart

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

Valve Clearance Adjustment

Note:

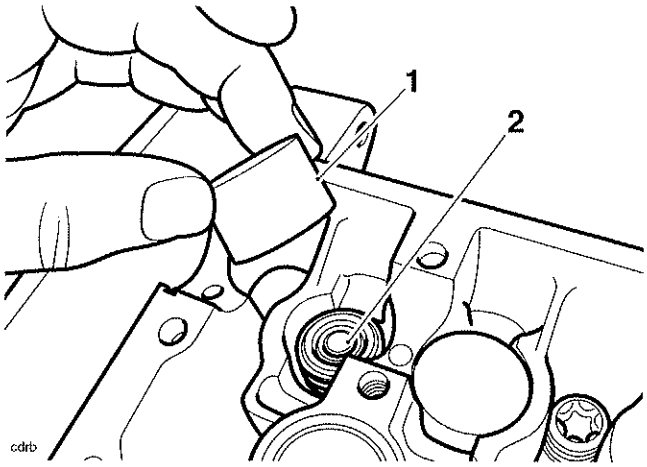
- **To adjust the valve clearances the camshafts must be removed.**

1. Remove the camshafts (see page *3-12*).
2. Remove the tappet bucket from the cylinder head.

Note:

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

3. Remove the shim from the valve head.



1. **Tappet bucket**
2. **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 (see page *3-15*).
9. Re-check all valve clearances.
10. Repeat the procedure if the valves require further adjustment.

Camshaft Drive Chain, Tensioner Blade and Rubbing Strip

Removal

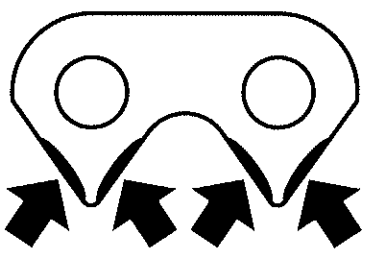
1. Remove the camshafts (see page *3-12*).
2. Remove the tensioner blade pin and remove the tensioner blade through the right hand crankshaft cover opening in the crankcase.
3. Remove the rubbing strip pin and allow the rubbing strip to drop. This will allow the camshaft drive chain to be un-hooked from the crankshaft sprocket.
4. Un-hook the camshaft drive chain from the crankshaft sprocket and remove it through the right hand crankshaft cover opening in the crankcase.
5. Remove the rubbing strip through the right hand crankshaft cover opening in the crankcase.

Inspection - Camshaft Drive Chain

Chain Installed

Visual checks can also be made as follows:

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



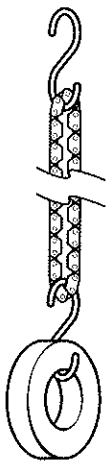
ccrv

Inner Plates

Chain Removed

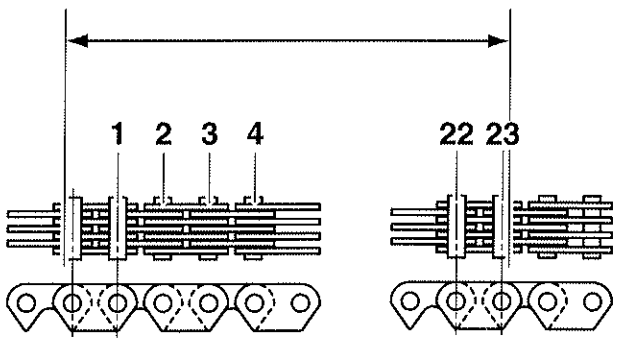
For a more thorough check, proceed as follows:

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



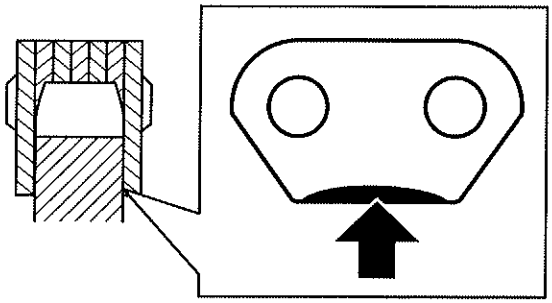
cajs

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



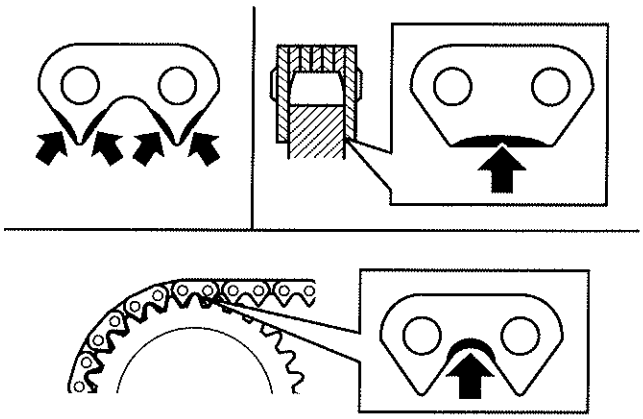
cajt

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



ccru

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



caju

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

Inspection - Camshaft Drive Chain Tensioner and Rubbing Blade

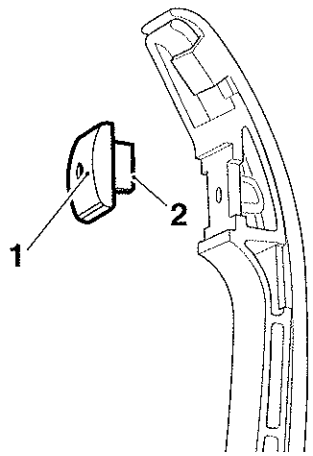
1. Check the camshaft drive chain tensioner and rubbing blade for wear or damage. Renew if worn or damaged.

Disassembly - Camshaft Drive Chain Tensioner Blade

Note:

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

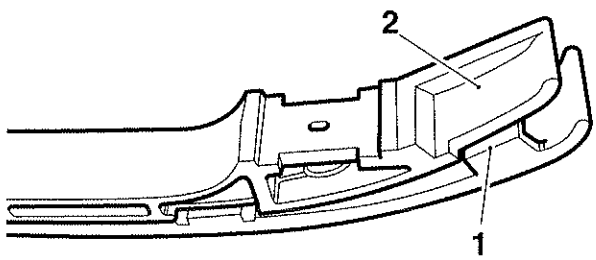
1. Release the clips and remove the pad.



cfee

1. **Pad**
2. **Clip (one side shown)**

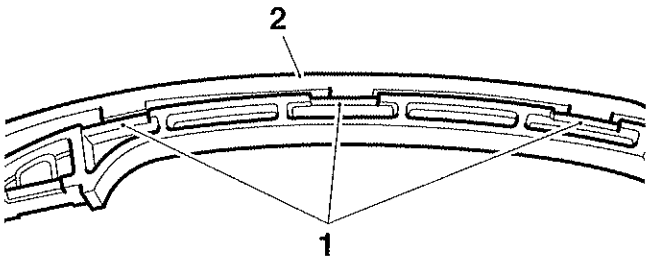
2. Detach the top hook from the tensioner blade.



cfef

1. **Top hook**
2. **Tensioner blade**

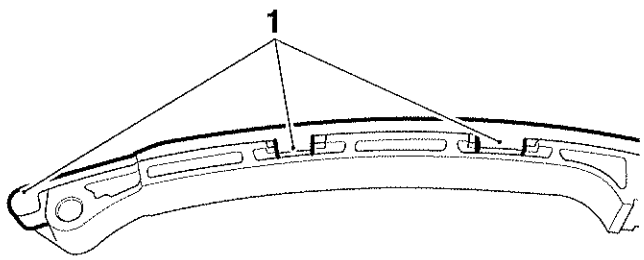
3. Release the two side locating devices.



cfeg

1. Locating devices
2. Facing blade

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



cfeh

1. Hooks

Assembly

1. Assembly is the reverse of disassembly.

Installation

1. Loosely refit the rubbing blade. Do not fit the pin at this stage.
2. Lower the chain through the cylinder head opening and hook over the crankshaft sprocket. Support the chain at its upper end until the camshafts are refitted.
3. Refit the tensioner blade, ensuring that the camshaft drive chain is correctly seated on the facing blade and secure with the pin.
4. Reposition the rubbing blade, ensuring that the camshaft drive chain is correctly seated on the rubbing blade and secure with the pin.
5. Refit the camshafts (see page *3-15*).

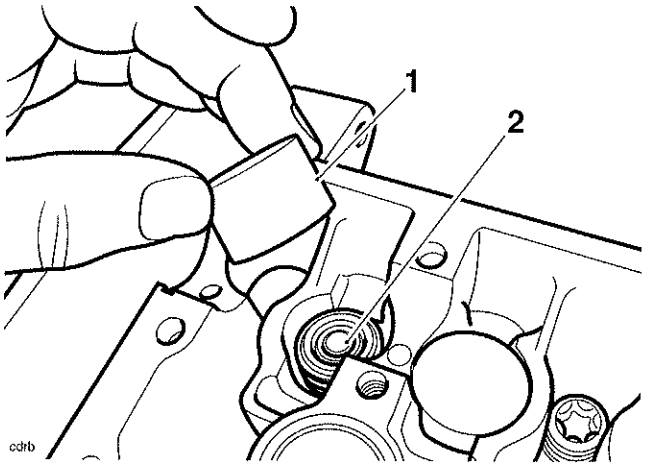
Cylinder Head

Removal

Note:

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

1. Remove the engine from the frame (see page *9-2*).
2. Remove the camshafts (see page *3-12*).
3. Remove the camshaft drive chain, tensioner blade and rubbing strip (see page *3-22*).
4. Note the position of all tappet buckets and shims so that they can be refitted in the same positions. Remove all the tappet buckets and shims.

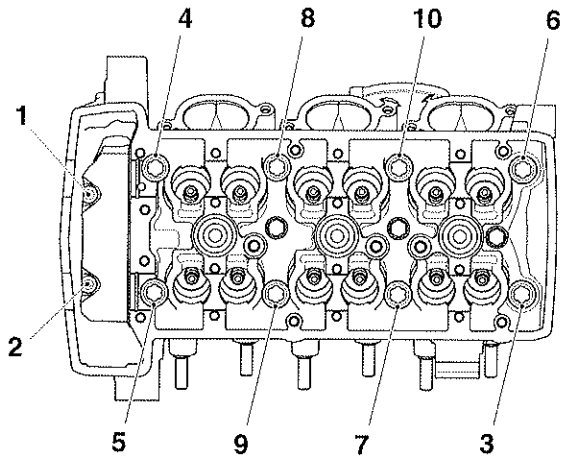


1. **Tappet bucket**
2. **Shim**

Note:

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

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

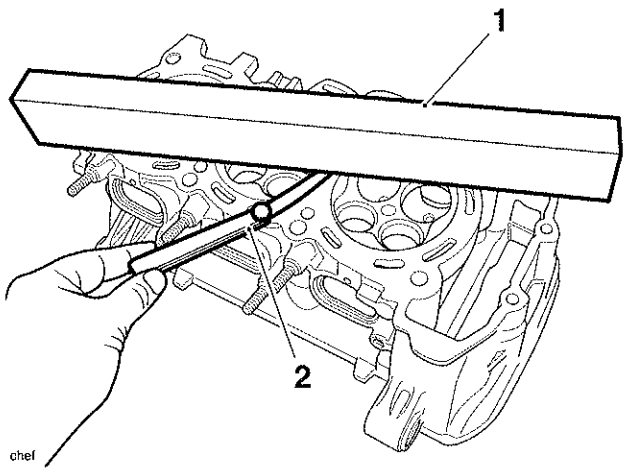


Cylinder Head Bolt Release Sequence

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

Inspection

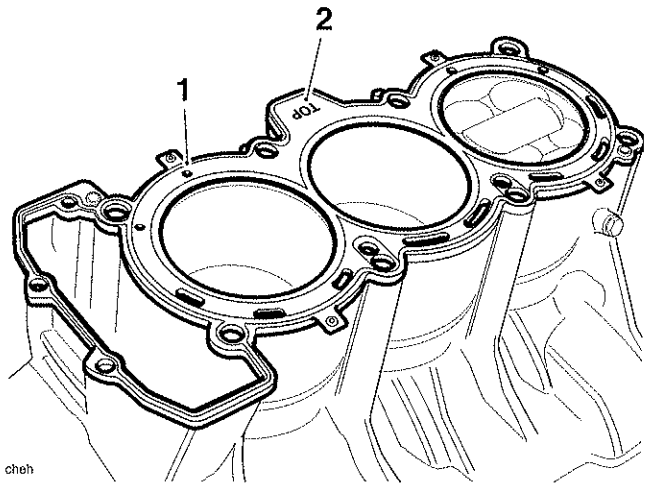
1. Thoroughly clean the surface of the head and check for damage and pitting of the combustion chambers.
2. Using a straight edge, check the cylinder head gasket face for warp which could lead to gasket failure. Replace the head if warped.



1. **Straight edge**
2. **Cylinder head gasket face**

Installation

1. Remove and re-seal the cylinder liners (see page 5-17).
2. Thoroughly clean the upper faces of the crankcase taking care not to damage the mating surfaces.
3. Fit a new cylinder head gasket (TOP marking uppermost) ensuring that the head to crankcase location dowels are correctly in place.



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

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

⚠ Caution

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

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

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

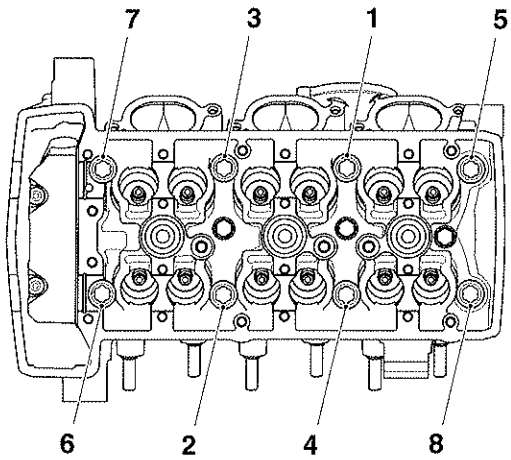
Tighten the bolts using the three-stage procedure given below.

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

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

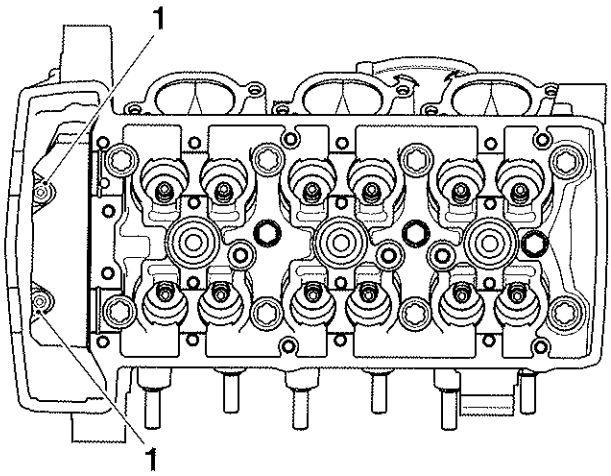
Note:

- **For stages A and B of the head bolt tightening operation, a torque wrench of known, accurate calibration must be used.**
  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 **40 Nm.**
- **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 by 90° to reach the final setting. To accurately gauge the 90° turn, use Angular Torque Gauge T3880105 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 nine 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**.



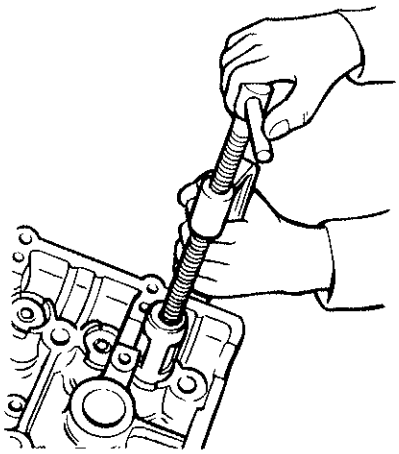
1. Cylinder head to upper crankcase screws

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. Refit the camshaft drive chain, tensioner blade and rubbing strip (see page *3-22*).
10. Refit the camshafts (see page *3-15*).
11. Install the engine to the frame (see page *9-4*).

Valves and Valve Stem Seals

Removal from the Cylinder Head

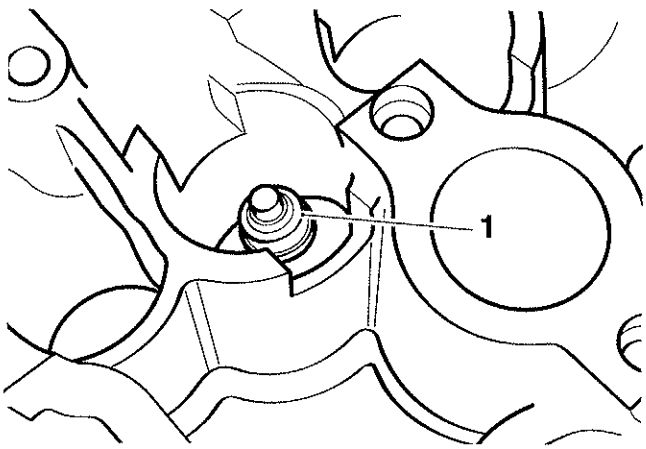
1. Remove each valve from the head using a valve spring compressor. The compressor must act on the top cup to allow removal of the valve collets.



adh

Valve Removal

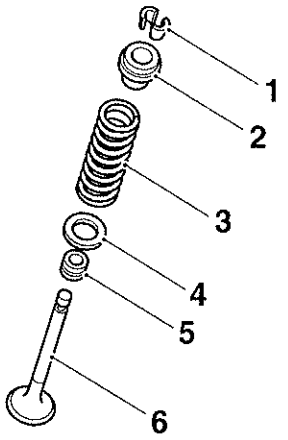
2. Once the collets are released, remove the following items:
   - collets;
   - valve spring retainer;
   - valve spring;
   - valve stem seal;
   - spring platform;
   - valve (de-burr before removal).



1. Valve stem seal

Note:

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



1. **Collets**
2. **Valve spring retainer**
3. **Valve spring**
4. **Valve spring platform**
5. **Stem oil seal**
6. **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 spring platform.
5. Install the valve spring over the valve stem.
6. Compress the valve spring ensuring that the spring is compressed squarely to prevent damage to the valve stem and cylinder head.
7. Fit the valve collets ensuring correct collet location in the spring retainer and valve as the spring compressor is released.

⚠ Caution

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

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:	0.068 mm
Exhaust:	0.128 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.

4 Clutch

Table of Contents

Exploded View - Clutch Cover 4.2
Exploded View - Clutch Assembly 4.3
Exploded View - Clutch Controls 4.4
Clutch Description 4.5
- Clutch System Maintenance Safety Precautions 4.5
- Clutch Switch 4.5

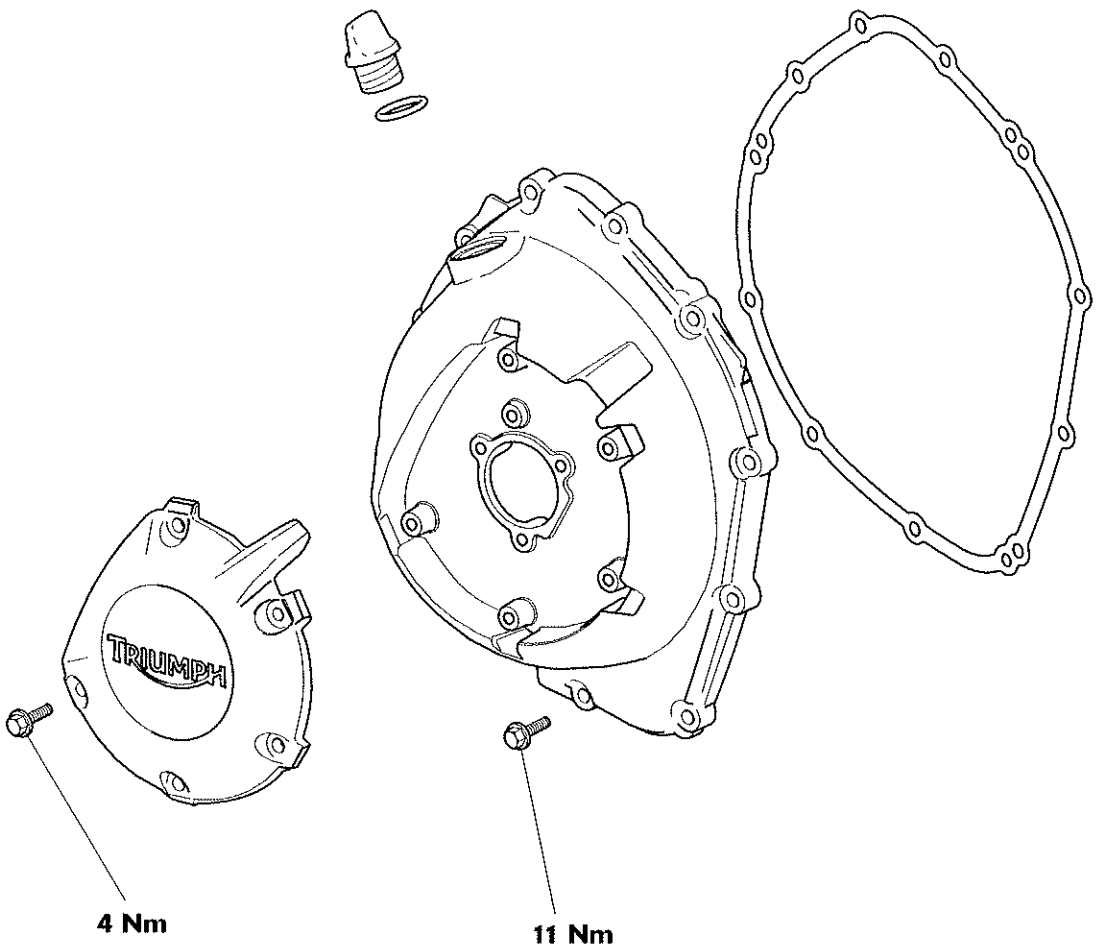
Clutch Fluid Level Inspection 4.6
Bleeding the Clutch 4.6
Clutch Master Cylinder 4.8
- Removal 4.8
- Disassembly 4.9
- Inspection 4.9
- Assembly 4.9
- Installation 4.10

Clutch Slave Cylinder 4.10
- Removal 4.10
- Inspection 4.11
- Assembly 4.11
- Installation 4.11

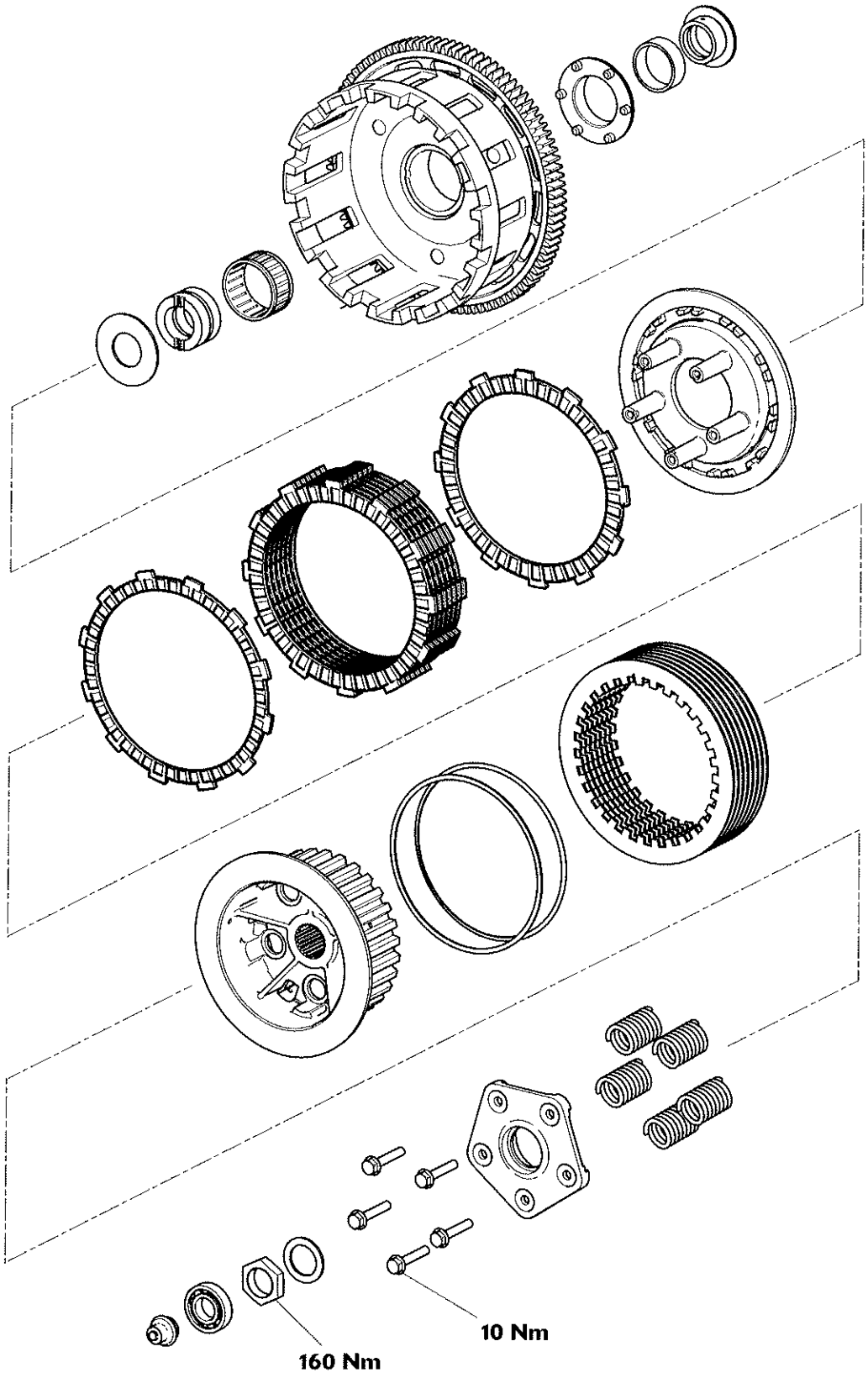
Clutch Cover 4.12
- Removal 4.12
- Installation 4.12

Clutch 4.13
- Removal 4.13
- Disassembly 4.14
- Friction Plate Inspection 4.15
- Clutch Pack Height 4.16
- Assembly 4.17
- Installation 4.17

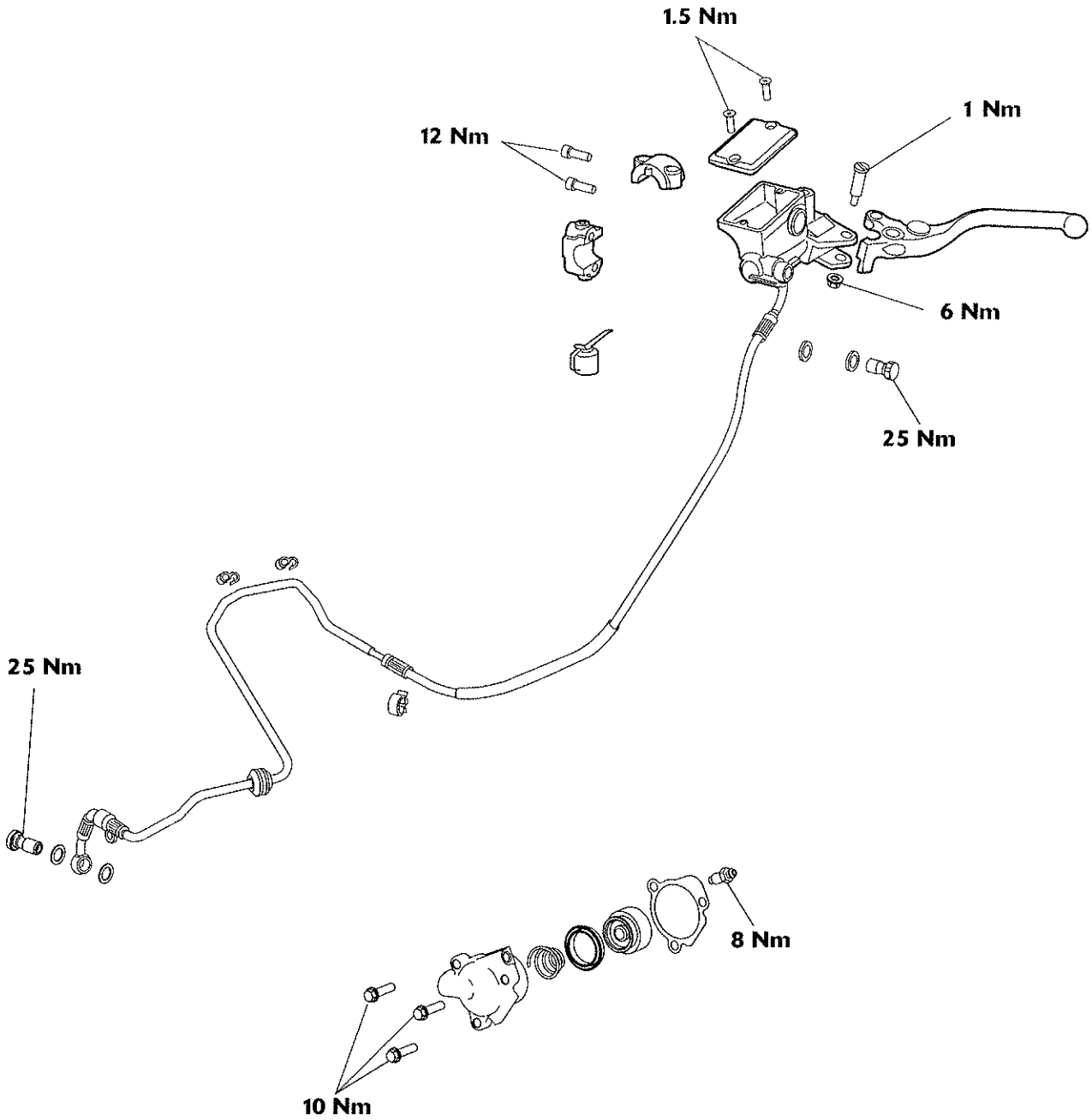
Exploded View - Clutch Cover



Exploded View - Clutch Assembly



Exploded View - Clutch Controls



Clutch Description

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

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

Clutch System Maintenance Safety Precautions

Warning

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

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

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

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

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

Check regularly for clutch hose damage.

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

Warning

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

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

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

Warning

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

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

Warning

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

Clutch Switch

Warning

The clutch switch is an integral part of the cruise control system. To ensure the clutch switch functions correctly after a replacement, the cruise control switch test must be carried out as described on page *10-33*.

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

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

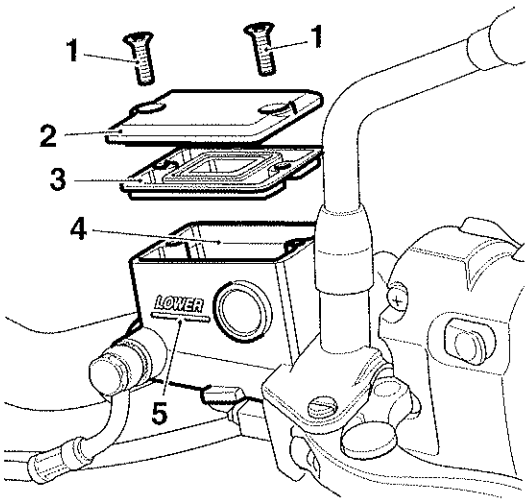
Clutch Fluid Level Inspection

⚠ Warning

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

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

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



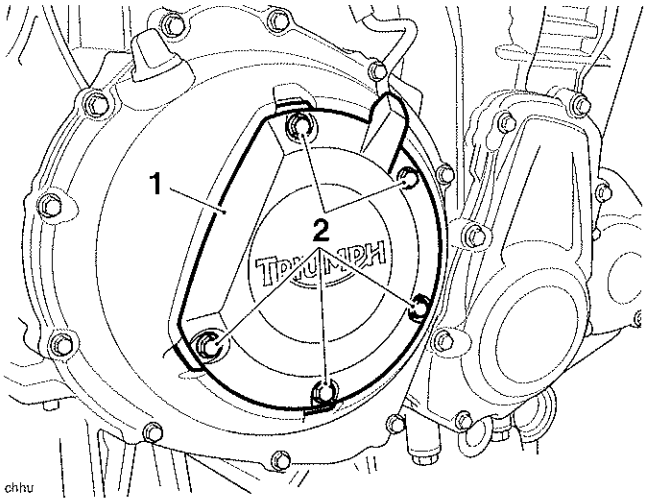
clqv

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

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

Bleeding the Clutch

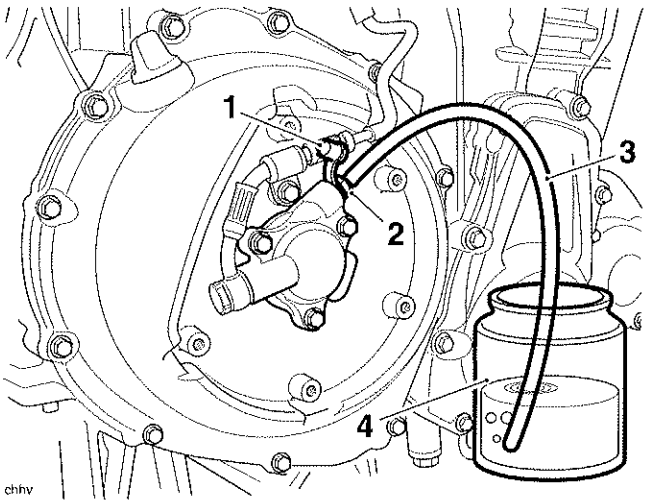
1. Note the original setting of the clutch lever adjuster in order that it can be returned to the same position when the bleeding operation is complete. Set the clutch lever adjuster to position No. 1.
2. Turn the handlebars to bring the fluid reservoir to a level position.
3. Remove the five fixings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



chhu

1. **Slave cylinder cover**
2. **Fixings**

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



chhv

1. **Bleed nipple rubber cap**
2. **Bleed nipple**
3. **Bleed tube**
4. **Container**

6. Place the other end of the tube in suitable receptacle containing new clutch fluid.
7. Release and remove the two screws securing the clutch reservoir cover.

Warning

Ensure absolute cleanliness when adding clutch fluid to the clutch fluid reservoir.

Do not allow moisture or debris to enter the cylinder as this will adversely affect the fluid properties.

Always use fluid from a sealed container and do not use fluid from a container which has been opened for any period of time.

Always check for fluid leakage around hydraulic fittings and for damage to hoses.

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

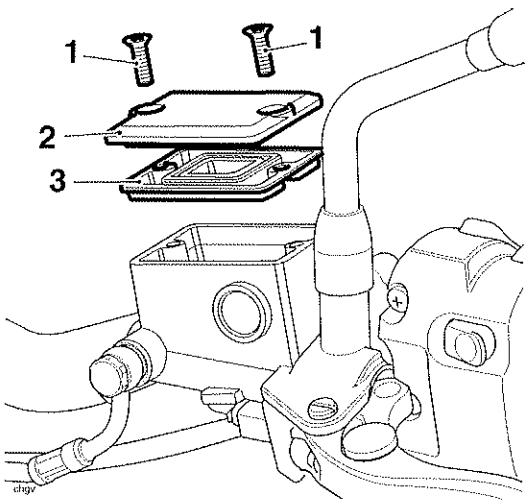
Warning

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

Caution

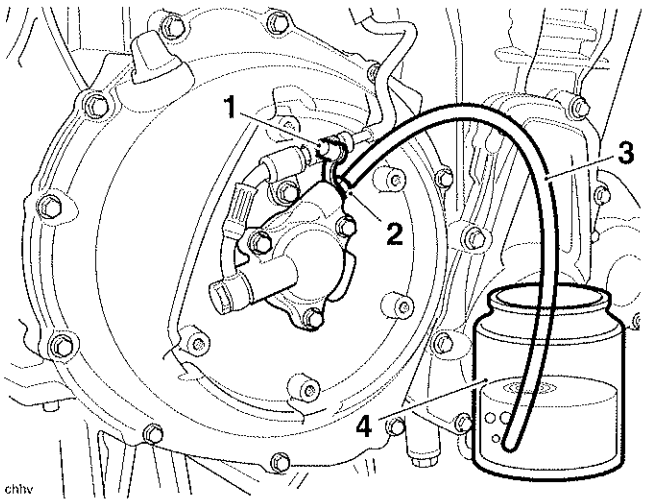
To prevent body damage, do not spill clutch fluid onto any area of the bodywork.

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



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

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



1. **Bleed nipple rubber cap**
2. **Bleed nipple**
3. **Bleed tube**
4. **Container**

Note:

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**

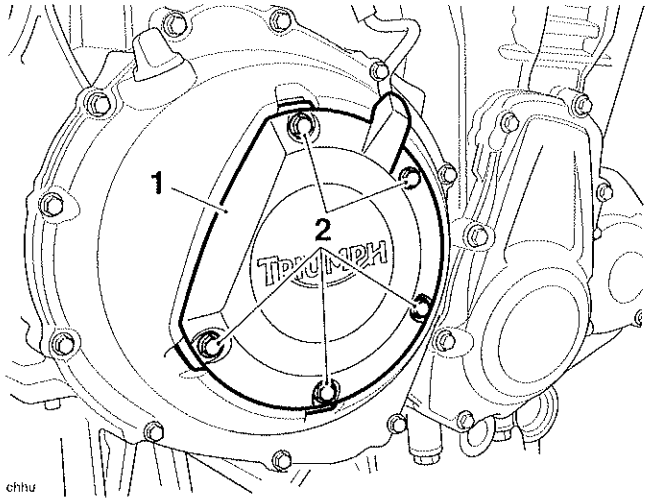
12. Maintain the clutch fluid level between the upper and lower levels whilst bleeding is being carried out.
13. When all the air has been expelled from the system, hold in the clutch lever and close the bleed nipple. Tighten to **8 Nm**.
14. Fill the reservoir to the upper level.

Warning

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

15. Replace the reservoir cover and diaphragm ensuring correct fitment of the diaphragm. Tighten the screws to **1.5 Nm**.
16. Remove the transparent bleed pipe.
17. Replace the bleed nipple dust cap.

18. Refit the slave cylinder cover. Tighten the new fixings to **4 Nm**.



chhu

1. Slave cylinder cover
2. Fixings

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

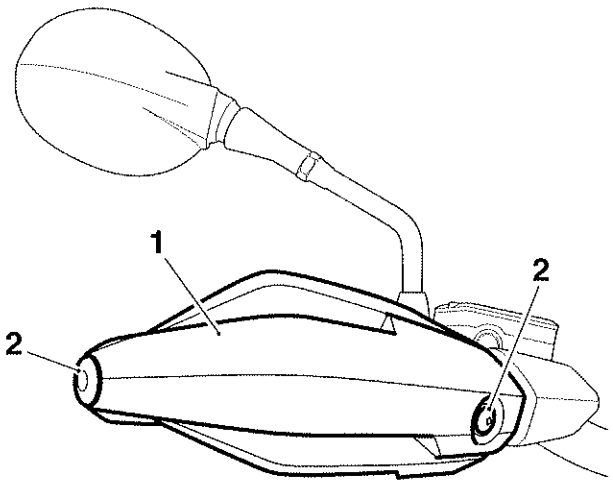
Warning

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

Clutch Master Cylinder

Removal

1. Remove the reservoir cover. Drain the fluid from the master cylinder using the bleed process described on page *4-6*.
2. **For motorcycles with handguards fitted only:** Release the two fixings and remove the handguards and the handlebar end weights.



chnl

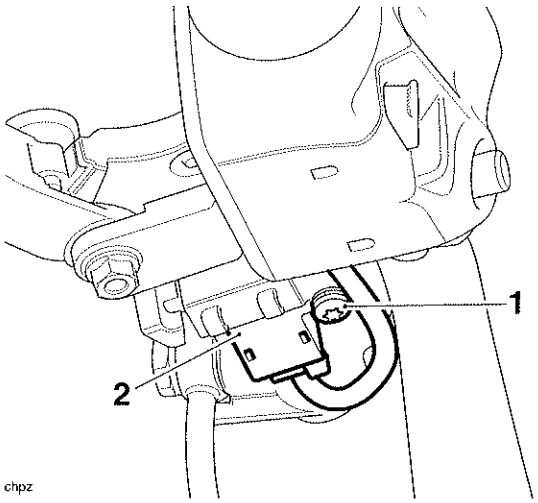
1. Handguard (left hand shown)
2. Fixings

3. Remove the nut and pivot bolt securing the clutch lever to the master cylinder.
4. Remove the clutch lever from the master cylinder.
5. Release the union bolt securing the clutch hose to the master cylinder. Disconnect the clutch hose. Discard the sealing washers.

Caution

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

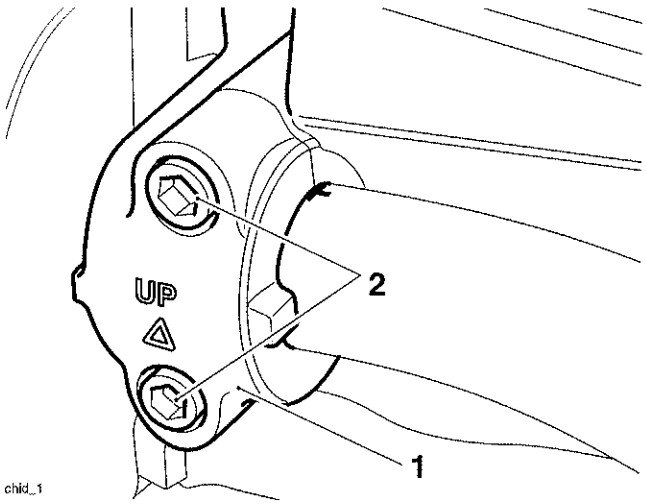
6. Release the fixing and detach the clutch switch from the master cylinder.



chpz

1. Fixing
2. Clutch switch

7. Release the handlebar clamp screws and remove the clamp and master cylinder.

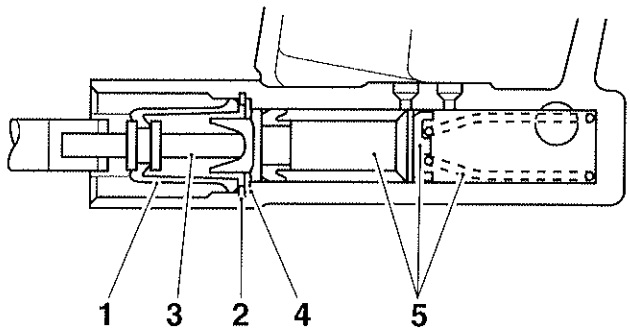


chld_1

1. Handlebar clamp
2. Screws

Disassembly

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



chhr

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

Inspection

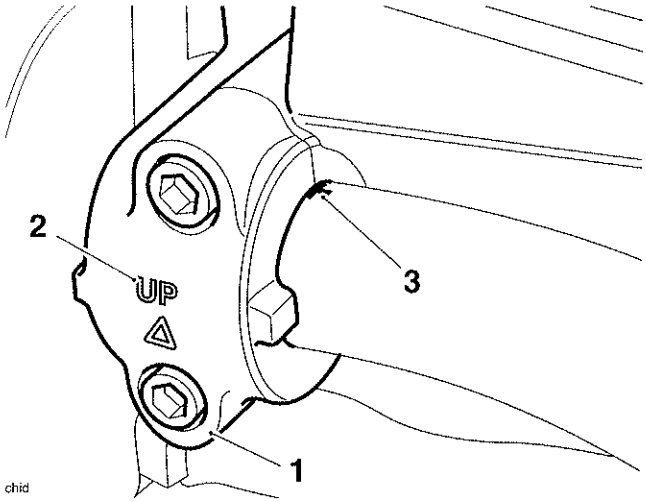
1. Check the following for wear, damage, cracks or signs of deterioration and replace as necessary:
   - cylinder bore and piston;
   - seals;
   - dust cover;
   - spring.
2. Ensure that the fluid return and supply ports on cylinder are not blocked.

Assembly

1. Clean all disassembled parts with new DOT 4 brake and clutch fluid. Apply brake and clutch fluid to the bore of the cylinder.
2. Fit a new seal and piston set ensuring that the seal is fitted in the same position as noted during removal.
3. Assemble all components to the master cylinder in the reverse order to removal. Ensure that the dust cover is correctly located over both the pushrod and cylinder body.

Installation

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



1. **Handlebar clamp**
2. **UP arrow**
3. **Alignment mark**

3. Re-connect the clutch switch to the master cylinder.
4. Position the clutch lever ensuring that pivot boss is correctly aligned and fitted to the push rod. Tighten the pivot bolt to **1 Nm**.
5. Counter hold the pivot bolt, fit and tighten the lock nut to **6 Nm**.
6. Align and fit the union bolt to the clutch hose incorporating new sealing washers. Connect the hose to the master cylinder.
7. Tighten the union bolt to **25 Nm**.
8. Bleed the clutch as described earlier and then examine the system for:
   - correct clutch operation;
   - fluid leakage.
9. **For motorcycles with handguards fitted only:** Position the handlebar end weights and the handguards to the handlebar, secure with the two fixings and tighten to **8 Nm**.

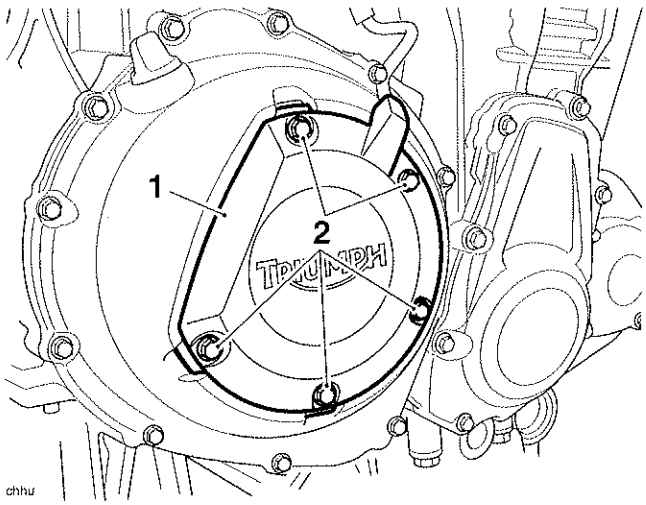
Clutch Slave Cylinder

Removal

⚠ Caution

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

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



1. **Slave cylinder cover**
2. **Fixings**

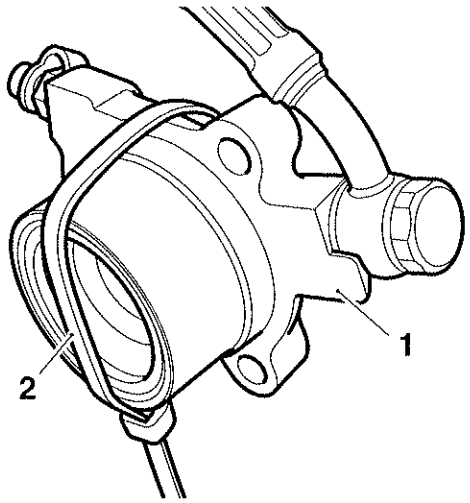
2. Position a suitable container for the collection of brake and clutch fluid.

⚠ Caution

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

3. Release the union bolt from the clutch slave cylinder. Place the hose fitting into the container to collect the fluid.
4. Release the three bolts securing the clutch slave cylinder to the clutch cover.
5. Detach the cylinder taking care to ensure that the piston remains in the cylinder.

6. If the cylinder is not to be disassembled, retain the piston to the slave cylinder using a retaining tie such as a rubber band or cable tie.



chic

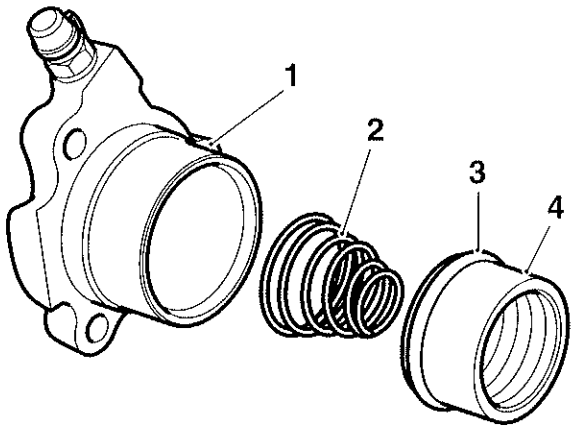
1. Clutch slave cylinder
2. Retaining tie

Disassembly

The spring inside the cylinder will push the piston out far enough for removal by hand. Remove the spring from the piston using a twisting action.

Inspection

1. Inspect the clutch slave cylinder carefully for fluid leaks.
2. Check the following for wear, damage, cracks or deterioration and replace as necessary:
   - cylinder inner wall;
   - spring;
   - piston seal;
   - piston.



chie

1. Slave cylinder
2. Spring
3. Piston seal
4. Piston

Assembly

1. Refit the spring to the piston using a twisting action.
2. Apply clutch fluid to the outside of both the piston and seal.
3. Refit the piston, ensuring that the spring is correctly positioned. Retain the piston using a rubber band or cable tie prior to final assembly on the clutch cover.

Installation

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

Clutch Cover

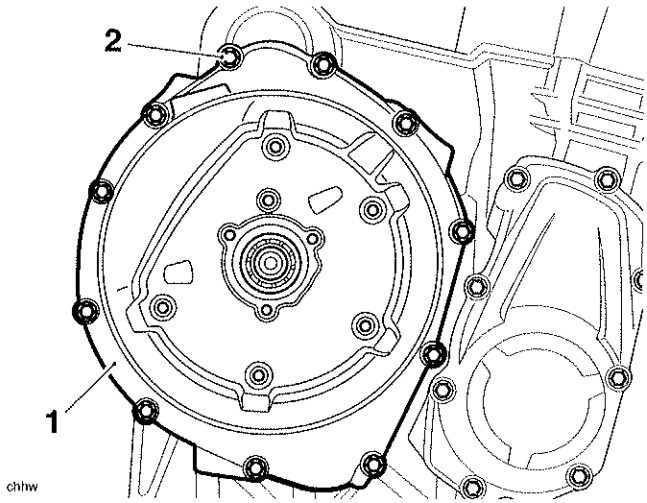
Removal

1. Remove the clutch slave cylinder (see page *4-10*). It is not necessary to drain the clutch cylinder fluid. Retain the piston to the slave cylinder using a rubber band or cable tie.

Warning

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

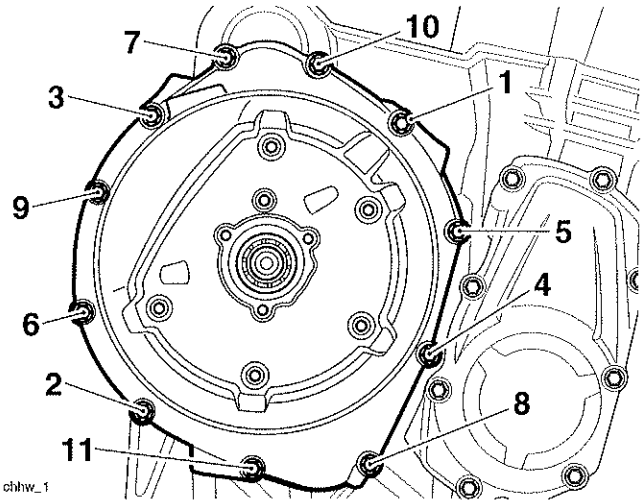
2. Tie the clutch slave cylinder aside.
3. Noting the position of the patch-locked bolt, remove the fixings and remove the clutch cover. Discard the patch-locked bolt.



1. Clutch cover
2. Patch-locked fixing position

Installation

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



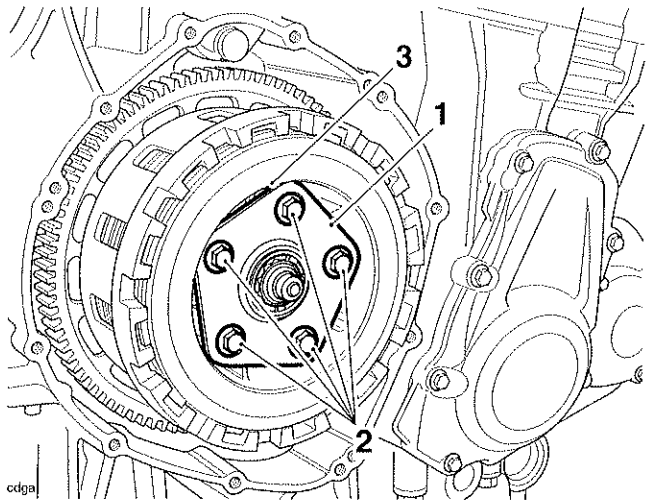
Clutch Cover Tightening Sequence

4. Remove the cable tie or rubber band from the clutch slave cylinder.
5. Clean and refit the clutch slave cylinder incorporating a new gasket (see page *4-12*).
6. Check and top the engine level (see page *8-6*).
7. Check the clutch operation. Rectify as necessary.

Clutch

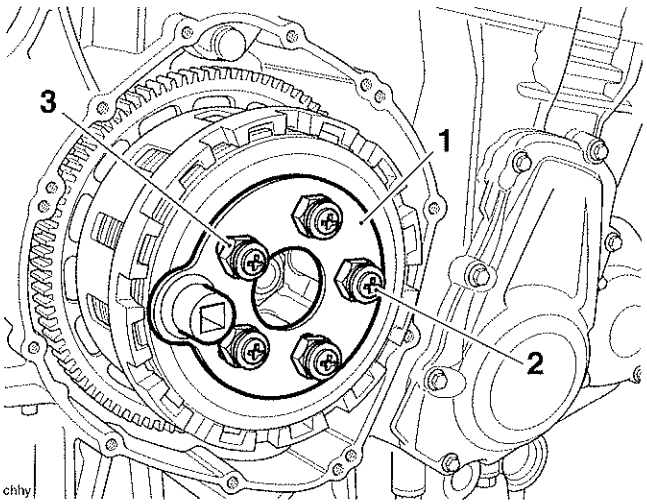
Removal

1. Remove the clutch cover (see page *4-12*).
2. Evenly and progressively slacken the five fixings securing the release plate to the clutch.
3. Remove the bolts and lift off the release plate (complete with the bearing and pushrod seat) and clutch springs.



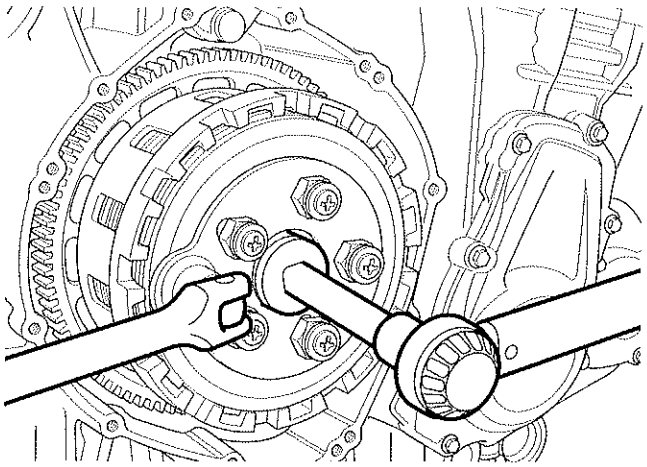
1. Release plate
2. Bolts
3. Springs (not shown)

4. Carefully de-stake the clutch centre nut.
5. Position the Clutch Restraint T3880604 to the clutch centre and pressure plate assembly, lightly tightening the five nuts and retaining screws. Do not over tighten the service tool screws.



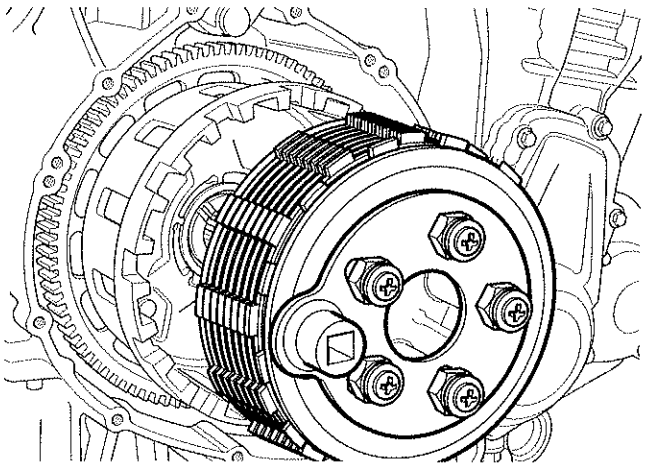
1. Clutch Restraint T3880604
2. Screw
3. Nut

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



Retain the Service Tool and Slacken the Centre Nut

7. Withdraw the clutch centre and pressure plate assembly, complete with the service tool.



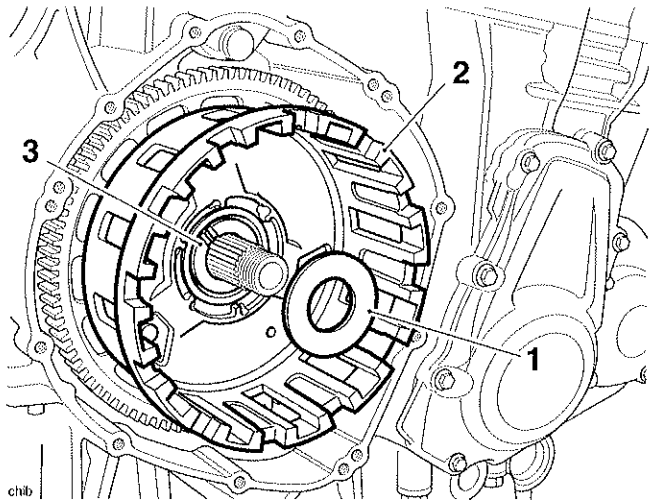
Clutch Centre and Pressure Plate Assembly

Note:

- **If the clutch outer drum is being removed and the clutch plates are not to be dismantled, the Clutch Restraint T3880604 can remain in position on the clutch centre and pressure plate assembly and the complete assembly placed aside. If the clutch centre and pressure plate assembly is to be dismantled, see Disassembly on the following page.**

8. Remove the thrust washer from the input shaft.

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

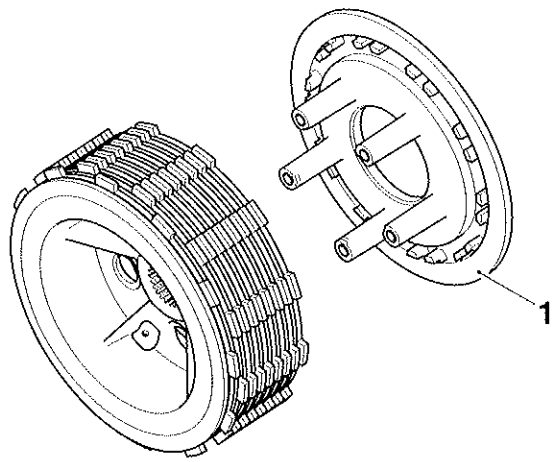


1. **Thrust washer**
2. **Outer drum**
3. **Bearing sleeve**

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

Disassembly

1. Remove the Clutch Restraint T3880604 then invert the assembly and lift off the pressure plate from the rear of the clutch centre.



1. **Pressure plate**

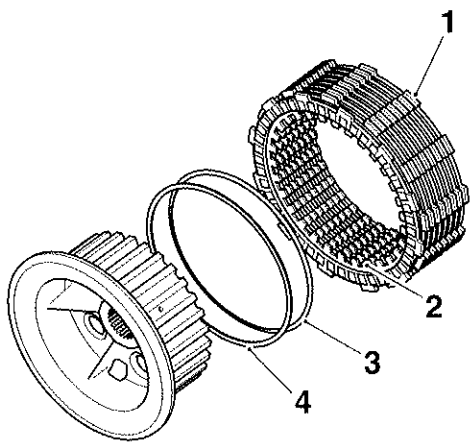
Note:

- **The inner and outermost friction plates differ from the seven inner plates and also differ from each other.**
- **The inner and outer friction plates must not be fitted in any other positions.**

2. Noting their orientation, remove all the clutch friction plates and steel plates together with the anti-judder spring and anti-judder seat washer.

Note:

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

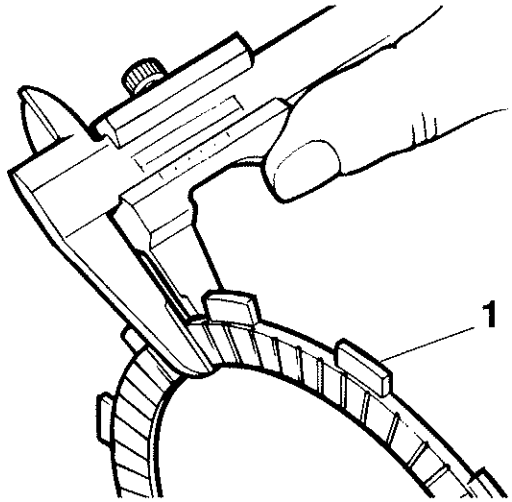


1. **Friction plate**
2. **Steel plate**
3. **Anti-judder spring**
4. **Anti-judder seat washer**

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

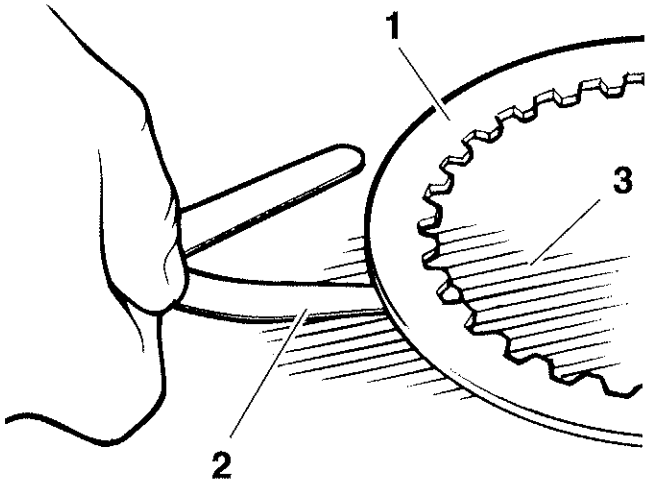
Friction Plate Thickness - All Other Plates

Standard	3.80 mm
Service Limit	3.60 mm

Steel Plate Bend/Warp

Check all plates for bend and warp as follows:

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



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

Steel Plate Bend/Warp

Standard	up to 0.15 mm
Service Limit	0.20 mm

Clutch Pack Height

The clutch pack height should only be measured if the friction plates and the steel plates have been replaced.

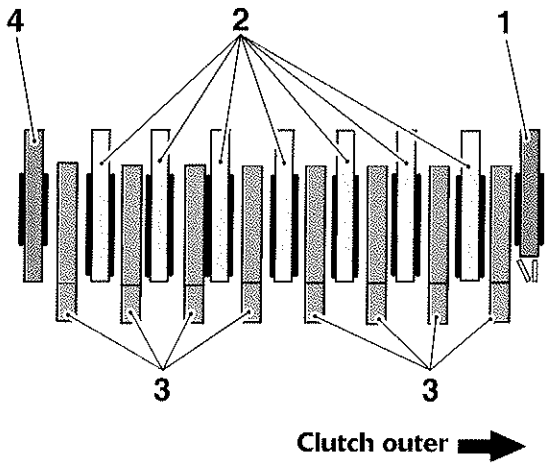
The clutch pack height is critical for a smooth operation of the transmission and must be measured prior to installation of new clutch plates.

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

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

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

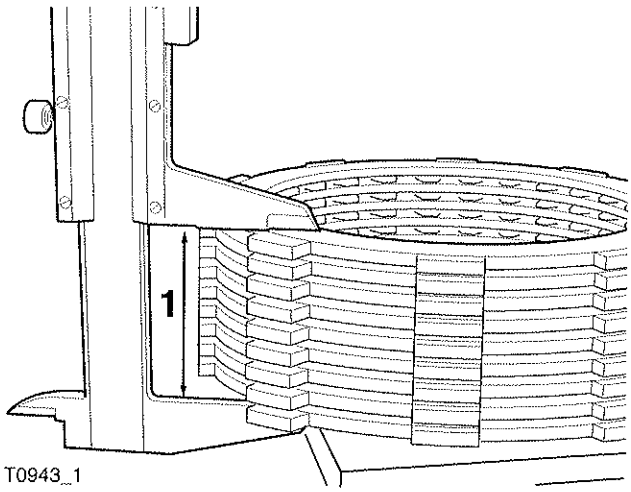
1. Arrange the new friction and new steel plates in a stack as shown below.



T0944_16

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

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



T0943_1

1. Clutch pack height

3. The correct clutch pack height for this clutch assembly is shown in the table below.

Standard height (mm)	Tolerance (mm)
50.2	50.52 - 49.52

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

Clutch Pack Height Too High

Note:

- **No more than one 1.6 mm thick steel plate may be used in the clutch pack.**

1. Replace one 2.0 mm steel plate with a 1.6 mm steel plate. The thinner plate can be installed in any position.
2. Re-check the clutch pack height as described earlier.

Clutch Pack Height Too Low

Note:

- **No more than one 2.3 mm thick steel plate may be used in the clutch pack.**

1. Replace one 2.0 mm steel plate with a 2.3 mm steel plate. The thicker plate can be installed in any position.
2. Re-check the clutch pack height as described earlier.

Assembly

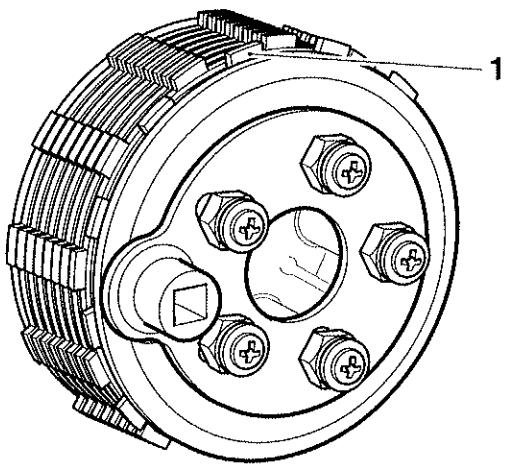
1. The innermost and outermost friction plates differ from the seven centre friction plates. Identification is as follows.
   a) The outermost friction plate has a larger internal diameter to accommodate the anti-judder spring and seat.
   b) The innermost friction plate has more friction pads (60 pads) than the other plates (50 pads).

Both can be identified by blue paint markings on the outer tabs. The seven inner friction plates have black paint markings.

⚠ Caution

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

2. Coat all friction and steel 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.
3. Fit the pressure plate ensuring it engages correctly with the clutch centre.
4. Invert the assembly and fit the Clutch Restraint T3880604 to the pressure plate. Align all the friction plate tabs, with the exception of the outer friction plate, as shown below.

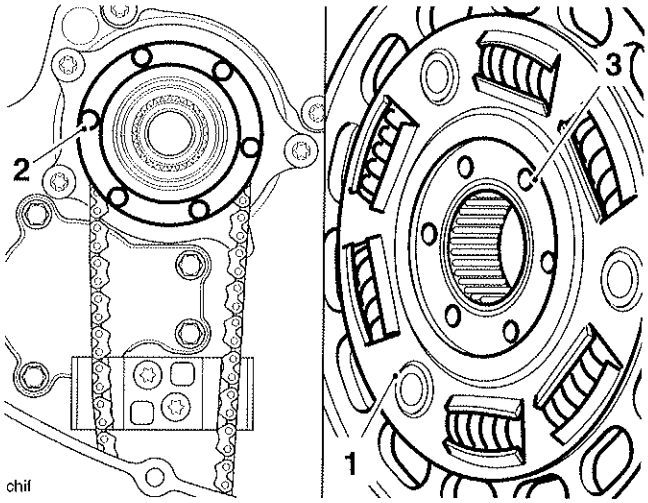


1. Outer friction plate

5. Lightly tighten the four service tool screws to hold them in position. Do not over tighten the service tool screws.

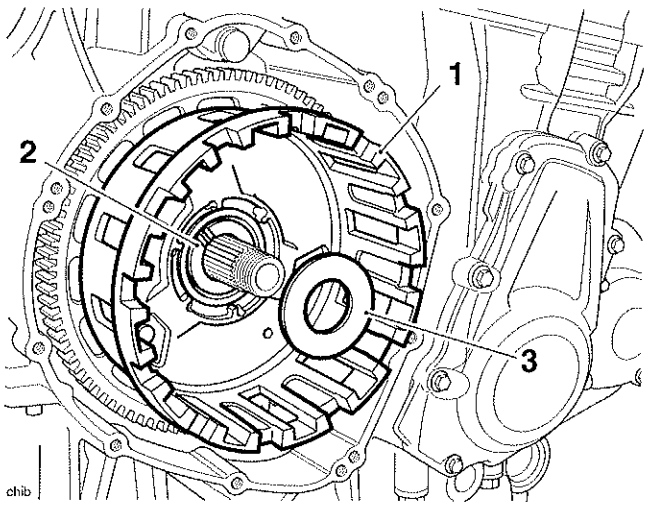
Installation

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



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

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



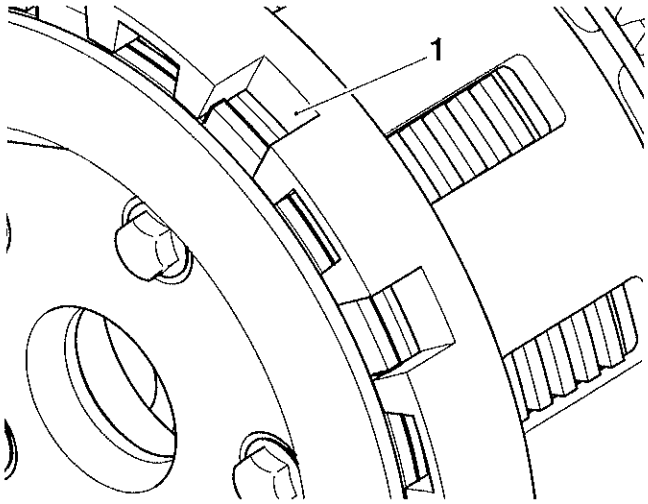
1. Outer drum
2. Bearing sleeve
3. Thrust washer

Note:

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

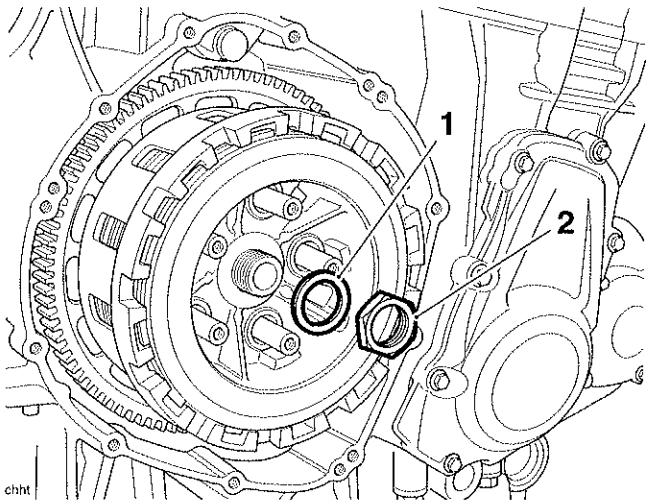
3. Fit the thrust washer to the shaft.

4. Fit the clutch centre and pressure plate assembly, aligning the friction plate tabs with the clutch drum slots, noting that the outermost friction plate engages in its own (shallow) slot. Align the clutch centre splines with those of the input shaft and slide the assembly fully into position.



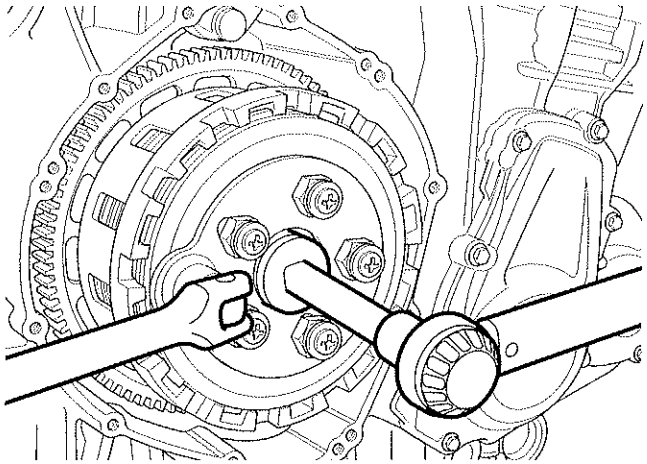
1. Outer friction plate slot

5. Fit a new Belleville washer with its OUT marking facing outwards.
6. Fit a new centre nut.



1. Dished washer (service tool not shown for clarity)
2. Centre nut

7. Tighten the centre nut to **160 Nm** whilst holding the service tool to prevent rotation.



Retain the Service Tool and Slacken the Centre Nut

8. Remove the service tool from the pressure plate.
9. Stake the clutch centre nut to the shaft.
10. Fit the clutch springs.
11. Ensure the bearing and pushrod seat are correctly installed in the release plate.
12. Reposition the release plate to the clutch, ensuring the springs are located correctly, and secure with the five bolts.

⚠ Caution

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

13. Evenly and progressively tighten the bolts by hand until the release plate is fully seated, then evenly tighten to **10 Nm**, ensuring the springs remain correctly located under the release plate.
14. Refit the clutch cover (see page *4-12*).

5 Crankshaft, Connecting Rods and Pistons

Table of Contents

Exploded View - Crankshaft, Connecting Rod, Piston and Liner 5.2
Exploded View - Crankcases 5.3
Exploded View - Engine Covers 5.4
Crankcases 5.5
- Disassembly 5.5
- Assembly 5.6

Connecting Rods 5.8
- Removal 5.8
- Installation 5.8

Connecting Rod Bearing Selection/Crankshaft Journal Wear Check 5.10
- Connecting Rod Bearing Selection 5.11

Crankshaft 5.12
- Removal 5.12
- Installation 5.12

Crankshaft Main Bearing/Journal Wear 5.13
Pistons 5.14
- Disassembly 5.14
- Piston Wear Check 5.15

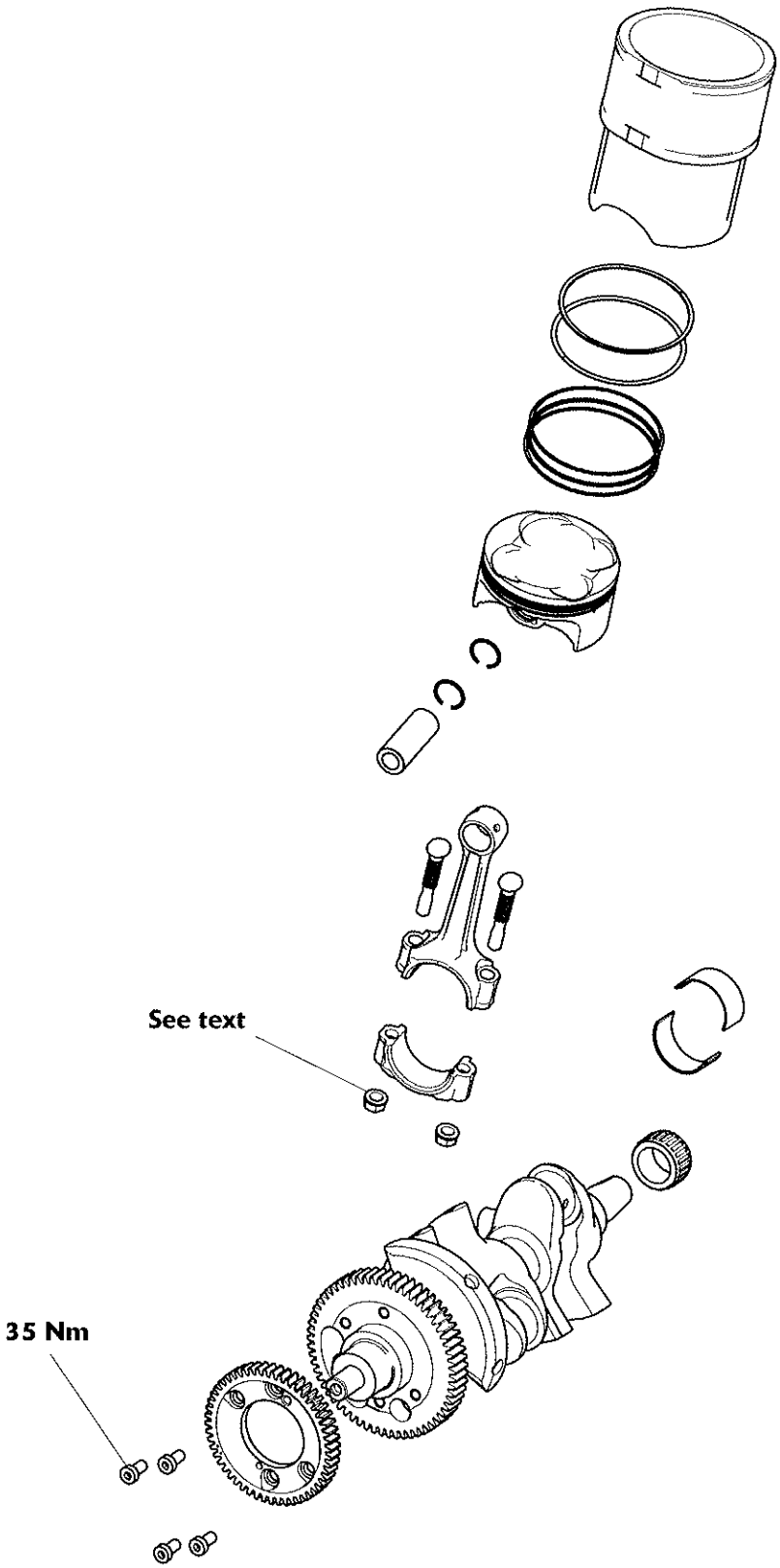
Cylinder Liners 5.17
- Removal 5.17
- Cylinder Liner Wear 5.18
- Installation 5.18

Flywheel Cover 5.19
- Removal 5.19
- Installation 5.20

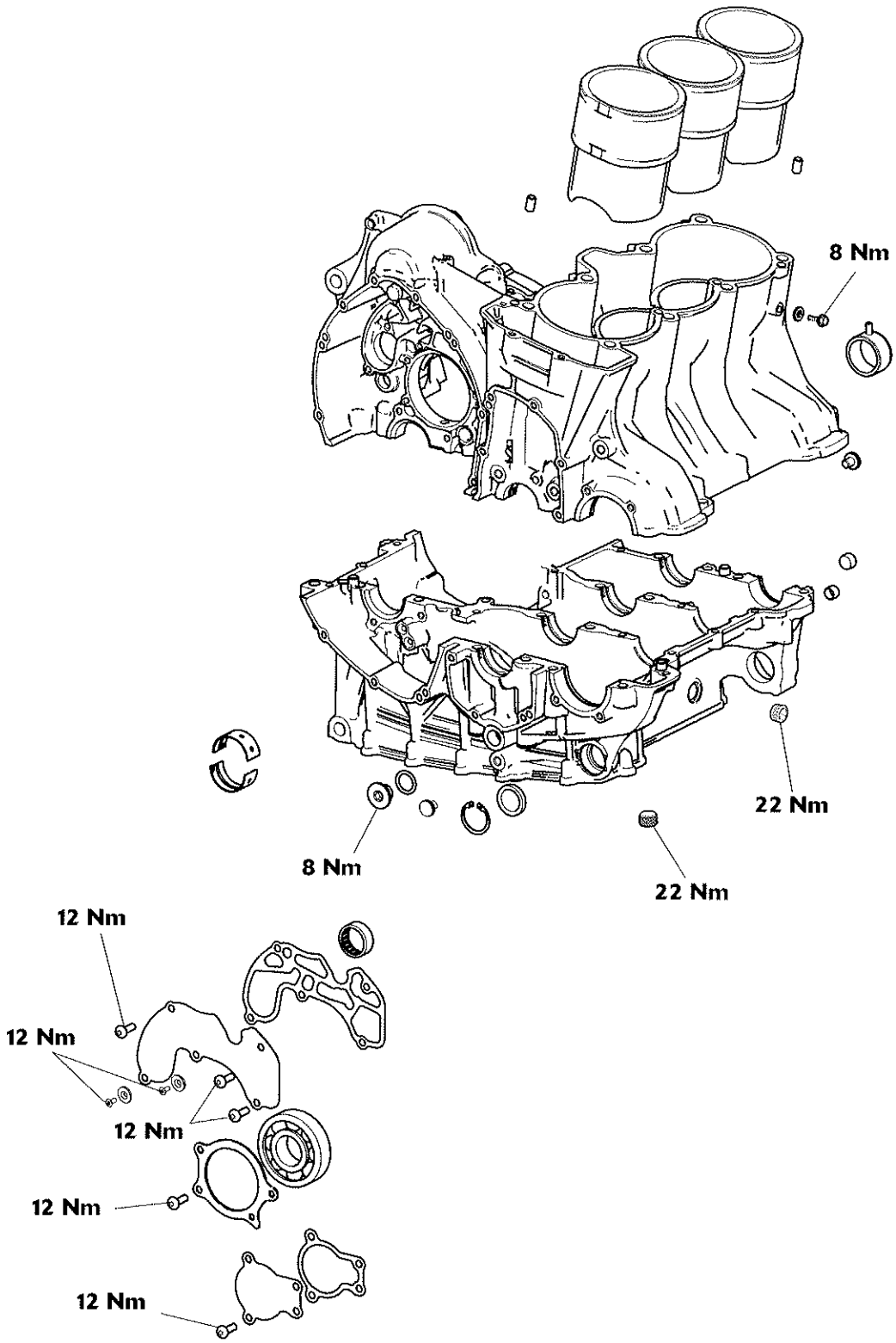
Crankshaft Cover 5.21
- Removal 5.21
- Installation 5.21

Balancer Shaft Cover 5.22
- Removal 5.22
- Installation 5.22

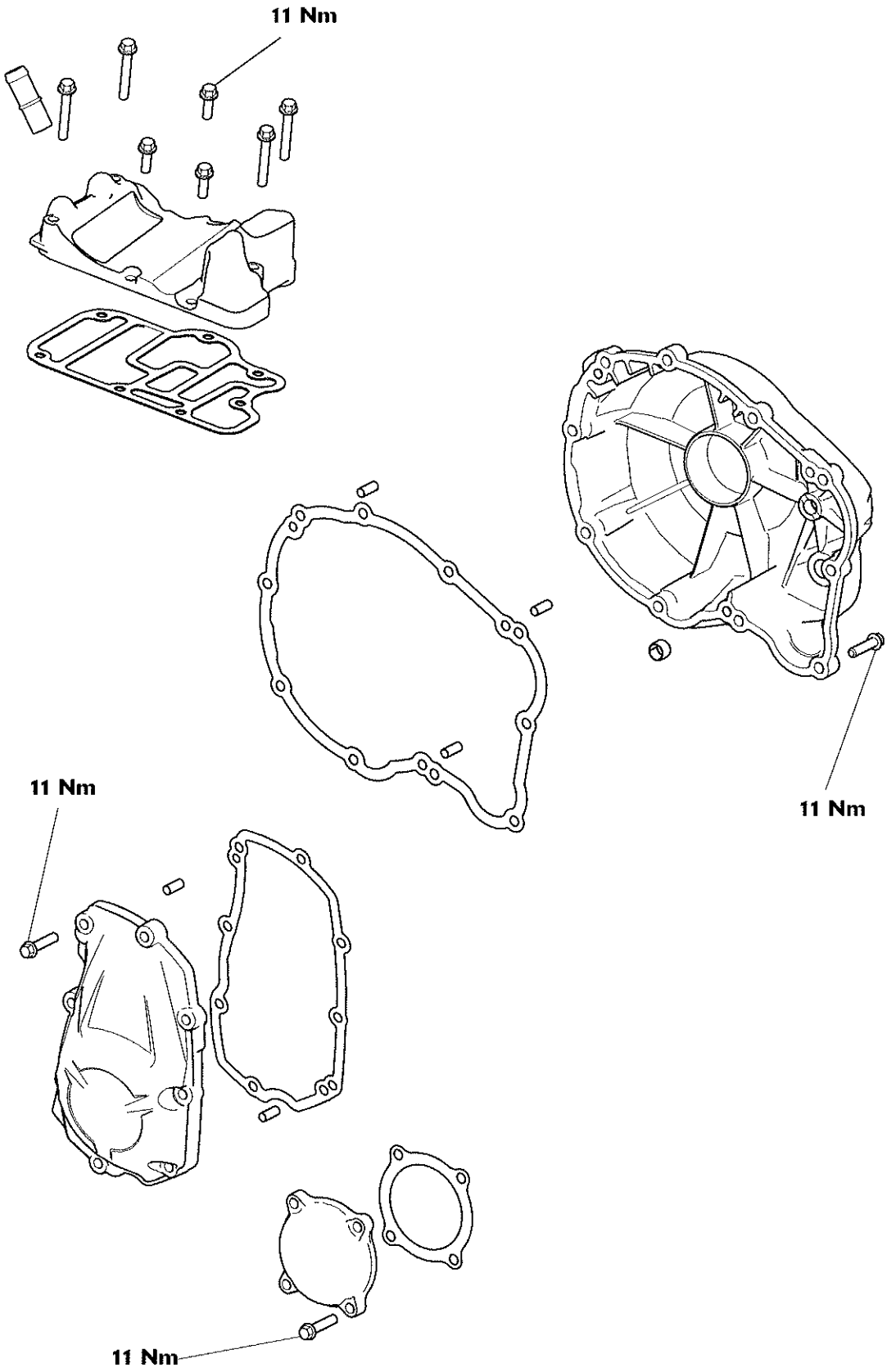
Exploded View - Crankshaft, Connecting Rod, Piston and Liner



Exploded View - Crankcases



Exploded View - Engine Covers



Crankcases

⚠ Caution

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

1. Remove the engine from the frame (see page *9-2*).
2. Remove the sump (see page *8-10*).
3. Remove the flywheel cover (see page *5-19*).
4. Remove the crankshaft cover (see page *5-21*).
5. Remove the balancer shaft cover (see page *5-22*).
6. Remove the clutch (see page *4-13*).
7. Remove the transmission assembly (see page *7-13*).
8. Remove the oil pump (see page *8-12*).
9. Remove the starter drive and flywheel (see page *7-24*).

Note:

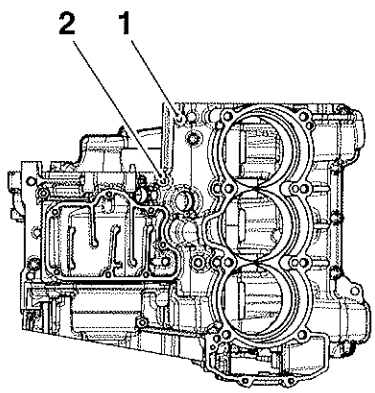
- **If the crankshaft or connecting rods are to be removed, the cylinder head must also be removed.**

Disassembly

⚠ Caution

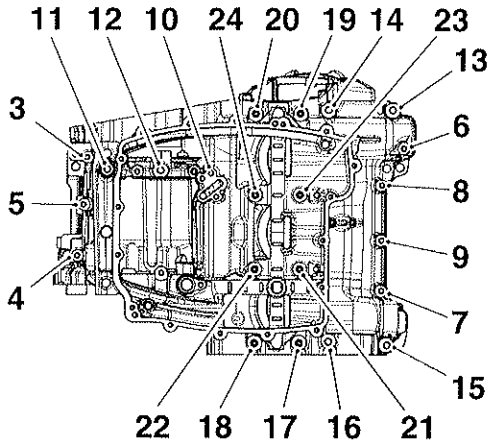
Failure to follow the correct screw release sequence may result in permanent crankcase damage.

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.



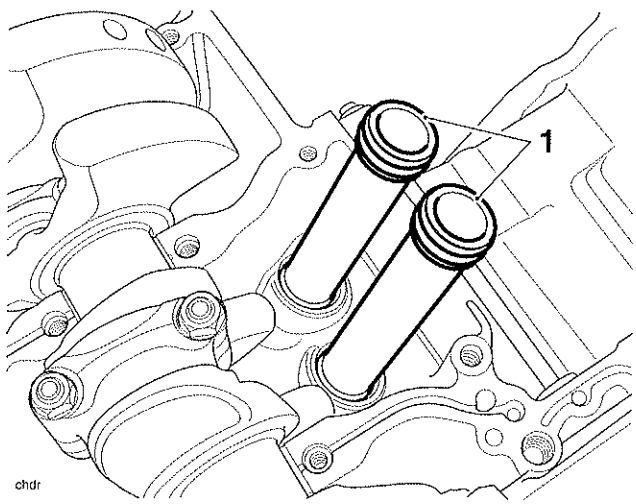
Lower Crankcase Bolt Release Sequence

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

⚠ Caution

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

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



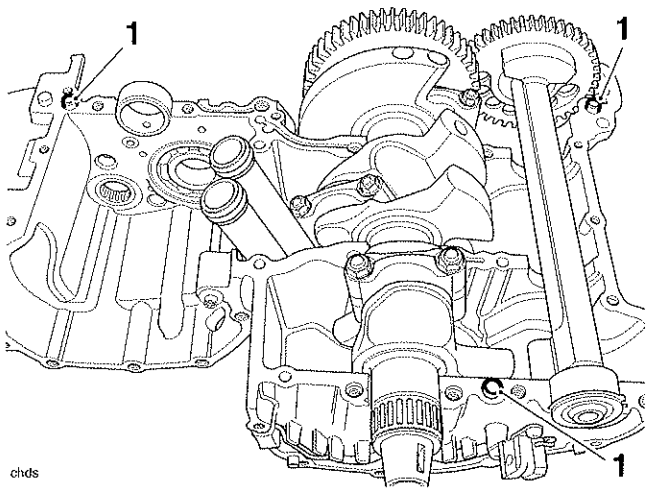
1. Coolant tubes

Note:

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

Assembly

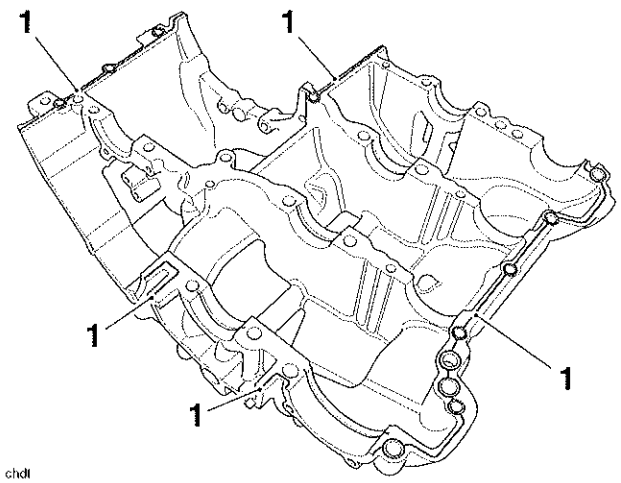
1. Use high flash-point solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.
2. Fit the gearbox shafts (if removed), ensuring the locating ring on the input shaft is in position in the circlip groove on the crankcase.
3. Ensure that the three locating dowels are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



chds

1. Locating dowels

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



chdl

1. Sealer areas

Caution

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

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

Note:

- **The crankcase screws are tightened in stages.**

Caution

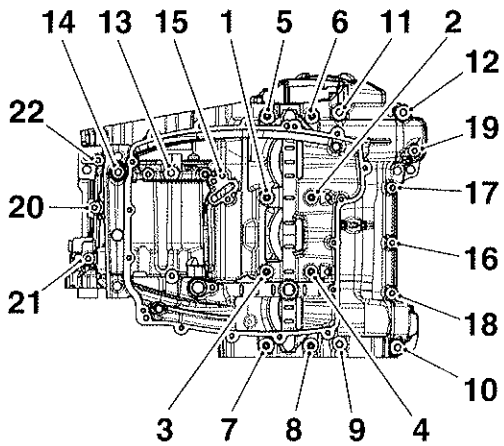
Failure to follow the correct screw tightening sequence may result in permanent crankcase damage.

Stage 1 - M8 screws only

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

Stage 2 - M6 screws only

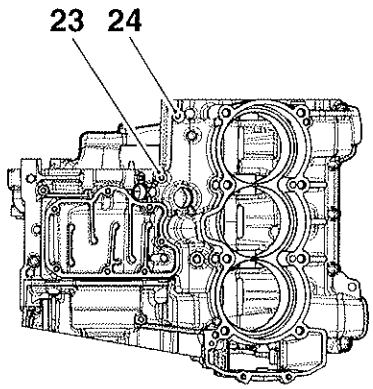
3. In the correct sequence, tighten the M6 size lower crankcase screws (numbers 15 to 22) to **12 Nm**.



Lower Crankcase Bolt Tightening Sequence

4. Invert the engine.

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



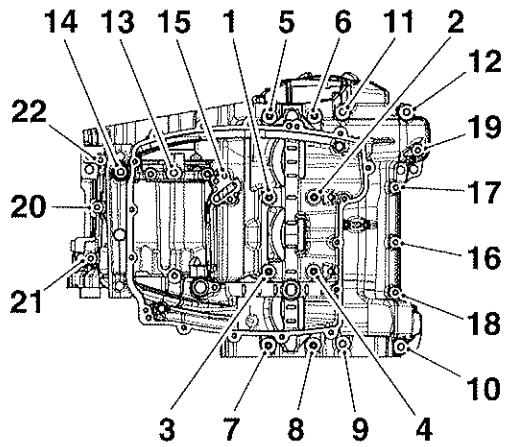
Upper Crankcase Bolt Tightening Sequence

Stage 3- M8 screws only

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

Stage 4- M6 screws only

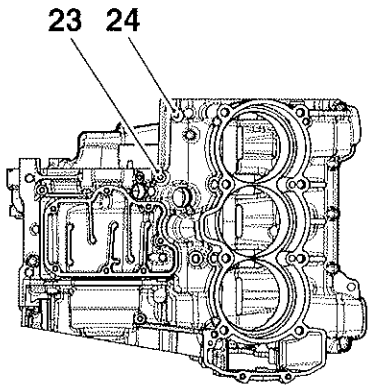
3. In the correct sequence, tighten the M6 size lower crankcase screws (number 15 to 22) to **12 Nm**.



Lower Crankcase Bolt Tightening Sequence

4. Invert the engine.

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



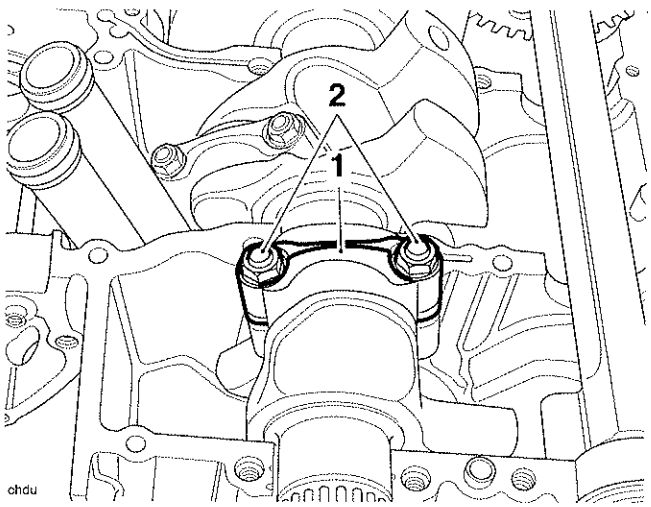
Upper Crankcase Bolt Tightening Sequence

6. Rotate the crankshaft clockwise. Check for tight spots and rectify as necessary.
7. Refit the transmission assembly (see page *7-13*).
8. Refit the starter drive and flywheel (see page *7-25*).
9. Refit the oil pump (see page *8-15*).
10. Refit the clutch (see page *4-17*).
11. Refit the flywheel cover (see page *5-20*).
12. Refit the crankshaft cover (see page *5-21*).
13. Refit the balancer shaft cover (see page *5-22*).
14. Refit the sump (see page *8-11*).
15. Install the engine in the frame (see page *9-4*).

Connecting Rods

Removal

1. Remove the engine from the frame (see page *9-2*).
2. Remove the cylinder head (see page *3-23*).
3. Remove the cylinder liners (see page *5-17*).
4. Remove the pistons from the connecting rod (see page *5-14*).
5. Separate the two halves of the crankcase (see page *5-5*).
6. 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.
7. Release and discard the connecting rod nuts and remove the big end cap. Ensure that the bearing shell remains in place in the cap.



1. Big end cap
2. Connecting rod nuts

Note:

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

8. Push the connecting rod up through the crankcase and collect the connecting rod from the top.
9. Label the assembly to identify the cylinder from which it was removed.
10. Remove and discard the connecting rod bolts.

⚠ 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 bolts and nuts may lead to severe engine damage.

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 always be used.

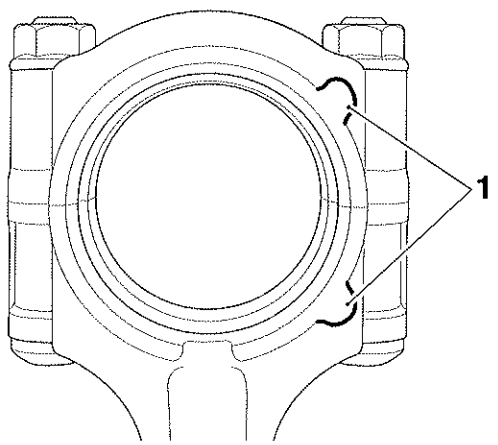
Re-using bolts can cause connecting rods and their caps to detach from the crankshaft causing severe engine damage, loss of motorcycle control and an accident.

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

Note:

- **Ensure the piston is fitted correctly to the connecting rod.**
- **If a previously run engine is being rebuilt, always ensure that the piston and connecting rod are assembled in the same orientation as prior to strip-down.**
- **Connecting rods may be fitted to the pistons either way around. However, ensure all three are fitted facing the same way in relation to the piston. To aid correct assembly, the connecting rods have assembly markers cast in to them, as shown overleaf.**

2. Fit the pistons to the connecting rods (see page *5-16*), ensuring the assembly markers will all be assembled on the same side, when the piston arrows face the front of the engine.

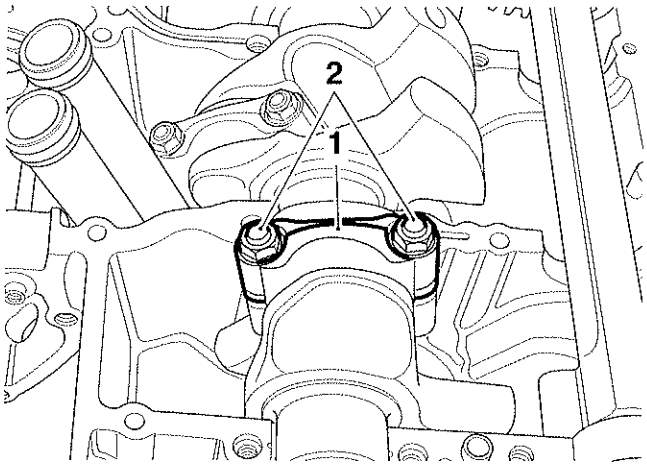


1. Assembly markers

⚠ Caution

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

3. Select the correct big end bearing shells (see page *5-10*).
4. Fit the bearing shells as selected at paragraph 3, to the connecting rod and big end cap and lubricate with a 50/50 solution of engine oil and molybdenum disulphide grease.
5. Align the connecting rod to the crankshaft and fit the big end cap. Ensure the assembly marker on the connecting rod and cap face the same direction.



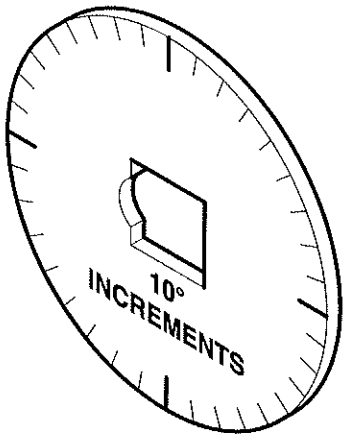
1. Big end
2. Connecting rod nuts

6. Lubricate the threads of the bolt and the face of the nut with molybdenum disulphide grease. Tighten the nuts progressively in two stages as follows:

⚠ 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 **14 Nm**.
b) Tighten through **180°** of nut rotation as measured using the Angular Torque Gauge T3880105.



cbxt

Angular Torque Gauge T3880105

7. Assemble the crankcases (see page *5-6*).
8. Refit the cylinder liners (see page *5-18*).
9. Refit the cylinder head (see page *3-24*).
10. Refit the engine to the frame (see page *9-4*).

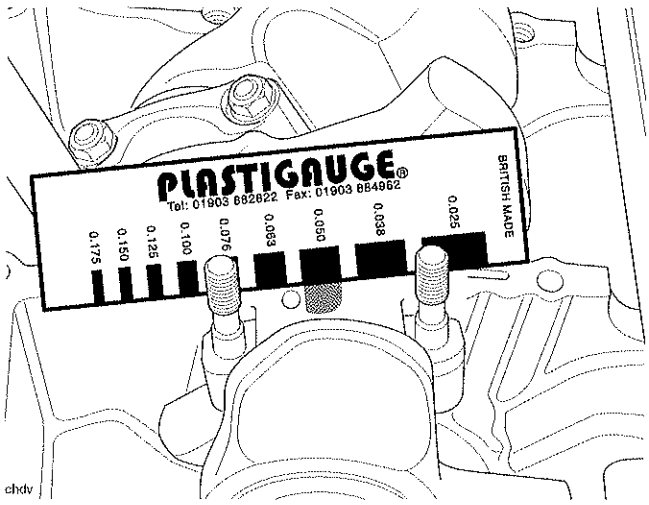
Connecting Rod Bearing Selection/Crankshaft Journal Wear Check

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

Note:

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

2. Remove the big end cap from the journal to be checked.
3. Wipe the exposed areas of the crankshaft journal, and the bearing face inside the cap.
4. Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the bearing.
5. Trim a length of the Plastigauge to fit across the journal. Fit the strip to the journal using the grease to hold the Plastigauge in place.
6. Lubricate the threads of the bolt and the face of the nut with molybdenum disulphide grease. Refit the bearing end cap and tighten the big end nuts (see page *5-9*).
7. Release the nuts and remove the cap being measured. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Checking the Measured Clearance

Connecting Rod Bearing/Crankshaft Journal Clearance

Standard:	0.030 mm
Service Limit:	0.061 mm

Note:

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

Crankshaft Journal Diameter

Standard:	38.020 - 38.036 mm
Service Limit:	37.996 mm

Note:

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

Connecting Rod Bearing Selection

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

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

Connecting Rod Bearing Selection Chart

Shell Colour	White	Red	Red	Blue
Connecting Rod Marking	5	5	4	4
Connecting Rod Bore Dia.	41.000 41.008	41.000 41.008	41.009 41.018	41.009 41.018
Crankshaft Journal Dia.	38.029 38.036	38.020 38.028	38.029 38.036	38.020 38.028
Running Clearance	0.030 0.053	0.030 0.054	0.031 0.055	0.031 0.056

For instance:

Connecting Rod Mark 5

Connecting Rod Bore Diameter . . 41.008

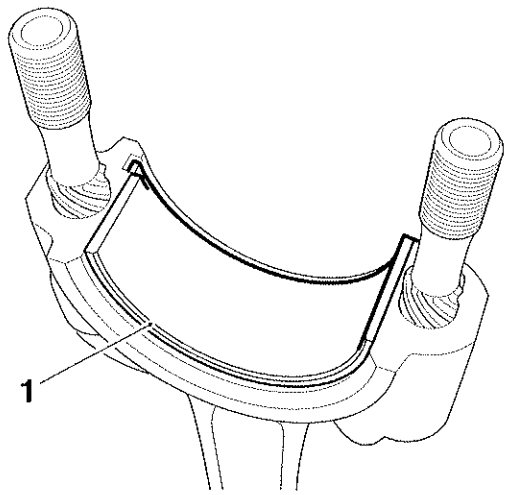
Crankshaft Journal Diameter. 38.020

Required Bearing. . . . . Red

Note:

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

3. Install the new bearings in the connecting rod.



chdy

1. Connecting rod bearing

Caution

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

Crankshaft

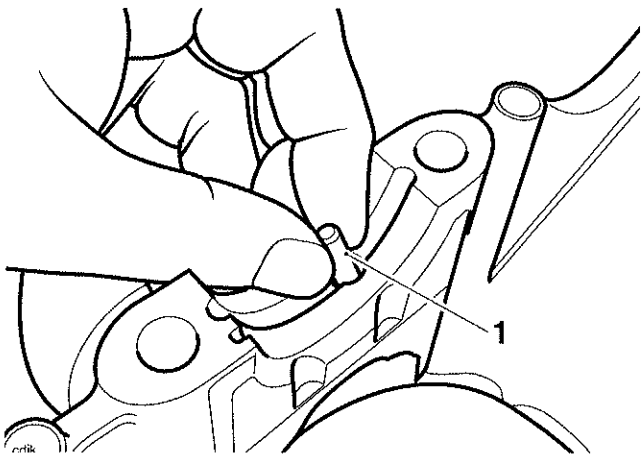
Removal

1. Remove the engine from the frame (see page *9-2*).
2. Separate the two halves of the crankcase (see page *5-5*).
3. Remove the connecting rods (see page *5-8*).
4. Remove the camshaft drive chain (see page *3-20*).
5. Release and remove the crankshaft from the upper crankcase.

Note:

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

6. Collect the piston cooling jets from the crankcase oil ways beneath the crankshaft bearings.



1. Piston cooling jet (one of three)

Caution

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

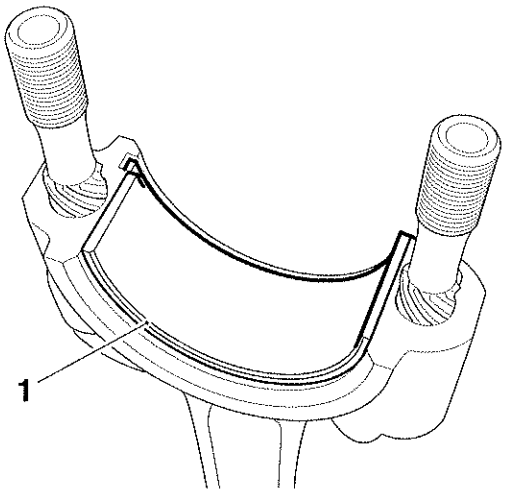
7. Remove the balancer (see page *6-3*).

Installation

Caution

Always check the bearing journal clearance (see page *5-13*), before final assembly of the crankshaft. Failure to correctly select crankshaft bearings will result in severe engine damage.

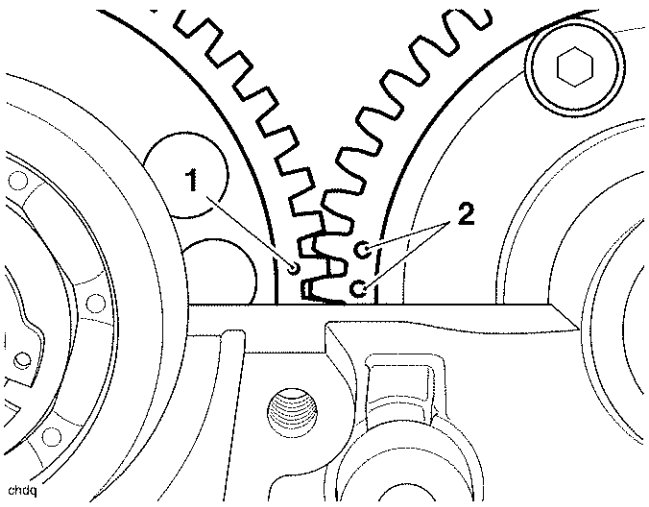
1. If removed, insert the three piston cooling jets into the main bearing housings in the upper crankcase.
2. Select and fit new main and big end shell bearings using the selection processes detailed in this section.



chdy

1. Big end bearing

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



chdq

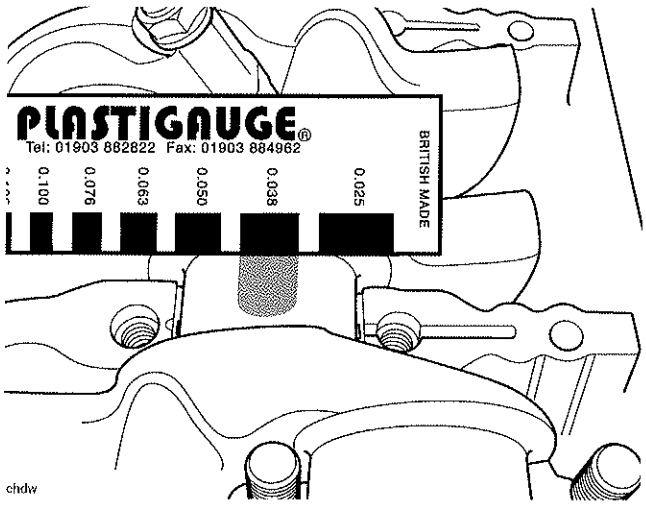
1. Balancer drive gear marking
2. Crankshaft markings

7. Refit the connecting rods (see page *5-8*).
8. Assemble the crankcases (see page *5-6*).
9. Assemble the camshaft drive chain (see page *3-22*).
10. Refit the engine to the frame (see page *9-4*).

Crankshaft Main Bearing/Journal Wear

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

- Measure the bearing to crankshaft main journal clearance using Plastigauge (Triumph part number 3880150-T0301) (see page *5-13*).



Checking Crankshaft Journal Clearance using Plastigauge

Crankshaft Main Bearing/Journal Clearance

Standard:	0.029 - 0.053 mm
Service Limit:	0.061 mm

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

Crankshaft Main Journal Diameter

Standard:	37.960 – 37.976 mm
Service Limit:	37.936 mm

Note:

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

Select bearings as follows:

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

Main Bearing Selection Chart (all dimensions in mm)

Shell Colour	Crankcase Bore	Journal Diameter	Running Clearance
White	41.116 to 41.108	37.969 to 37.976	0.045 to 0.022
Red	41.116 to 41.108	37.968 to 37.960	0.046 to 0.020
Red	41.125 to 41.117	37.976 to 37.969	0.046 to 0.021
Blue	41.125 to 41.117	37.968 to 37.960	0.045 to 0.021
Blue	41.134 to 41.126	37.976 to 37.969	0.045 to 0.022
Green	41.134 to 41.126	37.968 to 37.960	0.046 to 0.022

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

For example:

Crankshaft Journal diameter . . . . .37.962 mm

Crankcase Bore. . . . . .41.125 mm

Bearing Required . . . . . .Blue

Note:

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

⚠ Caution

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

Crankshaft End Float

Standard	0.075 - 0.175 mm
Service Limit	0.375 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.**

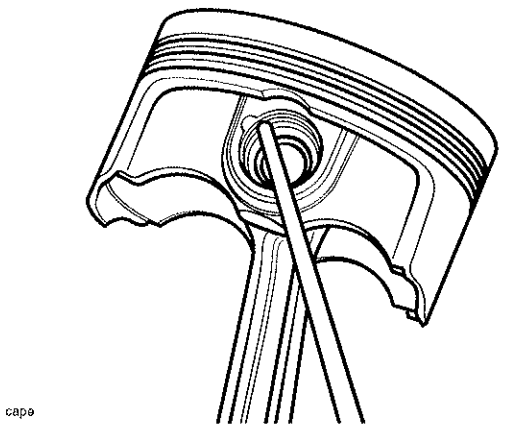
Pistons

Disassembly

Note:

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

1. Remove the cylinder head (see page *3-23*).
2. Remove the cylinder liner (see page *5-17*).
3. Remove the gudgeon pin circlip from one side of the piston.



Removing the Gudgeon Pin Circlip

⚠ Caution

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

Note:

- **If the gudgeon pin is found to be tight in the piston, check the piston for a witness mark caused by the circlip. Carefully remove the mark to allow the pin to be removed.**

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

Note:

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

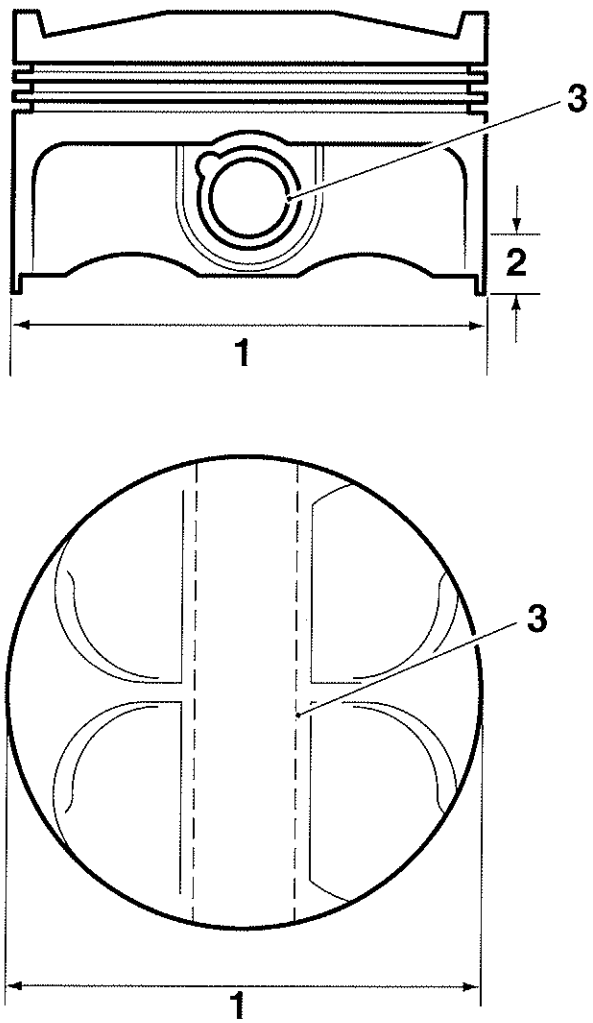
5. Remove the piston rings.

Piston Wear Check

Note:

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

1. Measure the piston outside diameter, 12.5 mm up from the bottom of the piston and at 90° to the direction of the gudgeon pin bore.



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

Piston Diameter

Grade A	84.981 - 84.984 mm
Grade AB	84.972 - 84.980 mm
Grade B	84.968 - 84.971 mm
Service Limit (all grades):	84.928 mm

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

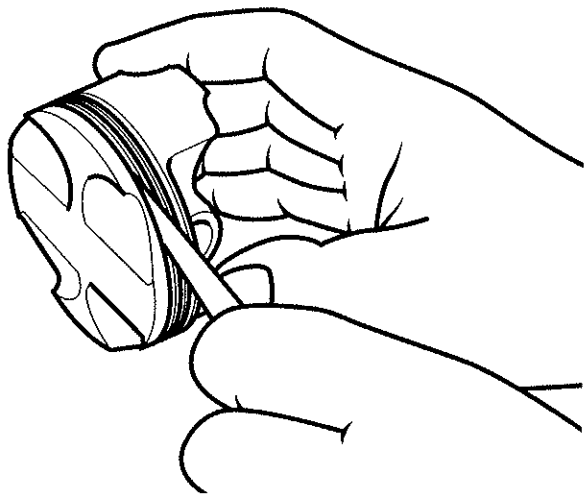
Piston Rings/Ring Grooves

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

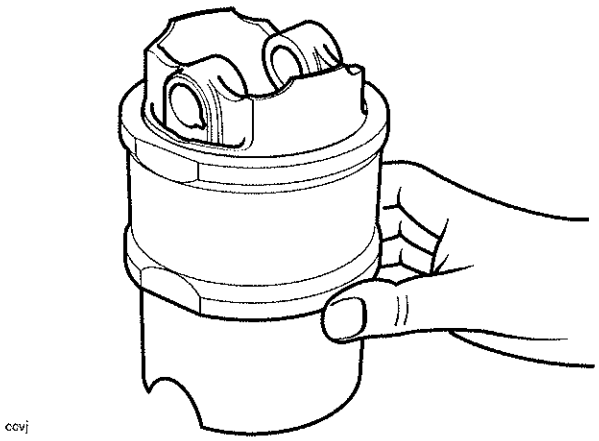
Top Ring	0.000 - 0.040 mm
Service Limit	0.085 mm
Second	0.020 - 0.060 mm
Service Limit	0.075 mm

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 the full circumference of the cylinder.



ccvj

Aligning Piston Rings using the Piston

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

Piston Ring End Gap Tolerances

Top	0.150 - 0.350 mm
Service Limit	0.470 mm
Second	0.350 - 0.550 mm
Service Limit	0.670 mm
Oil Control	0.200 - 0.700 mm
Service Limit	0.84 mm

Note:

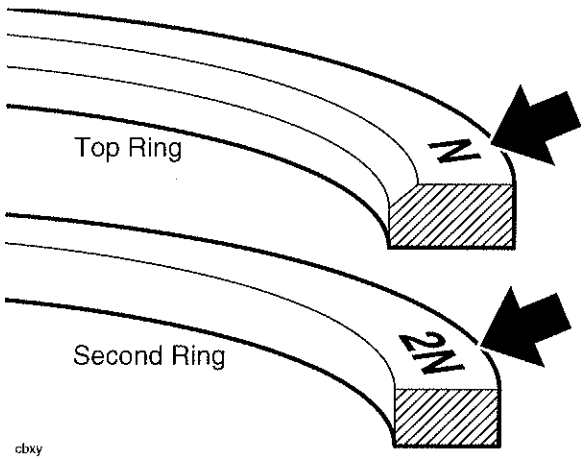
- **If the end gap is too large, replace the piston rings with a new set.**
- **If the gap remains too large with new piston rings, both the pistons and liners must be replaced.**
- **If the gap is too small, check the cylinder bore for distortion, replacing as necessary. DO NOT FILE PISTON RINGS!**

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.**



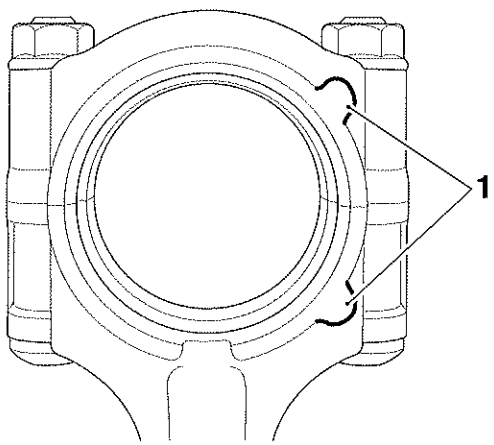
cbxy

Piston Ring Identification

Note:

- **Connecting rods may be fitted either way around. However, ensure all three are fitted the same way in relation to the piston.**

2. Fit the piston to the connecting rod, ensuring the assembly markers in the cap and rod will all be assembled on the same side, when the piston arrows face the front of the engine.



chdx

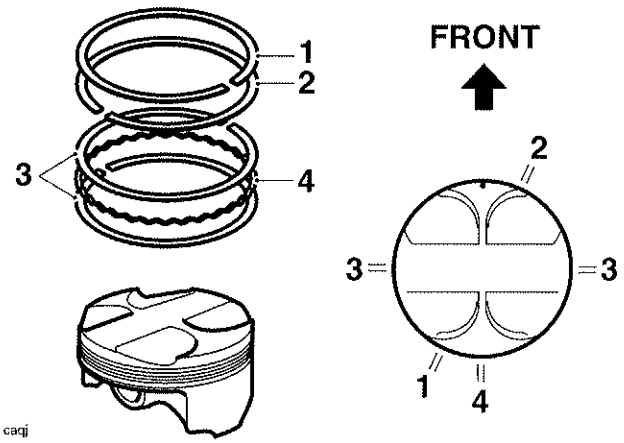
1. Assembly markers

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

⚠ Warning

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

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



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

Note:

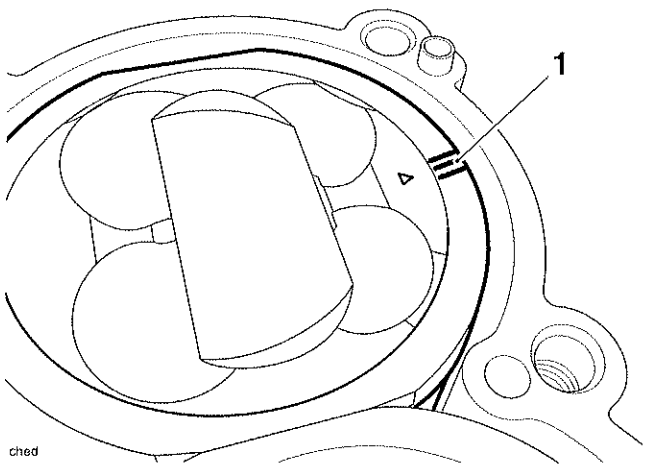
- **The top ring gap should be positioned in the 7 o'clock position, the second ring gap in the 1 o'clock position and the steel oil control ring gaps in the 9 & 3 o'clock positions (one in each position).**

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

Cylinder Liners

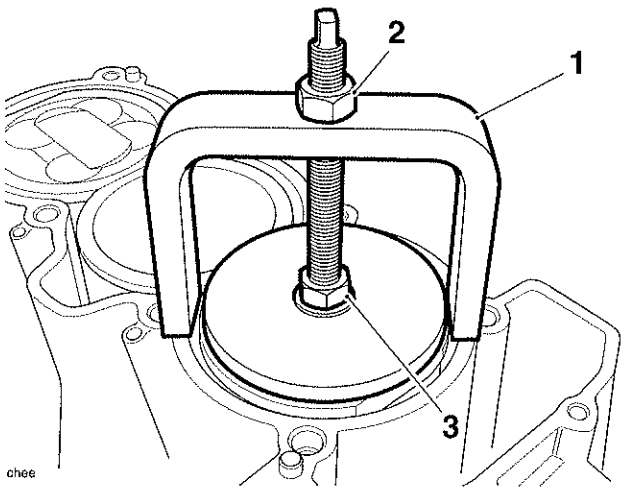
Removal

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



1. **Paint mark**

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



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

3. Check that the locking nut on the Cylinder Liner Extractor T3880315 is loose, then fully unscrew the extraction nut.
4. Carefully fit the tool fully into the cylinder bore, positioning the tool legs on the crankcase. Turn the locking nut clockwise until the rubber sleeve on the tool tightly grips the bore of the liner.

5. Check that the tool legs are positioned to allow withdrawal of the liner, then turn the extraction nut clockwise to extract the liner. Take care to ensure that the piston/connecting rod is not allowed to fall against the inside of the crankcase.
6. Turn the locking nut anti-clockwise 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.**

Cylinder Liner Wear

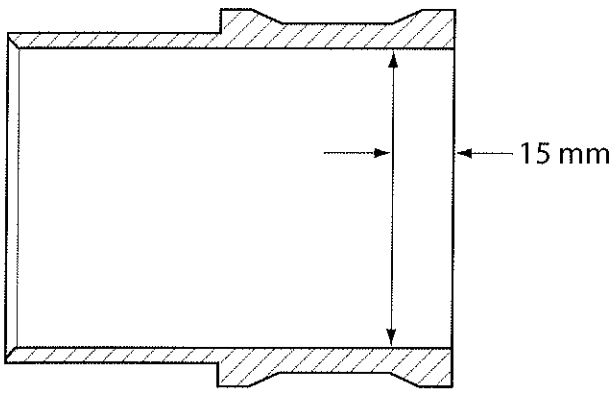
Note:

- **There are two grades of liner used during manufacture, these are grades A and B. For spare parts use, only a grade A liner will be supplied, which will fit all grades of piston.**

Measure the inside diameter of each cylinder liner, 15 mm from the top, using an internal micrometer or similar accurate measuring equipment.

Cylinder Bore Diameter

Grade A	84.995 - 85.003 mm
Grade B	84.985 - 84.994 mm
Service Limit (all grades):	85.100 mm

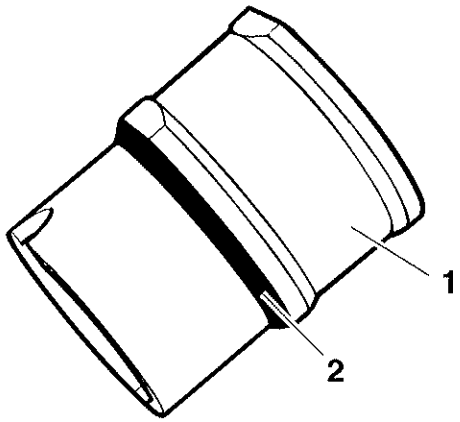


Test Positions For Bore Wear Check (bore shown in section)

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

Installation

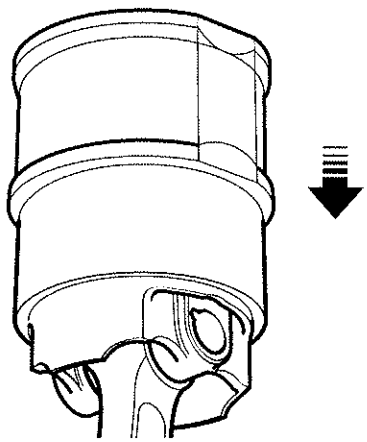
1. Thoroughly clean the liner removing all traces of old silicone sealer.
2. Remove all traces of sealer from the crankcase bores.
3. Apply silicone sealer to the liner to crankcase mating face.



ccvk

1. **Liner**
2. **Sealer area**

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



ccvl

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.

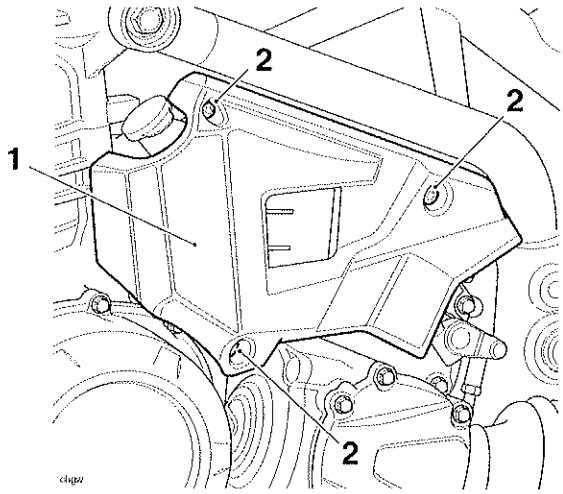
Note:

- **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.**

Flywheel Cover

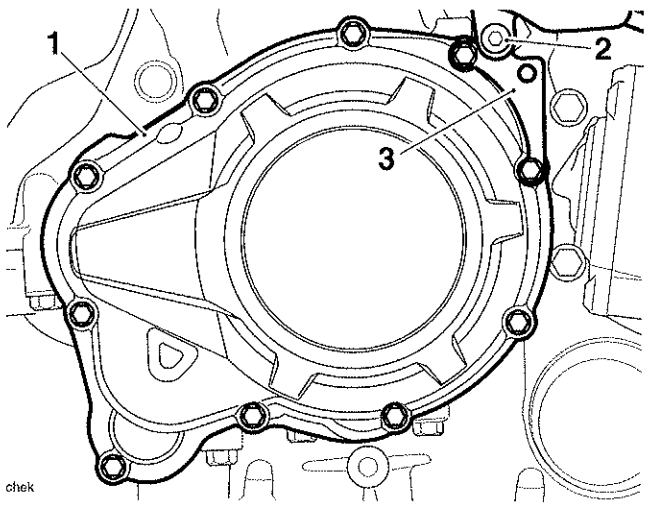
Removal

1. Disconnect the battery, negative (black) lead first.
2. Remove the three fixings and remove the expansion tank cover.



1. **Expansion tank cover**
2. **Fixings**

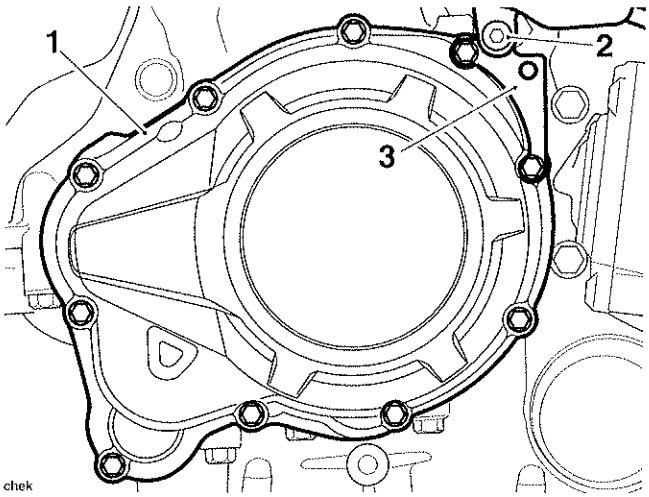
3. Remove the lower expansion tank fixing. It is not necessary to remove or drain the expansion tank.
4. Remove the fixings and remove the flywheel cover. Collect the expansion tank bracket. Discard the gasket.



1. **Flywheel cover**
2. **Expansion tank fixing**
3. **Expansion tank bracket**

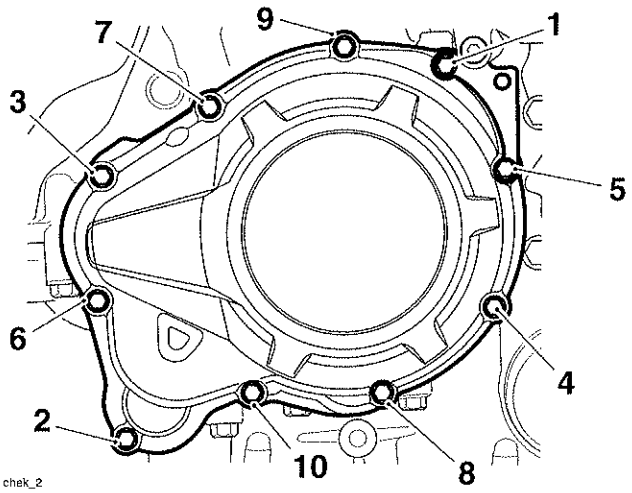
Installation

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



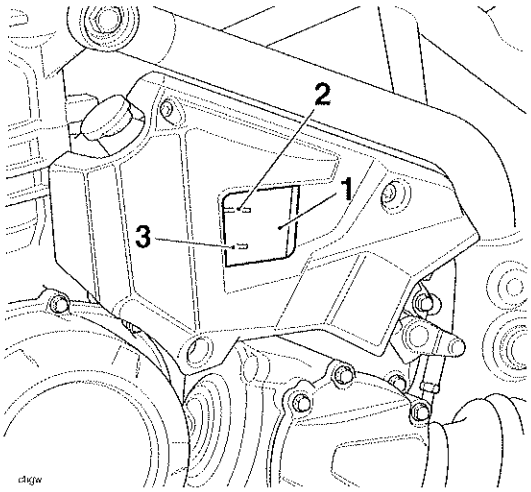
1. **Flywheel cover**
2. **Expansion tank fixing**
3. **Expansion tank bracket**

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



Flywheel Cover Tightening Sequence

5. Refit the expansion tank lower fixing, tightening to **9 Nm**.
6. Refit the expansion tank cover and secure with three new fixings. Tighten the upper fixing to **3 Nm** and the lower to **7 Nm**.



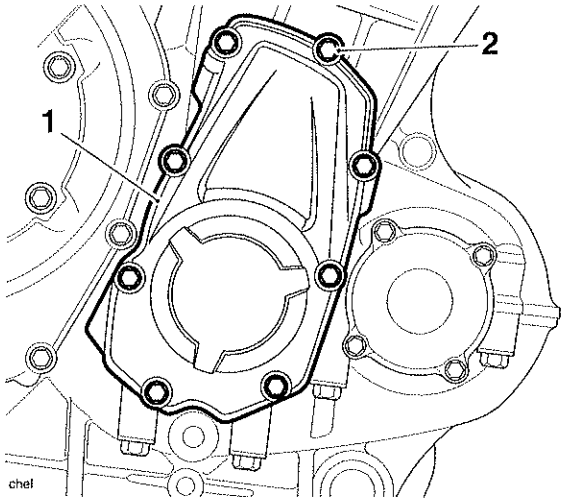
1. **Expansion tank cover**
2. **Fixings**
3. **Lower fixings (M6)**

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

Crankshaft Cover

Removal

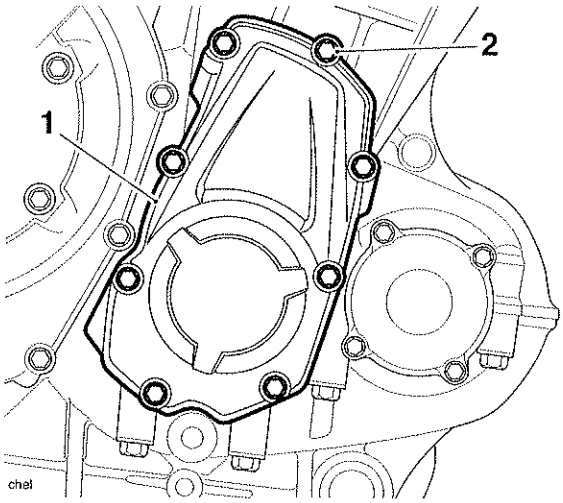
1. Remove the seven fixings, noting the position of the patch-locked bolt.
2. Remove the crank cover. Discard the patch-locked bolt and gasket.



1. Crankshaft cover
2. Patch-locked bolt

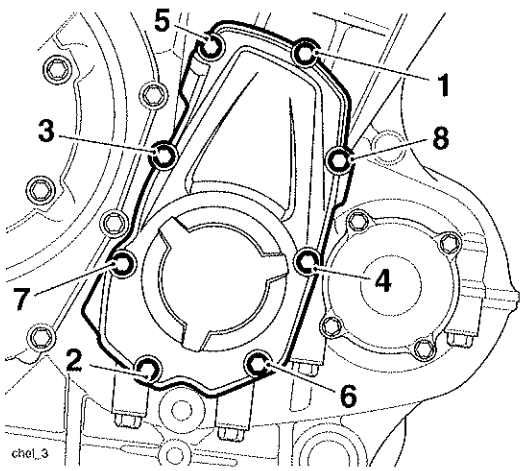
Installation

1. Thoroughly clean the crankshaft cover.
2. Position a new gasket to the crankcase dowels.
3. Refit the crankshaft cover, installing a new patch-locked bolt to the position shown below.



1. Crankshaft cover
2. Patch-locked bolt

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

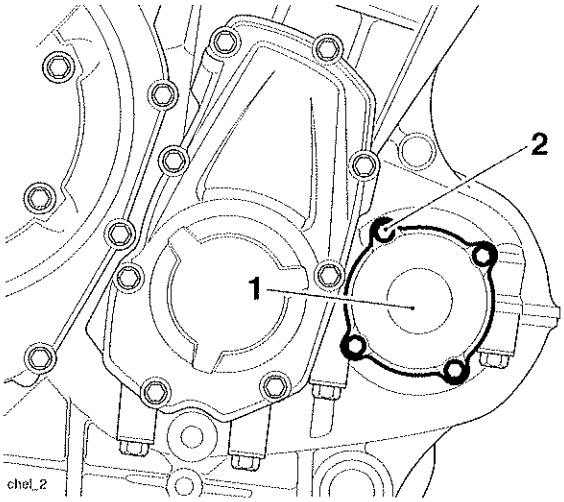


Crankshaft Cover Tightening Sequence

Balancer Shaft Cover

Removal

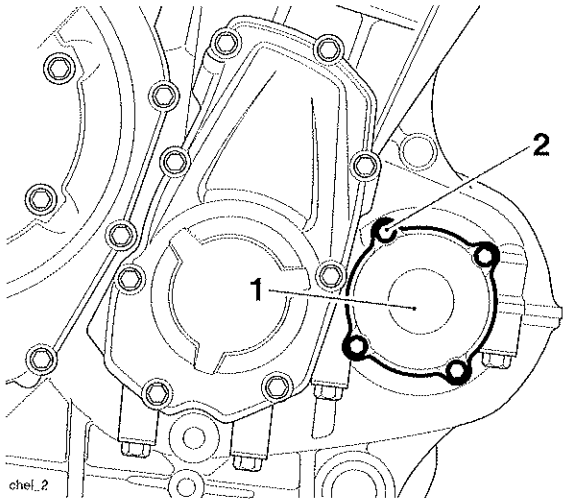
1. Remove the four fixings.
2. Remove the balancer shaft cover.



1. Balancer cover
2. Fixings

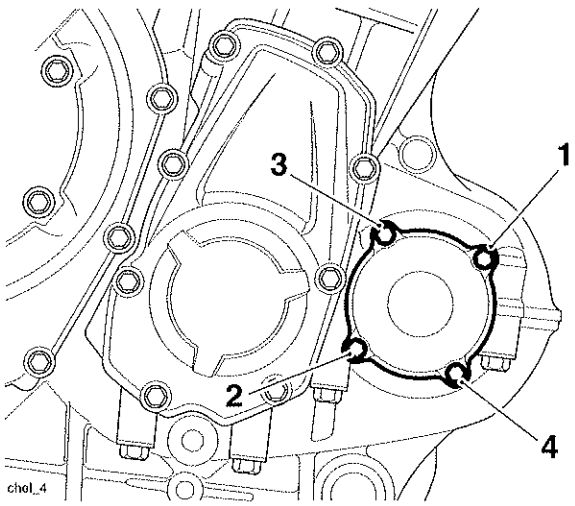
Installation

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



1. Balancer cover
2. Fixings

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



Balancer Cover Tightening Sequence

6 Balancer

Table of Contents

Exploded View - Balancer Shaft. 6.2

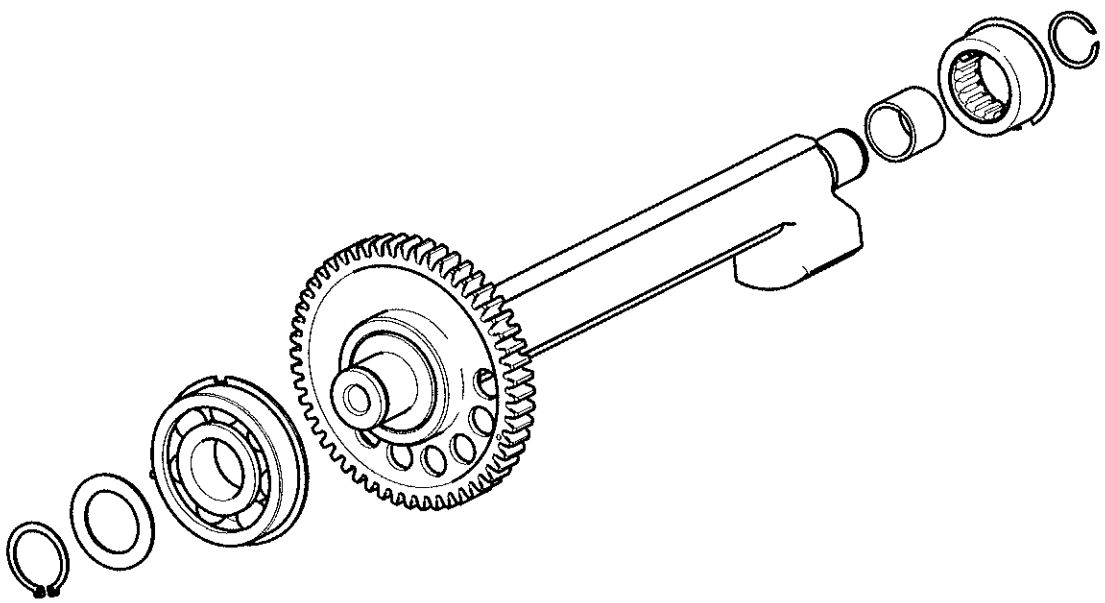
Balancer 6.3

Removal 6.3

Inspection 6.3

Installation 6.3

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.

Removal

1. Separate the crankcase halves (see page *5-5*).
2. With the crankcase halves separated, lift out the balancer shaft complete with the shaft bearings/ circlips.
3. To remove the left hand bearing, slide the bearing, circlip and bearing sleeve from the balancer shaft.
4. To remove the right hand bearing, remove the circlip and slide the bearing race and thrust washer from the shaft.

Inspection

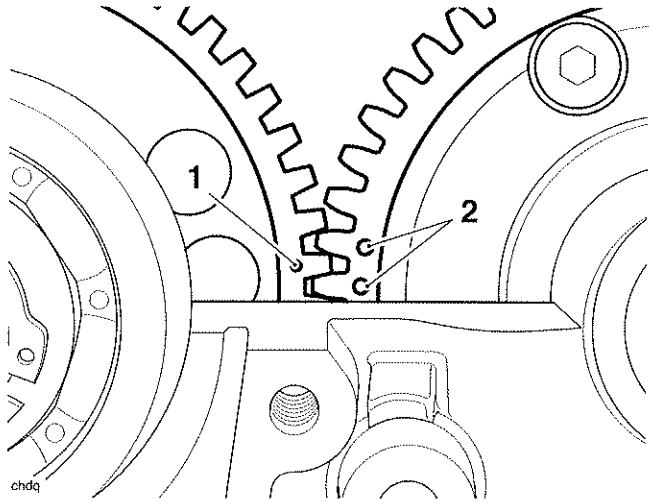
1. Inspect all gears for chipped or missing teeth.
2. Inspect all bearings for signs of overheating (blue discolouration), seized or damaged rollers, and any other damage.
3. Inspect the gear teeth for overheating (blue discolouration).

Note:

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

Installation

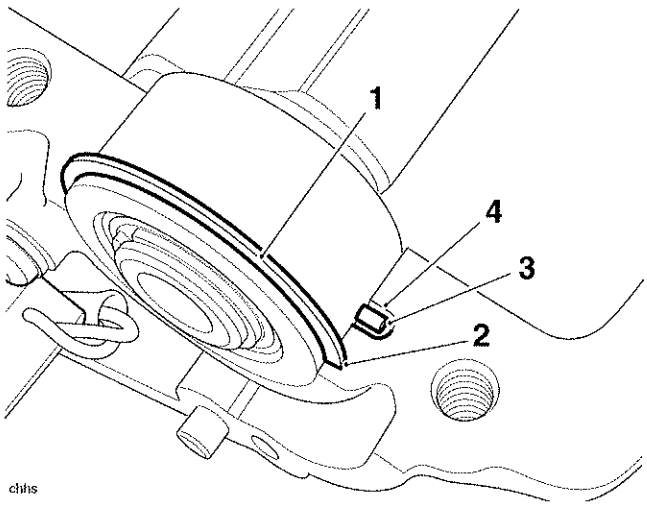
1. Lubricate and fit the right hand bearing and circlip to the shaft.
2. Lubricate and fit the left hand bearing and circlip.
3. Locate the balancer to the crankcase aligning the balancer gears and crankshaft as shown in the illustration below, while ensuring that the bearing circlips and pins locate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



1. Balancer drive gear markings
2. Crankshaft markings

⚠ Caution

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



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

4. Check that the balancer and crankshaft are correctly aligned before continuing.
5. Assemble the crankcase halves (see page *5-6*).

This page intentionally left blank

7 Transmission

Table of Contents

Exploded View - Transmission, Input and Output Shafts 7.2
Exploded View - Flywheel, Sprag Clutch and Starter Gears 7.3
Exploded View - Gear Selectors and Drum 7.4
Exploded View - Gear Change Mechanism 7.5
Description 7.6
Gear Change Linkage 7.6
- Removal 7.6
- Installation 7.8

Selector Shaft 7.9
- Removal 7.9
- Installation 7.11

Transmission 7.13
- Removal 7.13
- Installation 7.13

Selector Drum and Selector Forks 7.13
- Removal 7.13
- Inspection 7.14
- Installation 7.15

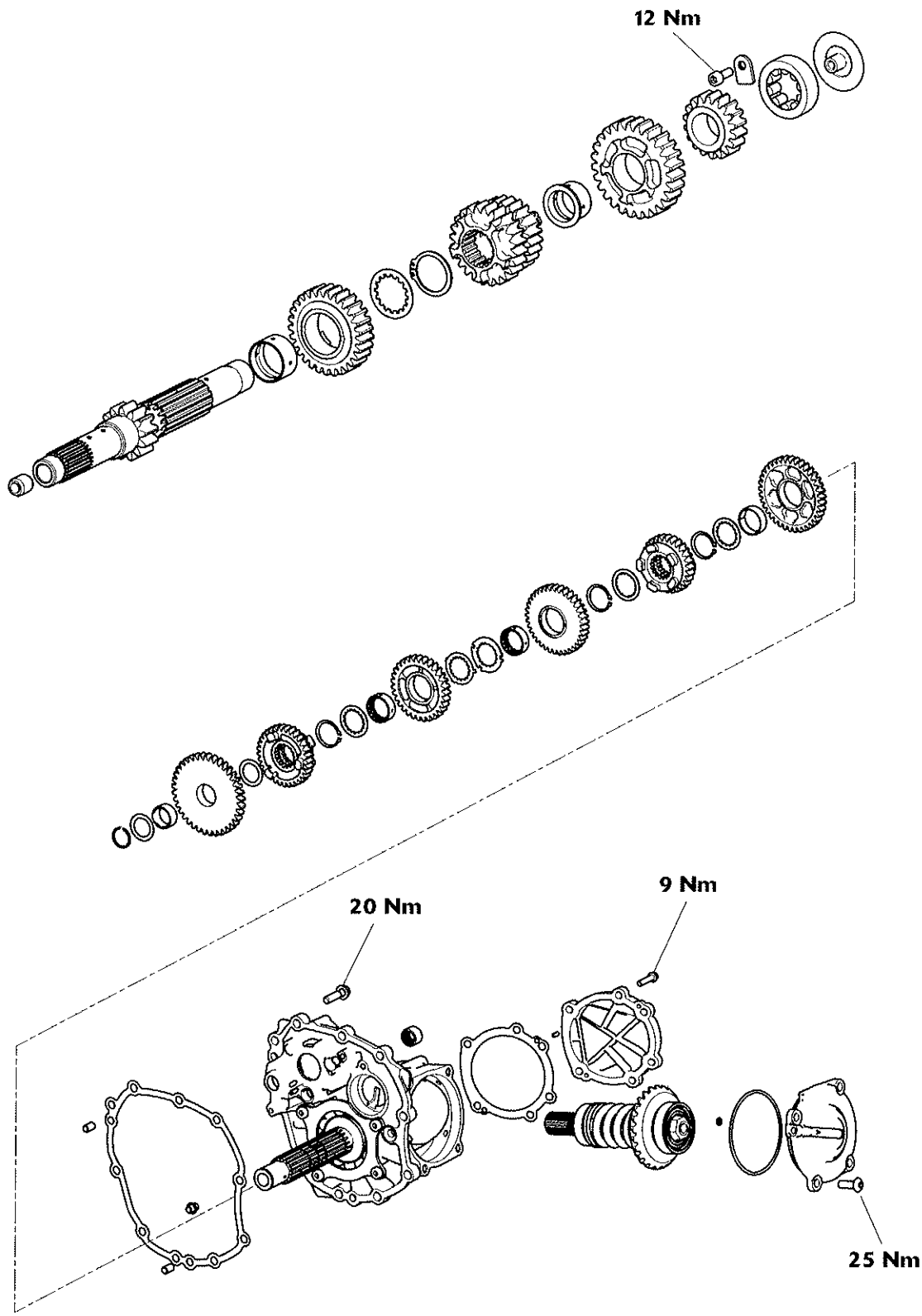
Input Shaft 7.16
- Removal 7.16
- Installation 7.17

Exploded View - Output Shaft 7.18
Output Shaft 7.19
- Disassembly 7.19
- Assembly 7.20

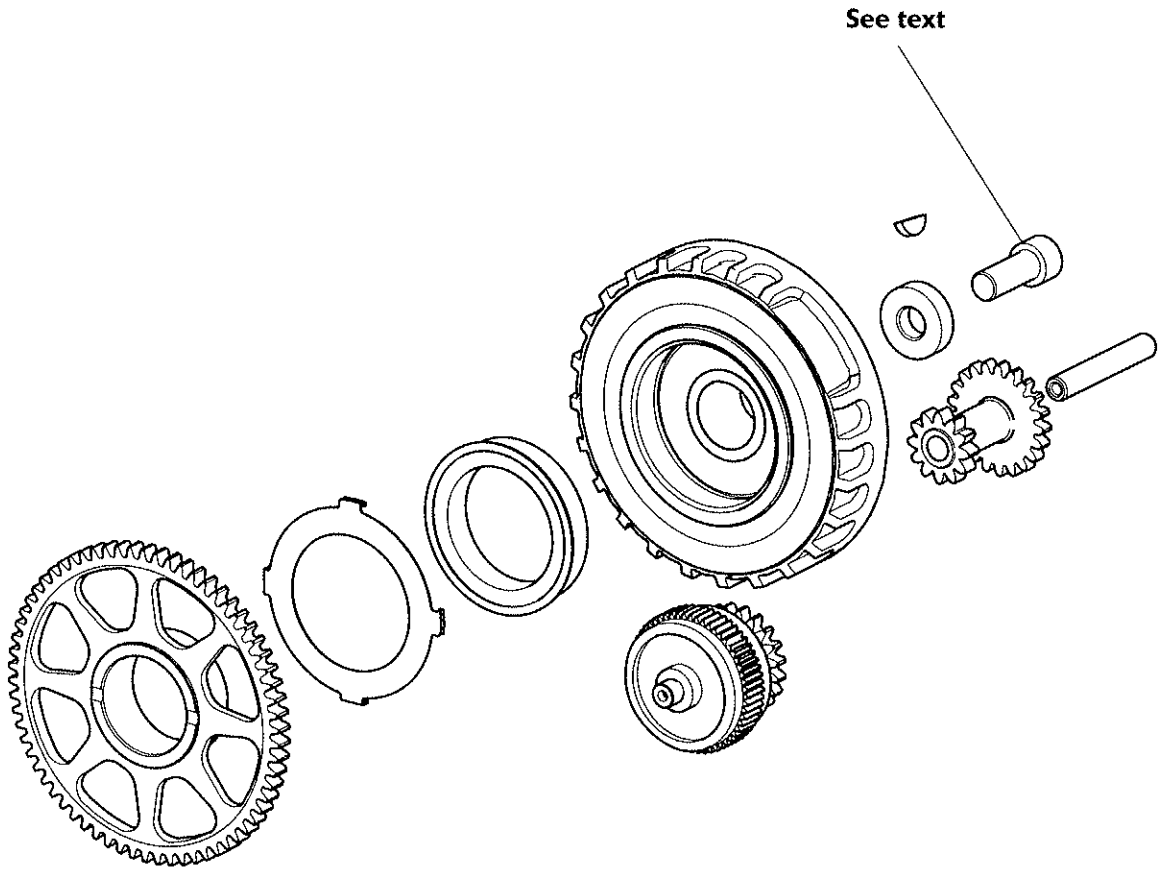
Bevel Box Damper Shaft Oil Seal 7.22
- Removal 7.22
- Installation 7.23

Flywheel, Starter Drive Gears and Sprag Clutch 7.24
- Removal 7.24
- Inspection 7.26
- Installation 7.26

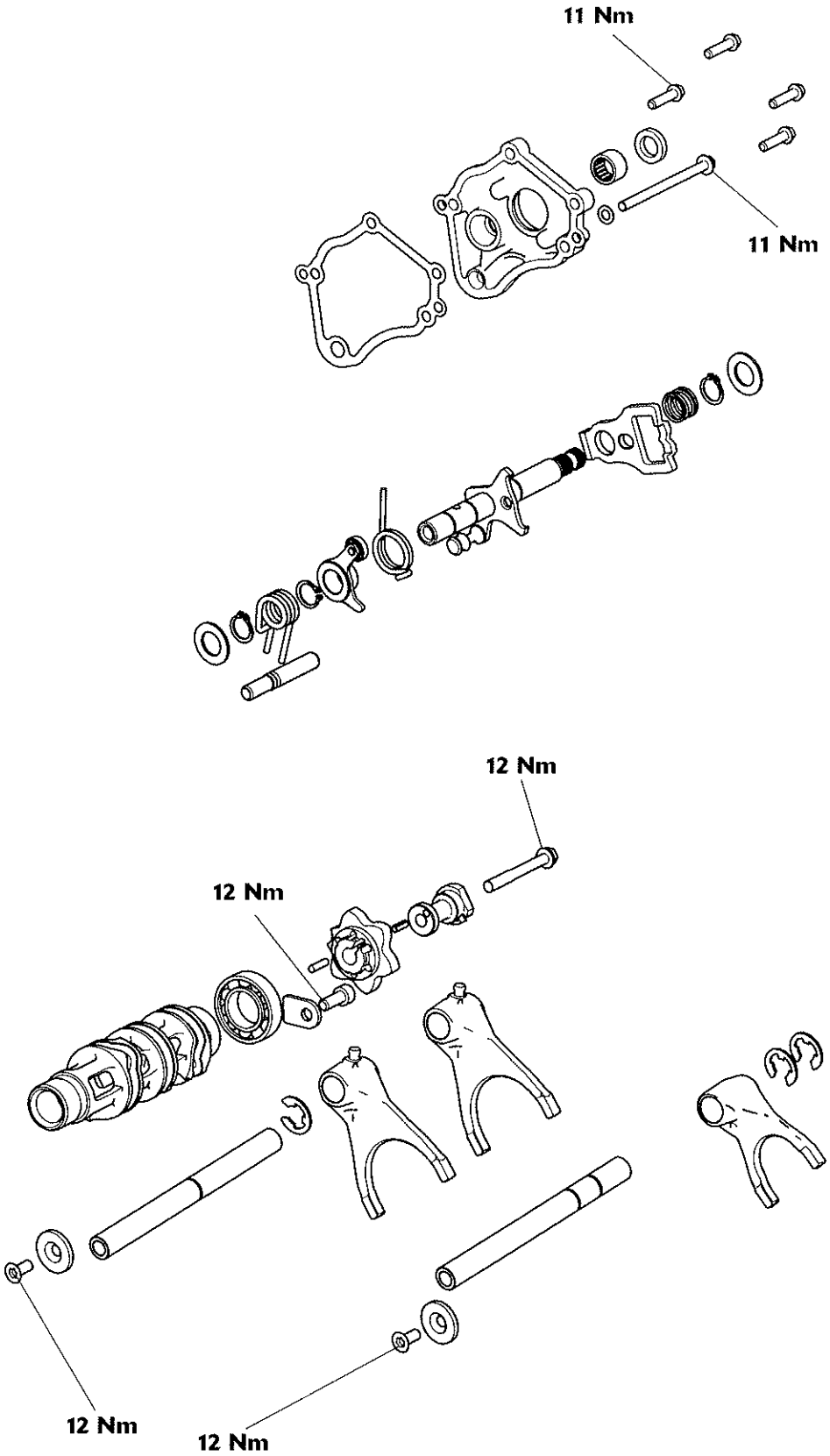
Exploded View - Transmission, Input and Output Shafts



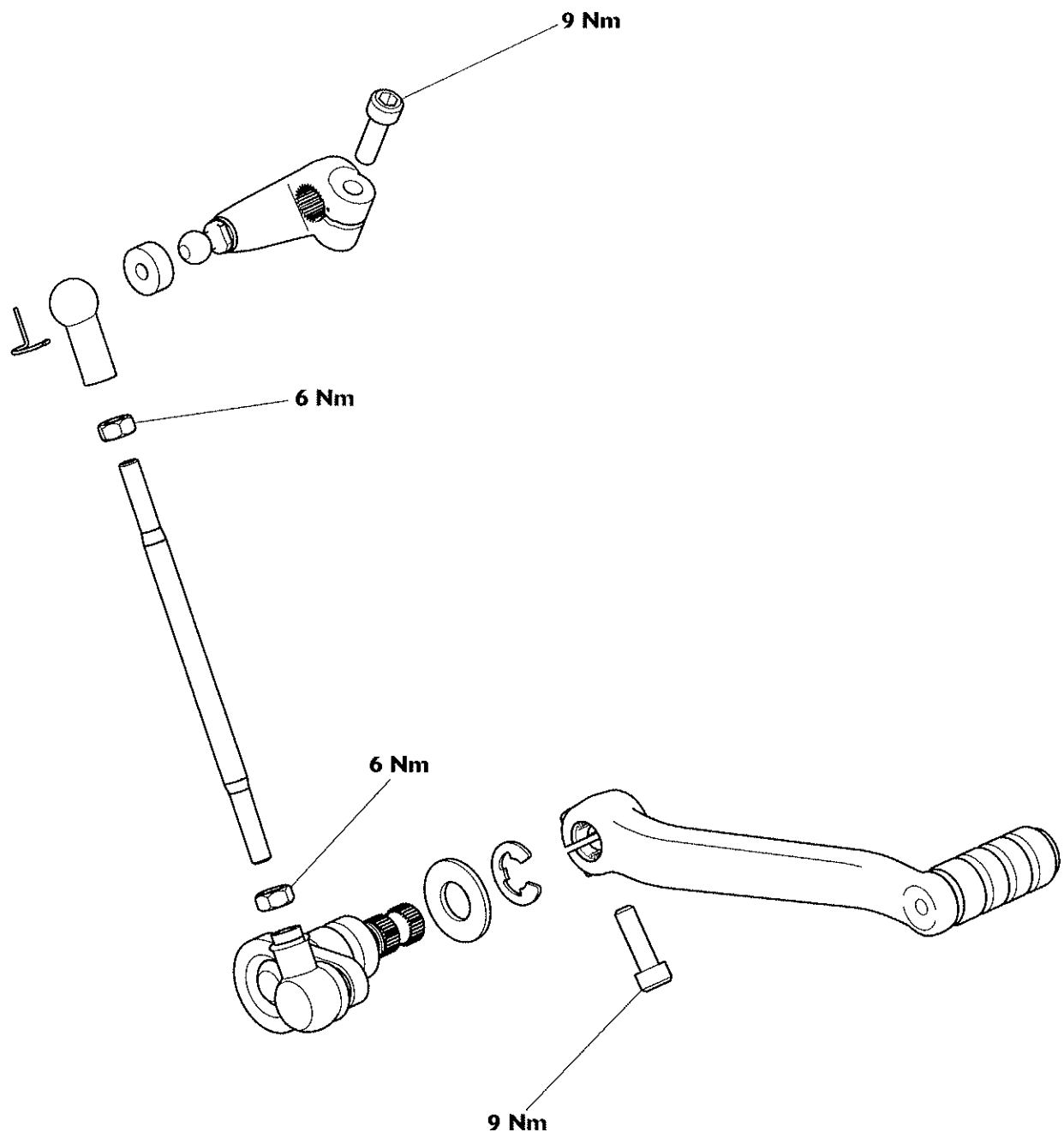
Exploded View - Flywheel, Sprag Clutch and Starter Gears



Exploded View - Gear Selectors and Drum



Exploded View - Gear Change Mechanism



Description

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

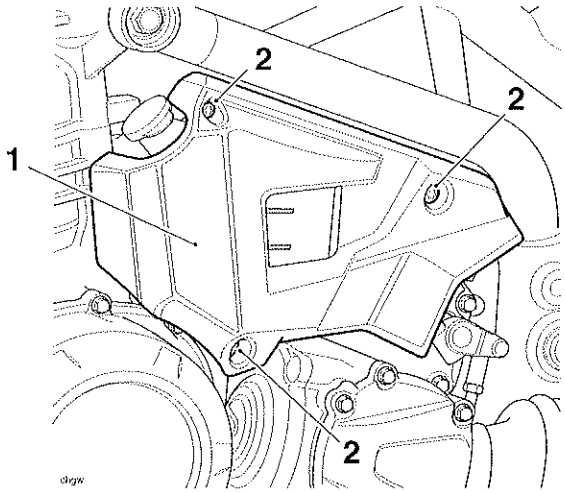
The front bevel box assembly contains no user serviceable parts, and must be replaced if any wear or damage are found. It is permitted however to replace the damper shaft oil seal and the bevel box casing O-rings and gaskets.

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

Gear Change Linkage

Removal

1. Remove and discard the three fixings and remove the expansion tank cover.



1. **Expansion tank cover**
2. **Fixings**

Note:

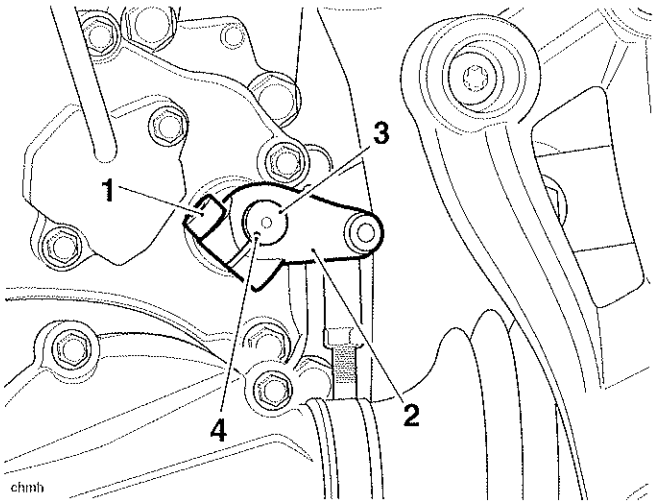
- **The upper ball joint and lock nut on the gear change linkage has a left hand thread. This is identified by a machined ring on the linkage and on the ball joint.**

2. Loosen the two lock nuts on the gear change linkage.

Note:

- **Note the position of the transmission linkage in relation to the punch mark on the gear change mechanism.**

3. Select neutral, remove the pinch bolt and disconnect the transmission linkage from the gear change mechanism.

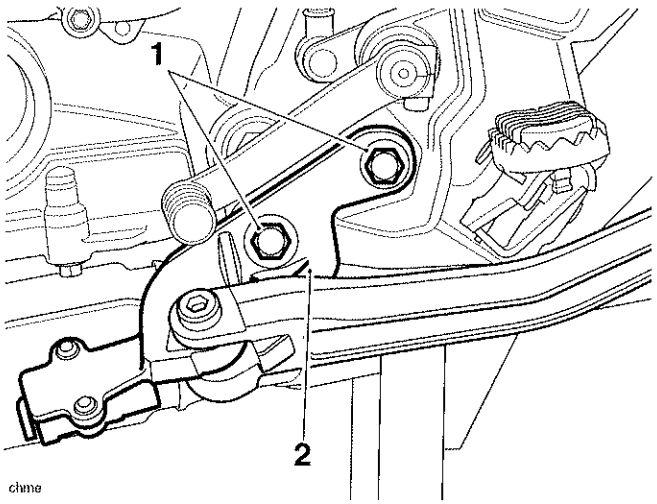


1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

Note:

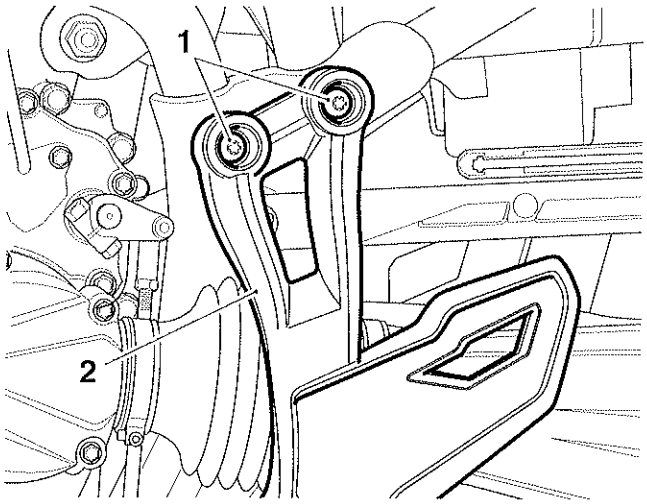
- **Do not allow the side stand to hang on the harness for the side stand switch.**
- **Note the routing of the harness for the side stand switch for installation.**

4. Release the fixings, detach the side stand and position aside.



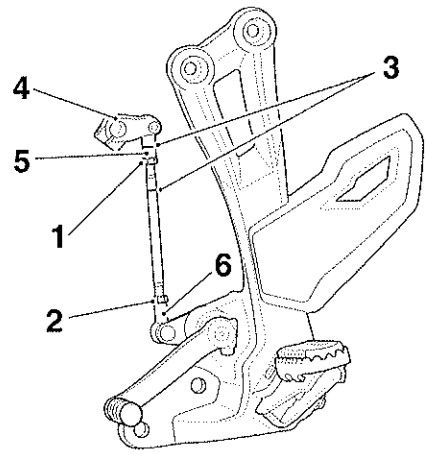
1. **Fixings**
2. **Side stand**

5. Release the fixings and remove the left hand control plate.



1. **Fixings**
2. **Control plate**

6. Remove the upper ball joint from the gear change linkage (left hand thread).
7. Remove the gear change linkage from the lower ball joint (right hand thread).

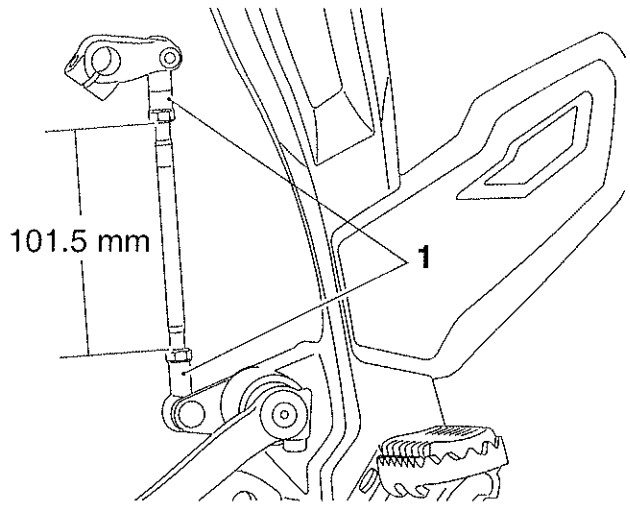


1. **Lock nut, left hand thread**
2. **Lock nut, right hand thread**
3. **Machined rings**
4. **Transmission linkage**
5. **Upper ball joint**
6. **Lower ball joint**

8. If necessary, remove the lock nuts from the gear change linkage.

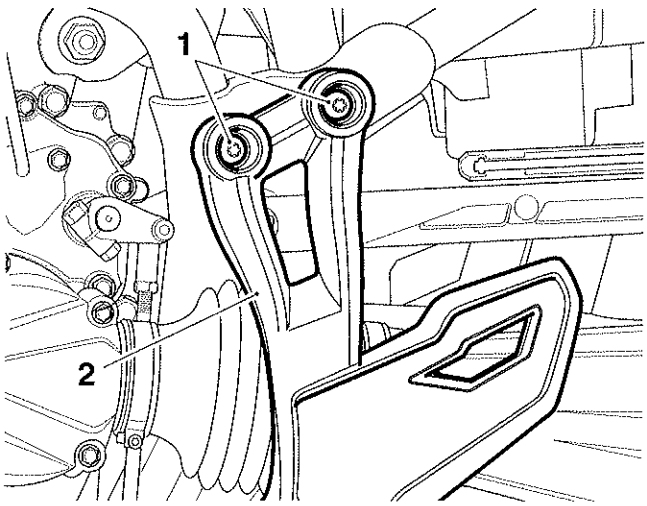
Installation

1. If removed, fit the lock nuts to the gear change linkage.
2. Screw the right hand threaded end of the gear change linkage into the lower ball joint by three complete turns.
3. Screw the upper ball joint and transmission linkage assembly to the left hand threaded end by three complete turns.
4. While holding the ball joint and transmission linkage assembly stationary, turn the gear change linkage to adjust the distance between the two ball joints to 101.5 mm.



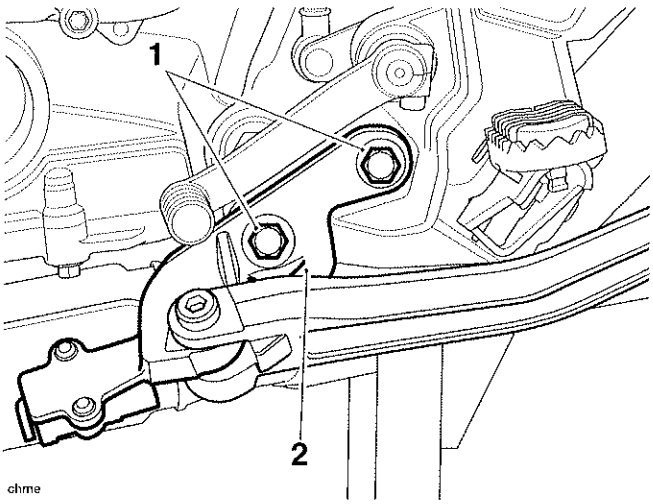
1. **Ball joints**

5. Move the lock nuts to the base of their ball joints and tighten the lock nut for the lower ball joint only to **6 Nm**. Do not fully tighten the upper lock nut at this stage.
6. Align the left hand control plate to the frame and fit the two upper fixings. Do not fully tighten at this stage.



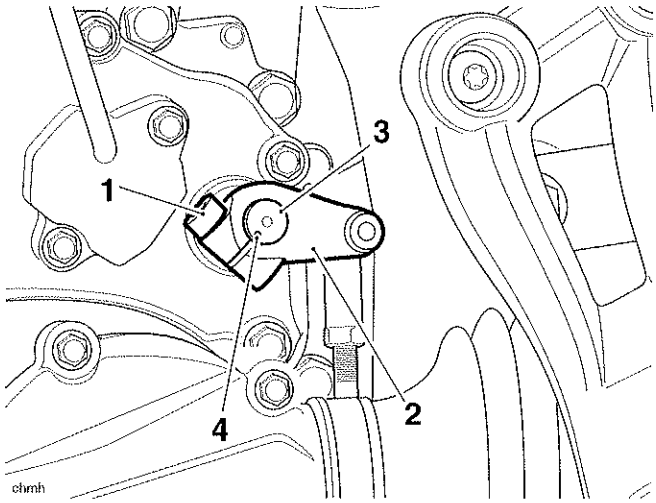
1. **Fixings**
2. **Control plate**

7. Route the harness for the side stand switch as noted for removal.
8. Fit the side stand and tighten its fixings to **70 Nm**.



1. **Fixings**
2. **Side stand**

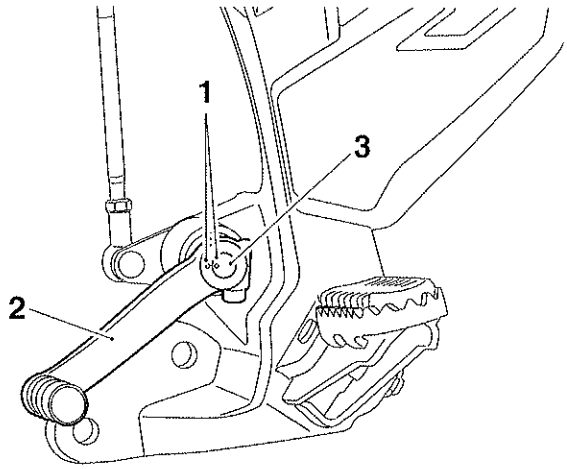
9. Tighten the upper fixings for the left hand control plate to **18 Nm**.
10. Fit the transmission linkage to the gear change mechanism as noted for removal.
11. Fit the pinch bolt and tighten it to **9 Nm**.



1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

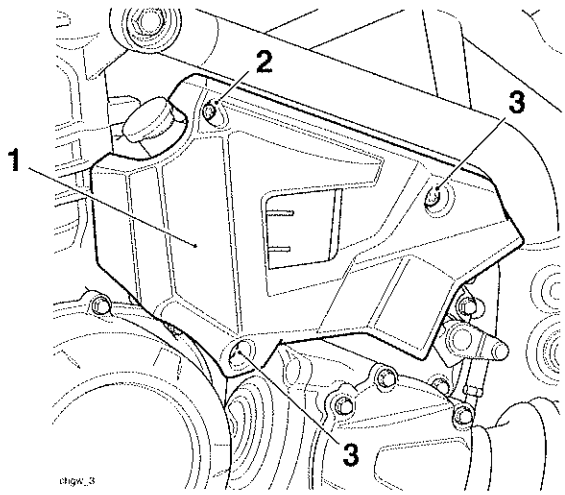
12. Tighten the upper lock nut (left hand thread) on the gear change linkage to **6 Nm**.
13. Check that the lower ball joint is facing the pivot for the gear change pedal and is not twisted to one side.
14. If the gear change pedal has been removed, align the punch mark on the pedal to the punch mark on the pivot for the gear change pedal.

15. Push the gear change pedal fully on, fit the pinch bolt and tighten to **9 Nm**.



1. **Punch marks**
2. **Gear change pedal**
3. **Pivot**

16. Refit the expansion tank cover and secure with three new fixings. Tighten the upper fixing (M5) to **3 Nm** and the lower fixings (M6) to **7 Nm**.



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

Selector Shaft

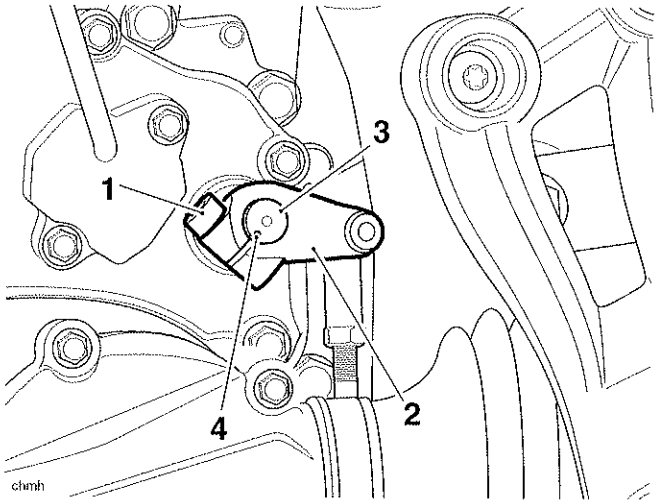
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the coolant expansion tank (see page *11-14*).

Note:

- **Note the position of the transmission linkage in relation to the punch mark on the gear change mechanism.**

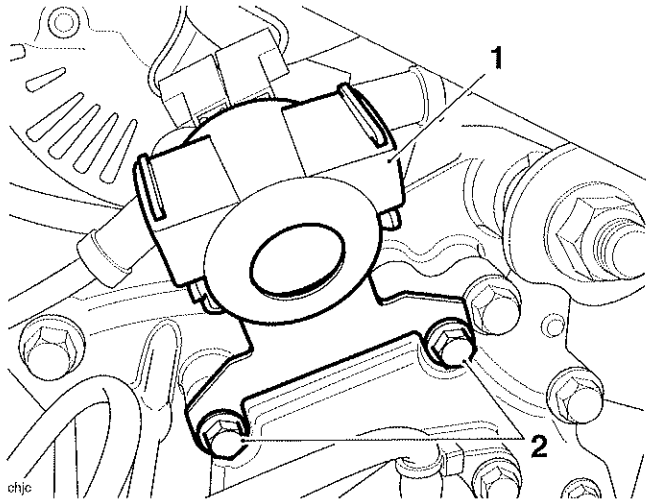
4. Select neutral, remove the pinch bolt and disconnect the transmission linkage from the gear change mechanism.



1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

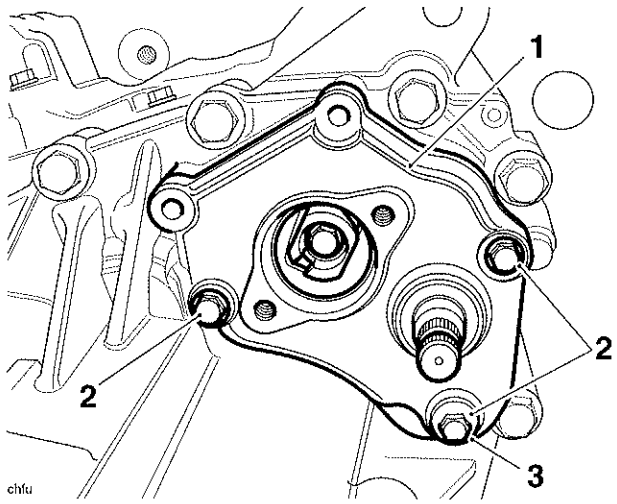
5. Remove the gear position sensor (see page *10-135*).

6. Remove the two upper selector cover fixings and detach the starter solenoid and bracket. Position the starter solenoid aside.



1. Starter solenoid
2. Fixings

7. Remove the three remaining fixings and remove the selector shaft cover and gasket. Note the position of the two dowels.
8. Note that the 90 mm fixing is fitted with a copper washer.



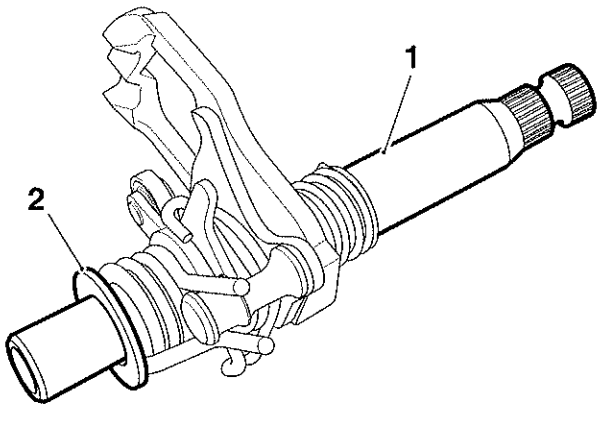
1. Selector shaft cover
2. Fixings
3. Copper washer position

9. Collect the washer from the outer end of the selector shaft.

Caution

Take care to ensure that the washer fitted to the inner end of the selector shaft remains in position during removal of the shaft. Should the washer become dislodged during removal, it is possible for it to drop in to the transmission housing. Should this happen, it will be necessary to remove the transmission and/or sump to recover the washer.

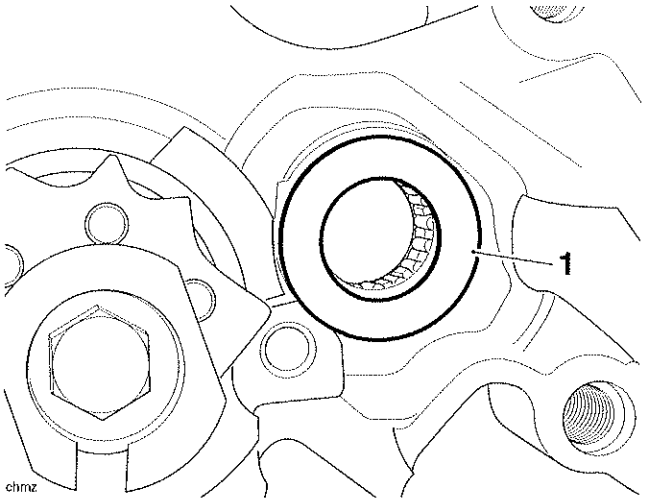
10. Remove the spring abutment sleeve.
11. Remove the selector shaft, along with the inner washer.



1. Selector shaft
2. Inner washer

Installation

1. Position the washer to the transmission housing, securing in position with a smear of multi-purpose grease.



1. Washer

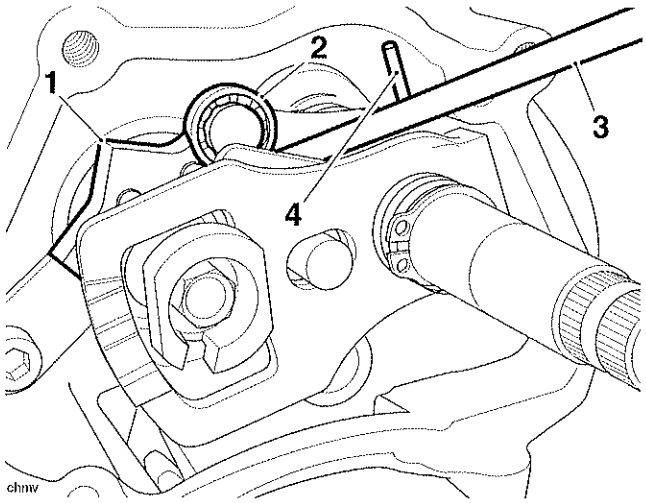
Caution

Take care to ensure that the washer remains in position during installation of the shaft. Should the washer become dislodged during installation, it is possible for it to drop in to the transmission housing. Should this happen, it will be necessary to remove the transmission and/or sump to recover the washer.

Note:

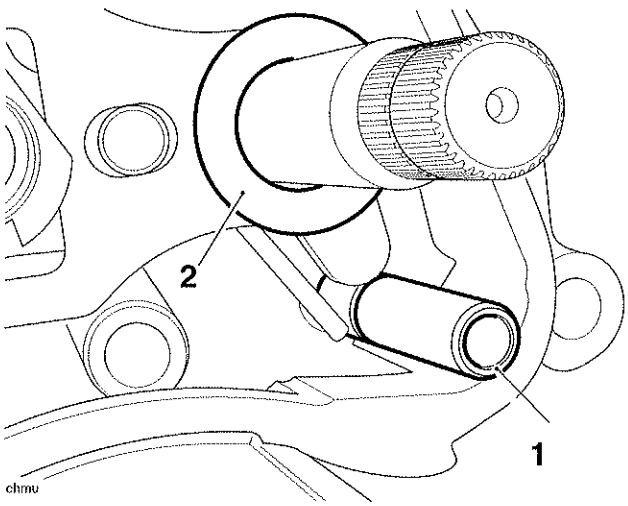
- **Prior to fitting the selector shaft, ensure that the long straight part of the detent spring is pointing up.**

2. Position the selector shaft to the transmission housing, aligning the shaft to the inner bearing. Ensure the inner washer remains in position as the shaft is installed.
3. Install the selector shaft until the detent arm lightly contacts the detent wheel.
4. Using a suitable tool, lift the detent arm roller onto the detent wheel, against the detent spring pressure, and install the selector shaft fully.



1. Detent wheel
2. Detent arm roller
3. Lever
4. Detent spring

5. Fit the abutment sleeve between the ends of the abutment spring and install fully in to the transmission casing.
6. Refit the washer to the outer end of the selector shaft.



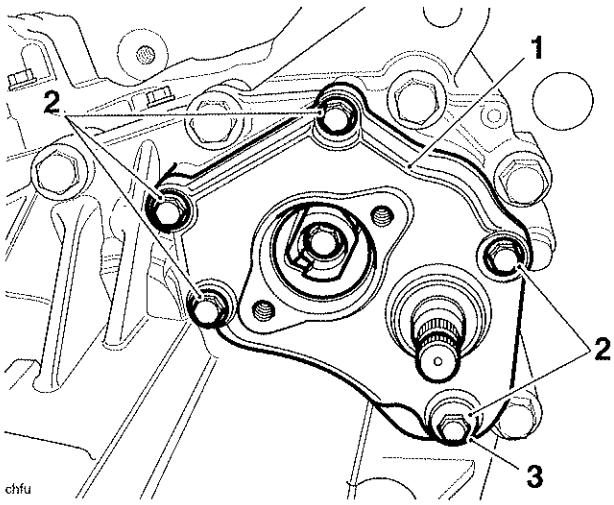
1. Abutment sleeve
2. Washer

7. Ensure that the two dowels are in position in the selector shaft cover.
8. Check the condition of the selector shaft seal; if necessary fit a new seal.

⚠ Caution

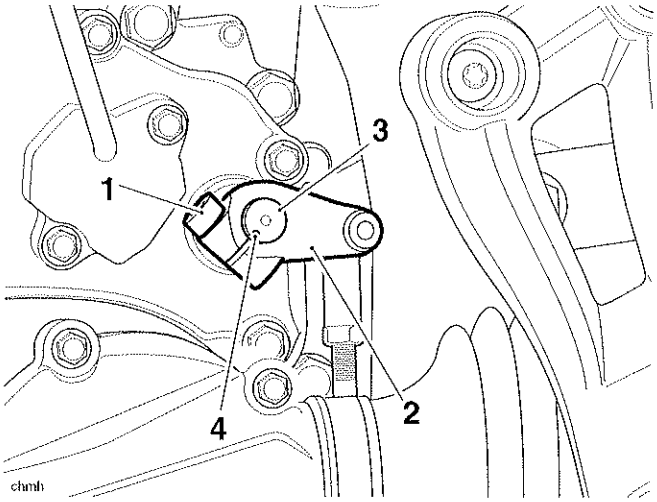
Take care to avoid damaging the lip of the seal when installing the selector shaft cover over the selector shaft. A damaged seal will lead to oil loss and could result in engine damage.

9. Fit a new gasket to the selector shaft cover, and refit the cover.
10. Fit a new copper washer to the 90 mm selector shaft cover fixing.
11. Secure the cover with the five fixings, noting that the 90 mm fixing passes through the abutment sleeve.



1. **Selector shaft cover**
2. **Fixings**
3. **Copper washer position**

12. Tighten the four 28 mm fixings to **11 Nm**, and the 90 mm fixing to **11 Nm**.
13. Fit the transmission linkage to the gear change mechanism as noted for removal.
14. Fit the pinch bolt and tighten it to **9 Nm**.



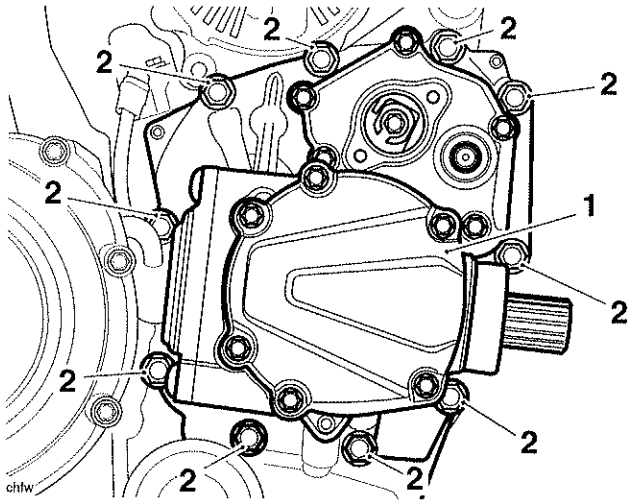
1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

15. Refit the coolant expansion tank (see page *11-15*).
16. Reconnect the battery, positive (red) lead first.
17. Refit the rider's seat (see page *17-16*).

Transmission

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the coolant expansion tank (see page *11-14*).
4. Remove the clutch (see page *4-13*).
5. Remove the rear bevel box (see page *14-4*).
6. Remove the 10 transmission fixings. Clean the threads of the fixings and position aside.



1. Transmission assembly
2. Fixings

7. Withdraw the transmission assembly from the crankcases, collecting the two dowels as you do so. Remove and discard the gasket.

Installation

1. Ensure the two dowels are in position in the transmission casing.
2. Position a new gasket to the transmission casing, aligning it to the dowels.
3. Carefully position the transmission to the crankcases, and align to the bolt holes. Take care not to damage or dislodge the gasket as you do so.
4. Install 10 new fixings, then evenly tighten to **20 Nm**.
5. Refit the rear bevel box (see page *14-8*).
6. Refit the clutch (see page *4-17*).
7. Refit the coolant expansion tank (see page *11-15*).
8. Reconnect the battery, positive (red) lead first.
9. Refit the rider's seat (see page *17-16*).

Selector Drum and Selector Forks

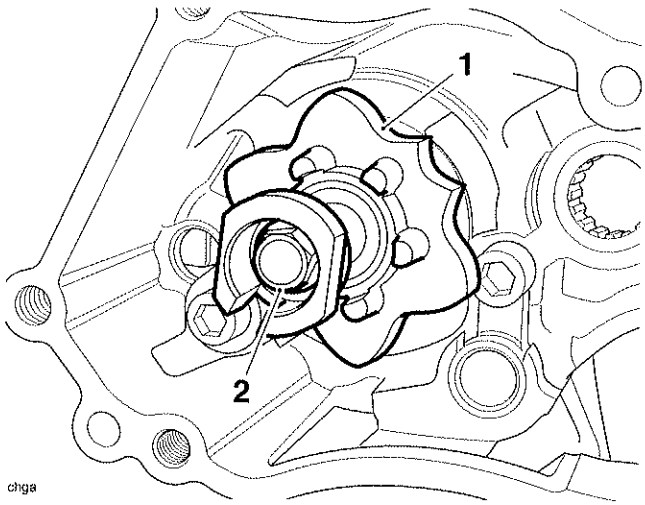
Removal

1. Remove the transmission from the engine (see page *7-13*).
2. Remove the selector shaft (see page *7-9*).

Note:

- **To prevent drum rotation, use a stout rod through one of the through-holes in the drum.**

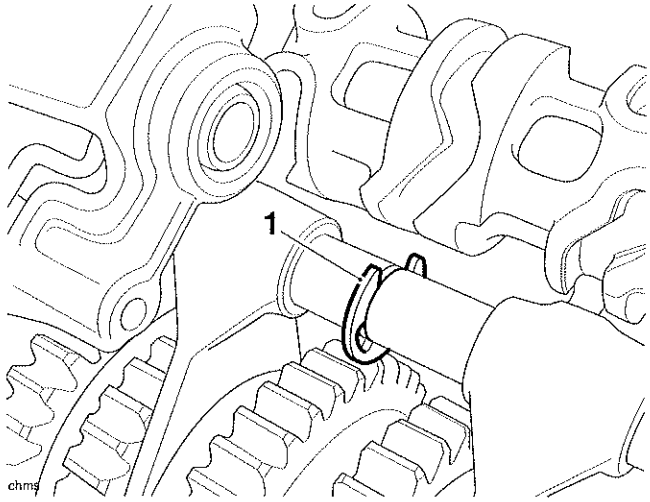
3. Remove the fixing and remove the detent wheel from the selector drum. Discard the fixing. The detent wheel is a tight fit in the selector drum, and can be removed using a rocking motion.



1. Detent wheel
2. Fixing

4. Remove the selector drum from the transmission housing, lifting it to allow removal from the selector forks.
5. If necessary, remove the fixing (discard the fixing) and keeper plate, and remove the selector drum bearing from the transmission housing.

6. Remove the E-clip from the output shaft selector shaft. Discard the E-clip.



1. E-clip

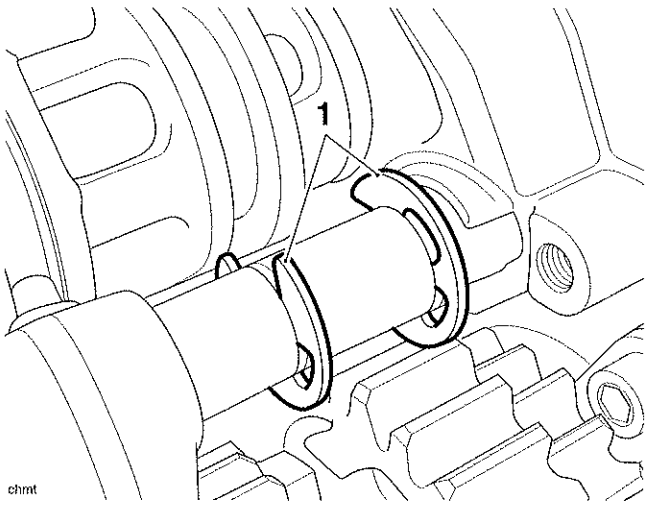
⚠ Caution

The selector forks and shafts can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks or shafts will cause gearbox damage or incorrect operation.

Note:

- **The two output shaft selector forks are identical. If the selector forks are to be re-used, note their respective positions prior to removal in order that the selector forks can be fitted in their original locations.**

7. Push the output shaft selector shaft out from the transmission housing in the direction of the output shaft. Collect each selector fork as they are released by the selector shaft, noting their orientation.
8. Remove the two E-clips from the input shaft selector shaft. Discard the E-clips.



1. E-clips

⚠ Caution

The selector forks and shafts can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks or shafts will cause gearbox damage or incorrect operation.

9. Push the input shaft selector shaft out from the transmission in the direction of the input shaft. Collect the selector fork as it is released by the selector shaft, noting its orientation.

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

Input Shaft	
Standard	5.80 - 5.90 mm
Service Limit	5.70 mm
Output Shaft	
Standard	6.30 - 6.40 mm
Service Limit	6.20 mm

Gear Selector Groove Width

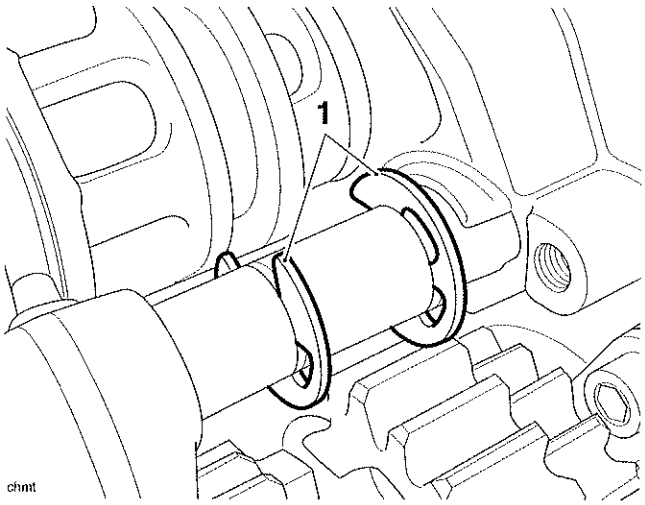
Input Shaft	
Standard	6.00 - 6.10 mm
Service Limit	6.20 mm
Output Shaft	
Standard	6.50 - 6.60 mm
Service Limit	6.70 mm

Selector Fork to Groove Clearance

Input Shaft
0.50 mm max.
Output Shaft
0.50 mm max.

Installation

1. Push the input shaft selector shaft into the transmission housing, with the two grooves facing towards the housing, from the input shaft side. As the shaft is inserted locate the selector fork. Ensure the fork is fitted in the position noted during removal.
2. Fit new E-clips to the grooves in the shaft between the selector fork and the transmission housing.

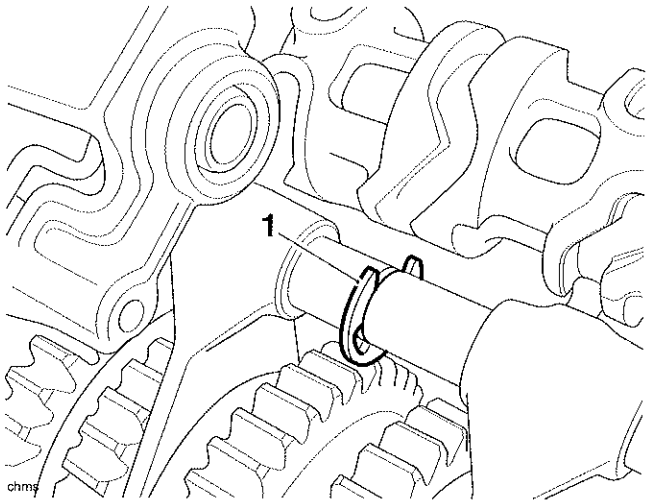


1. E-clips

Caution

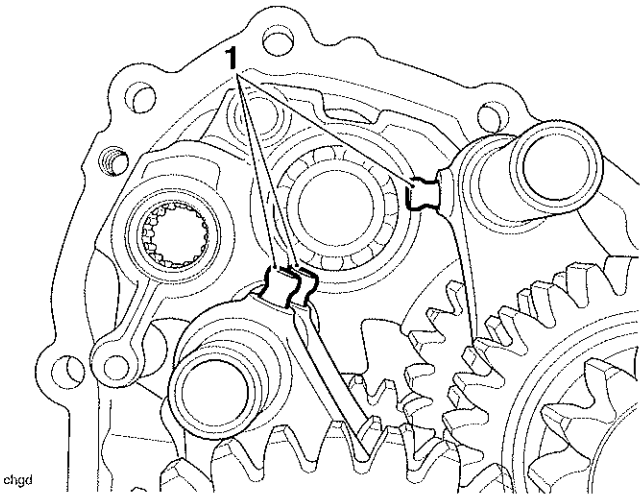
The selector forks can be fitted incorrectly. Ensure the position and orientation of the selector forks are marked prior to removal. Incorrect fitting of the selector forks will cause gearbox damage or incorrect operation.

3. Push the output shaft selector shaft into the transmission housing, with the single groove facing away from the housing, from the output shaft side. As the shaft is inserted locate the selector forks. Ensure the forks are fitted in the position noted during removal.
4. Fit a new E-clip to the groove in the shaft between the two selector forks.



1. E-clip

5. Check that the pins on each selector fork face inwards towards each other, as shown below.



1. Selector fork pins

6. If removed, refit the selector drum bearing to the transmission housing. Install the keeper plate and secure with a new fixing. Tighten to **12 Nm**.
7. Using clean engine oil, lubricate the selector drum bearing.
8. Set the transmission in neutral.
9. Engage the selector drum into the bearing and lower until the grooves on the drum engage with the three selector fork pins.
10. Check that the three selector fork pins are correctly engaged in the selector fork grooves. Rectify as necessary.

Note:

- **To prevent drum rotation, use a stout rod through one of the through-holes in the drum.**

11. Fit the detent wheel, engaging the slot in the wheel with the locator pin in the selector drum. Install a new fixing, tightening to **12 Nm**.
12. Refit the selector shaft (see page *7-11*).
13. Refit the transmission to the engine (see page *7-13*).

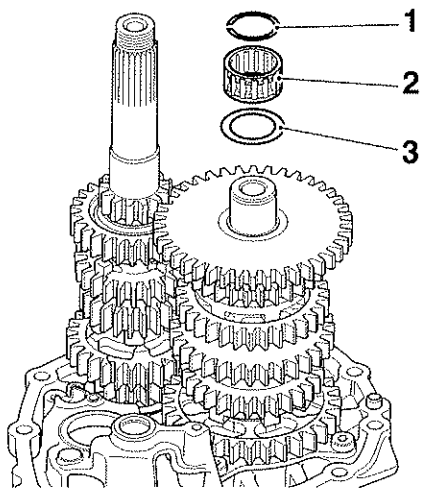
Input Shaft

Removal

Note:

- **Removal of the input shaft can be achieved after first removing the output shaft first gear and its bearing. The output shaft is an integral part of the front bevel box assembly and cannot be removed.**
- **If the transmission housing input shaft bearing is to be removed, the output shaft must first be disassembled. Remove the input shaft as described below, then see page *7-19* for output shaft disassembly.**
- **The input shaft can not be disassembled or assembled in service. If necessary, the complete input shaft assembly must be replaced.**

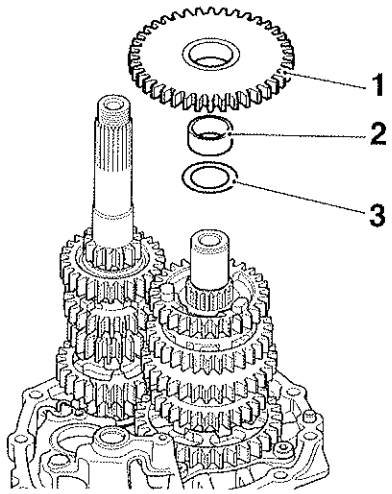
1. Remove the transmission from the engine (see page *7-13*).
2. Remove the selector drum and selector forks (see page *7-13*).
3. Place the transmission assembly on a clean surface, taking care to protect the transmission casing from damage.
4. Remove and discard the output shaft needle bearing snap ring.
5. Remove the output shaft needle bearing and thrust washer.



chfo

1. **Snap ring**
2. **Needle bearing**
3. **Thrust washer**

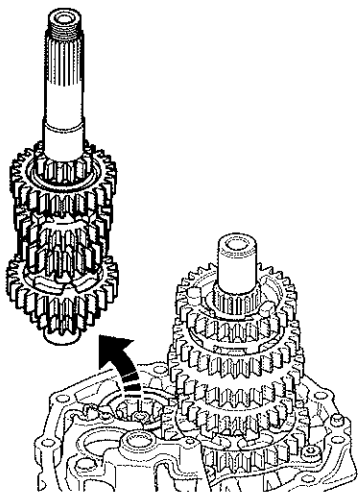
6. Remove the output shaft first gear, needle bearing and thrust washer.



chfo

1. **First gear**
2. **Needle bearing**
3. **Thrust washer**

7. Withdraw the input shaft assembly from its bearing and remove from the transmission housing.



chfn

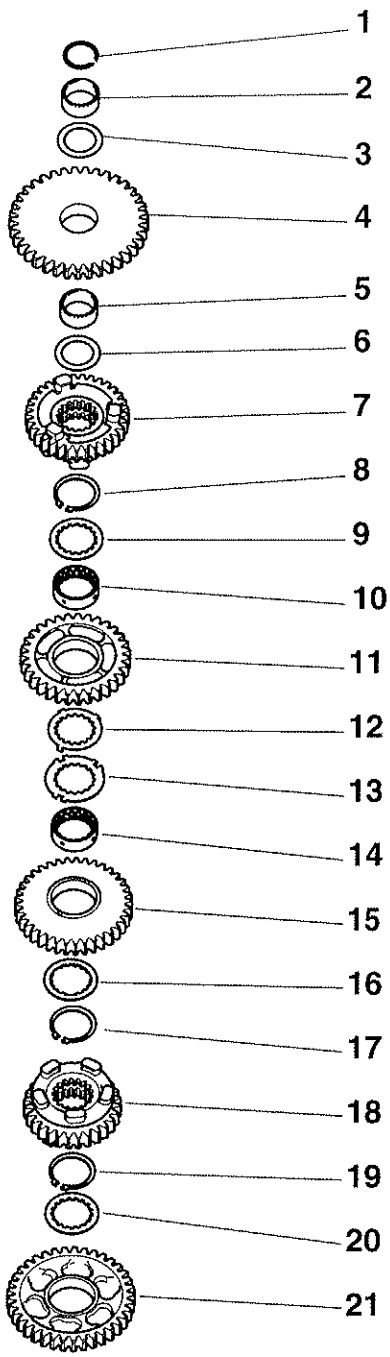
Input Shaft Removal

8. To disassemble the output shaft, see page *7-19*.

Installation

1. Place the input shaft in position in the transmission housing, and insert the shaft fully in to the bearing.
2. Refit the output shaft thrust washer, needle bearing and first gear.
3. Refit the output shaft thrust washer and needle bearing.
4. Secure the output shaft needle bearing with a new snap ring.
5. Refit the selector drum and selector forks (see page *7-15*).
6. Refit the transmission to the engine (see page *7-13*).

Exploded View - Output Shaft



1. Circlip
2. Needle roller bearing
3. Thrust washer
4. First gear
5. Needle roller bearing
6. Thrust washer
7. Fifth gear
8. Circlip
9. Thrust washer
10. Splined bush
11. Fourth gear
12. Lock washer
13. Splined washer
14. Splined bush
15. Third gear
16. Thrust washer
17. Circlip
18. Sixth gear
19. Circlip
20. Thrust washer
21. Second gear

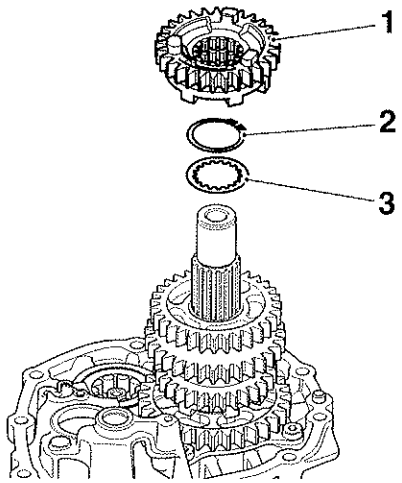
Output Shaft

Disassembly

Note:

- **The output shaft is an integral part of the front bevel box assembly and cannot be removed.**

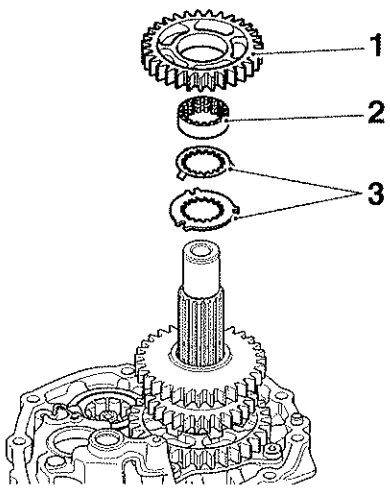
1. Remove the input shaft (see page *7-16*).
2. Slide fifth gear from the shaft.
3. Remove the circlip from in front of fourth gear.
4. Remove the splined thrust washer from the shaft.



chfg

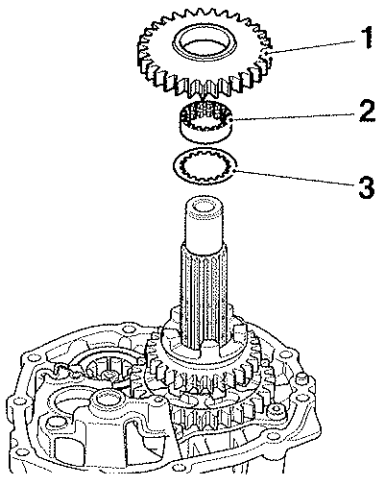
1. **Fifth gear**
2. **Circlip**
3. **Splined thrust washer**

5. Remove fourth gear.
6. Remove the splined bush.
7. Note their orientation and remove the splined lock washers. Note the UP mark on the lower splined lock washer.



1. **Fourth gear**
2. **Splined bush**
3. **Splined lock washer**

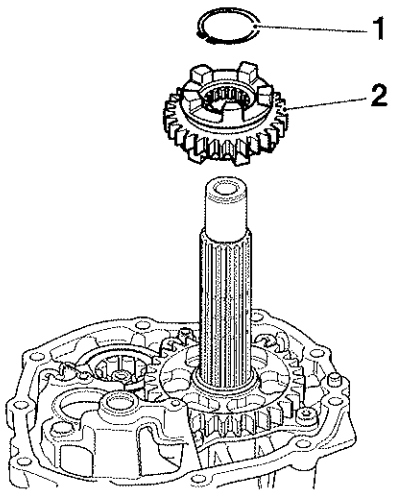
8. Slide third gear off the shaft and also remove the splined bush and thrust washer.



chfk

1. **Third gear**
2. **Splined bush**
3. **Splined thrust washer**

9. Remove the circlip from in front of sixth gear.
10. Remove sixth gear.

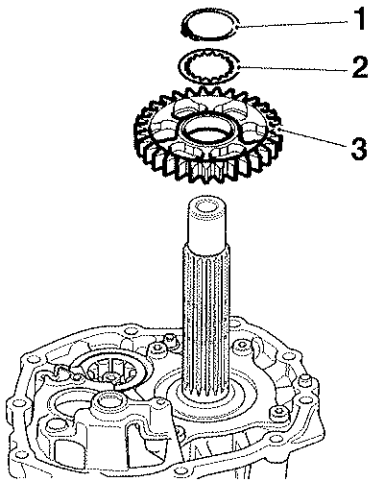


chfg

1. **Circlip**
2. **Sixth gear**

11. Remove the circlip from in front of second gear.

12. Remove the thrust washer and slide off second gear.



chfg

1. **Circlip**
2. **Thrust washer**
3. **Second gear**

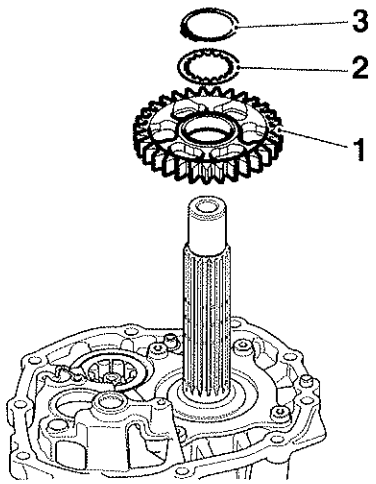
13. At this stage, the input shaft bearing can be removed from the transmission housing as follows:
    - Remove the fixing and collect the bearing keeper plate. Discard the fixing;
    - Using a proprietary bearing puller, remove the bearing from the housing;
    - Collect the oil restrictor plate.

Assembly

Note:

- **Lubricate each gear and bush with clean engine oil during assembly.**
- **Examine all gears, bearings and sleeves for damage, chipped teeth and wear beyond the service limits. Replace all suspect components and always use new circlips to assemble the shaft.**
- **The splined thrust washer fitted next to second gear is different to the two other splined thrust washers fitted elsewhere on the output shaft. It can be identified by three sets of missing splines, equally spaced around the inner circumference.**

1. Locate second gear to the shaft with the dog slots facing away from the bevel box. Fit the splined thrust washer (see note above for thrust washer identification) and retain with a new circlip.



chfg

1. **Second gear**
2. **Thrust washer**
3. **Circlip**

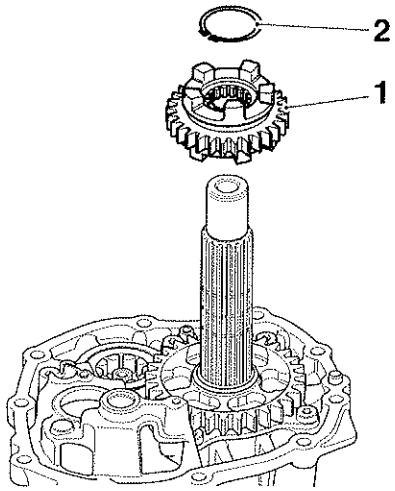
2. Fit sixth gear with the selector fork groove facing away from the bevel box. Ensure that the oil holes in the gear DO NOT align with the corresponding oil hole in the output shaft.

Warning

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

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

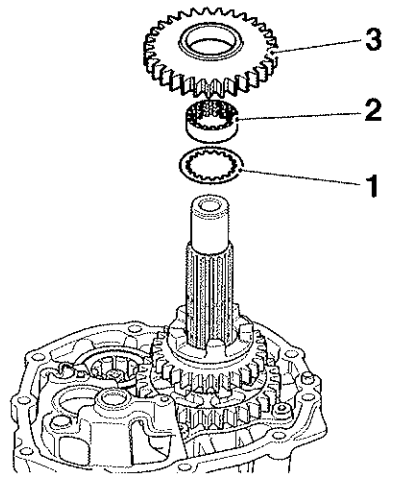
3. Fit a new circlip.



chfg

1. **Sixth gear**
2. **Circlip**

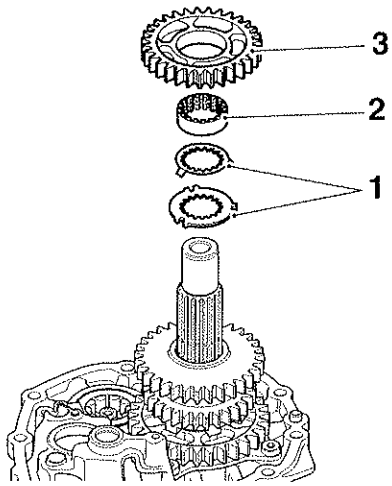
4. Fit the splined thrust washer.
5. Fit the splined bush for third gear, ensuring that the oil hole in the shaft DOES NOT align with the hole in the bush. Fit third gear to the shaft with the dog slots facing towards the bevel box.



chfk

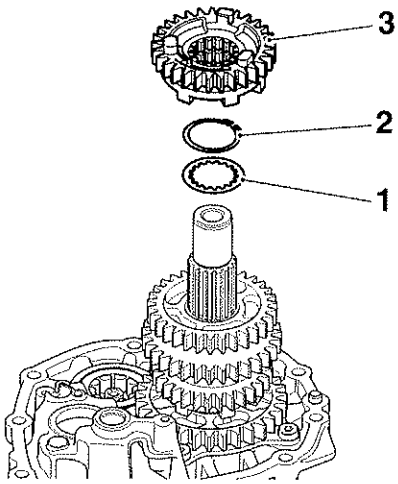
1. **Thrust washer**
2. **Splined bush**
3. **Third gear**

6. Fit the splined lock washer with the UP mark visible. Fit the lock washer, ensuring the three tabs in the smaller washer locate in the three slots in the larger washer. Note the lock washer will only fit the splined lock washer in one position.
7. Fit the splined bush for fourth gear, ensuring that the oil hole in the shaft DOES NOT align with the hole in the bush. Fit fourth gear to the shaft with the dog slots facing away from the bevel box.



1. **Splined lock washer**
2. **Splined bush**
3. **Fourth gear**

8. Fit the thrust washer and retain with a new circlip.
9. Fit fifth gear.



chfg

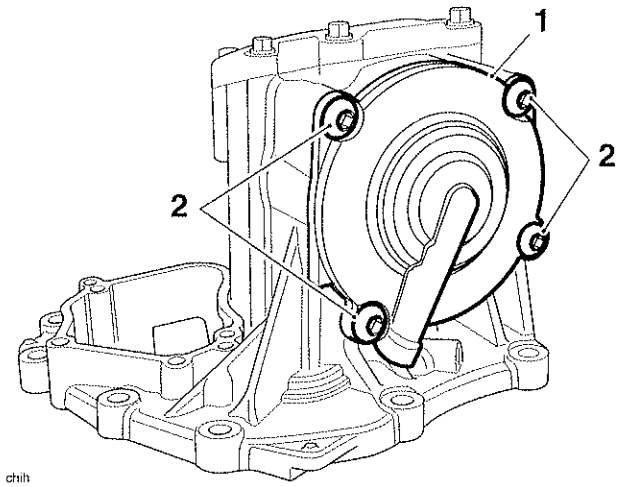
1. **Thrust washer**
2. **Circlip**
3. **Fifth gear**

10. Refit the input shaft (see page *7-20*).

Bevel Box Damper Shaft Oil Seal

Removal

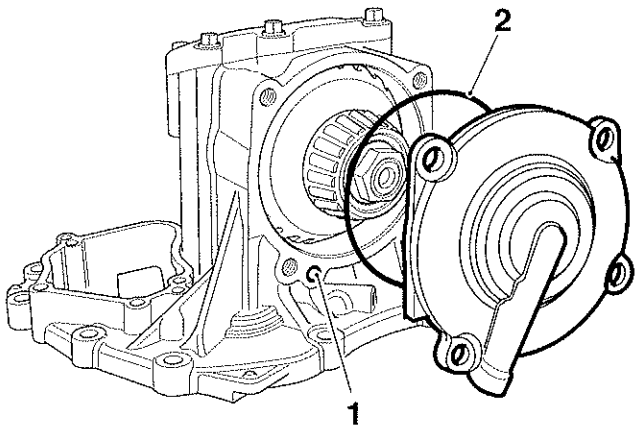
1. Remove the transmission from the engine (see page *7-13*).
2. Release the four fixings and remove the bevel box front cover.



chih

1. Bevel box front cover
2. Fixings

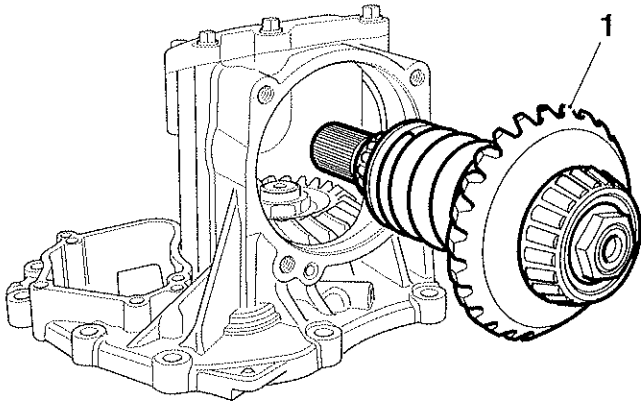
3. Remove and discard the front cover outer O-ring and oil feed O-ring.



chii

1. Oil feed O-ring
2. Front cover O-ring

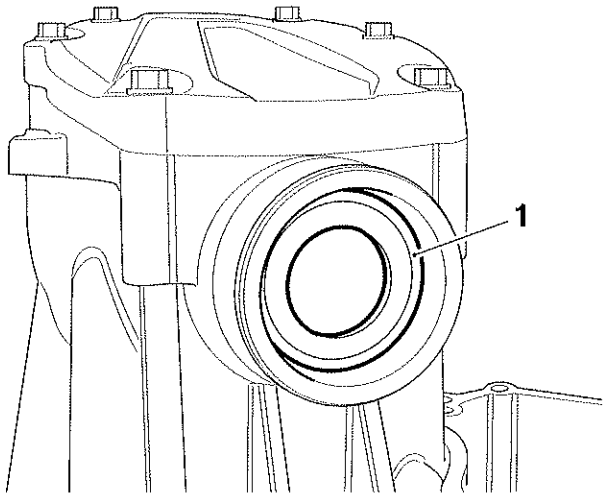
4. Withdraw the damper shaft from the bevel box.



chig

1. Damper shaft

5. Drift out the oil seal.



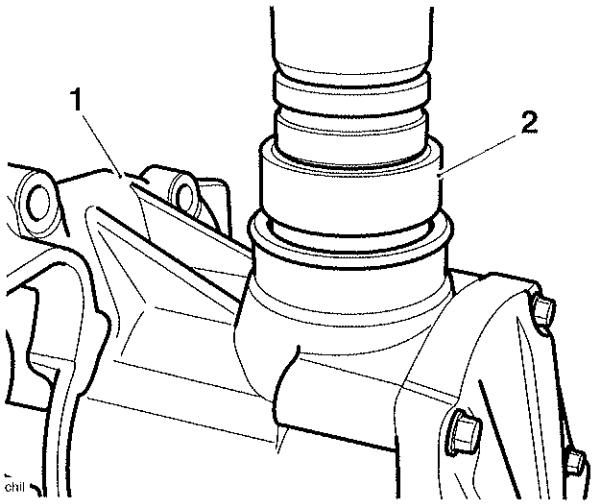
chij

1. Oil seal

6. Thoroughly clean the seal housing.

Installation

1. Protect the front cover mating face of the bevel box against damage and place it in a press.
2. Using the collar from Wheel Bearing Extraction Kit T3880053 (smaller diameter positioned on the outer edge of the seal), carefully press in a new oil seal.



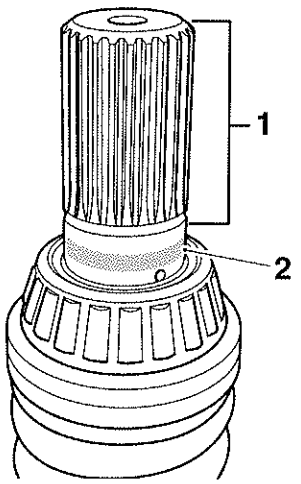
chil

1. Bevel box
2. Collar (part of Wheel Bearing Extraction Kit T3880053)

Caution

Failure to protect the splines of the damper shaft will result in damage to the new oil seal.

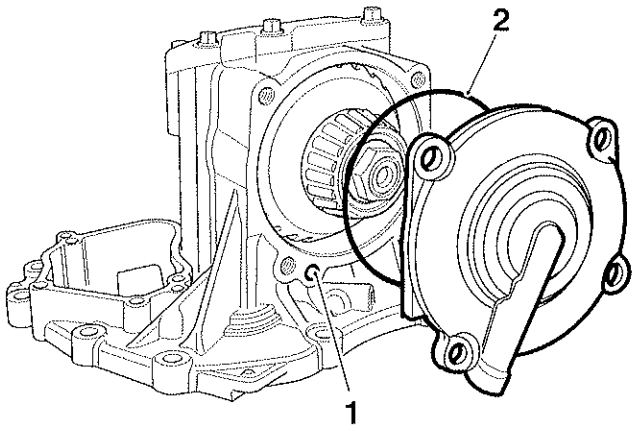
3. Protect the splines and the groove (as shown below) of the damper shaft with a suitable tape, such as electrical insulation tape. Do not apply tape to the seal running area, shown grey below.



chik

1. Damper shaft splines and groove
2. Seal running area

4. Refit the damper shaft to the bevel box, taking care not to damage the oil seal.
5. Remove the protective tape from the damper shaft splines.
6. Fit a new O-ring to the oil feed.
7. Fit a new O-ring to the front cover.



chil

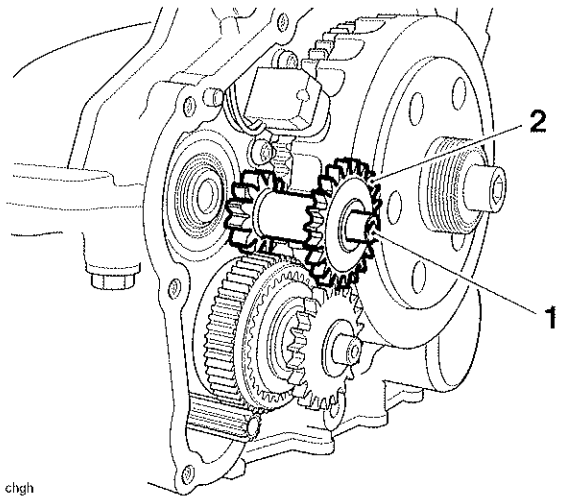
1. Oil feed O-ring
2. Front cover O-ring

8. Refit the front cover, ensuring the oil feed O-ring is not dislodged as you do so.
9. Secure the cover with four new fixings and tighten to **25 Nm**.
10. Refit the transmission to the engine (see page *7-13*).

Flywheel, Starter Drive Gears and Sprag Clutch

Removal

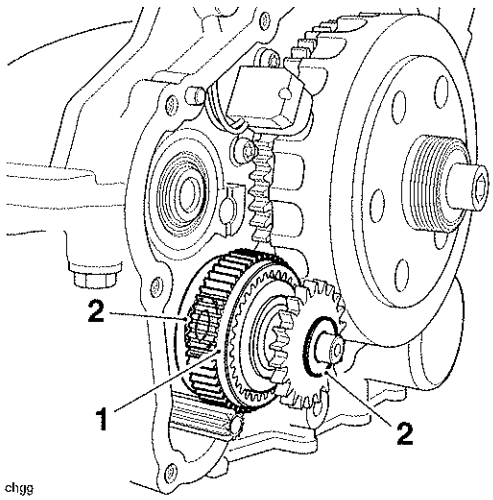
1. Remove the flywheel cover (see page *5-19*).
2. Withdraw the pin and remove the starter idler gear noting the orientation of the gear.



chgh

1. **Idler shaft**
2. **Idler gear**

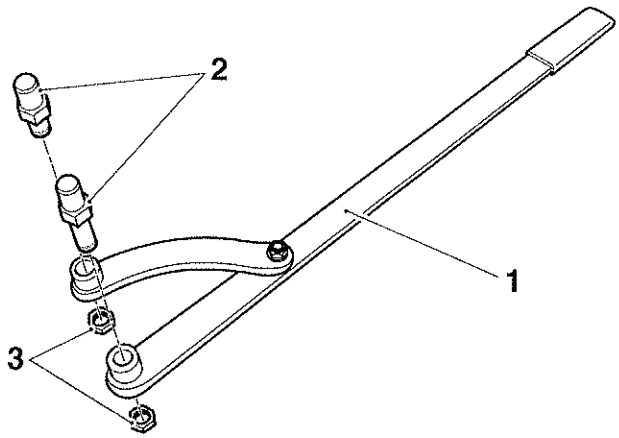
3. Withdraw the starter motor torque limiter from the crankcase, collecting the washers from each end of the shaft as you do so.



chgg

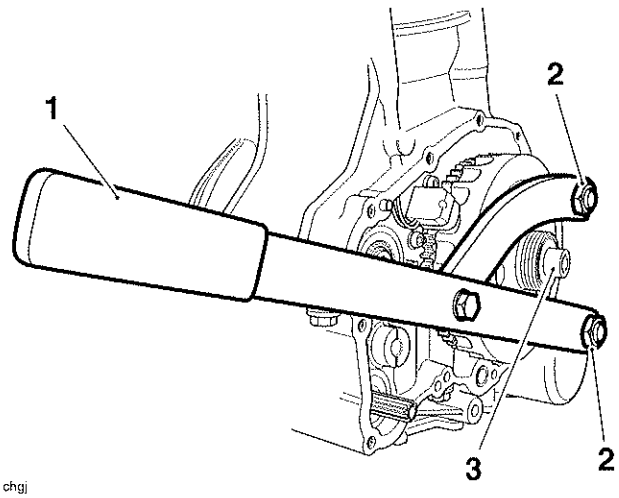
1. **Starter motor torque limiter**
2. **Flat washers (outer shown)**

4. Assemble the Flywheel Pin Set T3880608 to the Flywheel Restraint T3880606, ensuring the shorter pin is fitted to the short arm of the Flywheel Restraint T3880606. Fit the nuts and tighten to **10 Nm**.



1. **Flywheel Restraint T3880606**
2. **Pins (part of Flywheel Pin Set T3880608)**
3. **Nuts (part of Flywheel Pin Set T3880608)**

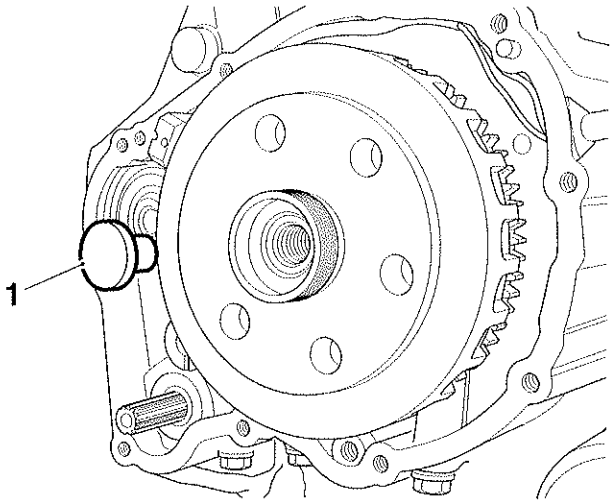
5. Using Flywheel Restraint T3880606 and Flywheel Pin Set T3880608, prevent the flywheel from turning and remove the flywheel fixing and washer from the end of the crankshaft.



chgj

1. **Flywheel Restraint T3880606**
2. **Flywheel Pin Set T3880608**
3. **Flywheel fixing**

6. Locate the spigot from the larger of the two thrust pads supplied with Alternator/Flywheel Rotor Puller T3880365 to the crankshaft.



chfq

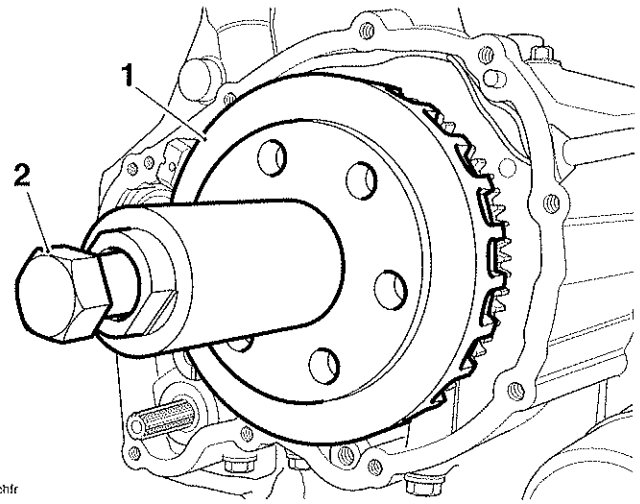
1. Thrust pad

7. Assemble Alternator/Flywheel Rotor Puller T3880365 to the threaded centre section of the flywheel.

Note:

- **Ensure that the thrust pad does not fall out during assembly of the tool.**

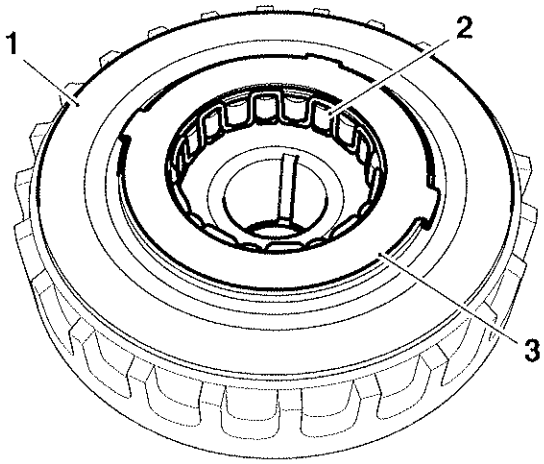
8. Hold the outer of the tool to prevent rotation then tighten the draw-bolt in the centre of the tool to release the taper seating of the flywheel from the crankshaft.



chfr

1. Flywheel
2. Alternator/Flywheel Rotor Puller T3880365

9. Withdraw the flywheel and tool as an assembly and then separate the tool from the flywheel. Collect the Woodruff Key and the tool thrust pad from the crankshaft.
10. Remove the starter gear from the flywheel.
11. Remove the sprag retaining clip and remove the sprag clutch. Discard the sprag retaining clip.



chgl

1. Flywheel
2. Sprag clutch
3. Sprag retaining clip

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. Assemble the needle roller bearing and starter gear to the flywheel.
2. Refit the Woodruff Key to the crankshaft slot.
3. Locate the flywheel to the crankshaft, ensuring the Woodruff Key remains in position on the crankshaft.
4. Prevent the flywheel from turning using Flywheel Restraint T3880606 then fit and tighten a new flywheel fixing and washer, first to **85 Nm**, then to **120 Nm**.
5. Check that the two flat washers are fitted to the starter motor torque limiter, one at each end.
6. Refit the starter motor torque limiter, engaging the gear teeth to the starter motor shaft.
7. Lubricate the idler gear shaft.
8. Fit the small idler gear and shaft to the crankcase.
9. Refit the flywheel cover (see page *5-22*).

This page intentionally left blank

8 Lubrication

Table of Contents

Exploded View - Sump and Oil Level Sensor 8.2
Exploded View - Lubrication System 8.3
Engine Oil Circuit 8.4
Engine Oil Circuit Description 8.5
Heat Exchanger 8.5
Engine Oil 8.6
- Specification 8.6
- Triumph Engine Oil 8.6

Oil Level Inspection 8.6
Oil and Oil Filter Change 8.7
- Disposal of Used Engine Oil 8.8

Low Oil Pressure Warning Light Switch 8.8
- Removal 8.8
- Installation 8.8

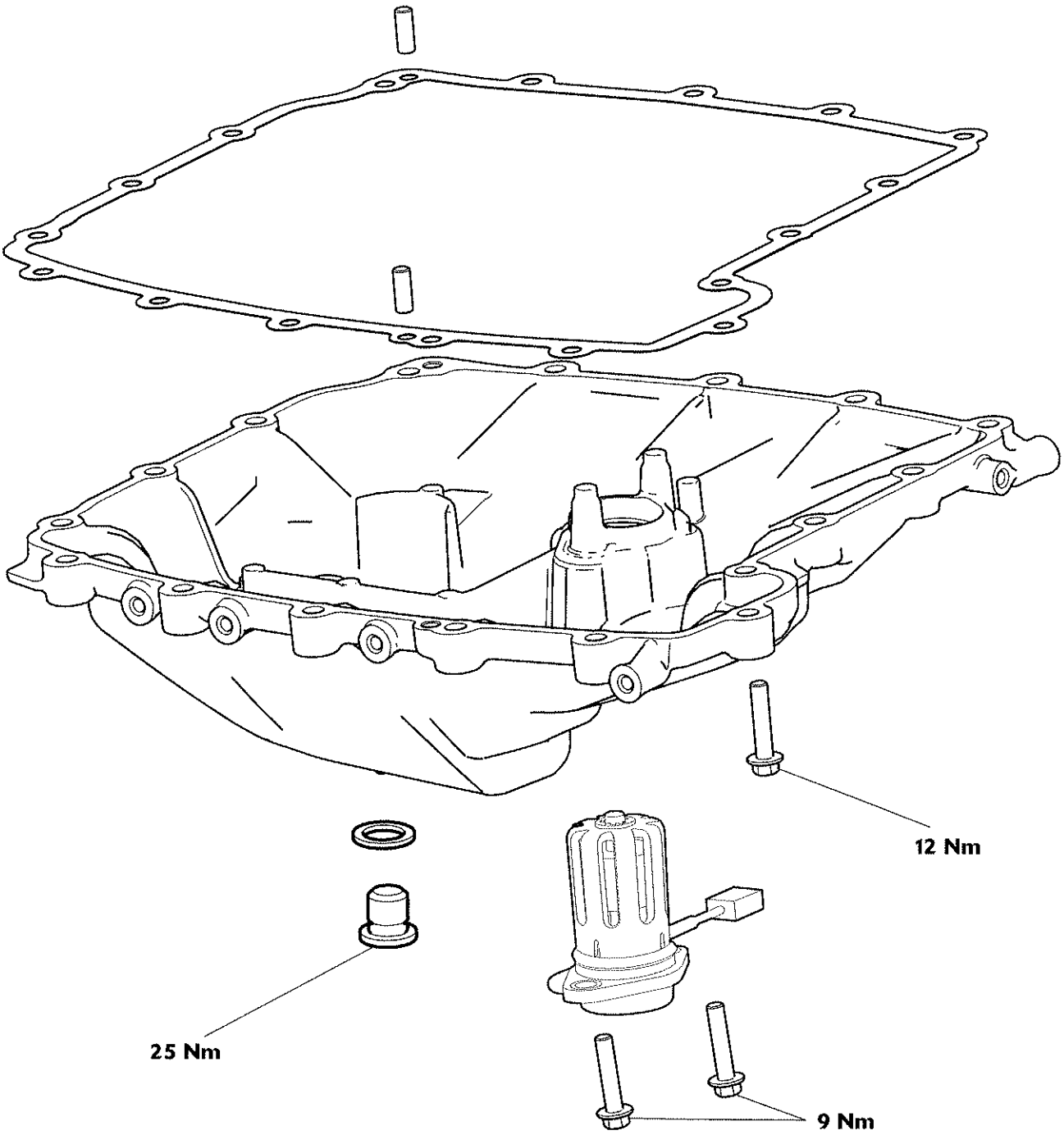
Low Oil Level Sensor 8.9
- Removal 8.9
- Installation 8.9

Sump 8.10
- Removal 8.10
- Inspection 8.11
- Installation 8.11

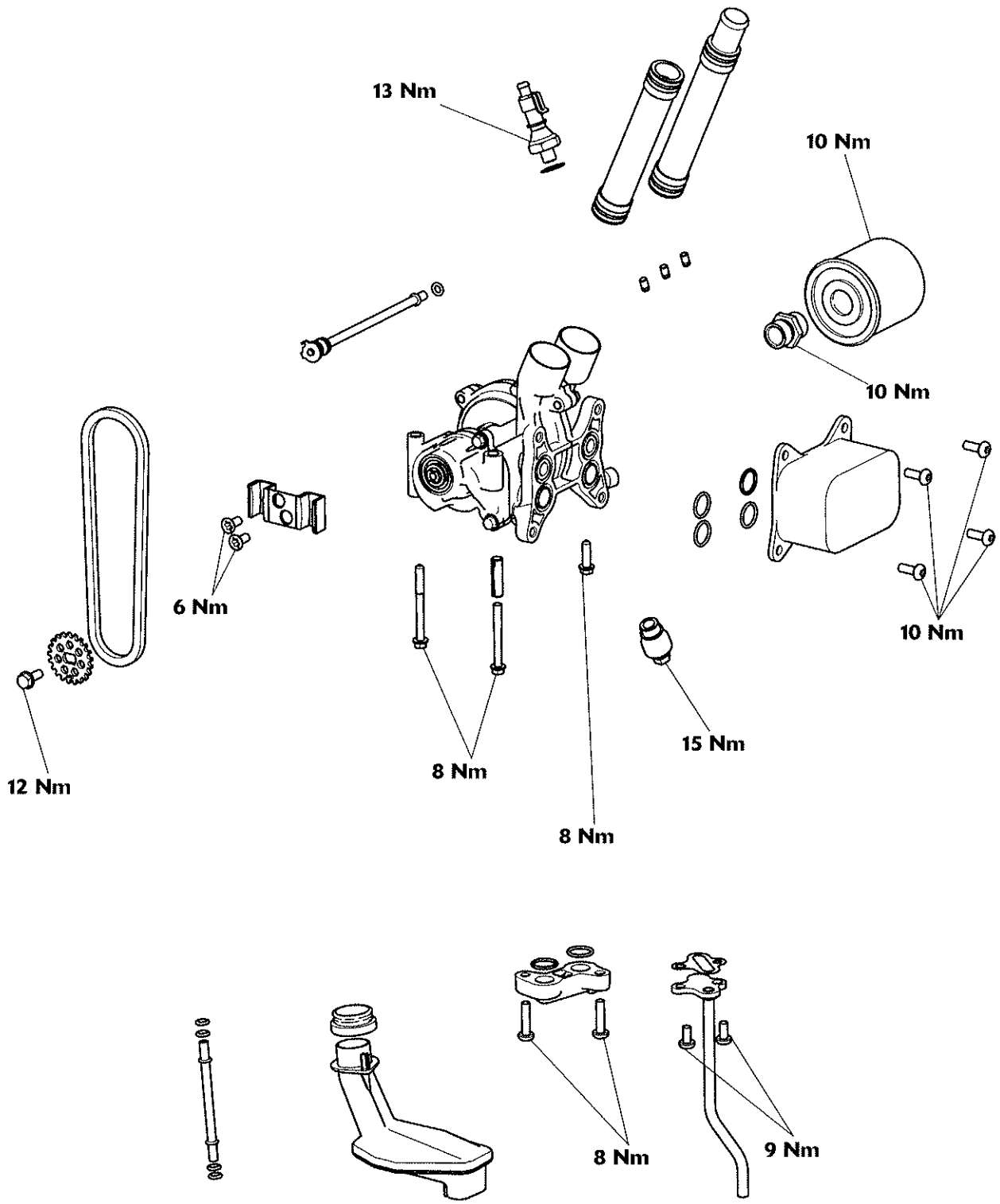
Oil Pump 8.12
- Removal 8.12
- Inspection 8.14
- Installation 8.15

Heat Exchanger 8.16
- Removal 8.16
- Inspection 8.16
- Installation 8.16

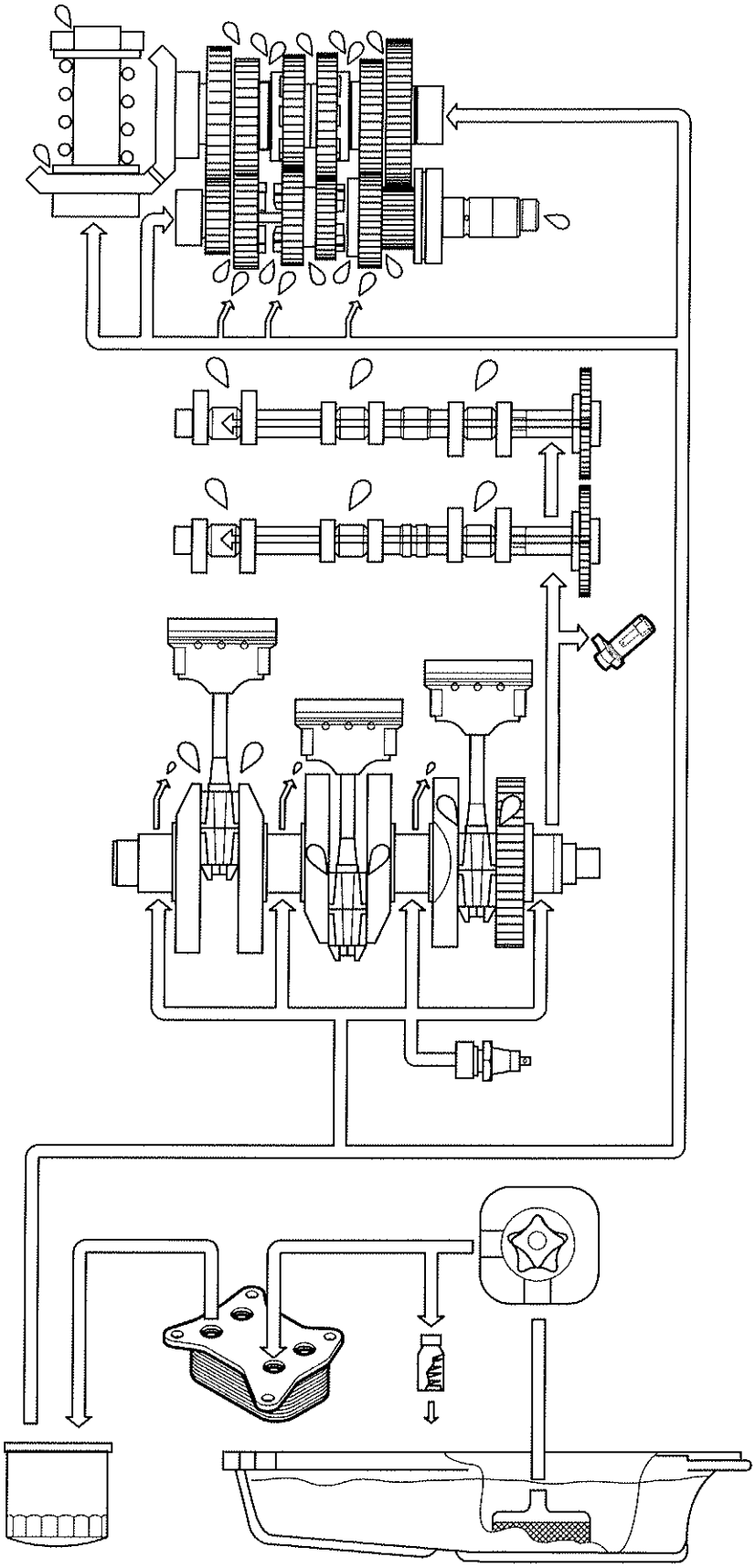
Exploded View - Sump and Oil Level Sensor



Exploded View - Lubrication System



Engine Oil Circuit



Engine Oil Circuit Description

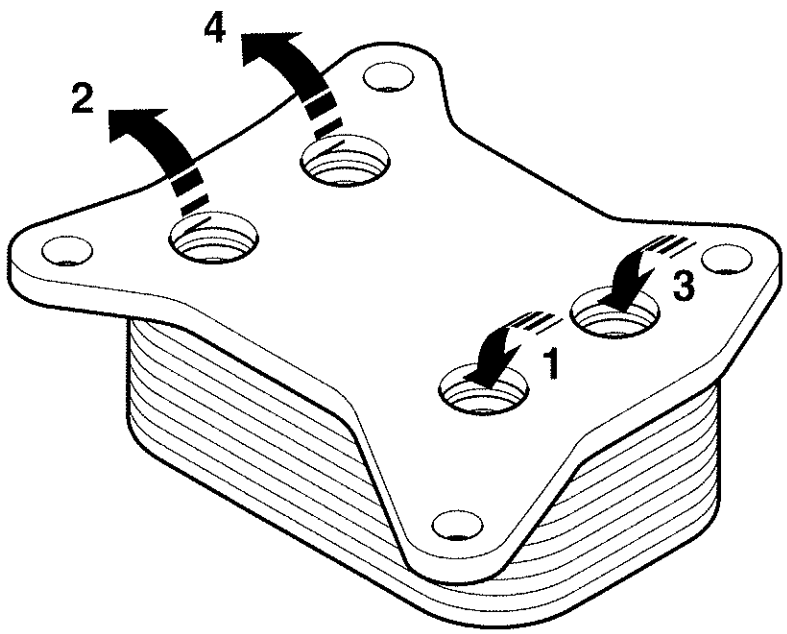
Oil is collected from the sump and is drawn through a mesh strainer into the oil pump rotor. The oil pump is fitted with a single pumping rotor which supplies pressurised oil to the lubrication circuit and the heat exchanger.

- Pressurised oil is delivered to the heat exchanger near to where the oil pressure relief valve is fitted. The relief valve is set to open at 75 lb/in² and when open, returns high pressure oil direct to the sump.
- Oil arrives at the heat exchanger (mounted on the oil pump) where it is cooled, and then it passes to the oil filter.
- Filtered oil is fed to the main gallery located under the crankshaft. Here it is delivered to the crankshaft main bearings and, via drillings in the crankshaft, to the big end bearings. Spray jets located in the upper crankcase, behind the main bearing shells, lubricate the pistons and connecting rod small ends. These jets are fed oil from the crankshaft oil feed.
- A low oil pressure warning light switch is connected to the main gallery.
- Some oil is sent directly to the timing chain tensioner and cylinder head via a drilling in the upper crankcase. Oil that arrives at the cylinder head is fed to both camshafts via a gallery in the cylinder head casting that delivers oil directly to the sprocket end camshaft bearings. Oil is then fed through the hollow camshafts to the other camshaft bearings, the tappet buckets and the valves.
- Oil is fed to the gearbox via a spray bar and drillings that supply oil directly to the end of the transmission shafts. The spray bar also directs oil to the bevel box bearings and gears.
- Oil is circulated along the gearbox shafts to exit holes that feed directly to the bearings and gears.

Heat Exchanger

The heat exchanger is used to transfer heat from the engine oil into the coolant. Oil is delivered to the heat exchanger via an opening (1) after which it flows through the heat exchanger core, where it is circulated. Coolant is pumped through a similar opening (3) in to heat exchanger core to cool the oil. The cooled oil then exits the heat exchanger (2) and flows to the oil filter. The coolant then flows out of the heat exchanger (4) and through the rest of system.

An additional benefit of the heat exchanger is that, as the engine coolant reaches its operating temperature more quickly than the engine oil, the oil is heated by the engine coolant at lower engine temperatures; this allows the engine oil to reach its optimum operating temperature more quickly, thereby helping to improve engine oil life. reduce exhaust emissions and reduce engine wear.



chhl

Engine Oil

Specification

Use semi or fully synthetic 10W/40 or 15W/50 motorcycle engine oil which meets specification API SH (or higher) and JASO MA, such as Castrol Power 1 Racing 4T, sold as Castrol Power RS Racing 4T in some countries.

⚠ 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.

Oil Level Inspection

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

⚠ Warning

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

⚠ Warning

Never start the engine or run the engine in a confined area. Exhaust fumes are poisonous and can cause loss of consciousness and death within a short period of time. Always operate your motorcycle in the open-air or in an area with adequate ventilation.

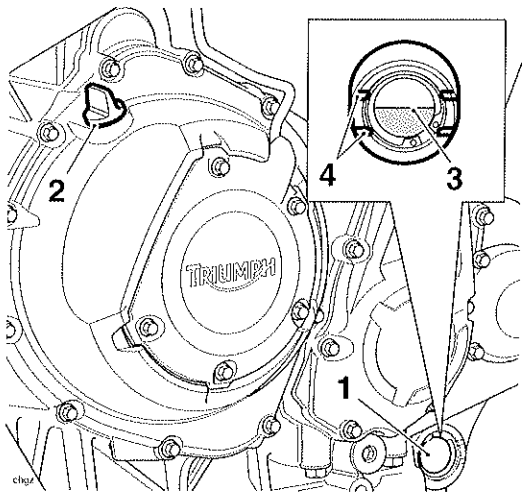
⚠ Caution

Running the engine with insufficient oil will cause engine damage. If the low oil pressure indicator remains on, stop the engine immediately and investigate the cause.

Note:

- **If, after the ignition is switched on, the oil pressure/low oil warning light remains on and 'oil Lo' is visible in the display screen, do not start the engine until the oil level has been physically checked.**

1. With the motorcycle upright and off the side stand, check to see if oil is visible in the sight-glass at a point mid-way between the upper (maximum) and lower (minimum) horizontal lines marked on the crankcase.
2. If it is necessary to top up the oil level, remove the filler plug and add oil, a little at a time, until the level registered in the sight glass is correct. Refit and tighten the filler plug.



1. **Filler plug**
2. **Sight glass**
3. **Oil level (correct level shown)**
4. **Crankcase oil level lines**

Note:

- **An accurate indication of the level of oil in the engine is only shown when the engine is at normal operating temperature and the motorcycle is upright (not on the side stand).**

3. Start the engine and run at idle for approximately five minutes.
4. Stop the engine, then wait for at least three minutes for the oil to settle.
5. Note the oil level visible in the sight glass.
6. When correct, oil should be visible in the sight-glass at a point mid-way between the upper (maximum) and lower (minimum) horizontal lines marked on the crankcase.
7. If necessary, top up the oil level as described earlier.
8. Once the correct level is reached, fit and tighten the filler plug.

Oil and Oil Filter Change

Warning

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

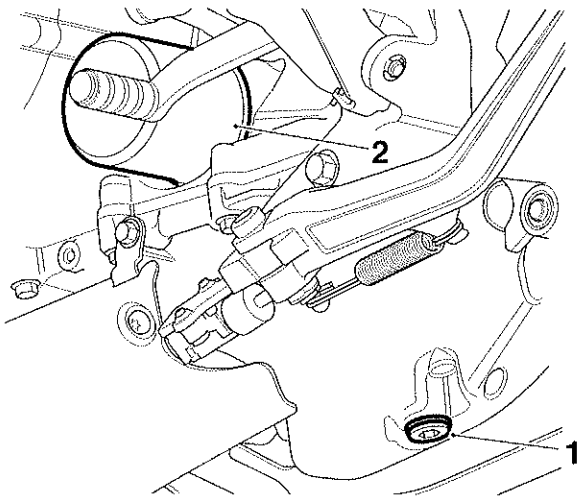
The engine oil and filter must be replaced in accordance with scheduled maintenance requirements.

1. Warm up the engine thoroughly, and then stop the engine and secure the motorcycle in an upright position on level ground.
2. Place an oil pan beneath the engine.

Warning

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

3. Remove the oil drain plug.



1. **Oil drain plug**
2. **Oil filter**

4. Unscrew and remove the oil filter using Triumph service tool T3880313.
5. Dispose of the old oil filter in an environmentally friendly way.
6. Pre-fill a new oil filter with clean engine oil.
7. Apply a smear of clean engine oil to the sealing ring of the new oil filter.
8. Fit the oil filter and tighten to **10 Nm**.
9. After the oil has completely drained out, fit a new sealing washer to the drain plug. Fit and tighten the plug to **25 Nm**.
10. Fill the engine with new oil of the type and grade listed previously and in the specification section.
11. Start the engine and allow to idle.

Caution

Racing the engine before the oil reaches every part can cause engine damage or seizure.

12. Ensure that the oil pressure warning light extinguishes shortly after starting and the 'oil Lo' or 'oil Pr' is not visible in the instrument's display screen.

Caution

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

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

Disposal of Used Engine Oil

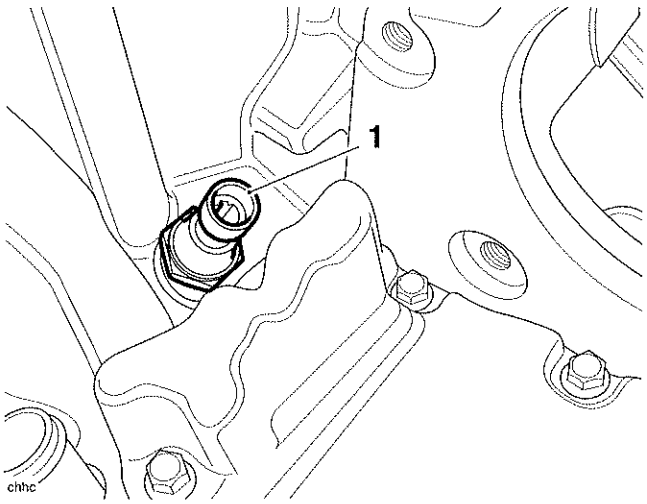
To protect the environment, do not pour oil on the ground, down sewers or drains, or into water courses. Dispose of used oil sensibly. If in doubt contact your local authority.

Low Oil Pressure Warning Light Switch

The low oil pressure warning light switch is located in the upper crankcase, behind the cylinder head.

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the throttle bodies (see page *10-135*).
4. Remove the alternator (see page *18-21*).
5. Disconnect the electrical connection to the switch.
6. Remove the switch and collect the copper washer.



1. Low oil pressure warning light switch

Installation

1. Incorporating a new copper washer, fit the switch and tighten to **13 Nm**.
2. Refit the electrical connection.
3. Refit the alternator (see page *18-23*).
4. Refit the throttle bodies (see page *10-137*).
5. Reconnect the battery, positive (red) lead first.
6. Refit the rider's seat (see page *17-16*).
7. Start the engine and ensure that the low oil pressure warning light goes out shortly after starting.

Low Oil Level Sensor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

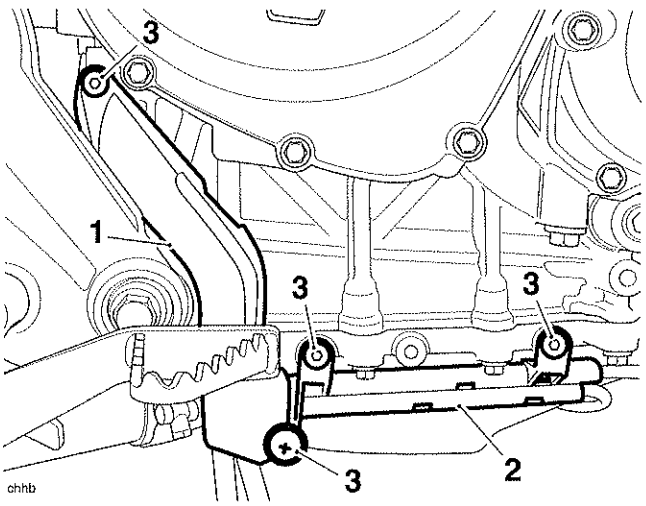
Warning

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

Warning

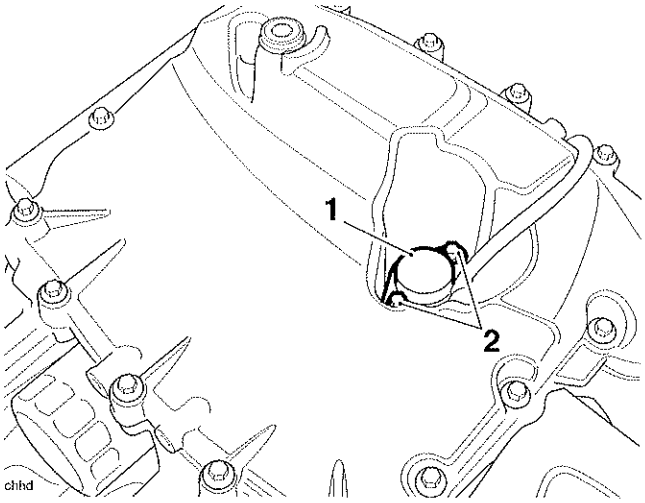
Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which can cause cancer. Wear suitable clothing and avoid skin contact.

3. Drain the engine oil (see page *8-7*).
4. Remove the sump guard (see page *17-34*).
5. Remove the four fixings and remove the upper and lower cable guides.



1. **Upper cable guide**
2. **Lower cable guide**
3. **Fixings**

6. Disconnect the low oil level sensor electrical connector.
7. Remove the fixings and remove the oil level sensor.



1. **Low oil level sensor**
2. **Fixings**

Installation

1. Position the oil level sensor to the sump and secure with the fixings. Tighten to **9 Nm**.
2. Reconnect the electrical connector.
3. Secure the harness to the cable guides and reposition the guides to the engine. Secure with the scrivet and three screws, and tighten the screws to **8 Nm**.
4. Refit the sump guard (see page *17-34*).
5. Fill the engine with the correct grade of engine oil (see page *8-7*).
6. Reconnect the battery, positive (red) lead first.
7. Start the engine and ensure that the low oil pressure warning light goes out shortly after starting.
8. Stop the engine and adjust the engine oil level.
9. Refit the rider's seat (see page *17-16*).

Sump

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

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.

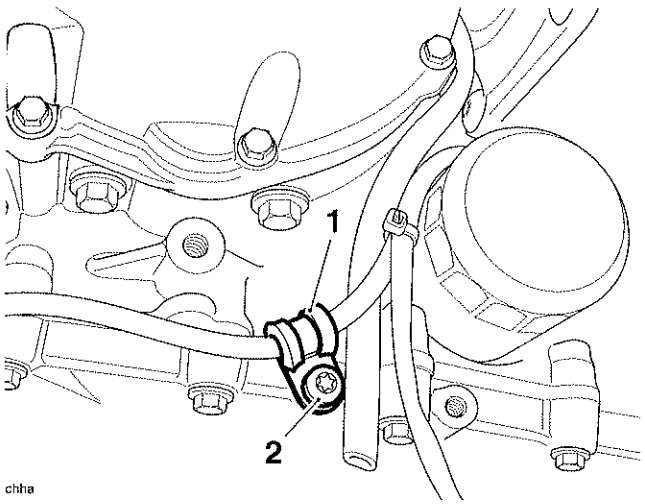
3. Drain the engine oil (see page *8-7*).

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.

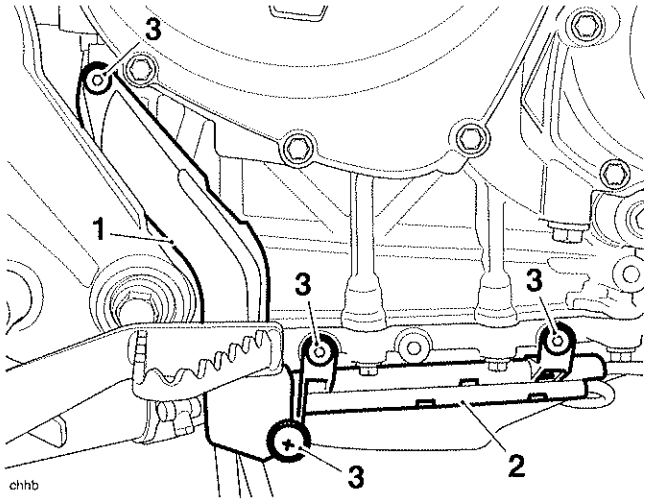
4. Remove the exhaust system (see page *10-142*).
5. Remove the sump guard (see page *17-34*).
6. Remove the fixing and detach starter motor cable P-clip from the sump.



chha

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

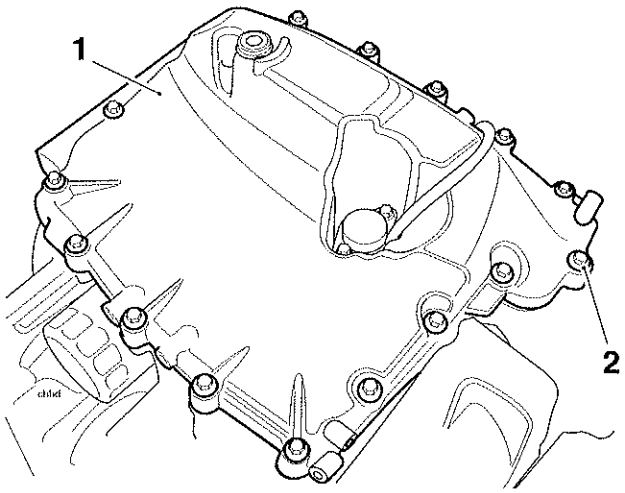
7. Remove the four fixings and remove the upper and lower harness guides from the right hand side of the engine.



chhb

1. **Lower cable guide**
2. **Upper cable guide**
3. **Fixings**

8. Disconnect the low oil level sensor electrical connector.
9. Release the fixings securing the sump to the lower crankcase.



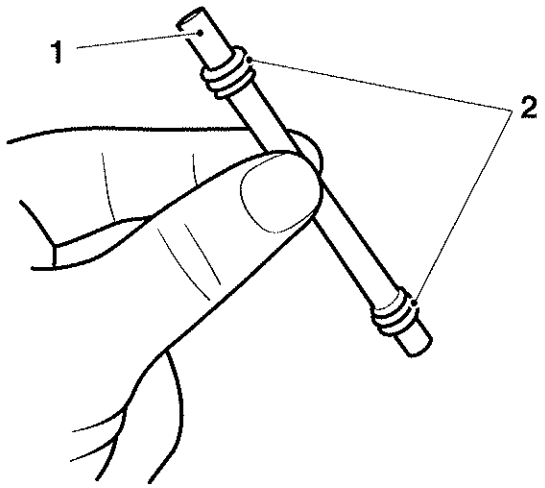
chhd

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

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

Note:

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



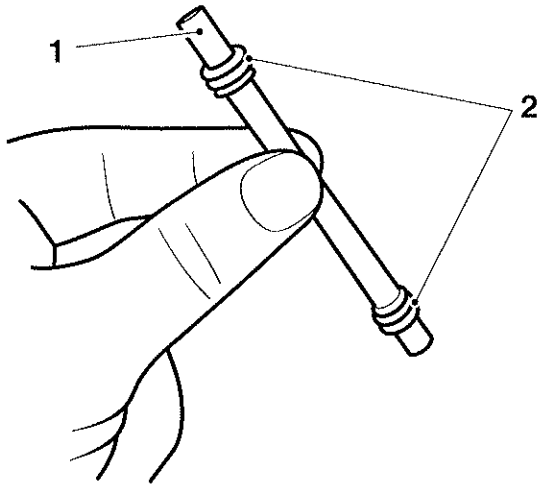
1. **Water pump drain tube**
2. **O-rings**

Inspection

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

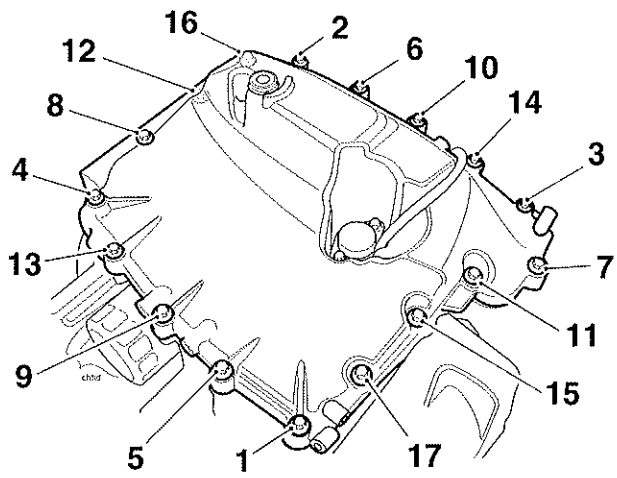
Installation

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



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

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



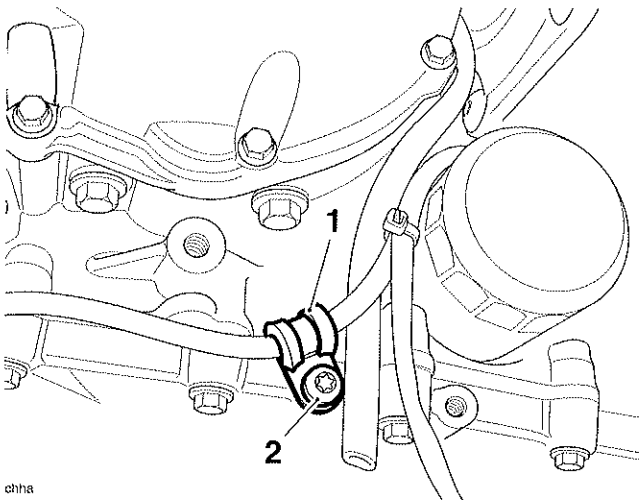
Sump Tightening Sequence

Note:

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

5. Refit the exhaust system (see page *10-143*).
6. Reconnect the low oil level sensor electrical connector.

7. Secure the low oil level sensor and harness to the cable guides and reposition the guides to the engine. Secure with the scrivet and three screws, and tighten the screws to **8 Nm**.
8. Reposition the starter motor cable P-clip to the sump and secure with the fixing. Tighten to **6 Nm**.



chha

1. P-clip
2. Fixing

9. Refit the sump guard (see page *17-34*).
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 rider's seat (see page *17-16*).

Oil Pump

⚠ 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.

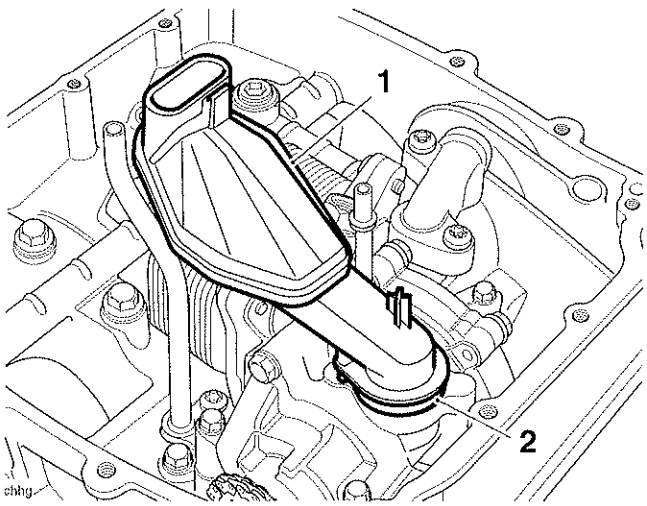
When handling used engine oil, always wear protective clothing and avoid any skin contact with the oil.

⚠ 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

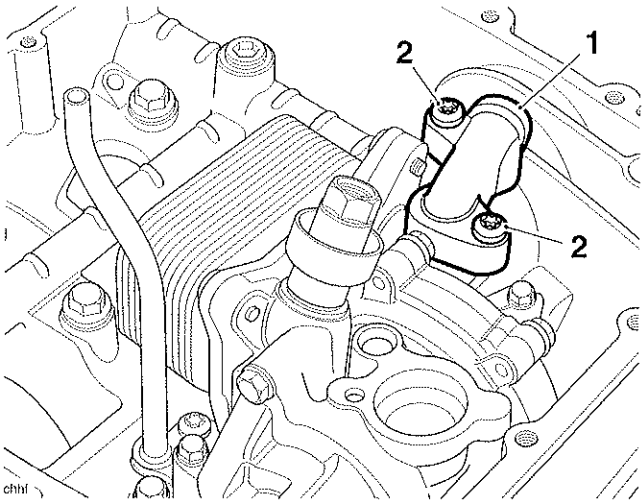
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Drain the coolant (see page *11-6*).
4. Remove the clutch (see page *4-13*).
5. Remove the sump (see page *8-10*).
6. Remove the oil pick-up and seal.



chhg

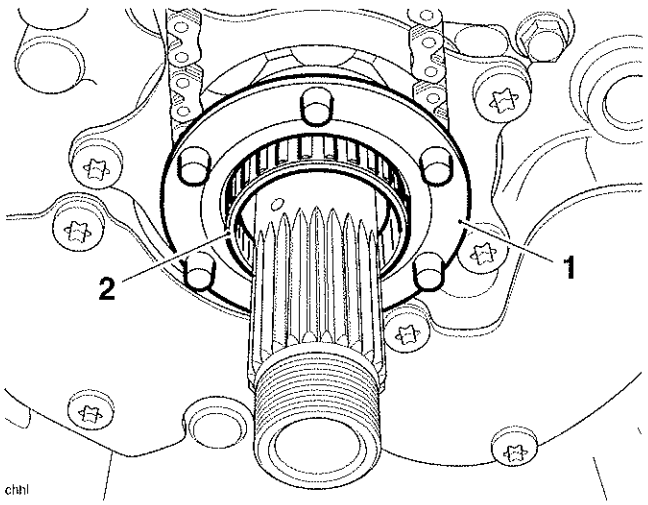
1. Oil pick-up
2. Seal

7. Release and discard the two fixings and remove the oil feed pipe. Remove and discard the two O-ring seals.



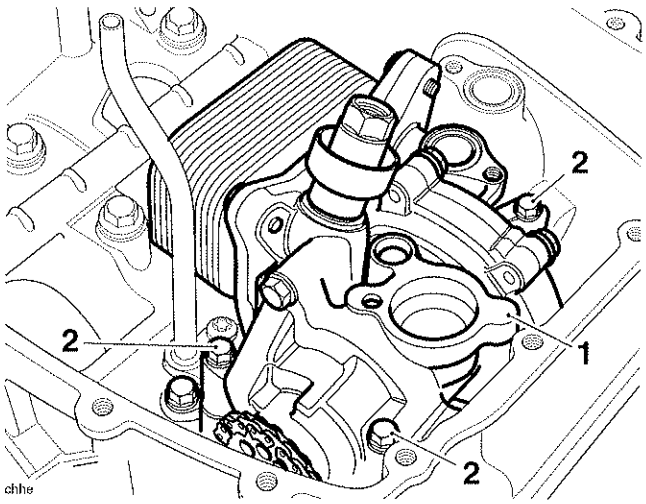
1. Oil feed pipe
2. Fixings

8. Slide the oil pump drive sprocket gently backwards and forwards to dislodge the inner needle roller bearing.
9. Carefully remove the bearing while supporting the oil pump drive sprocket.



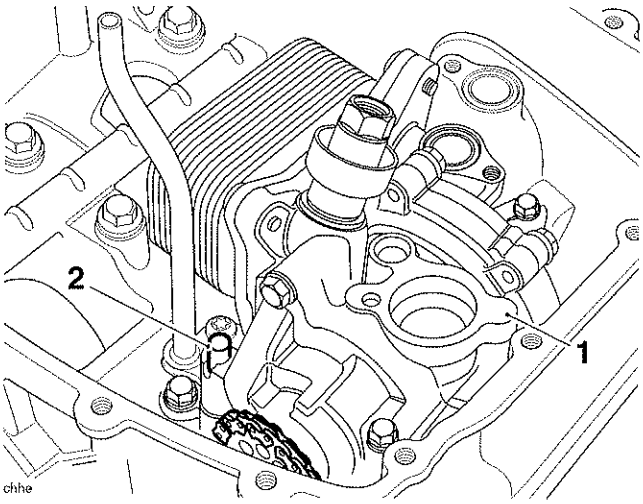
1. Oil pump drive sprocket
2. Needle roller bearing

10. Detach the drive chain from the oil pump.
11. Release the three oil pump fixings.



1. Oil pump
2. Fixings

12. Using a suitable tool, slide the dowel upwards to release the oil pump from the crankcase. It is not necessary to remove the dowel completely from the oil pump.

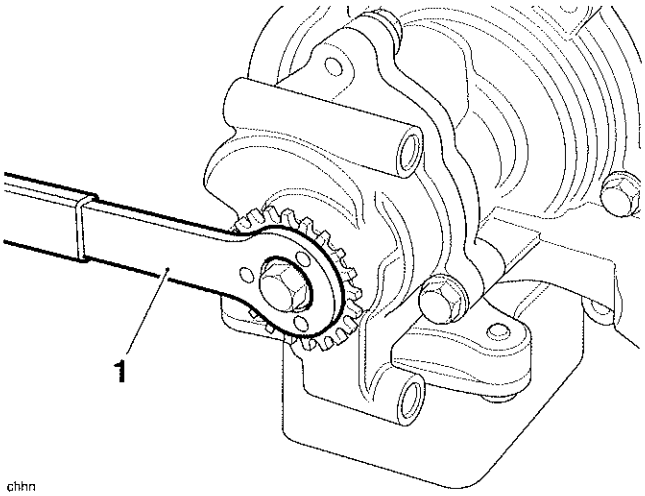


1. Oil pump
2. Dowel

13. Detach the oil pump from the coolant inlet and outlet tubes.
14. Carefully withdraw the oil pump from the crankcase.

Inspection

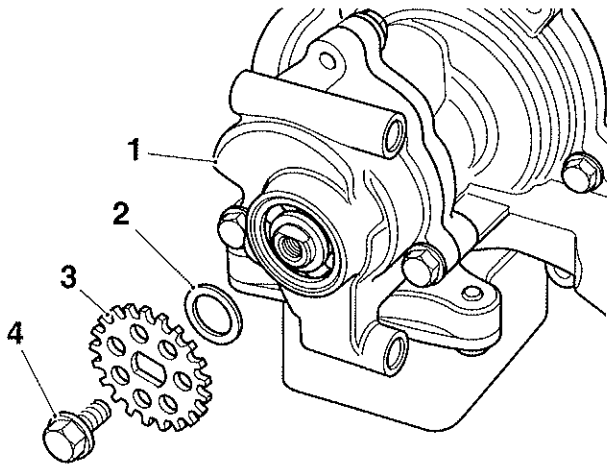
1. Prevent the oil pump sprocket from turning using Oil Pump Restraint T3880603 and remove the centre bolt.



chhn

1. Oil Pump Restraint T3880603

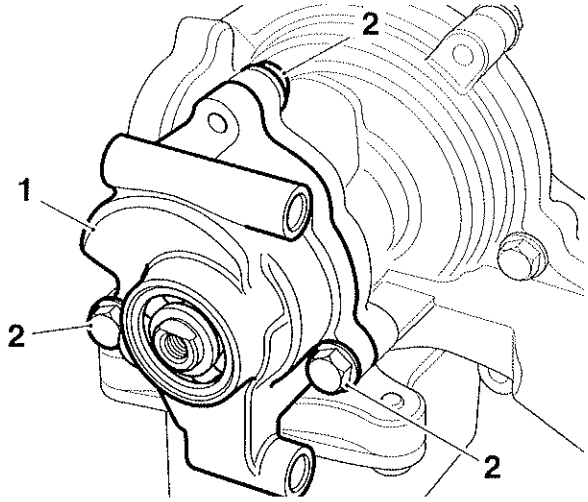
2. Remove the drive sprocket and spacer washer.



chhm

1. Oil pump
2. Spacer washer
3. Drive sprocket
4. Fixing

3. Release the three fixings and withdraw the oil pump body.



chhk

1. Oil pump body
2. Fixings

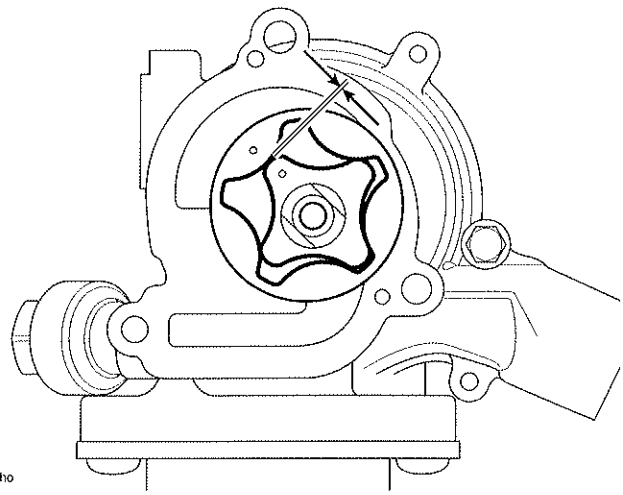
⚠ Caution

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

4. Measure the rotor tip clearance using feeler gauges.

Rotor Tip Clearance

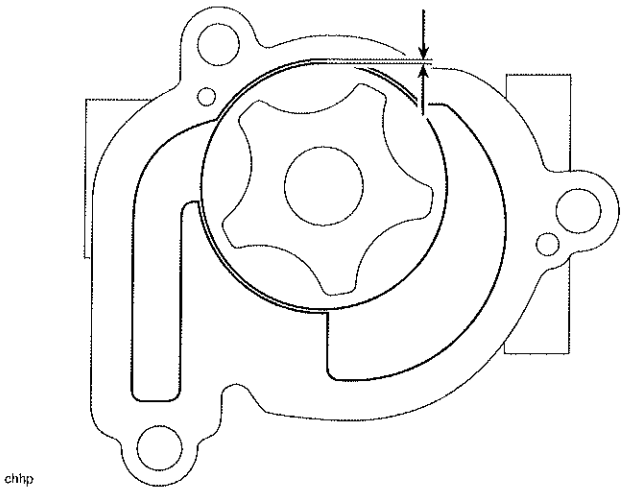
Standard:	0.050 - 0.150 mm
Service Limit:	0.200 mm



chho

Rotor Tip Clearance

5. Measure the pump body clearance using feeler gauges.



Pump Body Clearance

Body Clearance

Standard:	0.050 - 0.139 mm
Service Limit:	0.350 mm

6. Measure the pump end clearance.

Pump End Clearance

Standard:	0.040 - 0.090 mm
Service Limit:	0.170 mm

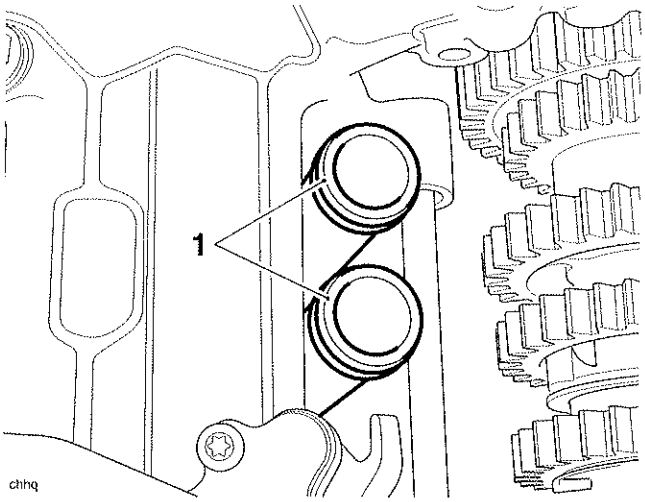
7. (a) If all clearances are within service limits, liberally apply clean engine oil to all internal components and refit the oil pump plate to the oil pump body.
8. (b) If any clearance measured is outside the service limits, renew the complete pump.
9. Inspect the sprocket and chain for wear and/or 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. Install new O-rings to the coolant inlet and outlet tubes.



1. Coolant tubes

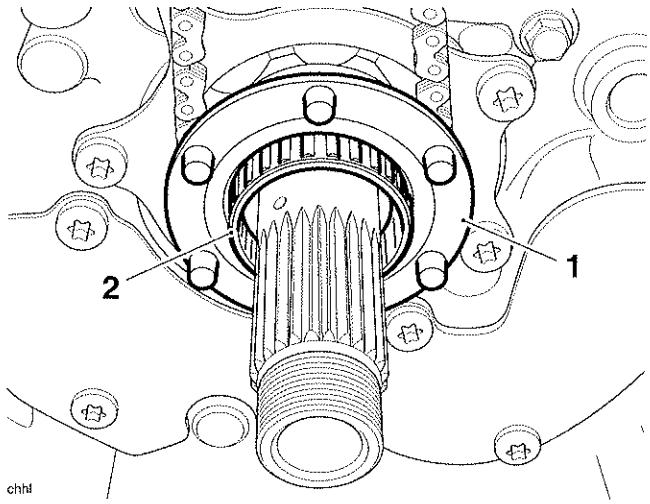
2. Fill the oil pump with new engine oil, turning the pump rotor as the oil is poured in to ensure all surfaces are coated with oil.
3. Position the oil pump to the crankcase and push the openings in the water pump over the coolant inlet and outlet tubes.
4. Align the oil pump to the crankcase, and ensure the oil pump dowel correctly locates over the bolt hole.

⚠ Caution

Do not use excessive force to insert the dowel into the crankcase. Severe dowel or crankcase damage may result from the use of excessive force.

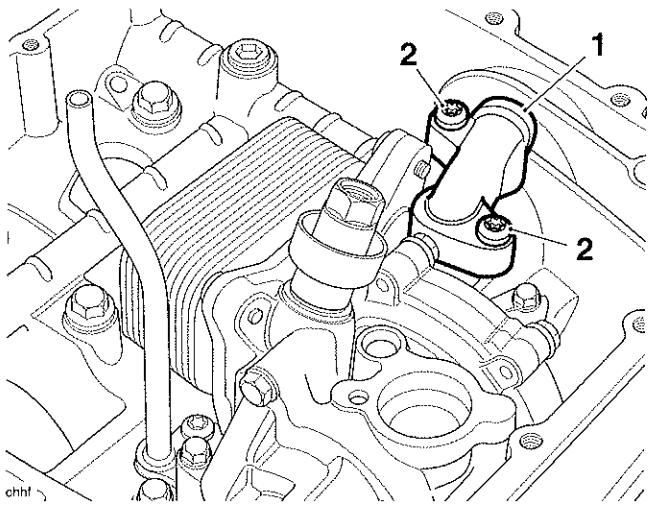
5. Using a suitable pin punch, gently tap the dowel downwards into the crankcase until it seats.
6. Secure the oil pump with new bolts. Tighten the bolts to **8 Nm**.
7. Feed the drive chain over the transmission input shaft and fit to the sprocket.
8. Fit the drive chain to the oil pump sprocket.

9. Support the oil pump drive sprocket and carefully refit the needle roller bearing.



1. Oil pump drive sprocket
2. Needle roller bearing

10. Install two new oil feed pipe O-rings to the crankcase.
11. Refit the oil feed pipe. Fit new bolts and tighten to **12 Nm**.



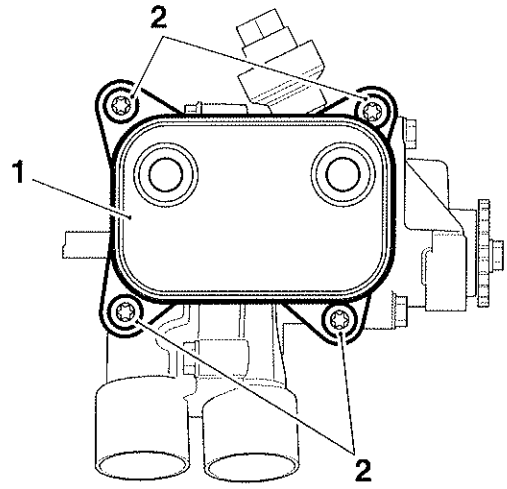
1. Oil feed pipe
2. Fixings

12. Install a new O-ring to the oil pick-up and refit the oil pick-up.
13. Refit the clutch (see page *4-17*).
14. Refit the sump, ensuring the water pump drain tube is correctly installed (see page *8-11*).
15. Reconnect the battery, positive (red) lead first.
16. Refit the rider's seat (see page *17-16*).
17. Refill the engine with oil (see page *8-7*).
18. Refill the cooling system (see page *11-7*).

Heat Exchanger

Removal

1. Remove the sump (see page *8-10*).
2. Remove the oil pump (see page *8-12*).
3. Release the heat exchanger fixings.



1. Heat exchanger
2. Fixings

4. Detach the heat exchanger.
5. Collect the four O-rings from the oil pump.

Inspection

1. Inspect the heat exchanger for fractures and signs of oil leakage or coolant leakage.

Installation

1. Fit new O-rings to the oil pump.
2. Position the heat exchanger to the oil pump, noting that it will only fit one way.
3. Secure with new fixings and tighten to **10 Nm**.
4. Refit the oil pump (see page *8-15*).
5. Refit the sump, ensuring the water pump drain tube is correctly installed (see page *8-11*).
6. Refill the engine with oil (see page *8-6*).
7. Reconnect the battery, positive (red) lead first.
8. Start the engine and check for oil leaks. Once a leak check has been made, stop the engine and allow to stand for 10 minutes.
9. Adjust the engine oil level (see page *8-6*).

9 Engine Removal/Refit

Table of Contents

Engine Removal/Refit 9.2
Removal 9.2
Installation 9.4

Engine Removal/Refit

Removal

⚠ Warning

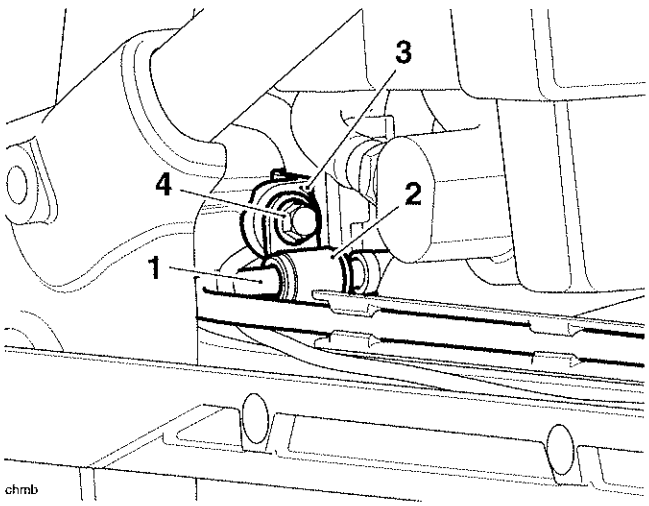
Before staring work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and securely support the motorcycle.
2. Remove the seats (see page *17-16*).
3. Remove the battery (see page *18-8*).
4. If fitted, remove the engine bars (see page *17-17*).
5. Remove the fuel tank (see page *10-117*).
6. Remove the airbox (see page *10-126*).
7. Remove the throttle bodies (see page *10-135*).
8. Drain the engine oil (see page *8-7*).
9. Remove the radiator (see page *11-13*).
10. Remove the radiator mounting brackets from the engine.
11. Remove the exhaust system (see page *10-142*).
12. Remove the rear bevel box (see page *14-4*).
13. Remove the coolant expansion tank (see page *11-14*).

Note:

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

14. Drain the clutch fluid and detach the clutch hose from the master cylinder (see page *4-8*).
15. Detach the rear brake line and its bracket from the crankcase tidy moulding.



1. **Rear brake line**
2. **Bracket**
3. **Crankcase tidy**
4. **Fixing**

Note:

- **Note the routing of the harness for the oil level sensor for installation.**

16. Follow the routing of the of the harness for the oil level sensor and disconnect it from the main harness.
17. Disconnect all electrical connections to the engine, noting the connection locations and the position of cable ties securing the harnesses in position.
18. Place a support beneath the engine and ensure that the frame is still adequately and securely supported.

Note:

- **The washers and a spacer are only fitted to the right hand side of the frame.**
- **Note the position for each of the mounting bolts, washers and the spacer for installation.**

19. Remove the engine mounting bolts, lock nuts and washer from the front of the cylinder head. Discard the lock nuts.

Note:

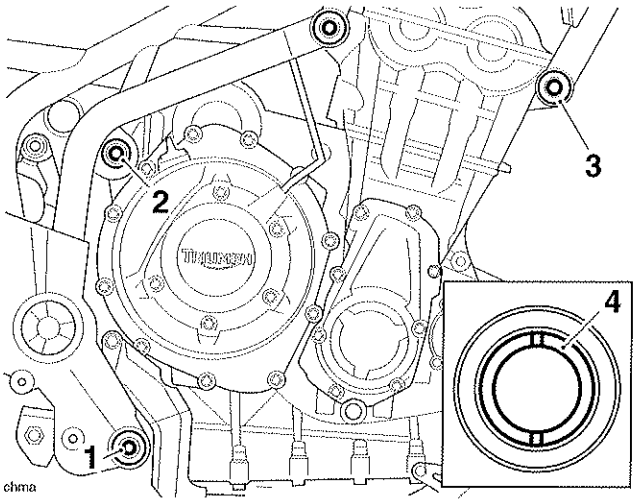
- **The cylinder head rear mounting on the right hand side has a spacer between it and the frame. Note the spacer's position for installation.**

20. Remove the engine mounting bolts and a spacer from the rear of the cylinder head. Discard the mounting bolts.
21. Remove the engine mounting bolts, washers and lock nuts from the crankcase mountings. Discard the lock nuts.

There are three frame adjuster sleeves for this model. They are located as follows:

- Two of the frame adjuster sleeves are located on the right hand side of the frame.
- The third frame adjuster sleeve is located in the front right hand mounting of the cylinder head.

22. Using tool Engine Mounting Adjuster Wrench T3880377 slacken the frame adjuster sleeves.



1. **Lower crankcase adjuster**
2. **Upper crankcase adjuster**
3. **Cylinder head front right hand adjuster**
4. **Adjuster**

Caution

To prevent body damage, do not allow clutch and brake fluid to contact any area of the bodywork.

Caution

To prevent damage to components, lower the engine very carefully.

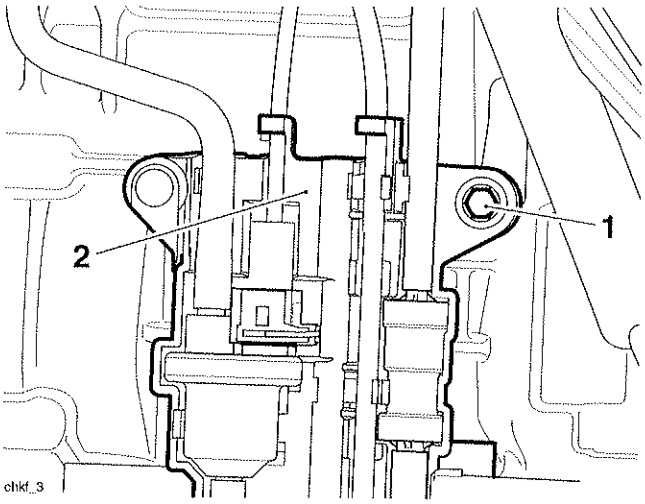
23. Temporarily refit the mounting bolts to the front mountings of the cylinder head and frame.

Note:

- **If fitted, note the routing of the evaporative canister hoses for installation.**

24. Carefully partially lower the rear of the engine to gain access to the rear cable tidy on the crankcase.

25. Release the fixing and detach the cable tidy from the crankcase. Discard the fixing.

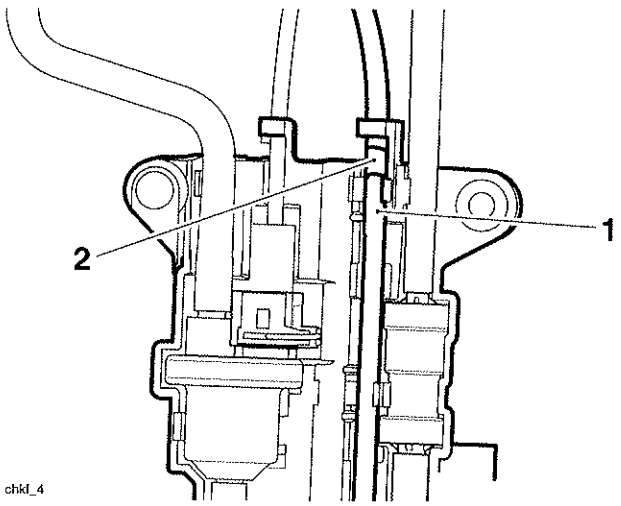


1. **Fixing**
2. **Cable tidy**

Note:

- **The harness for the oil level sensor is attached to the cable tidy behind the oxygen sensor harness.**
- **Note the position of the blue tape on the oxygen sensor in relation to the cable tidy for installation.**

26. Detach the oxygen sensor harness and the oil level sensor harness from the cable tidy.



1. **Oxygen sensor harness**
2. **Blue tape**

27. Support the engine and remove the front mounting bolts for the cylinder head. Discard the mounting bolts.

Note:

- **Note the routing of the clutch hose for installation.**

28. Lower the engine while feeding the clutch hose around the frame and remove the engine.

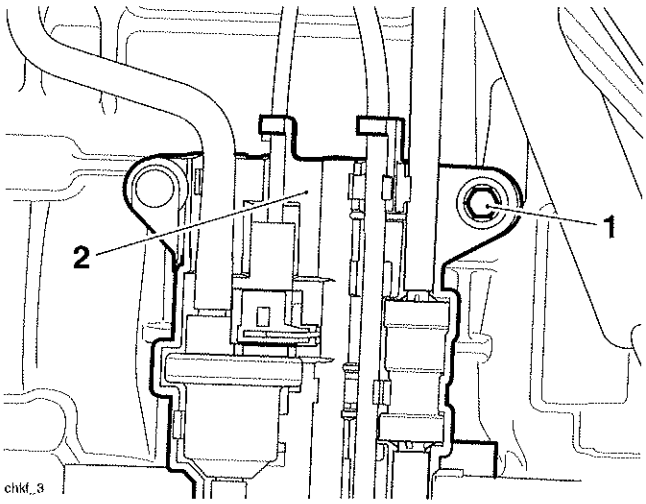
Installation

1. Position the engine beneath the frame.
2. Raise the engine, while routing the clutch cable as noted for removal.
3. Temporarily fit the new mounting bolts to the front mountings of the cylinder head and frame.
4. Lower the rear of the engine to gain access to the rear cable tidy on the crankcase.
5. Fit the oil level sensor harness and the oxygen sensor to the cable tidy. Ensure that the blue tape on the oxygen sensor harness is positioned as noted for removal.

Note:

- **When fitting the cable tidy, ensure its left hand mounting is aligned correctly to its threaded hole for the brake line clip.**

6. Attach the cable tidy to the crankcase and tighten its new fixing to **8 Nm**.



1. **Fixing**
2. **Cable tidy**

⚠ Caution

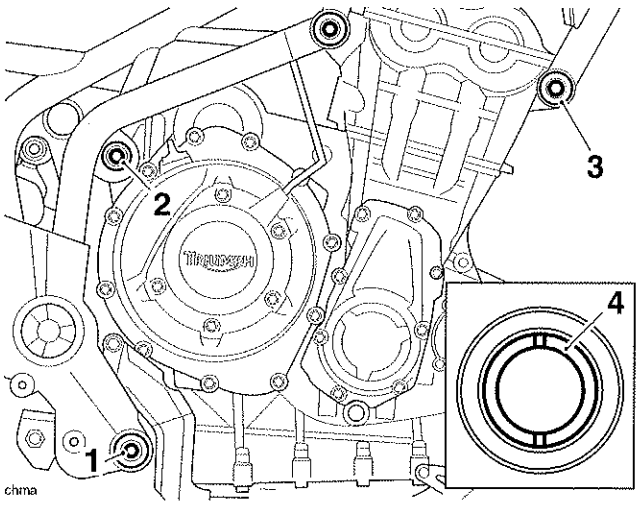
Unless the following engine mounting bolt tightening sequence is precisely followed, severe frame damage can occur.

Note:

- **If fitted, ensure that the evaporative canister hoses are routed as noted for removal while raising the rear of the engine.**

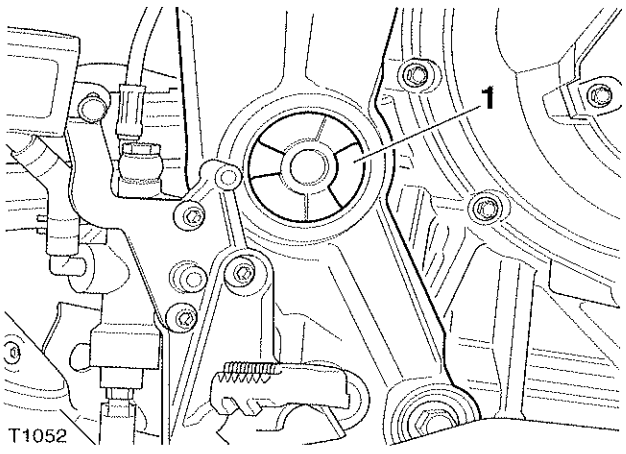
7. Raise the rear of the engine and align the engine to the frame and temporarily fit the following engine mounting bolts as described below.
   a) Fit the crankcase mounting bolts and washers to the left hand side of the frame.
   b) Fit the cylinder head front right hand new mounting bolt and washer to the left hand side of its mounting.
   c) Loosely fit the cylinder head rear new mounting bolts as follows:
   - Lubricate the threads of the mounting bolts for the cylinder head rear mountings **only** with a smear of proprietry high temperature copper-based grease.
   - Loosely fit the bolts ensuring that the spacer is fitted to the right hand side as noted for removal.

   d) Refit the new mounting bolt and a new lock nut to the cylinder head front left hand mounting as noted for removal and tighten to **24 Nm**.
8. Using tool Engine Mounting Adjuster Wrench T3880377, tighten the three adjusters in the following sequence.
   a) Tighten the lower crankcase adjuster to **5 Nm**, then remove the bolt and washer. Refit the bolt and washer to the right hand side of the frame.
   b) Tighten the upper crankcase adjuster to **5 Nm**, then remove the bolt and washer. Refit the bolt and washer to the right hand side of the frame.
   c) Tighten the cylinder head front right hand adjuster to **5 Nm**, then remove the bolt and washer. Refit the bolt and washer to the right hand side of its mounting.



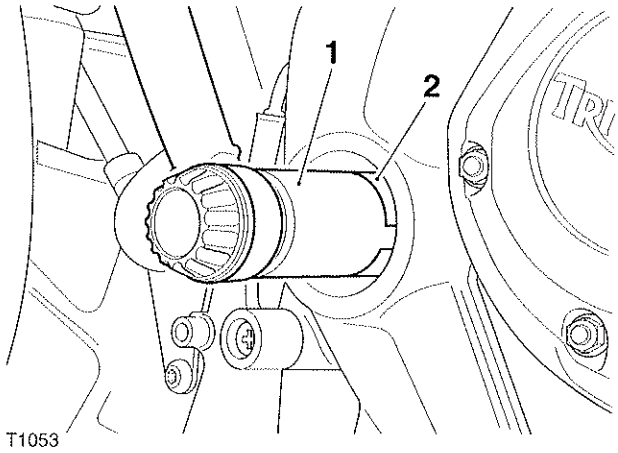
1. **Lower crankcase adjuster**
2. **Upper crankcase adjuster**
3. **Cylinder head front right hand adjuster**
4. **Adjuster**

9. Remove the support from beneath the engine.
10. Fit new lock nuts and tighten in the following sequence.
    a) Upper crankcase mounting lock nut to **105 Nm**.
    b) Cylinder head left hand rear mounting to **85 Nm**.
    c) Cylinder head right hand rear mounting to **85 Nm**.
    d) Cylinder head left hand front mounting to **115 Nm**.
    e) Cylinder head right hand front mounting to **100 Nm**.
    f) Lower crankcase mounting lock nut to **105 Nm**.
11. Refit the throttle bodies to the cylinder head (see page *10-137*).
12. Route the harness for the oil level sensor as noted for removal and connect it to the main harness.
13. Reconnect all electrical connections to the engine and ensure they are secured as noted for removal.
14. Attach the brake line and its bracket to the crankcase and tighten the new fixing to **8 Nm**.
15. Carefully remove the cover from the swinging arm's right hand pivot pin.



1. Cover

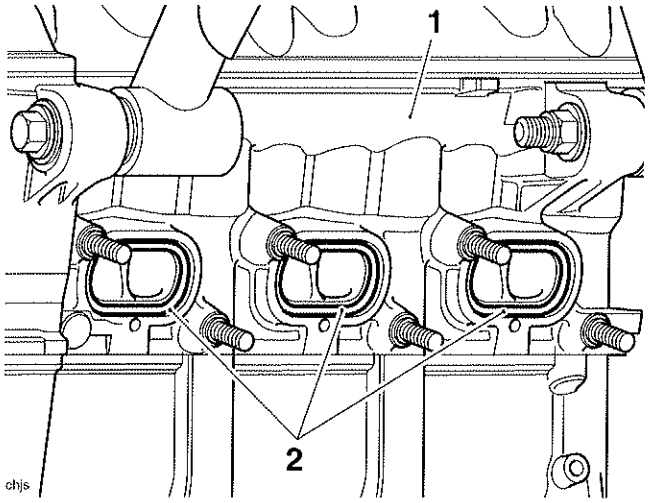
16. Using the service tool Lock Ring Wrench, 38 mm T3880062, remove the locking ring from the right hand pivot pin.



1. Lock Ring Wrench, 38 mm T3880062
2. Locking ring

17. Tighten the right hand pivot bolt to **45 Nm**.
18. Lubricate the threads of the locking ring with a smear of proprietary high temperature copper-based grease, then fit to the right hand pivot pin and tighten to **100 Nm**.
19. Refit the cover to the swinging arm's right hand pivot pin.
20. Refit the rear bevel box (see page *14-8*).
21. Refit the clutch hose to the clutch master cylinder (see page *4-10*).
22. Fill and bleed the clutch system (see page *4-6*).
23. Refit the coolant expansion tank (see page *11-15*).

24. Using new seals at the cylinder head, refit the exhaust system (see page *10-143*).



1. Cylinder head
2. Seals

25. Refit the radiator (see page *11-14*).
26. Refill the cooling system (see page *11-7*).
27. Fill the engine with oil of the correct grade and viscosity (see page *8-6*).
28. Refit the airbox (see page *10-127*).
29. Refit the fuel tank (see page *10-119*).
30. If fitted, refit the engine protector bars (see page *17-19*).
31. Refit and connect the battery (see page *18-8*).
32. Remove the motorcycle from its support and place on the side stand.
33. Refit the seats (see page *17-16*).

10 Fuel System/Engine Management

Table of Contents

Exploded View - Fuel Tank and Fuel Pump 10.8
Exploded View - Fuel Rail, Throttles and Injectors 10.9
Exploded View - Airbox 10.10
Exploded View - Exhaust System 10.11
Exploded View - Evaporative System 10.12
Exploded View - Secondary Air Injection 10.12
Fuel Requirements 10.13
- Fuel Requirements - all countries except USA 10.13
- Fuel Requirements - USA 10.13
- Oxygenated Gasoline 10.13
- Ethanol 10.13
- Methanol 10.13
- MTBE (Methyl Tertiary Butyl Ether) 10.13

Glossary of Terms 10.14
- Intake air temperature 10.14
- Ambient air temperature 10.14
- Air temperature sensors 10.14
- ATDC 10.14
- Barometric pressure 10.14
- BTDC 10.14
- Catalyst 10.14
- Closed throttle position 10.14
- Coolant temperature 10.14
- Coolant temperature sensor 10.14
- Cooling fan status 10.14
- Cruise control cancel switch 10.14
- DTC 10.14
- ECM 10.14
- Engine speed 10.14
- Fall detection 10.14
- Freeze frame 10.14
- Gear position sensor 10.14
- Ignition advance 10.14
- Ignition switch position 10.14
- Ignition timing 10.14

Immobiliser and Tyre Pressure Monitoring System (TPMS) control module 10.14
Injector pulse time 10.15
MAP sensor 10.15
MIL 10.15
Neutral switch status 10.15
Open circuit 10.15
Over temp 10.15
Oxygen sensor 10.15
Throttle position sensor 10.15
Throttle actuator motor 10.15
Twist grip position sensor 10.15
Purge valve duty cycle 10.15
Secondary air injection 10.15
Sensor reference Voltage 10.15
Short circuit 10.15
Side stand status 10.15
Target dwell time 10.15
Throttle position 10.15
Throttle Voltage 10.15
TDC 10.15
TPMS 10.15
Transponder 10.15
vBatt 10.15

Engine Management System 10.16
System Description 10.16
Sensor Locations 10.17
System Actuators 10.18
Actuator Locations 10.19

Immobiliser System 10.20
System Description 10.20
System Components and Operation 10.20
Keys 10.20
Diagnostics 10.20
Further Diagnosis 10.20
Components Location 10.21

Tyre Pressure Monitoring System (TPMS) 10.22
System Description 10.22
System Components and Operation 10.22
Compliance 10.22
Diagnostics 10.22
Further Diagnosis 10.22
Component Locations 10.23

Engine Management Circuit Diagram 10.24
Key to Wiring Circuit Diagram 10.24
Key to Wiring Colour Codes 10.24

Engine Management Circuit Diagram 10.25

System Diagnostics 10.26
On-board Fault Detection System 10.26
Diagnostic Interface Connection 10.27
Triumph Diagnostic software 10.27
Build Data 10.27
Current Data 10.28
Sensor Data 10.29
Injector Data 10.30
Ignition Data 10.30
Idle Speed and Throttle Data 10.30
Inputs 10.31
Outputs 10.31
Adaption Status 10.32
Function Tests 10.33
Adjust Tune 10.35
Freeze Frame Data 10.36
Diagnostic Trouble Codes 10.37
Immobiliser/TPMS Control Module Diagnostic Trouble Codes 10.40
Electrical Connectors 10.41
Before Disconnection: 10.41
When Disconnecting a Connector: 10.41
When Inspecting a Connector: 10.41
When Connecting a Connector: 10.41
Disconnection of ECM connectors 10.41
Reconnection of ECM connectors 10.42
Further Diagnosis 10.42
Crankshaft Sensor 10.43
Pinpoint Tests 10.43
Fuel Injectors 10.44
Pinpoint Tests 10.44
Throttle Position Sensor 1 ..... 10.46
Pinpoint Tests 10.46
Throttle Position Sensor 2 ..... 10.48
Pinpoint Tests 10.48
Throttle Position Sensor 1 vs Throttle Position Sensor 2 Correlation Error 10.50
Pinpoint Tests 10.50
Twist Grip Position Sensor 1 ..... 10.51
Pinpoint Tests 10.51
Twist Grip Position Sensor 2 ..... 10.52
Pinpoint Tests 10.52
Twist Grip Position Sensor 1 vs Twist Grip Position Sensor 2 Correlation Error 10.53
Pinpoint Tests 10.53

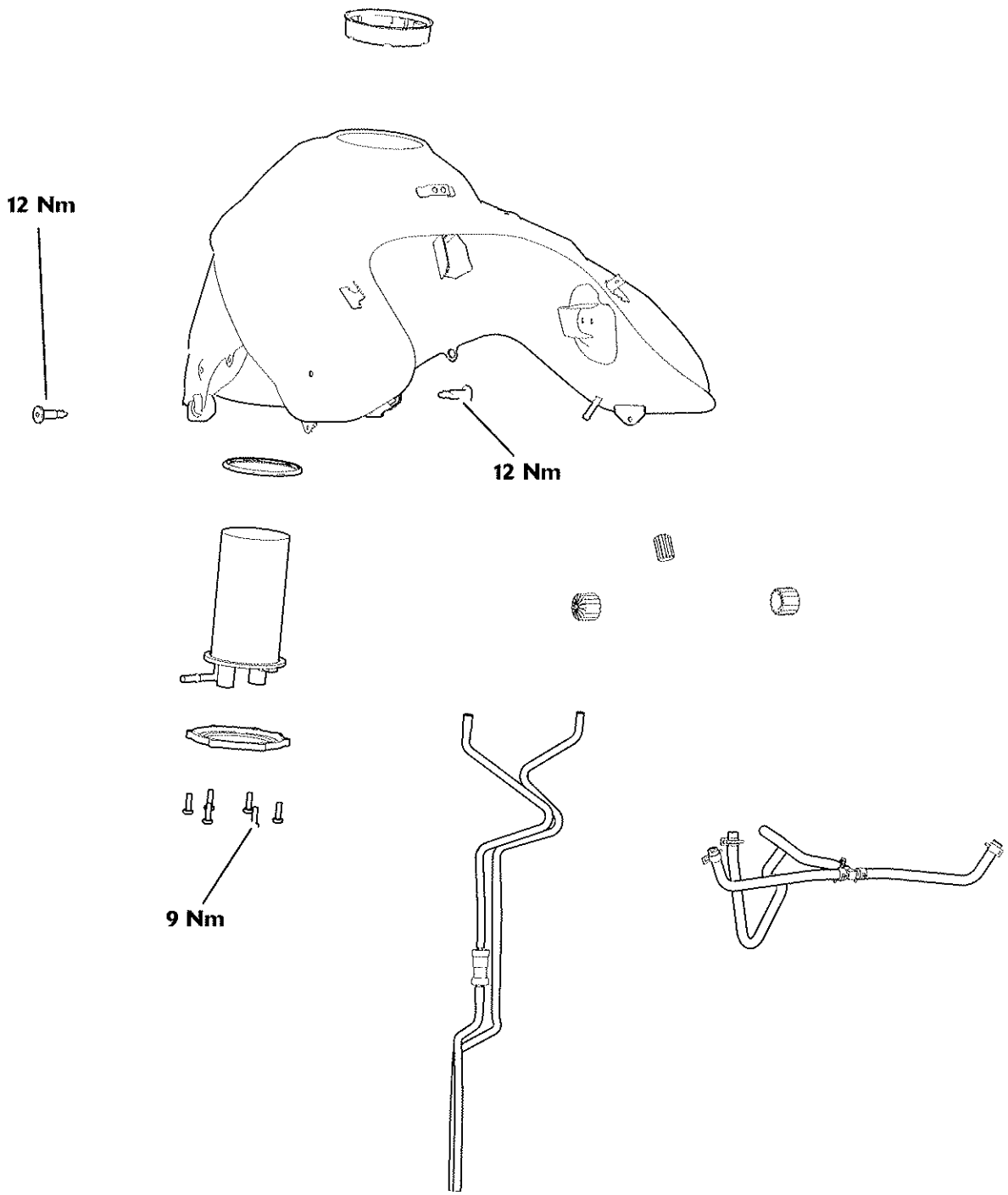
Throttle Actuator Motor 10.54
Throttle Valve Drive Error 10.55
Purge Valve 10.56
Pinpoint Tests 10.56
Starter Motor Relay 10.58
Pinpoint Tests 10.58
Gear Position Sensor 10.60
Pinpoint Tests 10.60
Engine Oil Level Sensor 10.61
Pinpoint Tests 10.61
Ignition Coils 10.62
Pinpoint Tests 10.62
Coolant Temperature Sensor 10.64
Pinpoint Tests 10.64
Inlet Air Temperature Sensor 10.66
Pinpoint Tests 10.66
Fuel Pump Relay 10.68
Pinpoint Tests 10.68
System Voltage 10.69
Pinpoint Tests 10.69
Cooling Fan Relay 10.70
Pinpoint Tests 10.70
Oxygen Sensor 10.71
Pinpoint Tests 10.71
Oxygen Sensor Heater 10.72
Pinpoint Tests 10.72
Fall Detection Switch 10.74
Pinpoint Tests 10.74
Vehicle Speed Sensor 10.75
CAN Communication 10.76
Instrument Communication (CAN) 10.78
Pinpoint Tests 10.78
Fuel Level Sensor Circuit Malfunction 10.79
Pinpoint Tests 10.79
Ambient Pressure Sensor 10.80
Pinpoint Tests 10.80
Manifold Absolute Pressure (MAP) Sensor 10.82
Pinpoint Tests 10.82
Secondary Air Injection Valve 10.84
Pinpoint Tests 10.84

EMS Main Relay Circuit 10.86
Pinpoint Tests 10.86
EEPROM Error 10.88
EMS Ignition Voltage Input Circuit 10.89
Pinpoint Tests 10.89
5 Volt Sensor Supply Circuit 10.90
Pinpoint Tests 10.90
Tune Lock 10.91
Instrument ID Incorrect 10.92
Pinpoint Tests 10.92
Immobiliser and TPMS Control Module Communication 10.93
Immobiliser and TPMS Control Module ID Incompatible 10.94
ABS Modulator ID Incompatible 10.95
ABS Modulator Communication 10.96
Brake Switches 10.98
Twist Grip - Cruise Cancel Switch 10.100
Cruise Control Prevented Due to Other Malfunction 10.101
Cruise Control Disabled Until Button Press Sequence Completed 10.102
Traction Control Prevented Due to ABS Malfunction 10.103
ECM Internal Error 10.104
ECM Tamper Detected 10.105
Accessory Control Relay 10.106
Headlight Relay 10.107
Fault Finding - Non Electrical 10.108
Front Wheel Unit Sensor Battery Alert 10.109
Rear Wheel Unit Sensor Battery Alert 10.110
Front Wheel Unit Sensor Fault Alert 10.111
Rear Wheel Unit Sensor Fault Alert 10.112
Front Wheel Unit Sensor Loss of Communication 10.113
Rear Wheel Unit Sensor Loss of Communication 10.114
Immobiliser/TPMS Control Module Fault 10.115
Invalid Key: Key Authentication Unsuccessful 10.116
Pinpoint Tests 10.116
Fuel Tank 10.117
Removal 10.117
Installation 10.119
Fuel Pump and Filter Assembly 10.120
Removal 10.120
Installation 10.121
Fuel Level Sender Assembly/Float Replacement 10.122
Removal 10.122

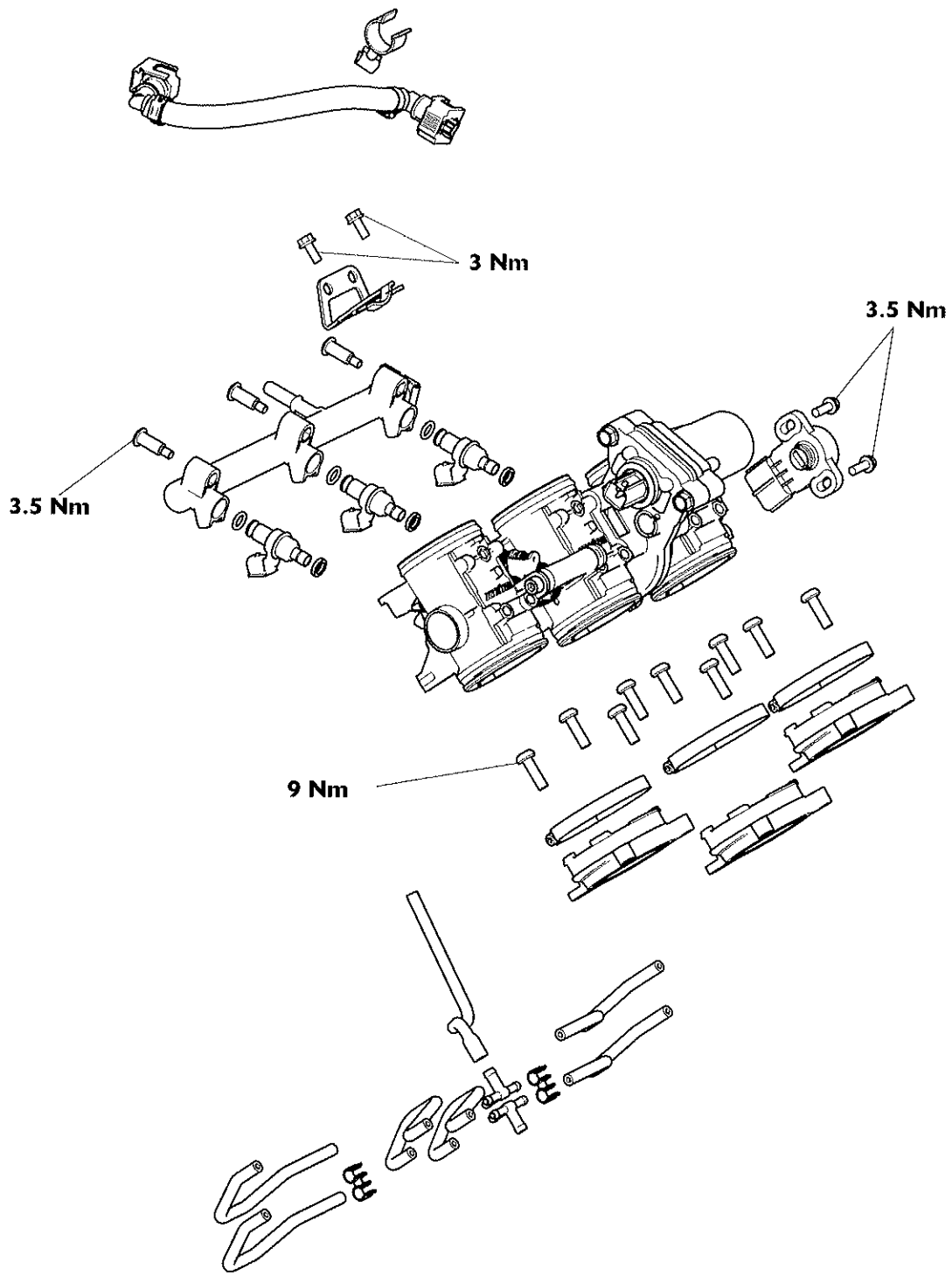
Float Replacement 10.122
Installation 10.123
Fuel Pressure Checking 10.124
Fuel Delivery System 10.125
Airbox 10.126
Removal 10.126
Inspection 10.126
Installation 10.127
Air Filter Element 10.127
Removal 10.127
Installation 10.128
Engine Control Module (ECM) 10.129
Removal 10.129
Installation 10.129
Intake Air Temperature Sensor 10.129
Removal 10.129
Installation 10.129
MAP Sensor 10.130
Removal 10.130
Installation 10.130
Barometric Pressure Sensor 10.130
Removal 10.130
Installation 10.130
Fall Detection Switch 10.131
Removal 10.131
Installation 10.131
Roll Over Valve 10.131
Removal 10.131
Installation 10.132
Crankshaft Position Sensor 10.133
Removal 10.133
Installation 10.133
Immobiliser/TPMS Control Module 10.133
Removal 10.133
Models with the Security Bracket Fitted 10.133
All Models 10.134
Installation 10.134
Models with the Security Bracket Fitted 10.134
All Models 10.134
Gear Position Sensor 10.135
Removal 10.135
Installation 10.135
Throttle Bodies/Injectors 10.135
Removal 10.135
Disassembly 10.136

Inspection 10.136
Assembly 10.136
Installation 10.137
Throttle Body Balancing 10.137
Throttle Position Sensor 10.139
Removal 10.139
Installation 10.139
Throttle Actuator Motor 10.140
Engine Management Adaption 10.140
General Information 10.140
Adaption Status 10.140
Terminology 10.141
Typical Values 10.141
Forcing Adaption to Take Place 10.141
Fault Indications 10.141
Exhaust System 10.142
Removal 10.142
Installation 10.143
Secondary Air Injection 10.145
System Purpose and Operation 10.145
Secondary Air Injection Solenoid Valve 10.146
Removal 10.146
Installation 10.146
Secondary Air Injection Reed Valves 10.147
Removal 10.147
Inspection 10.147
Installation 10.148
Evaporative Canister (Where Fitted) 10.148
Removal 10.148
Installation 10.149
Purge Control Valve 10.150
Removal 10.150
Installation 10.150
Evaporative Emissions Control System 10.151
Component Locations 10.151
Evaporative Control System - Engine Off 10.152
Evaporative Control System - Engine Running 10.153

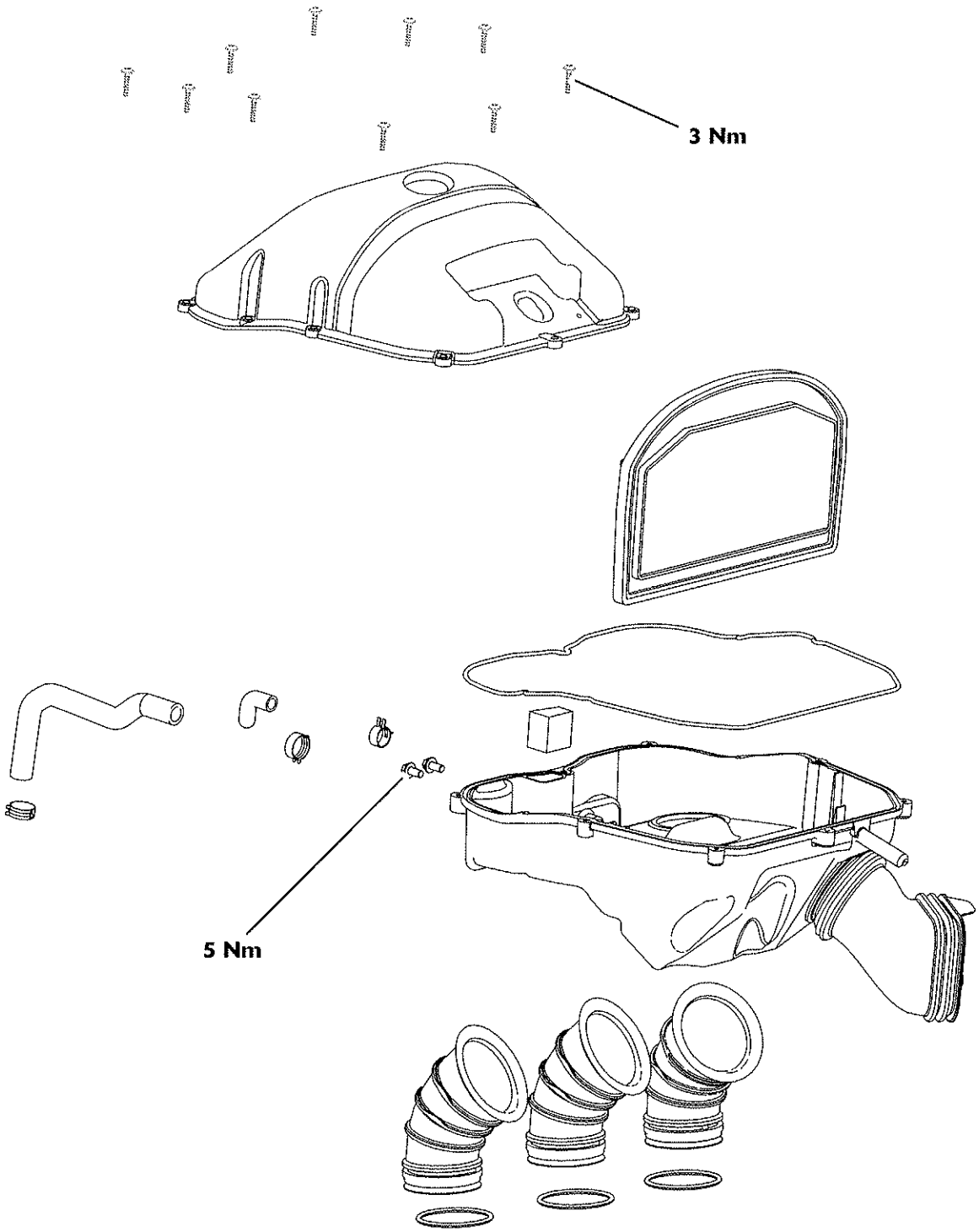
Exploded View - Fuel Tank and Fuel Pump



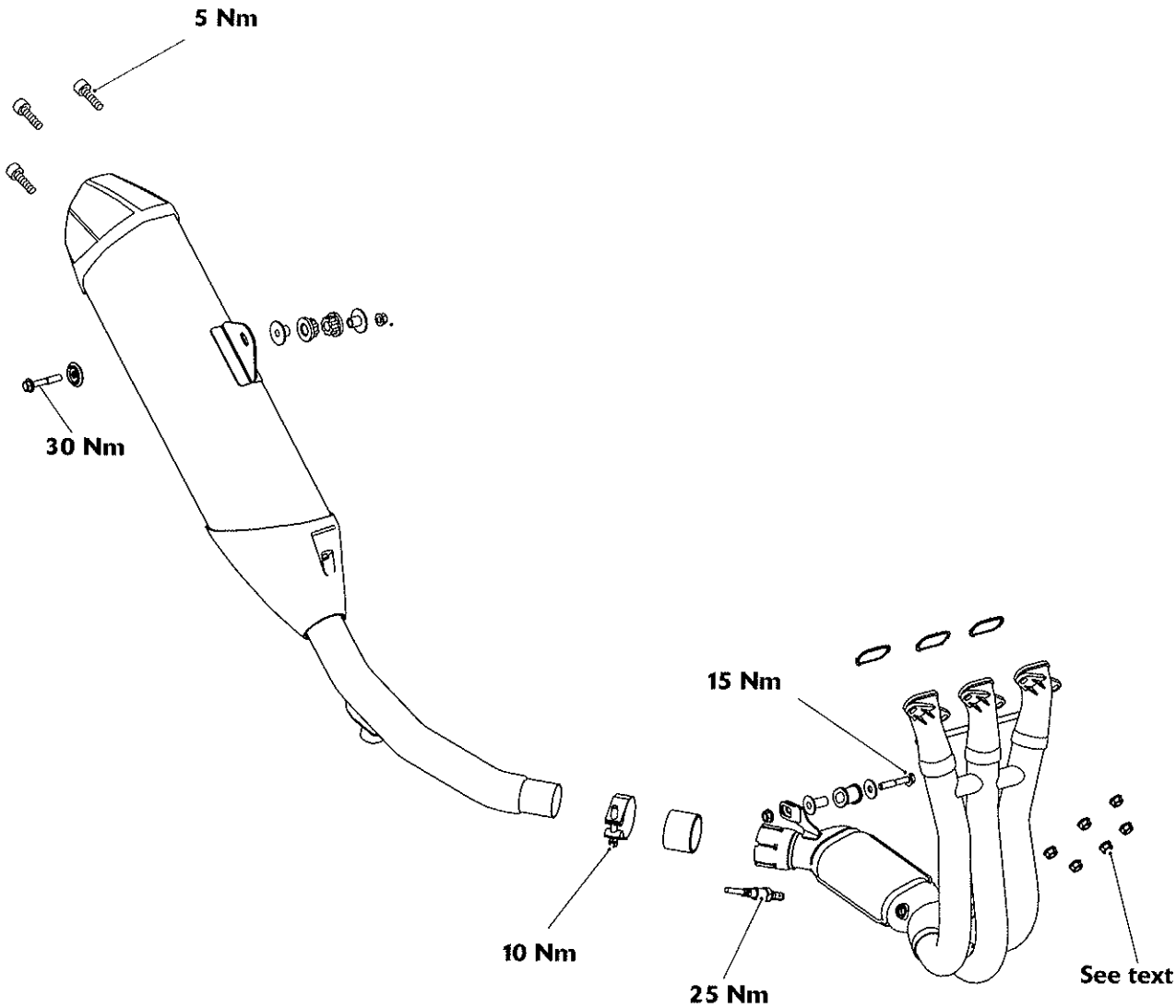
Exploded View - Fuel Rail, Throttles and Injectors



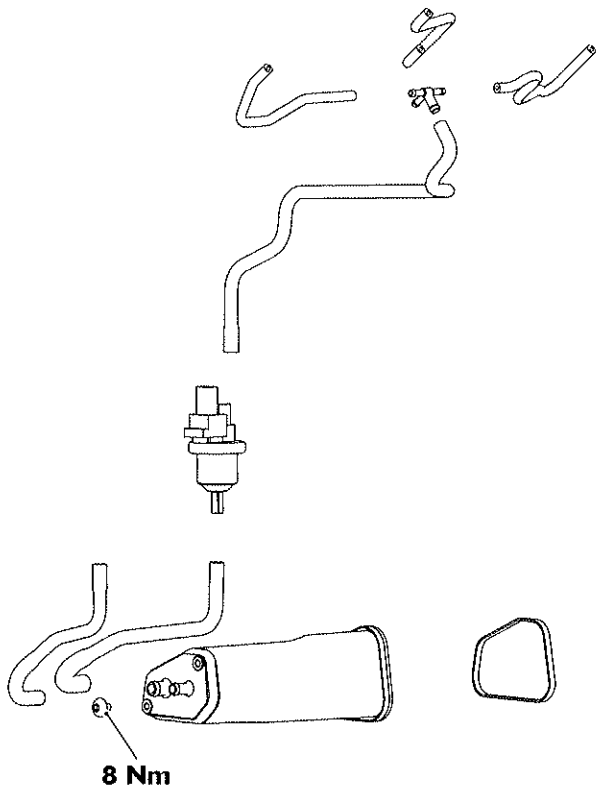
Exploded View - Airbox



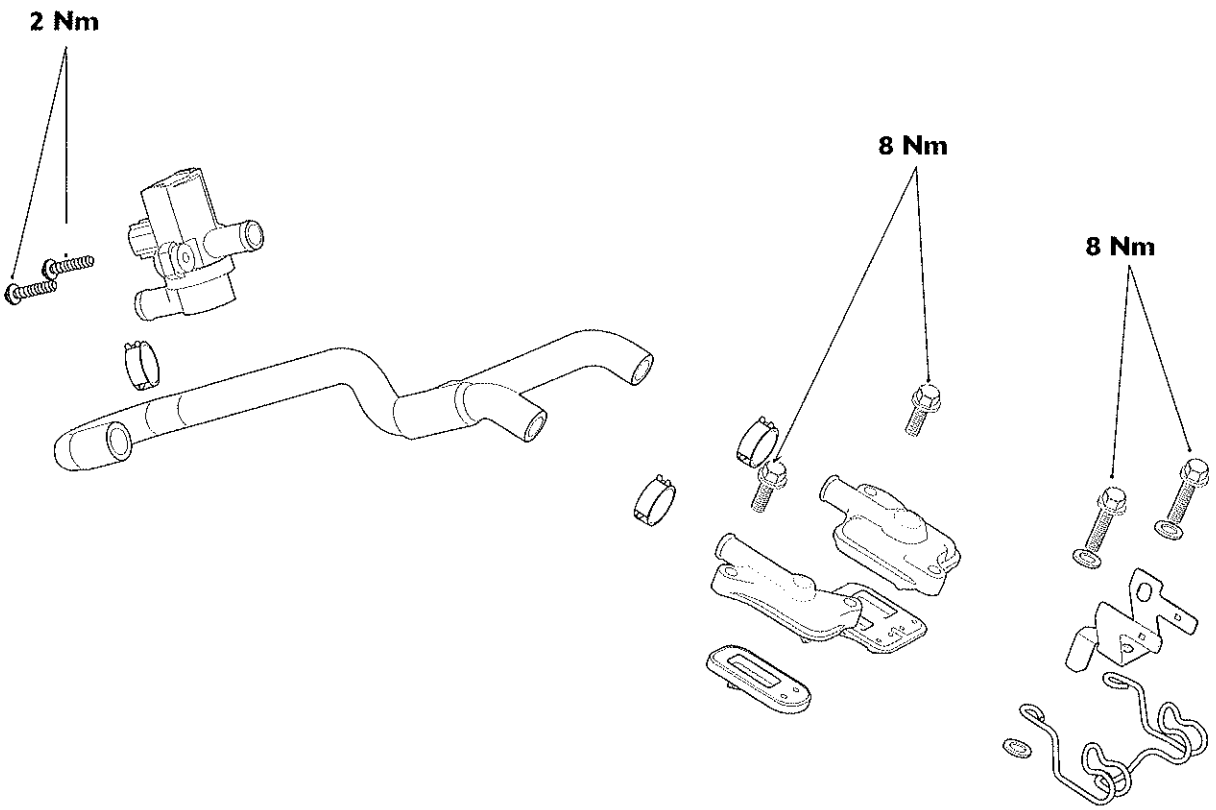
Exploded View - Exhaust System



Exploded View - Evaporative System



Exploded View - Secondary Air Injection



Fuel Requirements

Fuel Requirements - all countries except USA

Outside America, this model must be run on 91 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: This model is designed to run on unleaded gasoline with a CLC or AKI octane rating (R+M)/2 of 87 or higher.

⚠ Caution

The use of leaded gasoline is illegal in some countries, states or territories and will invalidate the vehicle and emissions control warranties. Additionally, leaded gasoline will cause damage to emissions control components.

Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. This model will give best performance when using unleaded gasoline. However, the following should be used as a guide to the use of oxygenated fuels.

⚠ Caution

Because of the generally higher volatility of oxygenated fuels, starting, engine response and fuel consumption may be adversely affected by their use. Should any of these difficulties be experienced, run the motorcycle on normal unleaded gasoline.

Ethanol

Ethanol fuel is a mixture of 10% ethanol and 90% gasoline and is often described under the names 'gasohol', 'ethanol enhanced', or 'contains ethanol'. This fuel may be used in Triumph motorcycles.

Methanol

⚠ Caution

Fuels containing methanol should not be used in Triumph motorcycles as damage to components in the fuel system can be caused by contact with methanol.

MTBE (Methyl Tertiary Butyl Ether)

The use of gasolines containing up to 15% MTBE (Methyl Tertiary Butyl Ether) is permitted in Triumph motorcycles.

Glossary of Terms

The following terms and abbreviations will be found in this section. A brief explanation is given below of what some of the more common terms and abbreviations mean.

Intake air temperature

The air temperature in the airbox and intake system.

Ambient air temperature

Temperature of the air in the atmosphere.

Air temperature sensors

A sensor located in the airbox to detect the temperature of the incoming air.

Another sensor is located in the cockpit under the instruments to detect the ambient air temperature.

ATDC

After Top Dead Centre.

Barometric pressure

Pressure of the air in the atmosphere.

BTDC

Before Top Dead Centre (TDC).

Catalyst

Device placed in the exhaust system which reduces exhaust emissions by stimulating secondary combustion of the exhaust gases.

Closed throttle position

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

Coolant temperature

The coolant temperature in the cylinder head.

Coolant temperature sensor

Sensor which detects coolant temperature.

Cooling fan status

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

Cruise control cancel switch

A switch located in the twist grip housing, used to cancel the cruise control. The switch is operated by 'over-closing' of the twist grip.

DTC

Diagnostic Trouble Code.

ECM

Engine Control Module.

Engine speed

The crankshaft revolutions per minute.

Fall detection

The fall detection switch will detect if the motorcycle is on its side and will cut power to the ECM immediately.

Freeze frame

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

Gear position sensor

Gearbox mounted sensor which delivers information to the ECM. This is converted to the gear position value that is displayed on the instrument's gear position indicator and neutral light.

Ignition advance

The timing of ignition at the spark plug relative to top dead centre.

Ignition switch position

The 'ON' or 'OFF' position of either or both the ignition switch and the engine stop switch.

Ignition timing

Same as 'ignition advance'.

Immobiliser and Tyre Pressure Monitoring System (TPMS) control module

The control module for the Immobiliser and TPMS system.

Injector pulse time

The time during which an injector remains open (i.e. delivering fuel).

MAP sensor

Manifold absolute pressure (the air pressure in the intake system).

MIL

Malfunction Indicator Light.

Illuminates when most Diagnostic Trouble Codes (DTCs) are set.

Neutral switch status

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

Open circuit

A break in an electrical circuit - current cannot flow.

Over temp

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

Oxygen sensor

The oxygen sensor measures the oxygen levels in the exhaust gases and feeds this information to the ECM. Based on this information, adjustments to air/fuel ratio are made.

Throttle position sensor

Sensor for the primary throttle position.

Throttle actuator motor

Motor used to open/close the throttle.

Twist grip position sensor

The twist grip position sensor is used to relay twist grip position information to the ECM. The ECM uses this information to drive the throttle actuator motor to the correct position.

Purge valve duty cycle

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

Secondary air injection

A small amount of air injected into the exhaust port to reduce the levels of pollutants in the exhaust gases.

Sensor reference Voltage

Supply Voltage to the system sensors (nominally 5 Volts).

Short circuit

A 'short cut' in an electrical circuit - current by-passes the intended circuit (either to earth (ground), 5 Volt sensor reference Voltage or vBatt).

Side stand status

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

Target dwell time

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

Throttle position

The position of the throttle butterfly given as a percentage of the movement range. When the data is displayed on the tool, fully open need not be 100% nor fully closed 0%.

Throttle Voltage

Voltage at the throttle potentiometer.

TDC

Top Dead Centre.

TPMS

Tyre Pressure Monitoring System.

Transponder

A transmitter-responder chip located in the ignition key. The transponder is activated by a radio signal sent out by the immobiliser and TPMS control module, via an antenna located around the ignition switch. If the immobiliser and TPMS control module does not receive the correct code signal from the transponder, the immobiliser will remain active and the engine will not start.

vBatt

Battery Voltage.

Engine Management System

System Description

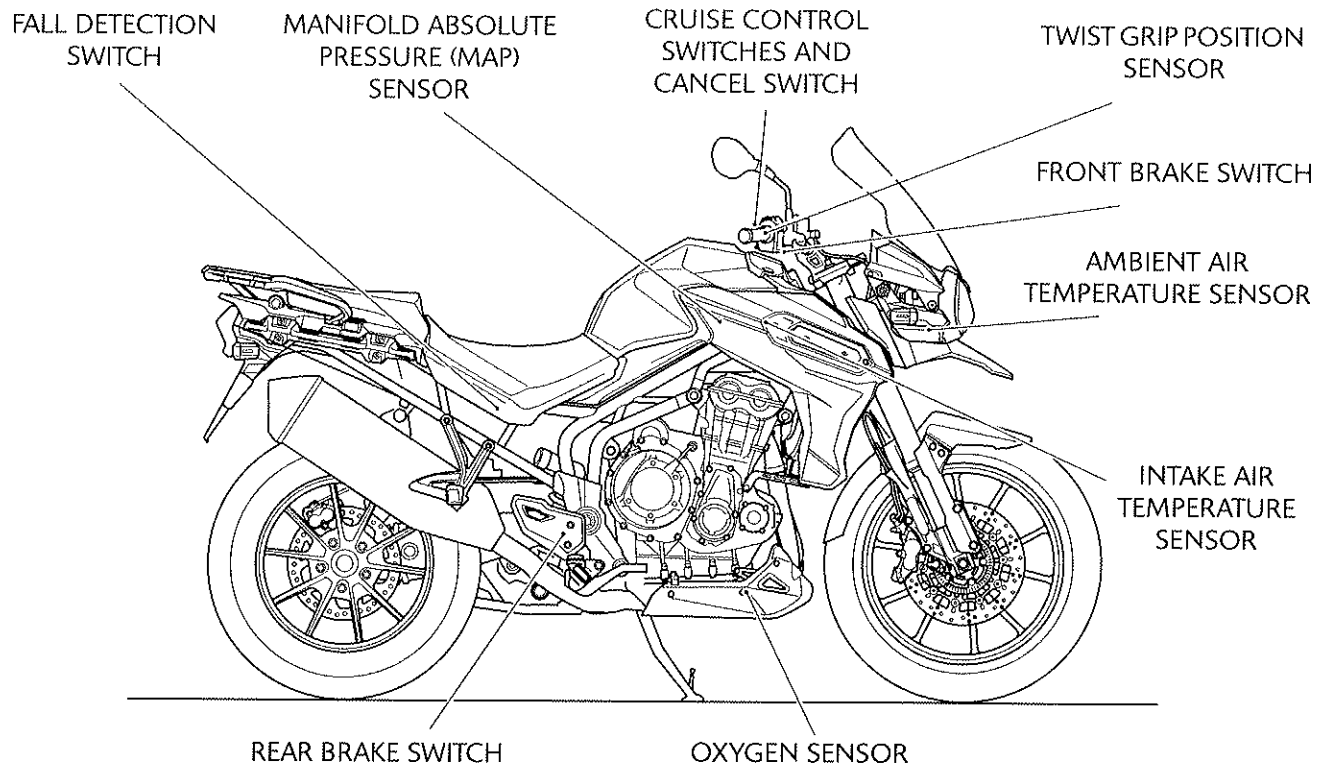
The Tiger Explorer is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The Engine Control Module (ECM) is electronically paired to the immobiliser/TPMS control module to help prevent theft of the motorcycle (see page *10-20*). The ECM also draws information from sensors positioned around the engine, cooling and air intake systems and precisely calculates ignition advance and fueling requirements for all engine speeds and loads.

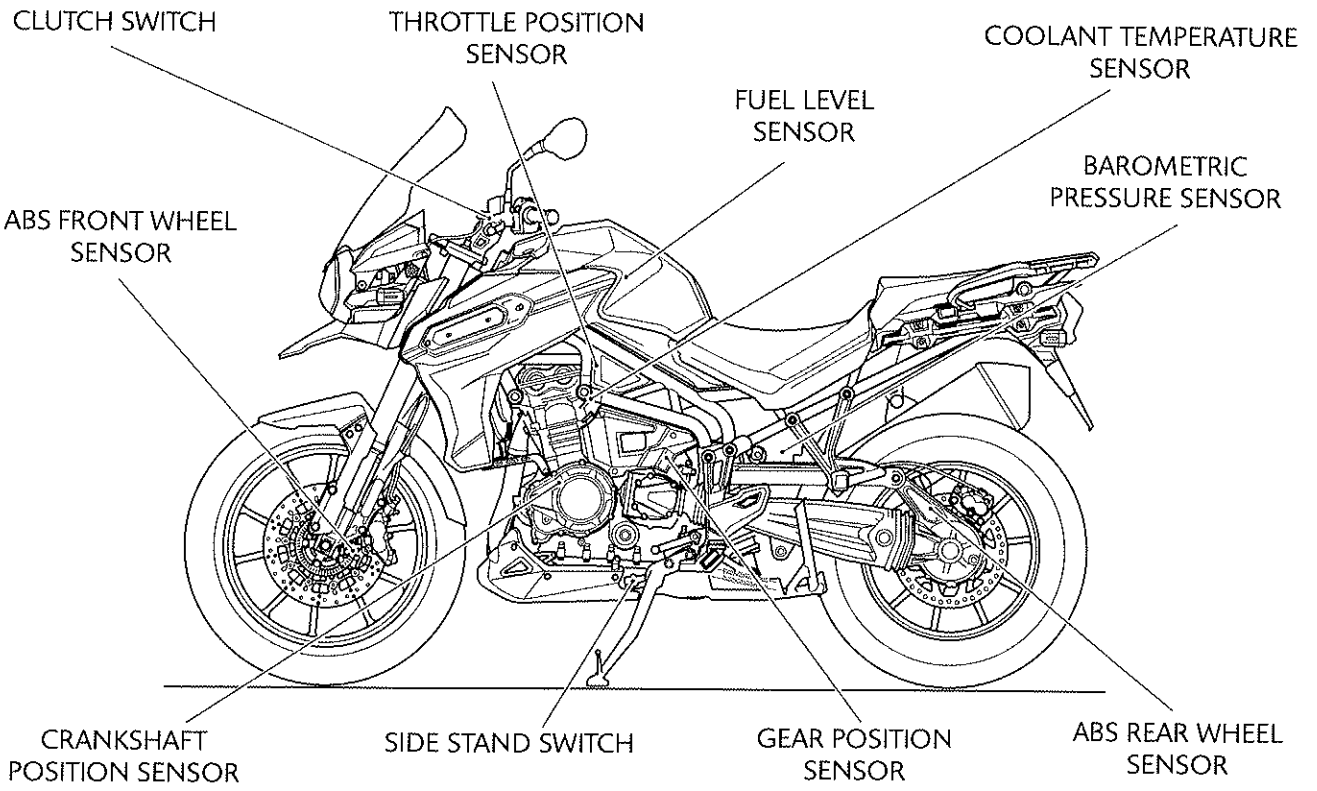
In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the engine management system, the malfunction type, and engine data at the time the malfunction occurred, are stored in the ECM memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

System Sensors

- **Intake air temperature sensor** - situated in the top of the airbox. As the density of the air (and therefore the amount of oxygen available to ignite the fuel) changes with temperature, an intake air temperature sensor is fitted. Changes in air temperature (and therefore air density) are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Barometric pressure sensor** - situated on the left hand side, at the front of the rear mudguard beneath the seat. The barometric pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.
- **Manifold Absolute Pressure (MAP) sensor** - situated to the left side of the airbox, connected to each of the three throttle bodies by equal length tubes. The MAP sensor provides information to the ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the ECM. This degree of engine load accuracy allows the ECM to make very small adjustments to fuel and ignition which would otherwise not be possible from throttle angle data alone.
- **Clutch switch** - situated on the clutch lever. The clutch must be pulled in for the starter motor to operate. With the cruise control on and active, the operation of the clutch will cancel cruise control.
- **Crankshaft position sensor** - situated in the crankcase, near the flywheel cover. The crankshaft position sensor detects movement of a toothed wheel attached to the flywheel rotor. The toothed wheel 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.
- **Engine coolant temperature sensor** - situated at the rear of the cylinder head, on the left hand side. Coolant temperature information, received by the ECM, is used to optimise fueling at all engine temperatures and to calculate hot and cold start fueling requirements.
- **Throttle position sensors 1 and 2** - the two sensors are located in the same housing which is situated at the left end of the throttle body. Used to relay throttle position information back to the ECM.
- **Oxygen sensor** - situated in the exhaust header system upstream of the catalyst. The oxygen sensor constantly feeds information to the ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.
- **Side stand switch** - situated at the top of the side stand leg. If the side stand is in the down position, the engine will not run unless the transmission is in neutral.
- **Fall detection switch** - situated beneath the seat. The fall detection switch will detect if the motorcycle is on its side and will cut power to the ECM immediately. This prevents the engine from running and the fuel pump from delivering fuel. In the event of a fall, the switch is reset by returning the bike to an upright position and switching the ignition off then back on again.
- **Twist grip position sensors 1 and 2** - the two sensors are located in the same housing which is situated in the right hand switch cube. The twist grip position sensor is used to relay twist grip position information to the ECM. The ECM uses this information to drive the throttle actuator motor to the correct position.
- **Gear position sensor** - situated in the transmission cover, behind the coolant expansion tank. The gear position sensor provides the ECM with selected gear information. This is used to prevent the engine from starting if the transmission is in gear. The sensor also provides information to the gear position indicator and the neutral light in the instruments.
- **Brake switches** - situated at the front brake lever and the rear brake pedal. With the cruise control on and active, the operation of the front or rear brakes will cancel cruise control.

Sensor Locations





System Actuators

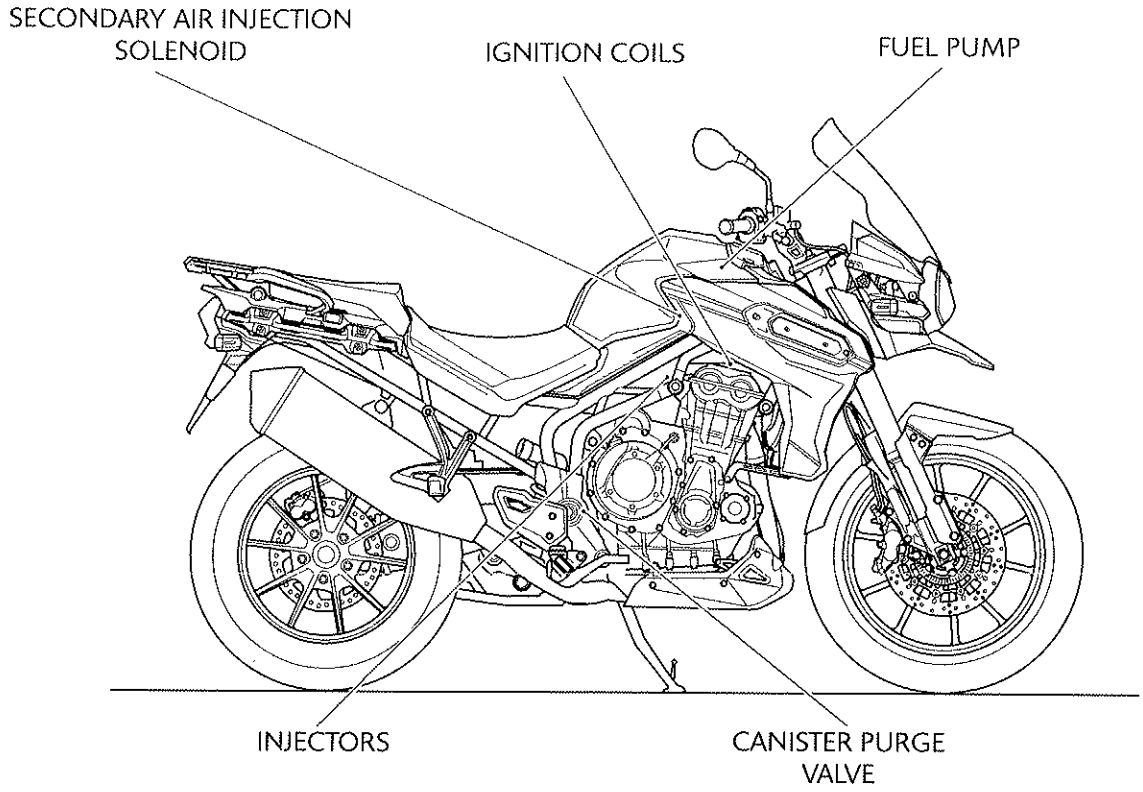
In response to signals received from the sensors, the ECM controls and directs messages to a series of electronic and electro-mechanical actuators. The function and location of the actuators is given below.

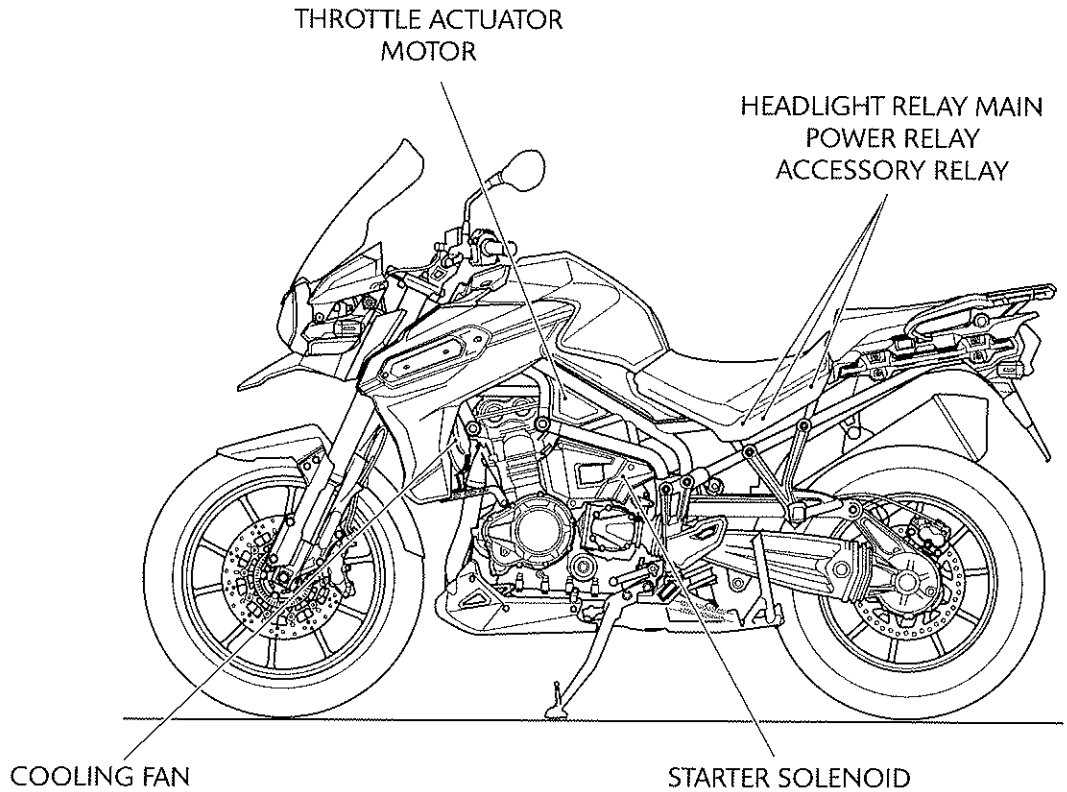
- **Throttle actuator motor** - situated at the left end of the throttle bodies. The throttle actuator motor opens and closes the throttle plates in the throttle bodies, in response to commands from the ECM. The throttle actuator motor is an integral part of the throttle bodies.
- **Canister purge valve (certain markets only)** - situated in the vapour return line between the carbon canister and the throttle bodies. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is 'pulsed' by the ECM to give control over the rate at which the canister is purged.
- **Injectors** - located in the cylinder head. The engine is fitted with three injectors. The spray pattern of the injectors is fixed but the length of time each injector can remain open is variable according to operating conditions. The duration of each injection is calculated by the ECM using data received from the various sensors in the system.
- **Ignition coils** - plug-top coils are located in the camshaft cover. There are three coils fitted, one for each spark plug. The 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 under the seat. When the ignition is switched on, the main power relay is powered up to provide a stable Voltage supply for the ECM.
- **Fuel pump** - located inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant 3 bar pressure. The pump is run continuously when the engine is operating and is also run briefly when the ignition is first switched on to ensure that 3 bar is available to the system as soon as the engine is cranked. Fuel pressure is controlled by a regulator also situated inside the fuel tank.
- **Cooling fan** - located behind the radiator. The 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. The fan only becomes operational when the engine is running. It will not operate at any other time.
- **Secondary air injection solenoid** - located on the rear of the airbox. The secondary air injection solenoid controls airflow through the secondary air injection system.

Note:

- **In this system, the starter lockout system (clutch switch, neutral switch, side stand switch) all operate through the engine management ECM.**

Actuator Locations





Immobiliser System

System Description

The Tiger Explorer is fitted with an electronic immobiliser system to help protect it against theft. This system has to be paired with the ECM and the ignition key which contains a transponder chip. If all the components are correctly paired, the immobiliser will allow the engine to start. The Triumph diagnostic tool is the only way these components can be paired.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the immobiliser system, a malfunction code is stored in the immobiliser/tyre pressure monitoring system (TPMS) control module's memory. This stored data can then be recovered using the Triumph diagnostic tool (see page *10-20*).

System Components and Operation

- **Transponder chip** - situated inside the ignition key. The chip is activated by the antenna coil when the ignition switch is turned to the ON position.
- **Antenna coil** - situated around the ignition switch. When the ignition switch is turned to the ON position, and the transponder chip is activated, the signal from the chip is sent to the immobiliser/TPMS control module.
- **Immobiliser/TPMS control module** - situated on top of the airbox. This control module communicates with the transponder chip in the key and the ECM and will only allow the engine to start if a matching signal is received.
- **Alarm/immobiliser warning indicator light** - situated in the instrument pack. The light will flash on and off for 24 hours to show that the engine immobiliser is on. When the ignition switch is turned to the ON position the immobiliser and the indicator light will be off. If the indicator light remains on it indicates that the immobiliser has a malfunction that requires investigation. If an accessory alarm is fitted, the immobiliser indicator light will only illuminate when the conditions described in the accessory alarm instructions are met.

Keys

When the motorcycle is delivered from the factory it is supplied with two keys. Keys can be deleted or added to the immobiliser system using the Triumph diagnostic tool. A maximum of four keys can be added to the system.

To ensure the immobiliser system functions correctly note the following:

- Do not put any magnetic materials on the same key ring as the motorcycle key;
- Do not put any other ignition key with a transponder chip fitted near the motorcycle key when in use;
- Do not modify the immobiliser system;
- Do not submerge the key in water or any other fluid;
- Do not drop or strike the key against hard material.

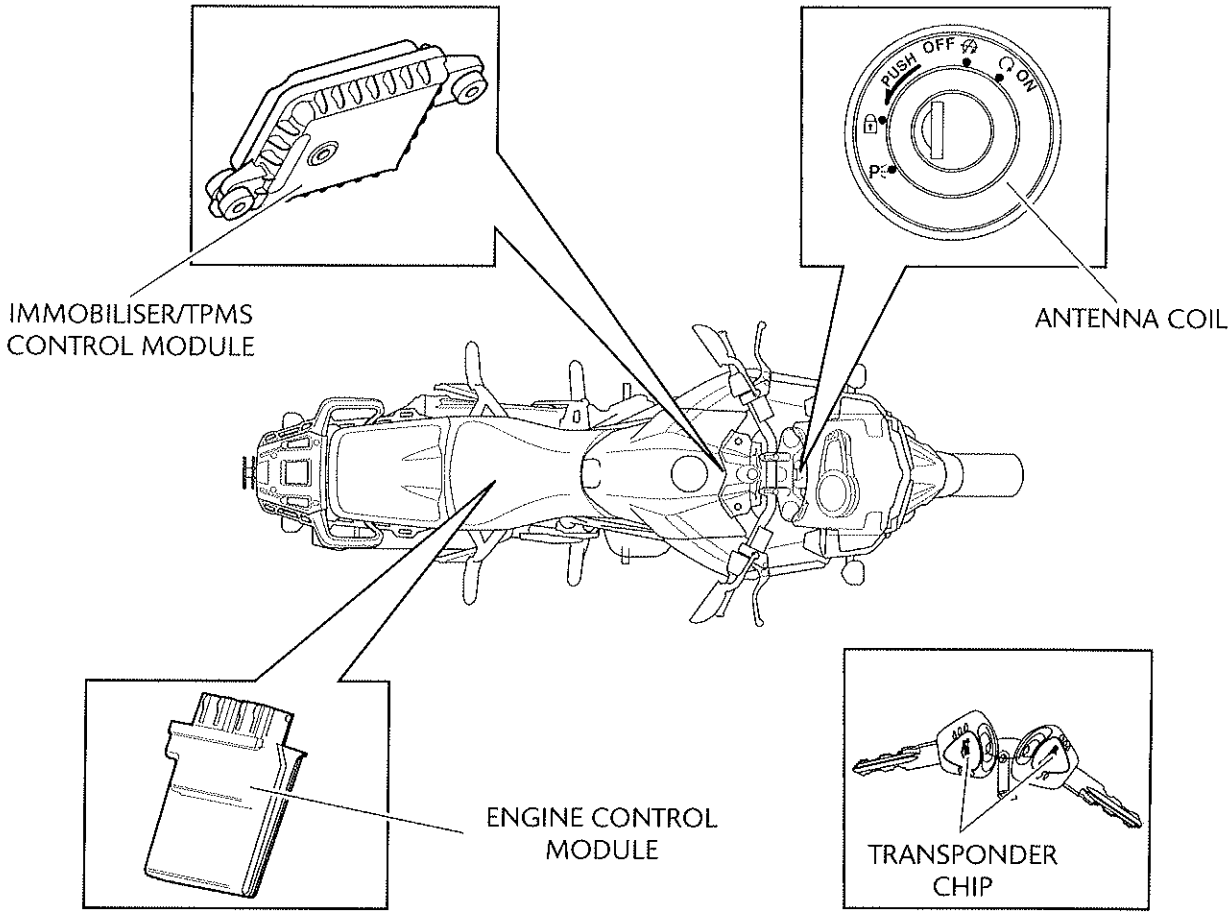
Diagnostics

To fully diagnose the immobiliser system it is necessary to check for fault codes in the immobiliser/TPMS control module using the Triumph diagnostic tool (see page *10-26*).

Further Diagnosis

The tables that start on page *10-37*, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Components Location



Tyre Pressure Monitoring System (TPMS)

System Description

This model can be fitted with the accessory tyre pressure monitoring system (TPMS).

When fitted, the tyre pressures shown on the instrument panel indicate the actual tyre pressure at the time of selecting the display. This may differ from the inflation pressure set when the tyres are cold because tyres become warmer during riding, causing the air in the tyre to expand and the pressure to increase. The cold inflation pressures specified by Triumph take account of this.

In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the immobiliser system, a malfunction code is stored in the immobiliser/tyre pressure monitoring system (TPMS) control module's memory. This stored data can then be recovered using the Triumph diagnostic tool (see page *10-27*).

Owners must only adjust tyre pressures when the tyres are cold using an accurate tyre pressure gauge and must not use the tyre pressure display on the instruments.

Warning

The tyre pressure monitoring system is not to be used as a tyre pressure gauge when adjusting the tyre pressures. For correct tyre pressures, always check the tyre pressures when the tyres are cold and using an accurate tyre pressure gauge.

Use of the TPMS system to set inflation pressures may lead to incorrect tyre pressures leading to loss of motorcycle control and an accident.

When fitting the TPMS, the installation flow-chart detailed in the Triumph diagnostic tool user guide must be followed.

System Components and Operation

- **Instruments** - used to display the tyre pressure value, the tyre symbol and the TPMS warning light.
- **Immobiliser/TPMS control module** - receives the data from the tyre pressure sensors and sends the information to the instrument pack.
- **Tyre pressure sensor** - situated inside the front and rear wheel. Each sensor has its own unique ID number and must be recorded in the spaces provided in the owner's handbook.
  These sensors measure the air pressure inside the tyre and transmit pressure data to the instruments. These sensors will not transmit the data until the motorcycle is travelling at a speed greater than 12 mph (20 km/h). Two dashes will be visible in the display area until the tyre pressure signal is received. The wheel sensor is a sealed unit and must not be opened. The battery inside the sensor is not replaceable and a new sensor must be fitted when the battery Voltage becomes too low.

Compliance

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- This device may not cause harmful interference;
- This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to the device could void the user's authority to operate the equipment.

Diagnostics

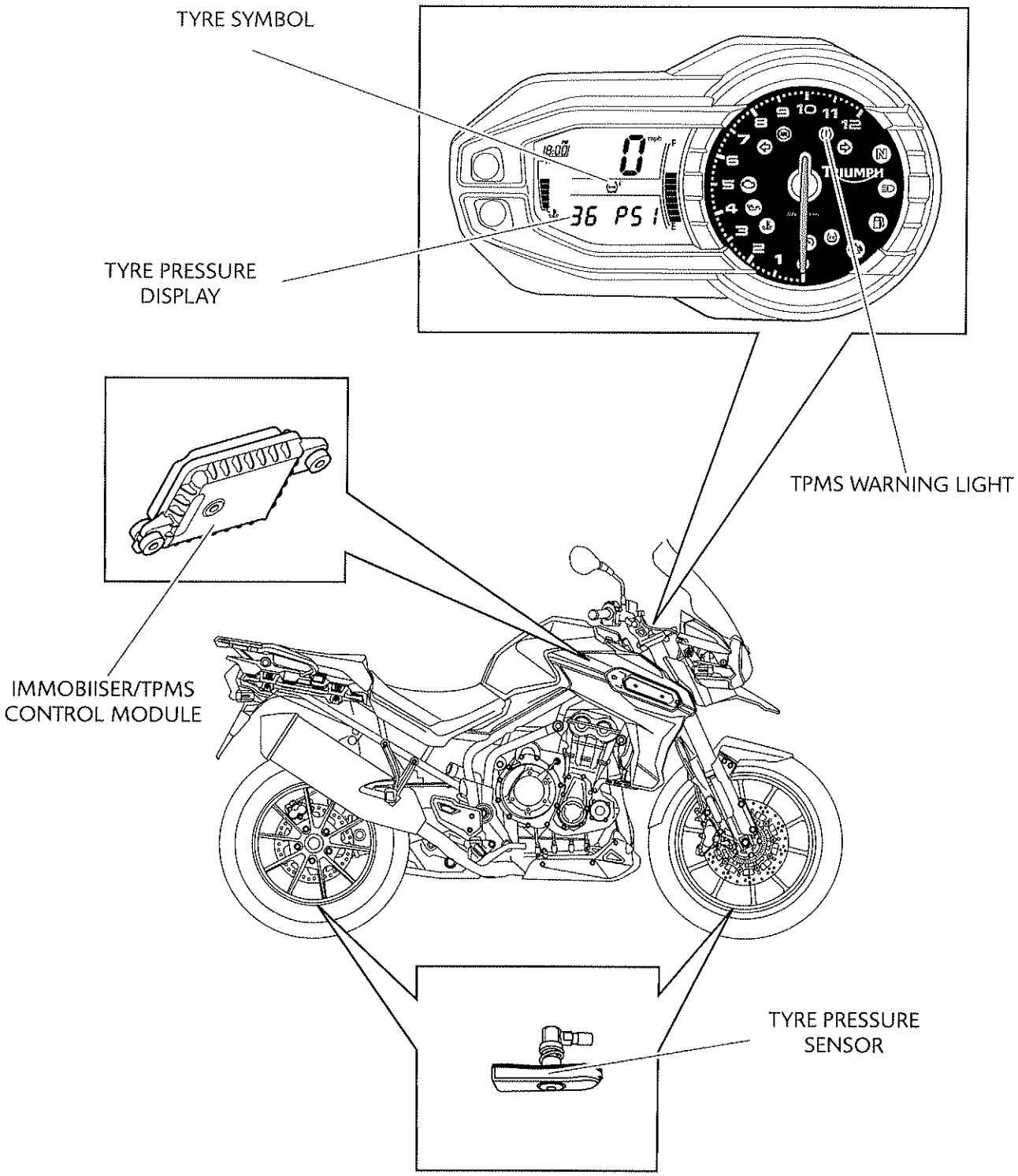
When a fault condition with the TPMS is detected, the red warning light in the instrument pack will illuminate and the tyre symbol will flash repeatedly.

The red warning light and flashing symbol will also occur if the TPMS has been enabled in the instrument pack but not in the immobiliser/TPMS control module. Before proceeding to the diagnostics, check that the motorcycle has wheel sensors fitted and that the option for the TPMS has been enabled in the immobiliser/TPMS control module.

Further Diagnosis

The tables that start on page *10-37*, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Component Locations



Engine Management Circuit Diagram

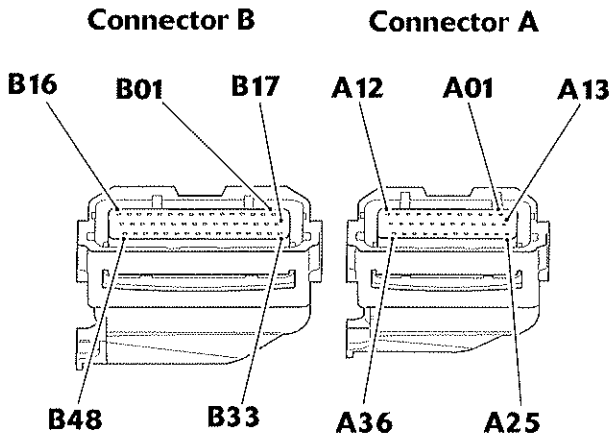
Key to Wiring Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Instruments
3	Diagnostic Connector
4	Immobiliser
5	Ignition Switch
6	Clutch Switch
7	Side Stand Switch
8	Fuel Level Sender
9	Fall Detection Switch
10	Ambient Pressure Switch
11	Manifold Pressure Switch
12	Oxygen Sensor
13	Intake Air Temperature Sensor
14	Coolant Temperature Sensor
15	Right Hand Switch Cube
16	Throttle Position Sensor
17	Oil Level Switch
18	Gear Position Sensor
19	Crankshaft Position Sensor
20	Engine Management Relay
21	Throttle Control
22	Purge Valve
23	Oxygen Sensor
24	Secondary Air Injection Solenoid
25	Coil 1
26	Coil 2
27	Coil 3
28	Injectors
29	Left Hand Fuse box
30	Cooling Fan Relay
31	Cooling Fan
32	Fuel Pump Relay
33	Fuel Pump
34	Right Hand Switch Cube
35	Rear Brake Switch
36	Cruise Control Grip Cancel

Key to Wiring Colour Codes

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

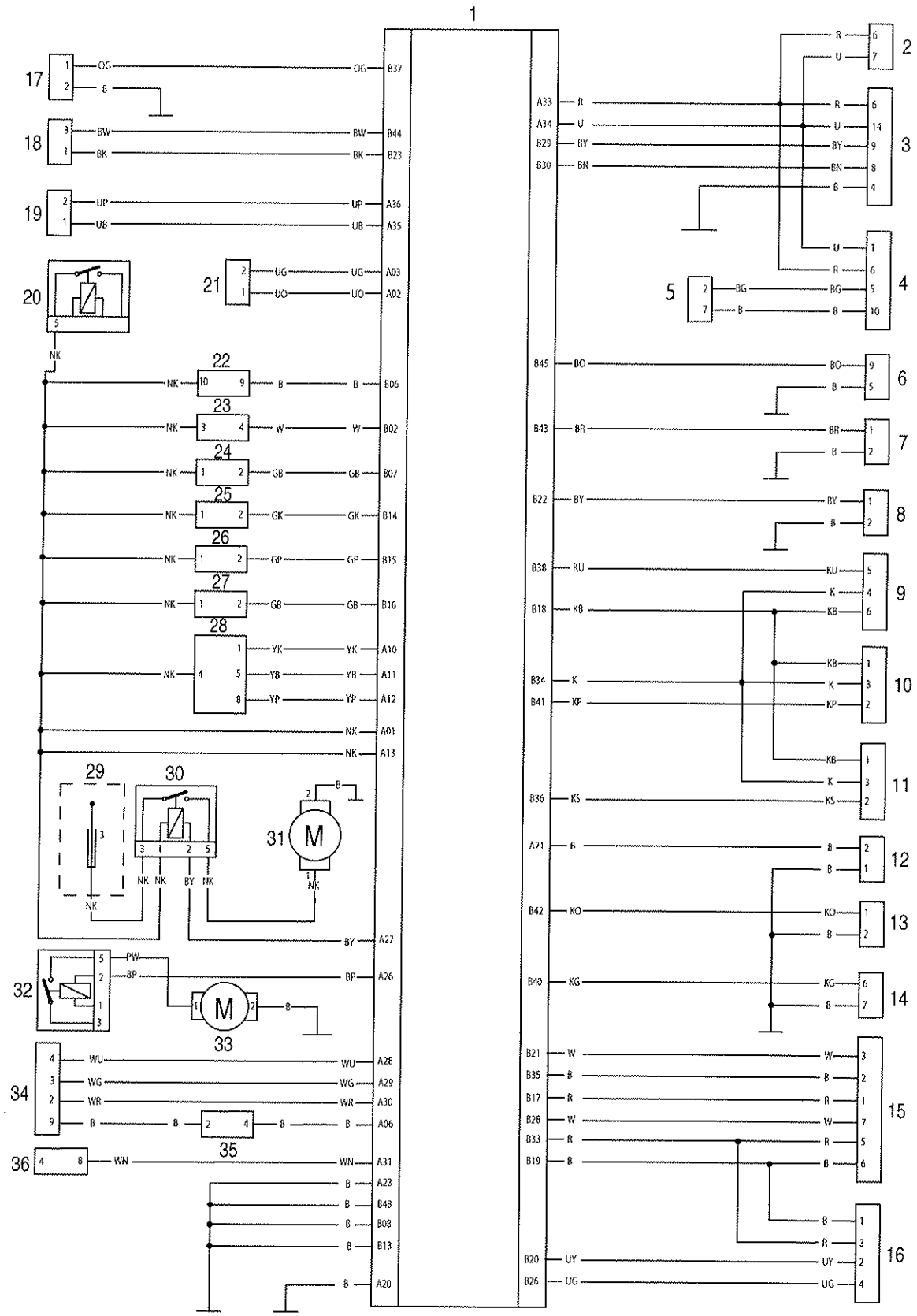
ECM Connector Pin Numbering



The above illustration shows the pin numbering system used in the engine management circuit diagram.

The larger connector's pins are prefixed A and the smaller connector's pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

Engine Management Circuit Diagram



System Diagnostics

The engine management system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated beneath the seat. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

On-board Fault Detection System

The on-board diagnostic system has two stages of fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted. For example, if there is a fault in the crankshaft position sensor, the counter will increment its count each time the crankshaft turns through 360°, provided the fault is still present.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a 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 Light) 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 Light) 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:

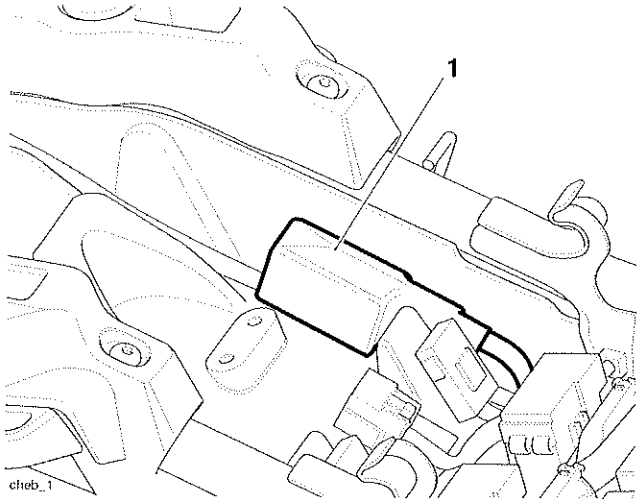
- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.
- A controlled power-down sequence must take place.

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

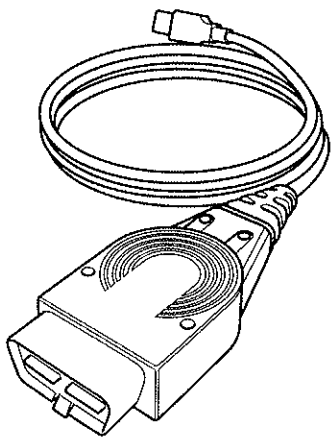
Diagnostic Interface Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see page *17-16*) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

2. Plug the diagnostic interface directly into the diagnostic connector.



Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the rider's seat (see page *17-16*).

Triumph Diagnostic software

Described on the following pages is the range of information which can be retrieved from the ECM's memory and the adjustments which can be performed using the Triumph diagnostic software.

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

Note:

- **Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.**

Build Data

The **Build Data** screen will display the following information:

- Motorcycle model;
- Vehicle Identification Number (VIN);
- ECM type;
- ECM ID;
- ECM serial number;
- Tune number;
- Date of last tune download;
- Total tune downloads since manufacture;
- The lock status of the ECM (ECM Locked, Unlocked or Not Applicable).

Current Data

The data available under Current Data is:

Function Examined	Result Reported (Scale)
Fuel system status	open or closed loop operation
Calculated load value	%
Engine coolant temperature	°C
Short term fuel trim	%
Intake manifold absolute pressure	mm/hg
Engine speed	rpm
Vehicle speed	km/h
Ignition timing advance	degrees
Intake air temperature	°C
Absolute throttle position	%
Oxygen sensor	Volts

Sensor Data

When using this function it is possible to check the status of various sensors and actuators.

The data sets are divided into seven groups - Sensor Voltages; Sensor Readings; Injector Data; Ignition Data; Idle Speed, Throttle Data and Inputs and Adaption Status. Each of these screens is described on the following pages.

Sensor Voltages

The data available under Sensor Voltages is:

Item Checked	Result Unit
Battery Voltage	Volts
Voltage from ignition switch to ECU	Volts
Air temperature sensor Voltage	Volts
Coolant temperature sensor Voltage	Volts
Atmospheric pressure sensor Voltage	Volts
Manifold absolute pressure sensor Voltage	Volts
Throttle position sensor Voltage	Volts
Fuel level sensor Voltage	Volts
Oxygen sensor output Voltage	Volts
Throttle position sensor 1 Voltage	Volts
Throttle position sensor 2 Voltage#	Volts
Twist grip position sensor 1 Voltage#	Volts
Twist grip position sensor 2 Voltage#	Volts

Sensor Readings

The data available under Sensor Readings is:

Item Checked	Result Unit
Air temperature	°C
Coolant temperature	°C
Atmospheric (barometric) pressure	mmHg
Manifold absolute pressure (one reading per cylinder)	mmHg
Low fuel light	on/off
Oxygen sensor 1 short term fuel trim	%
Oxygen sensor heater status	on/off

Injector Data

The data available under Injector Data is:

Item Checked	Result Unit
Injector 1 pulse time	milliseconds
Injector 2 pulse time	milliseconds
Injector 3 pulse time	milliseconds

Ignition Data

The data available under Ignition Data is:

Item Checked	Result Unit
Ignition timing cyl 1	degrees BTDC
Ignition timing cyl 2	degrees BTDC
Ignition timing cyl 3	degrees BTDC
Coil 1 dwell time	milliseconds
Coil 2 dwell time	milliseconds
Coil 3 dwell time	milliseconds

Idle Speed and Throttle Data

Item Checked	Result Unit
Engine speed	RPM
Idle reference speed	RPM
Idle speed control current steps	numeric
Idle speed control target steps	numeric
Throttle position 1	% open
Throttle position 2	% open
Secondary air injection status	SAI on/off
Twist grip position	%

Inputs

The data available under Inputs is:

Function Examined	Result Unit
Starter switch status	switch on/off
Side stand status	up/down
Fall detection status	normal/over
Clutch switch status	release/grip
Neutral switch	gear/neutral
Vehicle speed	km/h
Calculated load	%
Brake switch 1 status	on/off
Brake switch 2 status	on/off
Cruise control accelerate switch status	on/off
Cruise control deccelerate switch status	on/off
Cruise control ON/OFF switch status	on/off
Twist grip cruise control cancel switch status	on/off
Cruise control status	on/off
Oil level sensor	OK/Low

Outputs

The data available under Outputs is:

Function Examined	Result Unit
EMS Main relay status	relay on/off
Fuel pump relay status	on/off
Starter relay status	starter on/off
Malfunction indicator light status	MIL on/off
Cooling fan status	fan on/off
Purge valve duty cycle	%
Throttle actuator motor internal relay	on/off
Accessory control relay status	relay on/off
Headlight relay status	headlight on/off

Adaption Status

Because the fuel system is adaptive, the engine management system is able to automatically adjust to new working conditions, such as changes in fuel quality, component wear, air leaks etc. This screen displays information on the adaption status of the vehicle which will show if it has adapted or not.

Function Examined	Report Method
Closed throttle position adapted	adapted/not adapted
Twist grip adapted	yes/no
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption range (idle)	%
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption status (idle)	%

Function Tests

The system allows the diagnostic software to perform a series of function tests on various actuators in the engine management system. In some cases it is necessary to make a visual observation of a component and in others, if faults are present, DTCs will be logged.

The Function Tests available are:

Function Examined	Report Method
Instrument panel	Observe instrument panel, refer to service manual
Idle air control stepper motor	Observe throttle position/Stored fault code*
Purge valve	Listen for valve operation/Stored fault code*
Fuel pump - priming	Listen for fuel pump operation/Stored fault code*
Fuel pump - continuous operation	Fuel pressure test/Listen for fuel pump operation/Stored fault code*
Cooling fan control	Observe the cooling fan/Stored fault code*
Secondary air injection	Listen for valve operation/Stored fault code*
Ride by wire motor open/closed	Observe throttle position/Stored fault code*
Accessory control relay	Listen for/observe accessory control relay operation/Stored fault code*
Headlight on/off	Observe headlight operation/Stored fault code*
Cruise control switch check	Operate the cruise control switches as instructed. Observe the relevant switch response and rectify as necessary

* If a fault is detected.

Cruise Control Switch Check (motorcycles with cruise control only)

The cruise control switch check is required after certain DTCs or defects have been repaired which relate to the ride by wire system or cruise control system, or after the adaptions have been reset. The switch check requires the user to operate the switches in order, following the instructions on screen.

The following switches will be checked:

- Front brake switch;
- Rear brake switch;
- Clutch switch;
- Twist grip cruise cancel switch (operated by holding the twistgrip in the fully closed position);
- Cruise control ON/OFF switch;
- Cruise control accelerate switch;
- Cruise control decelerate switch.

A malfunction of any switch will not necessarily cause a DTC to be stored and may prevent the cruise control from operating correctly.

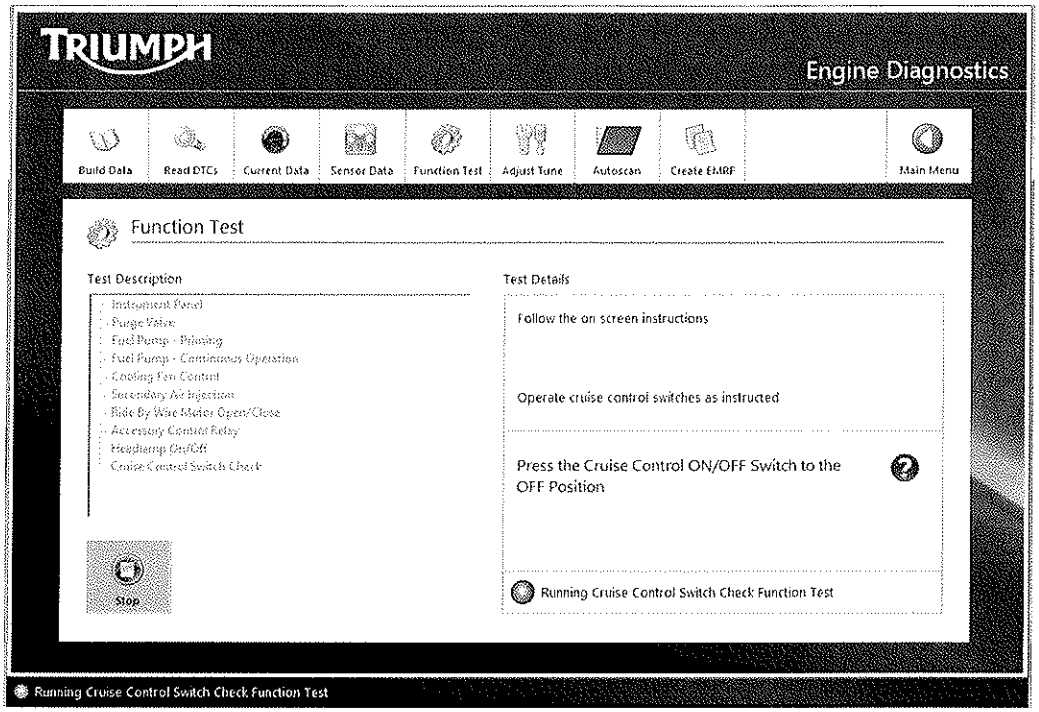
Note:

- **If the cruise control switch check is not carried out, the green cruise control warning light will illuminate when the ignition is turned to the ON position but the cruise function will be disabled.**

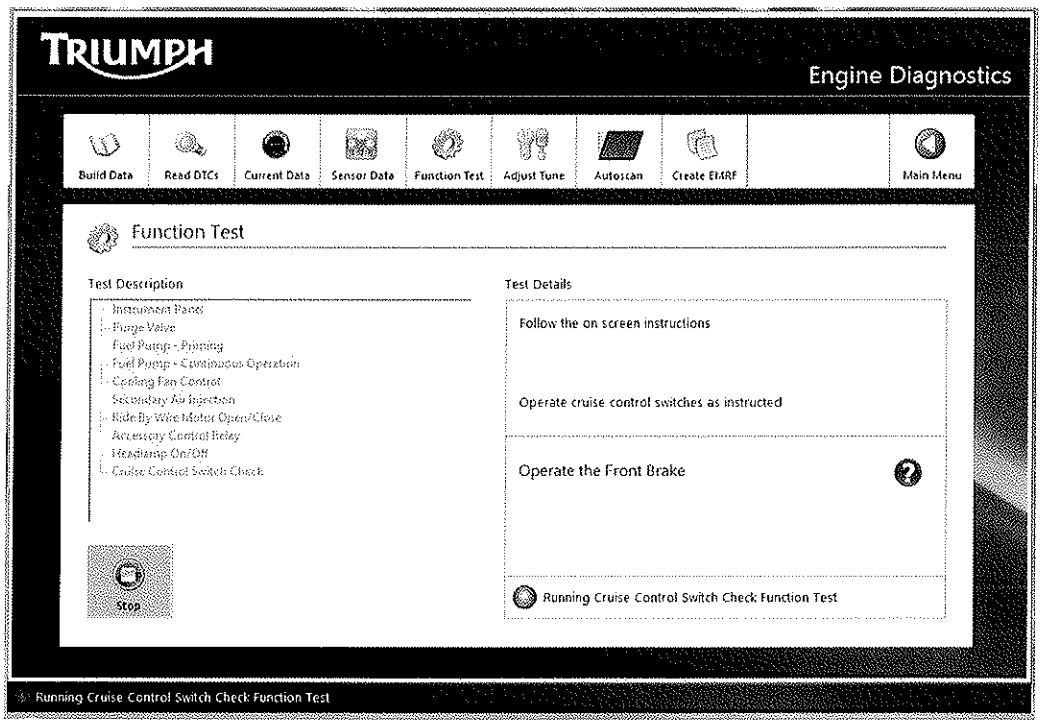
Cruise Control Switch Check Function

If the engine is running you will be prompted to turn it off before the test will start.

If the cruise control is turned on you will be prompted to turn it off before the test will start.



Follow the on-screen instructions to operate and then release each switch in turn.



Adjust Tune

Using the Triumph diagnostic software, it is possible to:

- reset the adaptions;
- balance the throttle bodies.

Further functions are provided to allow correct replacement and adjustment of the:

- throttle position sensor.

This function is needed as, after replacement of the parts concerned, adjustments have to be made to specific Voltage settings, with the throttles set in a specific position.

To reset the adaptions, see page *10-140*.

To replace and adjust the throttle position sensor, see page *10-139*.

To balance the throttles, see page *10-137*.

Freeze Frame Data

Freeze frame data is stored at the time a DTC is recorded (confirmed) by the ECM. If multiple DTCs are recorded, the freeze frame data which is stored will relate to the first recorded DTC only.

By calling up freeze frame data associated with the first recorded DTC, the technician can check the engine condition at the time the fault occurred. The data available is:

Function Examined	Report Method
DTC	Diagnostic Trouble Code (DTC) number
Fuel system status	open or closed loop operation
Calculated load	%
Coolant temperature	°C
Short term fuel trim	%
Intake manifold absolute pressure	mm/hg
Engine speed	RPM
Vehicle speed	km/h
Ignition advance	degrees
Intake air temperature	°C
Throttle position	%
Oxygen sensor output Voltage	Volts
Oxygen sensor short term fuel trim	%

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 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	Pinpoint test page number
P0201	Injector 1 circuit malfunction	3	40	Yes	*10-44*
P0202	Injector 2 circuit malfunction	3	40	Yes	*10-44*
P0203	Injector 3 circuit malfunction	3	40	Yes	*10-44*
P0351	Ignition coil fault - coil 1	3	40	Yes	*10-62*
P0352	Ignition coil fault - coil 2	3	40	Yes	*10-62*
P0353	Ignition coil fault - coil 3	3	40	Yes	*10-62*
P0335	Crankshaft sensor circuit malfunction	3	40	Yes	*10-43*
P0031	Oxygen sensor heater open circuit or short to ground	3	40	Yes	*10-72*
P0032	Oxygen sensor heater short circuit to vBatt	3	40	Yes	*10-72*
P0130	Oxygen sensor circuit malfunction	3	40	Yes	*10-71*
P0122	Throttle position sensor 1 short circuit to ground or open circuit	3	40	Yes	*10-46*
P0123	Throttle position sensor 1 short circuit to vBatt	3	40	Yes	*10-46*
P0227	Throttle position sensor 2 short circuit to ground or open circuit	3	40	Yes	*10-48*
P0228	Throttle position sensor 2 short circuit to vBatt	3	40	Yes	*10-48*
P2136	Throttle position sensor 1 correlation error with throttle position sensor 2	3	40	Yes	*10-50*
P2122	Twist grip position sensor 1 short circuit to ground or open circuit	3	40	Yes	*10-51*
P2123	Twist grip position sensor 1 short circuit to vBatt	3	40	Yes	*10-51*
P2127	Twist grip position sensor 2 short circuit to ground or open circuit	3	40	Yes	*10-52*
P2128	Twist grip position sensor 2 short to vBatt	3	40	Yes	*10-52*
P2138	Twist grip position sensor 1 correlation error with twist grip position sensor 2	3	40	Yes	*10-53*
P2102	Throttle actuator motor short to ground or open circuit	3	40	Yes	*10-54*

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P2103	Throttle actuator motor short to vBatt	3	40	Yes	*10-54*
P2119	Throttle valve drive error	3	40	Yes	*10-55*
P2111	Throttle valve drive error	3	40	Yes	*10-55*
P2107	Throttle valve drive error	3	40	Yes	*10-55*
P0107	Manifold absolute pressure sensor 1 short circuit to ground	3	40	Yes	*10-82*
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	*10-82*
P1105	Manifold absolute pressure sensor 1 pipe malfunction	3	40	Yes	*10-82*
P1107	Ambient pressure sensor circuit short circuit to ground	3	40	Yes	*10-80*
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	*10-80*
P0112	Intake air temperature sensor short circuit to ground	3	40	Yes	*10-66*
P0113	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	*10-66*
P0117	Engine coolant temperature sensor short circuit to ground	3	40	Yes	*10-64*
P0118	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	*10-64*
P0500	Vehicle speed sensor malfunction	3	40	Yes	*10-75*
P1552	Cooling fan relay short circuit or open circuit	3	40	Yes	*10-70*
P1553	Cooling fan relay short to battery vBatt or over temperature	3	40	Yes	*10-70*
P1231	Fuel pump relay short circuit to ground or open circuit	3	40	Yes	*10-68*
P1232	Fuel pump relay short circuit to vBatt	3	40	Yes	*10-68*
P0460	Fuel level sensor circuit malfunction	0	40	No	*10-79*
P0444	Purge valve system short circuit to ground or open circuit	3	40	Yes	*10-56*
P0445	Purge valve short circuit to vBatt or over temp	3	40	Yes	*10-56*
P0616	Starter relay short circuit to ground or open circuit	3	40	Yes	*10-58*
P0617	Starter motor relay short circuit to vBatt	3	40	Yes	*10-58*
P0413	Secondary air injection system short circuit to ground or open circuit	3	40	Yes	*10-84*
P0414	Secondary air injection system short circuit to vBatt	3	40	Yes	*10-84*

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1631	Fall detection circuit short circuit to ground	3	40	Yes	*10-74*
P1632	Fall detection circuit short circuit to vBatt	3	40	Yes	*10-74*
P0705	Gear position sensor circuit malfunction	3	40	Yes	*10-60*
P1534	Engine oil level sensor circuit malfunction	3	40	Yes	*10-61*
P0560	System Voltage - battery circuit malfunction	3	40	Yes	*10-69*
P1659	Ignition power supply malfunction	0	40	No	*10-89*
P1685	Main relay circuit malfunction	3	40	Yes	*10-86*
P0603	EEPROM error	0	40	No	*10-88*
P1696	5 V sensor supply short circuit to ground	3	40	Yes	*10-90*
P1697	5 V sensor supply short circuit to vBatt	3	40	Yes	*10-90*
P1698	5 Volt sensor supply circuit malfunction	3	40	Yes	*10-90*
P1605	ECM locked by the tunelock function	Only if Tunelock is unlocked	N/A	Flashing	*10-91*
P1614	Instrument ID incompatible	Only if Instrument ID Matching	N/A	Flashing	*10-92*
P1690	CAN fault	3	40	Yes	*10-76*
P1695	Lost communication with the instrument panel	3	40	Yes	*10-78*
P1650	Lost communication with Immobiliser ECM	3	40	Yes	*10-93*
P1508	Unmatched Immobiliser ECM	3	40	Flashing	*10-94*
P1520	Unmatched ABS	3	40	Flashing	*10-95*
P1521	Lost communication with ABS	3	40	Yes	*10-96*
P0571	Brake 1 switch malfunction	3	40	Yes	*10-98*
P1571	Brake 2 switch malfunction	3	40	Yes	*10-98*
P1576	Brake 1 switch correlation error with brake switch 2	3	40	Yes	*10-98*
P1577	Brake 2 switch correlation error with brake switch 1	3	40	Yes	*10-98*
P0510	Cruise cancel switch malfunction	3	40	Yes	*10-100*
P1574	Cruise control prevented due to other malfunction condition	3	40	Yes	*10-101*
P1575	Cruise control disabled until button press sequence completed	3	40	Yes	*10-102*
P1135	Traction Control prevented due to ABS problem	3	40	Yes	*10-103*
P1606	ECM internal error	3	40	Yes	*10-104*
P1607	ECM ride by wire internal error	3	40	Yes	*10-104*

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P1608	ECM ride by wire internal error	3	40	Yes	*10-104*
P1604	ECM tamper detected - return to Triumph	0	0	Yes	*10-105*
P1616	Accessory control relay short circuit to ground or open circuit	0	40	No	*10-106*
P1617	Accessory control relay short circuit to vBatt	0	40	No	*10-106*
P1619	Headlamp relay short circuit to ground or open circuit	0	40	No	*10-107*
P1620	Headlamp relay short circuit to vBatt	0	40	No	*10-107*

Immobiliser/TPMS Control Module Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the immobiliser/TPMS control module memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic tool as a four digit code.

The system will log the diagnostic trouble codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description	Warning Light/Information
L0001	Front wheel sensor unit battery alert	For low battery Voltage - LO bAt visible in the instrument display screen. the TPMS symbol in the display screen will indicate which sensor has low battery Voltage. For zero battery Voltage - Only dashes will be visible in the instrument display screen, TPMS warning light ON and the TPMS symbol in the display screen will flash ON and OFF
L0002	Rear wheel sensor unit battery alert	
L0003	Front wheel sensor unit fault alert	TPMS warning light ON and the TPMS symbol in the display screen will flash ON and OFF
L0004	Rear wheel sensor unit fault alert	
L0005	Front wheel sensor unit loss of communication error	
L0006	Rear wheel sensor unit loss of communication error	
L0007	Immobiliser ECM fault	
L0008	Invalid key: Key authentication unsuccessful	Alarm/Immobiliser light ON

Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

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 multi-plugs.

For example, the Engine Control Module (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 that must be released before the connector can be separated, e.g. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

When Connecting a Connector:

- Ensure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

Disconnection of ECM connectors

Note:

- **Two different sized connectors are used in the ECM, which ensures correct connection is always made. The connectors on the ECM are coloured black and correspond with identical connectors on the main harness.**

⚠ Caution

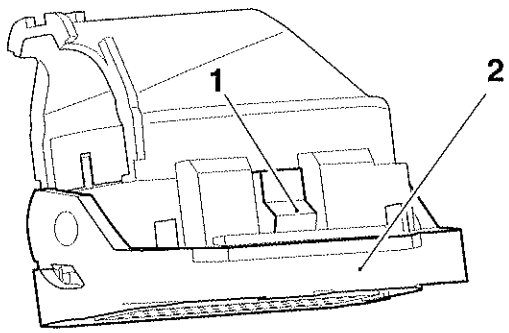
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

⚠ Caution

Never disconnect an ECM when the ignition switch is in the 'ON' position as this may cause multiple fault codes to be logged in the ECM memory.

Always disconnect an ECM after disconnecting the battery, negative (black) lead first.

1. Turn the ignition to the OFF position and wait at least 1 minute for the ECM to complete its power down sequence.
2. If fitted, remove the security bracket (see page *10-129*).
3. Lift the ECM out of the underseat tray, press down on the locking device and gently raise the locking lever on the connector.
4. Gently pull back on the connector to release it from the ECM.



1. **Locking device**
2. **Locking lever**

Note:

- **The ECM is located under the seat.**

Reconnection of ECM connectors

Caution

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

1. Fit the connector into its socket. When the locking lever starts to move, stop pushing the connector and use the locking lever to fully insert the connector home and lock it.
2. If removed, refit the security bracket with a new fixing (see page *10-129*).

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

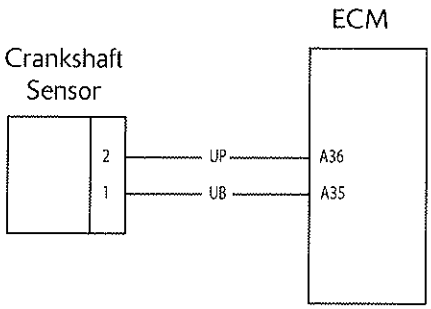
Crankshaft Sensor

Fault Code	Possible cause	Action
P0335	Crankshaft sensor circuit malfunction	View & note diagnostic tool 'freeze frame' data if available Ensure sensor is fitted correctly and connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - ECM pin A35 - ECM pin A36	OK	Disconnect crankshaft sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A35 to ground - ECM pin A36 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A35 to sensor pin 1 - ECM pin A36 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A35 to ECM pin A36	OK	Renew crankshaft sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check crank toothed wheel: - Damage to teeth - magnetic debris contamination	OK	Proceed to test 6
	Faulty	Clean/renew toothed wheel, proceed to test 6
6 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Fuel Injectors

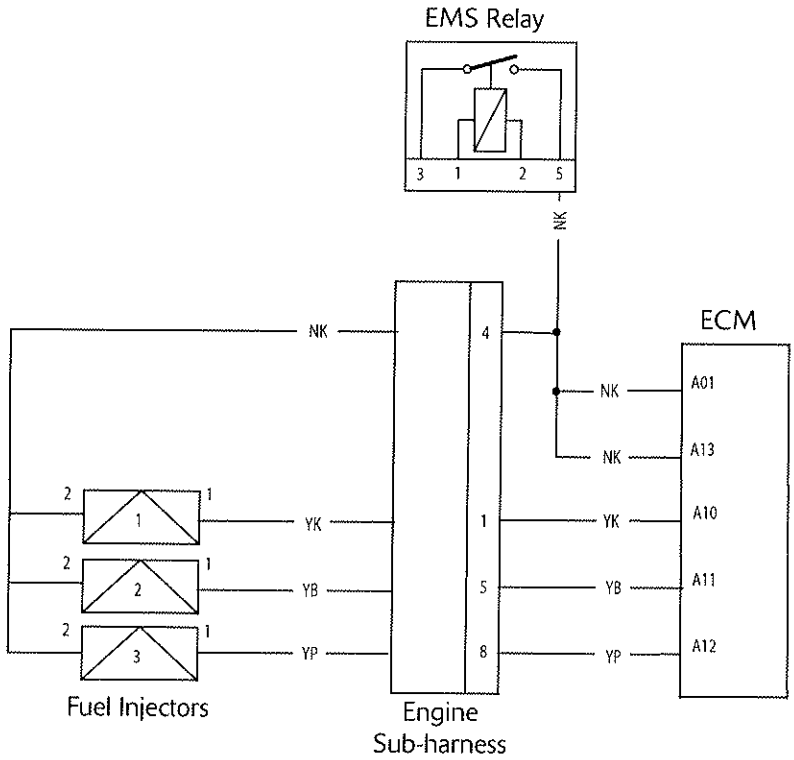
Fault Code	Possible cause	Action
P0201/02/03	Injector 1 circuit malfunction 1/2/3 - Misfire indicates open circuit - Flooding indicates short circuit	View & note diagnostic tool 'freeze frame' data if available Ensure relevant injector connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A12 - ECM pin A11 - ECM pin A10 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - ECM pin A01 to ECM pin A10 (injector 1) - ECM pin A01 to ECM pin A11 (injector 2) - ECM pin A01 to ECM pin A12 (injector 3) - ECM pin A13 to ECM pin A10 (injector 1) - ECM pin A13 to ECM pin A11 (injector 2) - ECM pin A13 to ECM pin A12 (injector 3)	9Ω to 12Ω	Proceed to test 3
		Open circuit	Disconnect relevant injector and proceed to test 4
		Short circuit	Disconnect relevant injector and proceed to test 5
3	Check cable for short circuit to ground: - ECM pin A10 to earth - ECM pin A11 to earth - ECM pin A12 to earth	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to relevant injector pin 2 - ECM pin A10 to injector 1 pin 1 - ECM pin A11 to injector 2 pin 1 - ECM pin A12 to injector 3 pin 1	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - ECM pin A01 to ECM pin A10 (injector 1) - ECM pin A01 to ECM pin A11 (injector 2) - ECM pin A01 to ECM pin A12 (injector 3) - ECM pin A13 to ECM pin A10 (injector 1) - ECM pin A13 to ECM pin A11 (injector 2) - ECM pin A13 to ECM pin A12 (injector 3)	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7

Test	Result	Action
6 Check relevant injector resistance: - Injector pin 1 to injector pin 2	9Ω to 12Ω	Proceed to test 7
	Faulty	Renew relevant injector, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



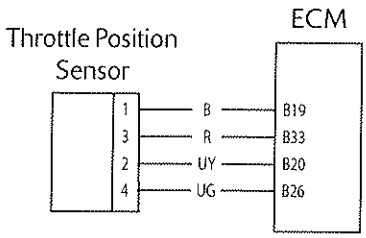
Throttle Position Sensor 1

Fault Code	Possible cause	Action
P0122	Throttle position sensor 1 short circuit to ground or open circuit	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:
P0123	Throttle position sensor 1 short circuit to vBatt	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B19 - ECM pin B20 - ECM pin B33	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B20 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B19 to sensor pin 1 - ECM pin B20 to sensor pin 2 - ECM pin B33 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 B20 to ECM pin B19 - ECM pin B20 to ECM pin B33	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



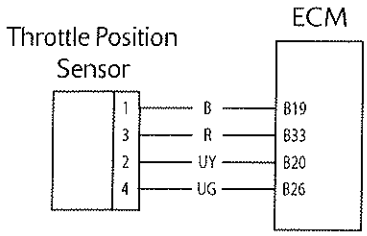
Throttle Position Sensor 2

Fault Code	Possible cause	Action
P0227	Throttle position sensor 2 short circuit to ground or open circuit	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:
P0228	Throttle position sensor 2 short circuit to vBatt	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B19 - ECM pin B26 - ECM pin B33	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B26 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B19 to sensor pin 1 - ECM pin B26 to sensor pin 4 - ECM pin B33 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 B26 to ECM pin B19 - ECM pin B26 to ECM pin B33	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



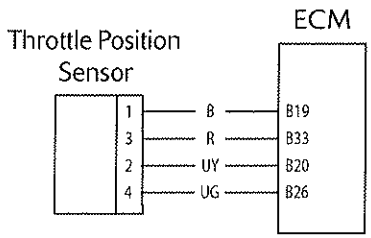
Throttle Position Sensor 1 vs Throttle Position Sensor 2 Correlation Error

Fault Code	Possible cause	Action
P2136	Throttle position sensor 1 correlation error with throttle position sensor 2	View & note diagnostic tool 'freeze frame' data if available View & note diagnostic tool 'sensor' data Ensure throttle position sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Turn the ignition on and measure the Voltage between: - ECM pin B33 and ECM pin B19.	5 V DC	Change throttle position sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 2
2	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



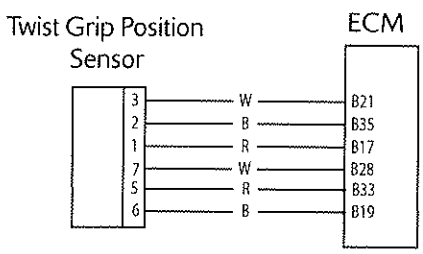
Twist Grip Position Sensor 1

Fault Code	Possible cause	Action
P2122	Twist grip position sensor 1 short circuit to ground or open circuit	View & note diagnostic tool 'freeze frame' data if available View & note diagnostic tool 'sensor' data Ensure accelerator position sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P2123	Twist grip position sensor 1 short circuit to vBatt	

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B17 - ECM pin B21 - ECM pin B35	OK	Disconnect accelerator position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B21 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B17 to sensor pin 1 - ECM pin B21 to sensor pin 3 - ECM pin B35 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B21 to ECM pin B17 - ECM pin B21 to ECM pin B35	OK	Renew twist grip position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



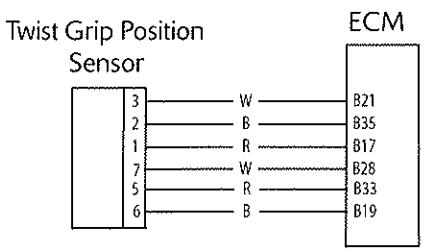
Twist Grip Position Sensor 2

Fault Code	Possible cause	Action
P2127	Twist grip position sensor 2 short circuit to ground or open circuit	View & note diagnostic tool 'freeze frame' data if available View & note diagnostic tool 'sensor' data Ensure accelerator position sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P2128	Twist grip position sensor 2 short circuit to vBatt	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B19 - ECM pin B28 - ECM pin B33	OK	Disconnect accelerator position sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B28 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B19 to sensor pin 6 - ECM pin B28 to sensor pin 7 - ECM pin B33 to sensor pin 5	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin B28 to ECM pin B19 - ECM pin B28 to ECM pin B33	OK	Renew twist grip position sensor, proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



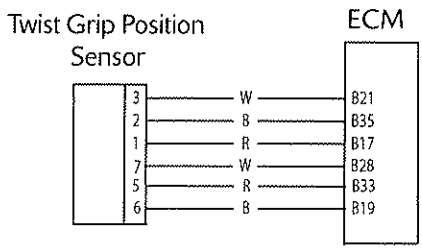
Twist Grip Position Sensor 1 vs Twist Grip Position Sensor 2 Correlation Error

Fault Code	Possible cause	Action
P2138	Twist grip position sensor 1 correlation error with twist grip position sensor 2	View & note diagnostic tool 'freeze frame' data if available View & note diagnostic tool 'sensor' data Disconnect twist grip position sensor and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Turn the ignition on and measure the Voltage between: - ECM pin B33 and ECM pin B19 - ECM pin B17 and ECM pin B35	5 V DC	Change throttle position sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 2
5	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Throttle Actuator Motor

Fault Code	Possible cause	Action
P2102	Throttle actuator motor short to ground or open circuit	Contact Triumph service
P2103	Throttle actuator motor short circuit to vBatt	

Throttle Valve Drive Error

Fault Code	Possible cause	Action
P2107	Throttle valve drive error	View & note diagnostic tool 'freeze frame' data if available View & note diagnostic tool 'sensor' data Check throttle body for mechanical malfunctions. Clear fault code and contact Triumph service if fault still present
P2111	Throttle valve drive error - Return spring malfunction	
P2119	Throttle valve drive error - Throttle valves malfunction	

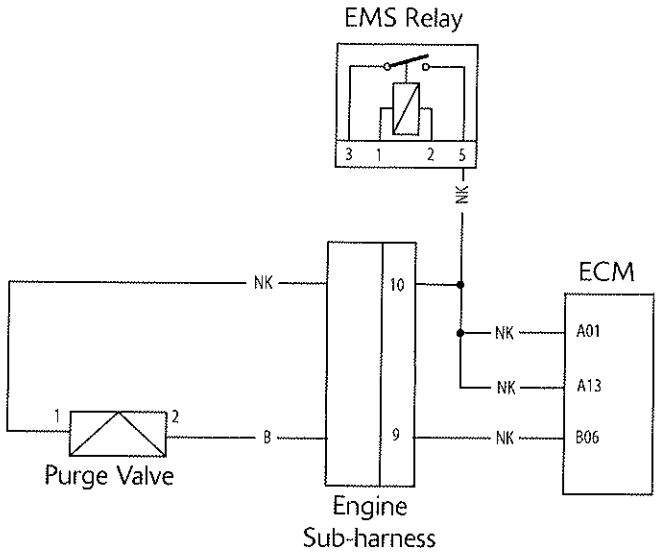
Purge Valve

Fault Code	Possible cause	Action
P0444	Purge valve short circuit to ground or open circuit	View & note diagnostic tool 'sensor' data Ensure purge valve connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0445	Purge valve short circuit to vBatt	Disconnect purge valve and proceed to pinpoint test 5:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B06 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - ECM pin A01 to ECM pin B06 - ECM pin A13 to ECM pin B6	22Ω to 30Ω	Proceed to test 3
		Open circuit	Disconnect purge valve and proceed to test 4
		Short circuit	Disconnect purge valve and proceed to test 5
3	Check cable for short circuit: - ECM pin B06 to earth	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to valve pin 1 - ECM pin B06 to valve pin 2	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - ECM pin A01 to ECM pin B06 - ECM pin A13 to ECM pin B06	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check purge valve resistance: - Valve pin 1 to valve pin 2	22Ω to 30Ω	Proceed to test 7
		Faulty	Renew purge valve, proceed to test 7
7	Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of purge valve	OK	Action complete - quit test
		Fault	Contact Triumph service

Circuit Diagram



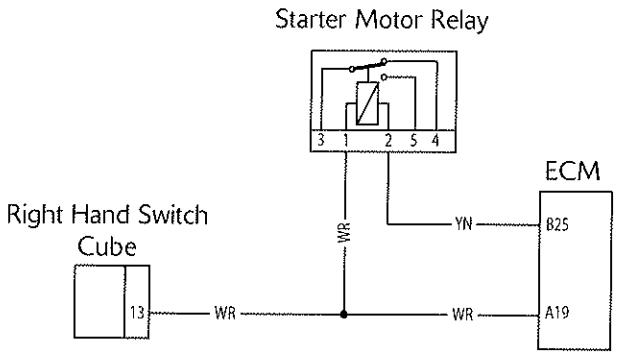
Starter Motor Relay

Fault Code	Possible cause	Action
P0616	Starter motor relay short circuit to ground or open circuit	Ensure starter motor relay connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0617	Starter motor relay short circuit to vBatt	Disconnect ECM and starter motor relay and proceed to pinpoint test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B25 - Right hand switch cube pin 13	OK	Disconnect starter motor relay and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B25 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B25 to starter motor relay pin 2 - Right hand switch cube pin 13 to starter motor relay pin 1	OK	Renew starter motor relay, proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	With starter switch ON, check cable for short circuit: - ECM pin B25 to ECM pin A19	OK	Renew starter motor relay, 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 starter motor	OK	Action complete - quit test
		Fault	Contact Triumph service

Circuit Diagram



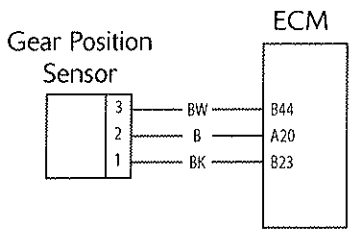
Gear Position Sensor

Fault Code	Possible cause	Action
P0705	Gear position sensor circuit malfunction	View & note 'freeze frame' data if available View & note 'sensor' data Ensure gear position 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 B23 - ECM pin B44	OK	Disconnect gear position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B23 to ground - ECM pin B44 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B23 to gear position sensor pin 1 - Ground to gear position sensor pin 2 - ECM pin B44 to gear position 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 B23 to ECM pin B44	OK	Renew gear position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



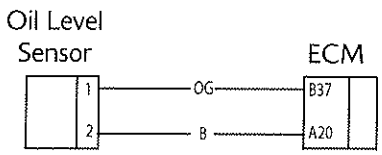
Engine Oil Level Sensor

Fault Code	Possible cause	Action
P1534	Engine oil level sensor circuit malfunction	View & note diagnostic tool 'sensor' data Ensure oil level switch connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B37	OK	Disconnect oil level switch and proceed to test 2
	Faulty	Rectify fault, proceed to test 4
2 Check cable for short circuit: - ECM pin B37 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 4
3 Check cable continuity: - ECM pin B37 to oil level switch pin 1 - Ground to oil level switch pin 2	OK	Renew oil level switch, proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



Ignition Coils

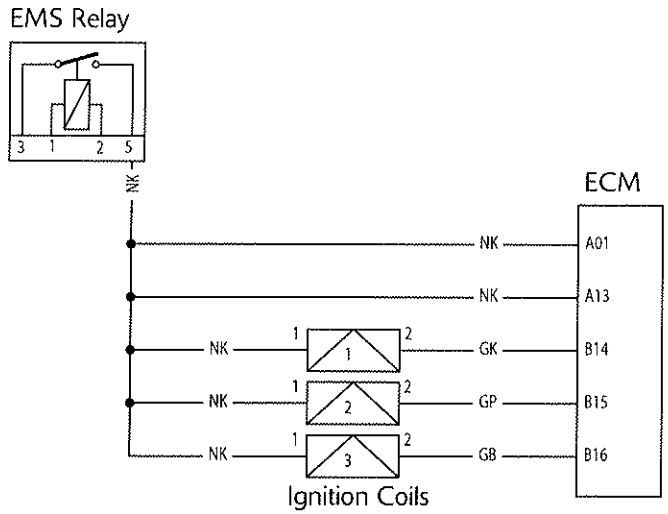
Fault Code	Possible cause	Action
P0351	Ignition coil 1 malfunction	View & note diagnostic tool 'freeze frame' data if available Ensure relevant ignition coil connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0352	Ignition coil 2 malfunction	
P0353	Ignition coil 3 malfunction	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B14 - ECM pin B15 - ECM pin B16 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - ECM pin A01 to ECM pin B14 (coil 1) - ECM pin A01 to ECM pin B15 (coil 2) - ECM pin A01 to ECM pin B16 (coil 3) - ECM pin A13 to ECM pin B14 (coil 1) - ECM pin A13 to ECM pin B15 (coil 2) - ECM pin A13 to ECM pin B16 (coil 3)	1.5Ω to 1.6Ω	Proceed to test 3
		Open circuit	Disconnect relevant ignition coil and proceed to test 4
		Short circuit	Disconnect relevant ignition coil and proceed to test 5
3	Check cable for short circuit: - ECM pin B14 to ground - ECM pin B15 to ground - ECM pin B16 to ground	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to relevant ign coil pin 1 - ECM pin B14 to ignition coil 1 pin 2 - ECM pin B15 to ignition coil 2 pin 2 - ECM pin B16 to ignition coil 3 pin 2	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - ECM pin A01 to ECM pin B14 (coil 1) - ECM pin A01 to ECM pin B15 (coil 2) - ECM pin A01 to ECM pin B16 (coil 3) - ECM pin A13 to ECM pin B14 (coil 1) - ECM pin A13 to ECM pin B15 (coil 2) - ECM pin A13 to ECM pin B16 (coil 3)	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7

	Test	Result	Action
6	Check relevant ignition coil resistance:	1.2Ω to 1.6Ω	Proceed to test 7
	- Ignition coil pin 1 to ignition coil pin 2	Faulty	Renew relevant ignition coil, proceed to test 7
7	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Coolant Temperature Sensor

Fault Code	Possible cause	Action
P0118	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	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	Engine coolant temperature sensor short circuit to ground	Disconnect sensor and proceed to test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B40	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check resistance value: - ECM pin B40 to ground (temperature dependant - see opposite page)	OK	Proceed to test 6
		Open circuit	Disconnect coolant temperature sensor and proceed to test 3
		Short circuit	Disconnect coolant temperature sensor and proceed to test 4
3	Check cable continuity: - ECM pin B40 to sensor pin 1 - Ground to sensor pin 2	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short circuit: - ECM pin B40 to ground	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 6
5	Check sensor resistance: - Sensor pin 1 to sensor pin 2 (temperature dependent - see opposite page)	OK	Proceed to test 6
		Faulty	Renew temp sensor, proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

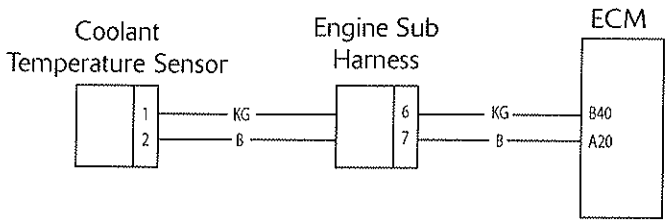
Resistance data under typical conditions:

Warm engine: . . . . . 200 to 400Ω

Cold engine:

20°C ambient. . . . . 2.35 to 2.65KΩ

-10°C ambient . . . . . 8.50 to 10.25KΩ



Inlet Air Temperature Sensor

Fault Code	Possible cause	Action
P0113	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	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:
P0112	Intake air temperature sensor short circuit to ground	Disconnect sensor and proceed to pinpoint test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B42	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check resistance value: - ECM pin B42 to ground (temperature dependent - see opposite page)	OK	Proceed to test 6
		Open circuit	Disconnect air temperature sensor and proceed to test 3
		Short circuit	Disconnect air temperature sensor and proceed to test 4
3	Check cable continuity: - ECM pin B42 to sensor pin 1 - Ground to sensor pin 2	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short circuit: - ECM pin B42 to ground	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 6
5	Check sensor resistance: - sensor pin 1 to sensor pin 2 (temperature dependant - see opposite page)	OK	Proceed to test 6
		Faulty	Renew air temperature sensor and proceed to test 6
6	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

If engine is warm, remove sensor and allow time to cool to ambient prior to test.

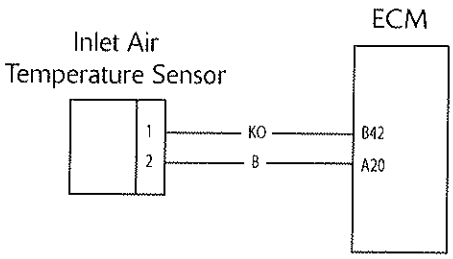
Resistance data:

Ambient temp . . . . . .Resistance value

80°C. . . . . .200 to 400Ω

20°C. . . . . .2.35 to 2.65KΩ

-10°C. . . . . .8.50 to 10.25KΩ



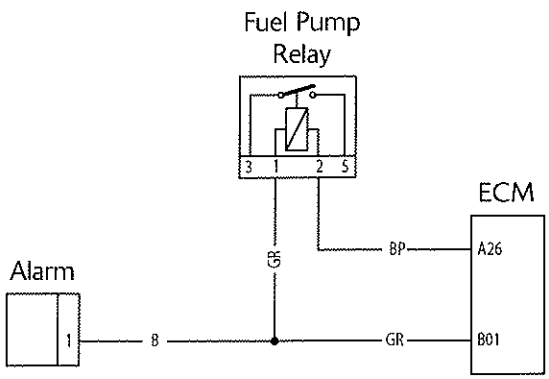
Fuel Pump Relay

Fault Code	Possible cause	Action
P1231	Fuel pump relay short circuit to ground or open circuit	Check if pump runs briefly when ignition is switched on Ensure fuel pump relay connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1232	Fuel pump relay short circuit to vBatt	Disconnect fuel pump relay and proceed to pinpoint test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A26 - Alarm pin 1	OK	Disconnect fuel pump relay and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A26 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A26 to fuel pump relay pin 2 - Alarm pin 1 to fuel pump relay pin 1	OK	Renew fuel pump relay, proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A26 to Alarm pin 1	OK	Renew fuel pump relay, 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



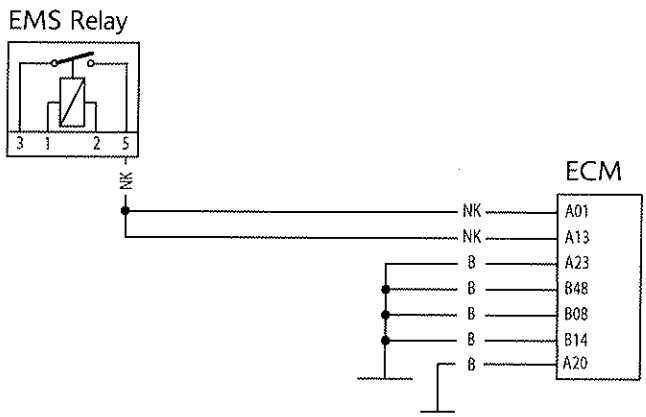
System Voltage

Fault Code	Possible cause	Action
P0560	System Voltage - battery circuit malfunction	View & note diagnostic tool 'sensor' data Ensure Voltage across battery is acceptable, note Voltage Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A01 - ECM pin A13 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 3
2	With Ignition 'ON', check Voltage at: - ECM pin A01 - ECM pin A13	Same as 'across battery' Voltage	Proceed to test 3
		Less than 'across battery' Voltage	Locate and rectify wiring fault, proceed to test 3
3	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



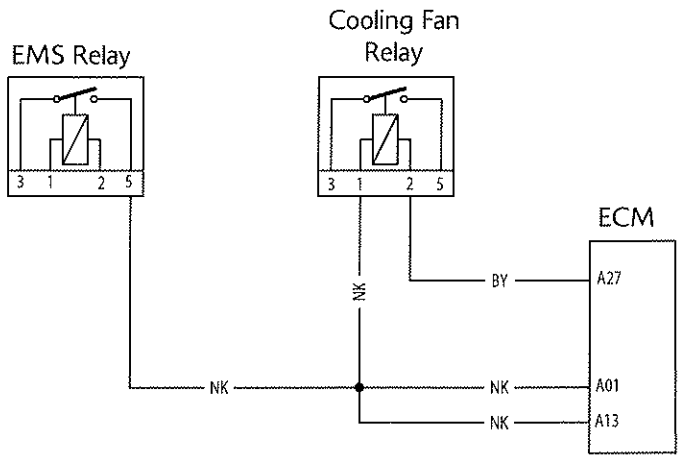
Cooling Fan Relay

Fault Code	Possible cause	Action
P1552	Cooling fan relay short circuit to ground or open circuit	View & note diagnostic tool 'sensor' data Ensure fan relay connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1553	Cooling fan relay short circuit to vBatt or over temperature	Disconnect ECM relay, fan relay and proceed to pinpoint test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A27 - EMS relay pin 5	OK	Disconnect fan relay and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A27 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A27 to cooling fan relay pin 2 - EMS relay pin 5 to cooling fan relay pin 1	OK	Renew cooling fan relay, proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A27 to EMS relay pin 5	OK	Renew cooling fan relay, 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 cooling fan	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



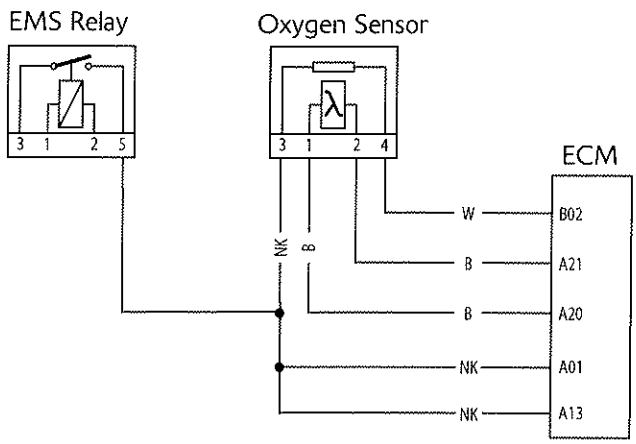
Oxygen Sensor

Fault Code	Possible cause	Action
P0130	Oxygen sensor circuit malfunction	View & note 'freeze frame' data if available View & note 'sensor' data Ensure oxygen 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 A21	OK	Disconnect oxygen sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin A21 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - ECM pin A21 to lambda sensor pin 2 - Ground to lambda sensor pin 1	OK	Renew oxygen sensor, proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine. Check adaptation status	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



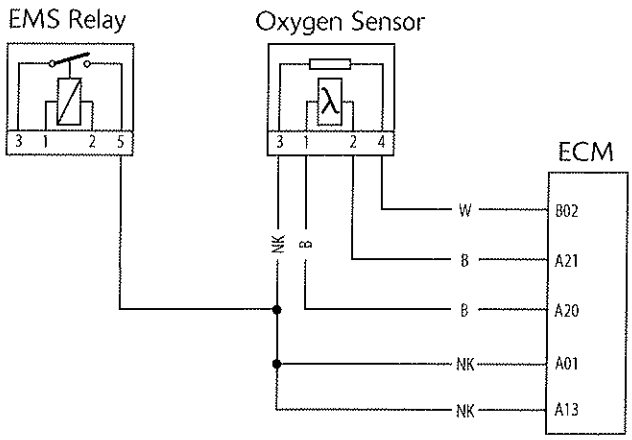
Oxygen Sensor Heater

Fault Code	Possible cause	Action
P0031	Oxygen sensor heater open circuit or short to ground	View & note 'freeze frame' data if available View & note 'sensor' data Ensure oxygen sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0032	Oxygen sensor heater short circuit to vBatt	Disconnect oxygen sensor and proceed to pinpoint test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B02 - EMS relay pin 5	OK	Disconnect oxygen sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B02 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B02 to oxygen sensor pin 4 - EMS relay pin 5 to oxygen sensor pin 3	OK	Renew oxygen sensor, proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A01 to ECM pin B02 - ECM pin A13 to ECM pin B02	OK	Renew oxygen sensor and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine. Check adaption status	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



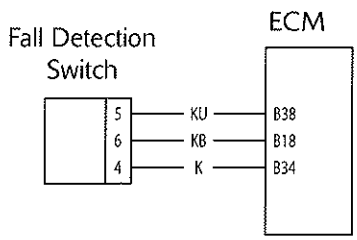
Fall Detection Switch

Fault Code	Possible cause	Action
P1631	Fall detection circuit short circuit to ground	View & note 'freeze frame' data if available View & note 'sensor' data Ensure fall detection switch connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1632	Fall detection circuit short circuit to vBatt	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B18 - ECM pin B34 - ECM pin B38	OK	Disconnect fall detection switch and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B38 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B18 to sensor pin 6 - ECM pin B34 to sensor pin 4 - ECM pin B38 to sensor pin 5	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin B38 to ECM pin B34 - ECM pin B38 to ECM pin B18	OK	Renew fall detection switch, proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Vehicle Speed Sensor

Fault Code	Possible cause	Action
P0500	Vehicle speed sensor malfunction	Refer to C1613 (see page *15-58*).

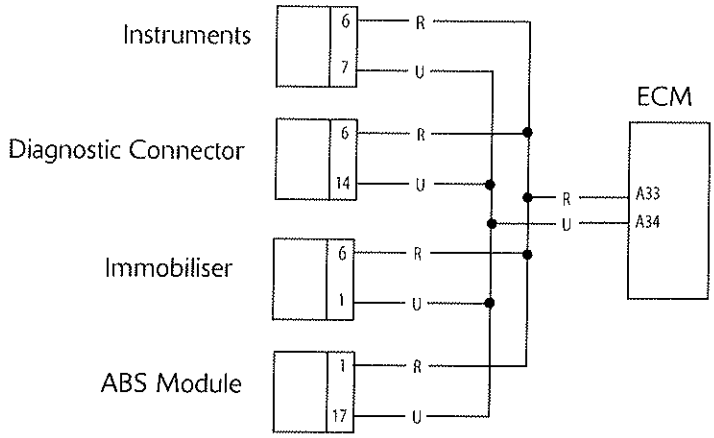
CAN Communication

Fault Code	Possible cause	Action
P1690	CAN Fault - communication between ECM and other CAN nodes (Immobiliser unit, instruments and ABS module)	View & note 'freeze frame' data if available Ensure ignition switch is in 'OFF' position Proceed to pinpoint test 1:

Pinpoint Test

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A33 - ECM pin A34 - Instruments pin 6 - Instruments pin 7 - Immobiliser pin 1 - Immobiliser pin 6 - ABS modulator pin 1 - ABS modulator pin 17	OK	Disconnect immobiliser and ABS modulator and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A33 to instruments pin 6 - ECM pin A34 to instruments pin 7 - ECM pin A33 to immobiliser pin 6 - ECM pin A34 to immobiliser pin 1 - ECM pin A33 to ABS modulator pin 1 - ECM pin A34 to ABS modulator pin 17	OK	Contact Triumph service
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A33 to ECM pin A34	OK	Proceed to test 5
		Faulty	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



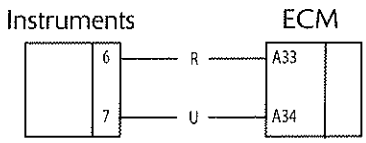
Instrument Communication (CAN)

Fault Code	Possible cause	Action
P1695	Lost communication with instrument panel	View & note 'freeze frame' data if available Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - Instruments pin 6 - Instruments pin 7	OK	Disconnect instruments and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A33 to instruments pin 6 - ECM pin A34 to instruments pin 7	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A33 to ECM pin A34	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



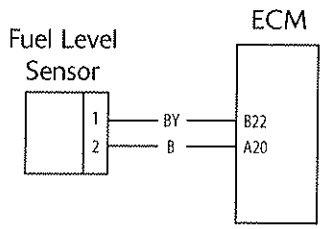
Fuel Level Sensor Circuit Malfunction

Fault Code	Possible cause	Action
P0460	Fuel level sensor circuit malfunction	View & note 'freeze frame' data if available View & note 'sensor' data Ensure fuel level 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 B22	OK	Disconnect fuel level sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin B22 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B22 to sensor pin 1 - Ground to sensor pin 2	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



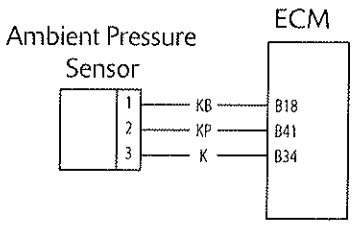
Ambient Pressure Sensor

Fault Code	Possible cause	Action
P1107	Ambient air pressure sensor circuit short circuit to ground	View & note 'freeze frame' data if available View & note 'sensor' data Ensure ambient pressure sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1108	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	Disconnect ECM and ambient pressure sensor and proceed to pinpoint test 4:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B18 - ECM pin B34 - ECM pin B41	OK	Disconnect ambient pressure sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - ECM pin B41 to ground - ECM pin B41 to ECM pin B18	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 6
3	Check cable for continuity: - ECM pin B34 to sensor pin 3	OK	Renew ambient pressure sensor and proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short circuit: - ECM pin B41 to ECM pin B34	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 6
5	Check cable continuity: - ECM pin B41 to sensor pin 2 - ECM pin B18 to sensor pin 1	OK	Renew ambient pressure sensor and proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



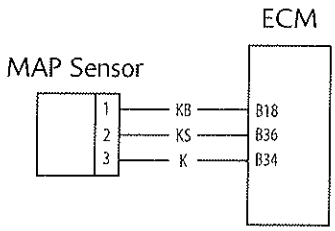
Manifold Absolute Pressure (MAP) Sensor

Fault Code	Possible cause	Action
P0107	Manifold absolute pressure sensor 1 short circuit to ground	View & note 'freeze frame' data if available View & note 'sensor' data Ensure MAP sensor connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0108	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	Disconnect ECM and MAP sensor and proceed to test 4:
P1105	Manifold absolute pressure sensor 1 pipe malfunction	Check connection/condition of pipe from MAP sensor to throttle body

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B18 - ECM pin B34 - ECM pin B36	OK	Disconnect MAP sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - ECM pin B36 to ground - ECM pin B36 to ECM pin B18	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 6
3	Check cable for continuity: - ECM pin B34 to sensor pin 3	OK	Renew MAP sensor and proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short circuit: - ECM pin B36 to ECM pin B34	OK	Renew MAP sensor and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 6
5	Check cable continuity: - ECM pin B36 to sensor pin 2 - ECM pin B18 to sensor pin 1	OK	Renew MAP sensor and proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



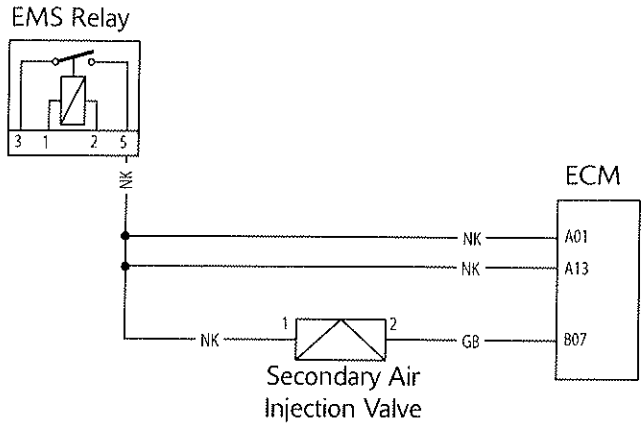
Secondary Air Injection Valve

Fault Code	Possible cause	Action
P0413	Secondary air injection short circuit to ground or open circuit	View & note diagnostic tool 'sensor' data Ensure SAI valve connector is secure Disconnect ECM and proceed to pinpoint test 1:
P0414	Secondary air injection short circuit to vBatt	Disconnect ECM and SAI valve and proceed to pinpoint test 5:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B07 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - ECM pin A01 to ECM pin B07 - ECM pin A13 to ECM pin B07	18Ω to 22Ω	Proceed to test 3
		Open circuit	Disconnect SAI valve and proceed to test 4
		Short circuit	Disconnect SAI valve and proceed to test 5
3	Check cable for short circuit: - ECM pin B07 to ground	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to valve pin 1 - ECM pin A01 to valve pin 3 - ECM pin A13 to valve pin 1 - ECM pin B07 to valve pin 2	OK	Proceed to test 6
		Open Circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - ECM pin B07 to ECM pin A01 - ECM pin B07 to ECM pin A13	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check SAI valve resistance: - Valve pin 1 to valve pin 2	18Ω to 22Ω	Proceed to test 7
		Faulty	Renew SAI valve, proceed to test 7
7	Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of SAI valve	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



EMS Main Relay Circuit

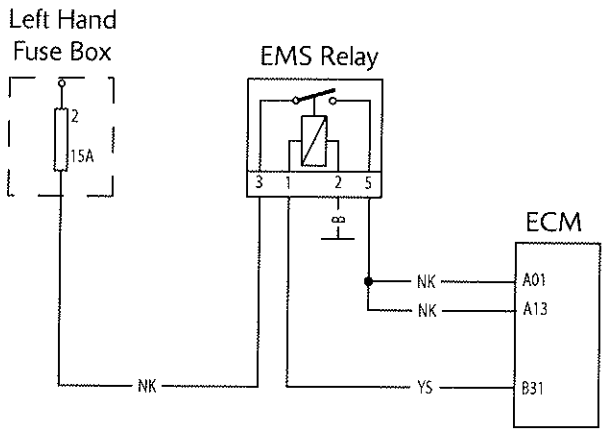
Fault Code	Possible cause	Action
P1685	Main relay circuit malfunction	Note that the Starter Motor cannot be powered if a Main Relay fault exists Ensure the EMS Main Relay connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Ensure ignition has been switched off for greater than one minute. Identify EMS Main Relay on the harness Check that relay operates when the ignition is switched on	OK	Proceed to test 2
		Faulty	Disconnect ECM and proceed to test 4
2	Check left hand fuse box, fuse 2 integrity	OK	Disconnect ECM and proceed to test 4
		Faulty	Disconnect ECM and proceed to test 3
3	Check cable for short circuit: - ECM pin A01 to ground - ECM pin A13 to ground - EMS main relay pin 3 to ground	OK	Replace fuse 2 and proceed to test 4
		Short circuit	Locate and rectify wiring fault, replace fuse 2 and proceed to test 7
4	Check cable and terminal integrity: - ECM pin A01 - ECM pin A13 - ECM pin B31 - EMS main relay pin 1 - EMS main relay pin 2 - EMS main relay pin 3 - EMS main relay pin 5	OK	Disconnect EMS main relay and proceed to test 5
		Faulty	Rectify fault, proceed to test 7
5	Check cable for short circuit: - ECM pin B31 to ground	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7

	Test	Result	Action
6	Check cable continuity: - ECM pin A01 to EMS main relay pin 5 - ECM pin A13 to EMS main relay pin 5 - ECM pin B31 to EMS relay pin 1 - EMS main relay pin 2 to ground - EMS main relay pin 3 to L.H. fuse box, fuse 2	OK	Replace EMS main relay and proceed to test 7
		Open circuit	Locate and rectify wiring fault, proceed to test 7
7	Reconnect harness, clear fault code. Switch ignition off for longer than one minute. Switch ignition on and check that the EMS Main Relay operates. Start engine as final check	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



EEPROM Error

Fault Code	Possible cause	Action
P0603	EEPROM error	View & note 'freeze frame' data if available No tests available - contact Triumph service

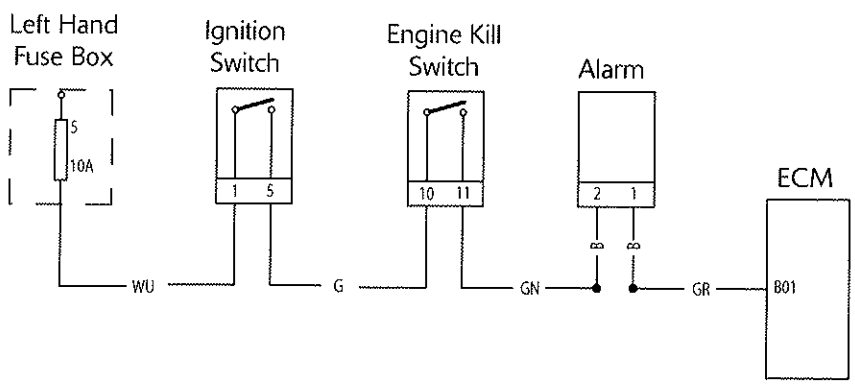
EMS Ignition Voltage Input Circuit

Fault Code	Possible cause	Action
P1659	Ignition power supply malfunction	Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check left hand fuse box fuse 5 integrity	OK	Proceed to test 3
		Faulty	Proceed to test 2
2	Check cable for short circuit: - ECM pin B01 to ground	OK	Replace fuse 5 and proceed to test 3
		Short circuit	Locate and rectify wiring fault, replace fuse 5 and proceed to test 5
3	Check cable and terminal integrity: - ECM pin B01 - Alarm connector pin 1 - Alarm connector pin 2 - Right hand switch cube pin 10 - Right hand switch cube pin 11 - Ignition switch pin 1 - Ignition switch pin 5	OK	Proceed to test 4
		Faulty	Rectify fault, proceed to test 5
4	Check cable continuity: - ECM pin B01 to left hand fuse box, fuse 5 Note that the engine stop switch must be in the 'RUN' position and any alarm fitted must be disarmed	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring, immobiliser or engine stop switch 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



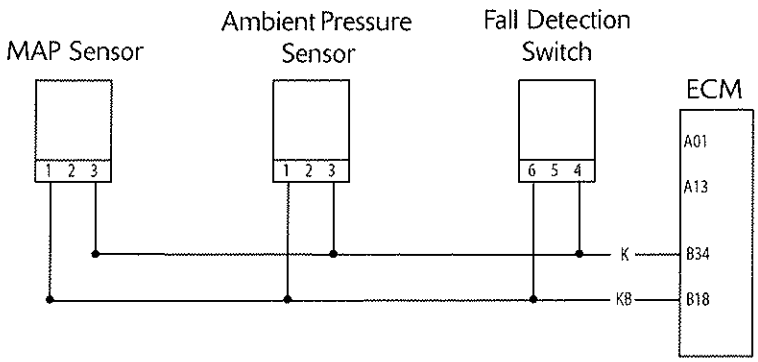
5 Volt Sensor Supply Circuit

Fault Code	Possible cause	Action
P1696	5 V sensor supply short circuit to ground	View & note 'sensor' data Note ECM sensors requiring a power supply will not be active Disconnect ECM and proceed to pinpoint test 1:
P1697	5 V sensor supply short circuit to vBatt	
P1698	5 V sensor supply malfunction	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B18 - ECM pin B34	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit - ECM pin B18 to ECM pin B34	OK	Proceed to test 4
		Faulty	Proceed to test 3
3	Disconnect the following sensors in turn: - MAP sensor - Ambient pressure sensor - Fall detection switch And retest for short circuit: - ECM pin B18 to ECM pin B34	OK	Replace sensor last removed and proceed to test 5
		Faulty	Proceed to test 4
4	Check cable for short circuit: - ECM pin B18 to ground - ECM pin B34 to ground - ECM pin B18 to ECM pin A01 and A13 - ECM pin B34 to ECM pin A01 and A13 - ECM pin B18 to battery positive - ECM pin B34 to battery positive	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and use service tool to check for correct sensor outputs and 5 V sensor supply Voltage level	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Tune Lock

Fault Code	Possible cause	Action
P1605	ECM locked by the tunelock function	This is also identified by a fast flashing MIL indication and a disabled engine management system Unlock the ECM using the diagnostic software and supplied unlock code from Triumph service

Instrument ID Incorrect

Fault Code	Possible cause	Action
P1614	Instrument ID incompatible Instrument or tune is incorrect, causing the ECM to be disabled to prevent the motorcycle from being operated	This is also identified by a fast flashing MIL indication and a disabled engine management system

Pinpoint Tests

	Test	Result	Action
1	Check instrument part number is correct for the motorcycle	OK	Proceed to test 2
		Faulty	Replace instrument with correct part and proceed to test 3
2	Check that the tune is correct for the motorcycle, using the diagnostic software	OK	Proceed to test 3
		Faulty	Update the tune using the diagnostic software, proceed to test 3
3	Clear fault code, check for normal operation	OK	Action complete - quit test
		Fault still present	Contact Triumph service

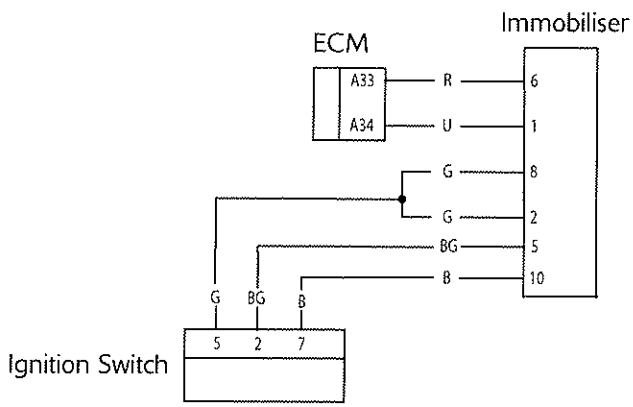
Immobiliser and TPMS Control Module Communication

Fault Code	Possible cause	Action
P1650	Lost communication with Immobiliser ECM	View & note 'freeze frame' data if available Ensure immobiliser and TPMS control module connector is secure Ensure the ignition switch is turned to the OFF position Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A33 - ECM pin A34 - Immobiliser pin 1 - Immobiliser pin 6	OK	Disconnect ECM and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Disconnect immobiliser, ignition switch and proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - ECM pin A33 to immobiliser pin 6 - ECM pin A34 to Immobiliser pin 1 - Immobiliser pin 7 to ground - Ignition switch pin 5 to immobiliser pin 2 - Ignition switch pin 5 to immobiliser pin 8	OK	Contact Triumph service
		Fault still present	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Immobiliser and TPMS Control Module ID Incompatible

Fault Code	Possible cause	Action
P1508	Unmatched Immobiliser ECM	This is also identified by a MIL indication and a disabled engine management system

Pinpoint Tests

	Test	Result	Action
1	Follow the Pair ECM and Immobiliser procedure as described in the Triumph Diagnostic Tool user guide	OK	Action complete, quit test
		Fault still present	Contact Triumph service

ABS Modulator ID Incompatible

Fault Code	Possible cause	Action
P1520	Unmatched ABS	This is also identified by ABS warning light indication. Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check ABS modulator part number is correct for the motorcycle	OK	Proceed to test 2
		Incorrect	Replace ABS modulator with correct part and proceed to test 3
2	Check that the tune is correct for the motorcycle, using the diagnostic tool	OK	Proceed to test 3
		Incorrect	Update tune using service tool, proceed to test 3
3	Clear fault code, check for normal operation	OK	Action complete, quit test
		Fault still present	Contact Triumph service

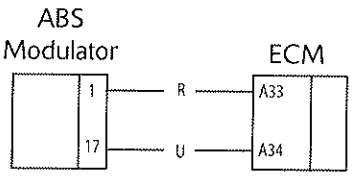
ABS Modulator Communication

Fault Code	Possible cause	Action
P1521	Lost communication with ABS	View & note 'freeze frame' data if available Ensure ABS modulator connector is secure Proceed to pinpoint test 1:

Pinpoint Test

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A33 - ECM pin A34 - ABS modulator pin 1 - ABS modulator pin 17	OK	Disconnect ECM and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin A33 to ground - ECM pin A34 to ground	OK	Disconnect ABS modulator and proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - ECM pin A33 to ABS modulator pin 1 - ECM pin A34 to ABS modulator pin 17	OK	Contact Triumph service
		Fault still present	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



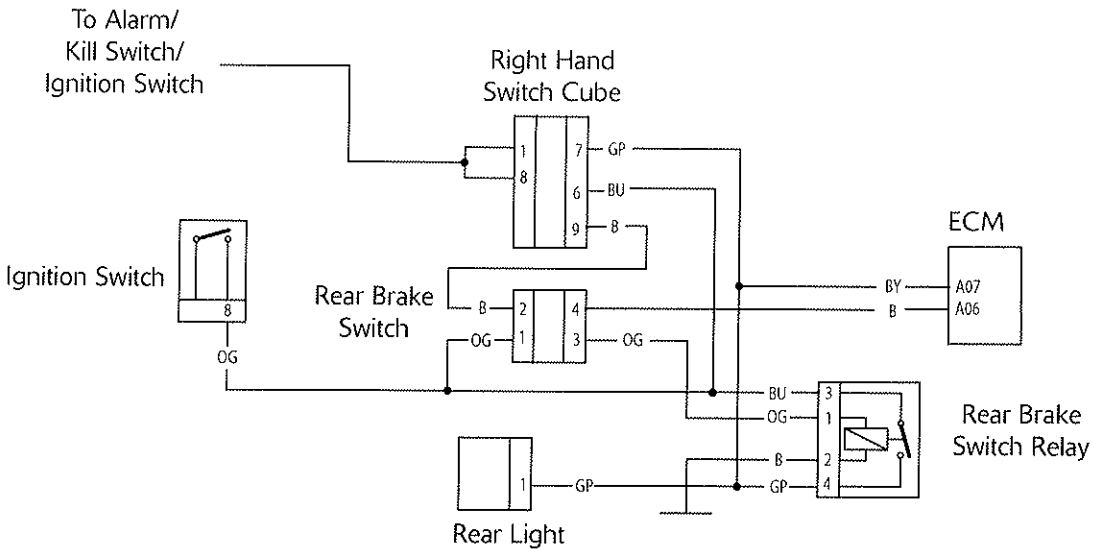
Brake Switches

Fault Code	Possible cause	Action
P0571	Brake 1 switch malfunction	View & note 'freeze frame' data if available Ensure brake switches connectors are secure Disconnect ECM and proceed to pinpoint test 1:
P1571	Brake 2 switch malfunction	
P1576	Brake 1 switch correlation error with brake switch 2	
P1577	Brake 2 switch correlation error with brake switch 1	

Pinpoint Test

	Test	Result	Action
1	Turn ignition on, operate rear brake switch and check brake light operation	OK	Proceed to test 2
		Faulty	Change brake light relay, proceed to test 5
2	Check cable and terminal integrity: - ECM pin A06 - ECM pin A07	OK	Disconnect front and rear brakes switches connector, proceed to test 3
		Faulty	Rectify fault, proceed to test 5
3	Check front and rear brake switches operation - R.H. switch cube pin 6 and 7 (switch cube side) - R.H. switch cube pin 8 and 9 (switch cube side) - Rear brake switch pin 1 and 3 (switch side) - Rear brake switch pin 2 and 4 (switch side)	OK	Proceed to test 4
		Faulty	Replace relevant brake switch, proceed to test 5
4	Check cables continuity: - ECM pin A07 to R.H switch cube pin 7 - ECM pin A07 to rear brake relay pin 4 - ECM pin A06 to alarm pin 1	OK	Proceed to test 5
		Open Circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



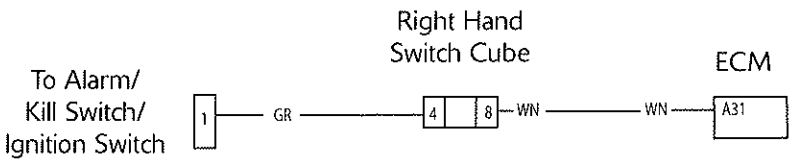
Twist Grip - Cruise Cancel Switch

Fault Code	Possible cause	Action
P0510	Twist grip cruise cancel switch malfunction	View & note 'freeze frame' data if available Ensure right hand switch cube connector is secure Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Test

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A31	OK	Disconnect right hand switch cube and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A31 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A31 to right hand switch cube small connector pin 8 - Alarm pin 1 to right hand switch cube small connector pin 4	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cruise cancel switch: - With the twist grip at the throttle closed position, measure continuity: - Right hand switch cube small connector pin 8 to small connector pin 4	OK	Proceed to test 5
		Faulty	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Cruise Control Prevented Due to Other Malfunction

Fault Code	Possible cause	Action
P1574	Cruise control prevented due to other malfunction	Check that there is no other DTC linked to the engine management system stored Check front and rear brake switches, cruise control cancel switch and the rear wheel speed sensor

Cruise Control Disabled Until Button Press Sequence Completed

Fault Code	Possible cause	Action
P1575	Cruise control disabled until button press sequence completed After certain DTCs have been stored and subsequently repaired, the cruise control will be disabled until a test of the systems various switches has been performed	Carry out the button press sequence as described on page *10-33*

Traction Control Prevented Due to ABS Malfunction

Fault Code	Possible cause	Action
P1135	Traction Control prevented due to ABS malfunction	Check that there is no other DTC linked to the ABS system or CAN communication stored Contact Triumph service

ECM Internal Error

Fault Code	Possible cause	Action
P1606	ECM internal error	Contact Triumph service
P1607 P1608	ECM ride by wire internal error	

ECM Tamper Detected

Fault Code	Possible cause	Action
P1604	ECM tamper detected - return to Triumph	Contact Triumph service

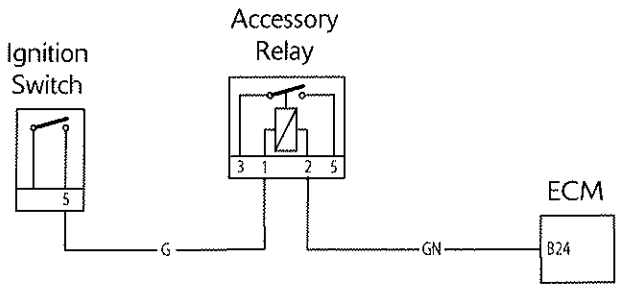
Accessory Control Relay

Fault Code	Possible cause	Action
P1616	Accessory control relay short circuit to ground or open circuit	View & note 'freeze frame' data if available Ensure accessory relay connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1617	Accessory control relay short circuit to vBatt	Disconnect ECM and accessory relay and proceed to pinpoint test 4:

Pinpoint Test

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B24 - Ignition switch pin 5	OK	Disconnect accessory relay and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B24 to ground	OK	Proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B24 to accessory relay pin 2 - Ignition switch pin 5 to accessory relay pin 1	OK	Renew accessory relay, proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin B24 to Ignition switch pin 5	OK	Renew accessory relay, proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



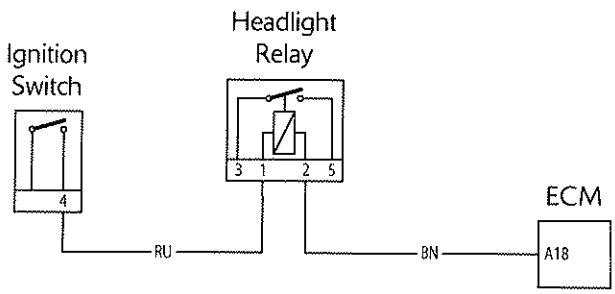
Headlight Relay

Fault Code	Possible cause	Action
P1619	Headlamp relay short circuit to ground or open circuit	View & note 'freeze frame' data if available Ensure ABS modulator connector is secure Disconnect ECM and proceed to pinpoint test 1:
P1620	Headlamp relay short circuit to vBatt	Disconnect ECM and headlight relay and proceed to pinpoint test 4:

Pinpoint Test

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A18 - Ignition switch pin 4	OK	Disconnect headlight relay and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A18 to ground	OK	Proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A18 to headlight relay pin 2 - Ignition switch pin 4 to headlight relay pin 1	OK	Renew headlight relay, proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A18 to Ignition switch pin 4	OK	Renew headlight relay, proceed to test 5
		Short circuit	Renew headlight relay, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Fault Finding - Non Electrical

Symptom	Possible cause(s)
Poor throttle response at low RPM	Low fuel pressure caused by filter blockage/leaks
Cutting out at idle	Throttle bodies out of balance
	Low fuel pressure
	Weak mixture caused by air leak at the throttle body/transition piece to cylinder head face
Idle speed too low/high	Incorrect closed throttle position setting
	Mechanical fault with the throttle linkage
Diagnostic software malfunctions during tune download procedure	Low battery Voltage
Throttle hang-up	Incorrect closed throttle position setting
Motorcycle will start but cuts out immediately	Low fuel pressure caused by filter blockage/leaks
Abnormally high fuel pressure	Fuel pressure regulator inoperative
Temperature gauge reads cooler than normal	Cooling system air-locked resulting in coolant temperature sensor operating in air instead of coolant
Motorcycle will not start	Check the immobiliser system for faults
	Ensure that the keys, ECM and immobiliser/TPMS control module an all correctly paired

Front Wheel Unit Sensor Battery Alert

Note:

- **All the fault codes for the tyre pressure monitoring system and the immobiliser system can only be viewed in the Safety/Security section of the Triumph diagnostic software.**

Fault Code	Possible cause	Action
L0001 or The TPMS tyre symbol in the instrument pack will be on for 8 seconds with the 'F' symbol with 'lo bAtt' shown in the display screen	Front wheel sensor unit battery alert	Replace the front wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

Rear Wheel Unit Sensor Battery Alert

Fault Code	Possible cause	Action
L0002 or The TPMS tyre symbol in the instrument pack will be on for 8 seconds with the 'F' symbol with 'lo bAtt' shown in the display screen	Rear wheel sensor unit battery alert	Replace the rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

Front Wheel Unit Sensor Fault Alert

Fault Code	Possible cause	Action
L0003	Front wheel sensor unit fault alert Note: This DTC will automatically be generated if DTC L0007 occurs	If the problem persists: Replace the front wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

Rear Wheel Unit Sensor Fault Alert

Fault Code	Possible cause	Action
L0004	Rear wheel sensor unit fault alert Note: This DTC will automatically be generated if DTC L0007 occurs	If the problem persists: Replace the rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

Front Wheel Unit Sensor Loss of Communication

Note:

- **Refer to the owner's handbook for the wheel pressure sensors ID numbers.**

Fault Code	Possible cause	Action
L0005	Front wheel sensor unit loss of communication error Low battery Voltage Wrong sensor ID number has been registered in the immobiliser/TPMS control module	If the problem persists: Using the Triumph diagnostic tool, check that the correct ID number for the front wheel pressure sensor is registered to the Immobiliser/TPMS control module Replace the front wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

Rear Wheel Unit Sensor Loss of Communication

Note:

- **Refer to the owner's handbook for the wheel pressure sensors ID numbers.**

Fault Code	Possible cause	Action
L0006	Rear wheel sensor unit loss of communication error Low battery Voltage Wrong sensor ID number has been registered in the immobiliser/TPMS control module	If the problem persists: Using the Triumph diagnostic tool, check that the correct ID number for the rear wheel pressure sensor is registered to the Immobiliser/TPMS control module Replace the rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

Immobiliser/TPMS Control Module Fault

Note:

- **Refer to the owner's handbook for the wheel pressure sensors ID numbers.**

Fault Code	Possible cause	Action
L0007	Immobiliser ECM fault Low battery Voltage Wrong sensor ID numbers have been registered in the immobiliser/TPMS control module	Using the Triumph diagnostic tool, check that the correct ID numbers for the wheel pressure sensors are registered to the Immobiliser/TPMS control module If the correct IDs are registered, replace the front and rear wheel pressure sensor following the procedure described in the Triumph diagnostic tool user guide Record the new sensor's ID number into the owner's handbook before fitting

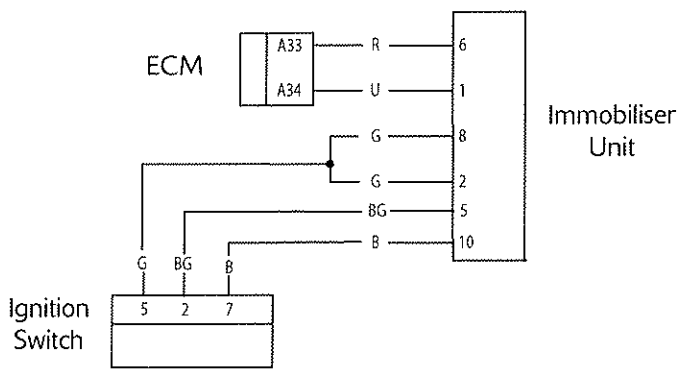
Invalid Key: Key Authentication Unsuccessful

Fault Code	Possible cause	Action
L0008 or Alarm/immobiliser warning indicator light is on when the ignition switch is at the ON position (only visible on motorcycles without the accessory alarm fitted)	Invalid key: Key authentication unsuccessful	Check that the key has been registered with the immobiliser/TPMS control module, if it is a new key or an additional key Check that there are no additional keys with a transponder chip fitted close to the ignition key and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	If available, try to start the motorcycle with the second registered key:	OK	Transponder chip in the key not functioning correctly. Register a new key using the Triumph diagnostic tool then proceed to test 5
		Faulty	Proceed to test 2
2	Check the condition of cable, connector housing and terminals for the following: - Ignition switch - Immobiliser and TPMS control module	OK	Disconnect the ignition switch, proceed to test 3
		Faulty	Rectify fault, proceed to test 5
3	Check antenna coil resistance: - Ignition switch pin 2 to ignition switch pin 7	7Ω to 13Ω	Proceed to test 4
		Faulty	Replace the ignition switch, register new keys and proceed to test 5
4	Check cable continuity: - Ignition switch pin 7 to Immobiliser and TPMS control module pin 10 - Ignition switch pin 2 to Immobiliser and TPMS control module pin 5	OK	Contact Triumph service
		Faulty	Rectify fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



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.

Warning

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

3. Remove the rider's seat (see page *17-16*).
4. Remove the fuel tank infill panels (see page *17-22*).
5. Remove the radiator infill panels (see page *17-22*).
6. Remove the side fairings (see page *17-23*).
7. Remove the seat infill panels (see page *17-26*).

Warning

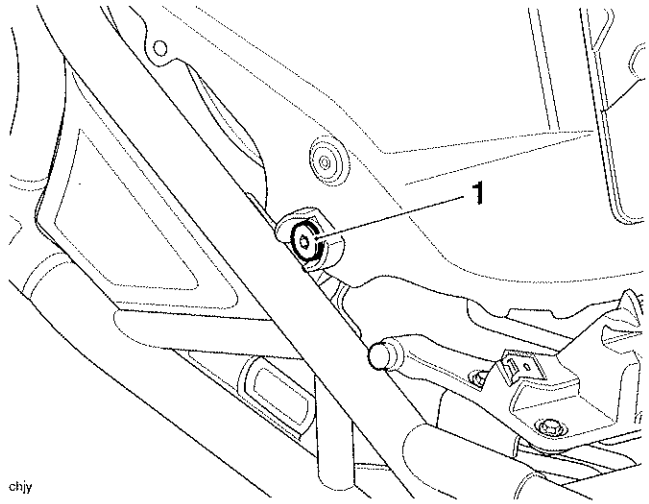
If the fuel rail is dismantled without first reducing pressure, fuel may escape causing clothing and components to be coated with fuel.

This would represent a serious fire hazard which could lead to burn injuries and damage to property.

Note:

- **Due to the shape of the fuel tank, a small amount of fuel may remain in the fuel tank after using a proprietary pump for removing fuel.**

8. Using proprietary professional automotive workshop equipment approved for fuel handling, drain the fuel from the fuel tank.
9. Remove the fixings securing the rear of the fuel tank to the frame.



chjy

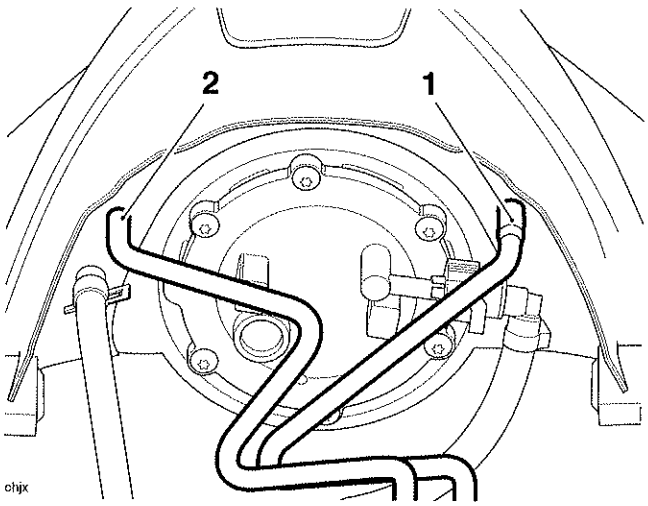
1. Fixing, left hand side shown

10. Raise the rear of the fuel tank to access the fuel lines and electrical connectors to the fuel pump.

Note:

- **Before disconnection, note that the right hand breather hose has a larger diameter than the left hand hose. Ensure they are returned to the same locations when refitting the tank.**

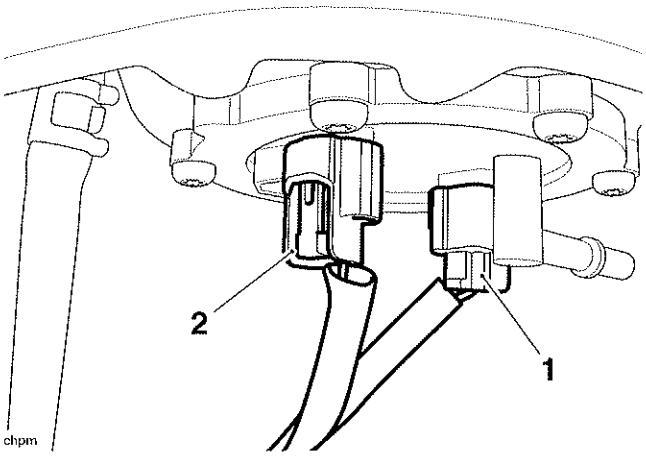
11. Disconnect the two breather hoses.



chjx

1. Right hand breather hose
2. Left hand breather hose

12. Disconnect the electrical connections to the fuel level sender and the fuel pump.

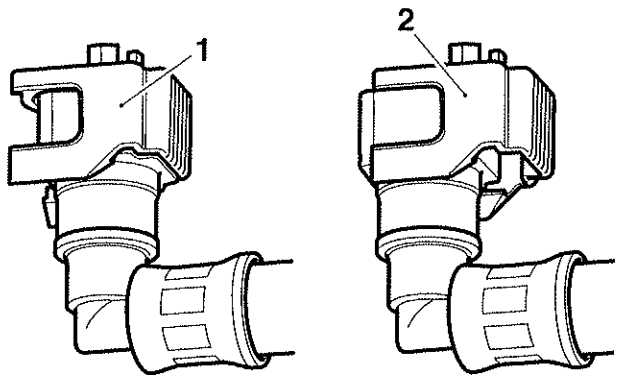


1. **Fuel pump connection**
2. **Fuel gauge connection**

Note:

- **Because fuel stored in the fuel rail will be at 3.5 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the fuel rail takes place. To reduce pressure, briefly crank the engine with the fuel pump disconnected.**
- **When disconnected, the fuel tank is self-sealing but a small amount of fuel may dribble from the hose.**
- **To protect the components under the fuel tank, place suitable material over the components to absorb the small amount of fuel that may come from the fuel tank and its fuel lines.**

13. Briefly crank the engine to reduce the fuel pressure the fuel rail.
14. Disconnect the battery, negative (black) lead first.
15. Ease the latch away from the fuel connector until the release buttons are exposed.



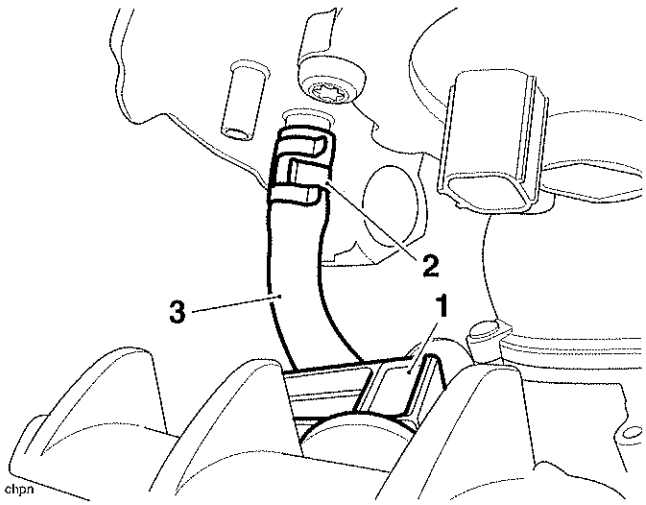
1. **Locked position**
2. **Unlocked position**

16. Disconnect the fuel hose by squeezing the sides of the connector and pulling the hose free from the spigot.

Note:

- **Use a suitable wooden block to support the rear of the fuel tank when fitting a fuel clamp to the rear transfer pipe and removing/fitting the transfer pipe to the fuel tank.**

17. Raise the rear of the fuel tank and using one of the fuel clamps from the service kit Fuel Hose Clamp T3880630, clamp the fuel transfer pipe. Ensure there is enough space to move the clip off the spigot.



1. **Fuel Hose Clamp T3880630**
2. **Clip**
3. **Fuel transfer pipe**

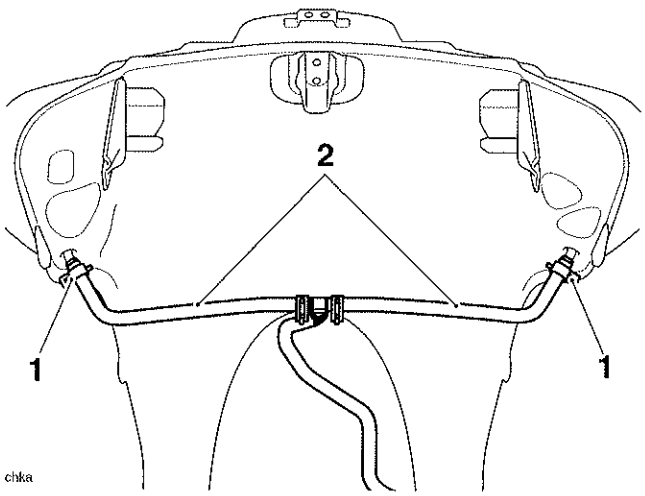
18. Release the clip and detach the transfer pipe from the spigot. At the same time fit a cap, from the service kit Blanking Cap T3880631, to the fuel tank spigot.

Caution

To prevent damage to the radiator fins, ensure that the fuel line clamp is positioned such that it will not contact the radiator while fitting/removing the clamp or removing/fitting the fuel transfer pipes.

Damaged radiator fins may impair the radiator's cooling efficiency.

19. Using the clamps from the service kit Fuel Hose Clamp T3880630, clamp the transfer pipe at the two front spigots. Ensure there is enough space to move the clip off the spigot.
20. Release the clip and detach one of the transfer pipes from the front spigot. At the same time fit a cap, from the service kit Blanking Cap T3880631, to the fuel tank spigot.
21. Repeat step 19 for the other front spigot.



1. **Clips**
2. **Fuel transfer pipe**

22. Raise the rear of the fuel tank and carefully slide the fuel tank rearwards to release its front mountings. Place the fuel tank onto a clean flat surface ensuring that the spigots and their caps do not make contact with the flat surface.

Caution

When the fuel tank has been removed from the motorcycle, the fuel clamps must be removed from the transfer pipe and the fuel drained into a suitable fuel container.

Keeping the fuel clamps on the transfer pipe for long periods of time may deform the fuel transfer pipe.

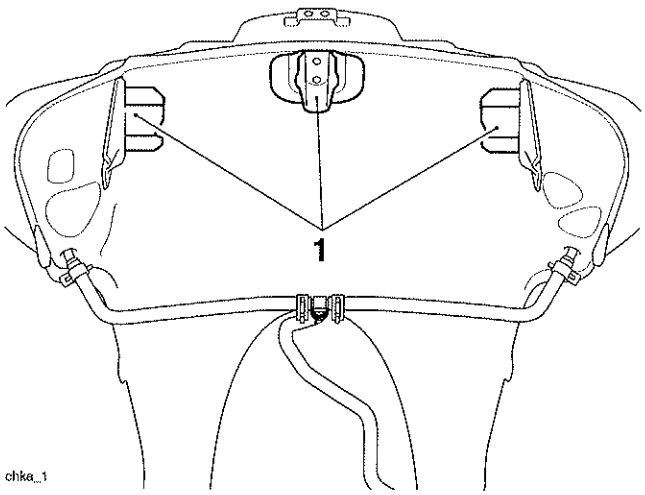
23. Remove the fuel line clamps from the transfer pipe and drain any fuel into an approved fuel container.

Installation

Note:

- **Due to the shape of the fuel tank, a small amount of fuel may remain in the fuel tank after using a proprietary pump for removing fuel.**

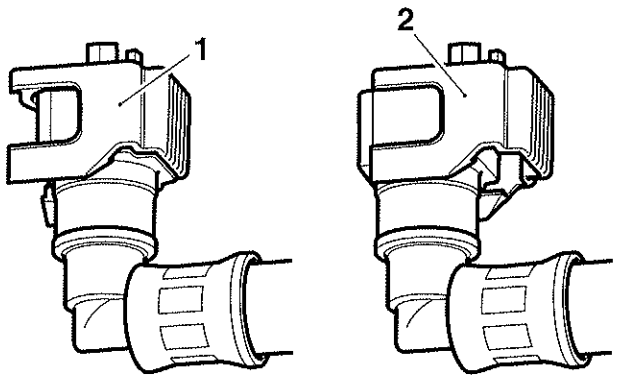
1. Prior to fitting the fuel tank, drain any remaining fuel that may be in the fuel tank using proprietary professional automotive workshop equipment approved for fuel handling.
2. Refit the fuel line clamps to the three ends of the fuel transfer pipe.
3. Align the three front mountings on the fuel tank to their rubber mountings on the frame and push forward until fully engaged.



1. **Front mountings**

4. Remove the blanking cap from one of the front spigots. At the same time, refit the front fuel transfer pipe to the spigot and secure with its clip.
5. Repeat step 4 for the other front fuel transfer pipe.
6. Remove the fuel line clamps from the two front transfer pipes.
7. Pivot the fuel tank upwards at the rear and carry out the following:
   - remove the blanking cap from the rear spigot. At the same time, refit the rear fuel transfer pipe to the spigot and secure with its clip;
   - remove the fuel line clamp from the rear fuel transfer pipe;
   - fit the two breather pipes as noted for removal;
   - fit the fuel pump and fuel level sensor electrical connectors;
   - reconnect the fuel feed hose by gently pushing inwards until the hose engages with a click.

8. Slide the double check-latch down (i.e. towards the spigot) until the release buttons of the fuel connector are covered. If the latch will not slide into position, then the fuel hose is not fully home on its spigot and must therefore be refitted correctly.
9. Remove the covering used to cover the components under the rear of the fuel tank.
10. Lower the rear of the fuel tank onto the frame, fit the two fixings and tighten to **12 Nm**.
11. Check to ensure that the latch on the connector to the fuel pump is in the locked position.



1. Locked position
2. Unlocked position

12. Using proprietary professional automotive workshop equipment approved for fuel handling, refill the fuel tank.
13. Check carefully for fuel leaks around the fuel transfer pipes.
14. Reconnect the battery, positive (red) lead first.
15. Start the engine and check carefully for fuel leaks. Rectify as necessary.
16. Refit the seat infill panels (see page *17-26*).
17. Refit the side fairings (see page *17-24*).
18. Refit the radiator infill panels (see page *17-22*).
19. Refit the fuel tank infill panels (see page *17-23*).
20. Refit the rider's seat (see page *17-16*).

Fuel Pump and Filter Assembly

Removal

Note:

- **The fuel pump and filter assembly is a sealed for life unit and must be replaced as a complete assembly.**
- **The fuel tank must be drained of fuel prior to its removal from the motorcycle.**

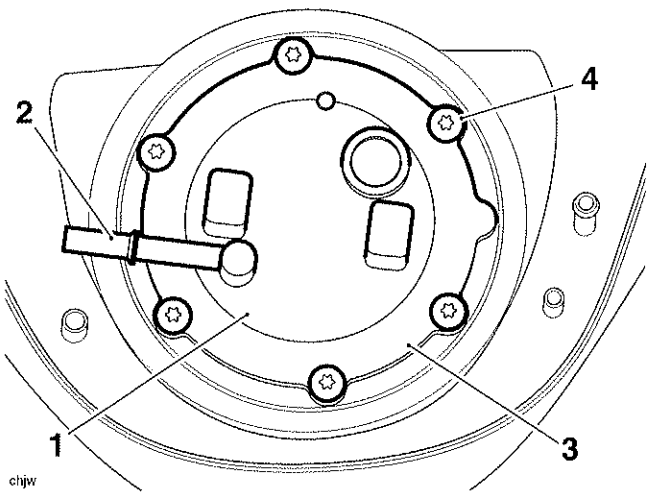
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).

⚠ 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.

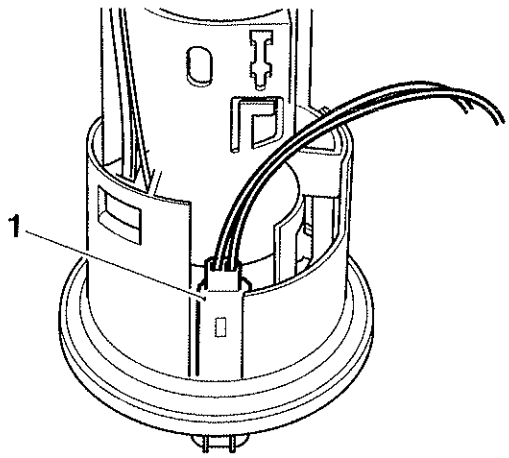
4. Invert the fuel tank and place on a protective surface to prevent paint damage.
5. Remove the fixings securing the fuel pump mounting plate to the tank. Remove the plate.



1. Fuel pump
2. Fuel pump spigot
3. Mounting plate
4. Mounting plate fixings

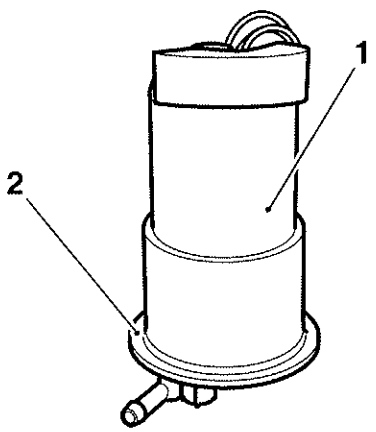
6. Lift the fuel pump and filter assembly and manoeuvre it from the fuel tank aperture.

7. Disconnect the fuel level sensor electrical connector and remove the fuel pump and filter assembly.



1. Fuel level sensor electrical connector

8. Noting its orientation, remove and discard the sealing ring from the fuel pump assembly.

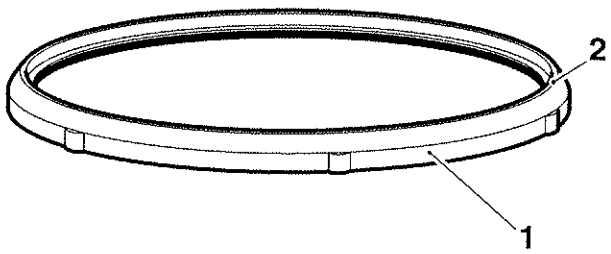


ccxh

1. Fuel pump and filter assembly
2. Sealing ring location

Installation

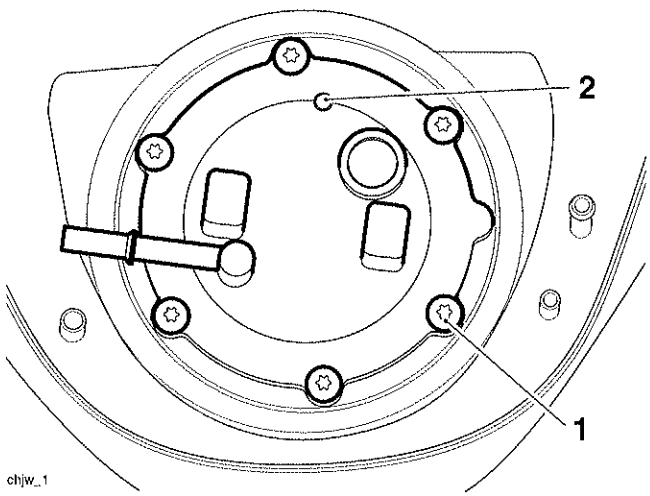
1. Install a new sealing ring into the fuel pump assembly, with the seal lip facing uppermost, and ensure that it is correctly seated.



fva

1. Sealing ring
2. Seal lip

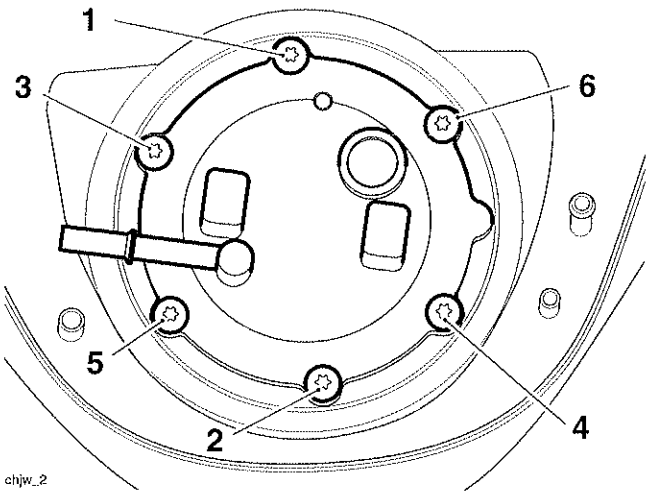
2. Taking care to ensure the sealing ring is not damaged or dislodged, manoeuvre the fuel pump assembly into the tank aperture.
3. Reconnect the fuel level sensor electrical connector and locate the fuel pump and filter assembly.
4. Ensure the locating peg on the fuel pump assembly is located in the cut out on the mounting plate and the offset hole is positioned as shown below.



chjw_1

1. Offset hole position
2. Locating peg

5. Tighten the fixings in the sequence shown below to **9 Nm**.



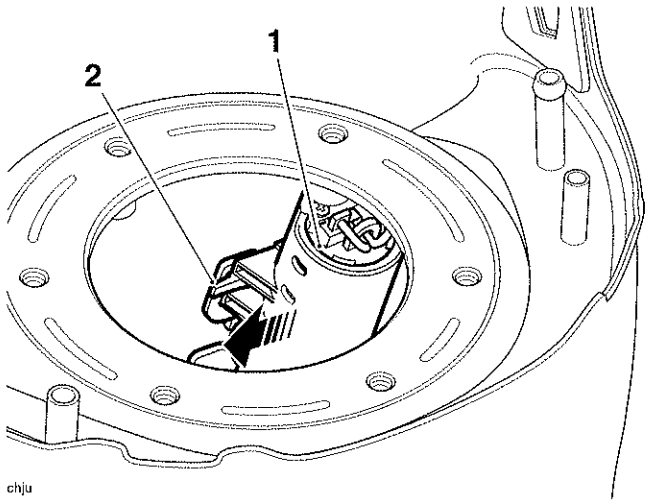
Pump Mounting Plate Torque Sequence

6. Refit the fuel tank (see page *10-119*).
7. Reconnect the battery, positive (red) lead first.
8. Start the engine and check carefully for fuel leaks. Rectify as necessary.
9. Refit the rider's seat (see page *17-16*).

Fuel Level Sender Assembly/Float Replacement

Removal

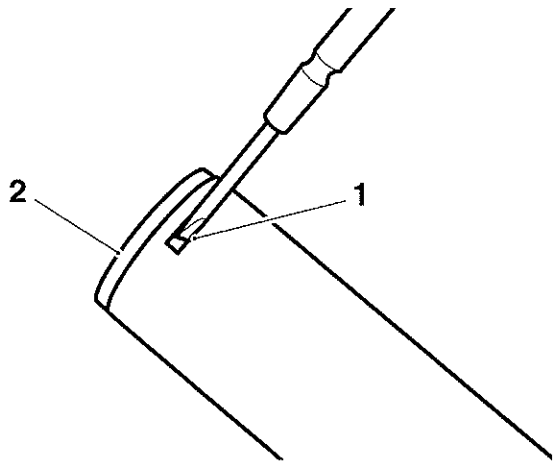
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel pump and filter assembly (see page *10-120*).
4. Release the locking device and slide the bottom of the level sender to the fuel tank opening. Withdraw from the tank and allow any remaining fuel to drain into a suitable container.



1. **Fuel level sensor**
2. **Locking device**

Float Replacement

1. Insert a small screwdriver into one of the tabs at the top of the float assembly and gently prise the lid free.

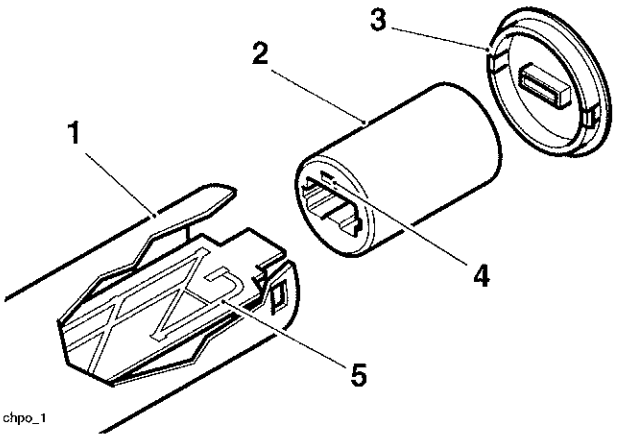


1. **Tab**
2. **Lid**

2. Invert the assembly and allow the float unit to slide free.
3. Discard the old float unit.
4. Insert the new float unit in the orientation shown below ensuring the magnet cover on the face of the unit faces towards the bottom of the support tube.

Note:

- **It is possible to fit the float unit upside down. An incorrect fuel level reading will be indicated during motorcycle operation if the float unit is fitted upside down.**

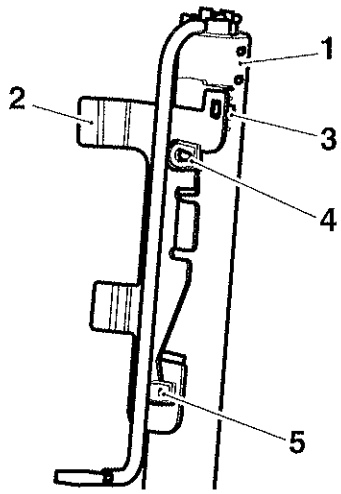


1. **Support tube**
2. **Float unit**
3. **Lid**
4. **Magnet cover**
5. **Slider**

5. Refit the lid ensuring the tabs on the lid locate correctly with the cut-outs in the top of the support tube.

Installation

1. Align the lower lug first to the bracket then the upper lug. Ensure that the locking device is fully engaged to the bracket and is secure.



1. **Level sender**
2. **Bracket, inside fuel tank**
3. **Locking device**
4. **Upper lug**
5. **Lower lugs**

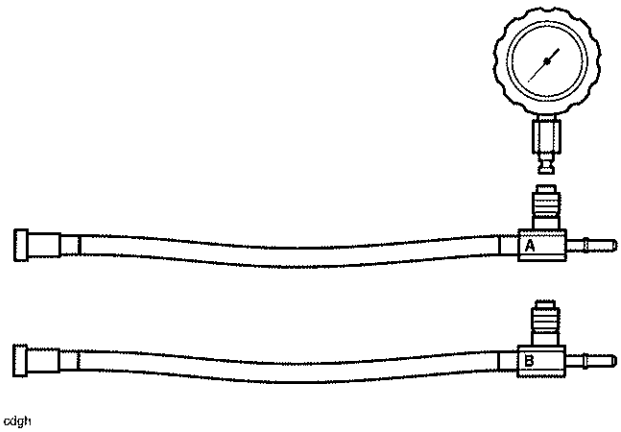
2. Refit the fuel pump and filter assembly (see page *10-121*).
3. Refit the fuel tank (see page *10-119*).
4. Reconnect the battery, positive (red) lead first.
5. Start the engine and check carefully for fuel leaks. Rectify as necessary.
6. Refit the rider's seat (see page *17-16*).

Fuel Pressure Checking

Warning

Observe the fuel handling precautions given in the general information system.

Fuel pressure is checked using service tool Fuel Pressure Gauge T3880001.



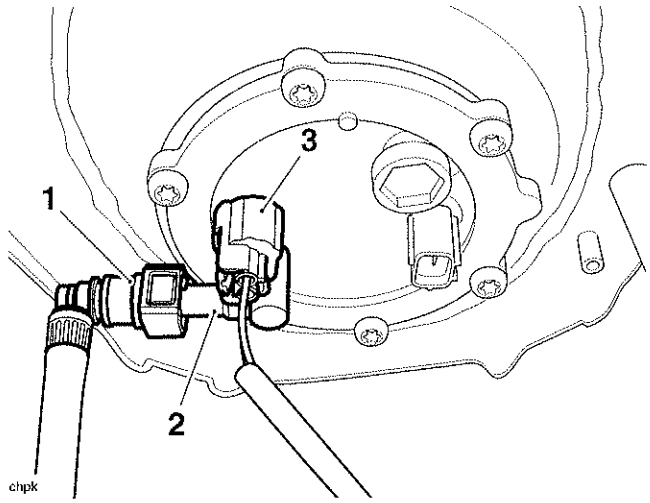
Fuel Pressure Gauge T3880001

1. Remove the fuel tank (see page *10-117*) and place on a suitable support, close to the motorcycle.
2. Using the Extension Cable T3880123, carefully connect the fuel pump connection on the main harness to the fuel tank. Connect the other end of the extension cable to the motorcycle main harness.
3. Select the fuel pressure gauge adapter marked 'B' from service tool Fuel Pressure Gauge T3880001.

Warning

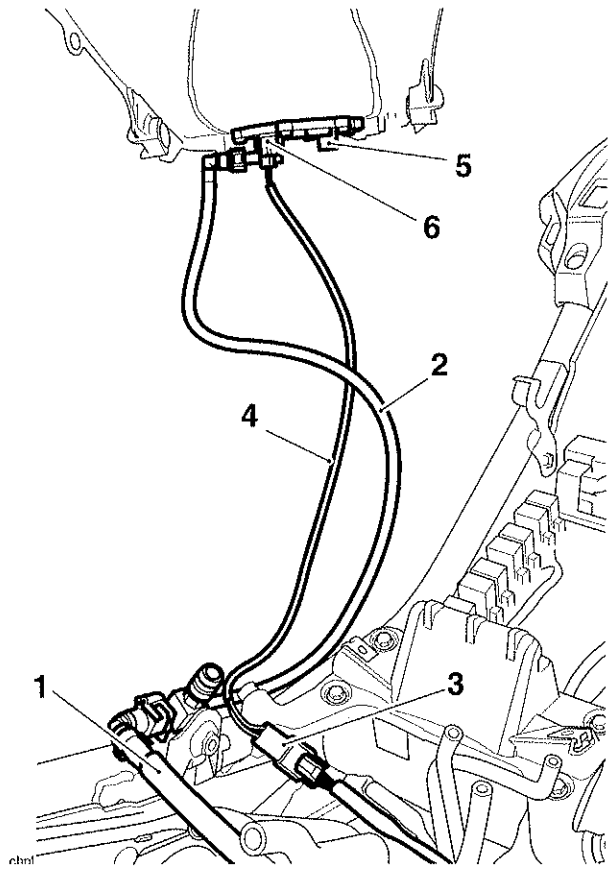
Always use the correct fuel pressure gauge adapter **(adapter 'B' for Tiger Explorer)**. Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

4. Connect the adapter hose to the fuel pump plate outlet as shown in the illustration below.



1. **Adaptor hose 'B'**
2. **Fuel pump plate outlet**
3. **Extension Cable T3880123**

5. Connect the adapter between the fuel pump plate outlet and fuel hose as shown in the illustration below. Insert the gauge to the adapter also as shown in the illustration.



1. **Motorcycle fuel hose**
2. **Adaptor hose 'B'**
3. **Fuel pump connection**
4. **Extension Cable T3880123**
5. **Fuel pump connection**
6. **Fuel pump plate outlet**

Note:

- **To release the fuel pressure gauge from the adapter, slide the outer ferrule downwards. This will allow the gauge to spring upwards from the adapter.**
- **To insert the gauge to the adapter, push the gauge spigot into the adapter until a click can be heard.**

6. Ensure the gauge is visible to the side of the motorcycle.
7. Using proprietary professional automotive workshop equipment approved for fuel handling, partially refill the fuel tank with the fuel removed earlier.
8. Reconnect the battery, positive (red) lead first.
9. Start the engine and observe the fuel pressure reading on the gauge.

Note:

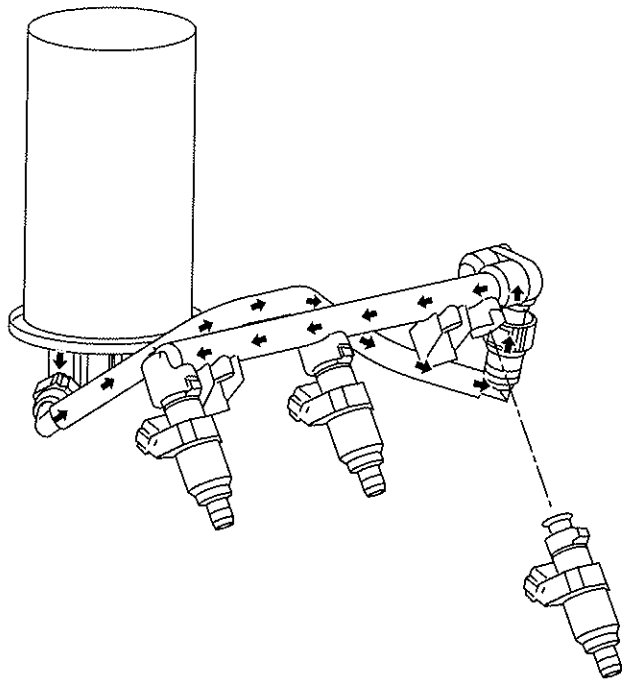
- **The fuel pressure should be 3.5 bar nominally.**

10. When fuel pressure checking is complete, turn the ignition to the OFF position, disconnect the fuel pressure gauge adapter and wiring extension.
11. Using proprietary professional automotive workshop equipment approved for fuel handling, drain any remaining fuel from the fuel tank.
12. Disconnect the battery, negative (black) lead first.
13. Refit the fuel tank (see page *10-119*).

Fuel Delivery System

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

Incorporated in the fuel pump assembly is a filter, a pressure regulator and a pick-up strainer.

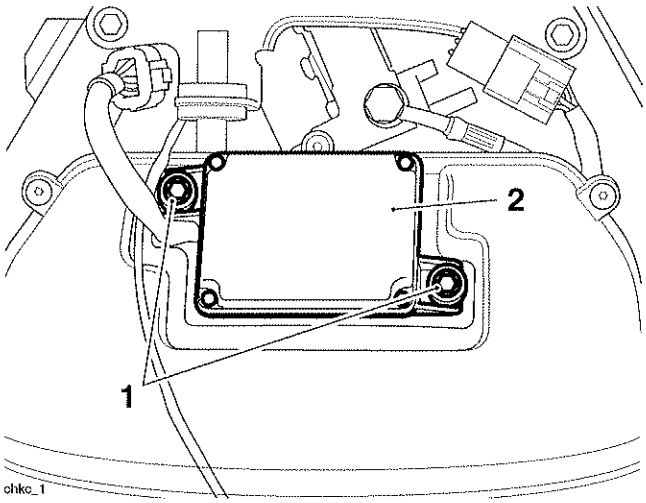


Direction of Fuel Flow

Airbox

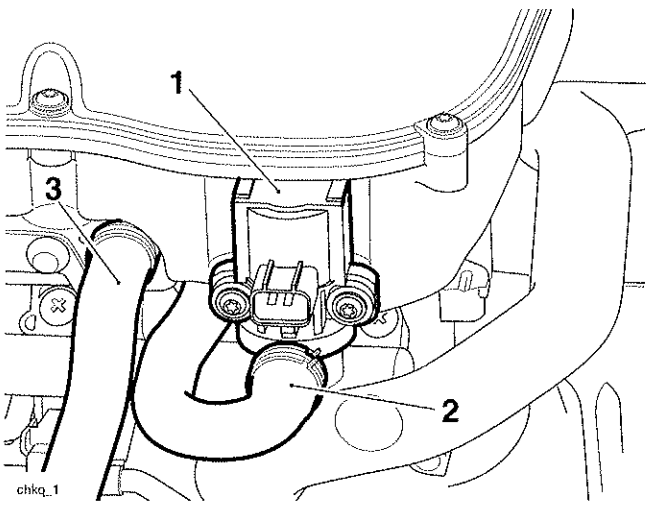
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the fixings and detach the immobiliser/ TPMS control module from the airbox.



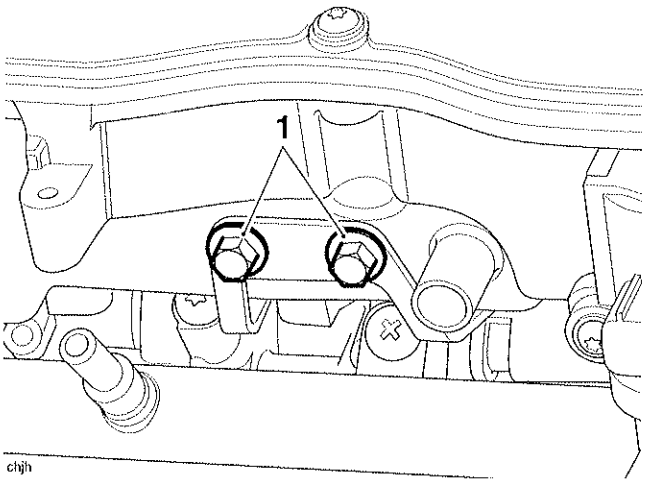
1. Fixings
2. Immobiliser/TPMS control module

5. Disconnect the following multi-plugs from the:
   - air temperature sensor,
   - secondary air injection control valve.
6. Disconnect the hose from the secondary air injection control valve.
7. Disconnect the breather drain hose from the rear of the airbox.



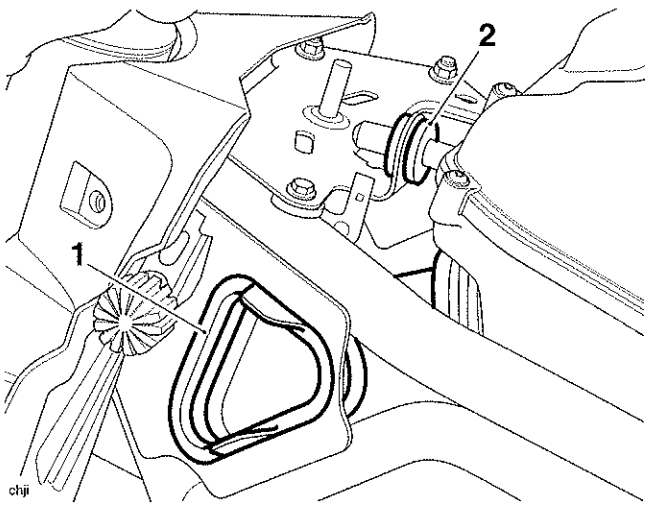
1. Secondary air injection control valve
2. Hose
3. Breather drain hose

8. Remove the MAP sensor (see page *10-130*).
9. Remove the rear fixings of the airbox.



1. Fixings

10. Gently lift the rear of the airbox to release it from the throttle bodies.
11. Detach the air intake duct from the frame and slide the airbox rearwards to release it from its front mounting for complete removal.



1. Air intake duct
2. Front mounting

Inspection

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

Installation

1. Position the airbox to its forward mounting and push home.
2. Refit the air intake duct to the frame.
3. Press down on the rear of the airbox to locate the intake rubbers to the throttle bodies.

⚠ Caution

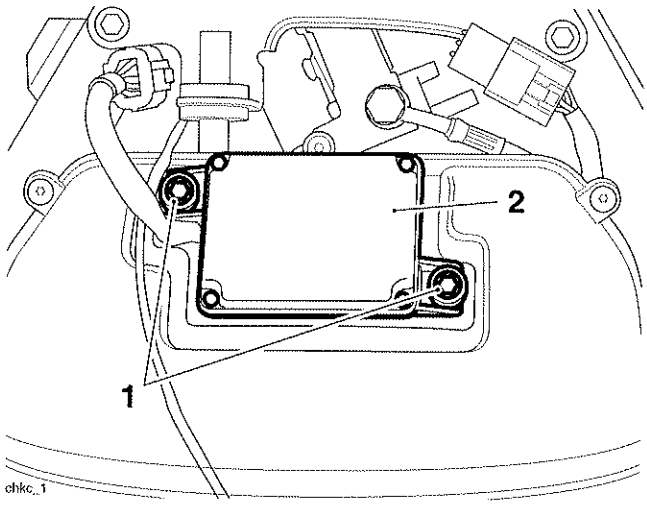
Always ensure that all 3 intake rubbers seal to the throttles through 360° as poor performance and lack of power can result from incorrect sealing.

4. Fit and tighten the airbox rear fixings to **5 Nm**.
5. Fit the breather drain hose to the rear of the airbox.
6. Reconnect the hose to the secondary air injection control valve.
7. Connect the following multi-plugs to the:
   - air temperature sensor,
   - immobiliser/tyre pressure monitoring system module,
   - secondary air injection control valve.
8. Refit the MAP sensor (see page *10-130*).
9. Fit the security bracket for the immobiliser/tyre pressure monitoring system connector and tighten its fixings to **12 Nm**.
10. Refit the fuel tank (see page *10-119*).
11. Reconnect the battery, positive (red) lead first.
12. Refit the rider's seat (see page *17-16*).

Air Filter Element

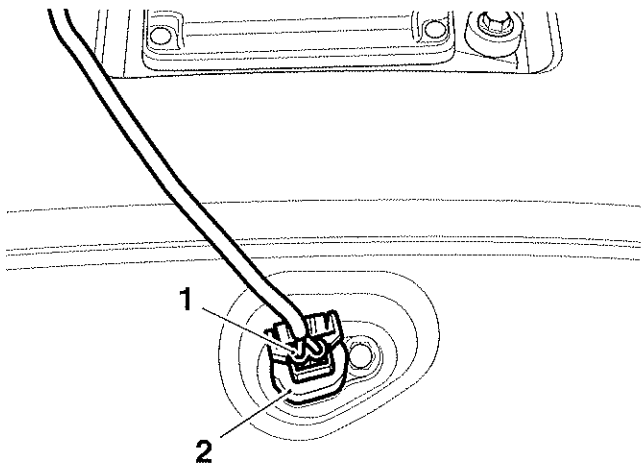
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the fixings and detach the immobiliser/ TPMS control module from the airbox.



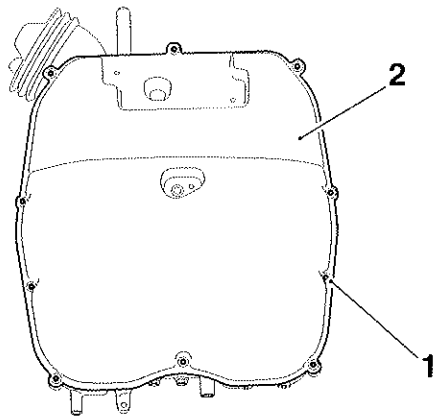
1. Fixings
2. Immobiliser/TPMS control module

5. Disconnect the multi-plug from the air temperature sensor.



1. Multi-plug
2. Air temperature sensor

6. Release the ten fixings and remove the airbox upper section.

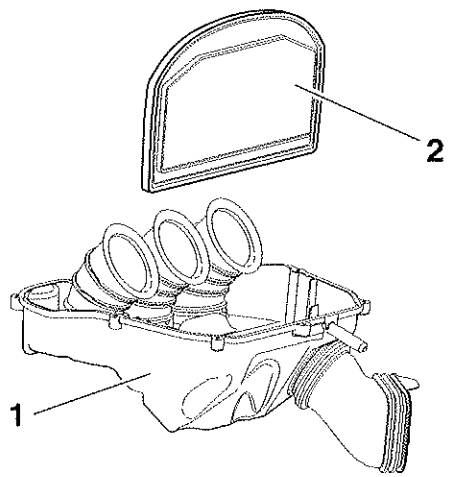


1. **Fixings**
2. **Airbox upper section**

Note:

- **Note the orientation of the air filter for installation.**

7. Lift the air filter out of the airbox lower section.



1. **Airbox lower section**
2. **Air filter element**

Installation

1. Thoroughly clean the inside and outside of the airbox.

Note:

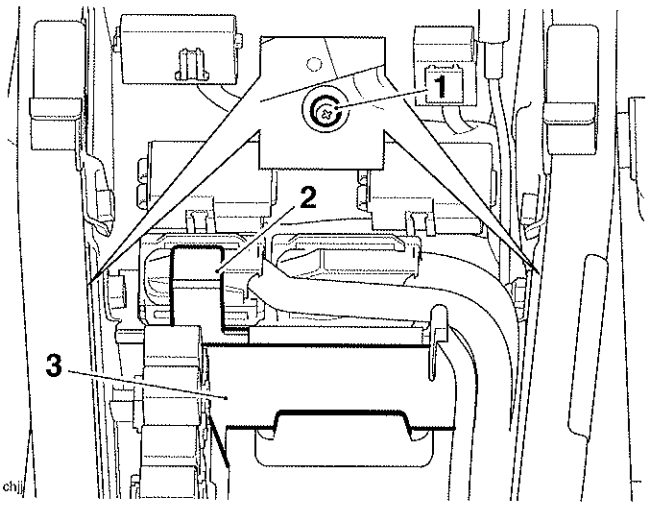
- **The air filter will only fit one way, do not force fit the air filter element.**

2. Fit the air filter element into the airbox lower section as noted for removal.
3. Refit the airbox upper section and tighten the fixings to **3 Nm**.
4. Reconnect the multi-plug to the air temperature sensor.
5. Reconnect the multi-plug for the immobiliser/TPMS control module to the main harness.
6. Refit the fuel tank (see page *10-119*).
7. Reconnect the battery, positive (red) lead first.
8. Refit the rider's seat (see page *17-16*).

Engine Control Module (ECM)

Removal

1. Turn the ignition to the OFF position and wait at least 1 minute for the ECM to complete its power down sequence.
2. Remove the rider's seat (see page *17-16*).
3. Disconnect and remove the battery (see page *18-8*).
4. If fitted, remove and discard the screws for the ECM security bracket. Retrieve the washers, left hand domed nut and remove the bracket.



chj

1. **Screw**
2. **Security clamp**
3. **ECM**

5. Disconnect the two electrical connectors from the ECM (see page *10-41*).
6. Remove the ECM from the under seat tray.

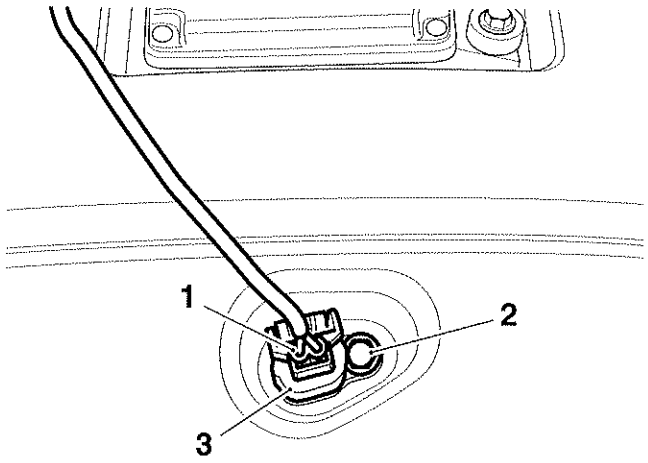
Installation

1. Fit the ECM into the under seat tray.
2. Fit the two connectors to the ECM (see page *10-42*).
3. If removed, refit the ECM security bracket and tighten its new screws to **7 Nm**.
4. Refit and connect the battery (see page *18-8*).
5. Refit the rider's seat (see page *17-16*).
6. If a new ECM is fitted it will need to be paired with the immobiliser/TPMS control module as described in the Safety/Security section of the Triumph diagnostic software.

Intake Air Temperature Sensor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Disconnect the multi-plug from the air temperature sensor.



chkb

1. **Multi-plug**
2. **Fixing**
3. **Air temperature sensor**

5. Release the fixing and remove the sensor from the airbox.

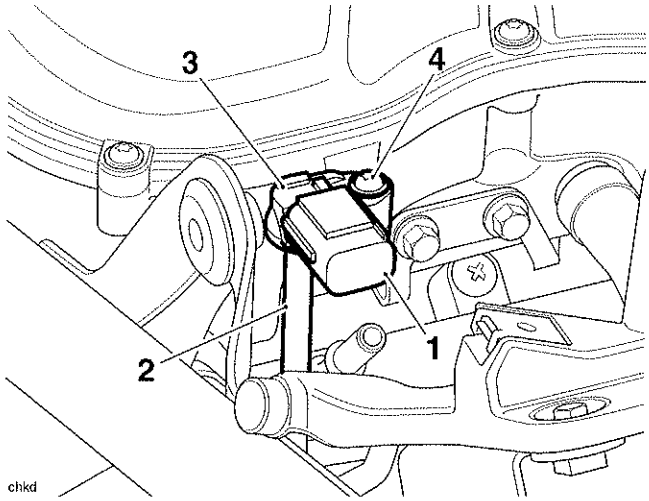
Installation

1. Fit the air temperature sensor to the airbox and tighten its fixing to **4 Nm**.
2. Connect the air temperature sensor multi-plug.
3. Refit the fuel tank (see page *10-119*).
4. Reconnect the battery, positive (red) lead first.
5. Refit the rider's seat (see page *17-16*).

MAP Sensor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Disconnect the multi-plug from the MAP sensor.
5. Release the fixing securing the sensor to the airbox.
6. Raise the sensor, disconnect the air hose and remove the sensor.



1. **Multi-plug**
2. **Air hose**
3. **MAP sensor**
4. **Fixing**

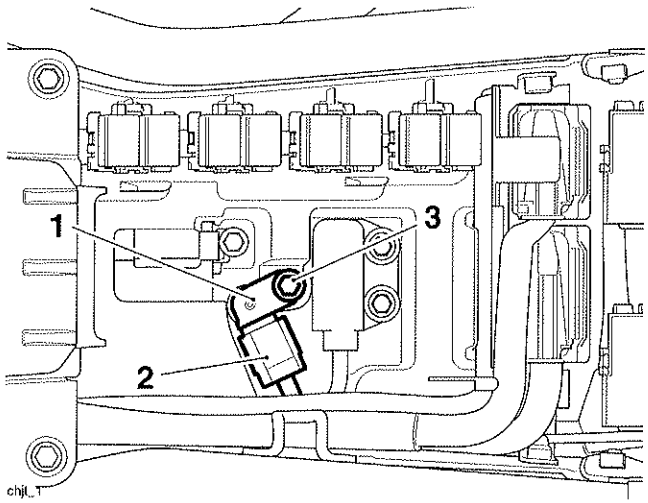
Installation

1. Refit the air hose.
2. Fit the sensor to the airbox, and its fixing to **2 Nm**.
3. Reconnect the multi-plug.
4. Refit the fuel tank (see page *10-119*).
5. Reconnect the battery, positive (red) lead first.
6. Refit the rider's seat (see page *17-16*).

Barometric Pressure Sensor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect and remove the battery (see page *18-8*).
3. Release the fixing, disconnect the multi-plug from the barometric pressure sensor and remove the sensor.



1. **Barometric pressure sensor**
2. **Multi-plug**
3. **Fixing**

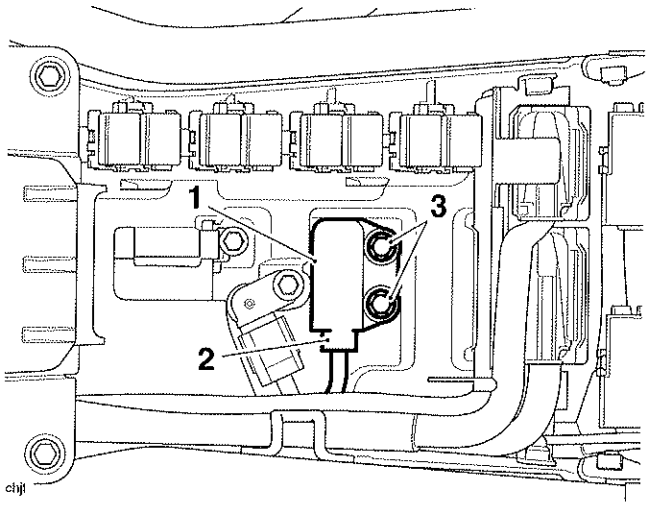
Installation

1. Reconnect the multi-plug.
2. Fit the sensor and tighten its fixing to **6 Nm**.
3. Refit and connect the battery (see page *18-8*).
4. Refit the rider's seat (see page *17-16*).

Fall Detection Switch

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect and remove the battery (see page *18-8*).
3. Release and discard the screws securing the switch to the mounting bracket.
4. Disconnect the fall detection switch multi-plug and remove the switch.



1. **Fall detection switch**
2. **Multi-plug**
3. **Screws**

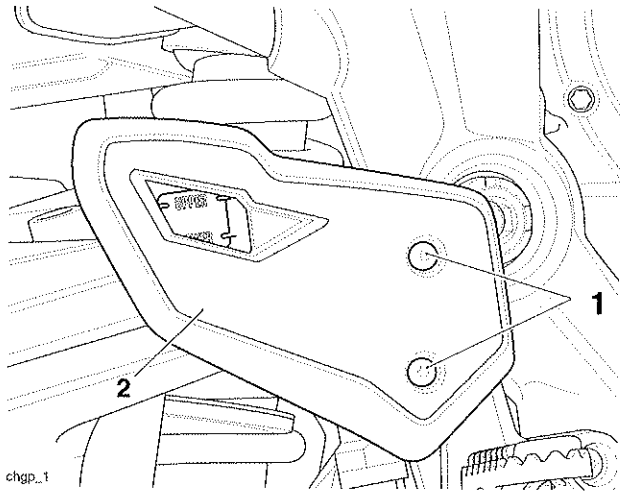
Installation

1. Connect the fall detection switch multi-plug.
2. Fit the fall detection switch to the under seat tray, fit new fixings and tighten to **3 Nm**.
3. Refit and connect the battery (see page *18-8*).
4. Refit the rider's seat (see page *17-16*).

Roll Over Valve

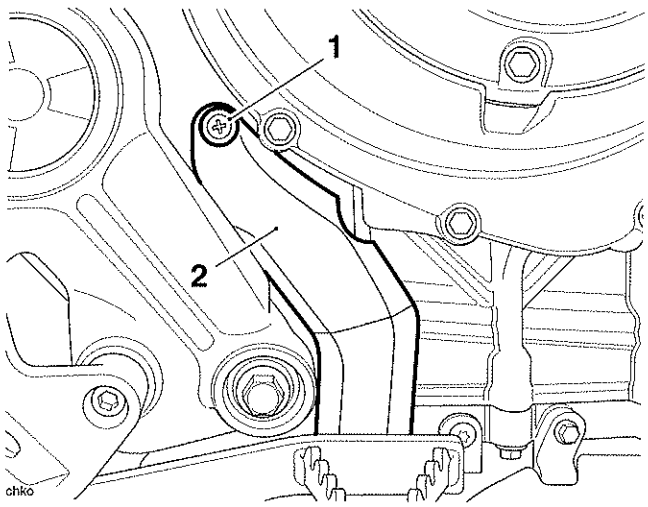
Removal

1. Remove the rider's seat (see page *17-16*).
2. Remove the fuel tank (see page *10-117*).
3. Remove the airbox (see page *10-126*).
4. Release the fixings and remove the right hand heel guard.



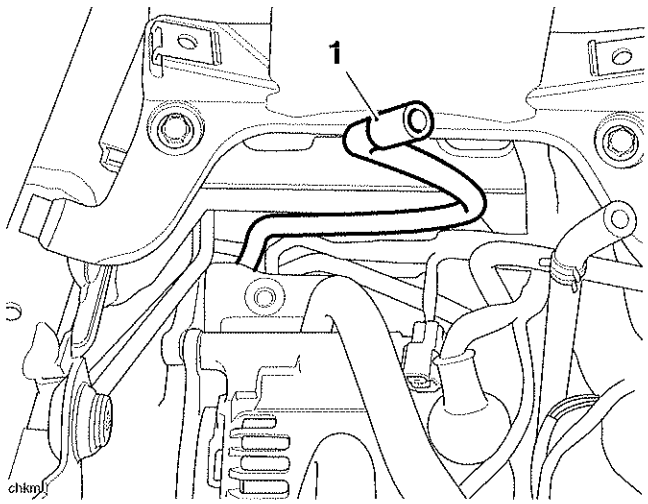
1. **Fixings**
2. **Heel guard**

5. Release the scrivet and remove the upper part of the sump's cable tidy.



1. **Scrivet**
2. **Cable tidy, upper**

6. From the top of the motorcycle, follow the route of the hose to the roll over until near the top of the crankcase tidy. Then gently push the hose towards the rear of the motorcycle to release the roll over valve from the crankcase tidy.

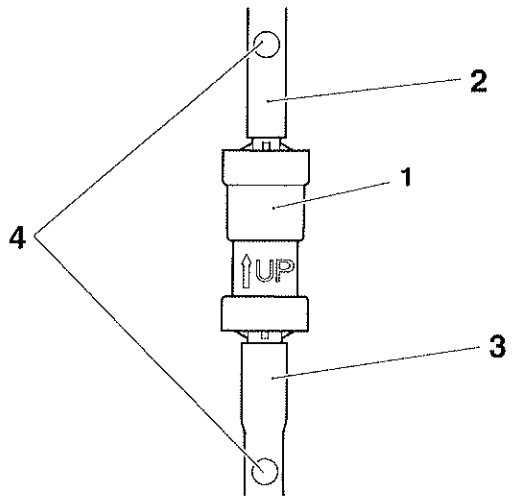


1. **Hose to roll over valve**

Note:

- **The hoses connected to the roll over valve are marked with a white spot. When correctly fitted and in the crankcase tidy, these spots will face the rear of the motorcycle.**

7. From the right hand side of the motorcycle, manoeuvre the roll over valve out, disconnect the two hoses and remove the roll over valve.



1. **Roll over valve**
2. **Hose, from fuel tank**
3. **Hose, to atmosphere**
4. **White spots**

Installation

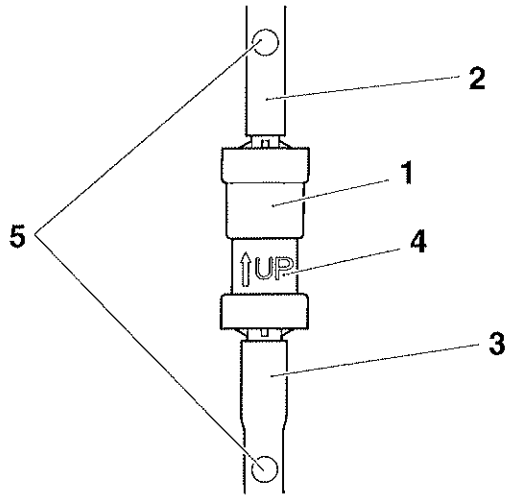
Caution

The roll over valve must be fitted in the correct orientation. An inverted roll over valve will prevent the fuel tank from breathing causing engine running problems and possible fuel tank damage.

Note:

- **To ensure that the roll over valve is correctly orientated when fitted, ensure that the arrow and UP embossed on it is pointing upwards.**

1. Reconnect the hoses to the roll over valve as noted for removal. Ensure the arrow is pointing upwards.



1. **Roll over valve**
2. **Hose, from fuel tank**
3. **Hose, to atmosphere**
4. **Arrow and UP**
5. **White spots**

2. Carefully attach the roll over valve to the crankcase tidy. Ensure that the hoses are also secured by the crankcase tidy and the white spots are facing the rear of the motorcycle.
3. Refit the heel guard and tighten its fixings to **7 Nm**.
4. Refit the upper part of the sump's cable tidy.
5. Refit the airbox (see page *10-127*).
6. Refit the fuel tank (see page *10-119*).
7. Reconnect the battery, positive (red) lead first.
8. Fit the rider's seat (see page *17-16*).

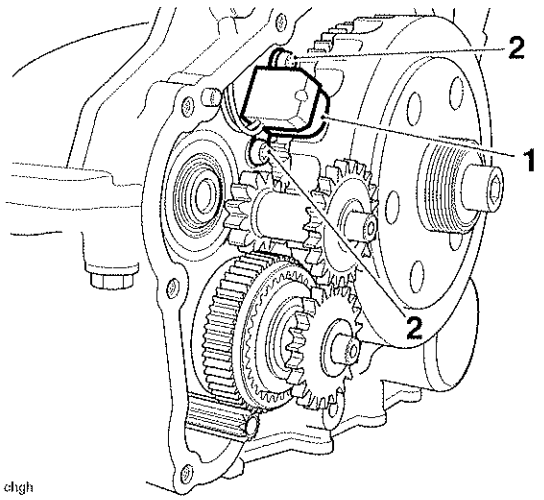
Crankshaft Position Sensor

Note:

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

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the coolant expansion tank (see page *11-14*).
4. Remove the flywheel cover (see page *5-19*).
5. Remove and discard the two fixings securing the sensor to the crankcase.



chgh

1. **Sensor**
2. **Fixings**

6. Disconnect the sensor multi-plug.
7. Detach the harness grommet from the opening in the crankcase.
8. Remove the crankshaft position sensor, detaching the harness from the crankcase retaining pegs as you do so.

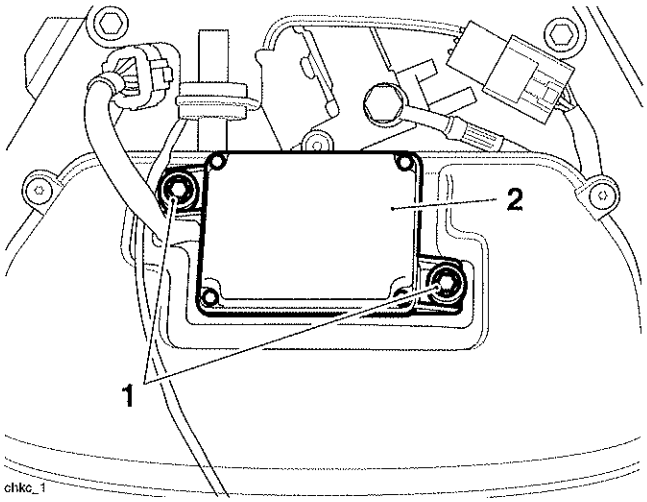
Installation

1. Refit the crankshaft position sensor. Fit and tighten new fixings to **6 Nm**.
2. Reconnect the sensor multi-plug.
3. Refit the harness grommet to the crankcase opening.
4. Refit the harness to the retaining pegs on the crankcase.
5. Refit the coolant expansion tank (see page *11-15*).
6. Reconnect the battery, positive (red) lead first.
7. Refit the rider's seat (see page *17-16*).

Immobiliser/TPMS Control Module

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the fixings and detach the immobiliser/TPMS control module from the airbox.



chkc_1

1. **Fixings**
2. **Immobiliser/TPMS control module**

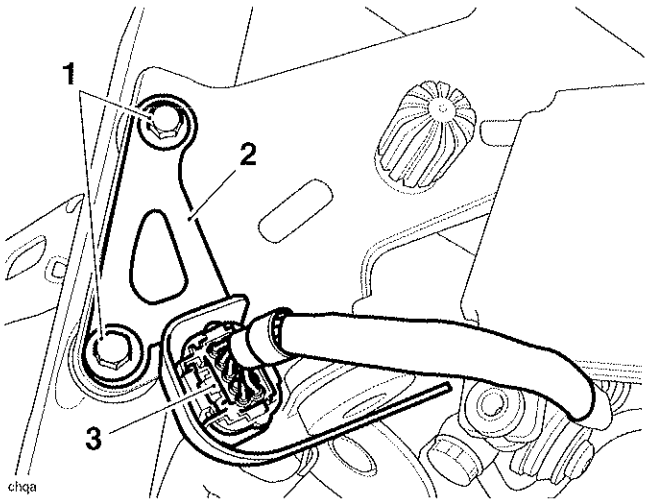
Models with the Security Bracket Fitted

Note:

- **Some models may be fitted with a security bracket around the multi-plug for the immobiliser/TPMS control module.**
- **For models with the security bracket fitted, continue from step 5.**
- **For models without the security bracket fitted, omit steps 5 and 6.**

5. Remove the airbox (see page *10-126*).

6. Release the fixings and remove the security bracket for the immobiliser/TPMS control module multi-plug.



1. **Fixings**
2. **Bracket**
3. **Multi-plug**

All Models

7. Disconnect the immobiliser/TPMS control module multi-plug from the main harness and remove the control module.

Installation

1. Connect the control module multi-plug to the main harness.

Note:

- **For models with the security bracket fitted, continue from step 2.**
- **For models without the security bracket fitted, omit steps 2 and 3.**

Models with the Security Bracket Fitted

2. Fit the security bracket for the immobiliser/TPMS control module multi-plug and tighten its fixings to **12 Nm**.
3. Fit the airbox (see page *10-127*).

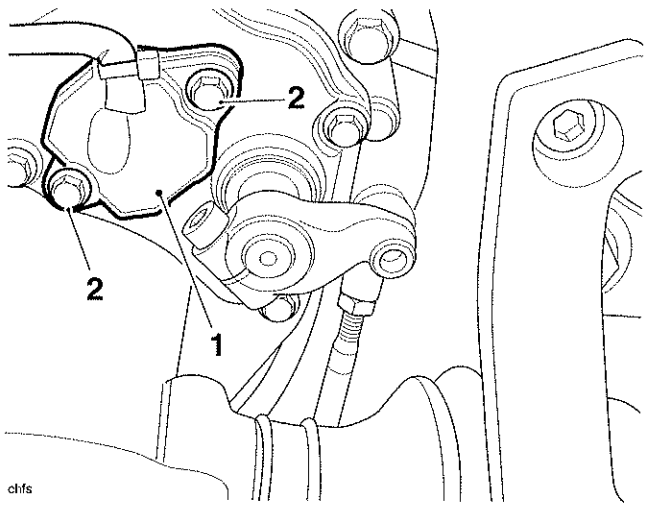
All Models

4. Fit the immobiliser/TPMS control module to the airbox and tighten its fixings to **2 Nm**.
5. Refit the fuel tank (see page *10-119*).
6. Reconnect the battery, positive (red) lead first.
7. If a new immobiliser/TPMS control module is fitted it must be paired with the following items as described in the Safety/Security section of the Triumph diagnostic software:
   - ECM;
   - Ignition keys for the motorcycle;
   - If fitted, the front and rear tyre pressure sensors.
8. Refit the rider's seat (see page *17-16*).

Gear Position Sensor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the coolant expansion tank (see page *11-14*).
4. Set the transmission in neutral.
5. Disconnect the gear position sensor electrical connector.
6. Remove the two fixings and remove the gear position sensor.



1. Gear position sensor
2. Fixings

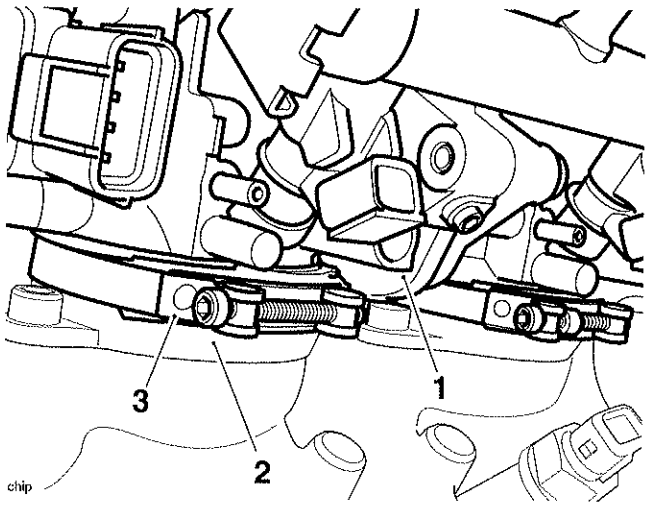
Installation

1. Install a new O-ring to the gear position sensor.
2. Position the gear position sensor to the selector cover, ensuring the pin on the sensor engages with the slot on the selector drum shaft.
3. Fit two new fixings and tighten to **5 Nm**.
4. Reconnect the electrical connector.
5. Refit the coolant expansion tank (see page *11-15*).
6. Reconnect the battery, positive (red) lead first.
7. Refit the rider's seat (see page *17-16*).

Throttle Bodies/Injectors

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the airbox (see page *10-126*).
5. Disconnect the throttle position sensor multi-plug.
6. Disconnect the throttle actuator motor multi-plug.
7. Disconnect the electrical connector from each injector.
8. Detach the MAP sensor hoses from the throttle bodies.
9. Release the clips securing the throttle bodies to the transition pieces.

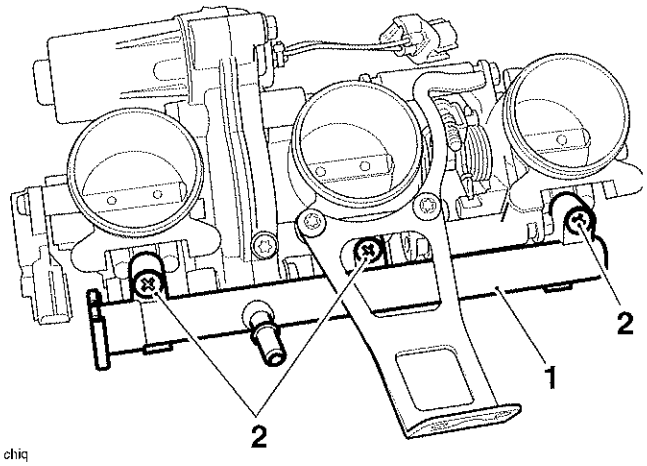


1. Throttle body
2. Transition piece (one per cylinder)
3. Clip (one per cylinder)

10. Remove the throttle bodies.

Disassembly

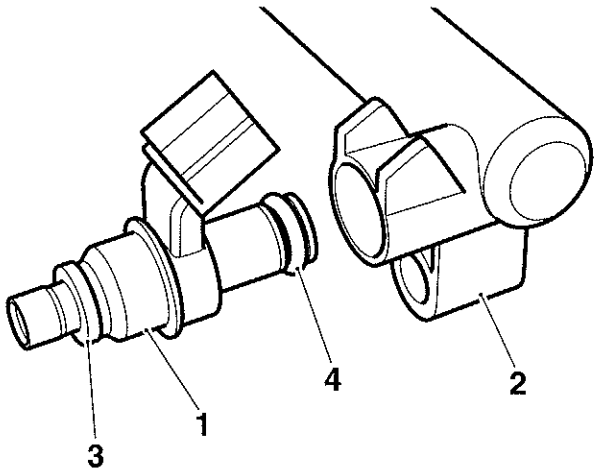
1. Release the fixings securing the fuel rail to the throttle bodies.



chiq

1. **Fuel rail**
2. **Fixings**

2. Ease the fuel rail and injectors from the throttle bodies.
3. To detach the injectors from the fuel rail, gently pull the injector out of the fuel rail using a twisting action.



chir

1. **Injector**
2. **Fuel rail**
3. **Injector front seal**
4. **Injector rear seal**

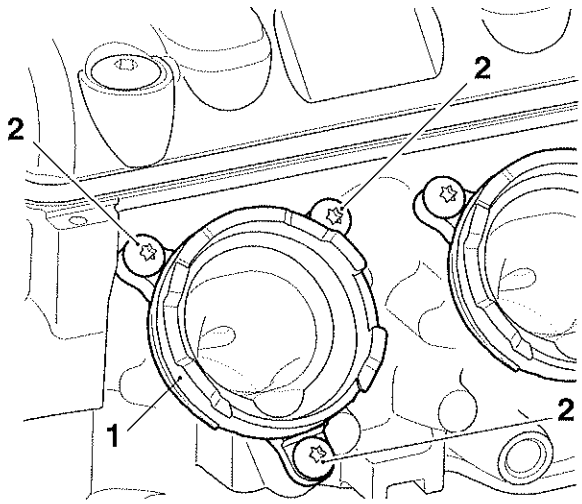
4. Discard the injector seals.
5. Release the fixings and remove the transition pieces.

Inspection

1. Check all joints and seals for splits, cuts and damage.
2. Check the throttles for sticking, loose or damaged throttle plates.

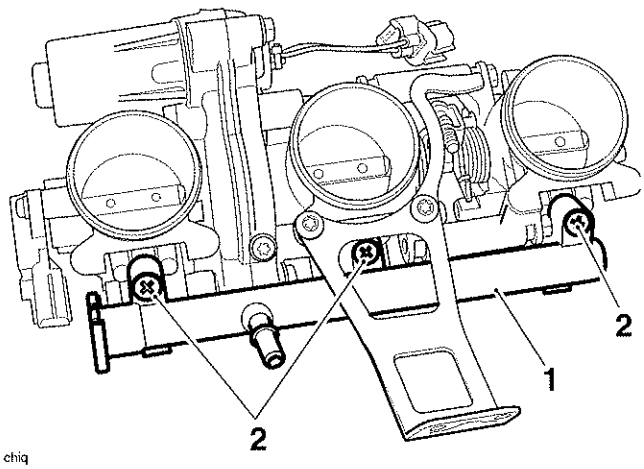
Assembly

1. Thoroughly clean the transition piece to cylinder head mating faces.
2. Refit the transition pieces to the head and tighten the fixings to **9 Nm**.



1. **Transition piece**
2. **Fixings**

3. Fit a new injector O-ring and seal to each injector.
4. Refit the injectors to the fuel rail using a twisting action.
5. Refit the injectors and fuel rail to the throttle bodies. Tighten the fuel rail fixings to **3.5 Nm**.



chiq

1. **Fuel rail**
2. **Fixings**

Installation

1. Refit the throttle bodies to the transition pieces and secure with clips. Tighten the clips to **1.5 Nm**.
2. Reconnect the electrical connector to each injector.
3. Reconnect the throttle control stepper motor.
4. Reconnect the throttle position sensor multi-plug.
5. Reconnect the MAP sensor hoses.
6. Refit the airbox (see page *10-127*).
7. Refit the fuel tank (see page *10-119*).
8. Reconnect the battery, positive (red) lead first.
9. Refit the rider's seat (see page *17-16*).

Warning

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

Note:

- **Resetting adaptions with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, leading to poor engine running. Always reset the adaptions with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well-ventilated area.**

10. Start the engine and allow to idle until the motorcycle has adapted (see page *10-140*).

Throttle Body Balancing

Note:

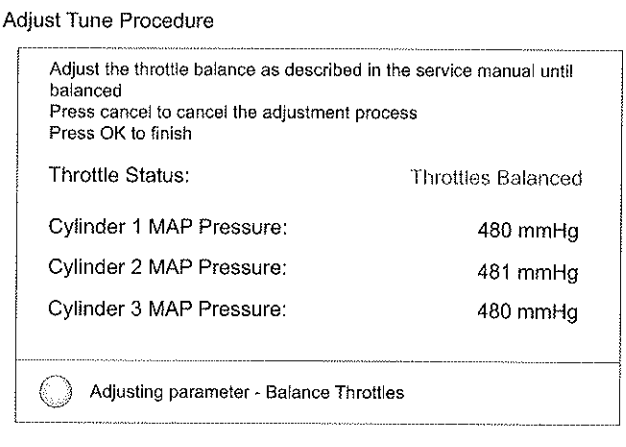
- **The throttles cannot be balanced using equipment to measure vacuum in each throttle. Instead, the Triumph diagnostic tool must be used.**

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the airbox (see page *10-126*).

Warning

If the engine has recently been running, the components beneath the fuel tank may be hot to the touch.

5. Temporarily refit the fuel tank and reconnect the fuel supply and fuel pump connection using tools Fuel Pressure Gauge T3880001 (minus the fuel pressure gauge) and Extension Cable T3880123 (see page *10-124*).
6. Using proprietary professional automotive workshop equipment approved for fuel handling, partially refill the fuel tank with the fuel removed earlier.
7. Temporarily reconnect the battery, positive (red) lead first.
8. Attach exhaust extraction hoses to the silencers.
9. Attach the Triumph diagnostic tool, start the engine and navigate to ADJUST TUNE (see page *10-27*).
10. Select BALANCE THROTTLES.



Balance Throttles Screen

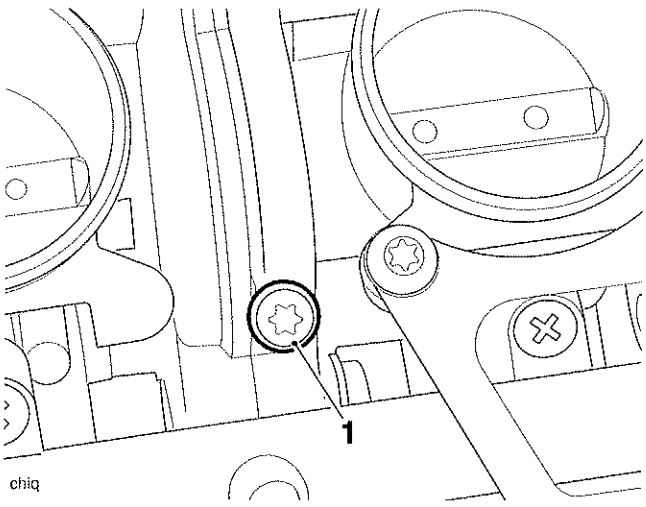
Note:

- **The balance throttles screen shows the vacuum value of each throttle in mm/Hg. In addition, when the throttles are balanced to an acceptable range of each other the words 'THROTTLES BALANCED' in green text will appear on the right of the screen. At this point, no further adjustment is necessary or productive.**
- **If the throttles are not balanced to each other the words 'THROTTLES UNBALANCED' in red text will appear on the right of the screen. At this point adjustment will be necessary.**
- **The adjusters operate on the outer cylinders only (cylinders 1 and 3). The centre throttle (cylinder 2) adjustment is fixed, this being controlled by the throttle control motor. Note that the centre reading may alter slightly as the two outer cylinders are adjusted.**
- **DO NOT attempt to adjust the throttle stop screws, located below the fuel rail. The stop screws are set at the factory during manufacture, and must not be adjusted.**

⚠ Warning

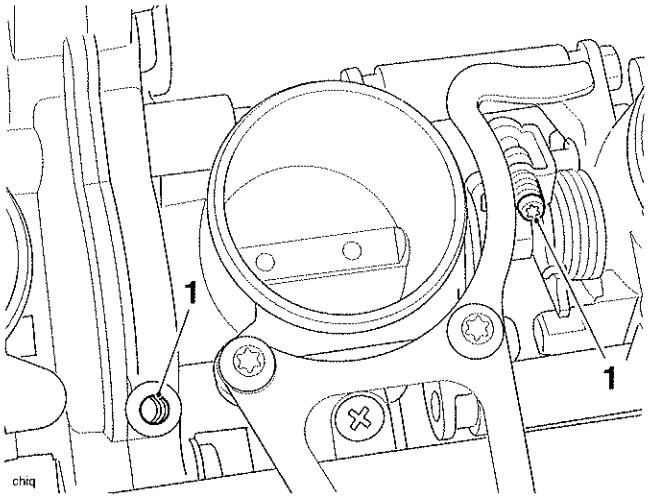
Total cleanliness must be observed at all times whilst the throttle balance blanking screw is removed, and adjustment must take place in a dirt/dust-free environment. Dirt or dust ingress to the throttle motor housing will cause the throttles to stick, leading to loss of motorcycle control and an accident.

11. Remove the Torx T30 blanking screw from the throttle control motor housing, located between cylinders one and two.



1. Throttle balance blanking screw

12. Using a suitable Torx T20 screwdriver adjust the throttle adjusters until the words 'THROTTLES BALANCED' appear on the diagnostic tool.



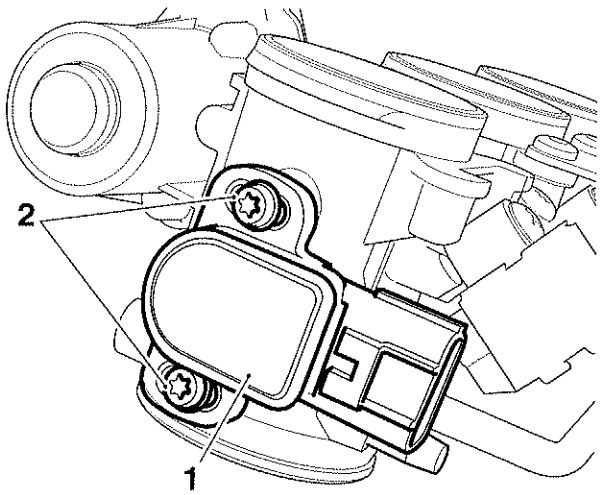
1. Adjusters

13. When balanced, stop the engine and disconnect the diagnostic tool.
14. Refit the Torx T30 blanking screw to the throttle control motor housing and tighten to **5 Nm**.
15. Disconnect the battery, negative (black) lead first.
16. Refit the airbox (see page *10-127*).
17. Using proprietary professional automotive workshop equipment approved for fuel handling, drain any remaining fuel from the fuel tank.
18. Refit the fuel tank (see page *10-119*).
19. Reconnect the battery, positive (red) lead first.
20. Refit the rider's seat (see page *17-16*).

Throttle Position Sensor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the airbox (see page *10-126*).
5. Remove the throttle body assembly (see page *10-135*).
6. Release the fixings and remove the throttle position sensor from the left hand end of the throttle body. Collect the O-ring on disassembly.

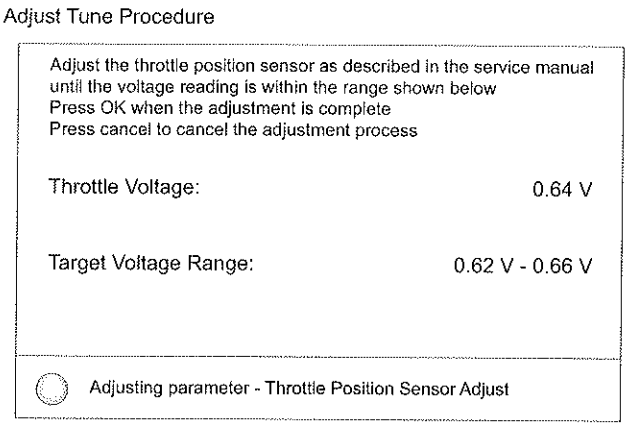


chis

1. **Throttle position sensor**
2. **Fixings**

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 diagnostic tool to the dedicated plug.
6. Turn the ignition to the ON position.
7. Connect the diagnostic tool and navigate to, and select the ADJUST TUNE option.
8. At the next screen, select Throttle Position Sensor Renew (see below), then press the ADJUST button.
9. On pressing the ADJUST button, the diagnostic tool will send a command which drives the throttle to the fully closed position. The tool will also display the Voltage reading coming from the throttle position sensor.



Adjust Tune Screen

10. Gently rotate the throttle position sensor until the Voltage reading on the tool shows 0.64 Volts ±0.02 Volts. The reading on the screen will turn green, indicating that the reading is correct.

Note:

- **This is a setting Voltage only. Because of the adaptive nature of the engine management system, in-service Voltage may vary from this setting figure.**

11. Tighten the sensor retaining screw to **3.5 Nm** and recheck the Voltage reading shown on the tool. Repeat the adjustment if the reading is outside the specified range.
12. Press the **OK** button to return the throttle to normal control and return the diagnostic tool to the **Adjust Tune** menu.

Note:

- **The engine will not start until the ignition switch has been turned to the OFF position then back to the ON position.**

13. Turn the ignition switch to the OFF position.
14. Refit the throttle bodies (see page *10-137*).
15. Disconnect the battery, negative (black) lead first.
16. Refit the airbox (see page *10-127*).
17. Refit the fuel tank (see page *10-119*).
18. Reconnect the battery, positive (red) lead first.
19. Check and clear any stored faults using the Triumph diagnostic tool.
20. Disconnect the diagnostic tool.
21. Refit the rider's seat (see page *17-16*).
22. Start the engine and allow to idle. Reset the adaptions (see page *10-140*).

Throttle Actuator Motor

The throttle actuator motor is an integral part of the throttle bodies and cannot be replaced separately.

Engine Management Adaption

Note:

- **After the engine management adaption has been reset on Tiger Explorer, the Cruise Control Switch Check Function Test must be performed (see page *10-33*). After the adaptions have been reset, DTC 1575 (cruise control disabled until button press sequence completed) will be stored, and the cruise control disabled, until the function test is completed.**

General Information

The engine management system fitted to this model is adaptive. This means that the system is able to learn about new or changing operating conditions and continuously adapt itself without needing to constantly make major adjustments from a fixed baseline setting.

Adaptive changes can become necessary because of changes in fuel quality, minor defects, or because a new part may have been fitted which has slightly different characteristics to the old part. All adaptive changes are automatic and require no intervention by rider or dealer.

Adaption Status

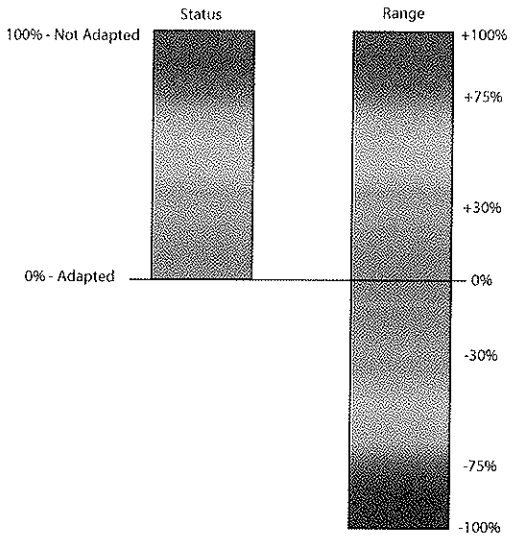
To see if a motorcycle has fully adapted, a facility named 'ADAPTION STATUS' is provided on the diagnostic tool. The following adaption details can be examined:

Function Examined	Report Method
Closed throttle position reference status	Adapted/not adapted
Twist grip adaption	Adapted/not adapted
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption status (idle)	%
Oxygen sensor adaption range (idle)	%

Terminology

Where the term 'status' is used, this indicates how far the present operating parameter is from the stored (baseline) value. The nearer these figures are to zero the better as it indicates the motorcycle has adapted to its current operating conditions.

The term 'range' indicates how much (in percentage terms) of the adjustment range has been used to reach the current operating status.



Status versus Range

Typical Values

In a correctly adapted motorcycle, the following will be typical:

Function Examined	Read Out
Closed throttle position reference status	Adapted
Twist grip adaption	Adapted
Oxygen sensor adaption status (off idle)	0% +/- 10%
Oxygen sensor adaption range (off idle)	Between +100 and -100%
Oxygen sensor adaption status (idle)	0% +/- 10%
Oxygen sensor adaption range (idle)	Between +100 and -100%

Forcing Adaption to Take Place

If the read-out indicates that the motorcycle is not adapted, the following will force the system to make adaptions:

Warning

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

Note:

- **Resetting adaptions with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, causing poor engine running. Always reset the adaptions with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well ventilated area.**

1. Ensure the engine is cold.
2. WITHOUT TOUCHING THE THROTTLE, start the engine and allow it to warm up until the cooling fan comes on.
3. Leave the engine to idle for a further 12 minutes.

Note:

- **As an alternative to the above process, connect the diagnostic tool, select ADJUST TUNE (see the Triumph Diagnostic Tool User Guide) and select RESET ADAPTIONS. This will force a fast adaption routine to take place in around 5 seconds. For this to happen, the engine MUST be running, it must be at normal operating temperature and in closed loop control mode. Under any other conditions fast adaption will not take place and may cause default values to be loaded, which may then require a normal 12 minute adaption routine to be run.**

Fault Indications

If 'range' figures at 100% are seen, then the adjustment has reached maximum indicating a mechanical fault exists on the motorcycle. This can be due to a number of faults but the most likely causes will be low/high fuel pressure, faulty injectors or air leaks at the throttle bodies or airbox.

In these circumstances, locate and rectify the fault, and reset the adaptions as described above.

Exhaust System

Removal

Warning

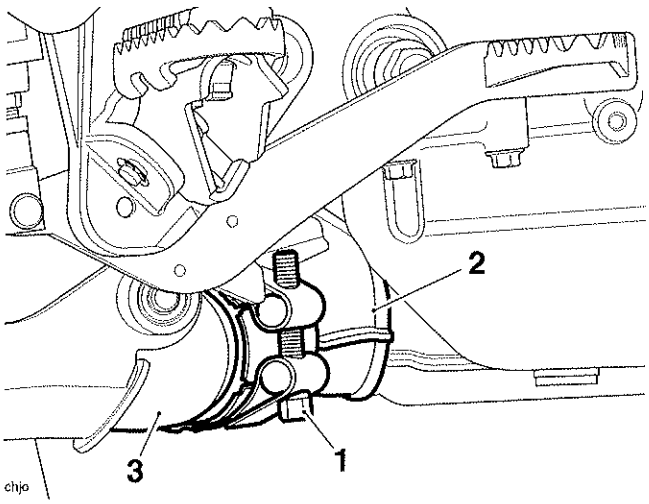
If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the sump guard (see page *17-34*).
4. Remove the radiator (see page *11-13*).
5. Remove the rear panels (see page *17-32*).

Note:

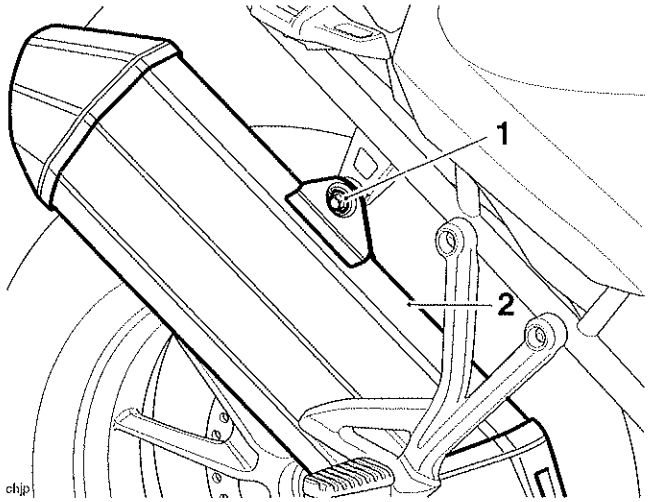
- **Note the position and orientation of the exhaust clamp for installation.**

6. Release the clamp securing the silencer to the intermediate pipe.



1. **Clamp fixing**
2. **Silencer**
3. **Header pipe**

7. Release the bolt securing the silencer to the frame.



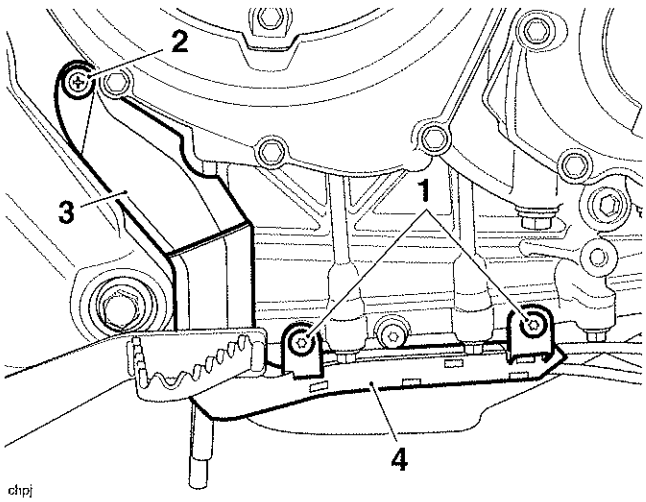
1. **Bolt**
2. **Silencer**

8. Remove the silencer and collect its gaskets.

Note:

- **Note the routing of the harnesses and drain pipes for installation.**

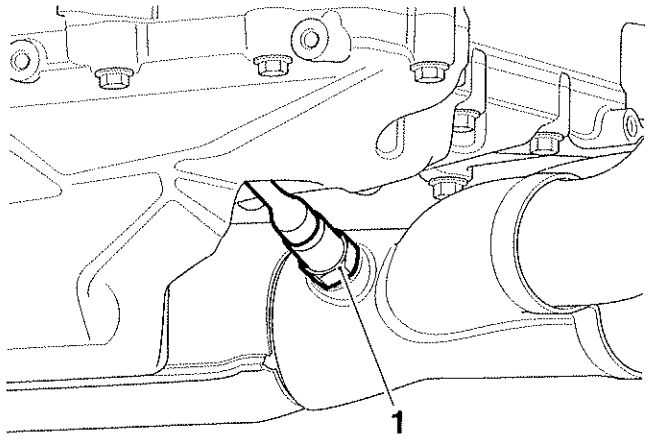
9. Release the fixings and remove the cable tidies on the right hand side of the engine.



1. **Screws**
2. **Scrivet**
3. **Cable tidy, crankcase**
4. **Cable tidy, sump**

10. Detach the oxygen sensor harness from the cable tidy for the sump.
11. Locate and disconnect the oxygen sensor multi-plug and release it from the wiring harness.

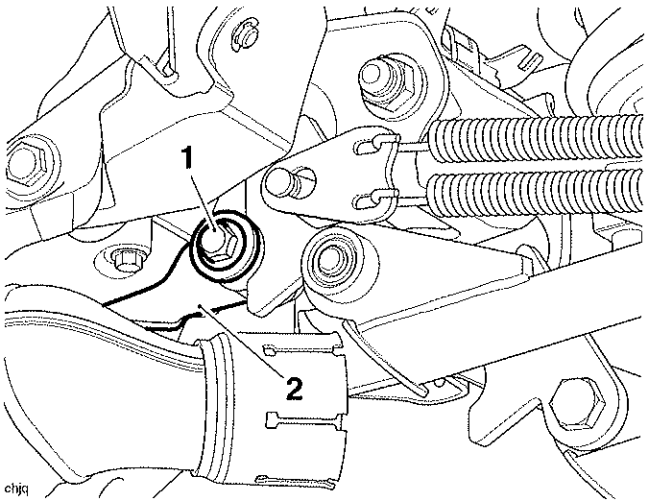
12. Remove the oxygen sensor if necessary.



chjr

1. Oxygen sensor

13. Remove the bolt from the rear mounting point on the header pipe.



chjq

1. Bolt
2. Header Pipe

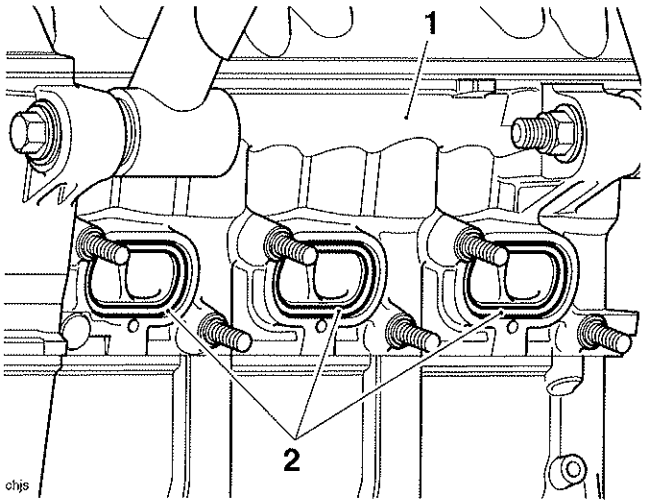
14. Release the header pipe fixings at the cylinder head.
15. Detach the header pipe assembly and collect the seals from the cylinder head ports.

Installation

1. Fit new seals to the cylinder head.

Note:

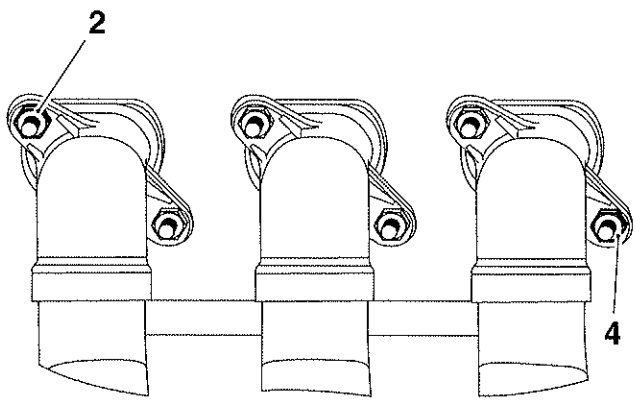
- **A smear of grease may be used to retain the seals in the cylinder head during assembly.**



chjs

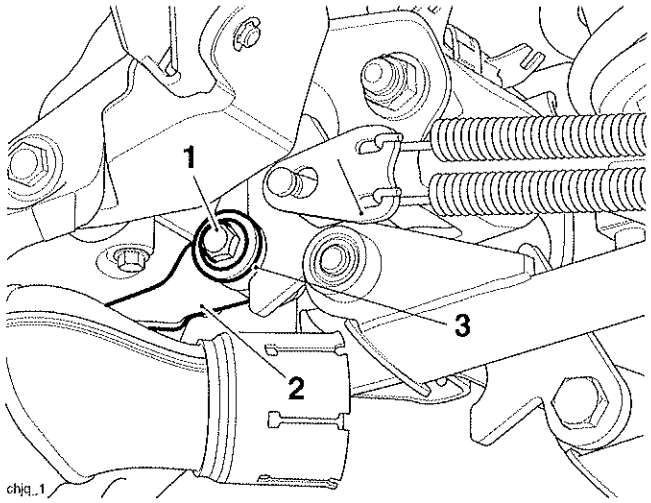
1. Cylinder head
2. Seals

2. Locate the header pipe and align the flanges to the cylinder head.
3. Fit the header pipe nuts loosely, then tighten nuts 2 and 4 hand tight to retain the header pipes in position.



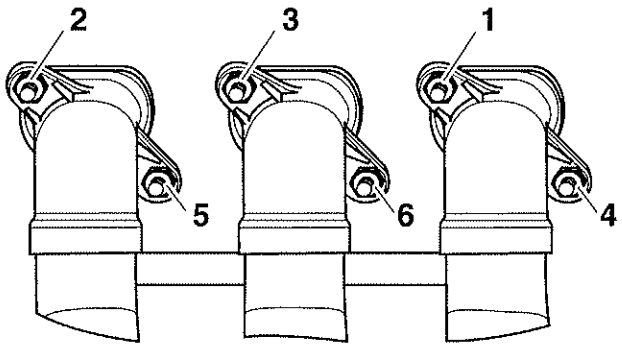
Header Pipe Hand Tightening Sequence

4. Fit the rear mounting point bolt such that it is positioned to the front of the mounting lug. Tighten the bolt to **15 Nm**.



1. **Bolt**
2. **Header pipe**
3. **Mounting lug**

5. Tighten the header pipe fixings to the cylinder head in the following sequence.

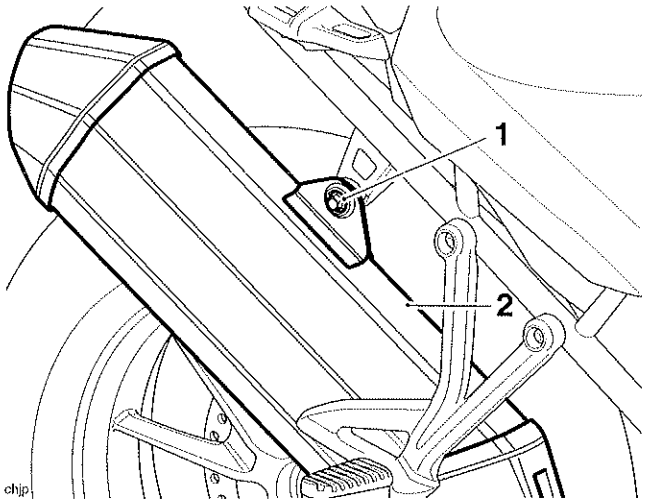


Exhaust to Cylinder Head Tightening Sequence

a) Tighten nuts 1 to 6 to **19 Nm** in the order shown.

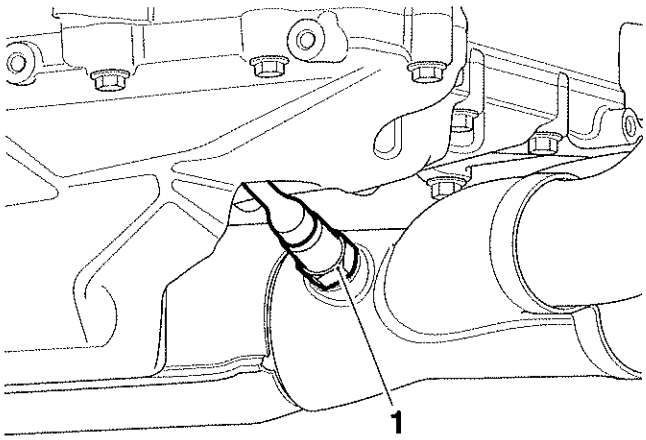
b) Retighten nuts 1 to 3 to **19 Nm** in the order shown.

6. Check the condition of the exhaust gasket for the silencer, replace if necessary, and fit it to the header pipe.
7. Position the silencer clamp to the header pipe.
8. Engage the silencer to the header outlet, align its mounting to the frame and fit the mounting bolt. Do not fully tighten the bolt or the clamp at this stage.
9. Orientate the clamps for the silencer as noted for removal.
10. Tighten the silencer clamp to **10 Nm**.
11. Tighten the silencer mounting bolt to **30 Nm**.



1. **Bolt**
2. **Silencer**

12. Refit and tighten the oxygen sensor to **25 Nm**.

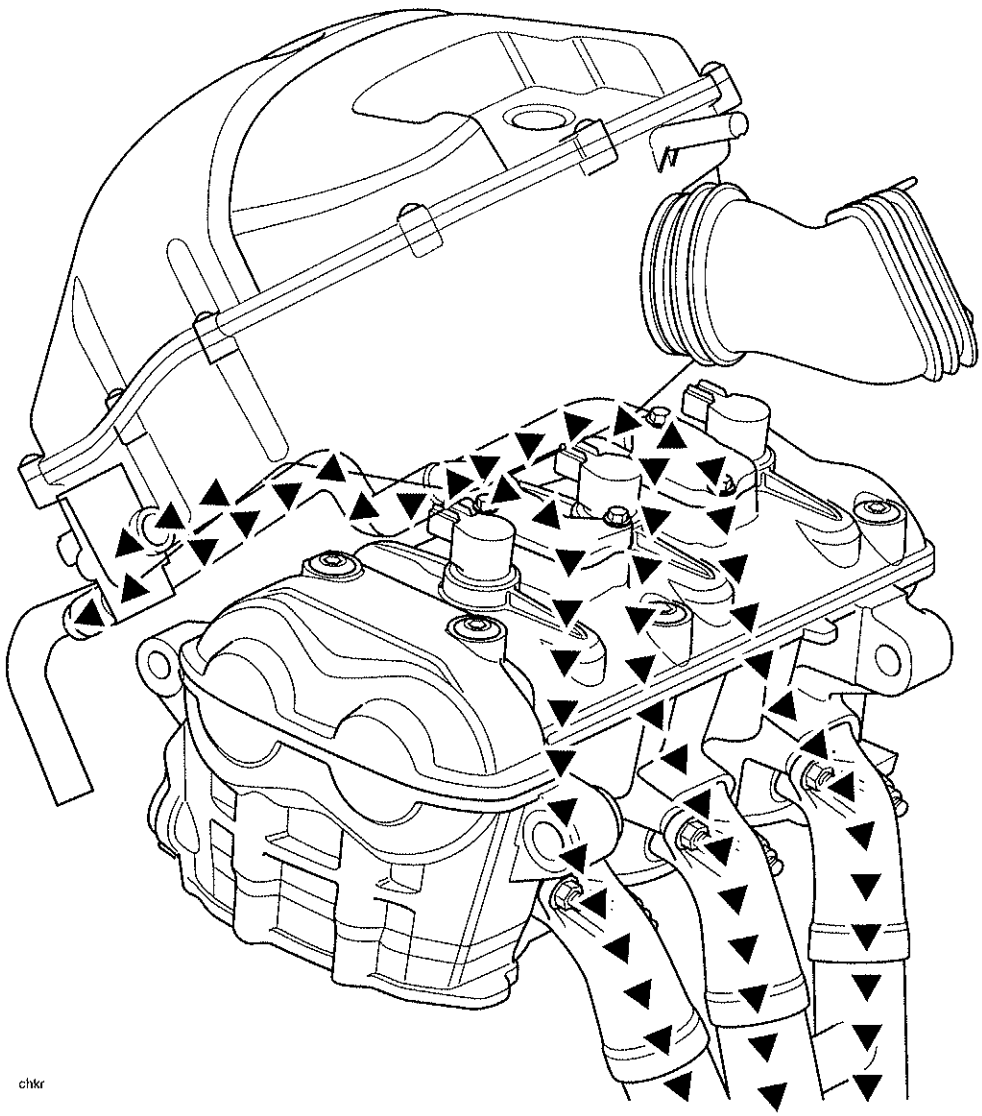


1. **Oxygen sensor**

13. Attach the harness for the oxygen sensor to the cable tidy for the sump as noted for removal.
14. Connect oxygen sensor electrical connector to the main harness.
15. Secure the cable tidy to the sump with its fixings and tighten the screws to **3 Nm**. Ensure that the routing of the harnesses and drain hoses are as noted for removal.
16. Refit the radiator and refill the cooling system (see page *11-7*).
17. Refit the rear panels (see page *17-32*).
18. Refit the sump guard (see page *17-34*).
19. Reconnect the battery, positive (red) lead first.
20. Refit the rider's seat (see page *17-16*).
21. Start the engine and check for exhaust leaks. Rectify if necessary.

Secondary Air Injection

System Purpose and Operation



The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber.

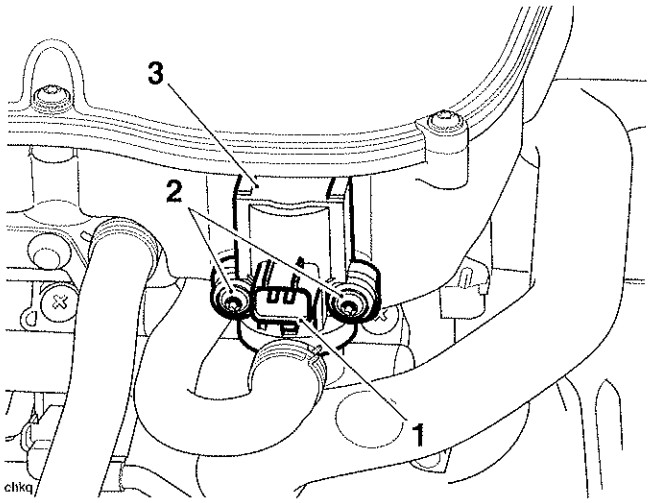
At certain specific engine speeds above idle (determined by the factory programming of engine management system), the secondary air injection control valve is opened by the ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the 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 the header system.

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

Secondary Air Injection Solenoid Valve

Removal

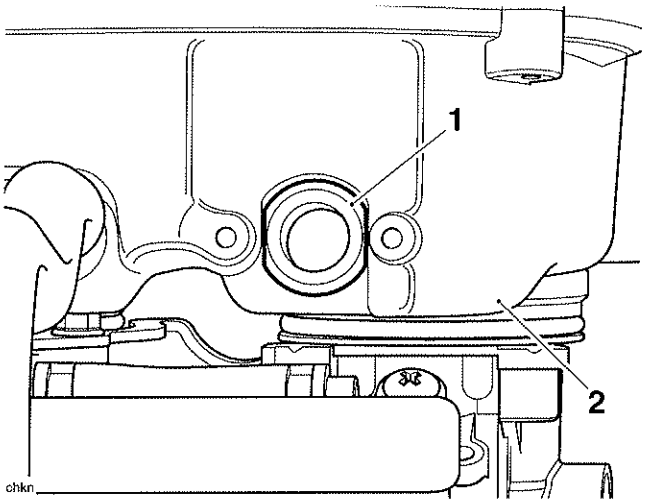
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Release the hose attached to the valve.
5. Disconnect the electrical connector, release the fixings and remove the valve.



1. Electrical connector
2. Fixings
3. Valve

Installation

1. Carefully fit the solenoid valve to the airbox, ensure that its seal remains fitted to the airbox.



1. Seal
2. Airbox

2. Fit the screws and tighten to **2 Nm**.
3. Reconnect the electrical connector and the hose to the valve.
4. Refit the fuel tank (see page *10-119*).
5. Reconnect the battery, positive (red) lead first.
6. Refit the rider's seat (see page *17-16*).

Secondary Air Injection Reed Valves

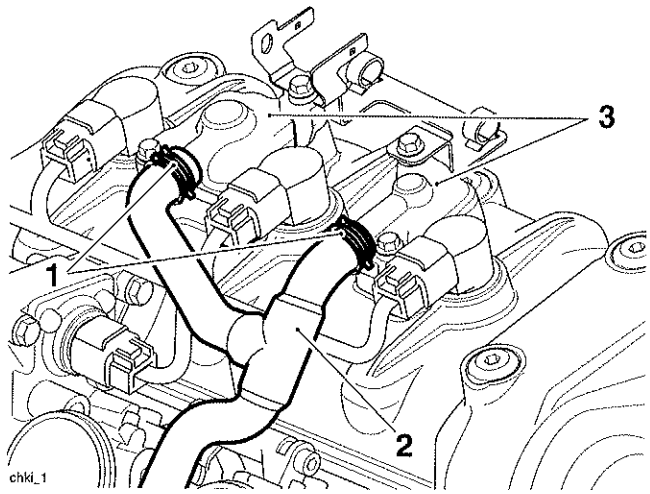
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the airbox (see page *10-126*).

Note:

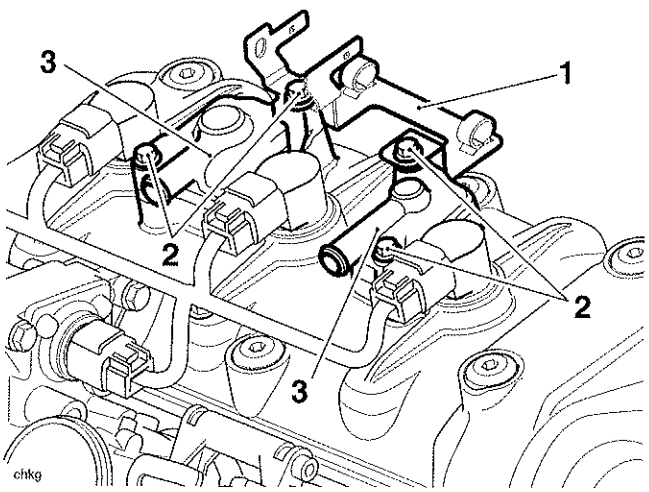
- **Note the routing of the secondary air injection hoses for installation.**

5. Detach the secondary air injection feed hoses from the reed valves on the camshaft cover.



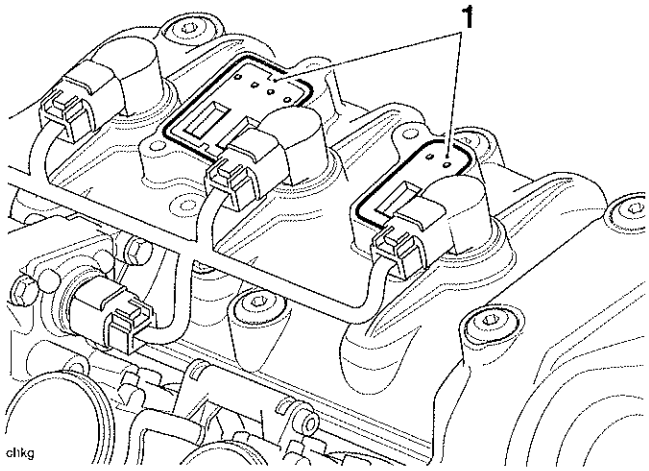
1. **Spring-close clip**
2. **Secondary air injection hose**
3. **Reed valve assemblies**

6. Note the position of the connector bracket and release the fixings securing the valve covers to the camshaft cover.



1. **Connector bracket**
2. **Fixings**
3. **Reed valve assemblies**

7. Ease the valve covers from the valves.
8. Note the orientation of the valves and remove them from the camshaft cover.



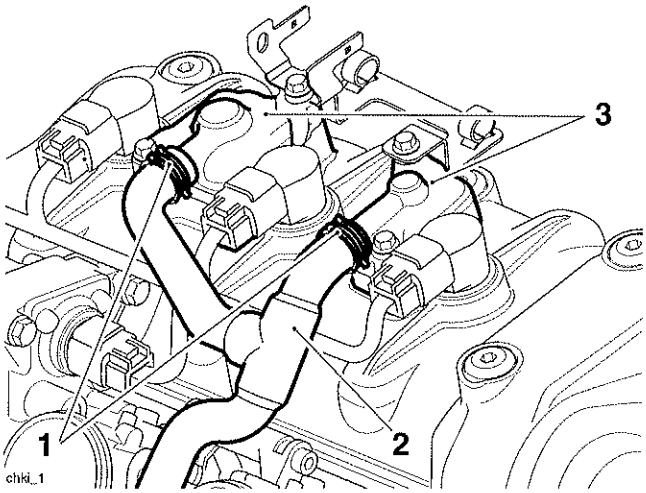
1. **Valves**

Inspection

1. Check for cracks, bending or other damage to the valve flaps. Replace as necessary.
2. Check for damage to the seal areas. Replace as necessary.
3. Check the valve body to cylinder head seal for damage.

Installation

1. Fit the reed valves to the camshaft cover as noted for removal.
2. Refit the valve covers and the connector bracket as noted for removal. Tighten the fixings to **9 Nm**.
3. Refit the air hoses to the reed valves as noted for removal.



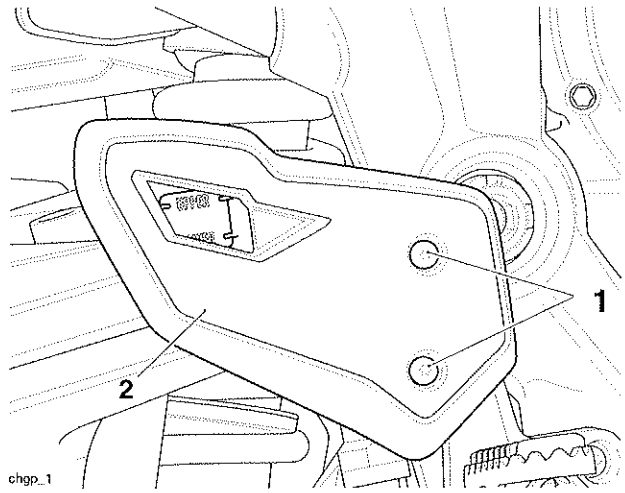
1. **Spring-close clip**
2. **Secondary air injection hose**
3. **Reed valve assembly**

4. Refit the airbox (see page *10-127*).
5. Refit the fuel tank (see page *10-119*).
6. Reconnect the battery, positive (red) lead first.
7. Refit the rider's seat (see page *17-16*).

Evaporative Canister (Where Fitted)

Removal

1. Remove the seats (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Release the fixings and remove the right hand heel guard.



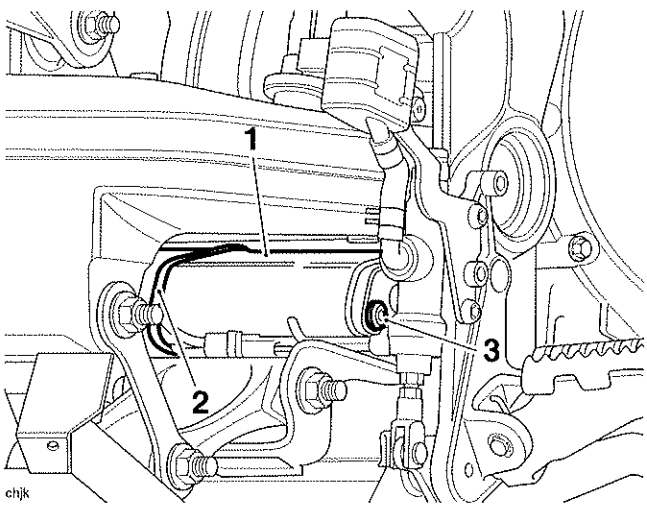
1. **Fixings**
2. **Heel guard**

4. Remove the exhaust silencer (see page *10-142*).
5. Remove the rear suspension unit (see page *13-5*).

Note:

- **Note the routing of the cable tie for installation.**

6. Cut the cable tie securing the canister to its bracket.
7. Remove the fixing from the right hand side of the canister.

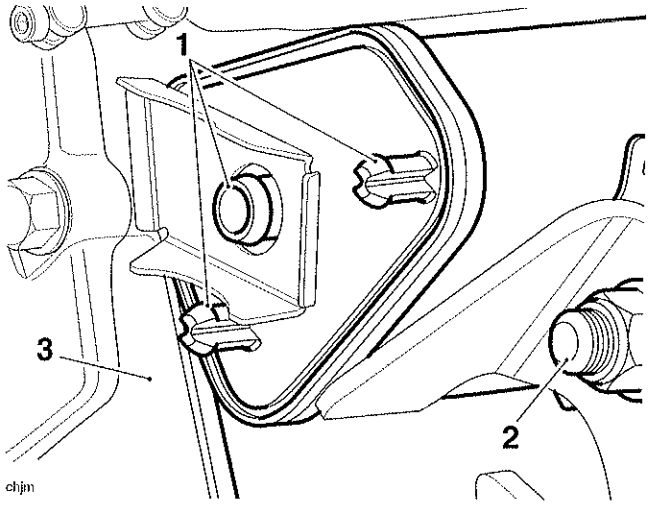


1. **Canister**
2. **Cable tie**
3. **Fixing**

Note:

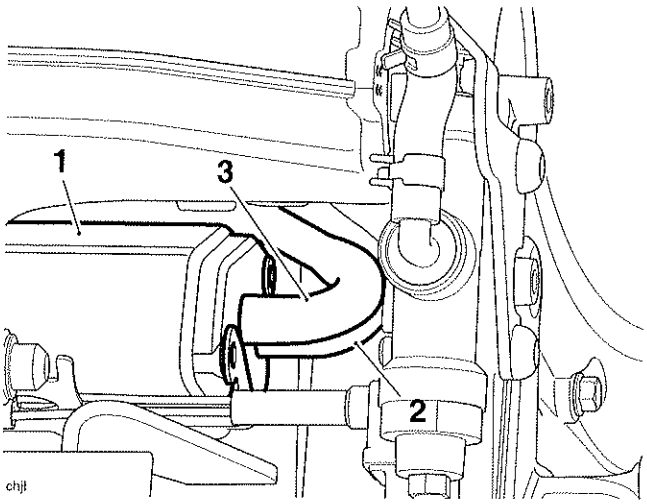
- **Note the orientation of the carbon canister for installation.**

8. Slide the canister to the right to disengage its locating lugs from the frame.



1. **Lugs**
2. **Canister**
3. **Frame, left hand side**

9. Disconnect the vacuum and purge hoses from the canister.

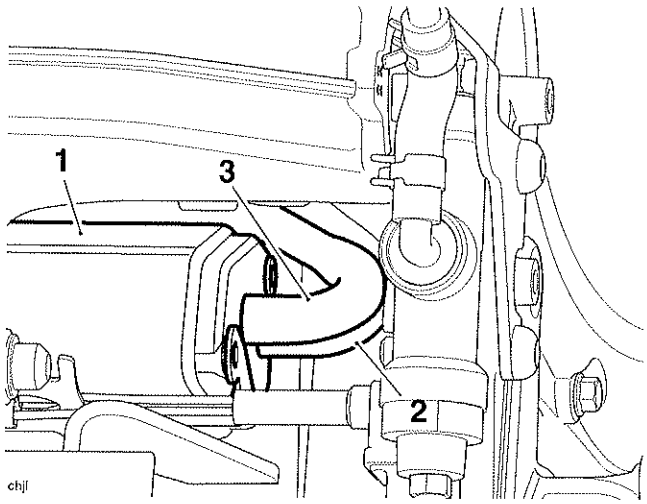


1. **Purge hose**
2. **Vacuum hose**
3. **Carbon canister**

10. Remove the canister from the right hand side of the motorcycle.

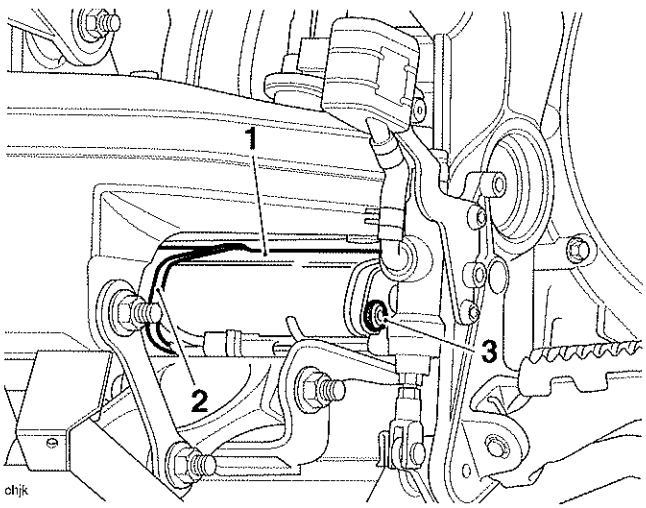
Installation

1. Fit the new cable ties to the mounting bracket for the carbon canister, as noted at removal.
2. Refit the vacuum and purge hoses to the carbon canister.



1. **Purge hose**
2. **Vacuum hose**
3. **Carbon canisters**

3. Fit the canister to its bracket in the orientation noted for removal. Ensure the locating lugs on the canister locate into their respective positions on the right hand frame.
4. Refit the fixing and tighten to **8 Nm**.



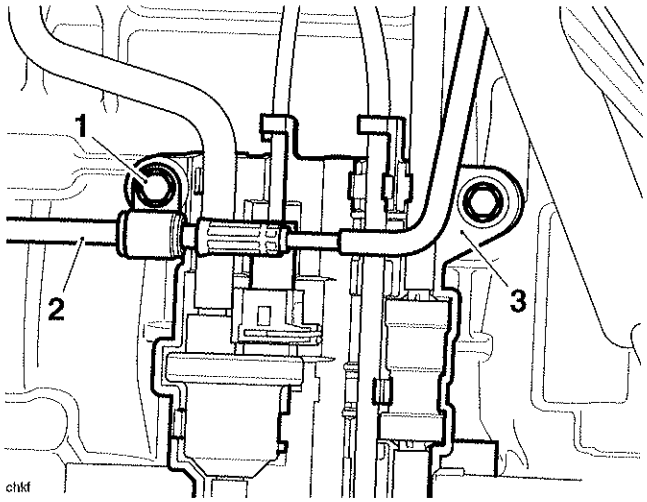
1. **Carbon canister**
2. **Cable tie**
3. **Fixing**

5. Secure the canister in place with the cable tie and trim off any excess cable tie.
6. Refit the rear suspension unit (see page *13-6*).
7. Refit the exhaust silencer (see page *10-143*).
8. Refit the right hand heal guard and tighten its fixings to **7 Nm**.
9. Reconnect the battery, positive (red) lead first.
10. Refit the rider's seat (see page *17-16*).

Purge Control Valve

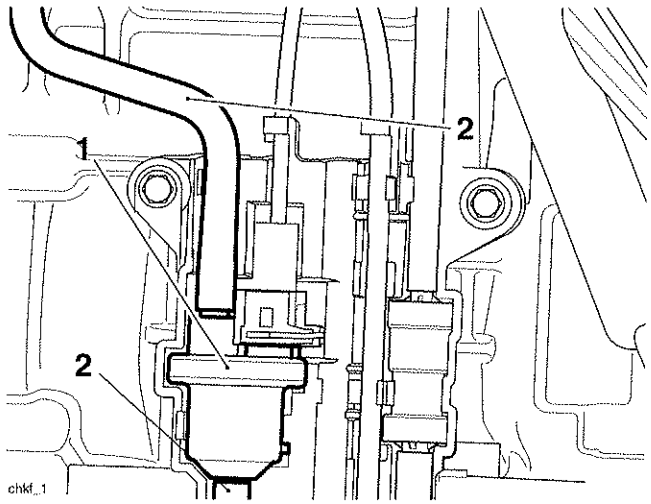
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear suspension unit (see page *13-5*).
4. Detach the brake line from the crankcase tidy. Discard the fixing.



1. **Fixing**
2. **Brake line**
3. **Crankcase tidy**

5. Carefully detach the purge valve from the crankcase tidy.



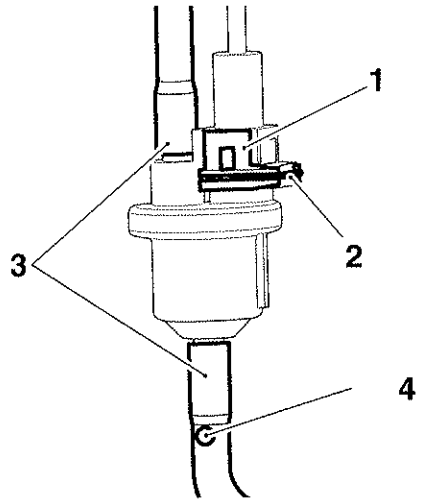
1. **Purge valve**
2. **Hoses**

6. Press the wire locking device fully in then lift the multi-plug and disconnect it from the purge valve.

Note:

- **The hose at the lower end of the purge valve is marked with a white spot. When correctly fitted, this spot will face the rear of the motorcycle.**
- **Note the orientation of the lower hose for installation.**

7. Disconnect the hoses from the purge control valve.



1. **Electrical connector**
2. **Wire locking device**
3. **Hoses**
4. **White spot**

Installation

1. Reconnect the hoses to the purge control valve as noted for removal.
2. Reconnect the electrical connector to the purge control valve.
3. Carefully attach the purge control valve to the crankcase tidy. Ensure that the hoses are also secured by the crankcase tidy.
4. Attach the brake line to the crankcase tidy and tighten the new fixing to **8 Nm**.
5. Refit the rear suspension unit (see page *13-6*).
6. Reconnect the battery, positive (red) lead first.
7. Fit the rider's seat (see page *17-16*).

Evaporative Emissions Control System

Some models in certain markets are fitted with a system to control the evaporation of fuel vapour to the atmosphere.

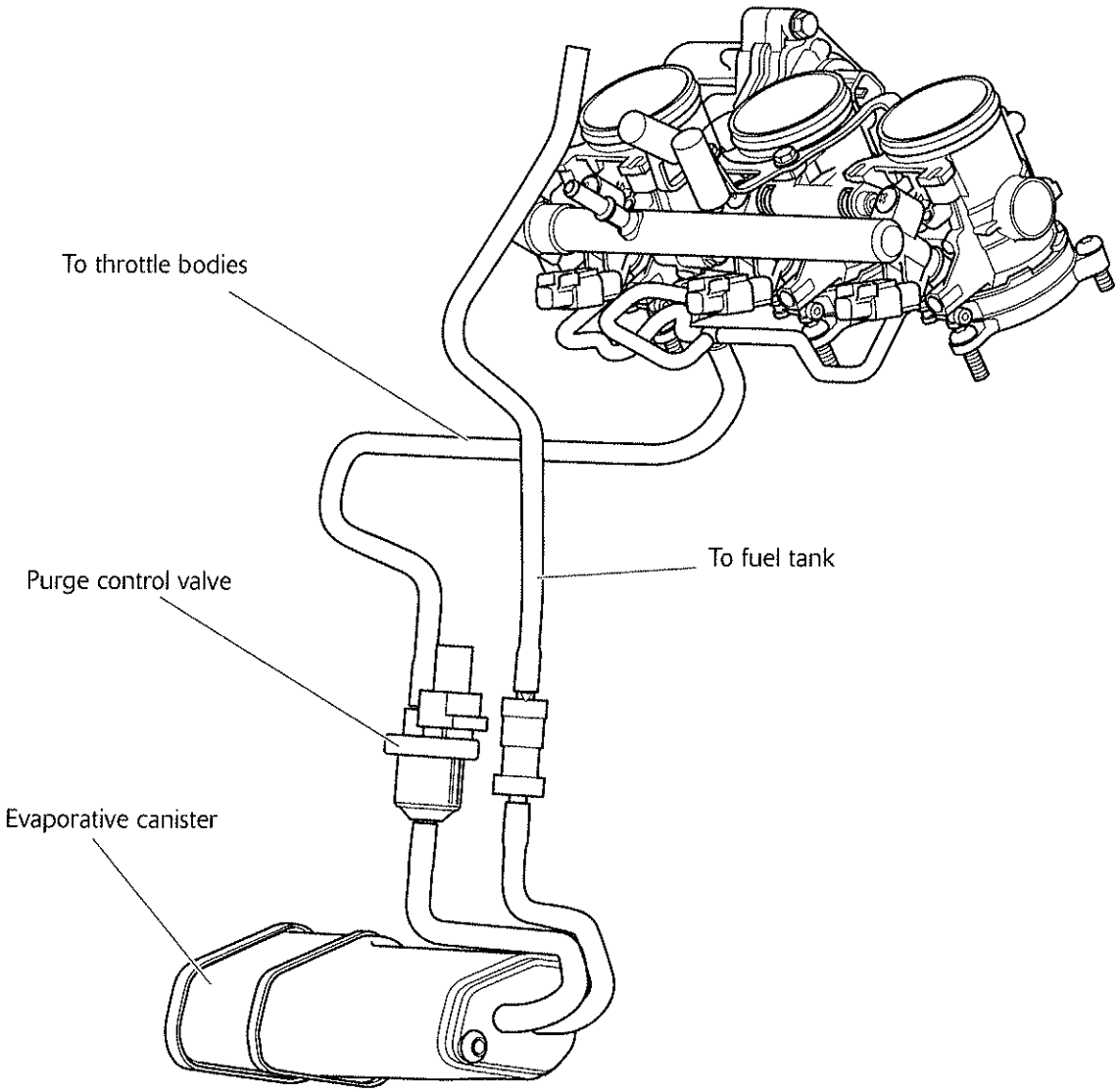
A carbon filled evaporative canister absorbs vapour while the engine is not running. When the engine is started, the vapour is returned to the engine and burnt.

There are two distinct phases to the system's operation, engine off and engine running. These two conditions are explained overleaf.

Component Locations

Carbon Canister - on the frame above the centre stand.

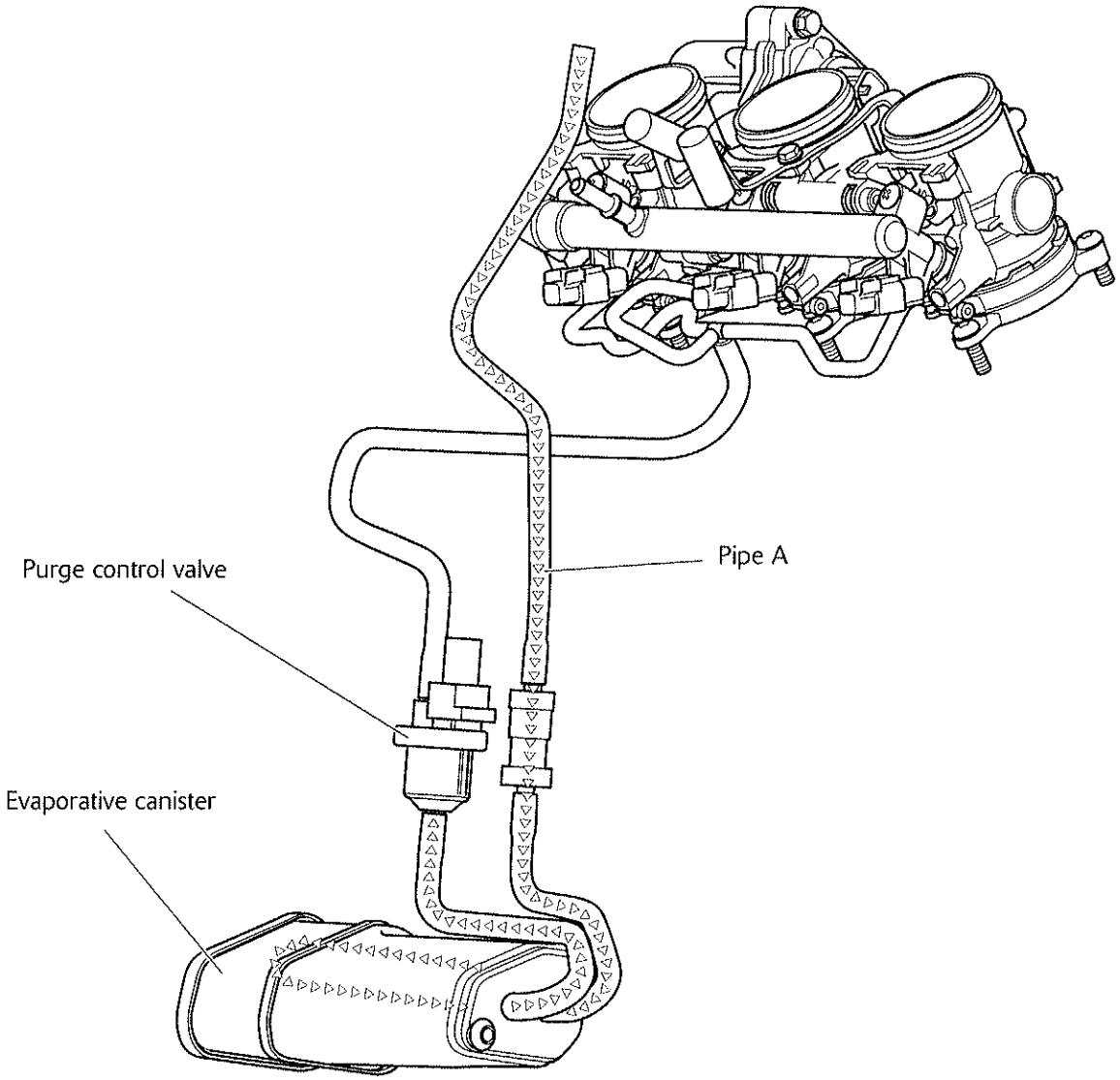
Purge Control Valve - (electronically controlled by the ECM) in the crankcase tidy at the rear of the crankcase.



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 to a carbon filled evaporative canister which stores the vapour.

Once in the canister, vapour cannot return to the fuel tank because the purge valve is closed.

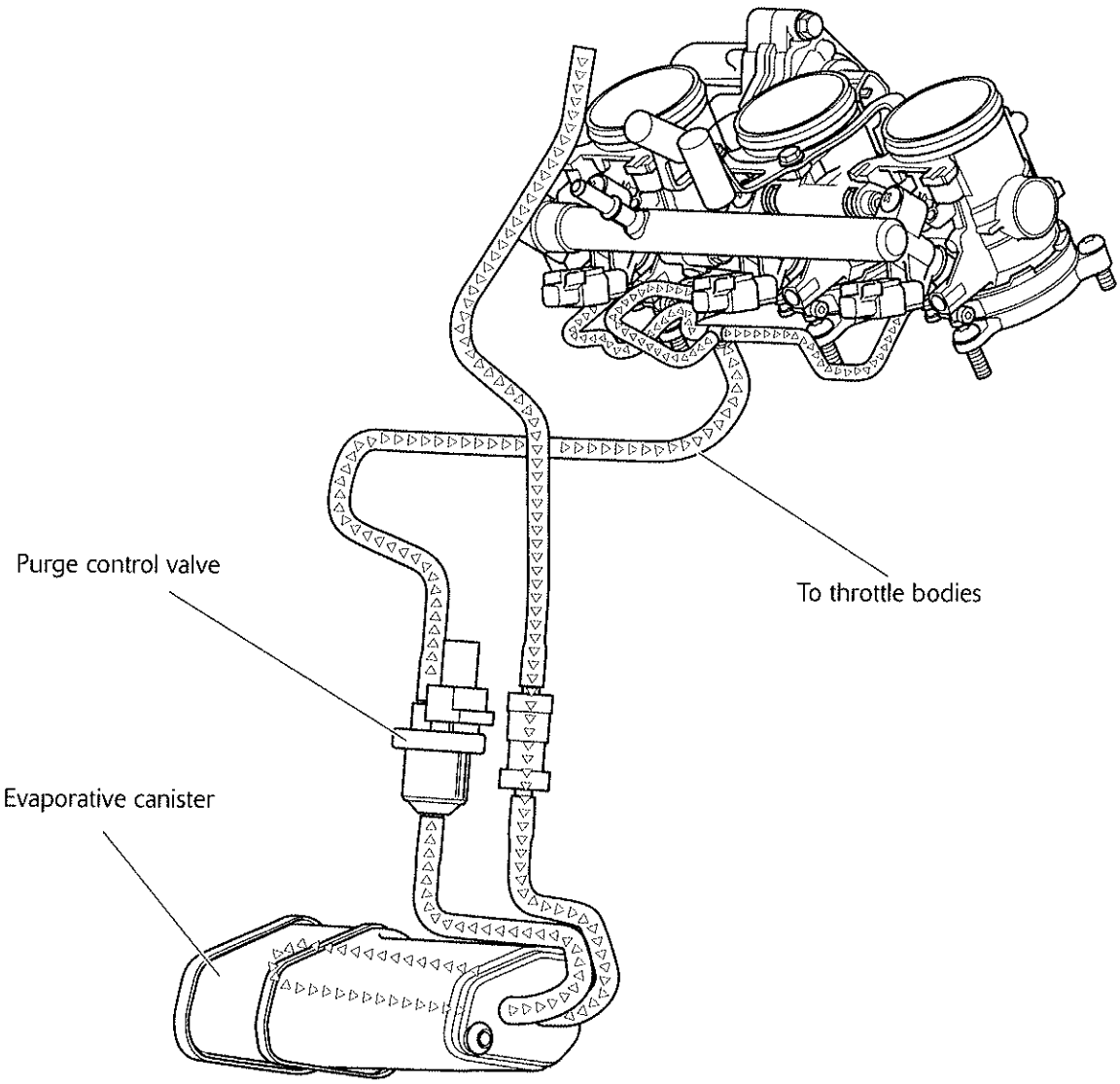


Evaporative Control System - Engine Running

When the engine is started, a vacuum is applied to the purge hose from the throttle bodies.

At certain times, the ECM opens the purge valve. The vacuum applied to the purge valve now begins to draw stored vapour from the carbon filled evaporative canister and returns it to the throttle bodies for burning in the engine.

In order to control the speed at which vapour is purged from the canister, the engine management system regularly shuttles the purge control valve between open and closed positions.



This page intentionally left blank

11 Cooling

Table of Contents

Exploded View - Cooling System 11.2
Coolant 11.3
Radiator Hoses 11.3
Radiator and Cooling Fan 11.4
Coolant Level Inspection 11.4
Coolant Level Adjustment 11.5
Coolant Replacement 11.6
- Drainage 11.6
- Filling 11.7

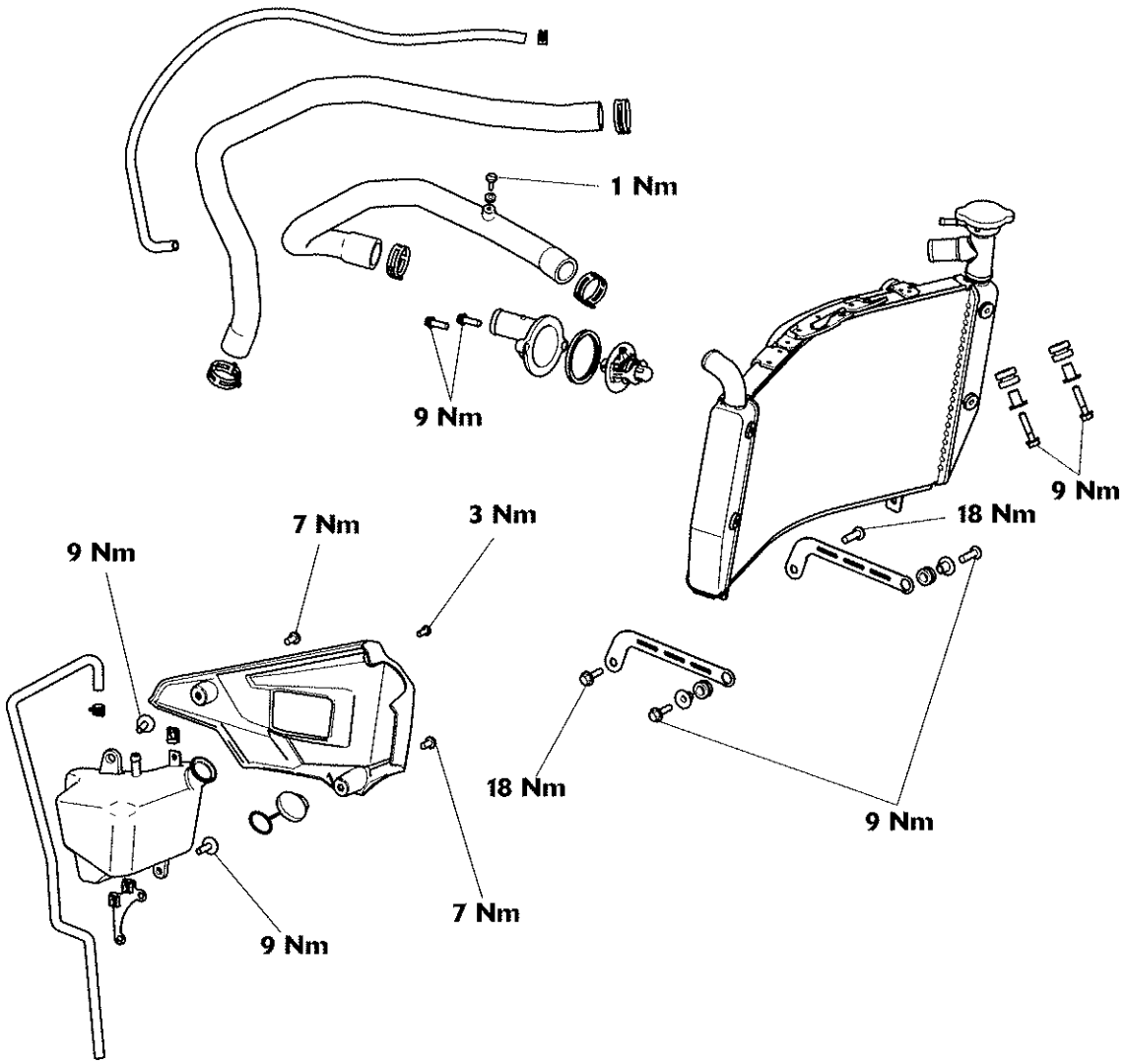
Water Pump 11.9
Coolant Pressure Cap and Coolant System Testing 11.9
- Inspection and Testing 11.9

Thermostat 11.11
- Removal 11.11
- Inspection 11.11
- Installation 11.12

Radiator 11.13
- Removal 11.13
- Inspection 11.13
- Installation 11.14

Expansion Tank 11.14
- Removal 11.14
- Installation 11.15

Exploded View - Cooling System



Coolant

A year-round, Hybrid Organic Acid Technology (known as Hybrid OAT or HOAT) coolant is installed in the cooling system when the motorcycle leaves the factory. It is coloured green, contains a 50% solution of ethylene glycol based anti-freeze, and has a freezing point of -35°C (-31°F).

Always change the coolant at the intervals specified in the Scheduled Maintenance chart.

⚠ Warning

The standard coolant mixture contains toxic chemicals that are harmful to the human body. Never swallow neat anti-freeze or any of the coolant mixture.

⚠ 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.

Note:

- **HD4X Hybrid OAT coolant, as supplied by Triumph, is pre-mixed and does not need to be diluted prior to filling or topping up the cooling system.**

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. To prevent injury, keep hands and clothing away from the fan blades at all times.

Caution

Using high-pressure water sprays can damage the radiator fins and impair the radiator's efficiency.

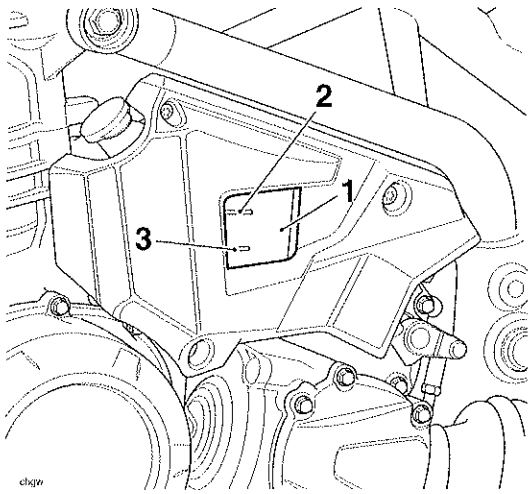
Do not obstruct or deflect airflow through the radiator by installing unauthorised accessories in front of the radiator or behind the cooling fan. Interference with the radiator airflow can lead to overheating and consequent engine damage.

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. The coolant level within the expansion tank can be inspected on the left hand side of the motorcycle without removing any covers.
3. Check the coolant level in the expansion tank. The coolant level must be between the MAX and MIN level marks moulded into the expansion tank cover. If the coolant is below the minimum level, the coolant level must be adjusted.



1. **Expansion tank**
2. **MAX mark**
3. **MIN mark**

Caution

If the coolant level is found to be low, or if coolant has to be added regularly, inspect the cooling system for coolant leaks. If necessary, pressure test the system to locate the source of the leak and rectify as necessary. Loss of coolant may cause the engine to overheat and suffer severe damage.

Coolant Level Adjustment

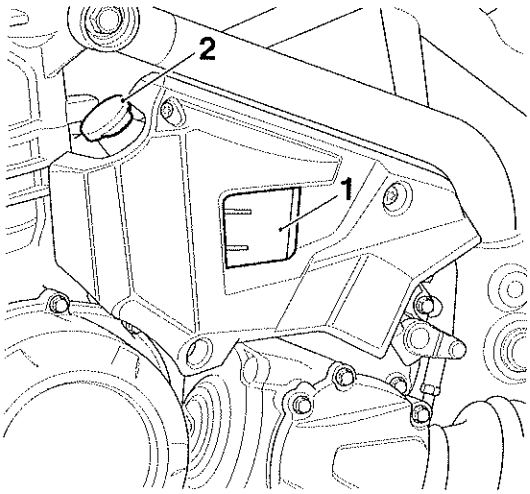
Warning

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

Warning

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

1. Allow the engine to cool.
2. The coolant within the expansion tank can be topped up on the left hand side of the motorcycle without removing any covers.
3. Remove the cap from the expansion tank and add coolant mixture through the filler opening until the level reaches the MAX mark on the expansion tank cover.



chgw

1. Expansion tank
2. Expansion tank cap

4. Refit the cap.

Note:

- **If the coolant level is being checked because the coolant has overheated, also check the level in the radiator and top up if necessary.**
- **In an emergency, distilled water can be added to the cooling system. However, the coolant must then be drained and replenished with HD4X Hybrid OAT coolant as soon as possible.**

Caution

If hard water is used in the cooling system, it will cause scale accumulation in the engine and radiator and considerably reduces the efficiency of the cooling system. Reduced cooling system efficiency may cause the engine to overheat and suffer severe damage.

Coolant Replacement

Drainage

Warning

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

Note:

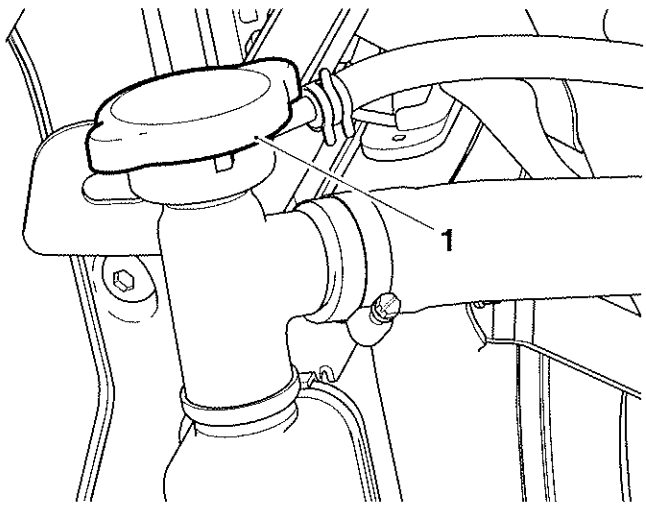
- **Prior to disassembly of the coolant hoses, note the orientation and position of the hose clips to help ensure that they are returned to the same positions and orientation on assembly.**

1. Remove the rider's seat (see page *17-16*).
2. Remove the fuel tank (see page *10-117*).

Warning

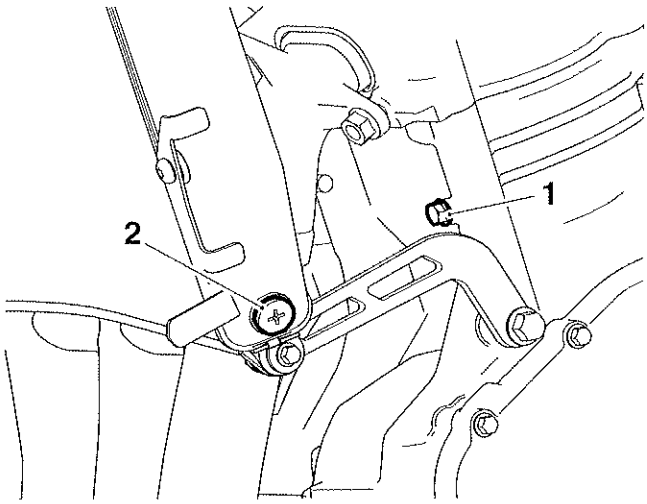
Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.

3. Remove the coolant pressure cap on the radiator.



1. Coolant pressure cap

4. Position a container to collect the displaced coolant.
5. Remove the drain screw located on the left hand side of the radiator and allow the coolant to drain.
6. To drain the crankcase, remove the drain screw shown in the illustration below. Discard the washer.



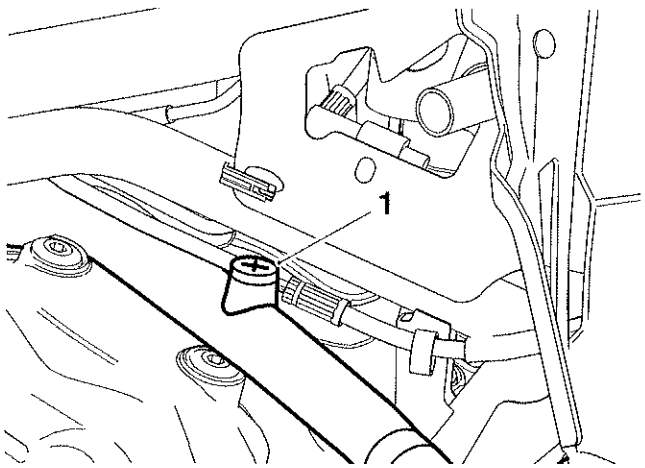
1. Crankcase coolant drain screw
2. Radiator coolant drain screw

Note:

- **It is not possible to completely drain all of the coolant, a small amount may remain in the water pump or heat exchanger.**

Filling

1. Refit the radiator drain screw and tighten to **1.5 Nm**.
2. Fit a new washer to the drain screw and refit to the crankcase. Tighten to **8 Nm**.
3. Remove the bleed screw from the right hand hose.



1. Bleed screw

4. Slowly add coolant mixture to the system, through the filler opening in the radiator, until the system is full.
5. If the system has filled correctly and fully, there should be coolant visible through the:
   - Right hand hose bleed screw opening;
   - Radiator filler opening.
6. If there is no coolant visible through the right hand hose bleed screw opening, but the filler side appears to be full, attach a length of clear tubing to the bleed screw spigot and syphon coolant into the bleed screw side of the radiator.

Note:

- **A hand-operated vacuum pump or similar should be used to syphon the coolant through the system.**

7. If necessary, top up the system through the filler and refit the pressure cap.
8. Install the right hand hose bleed screw and tighten to **1 Nm**.
9. With the aid of an assistant, lean the motorcycle fully over to the right hand side, and then the left hand side, to release air trapped in the cooling system.
10. Remove the radiator cap and top up the coolant.
11. Refit the cap and repeat as necessary.
12. Reconnect the battery, positive (red) lead first.

⚠ Warning

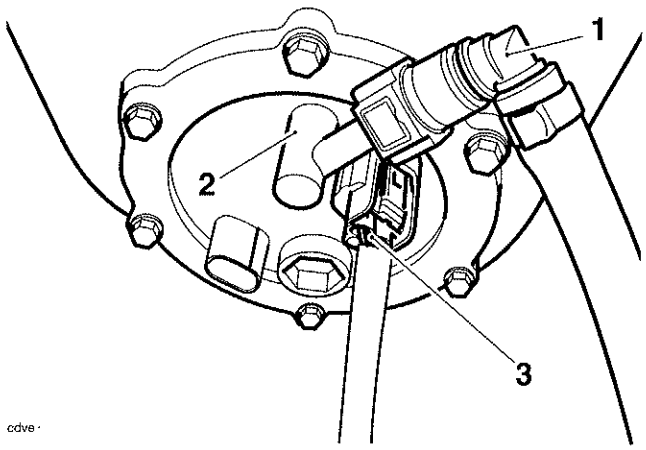
Observe the fuel handling precautions given in the general information section.

13. Place the fuel tank on a suitable support, close to the motorcycle.
14. Using the Extension Cable T3880123, carefully connect the fuel pump connection to the fuel tank. Connect the other end of the extension cable to the motorcycle main harness.
15. Select the fuel pressure gauge adapter marked 'B' from service tool Fuel Pressure Gauge T3880001.

⚠ Warning

Always use the correct fuel pressure gauge adapter **(adapter 'B' for Tiger Explorer)**. Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

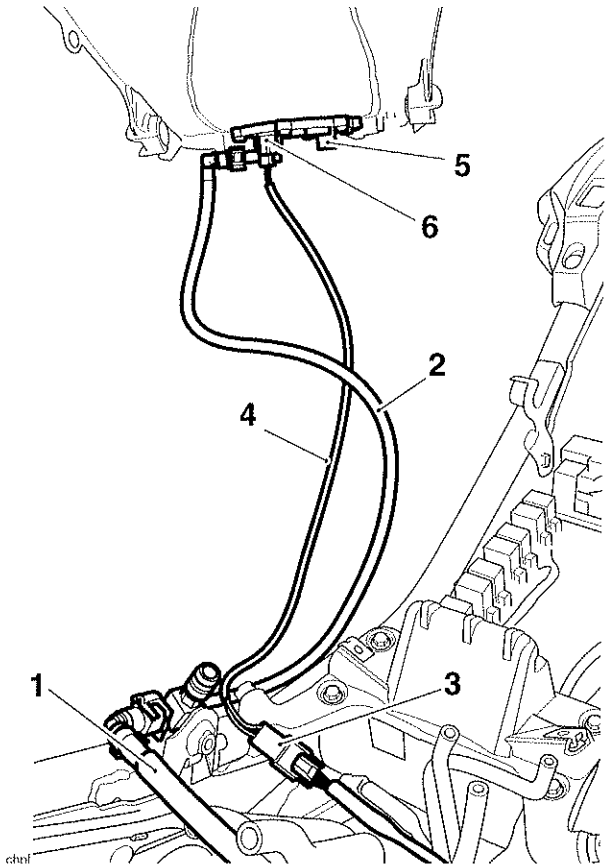
16. Connect the adapter hose to the fuel pump plate outlet as shown in the illustration below.



cdve

1. Adaptor hose 'B'
2. Fuel pump plate outlet
3. Extension Cable T3880123

17. Connect the fuel hose to the adaptor hose as shown in the illustration below.



1. **Motorcycle fuel hose**
2. **Adaptor hose 'B'**
3. **Fuel pump connection**
4. **Extension Cable T3880123**
5. **Fuel pump connection**
6. **Fuel pump plate outlet**

18. Start the motorcycle and allow to run for approximately 20 to 30 seconds. Briefly raise the engine speed several times to allow any air to be expelled from the system.
19. Stop the engine. Remove the radiator cap and check and top up the coolant level as necessary.
20. Refit the radiator cap.
21. Disconnect the fuel tank adaptor hose and extension harness.
22. With the aid of an assistant, lean the motorcycle fully over to the right hand side, and then the left hand side, to release air trapped in the cooling system.
23. Refit the fuel tank (see page *10-148*).
24. Start the motorcycle. Briefly raise the engine speed several times to allow any air to be expelled from the system.
25. Allow the engine to run until the cooling fan operates.
26. Stop the motorcycle and allow the engine to cool.

Warning

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

27. Check the expansion tank level and top up if necessary (see page *11-4*).
28. Refit the rider's seat (see page *17-16*).

Water Pump

Note:

- **The oil pump and water pump are supplied as an assembly and cannot be separated. For additional information, refer to Oil Pump (see page *8-12* for removal and page *8-9* for installation).**

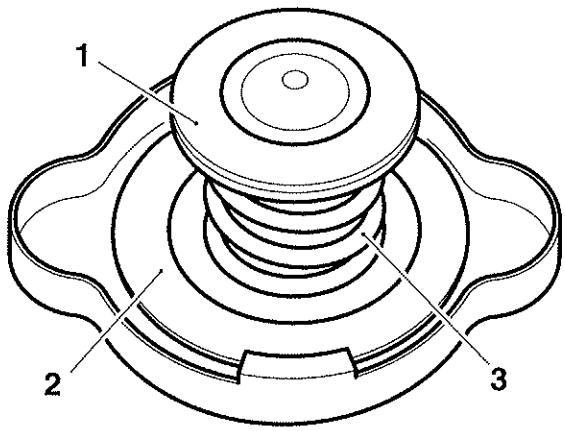
Coolant Pressure Cap and Coolant System Testing

Inspection and Testing

Warning

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

1. Allow the engine temperature to cool for at least 30 minutes.
2. Remove the coolant pressure cap.
3. Check the condition of the upper and lower seals of the coolant pressure cap.



cdbu

1. **Lower seal**
2. **Upper seal**
3. **Spring**

Note:

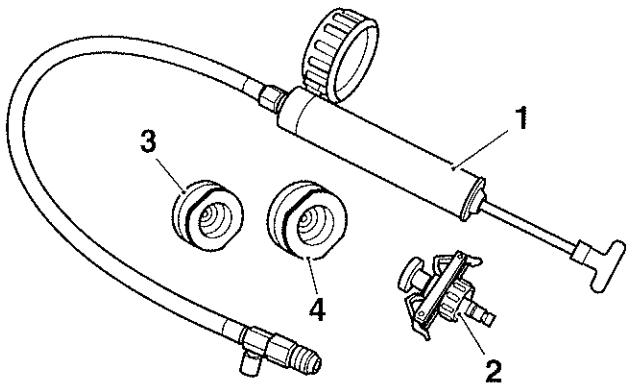
- **If there is any sign of damage or deterioration replace the cap.**

4. Pressure test the cap and cooling system to the blow off pressure of 1.1 bar as described below using Radiator and Cap Tester T3880147. If the cap opens at a lower pressure or fails to open at 1.1 bar, replace the cap.

Note:

- **It is recommended to carry out coolant pressure cap and cooling system pressure tests consecutively.**

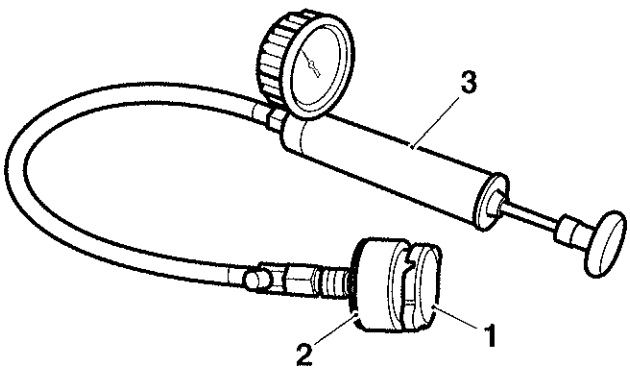
Coolant Pressure Cap Test



cgwp

1. **Hand held pump**
2. **Bayonet type connector**
3. **Pressure cap test adaptor 44 mm**
4. **Pressure cap test adaptor 46 mm**

1. Select the correct test adaptor and securely fasten to the pressure cap.
2. Carefully connect the hand pump to the adaptor ensuring an air tight seal is maintained.



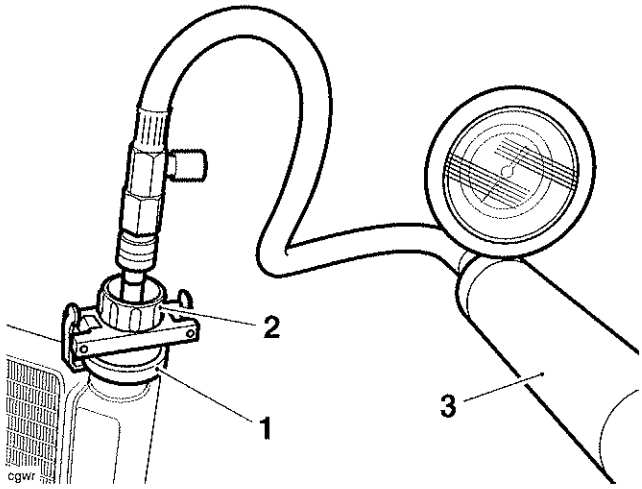
cgwq

1. **Pressure cap**
2. **Test adaptor**
3. **Hand held pump**

3. Pressure test the coolant cap to the blow off pressure. If the coolant cap opens at a lower pressure, fails to open at the correct pressure or the seal leaks, replace the cap.

Coolant System Pressure Test

1. Select the bayonet type adaptor and securely fasten to the radiator.
2. Carefully connect the hand pump to the bayonet connector ensuring an air tight seal is maintained.



cgwr

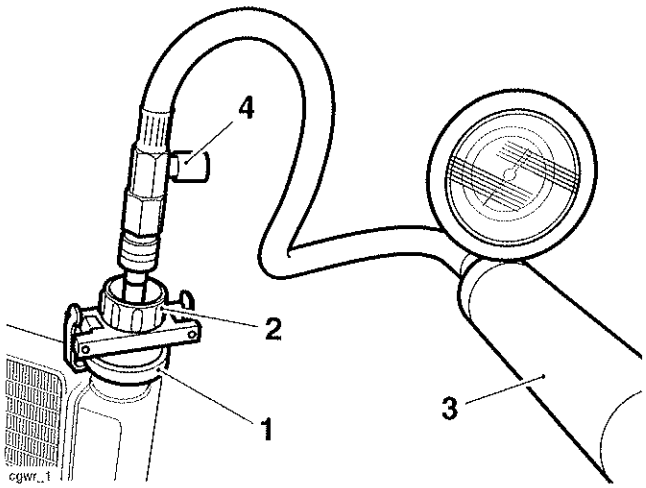
1. **Radiator filler**
2. **Bayonet type connector**
3. **Hand held pump**

3. Pressurise the cooling system to the operating pressure, using the hand pump taking care not to exceed the maximum cap pressure.
4. Hold the pressure for a minimum of 10 minutes, whilst visually inspecting the external components of the coolant system for leaks.
5. Remove the engine oil filler cap/dipstick and check for contamination of the engine oil caused by coolant escaping into the engine sump.

Note:

- **If the engine oil is contaminated further exploratory investigation will be required.**
- **If the engine oil is contaminated rectify the cause of the problem and then renew the oil and filter.**

6. Depressurise the coolant test kit using the pressure release valve.



1. **Radiator filler**
2. **Bayonet type connector**
3. **Hand held pump**
4. **Pressure release valve**

7. Refit the coolant cap.
8. Fill the coolant to the maximum mark (see page *11-5*).

Thermostat

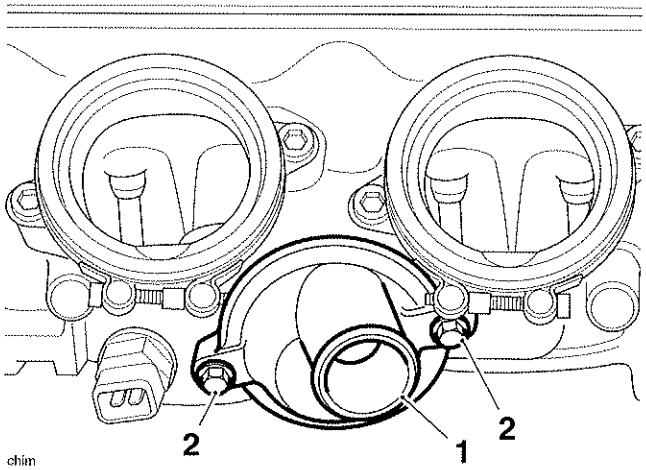
Removal

1. Remove the seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

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.

3. Drain the coolant (see page *11-6*).
4. Remove the throttle bodies (see page *10-135*).
5. Detach the top hose from the thermostat elbow.
6. Release the fixings securing the thermostat housing to the cylinder head.
7. Remove the thermostat housing.



1. **Thermostat housing**
2. **Fixings**

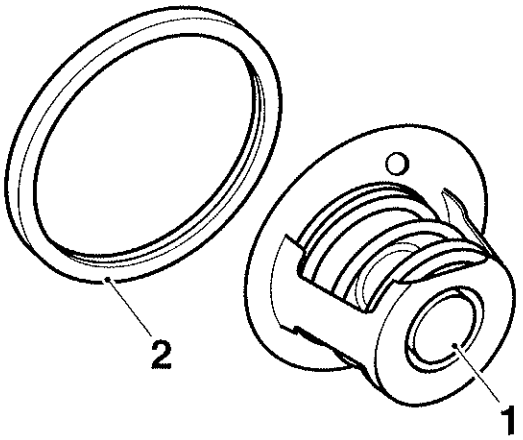
8. Remove the thermostat from the cylinder head. Discard the seal.

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.

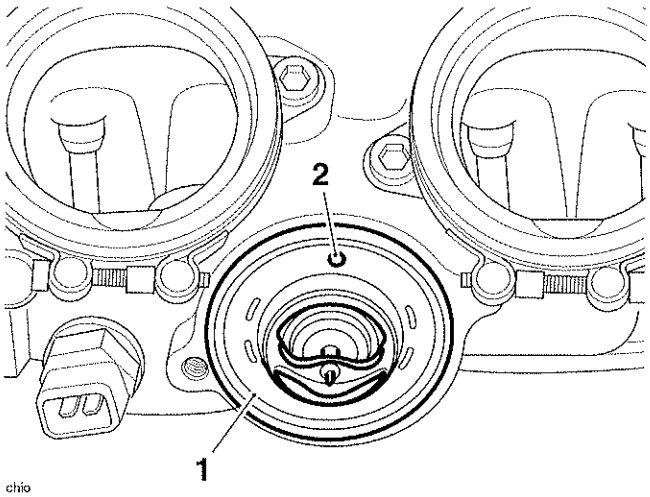
Installation

1. Fit a new seal to the thermostat.



1. **Thermostat**
2. **Seal**

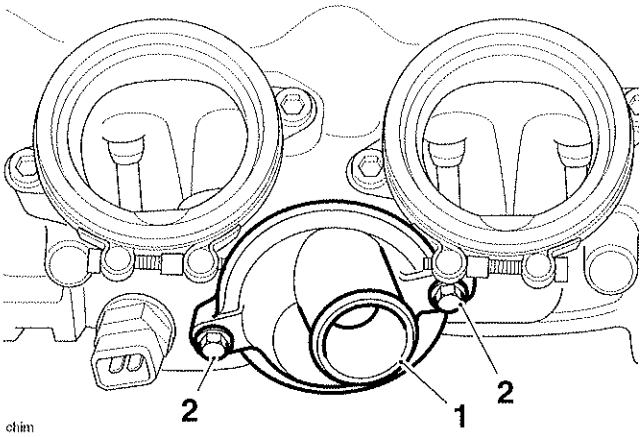
2. Locate the thermostat into the cylinder head, with the bleed hole uppermost.



chio

1. **Thermostat**
2. **Bleed hole**

3. Refit the thermostat housing and secure with the two fixings.



chim

1. **Thermostat housing**
2. **Fixings**

4. Tighten the fixings to **9 Nm**.
5. Reconnect the top hose, refit the hose clip and tighten to **2 Nm**.
6. Refit the throttle bodies (see page *10-148*).
7. Refill the cooling system (see page *11-7*).
8. Connect the battery, positive (red) lead first.
9. Refit the rider's seat (see page *17-16*).

Radiator

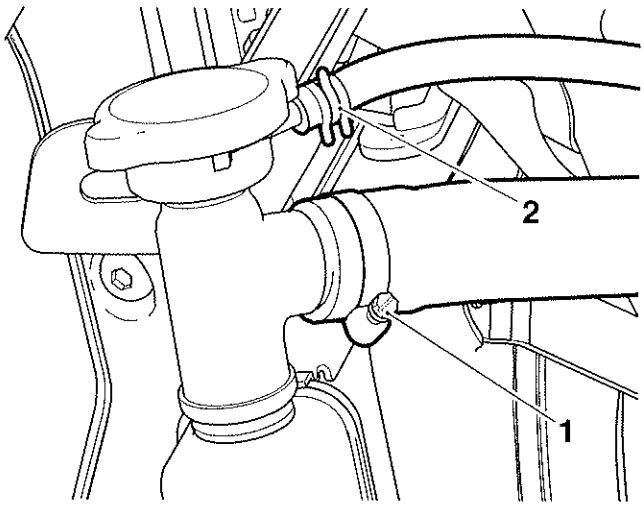
Removal

1. Remove the rider's seat (see page *17-16*).
2. Remove the battery (see page *18-8*).
3. Remove the fuel tank (see page *10-117*).
4. Drain the coolant (see page *11-6*).

Note:

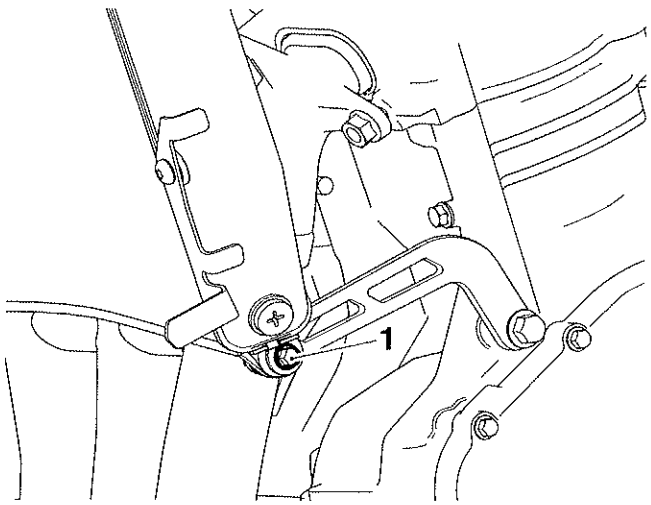
- **Note the orientation of the clips for installation.**

5. Disconnect the expansion tank, right hand and left hand hoses at the radiator.



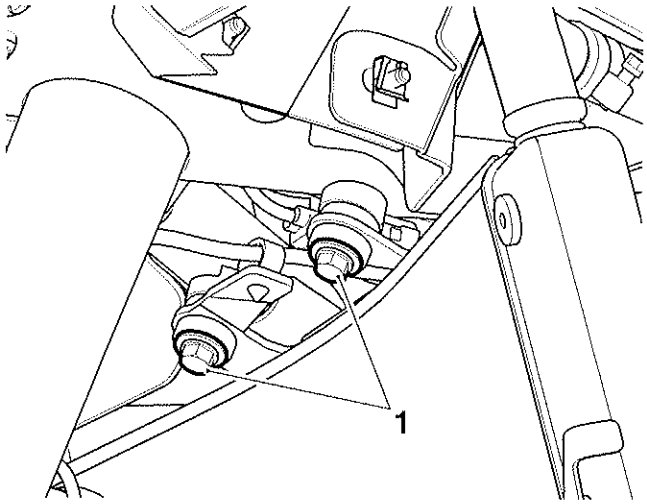
1. Left hand hose (left hand shown)
2. Expansion tank hose

6. Remove the two fixings securing the radiator to the lower radiator brackets.



1. Fixing (left hand shown)

7. Remove the air deflector fir-tree clip.
8. Release the two upper bolts securing the radiator to the frame.



1. Fixings

9. Lower the radiator and disconnect the cooling fan connection, located below the headstock.
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.

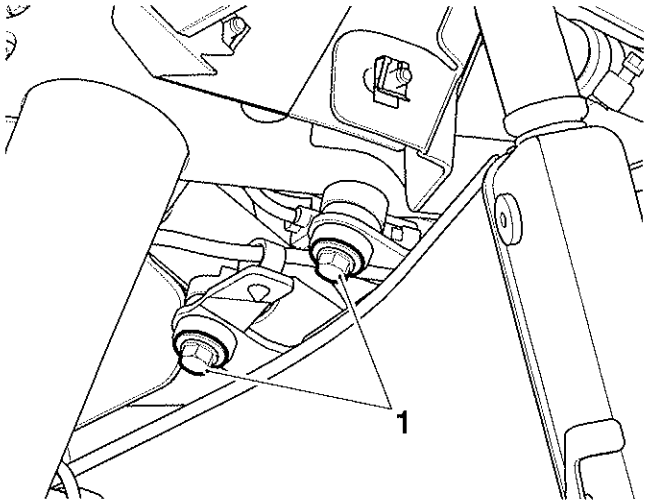
⚠ Caution

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.

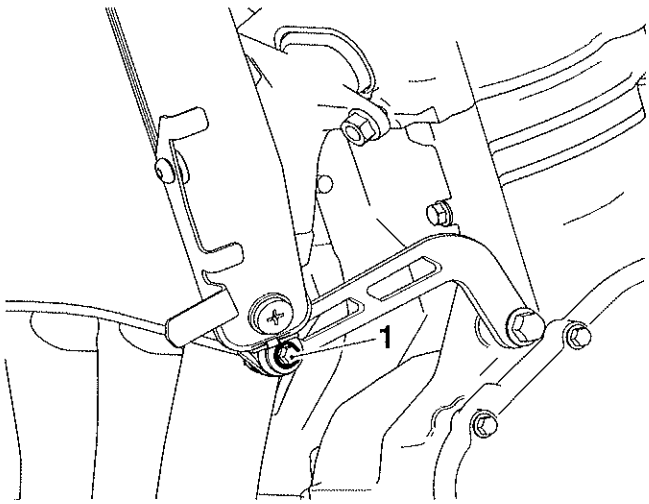
Installation

1. Position the radiator to the frame and connect the fan connector.
2. Align the radiator upper mounting to the frame. Fit the two fixings but do not fully tighten at this stage.



1. Bolt

3. Fit the two lower mounting fixings and tighten to **9 Nm**.



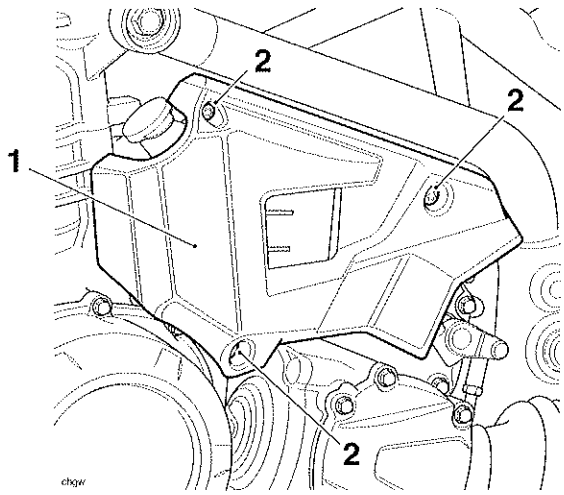
1. Fixing (left hand shown)

4. Tighten the upper fixings to **9 Nm**.
5. Reconnect the expansion tank, left hand and right hand hoses. Align the hoses clips as noted during disassembly and tighten to **2 Nm**.
6. Refit the fuel tank (see page *10-119*).
7. Refill the cooling system (see page *11-7*).
8. Refit the battery (see page *18-8*).
9. Refit the rider's seat (see page *17-16*).

Expansion Tank

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove and discard the three fixings and remove the expansion tank cover.



1. Expansion tank cover
2. Fixings

4. Position a container to collect the displaced coolant.

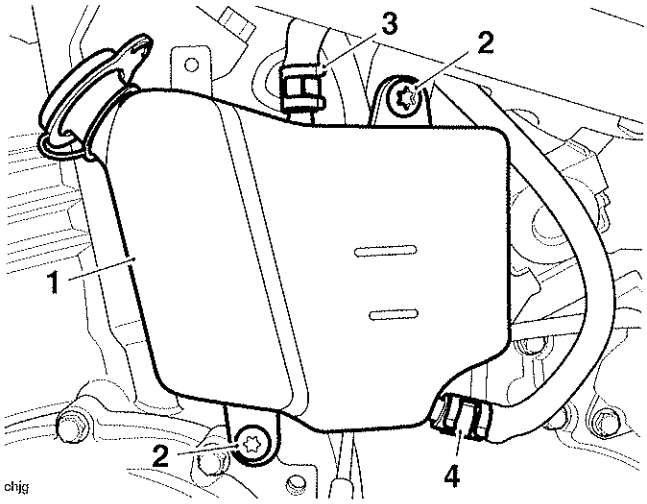
Warning

Do not disconnect the two coolant hoses from the expansion tank when the engine is hot. When the engine is hot the coolant in the expansion tank will be hot.

Contact with hot coolant will cause scalds and skin damage.

5. Disconnect the upper hose from the expansion tank.

6. Release the two fixings and manoeuvre the expansion tank away from the frame.

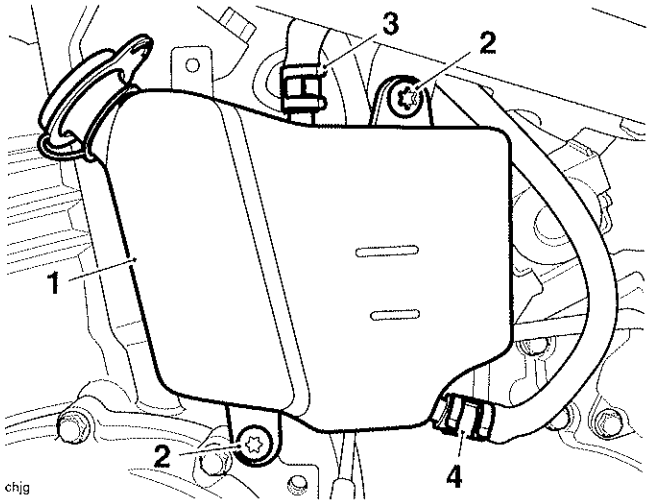


1. **Expansion tank**
2. **Fixings**
3. **Upper hose**
4. **Lower hose**

7. Release the clip, disconnect the lower hose and remove the expansion tank.

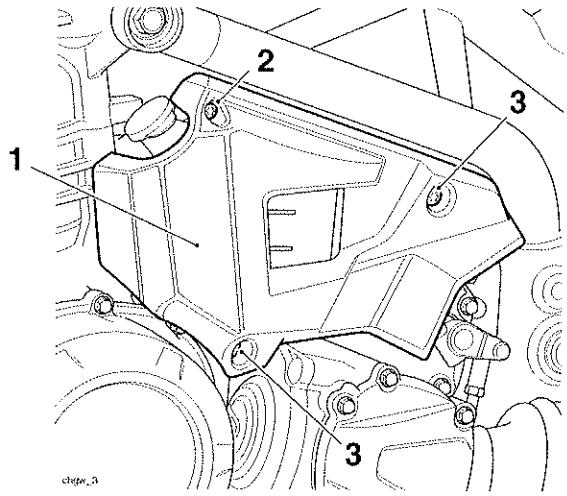
Installation

1. Align the expansion tank to the frame, fit the lower hose and secure in position with its clip.
2. Position the expansion tank to the engine and secure the expansion tank with the two fixings. Tighten to **9 Nm**.



1. **Expansion tank**
2. **Fixings**
3. **Upper hose**
4. **Lower hose**

3. Refit the upper hose and secure in position with its clip.
4. Check and adjust the coolant level as necessary (see page *11-4*).
5. Refit the expansion tank cover and secure with three new fixings. Tighten the upper fixing (M5) to **3 Nm** and the lower fixings (M6) to **7 Nm**.



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

6. Reconnect the battery, positive (red) lead first.
7. Refit the rider's seat (see page *17-16*).

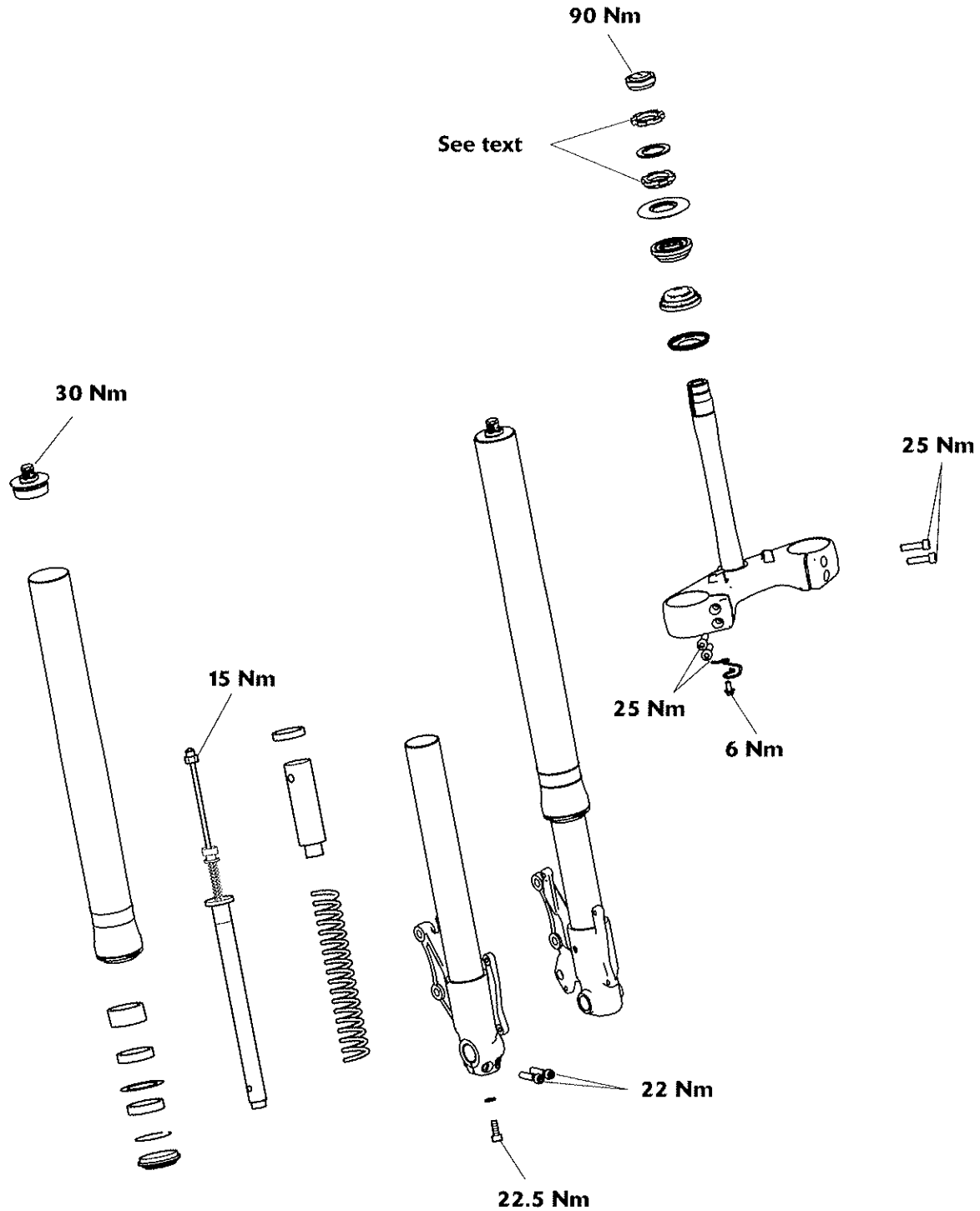
This page intentionally left blank

12 Front Suspension

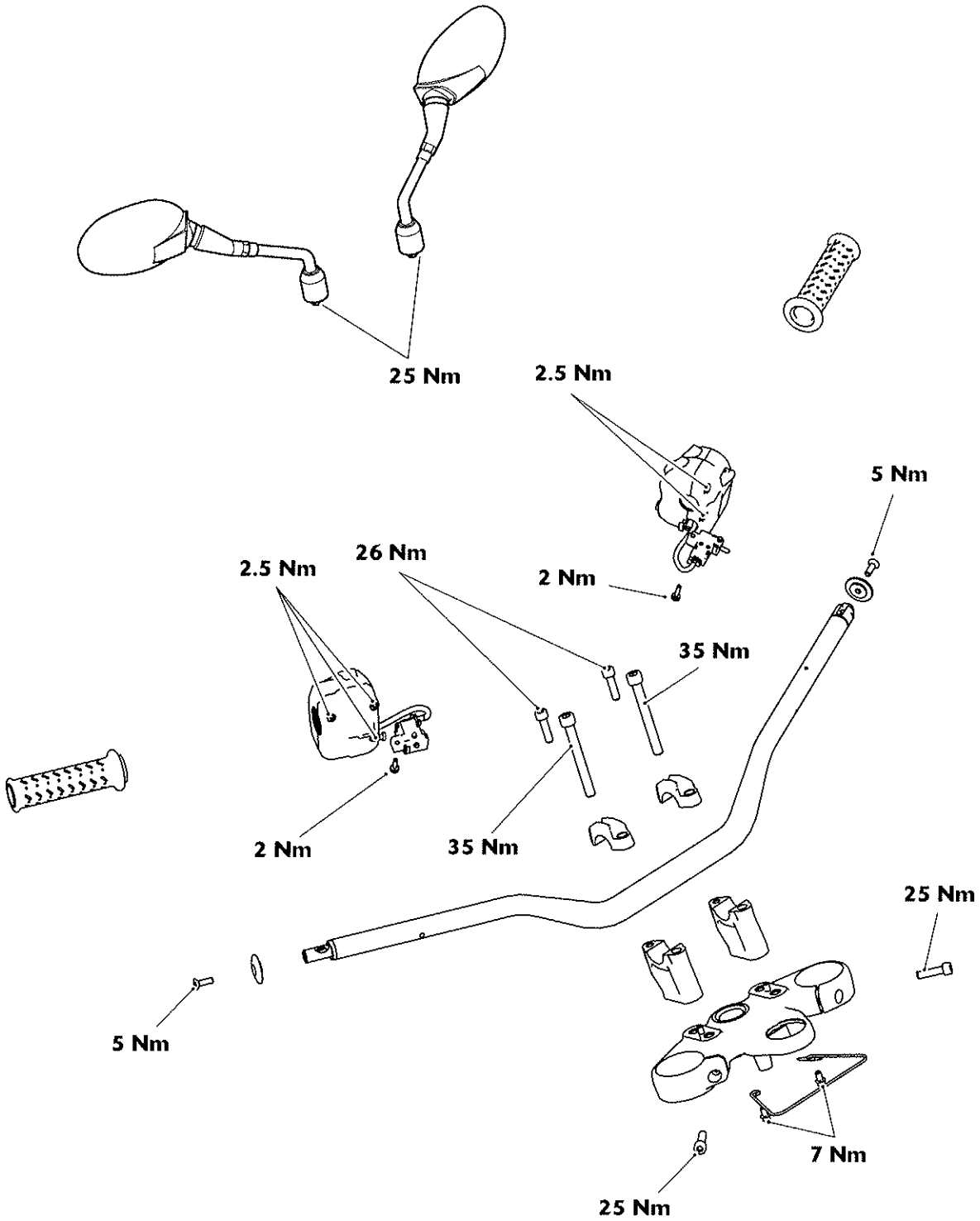
Table of Contents

Exploded View - Front Fork 12.2
Exploded View - Handlebars 12.3
Front Suspension 12.4
Fork Inspection 12.4
Front Fork 12.4
Removal 12.4
Installation 12.5
Fork Oil Change 12.6
Draining 12.6
Oil Refilling 12.6
Fork Oil Level Chart 12.7
Front Fork 12.8
Disassembly 12.8
Inspection 12.11
Assembly 12.11
Headstock Bearing Check/Adjustment 12.14
Check 12.14
Adjustment 12.15
Headstock Bearing Removal 12.16
Inspection 12.17
Installation 12.17
Handlebars 12.18
Removal 12.18
Installation 12.20

Exploded View - Front Fork



Exploded View - Handlebars



Front Suspension

The Tiger Explorer is equipped with hydraulic, telescopic front forks. The front suspension has spring pre-load adjustment only.

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

Note:

- **When the front forks are at full extension, it is possible to find a small amount of play between the upper and lower stanchions.**

Examine each fork for any sign of damage or scratching of the slider surface or for oil leaks.

If any damage or oil leakage is found, strip and repair as described in this section or consult an authorised Triumph dealer.

Check for smooth operation of the forks as follows:

- Place the motorcycle on level ground.
- While holding the handlebars and applying the front brake, pump the forks up and down several times.

If roughness or excessive stiffness is detected, repair as described in this section or consult an authorised Triumph dealer.

Warning

Riding the motorcycle with defective or damaged suspension can cause loss of motorcycle control and an accident. Never ride with damaged or defective suspension.

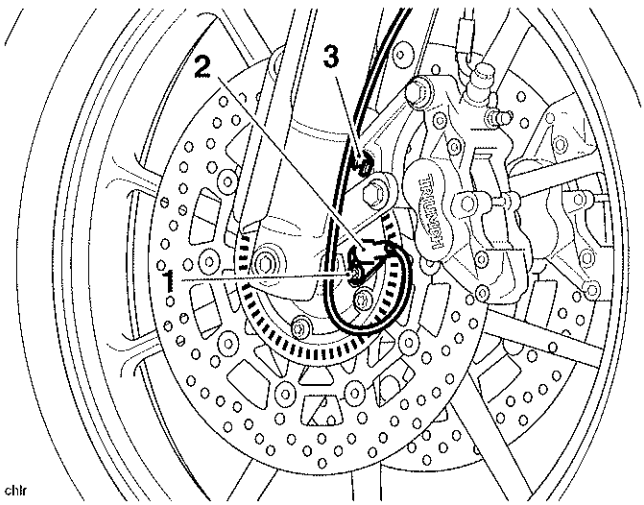
Front Fork

Removal

Warning

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

1. Raise and support the front of the motorcycle.
2. Release the fixing and detach the front wheel sensor from the left hand fork leg. Collect the shim from between the sensor and fork leg and discard the fixing.



chlr

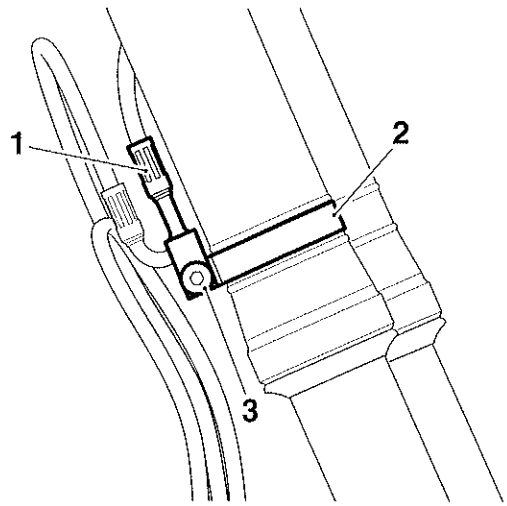
1. **Fixing**
2. **Front ABS wheel speed sensor**
3. **Clip**

3. Remove the front brake calipers (see page *15-15*).
4. Remove the front wheel (see page *16-6*).
5. Remove the front mudguard (see page *17-30*).

Note:

- **If the forks are to be dismantled, slacken the fork top cap, and if the damper cylinder is to be removed, slacken the lower damper cylinder bolt.**
- **The brake hose clip on the right hand fork leg is angled outwards by 20°. Note its orientation for installation.**

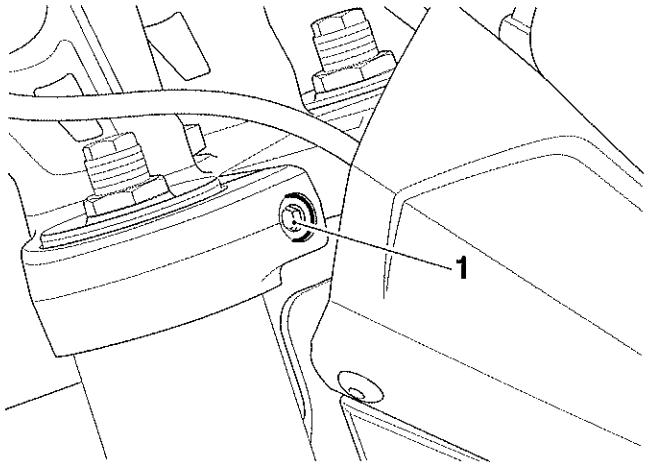
6. Remove the fixing and detach the brake hose from the clip on the right hand fork leg. Discard the fixing.



chnj

1. **Brake hose**
2. **Brake hose clip**
3. **Fixing**

7. Slacken the upper yoke clamp bolt.

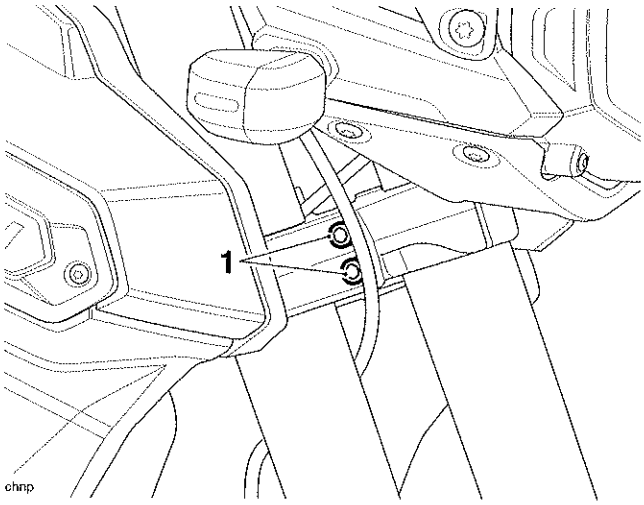


1. **Upper yoke clamp bolt**

⚠ Caution

Care must be taken when removing the forks, to ensure that the outer surfaces do not become scratched.

8. Slacken the lower yoke clamp bolts.



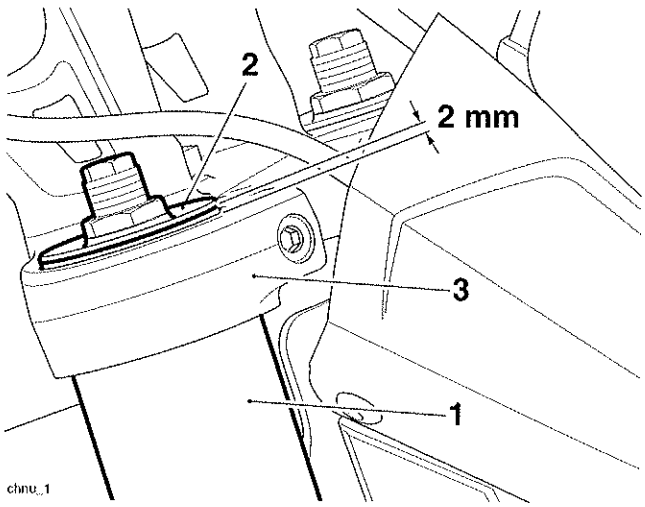
chnp

1. **Lower yoke clamp bolts**

9. Using a downward, twisting action, withdraw the forks from between the yokes.

Installation

1. Position the forks within the yokes so that the lip of the outer tube, not the top cap, is 2 mm above the upper surface of the top yoke.



chnu_1

1. **Outer tube**
2. **Top cap**
3. **Top yoke**

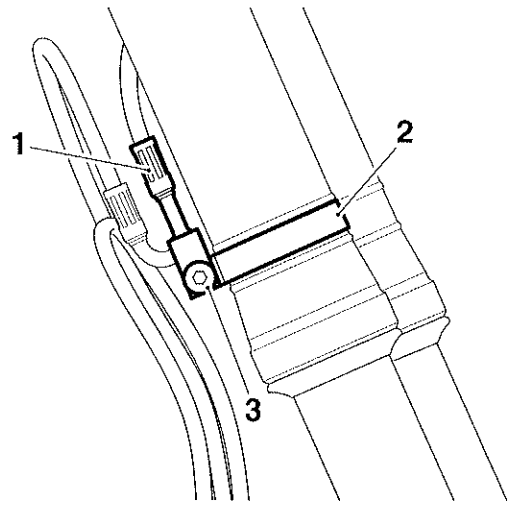
2. Tighten the lower yoke clamp bolts to **25 Nm**.
3. Tighten the upper yoke clamp bolts to **25 Nm**.

Note:

- **If the forks have been dismantled, tighten the fork top cap to 30 Nm, and if removed, the lower damper cylinder bolt to 22.5 Nm.**

4. Refit the front mudguard (see page *17-31*).

5. Position the brake hose to the clip on the right hand fork leg as noted for removal. Secure with a new fixing and tighten to **3 Nm**.



chnj

1. **Brake hose**
2. **Brake hose clip**
3. **Fixing**

6. Install the front wheel (see page *16-7*).
7. Refit the front brake calipers (see page *15-17*).

Note:

- **Check the condition of the shim before use. Do not use a shim which is bent or damaged.**

8. Position the wheel speed sensor to the left hand fork leg with its shim between the sensor and fork leg. Temporarily fit the original fixing and tighten to **5 Nm**.
9. Check and adjust the wheel speed sensor air gap as described in Air Gap Measurement (see page *15-35*).
10. Secure to the harness for the front wheel speed sensor to its clip on the front fork.
11. Lower the motorcycle to the ground and park it on the side stand.

Fork Oil Change

Draining

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.

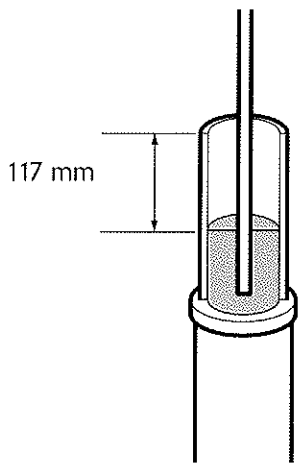
1. Remove the fork (see page *12-4*).
2. Remove the top cap assembly (see page *12-8*).
3. Holding the inner and outer tubes together, invert the fork and pour out the fork oil into a suitable container. Pump the damper rod to remove all the oil.
4. Remove the fork spring (see page *12-8*).

Oil Refilling

The oil level is measured from the upper surface of the fork outer tube, with the fork fully compressed and the spring removed.

Note:

- **The oil level specified for Tiger Explorer is 117 mm from the upper surface of the fork inner tube, with the spring removed and the fork fully compressed.**

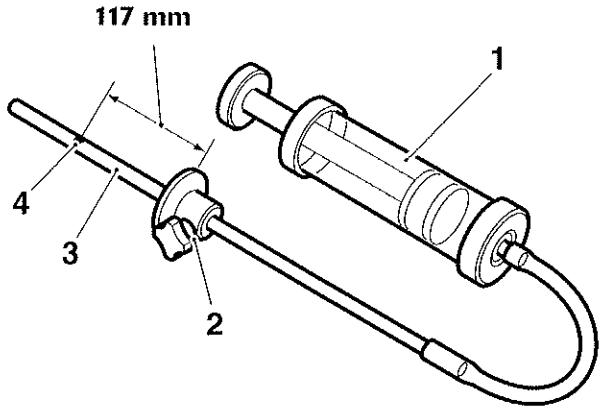


cbyf

Fork Oil Level
(fully compressed and spring removed)

1. Fill the fork with the grade of oil specified in the fork oil table, to a level above that which will finally be required.
2. Pump the fork and damper assembly several times to expel any trapped air then fully compress the fork and support it in an upright position. Leave the fork for a few minutes to allow the oil to stabilise.

3. Set the scale on tool Fork Filler/Evacuator 3880160 - T0301 to 117 mm, as shown below.



cbyg

1. **Tool, Fork Filler/Evacuator 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.**

4. Insert the scale end of the tool into the fork inner tube.
5. 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).
6. The fluid level in the fork is now set to the height set on the tool scale. Check the tool scale setting and repeat the process if incorrectly set.

Warning

Incorrect fork oil levels could result in an unsafe riding condition leading to loss of control and an accident.

7. Assemble the fork (see page *12-11*).
8. Refit the fork (see page *12-5*).

Fork Oil Level Chart

Tiger Explorer			
Oil Level*	Oil Volume	Oil Grade	Fork Pull Through
117 mm	664 cc	KHL15-10	Lip of the outer tube, not the top cap, is 2 mm above the upper surface of the top yoke

***Fork Fully Compressed and Spring Removed**

Front Fork

Disassembly

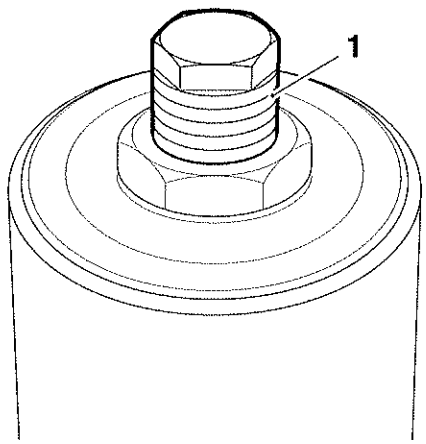
Warning

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

Note:

- **Before removing the forks, slacken the top cap a little to allow easier removal during strip-down.**
- **The fork seals can be renewed without removal of the damping cylinder. Unless removal of the damping cylinder is necessary, omit steps 16 and 17 of this procedure.**
- **If the damping cylinder is to be removed, loosen the lower damping cylinder bolt before removing the forks.**

1. Remove the forks (see page *12-4*).
2. Note the position of the spring pre-load adjuster relative to the fork cap to ensure the setting is retained on re-assembly. Turn the spring pre-load adjuster until 5 rings are shown on the adjuster.



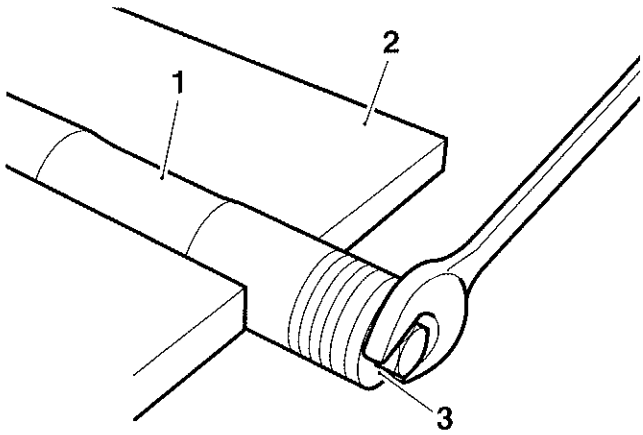
chns

1. Pre-load adjuster marks

Warning

Do not change the fork adjustments settings. If they are changed, this will change 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 motorcycle control and an accident.

3. Very gently clamp the fork in the soft jawed vice to prevent it from turning, hold the outer tube, then unscrew the top cap from the outer tube.



ccun

1. Fork
2. Soft jaws
3. Top cap

Caution

Never tightly clamp the outer tube as this will cause the tube to permanently distort. A distorted tube is not serviceable and must be replaced.

Note:

- **The top cap is not under spring tension and will not spring upwards when the threads disengage.**

4. Holding the inner and outer tubes together, invert the fork and pour out the fork oil into a suitable container. Pump the damper rod to remove all the oil.
5. Return the fork to the soft jawed vice.

Warning

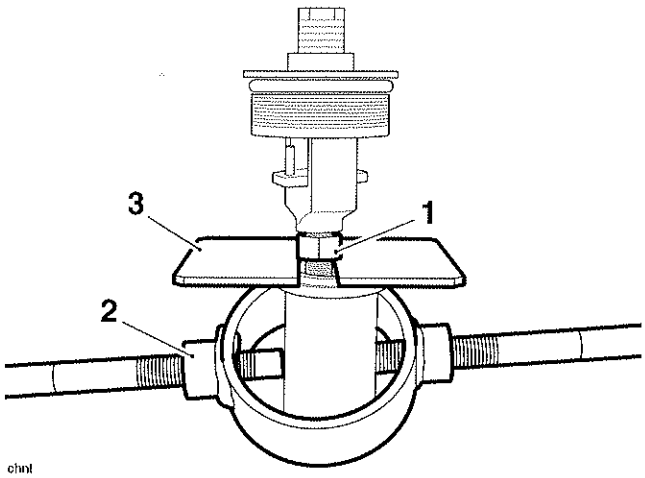
While compressing the fork spring always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

6. Fit Fork Spring Compressor T3880067 over the spring spacer. Position the two adjustable arms to the holes in the spring spacer. Screw in the arms until they positively engage in the spring spacer holes.

Note:

- **An assistant may be required to insert the spring holder below the damper lock nut.**

7. Using the Fork Spring Compressor T3880067, manually compress the fork spring and insert the spring holder as shown, below the damper lock nut.



chnt

1. **Damper lock nut**
2. **Fork Spring Compressor T3880067**
3. **Spring holder, part of T3880067**

8. Slacken the lock nut, unscrew and remove the top cap. If necessary remove the O-ring seal from the top cap. The top cap assembly cannot be dismantled.
9. Compress the spring and remove the spring holder.

⚠ Warning

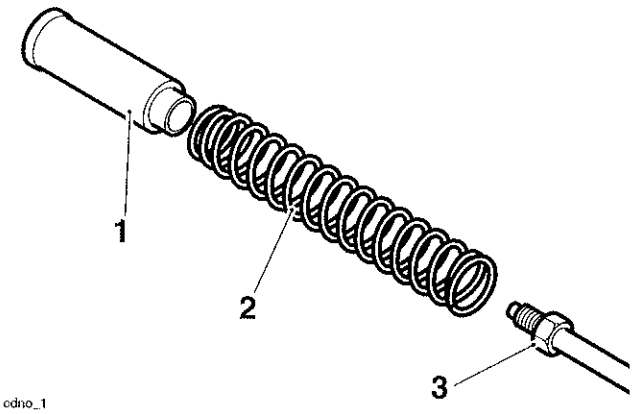
While compressing the fork spring always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

10. Remove the Fork Spring Compressor T3880067 from the spring spacer.

Note:

- **The spring has a smaller coil diameter at its upper end. Note the orientation of the spring before removal.**

11. Remove the spring spacer and spring.



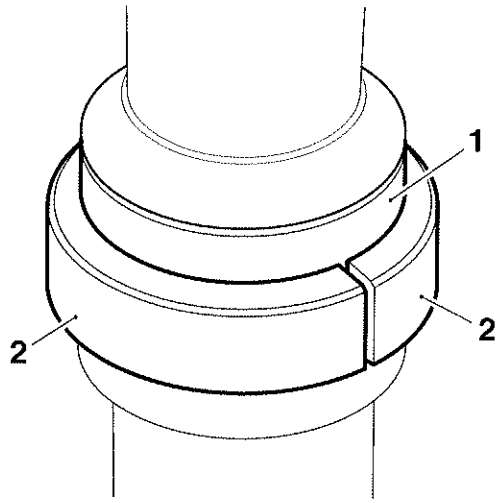
odno_1

1. **Spring spacer**
2. **Spring**
3. **Damper rod**

Note:

- **To help with identification of the service tools, Nylon Fork Support Collets T3880621 has three grooves turned on its outside circumference.**

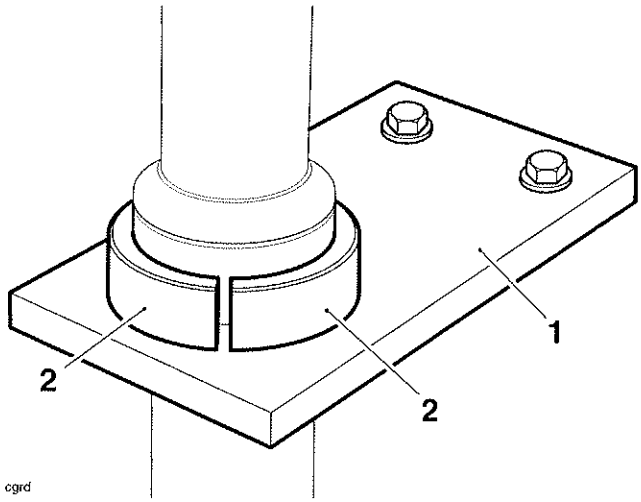
12. Fit both halves of Nylon Fork Support Collets T3880621 to the outer tube as shown below. Hold them in position by hand.



cgrc

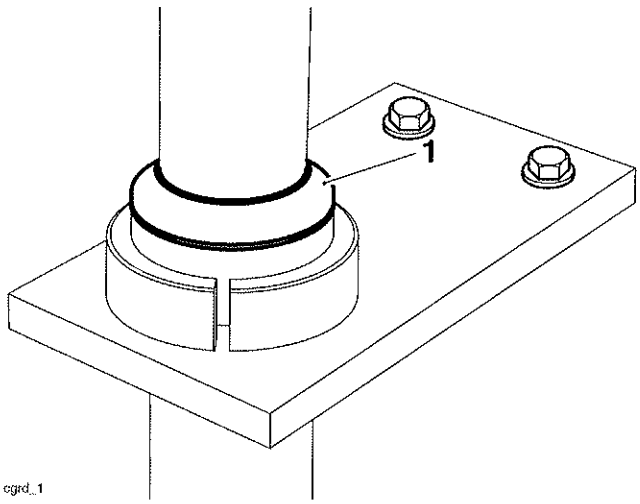
1. **Outer tube**
2. **Nylon Fork Support Collets T3880621**

13. Invert and mount the fork assembly and collets to Support Plate T3880153. Ensure the collets fit into the hole in the support plate.



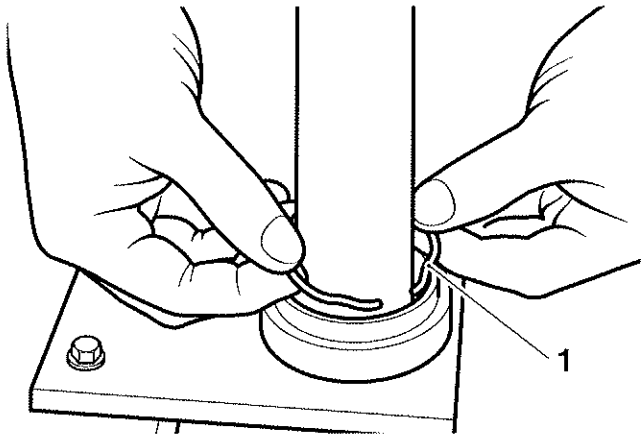
1. Support Plate T3880153
2. Nylon Fork Support Collets T3880621

14. Raise the inner tube and remove the dust seal from the outer tube.



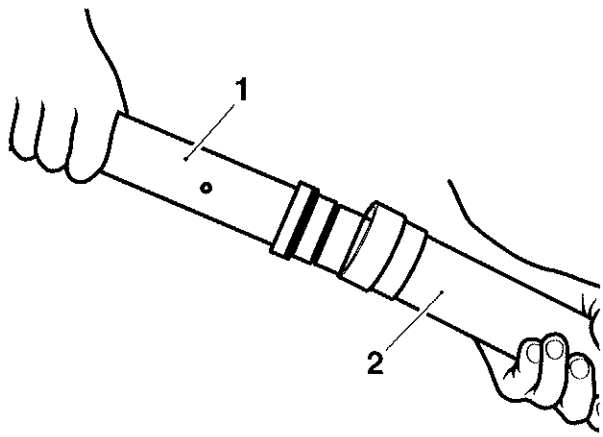
1. Dust seal

15. Remove and discard the circlip.



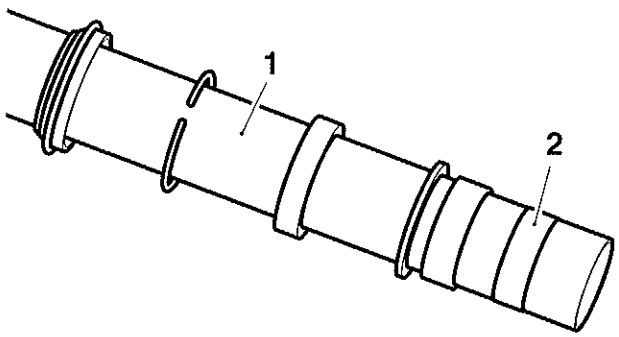
1. Circlip

16. Remove the fork from the support tool and collect the collets.
17. Using a slide hammer action to release the oil seal and bushes from the outer tube, separate the inner and outer tubes leaving the seals and bushes in place on the inner tube. Note the relative positions and orientation of all bushes and seals before removal.



1. Inner tube
2. Outer tube

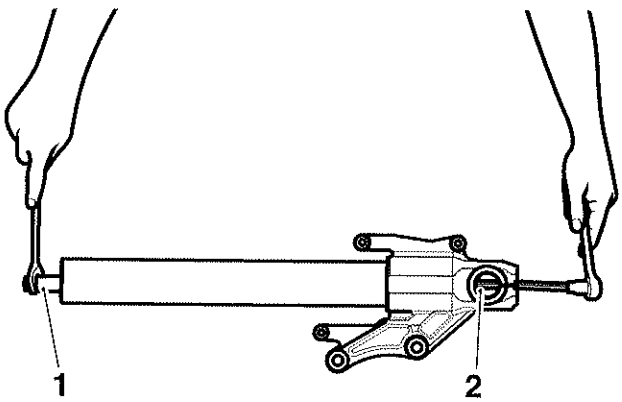
18. To allow the removal of the seals and bushes, carefully remove the upper bush from the inner tube.



ccup_3

1. **Inner tube**
2. **Upper bush**

19. If removal of the damping cylinder is required, insert the end of Damper Tube Wrench T3880622 with the lugs over the damper rod and lock nut. Engage the lugs on the tool to the flat edges of the damping cylinder inside the fork. Hold the tool to prevent the cylinder from turning while removing the damper bolt from the bottom of the fork. Discard the washer from the damper bolt.



cdnr_1

1. **Damper Tube Wrench T3880622**
2. **Damping cylinder bolt location**

20. Remove the tool, then the damping cylinder from the inner tube.

Inspection

1. Inspect the inner tube for stone chips, scoring, scratches, excessive wear and any other damage. Renew as necessary.

Note:

- **Small inclusions in the inner tube may be removed using a fine grade stone or similar.**

2. Inspect the spring for damage, cracks and deformation. Renew the spring if necessary.
3. Inspect the seals and bushes for damage. Renew any damaged items if necessary.

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.

Note:

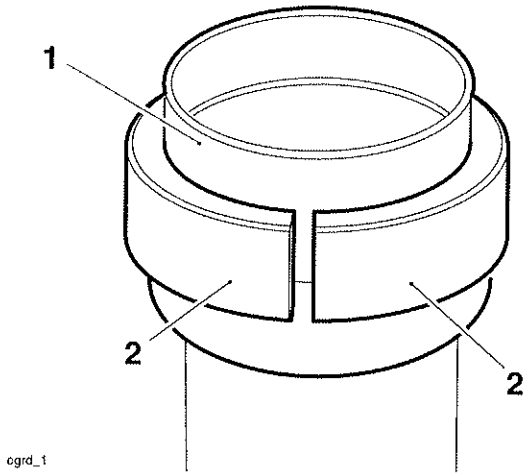
- **If the damping cylinder has not been removed, omit steps 1 to 23.**

1. Fit the damping cylinder to the inner tube.
2. Clean the threads of the damping cylinder bolt and fit a new sealing washer. Prevent the cylinder from turning with Damper Tube Wrench T3880622, while tightening the damping cylinder securing bolt to **22.5 Nm**.

Note:

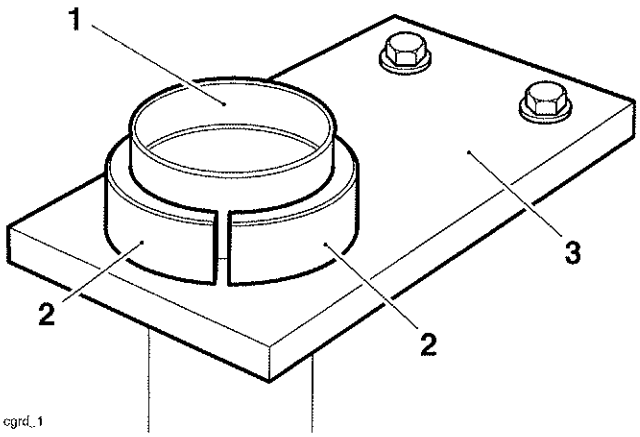
- **To help with the identification of the Nylon Fork Support Collets T3880621 has 3 grooves turned on its outside circumference.**

3. Fit both halves of the Nylon Fork Support Collets T3880621 to the outer tube as shown below and hold in position by hand.



1. **Outer tube**
2. **Nylon Fork Support Collets T3880621**

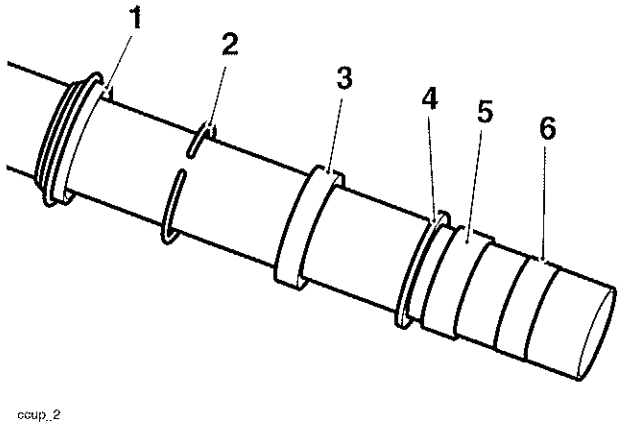
4. Invert and position the fork outer tube to Support Plate T3880153.



1. **Outer tube**
2. **Nylon Fork Support Collets T3880621**
3. **Support Plate T3880153**

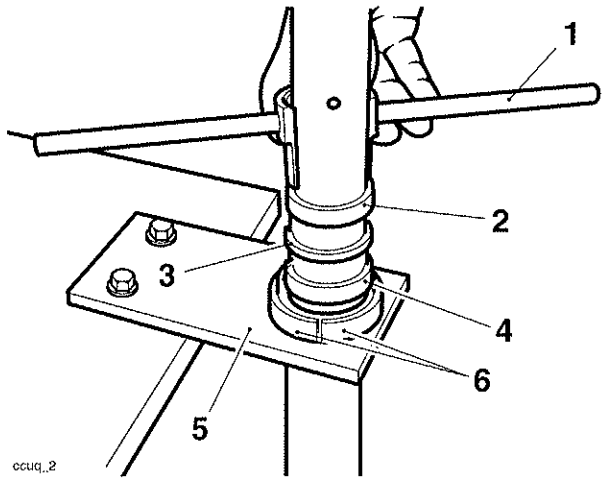
5. Apply a smear of fork oil to the upper and lower bushes and seals.

6. Position the seals and bushes to the inner tube as noted prior to removal. Ensure the seal (item 3) is positioned with the text end facing the circlip. Use a new circlip.



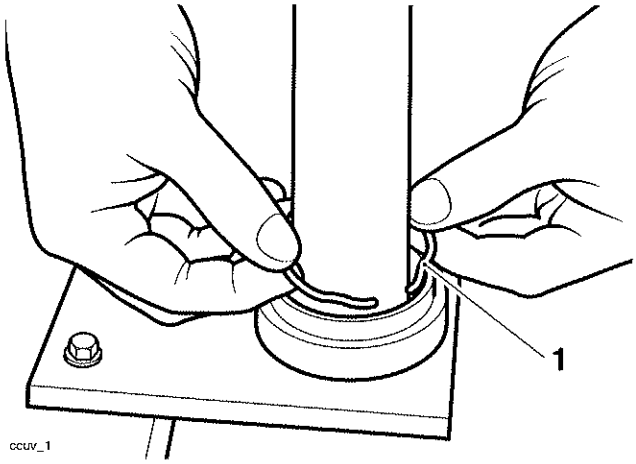
1. **Dust seal**
2. **Circlip**
3. **Seal**
4. **Washer**
5. **Lower bush**
6. **Upper bush**

7. Fit the upper bush to the fork inner tube.
8. Position the inner tube assembly to the outer, ensuring that the oil and dust seal lips do not become damaged.
9. Using the narrow end of Fork Seal Installer T3880623, guide the lower bush, washer and seal into place.



1. **Fork Seal Installer T3880623**
2. **Seal**
3. **Washer**
4. **Lower bush**
5. **Support Plate T3880153**
6. **Nylon Fork Support Collets T3880621**

10. Retain the bush, washer and seal with a new circlip.



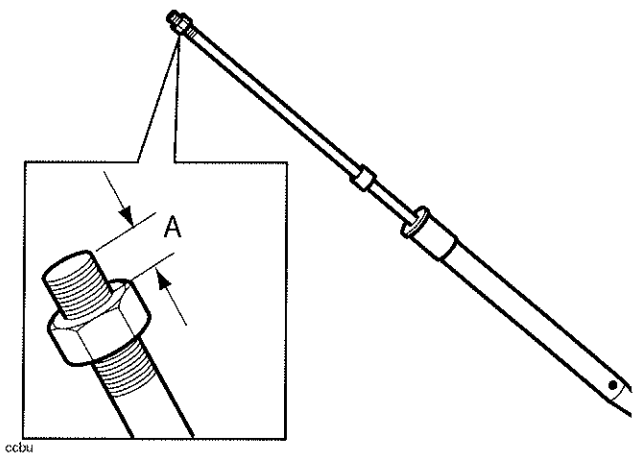
1. Circlip

11. Position the dust seal to the outer tube.
12. Invert Fork Seal Installer T3880623 and, using hand pressure only, push the dust seal squarely into the outer tube.
13. Remove the fork assembly from the support plate, collect the collets and fill the fork with oil (see page *12-6*).
14. Position the fork assembly as for compression of the fork spring during strip down.

⚠ Caution

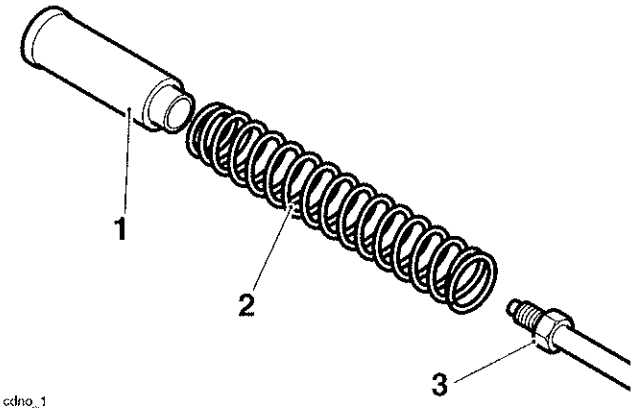
If removed, the damping rod lock nut must be fitted with the flat face facing to the top of the fork. The slightly tapered face must face the fork spring. Incorrect orientation may lead to a loosening of the lock nut.

15. Re-thread the damper cylinder rod lock nut leaving **12 mm** of thread exposed above the nut (dimension **A** below).



Damper Cylinder Rod Nut Setting

16. Refit the fork spring, close wound end uppermost, and spring spacer.



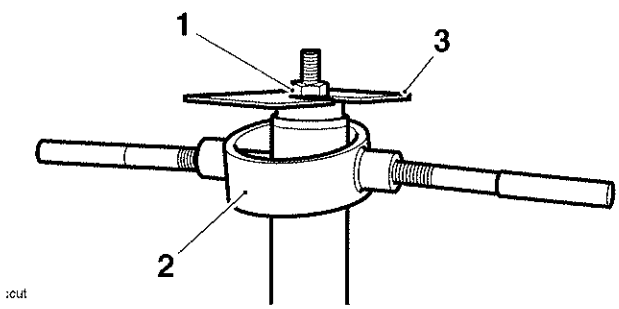
1. Spring spacer
2. Spring
3. Damper rod

17. Attach Fork Piston Holder 3880085-T0301 to the threads of the damper rod and pull the damper upwards.

⚠ Warning

While compressing the fork spring always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

18. Refit Fork Spring Compressor T3880067 as previously described, manually compress the fork spring and insert the spring holder as shown, below the damper lock nut.



1. Damper lock nut
2. Fork Spring Compressor T3880067
3. Spring holder (part of T3880067)

19. Fit a new O-ring to the top cap.
20. Refit the top cap to the damper rod.
21. Hold the top cap while tightening the damper rod lock nut to **15 Nm**.
22. Remove Spring holder and Fork Spring Compressor T3880067 from the damper rod.
23. Lubricate the O-ring on the top cap with a smear of fork oil then screw the top cap fully into the inner tube.
24. Tighten the top cap to **30 Nm**.

Note:

- **It is much easier to tighten the top cap when the fork has been refitted.**

25. Refit the fork (see page *12-5*).

Headstock Bearing Check/Adjustment

Check

Note:

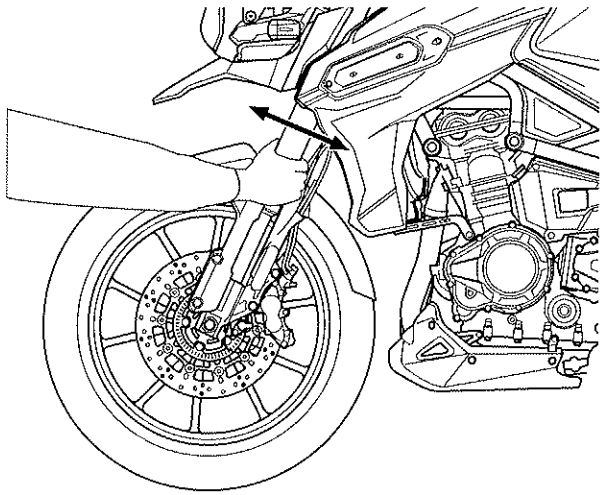
- **When checking the headstock free play, hold the lower end of the outer tube when carrying out the free play check.**

1. Raise and support the front of the motorcycle.

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. Hold the lower end of the outer tube of the front forks as illustrated and 'rock' with a front-to-rear motion. If free play can be detected, the headstock bearings require adjustment.



Checking Headstock Bearing Adjustment

Adjustment

Warning

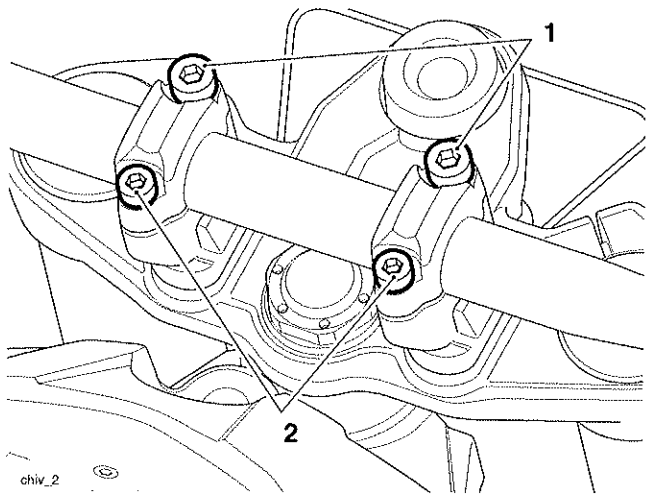
Always return the handlebars and risers to their original position as noted in paragraph 1. Operating the motorcycle with a handlebar position that is unfamiliar may lead to loss of control or an accident.

1. Note the orientation of the adjustable risers, in order that they can be returned to the same position when the repair operation is complete.
2. Raise and support the front of the motorcycle.

Note:

- **The bolt positions shown below are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**

3. Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.



1. **10 mm bolts**
2. **8 mm bolts**

4. As an assembly, raise the handlebars until clear of the top yoke. Rest the assembly forward of the steering stem such that access to the headstock top nut and the adjustment nuts is unrestricted. Ensure the master cylinder remains in an upright position.
5. Slacken the top yoke clamp bolts.

Warning

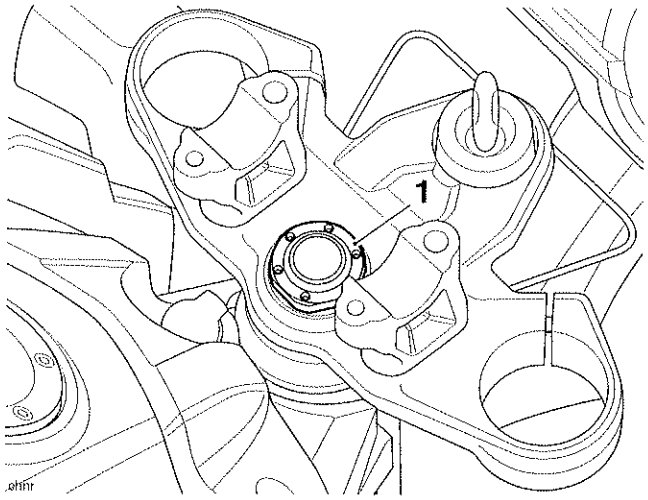
If the lower yoke fixings are also slackened, the forks will no longer support the weight of the motorcycle.

Do not slacken the lower yoke fixings as, in this condition, the motorcycle could topple over causing damage and/or risk of injury.

Caution

Care must be taken when removing the headstock top nut, to ensure that the top nut and top yoke do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

6. Remove the headstock upper nut and its washer. Discard the washer.



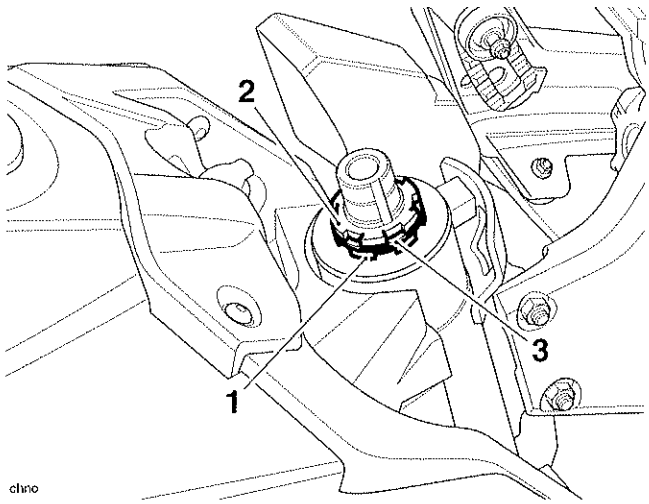
1. **Headstock upper nut**

7. Ease the top yoke from the forks and support while detached.
8. Adjust the bearing free play as follows, all using Adjuster Socket, 48 mm T3880620:
   - Ensure that the treads are free from grease.
   - Remove the lock nut and tab washer.
   - Slacken the adjuster nut then tighten to **40 Nm**.
   - Slacken the adjuster nut, then re-tighten to **10 Nm**.
   - Fit the tab washer and lock nut.

Warning

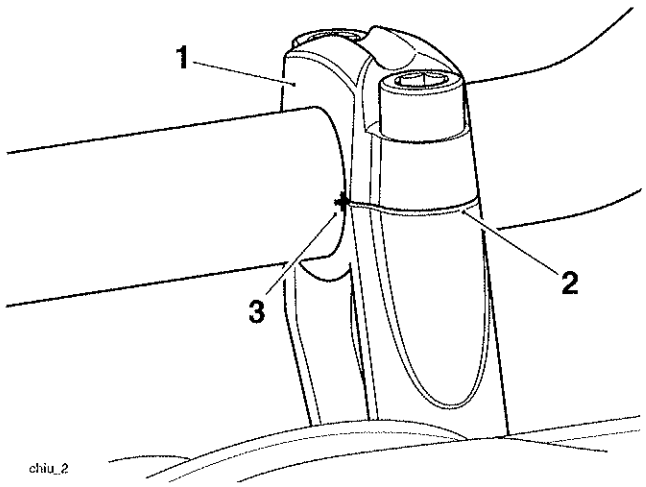
It is essential that the adjuster nut is not over-tightened. If the adjuster is over-tightened it will cause a pre-load on the headstock bearings. This will introduce tight steering, which could cause loss of control and an accident.

- Hold the adjuster nut in position while tightening the lock nut to **40 Nm**.



1. **Adjuster nut**
2. **Lock nut**
3. **Tab washer**

9. Refit the top yoke assembly to the forks.
10. Fit a new washer and the original top nut. Tighten the top nut to **90 Nm**.
11. Tighten the top yoke clamp bolts to **25 Nm**.
12. Ensure that the risers are in the same orientation as noted for removal.
13. Locate the handlebar assembly in the risers. Fit the upper clamps and the 10 mm bolts.
14. Rotate the handlebar so that the etched + marking on the handlebar aligns with the front left hand split line of the clamp riser.



1. **Upper clamp**
2. **Clamp split line**
3. **Centre marking**

15. Tighten the 10 mm bolts to **35 Nm**.
16. Fit the 8 mm bolts and tighten to **26 Nm**.
17. Recheck the bearing adjustment (see page *12-14*).

Headstock Bearing Removal

Warning

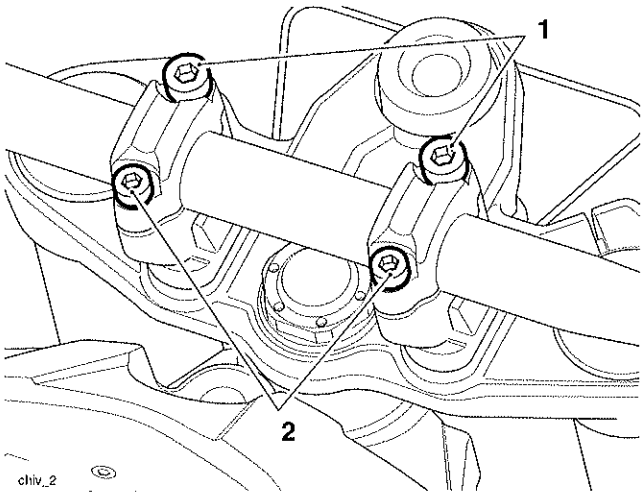
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help to prevent it falling and causing injury to the operator or damage to the motorcycle.

1. Remove both forks (see page *12-4*).
2. Note the orientation of the adjustable risers, in order that they can be returned to the same position when the repair operation is complete.

Note:

- **The bolt positions shown below are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**

3. Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts.



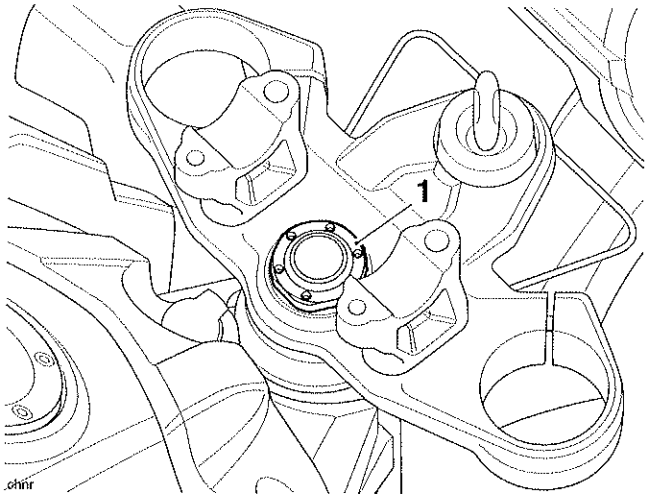
1. **10 mm bolts**
2. **8 mm bolts**

4. As an assembly, raise the handlebars until clear of the top yoke. Rest the assembly forward of the steering stem such that access to the headstock top nut and the adjustment nuts is unrestricted. Ensure the master cylinder remains in an upright position.
5. Slacken the top yoke clamp bolts.

Caution

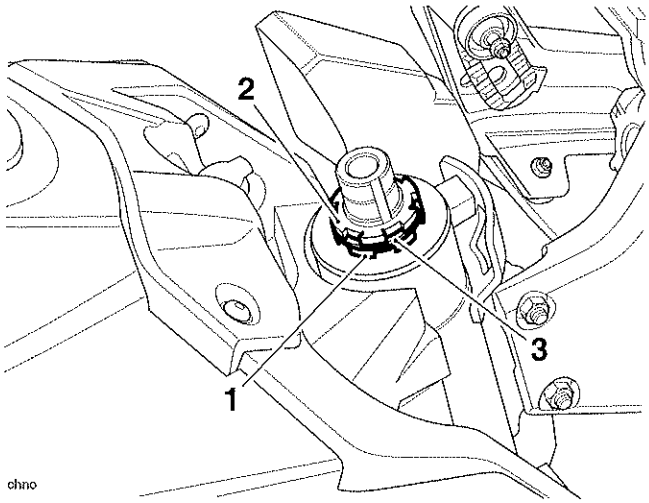
Care must be taken when removing the headstock top nut, to ensure that the top nut and top yoke do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

6. Remove the headstock upper nut.



1. Headstock upper nut

7. Ease the top yoke from the forks and support while detached.
8. Using Adjuster Socket, 48 mm T3880620 remove the lock nut and tab washer. Discard the tab washer.



1. Adjuster nut
2. Lock nut
3. Tab washer

9. Using the same tool, remove the adjuster nut.
10. Remove the bearing cover and dust seal.
11. Remove the bottom yoke from below the frame headstock.

Warning

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

12. Using a suitable drift, evenly and progressively drive the bearing races from the frame headstock.
13. Remove the inner race and dust seal from the bottom yoke using a press or puller.

Inspection

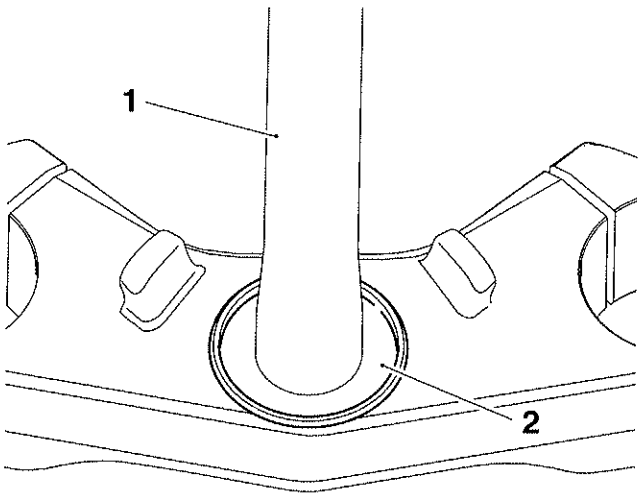
Warning

Only remove raised witness marks from within the frame. Removal of material below any raised areas will reduce the level of interference between the frame and the bearings. Loss of interference could cause the bearing to become loose in the frame leading to loss of motorcycle control and an accident.

1. Examine the frame for any raised witness marks caused by the removal process. Remove any such marks with fine emery paper or a gentle file.

Installation

1. Fit a new dust seal to the steering stem on the bottom yoke.

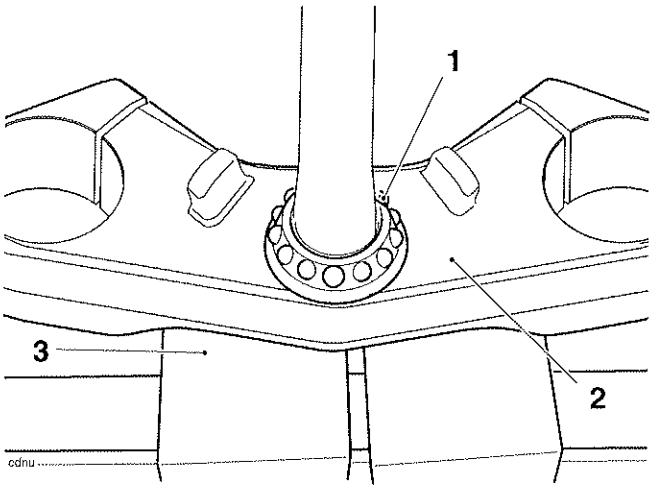


1. Steering stem
2. Dust seal

Caution

Protect the threads of the bottom yoke when using a press or puller as damaged threads may mean replacing the yoke completely.

2. Press a new lower bearing inner race onto the steering stem of the bottom yoke.



1. **Bearing**
2. **Bottom yoke**
3. **Press bed**

3. Evenly and progressively drive a new complete upper bearing into the frame headstock.
4. Lubricate the lower bearing using multi-purpose grease.
5. Drive a new lower outer bearing into the frame headstock.
6. Lubricate the upper bearing using multi-purpose grease.
7. Insert the lower yoke to the frame, fit the upper bearing and race.
8. Fit a new upper dust seal and bearing cover, and retain with the adjuster nut.
9. Adjust the headstock bearings (see page *12-14*).
10. Locate the upper yoke to the steering stem. Install but do not fully tighten the headstock top nut at this stage.
11. Fit the forks (see page *12-5*).
12. Tighten the headstock upper nut to **90 Nm**.
13. Check that no free play exists in the headstock bearings. Adjust as necessary (see page *12-14*).

Handlebars

Warning

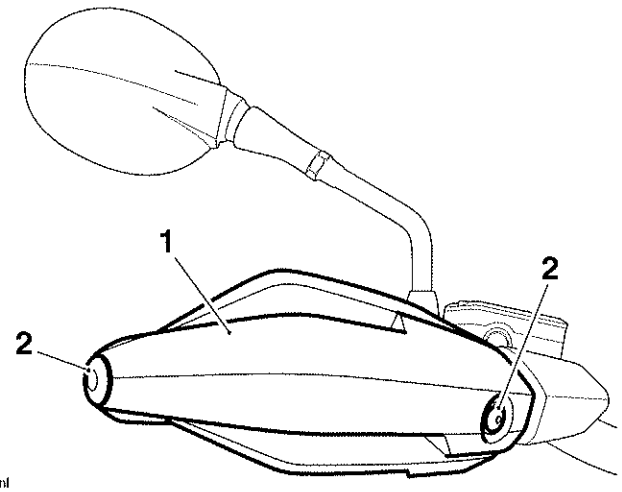
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

Removal

Warning

Always return the risers to their original position as noted in paragraph 1. Operating the motorcycle with a handlebar position that is unfamiliar may lead to loss of control or an accident.

1. Note the orientation of the adjustable risers, in order that they can be returned to the same position when the repair operation is complete.
2. Remove the rider's seat (see page *17-16*) and disconnect the battery, negative (black) lead first.
3. **For motorcycles with handguards fitted only:** Release the two fixings and remove the handguards and the handlebar end weights.



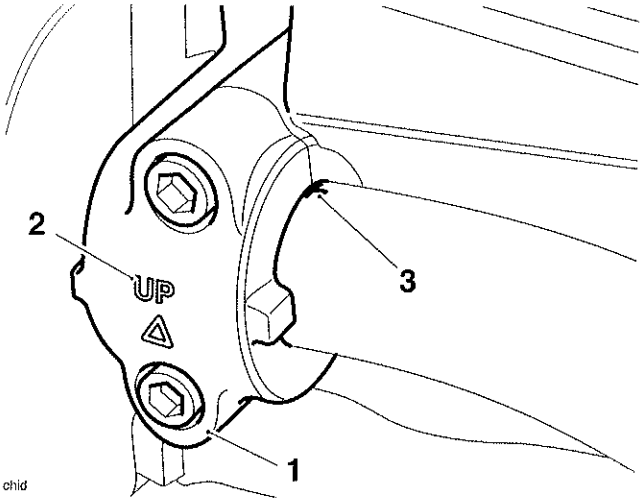
1. **Handguard (left hand shown)**
2. **Fixings**

4. **For motorcycles without handguards fitted only:** Release the fixing and remove the end weights from the handlebars.

Caution

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

5. Release the handlebar clamp screws and remove the clamp from the clutch master cylinder. Taking care to not invert the clutch fluid reservoir, lay the assembly aside.



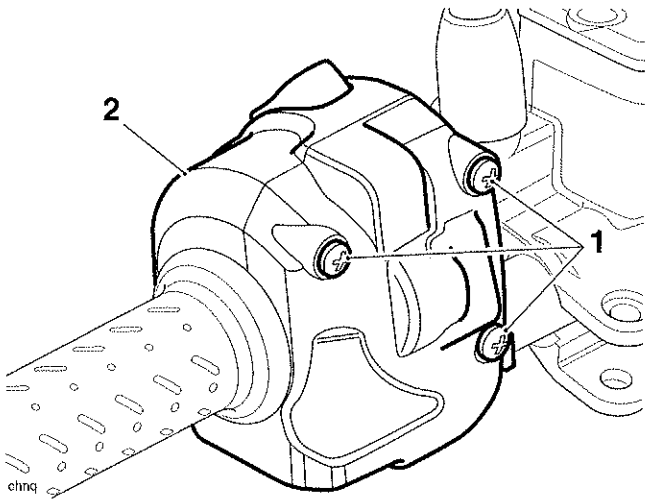
1. **Handlebar clamp**
2. **UP arrow**
3. **Alignment mark**

6. Release the screws and free the left switch gear assembly from the handlebar. Without disconnecting any wiring, lay the switch aside.
7. Note the setting of the brake lever adjuster to ensure it is returned to the same position for installation.
8. Remove the pivot lock nut and bolt securing the brake lever to the master cylinder, and remove the lever. Discard the lock nut.

Note:

- **The front of the right hand switch cube can not be removed from the handlebar until the handlebar is released from its clamps.**

9. Release the three fixings and free the rear of the right hand switch cube from the handlebar. Without disconnecting any wiring, lay it aside.

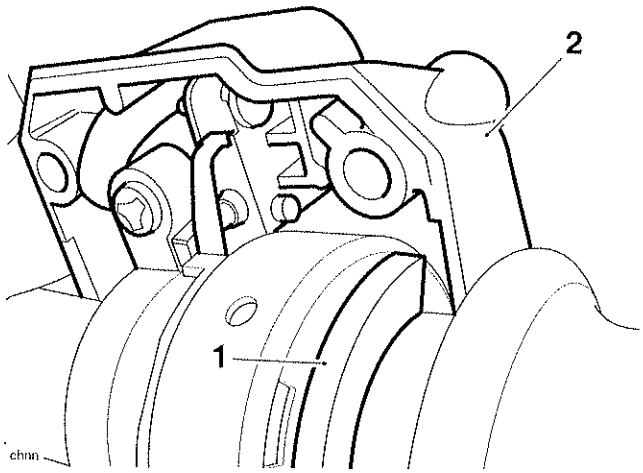


1. **Fixings**
2. **Rear of switch cube**

Note:

- **Note the position and orientation of the twist grip to the switch cube for installation.**

10. Slightly roll the twist grip rearwards until its guide is clear of the switch cube. Slide the twist grip off the handlebar.



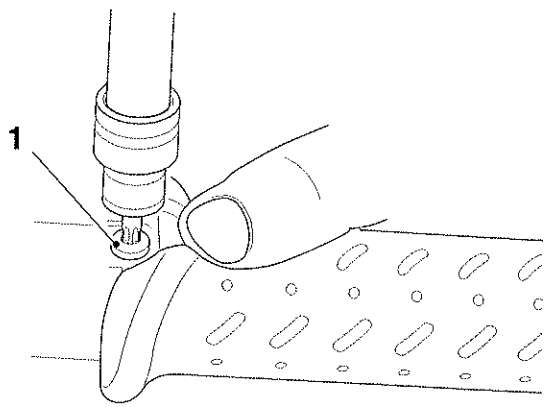
1. **Guide, twist grip**
2. **Switch cube**

11. Release the bolts and remove the clamp from the front brake master cylinder. Taking care to not invert the brake fluid reservoir, lay the assembly aside.

Note:

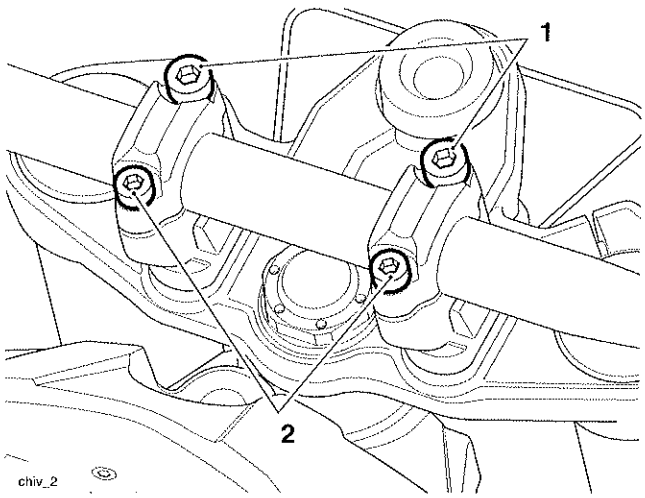
- **The bolt positions shown are in the standard position, as delivered from the factory. If the handlebars have been adjusted, the bolt positions will be reversed.**
- **Note the orientation of the risers for installation.**
- **Note the position of the 8 mm and 10 mm bolts for installation.**

12. Release the two fixings and remove the left hand handlebar grip.



1. **Fixing, one of two shown**

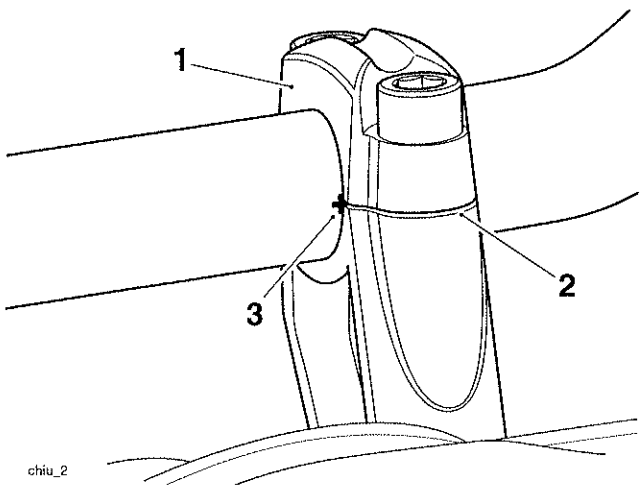
13. Remove the handlebar rear (8 mm threaded) clamp bolts, and then the front (10 mm threaded) clamp and riser bolts. Remove the handlebars while removing the front of the right hand switch cube from the handlebar.



1. **10 mm bolts**
2. **8 mm bolts**

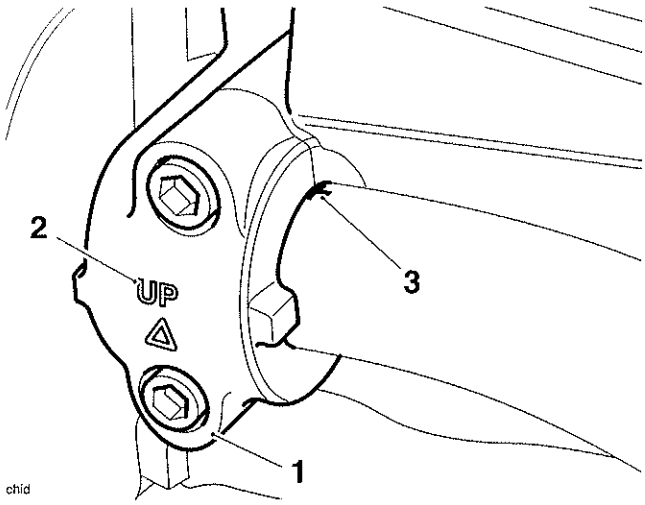
Installation

1. Ensure that the risers are in the same orientation as noted for removal.
2. Fit the front of the right hand switch cube to the right hand side of the handlebar.
3. Locate the handlebar assembly into the risers. Fit the upper clamps and the 10 mm bolts.
4. Rotate the handlebar so that the etched + marking on the handlebar aligns with the front left hand split line of the clamp riser.



1. **Upper clamp**
2. **Clamp split line**
3. **Centre marking**

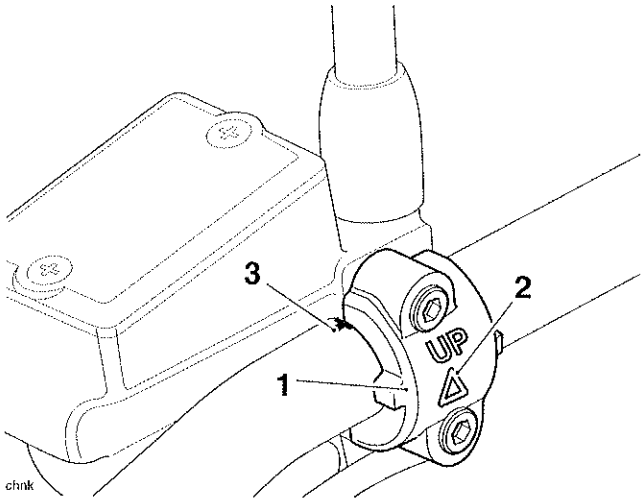
5. Tighten the 10 mm bolts to **35 Nm**.
6. Fit the 8 mm bolts and tighten to **26 Nm**.
7. Fit the left hand handlebar grip and tighten its fixings to **3 Nm**.
8. Align the left hand switch cube to the handlebar and secure with the screws. Tighten the screws to **2.5 Nm**.
9. Locate the clutch master cylinder to the handlebars and position the clamp with the UP arrow pointing upwards. Align the clutch master cylinder/clamp split line with the etched + marking on the handlebar.
10. Tighten the clamp fixings, upper first and then lower to **12 Nm**.



1. **Handlebar clamp**
2. **UP arrow**
3. **Alignment mark**

11. Position the front brake master cylinder assembly to the handlebar. Fit the clamp (UP arrow pointing upwards) and clamp fixings.
12. Align the split line of the master cylinder clamp to the '+' mark on the upper surface of the handlebar.

13. Tighten the clamp fixings, upper first and then lower to **12 Nm**.

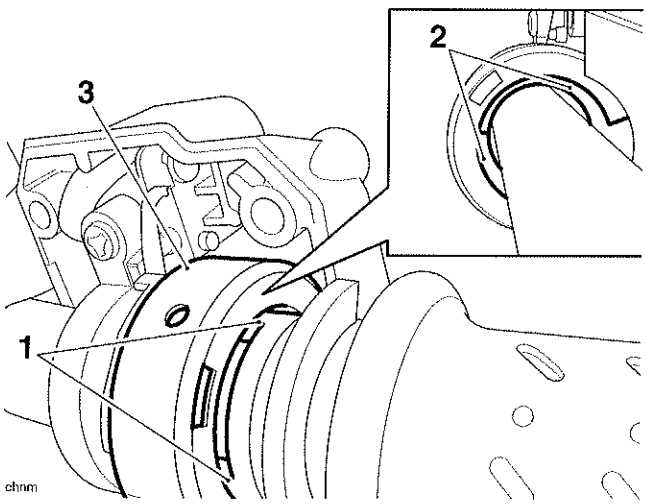


1. **Handlebar clamp**
2. **UP arrow**
3. **Alignment mark**

Note:

- **The twist grip will only fit in one position to the switch cube. Do not force the twist grip to fit.**

14. Partially engage the locating lugs on the twist grip into their slots in the spring housing.



1. **Locating lugs**
2. **Slots**
3. **Spring housing**

15. To fully engage the twist grip, rotate it rearwards and gently push fully in.
16. Fit the rear of the switch cube and tighten its fixings to **2.5 Nm**.
17. Position the brake lever ensuring that the pivot boss is correctly aligned to the push rod. Fit and tighten the pivot bolt to **1 Nm**.
18. Counter hold the pivot bolt, fit and tighten the lock nut to **6 Nm**.
19. **For motorcycles without handguards fitted only:** Fit the handlebar end weights and tighten their fixings to **5 Nm**.
20. **For motorcycles with handguards fitted only:** Position the handlebar end weights and the handguards to the handlebar, secure with the two fixings and tighten to **8 Nm**.
21. Reconnect the battery, positive (red) lead first.
22. Refit the seats.
23. Check for correct operation of the front brake and clutch. Check that the throttle opens and closes without sticking. Rectify as necessary.

⚠ Warning

Operation of the motorcycle with incorrect throttle operation may result in loss of motorcycle control and an accident.

⚠ Warning

Move the handlebars to left and right full lock while checking that cables and harnesses do not bind or that the steering feels tight or difficult to turn. A cable or harness that binds, or steering that is tight/difficult to turn, will restrict the steering and may cause loss of control and an accident.

This page intentionally left blank

13 Rear Suspension

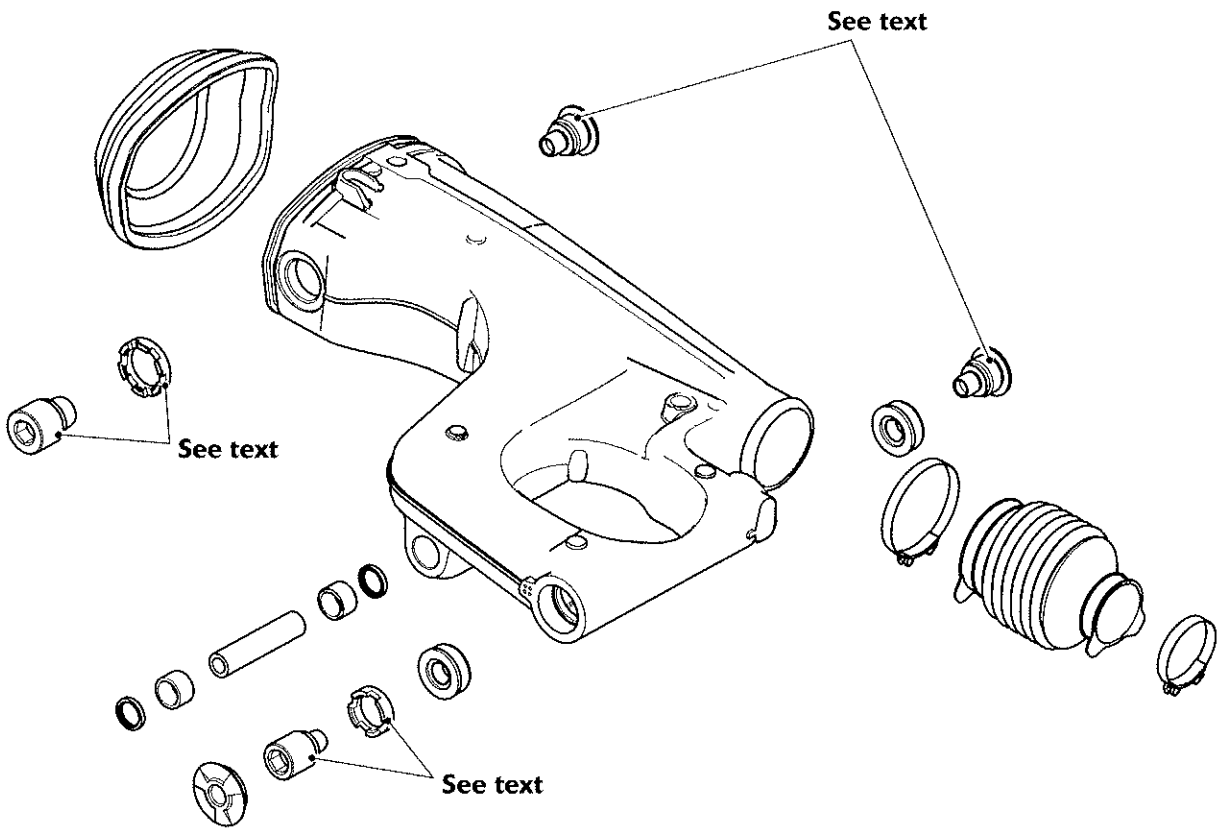
Table of Contents

Exploded View - Swinging Arm 13.2
Exploded View - Rear Suspension Unit 13.3
Exploded View - Drop/Drag Link 13.4
Rear Suspension Unit 13.5
- Removal 13.5
- Inspection 13.6
- Installation 13.6

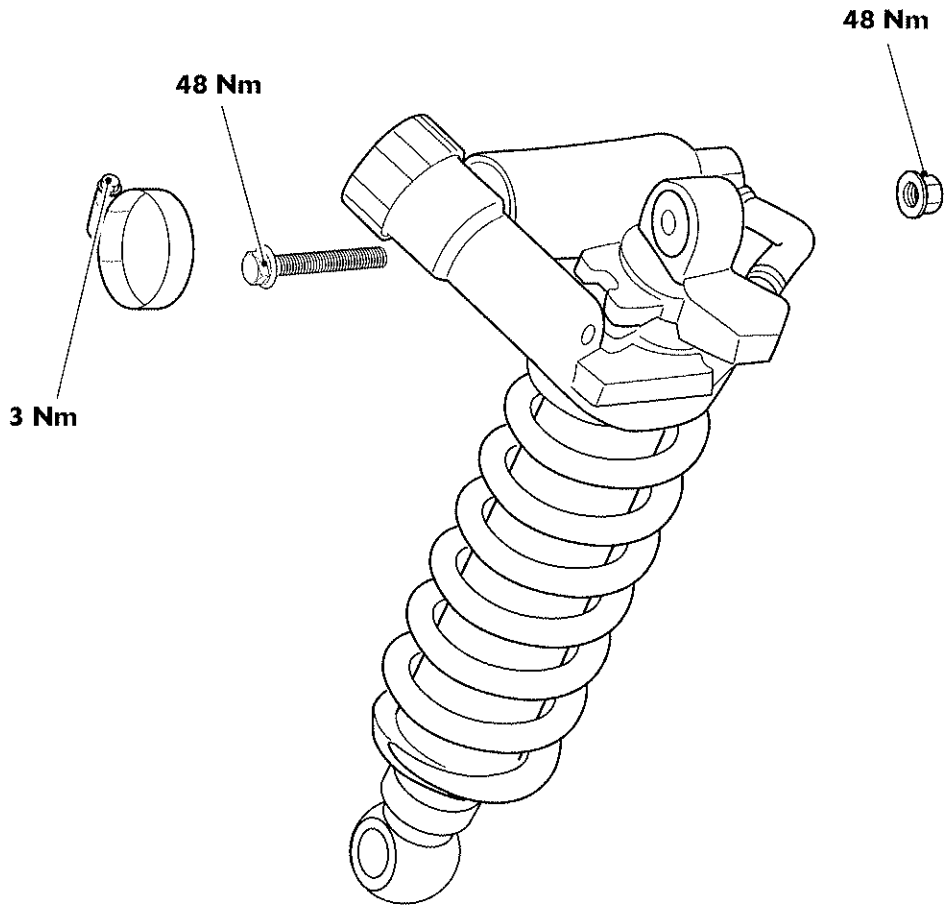
Drag Link and Drop Links 13.8
- Removal 13.8
- Inspection 13.9
- Installation 13.9

Swinging Arm 13.10
- Removal 13.10
- Inspection 13.11
- Disassembly 13.11
- Assembly 13.12
- Installation 13.14

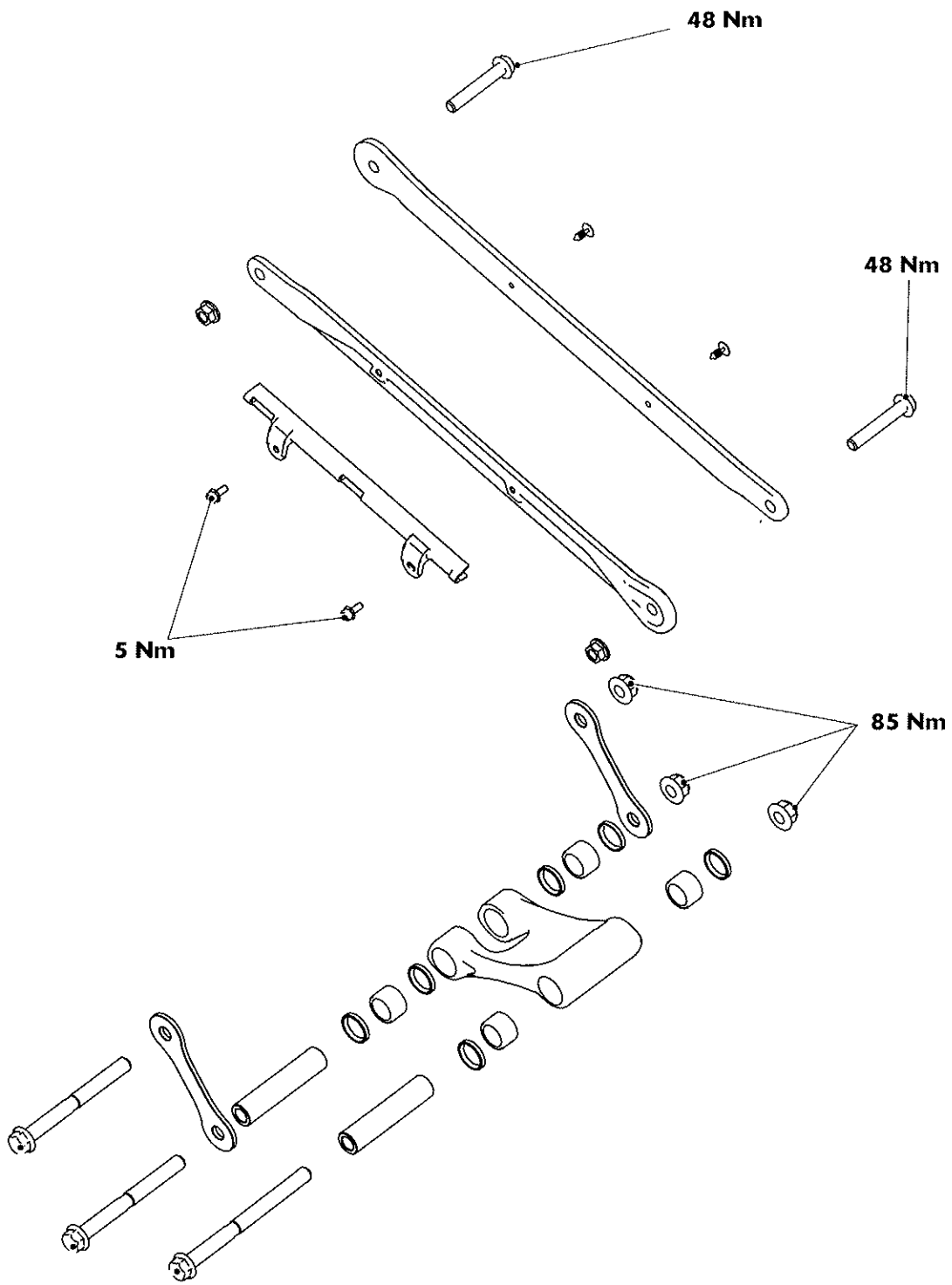
Exploded View - Swinging Arm



Exploded View - Rear Suspension Unit



Exploded View - Drop/Drag Link



Rear Suspension Unit

Removal

Warning

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

Warning

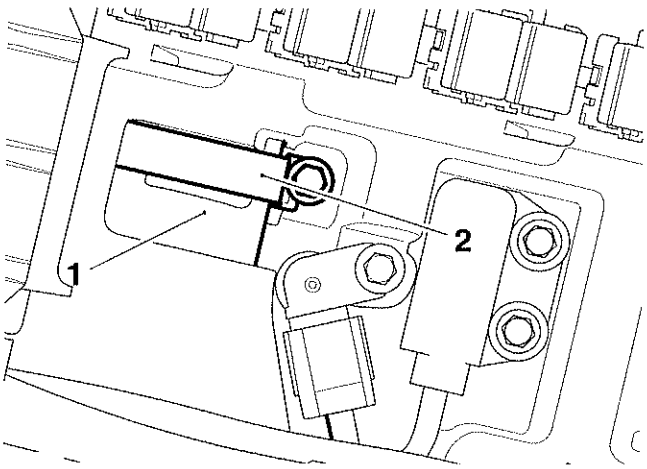
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

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 rider's seat (see page *17-16*).
3. Disconnect and remove the battery (see page *18-8*).

Note:

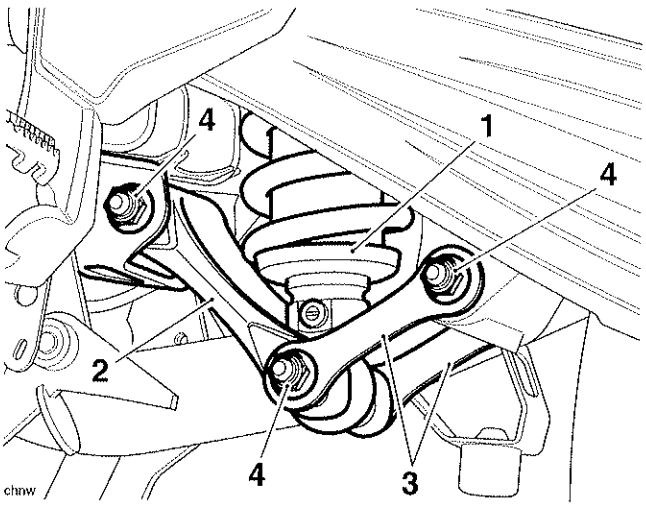
- **Note the orientation of the hydraulic hose on the remote reservoir for installation.**

4. Loosen the clip and detach the rear suspension unit remote reservoir from the under seat tray.



1. **Remote reservoir**
2. **Clip**

5. Remove the bolt securing the drag link to the rear suspension unit. Discard the lock nut.
6. Remove the lock nut securing the drop link to the swinging arm. Discard the lock nut.
7. Remove the lock nut securing the drag link to the frame. Discard the lock nut.



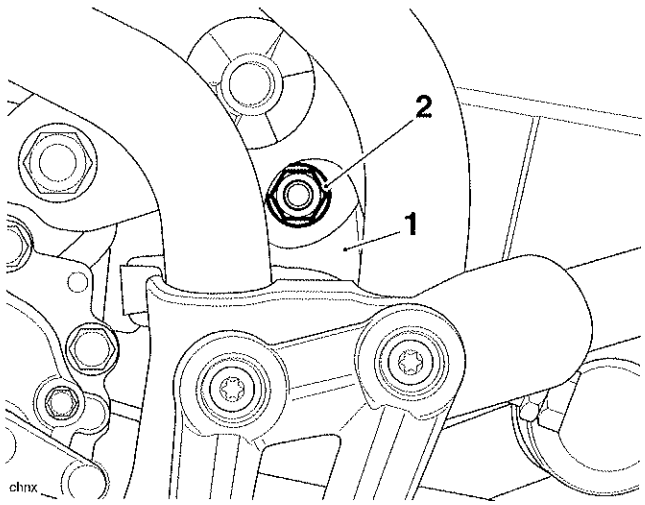
1. **Rear suspension unit**
2. **Drag link**
3. **Drop link**
4. **Lock nuts**

8. Remove the bearing sleeve from the drag link and rear suspension unit lower mounting.

Warning

Never attempt to disassemble the rear suspension unit or remote reservoir. It contains fluid under pressure and serious injury could result if any part of the system is disturbed.

9. Remove the bolt securing the rear suspension unit to its upper mounting. Discard the lock nut.



1. **Rear suspension unit**
2. **Lock nut**

10. Manoeuvre the unit and its remote reservoir downwards through the swinging arm and clear of the motorcycle.

Inspection

1. Clean all components and inspect for damage/wear to:
   - rear suspension unit upper and lower mountings. Renew as necessary;
   - drag link, drag link bearings, sleeves and seals. Renew as necessary;
   - drop link, drop link bearings, sleeves and seals. Renew as necessary.
2. Check the swinging arm drop link bearings for wear. Renew as necessary.
3. Check the drag link bearings for wear. Renew as necessary (see page *13-9*).

Warning

Never attempt to disassemble the rear suspension unit or remote reservoir. It contains fluid under pressure and serious injury could result if any part of the system is disturbed.

4. Inspect the remote reservoir and hose and the suspension unit itself for damage and fluid leaks. If there is any damage, or fluid leaks are evident, the unit must be replaced.

Installation

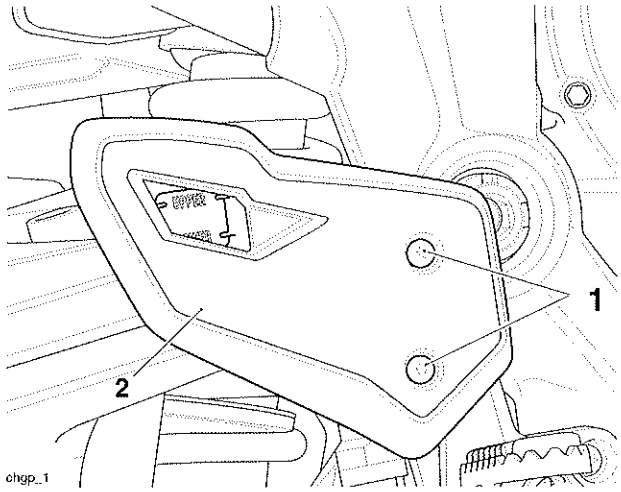
Warning

Do not allow the right hand control plate to hang on the brake hose as this may damage the hose and could lead to loss of motorcycle control and an accident.

Note:

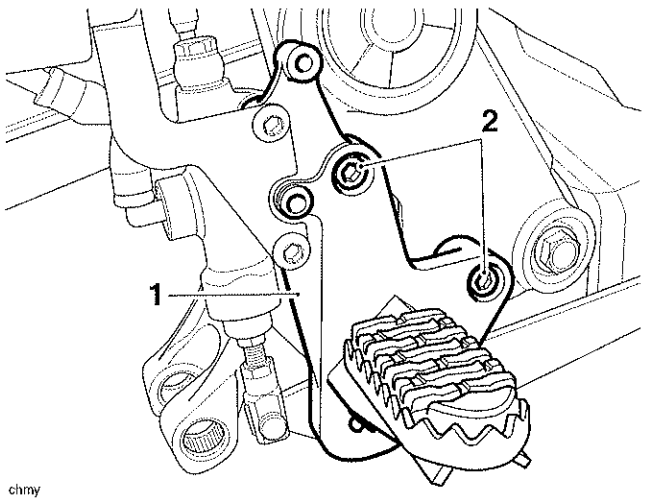
- **Note the orientation of the drag link for installation.**

1. Release the fixings and remove the right hand heel guard.



1. Fixings
2. Heel guard

2. Temporarily detach the right hand control plate from the frame.

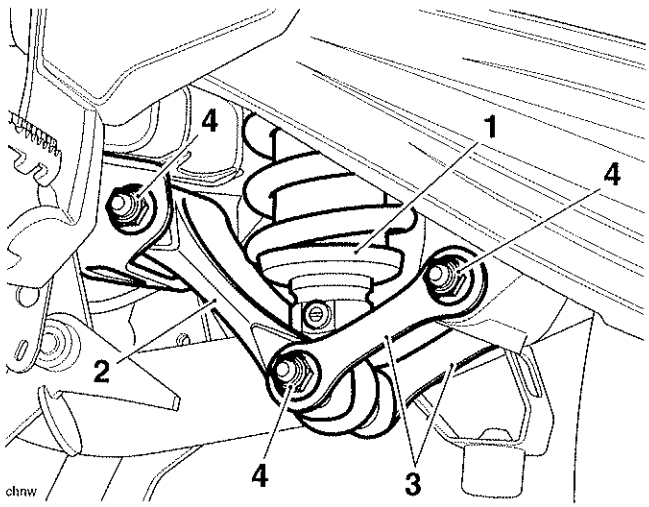


1. Control plate
2. Fixings

Note:

- **The bolt securing the drag link to the frame is longer than the bolts securing the drop links to the rear suspension unit and the swinging arm.**

3. Remove the drag link from the frame and pack the drag link bearings with fresh grease (NGLI 2 specification grease). Refit the drag link to the frame as noted for removal, fit the bolt and a new lock nut from the right hand side. Do not fully tighten at this stage.
4. Remove the drop links and the bearing sleeve from the swinging arm and pack the bearings with fresh grease (NGLI 2 specification grease). Refit the sleeve, the drop links and fit the bolt and a new lock nut from the right hand side. Do not fully tighten at this stage.
5. Pass the rear suspension unit and its remote reservoir upwards through the swinging arm.
6. Locate the rear suspension unit and fit the upper mounting bolt and a new lock nut from the right hand side. Do not fully tighten at this stage.
7. Position the remote reservoir to the under seat tray and secure with the clip, tightening to **3 Nm**. Ensure the hose is not twisted, or positioned so that it will chafe against any part of the motorcycle.
8. Pack the rear suspension unit bearing with fresh grease (NGLI 2 specification grease).
9. Locate the drag link to the rear suspension unit and fit the drag link bearing sleeve.
10. Reposition the drop link plates and from the right hand side fit the bolt and a new lock nut. Do not fully tighten at this stage.



1. **Rear suspension unit**
2. **Drag link**
3. **Drop links**
4. **Lock nuts**

11. With the weight of the motorcycle on its wheels, tighten the:
    - rear suspension unit lower mounting to **85 Nm**;
    - drop link to swinging arm fixing to **85 Nm**;
    - drag link to frame to **85 Nm**;
    - rear suspension unit upper mounting to **48 Nm**.
12. Refit the right hand control plate and tighten its fixings to **18 Nm**.
13. Refit the heel guard and tighten its fixings to **7 Nm**.
14. Refit and connect the battery, red (positive) lead first.
15. Fit the seats (see page *17-16*).

Drag Link and Drop Links

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.
2. Remove the seats (see page *17-16*).
3. Disconnect the battery, negative (black) lead first.

Note:

- **The bolt securing the drag link to the frame is longer than the two bolts securing the drop links to the rear suspension unit and the swinging arm.**

4. Remove the fixings securing the drop links to the swinging arm. Discard the lock nut.
5. Remove the fixings securing the drag link and drop links to the rear suspension unit and remove the drop links. Discard the lock nut.
6. Remove the bearing sleeve from the drag link and rear suspension unit lower mounting.

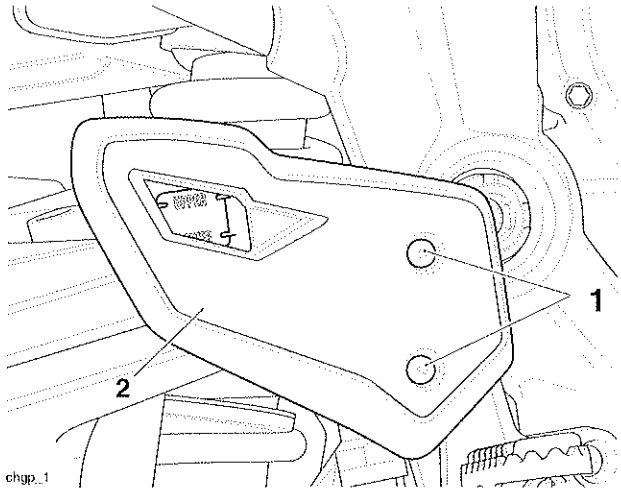
Warning

Do not allow the right hand control plate to hang on the brake hose as this may damage the hose and could lead to loss of motorcycle control and an accident.

Note:

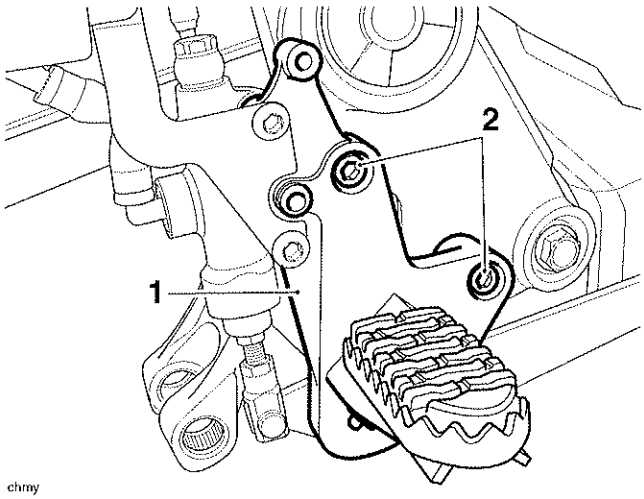
- **Note the orientation of the drag link for installation.**

7. Release the fixings and remove the right hand heel guard.



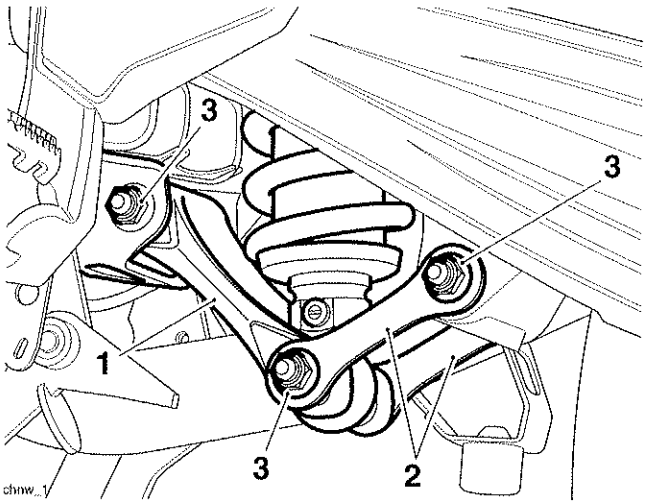
1. **Fixings**
2. **Heel guard**

8. Temporarily detach the right hand control plate from the frame.



1. **Control plate**
2. **Fixings**

9. Remove the fixings securing the drag link to the frame and remove the drag link. Discard the lock nut.



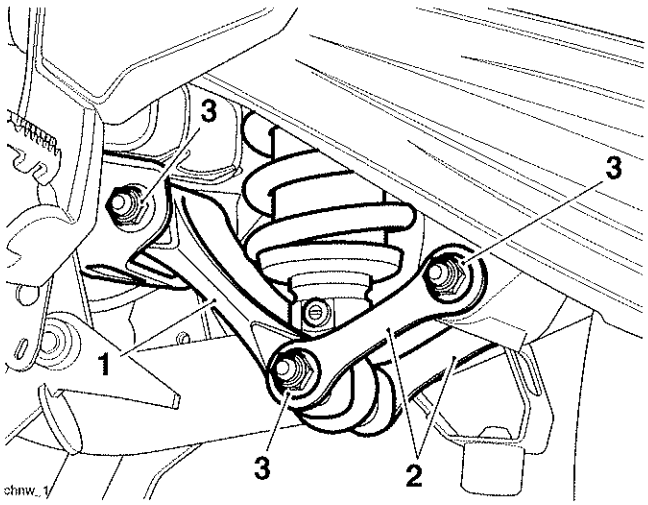
1. **Drag link**
2. **Drop links**
3. **Lock nuts**

Inspection

1. Clean all components and inspect the drag link and bearings for damage/wear.
2. Check the rear suspension unit lower bearings for wear.
3. Check the drop link bearings for wear.
4. Renew as necessary.

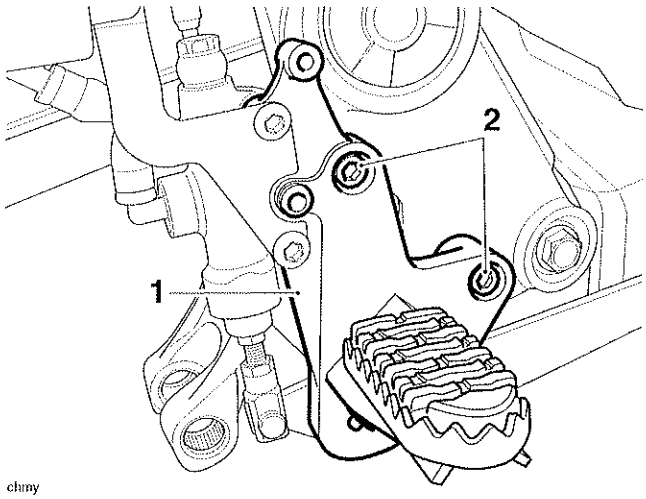
Installation

1. Remove the drag link sleeves and pack the bearings with fresh grease (NGLI 2 specification grease). Refit the sleeves.
2. Remove the swinging arm drop link sleeve and pack the bearings with fresh grease (NGLI 2 specification grease). Refit the sleeve.
3. Refit the drag link to the frame. Fit the bolt and a new lock nut from the right hand side. Do not fully tighten at this stage.
4. Pack the rear suspension unit bearing with fresh grease (NGLI 2 specification grease).
5. Locate the drag link to the rear suspension unit and fit the drag link bearing sleeve.
6. Refit the drop link plates and fit the bolts and new lock nuts from the right hand side. Do not fully tighten them at this stage.
7. With the weight of the motorcycle on its wheels, tighten the:
   - rear suspension unit lower mounting to **85 Nm**;
   - drop link to swinging arm fixing to **85 Nm**;
   - drag link to frame to **85 Nm**.



1. **Drag link**
2. **Drop links**
3. **Lock nuts**

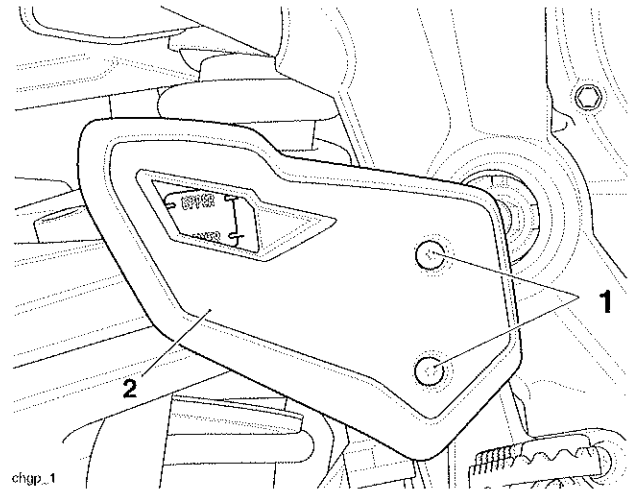
8. Refit the right hand control plate and tighten its fixings to **18 Nm**.



chmy

1. Control plate
2. Fixings

9. Refit the heel guard and tighten its fixings to **7 Nm**.



chgp_1

1. Fixings
2. Heel guard

10. Refit and connect the battery, red (positive) lead first.
11. Fit the seats (see page *17-16*).

Swinging Arm

Removal

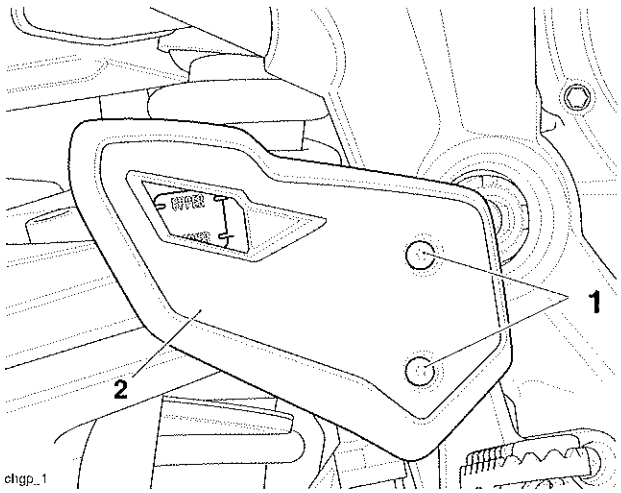
Warning

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.

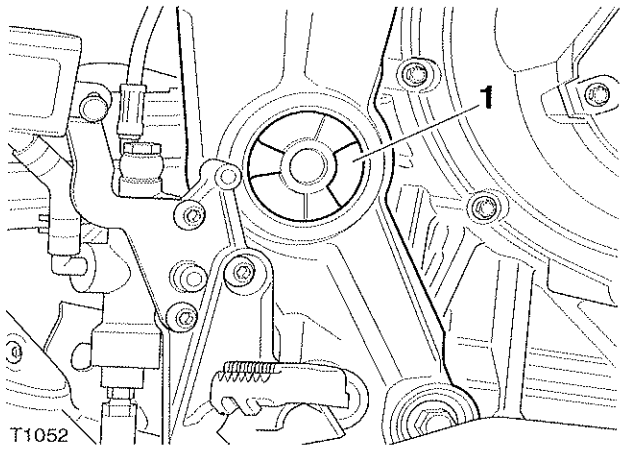
1. Remove the seats (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear wheel (see page *16-8*).
4. Remove the rear bevel box (see page *14-4*).
5. Remove the rear suspension unit (see page *13-5*).
6. Release the fixings and remove the right hand heel guard.



chgp_1

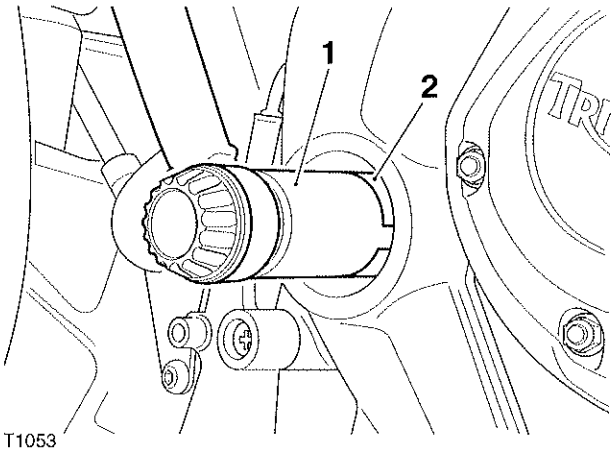
1. Fixings
2. Heel guard

7. Carefully remove the cover from the swinging arm's right hand pivot pin.



1. Cover

8. Using the service tool Lock Ring Wrench, 38 mm T3880062, remove the locking ring from the right hand pivot pin.



1. Lock Ring Wrench, 38 mm T3880062
2. Locking ring

9. While supporting the swinging arm, remove the left and right hand pivot pins and remove the swinging arm.

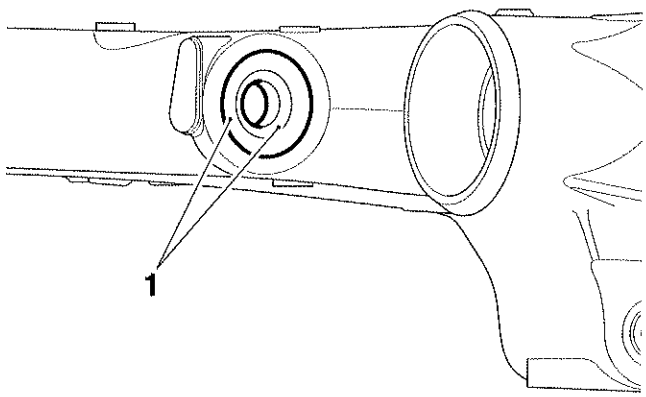
Inspection

1. Check the swinging arm bearings for damage, pitting, and cracks. Replace as necessary.
2. Inspect the swinging arm pivots for damage and deformation. Replace as necessary.
3. Check the swinging arm for damage. Replace as necessary.
4. Check all bearing seals for damage, splits etc. Replace as necessary.
5. Check the swinging arm gaiters for splits and other damage. Replace as necessary.

Disassembly

Pivot Bearings

1. Remove the seal and inner bearing assembly for the pivot bearings on both sides of the swinging arm.



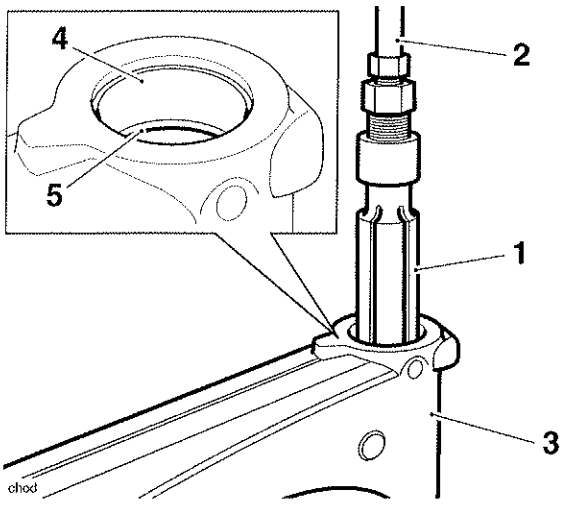
1. Seal and inner race assembly

Note:

- **When removing the bearing outer race, the cap will separate from the outer race.**

2. Fit the bearing puller such that the lugs of the tool are between the bearing outer race and its cap.

3. Assemble the Bearing Puller 32-42 mm T3880627 to the Slide Hammer T3880208, fully engaging the threads. Draw back the slide part of the hammer swiftly to facilitate the removal of the bearing outer race.

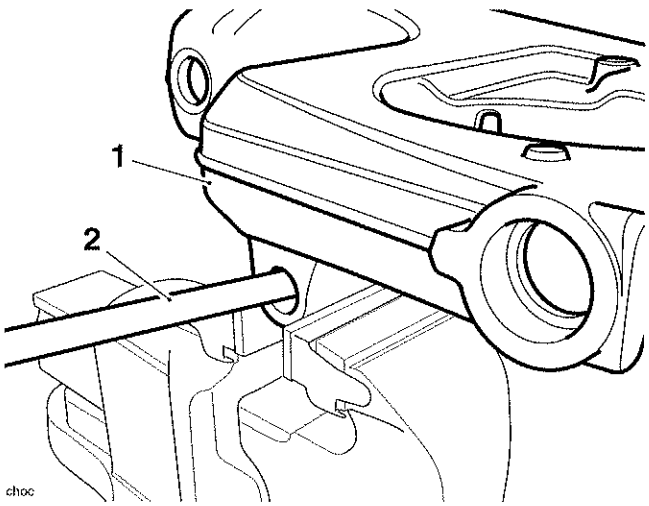


1. **Bearing Puller 32-42 mm T3880627**
2. **Slide Hammer T3880208**
3. **Swinging arm**
4. **Bearing outer race**
5. **Cap**

4. Remove the bearing end cap from the swinging arm.
5. Repeat steps 3 and 4 for the other side.

Drop Link Bearings

6. Remove the bearing sleeve for the drop links from the swinging arm.
7. Secure the swinging arm in a soft jawed vice as shown below.
8. Working from the opposite side of the arm to the bearing being removed, drift out the drop arm bearing and seal.



1. **Drift**
2. **Swinging arm**

Assembly

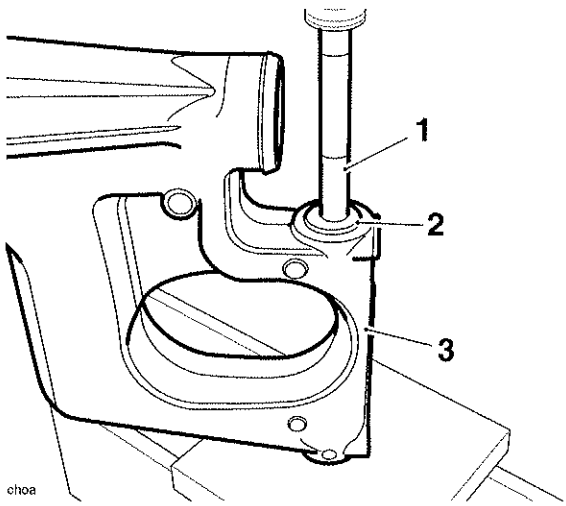
Pivot Pin Bearings

Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing which could become trapped in the press and cause a crushing injury to the hand, arms or other parts of the anatomy.

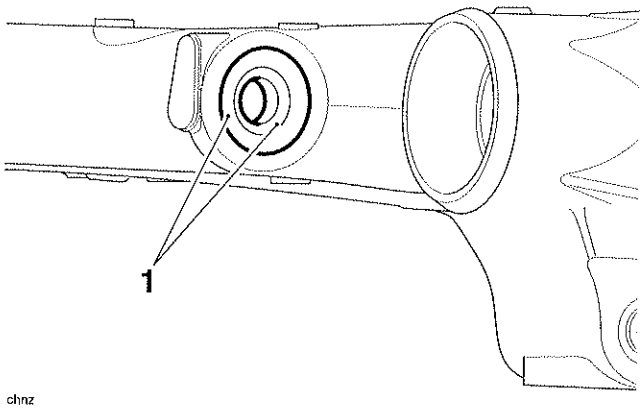
1. Ensure the Bearing Installer, 39 mm T3880625 is clean.
2. Assemble the Bearing Installer Handle T3880629 to Bearing Installer, 39 mm T3880625, fully engaging the threads.
3. Press in the new bearing fully onto its locating shoulder.



1. **Bearing Installer Handle T3880629**
2. **Bearing Installer, 39 mm T3880625**
3. **Swinging arm**

4. Repeat for the other side.

5. Fit the seal and inner race assembly to their bearings inner race on both sides of the swinging arm.



chnz

1. Seal and inner race assembly

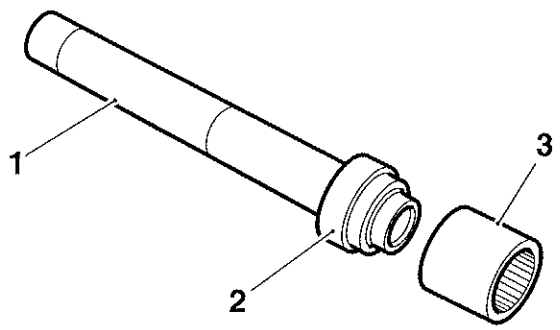
Drop Link Bearings

Warning

The bearings must be installed with the marked side of the bearing facing towards service tool T.

Failure to follow this instruction will result in damage to the bearing.

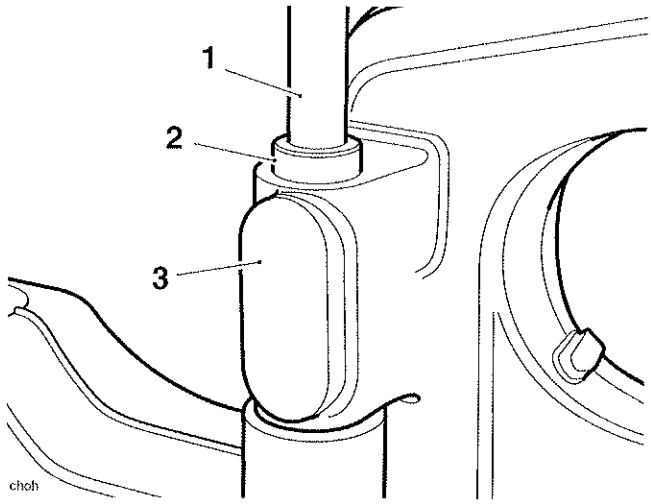
1. Ensure service tool Bearing Installer, 26 mm T3880628 is clean.
2. Assemble the Bearing Installer Handle T3880629 to Bearing Installer, 26 mm T3880628, fully engaging the threads.
3. Position a new bearing to service tool Bearing Installer, 26 mm T3880628, with the marked side of the bearing facing towards the tool.



chob

1. Bearing Installer Handle T3880629
2. Bearing Installer, 26 mm T3880628
3. Bearing

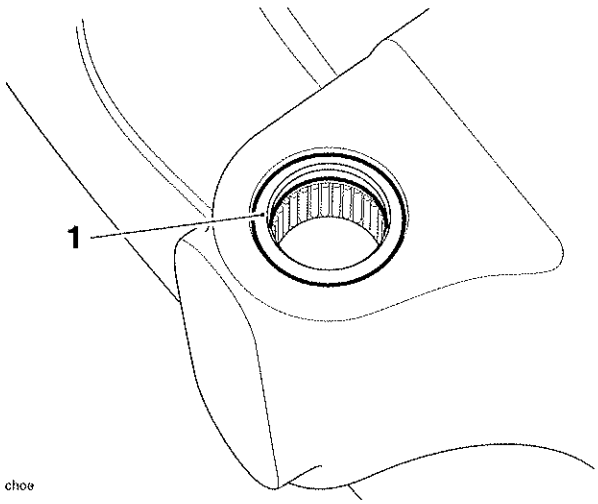
4. Position the service tools and bearing to the swinging arm on a press.
5. Press in the new bearing until the tool contacts the swinging arm.



choh

1. Bearing Installer Handle T3880629
2. Bearing Installer, 26 mm T3880628
3. Swinging arm

6. Repeat for the other side.
7. Install new seals, with the marked edge of the seal facing outwards, until they stop against the bearing.



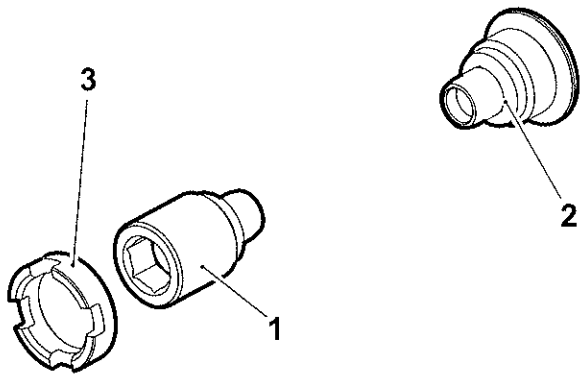
choe

1. Seal

8. Lubricate the bearings with grease to NLGI 2 specification and fit the bearing sleeve.

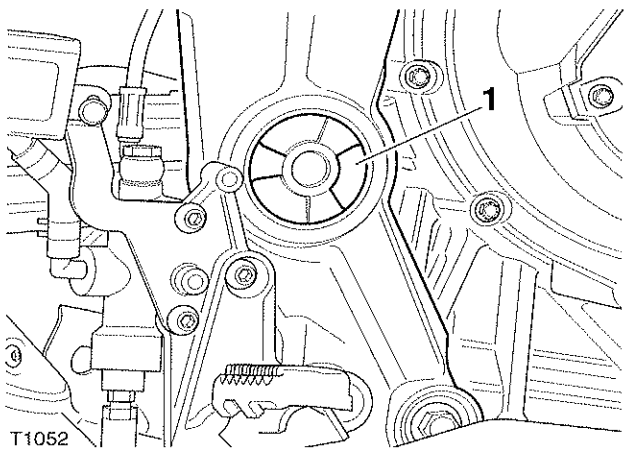
Installation

1. Position the swinging arm to the frame.
2. Lubricate the threads of both pivot pins with a smear of proprietary high temperature copper based grease.
3. Fit the left and right hand pivot pins to the frame. Do not fully tighten them at this stage.



1. Right hand pivot pin
2. Left hand pivot pin
3. Locking ring, right hand side only

4. Tighten the left hand pivot pin to **170 Nm**.
5. Tighten the right hand pivot pin to **45 Nm**.
6. Lubricate the threads of the locking ring with a smear of proprietary high temperature copper based grease then fit to the right hand pivot pin and tighten to **110 Nm**.
7. Refit the cover to the swinging arm's right hand pivot pin.



1. Cover

8. Refit the right hand heel guard, tightening the fixings to **7 Nm**.
9. Refit the rear suspension unit (see page *13-6*).
10. Refit the rear bevel box (see page *14-8*).
11. Refit the rear wheel (see page *16-9*).
12. Reconnect the battery, negative (black) lead first.
13. Refit the seats (see page *17-16*).
14. 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 (see page *15-17*).

⚠ Warning

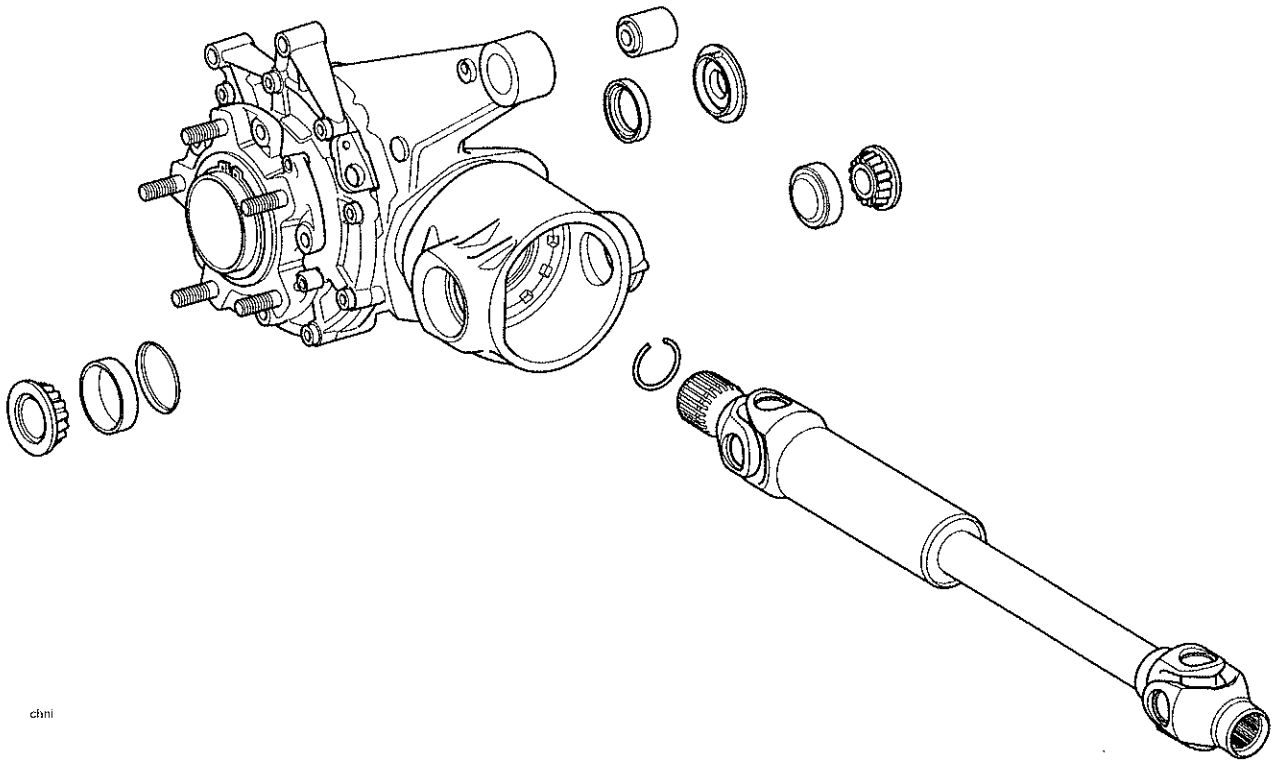
It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

14 Rear Bevel Box and Drive Shaft

Table of Contents

Exploded View - Rear Bevel Box and Drive Shaft 14.2
Rear Bevel Box and Drive Shaft Specification 14.3
Rear Bevel Box Oil Specification 14.3
Rear Bevel Box Oil Level Check 14.3
Rear Bevel Box Oil Change 14.4
Rear Bevel Box 14.4
Removal 14.4
Inspection 14.8
Installation 14.8
Rear Bevel Box Bearings 14.11
Removal 14.11
Installation 14.12
Rear Bevel Box Oil Seal 14.14
Removal 14.14
Installation 14.15

Exploded View - Rear Bevel Box and Drive Shaft



Rear Bevel Box and Drive Shaft Specification

The Tiger Explorer is fitted with a drive shaft coupling the transmission to the rear bevel box. The drive shaft is fitted with single Hookes universal joints which require no maintenance.

The rear bevel box consists of a crown wheel and pinion arrangement that has no dealer serviceable parts.

Maintenance of the rear bevel box consists soley of the following:

- oil change - at the first 500 mile (800 km) service only;
- oil level checks;
- pivot pin bearings;
- oil seal.

⚠ Warning

Under no circumstance should the rear bevel box be disassembled beyond what is described in this section of the service manual.

Failure to observe the above warning could lead to a malfunction of the rear bevel box causing lock-up of the rear wheel leading to loss of motorcycle control and an accident.

Rear Bevel Box Oil Specification

The rear bevel box must be filled and topped up with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil.

⚠ Warning

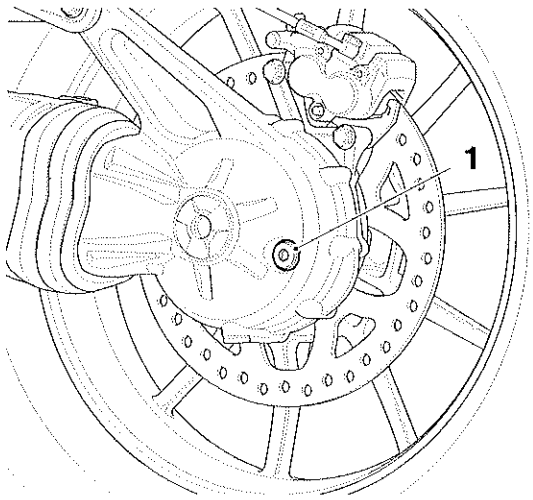
Use of incorrect bevel box lubricant could result in a malfunction of the final drive unit causing lock-up of the rear wheel leading to loss of motorcycle control and an accident.

Rear Bevel Box Oil Level Check

⚠ Warning

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

1. Have an assistant stand the motorcycle upright.
2. Clean the area around the filler then remove the filler level plug. Discard the washer.



1. Filler/level plug

3. Fill with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil, until the level of oil inside the unit is level with the bottom of the filler.
4. Incorporating a new washer, refit the plug and tighten to **25 Nm**.

Rear Bevel Box Oil Change

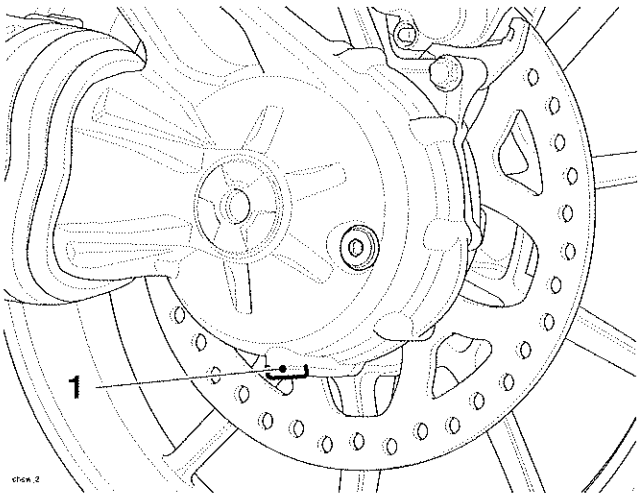
Note:

- **Change the rear bevel box oil at the 500 mile (800 km) service only. At subsequent services check the oil level and top up if necessary.**

Warning

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

1. Position a container beneath the rear bevel box oil drain plug.



1. Drain plug

2. Remove the drain plug and allow all the oil to fully drain out. Discard the sealing washer.
3. Wipe the drain plug clean, fit a new sealing washer then refit to the final drive and tighten to **25 Nm**.

Note:

- **The drain plug is magnetic. It is normal for metallic deposits to be attached to the drain plug magnet.**

4. Have an assistant stand the motorcycle upright.
5. Remove the filler level plug.
6. Fill with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil, until the level of oil inside the unit is level with the bottom of the filler.
7. Incorporating a new washer, refit the plug and tighten to **25 Nm**.

Rear Bevel Box

Removal

Warning

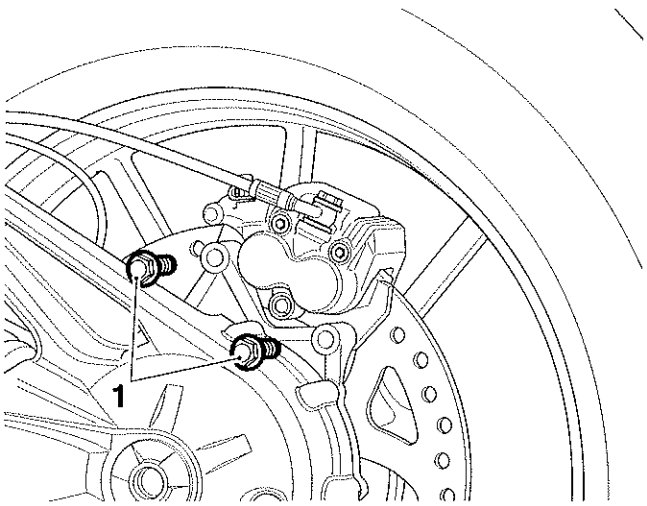
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Support the motorcycle so that the rear wheel is clear of the ground.
2. Remove the rider's seat (see page *17-16*).
3. Disconnect the battery, negative (black) lead first.
4. Remove the rear wheel (see page *16-8*).

Warning

Do not allow the caliper to hang on the brake hose as this may damage the hose and could lead to loss of motorcycle control and an accident.

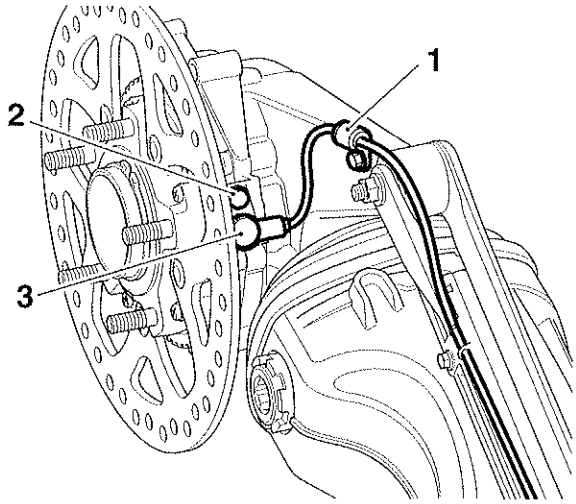
5. Detach and support the rear brake caliper such that the weight of the caliper is not supported by the brake hose.



1. Caliper mounting bolts

6. Detach the P-clip securing the harness for the rear wheel speed sensor to the rear bevel box.

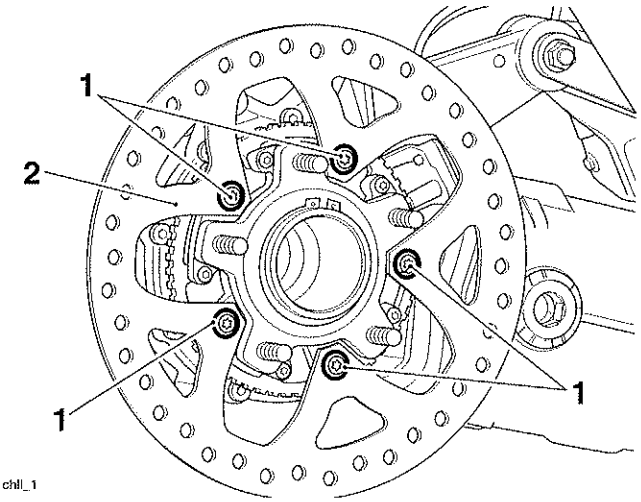
7. Release the fixing, detach the rear wheel speed sensor and position it aside. Discard the fixing.



chnb

1. **P-clip**
2. **Fixing**
3. **Wheel speed sensor**

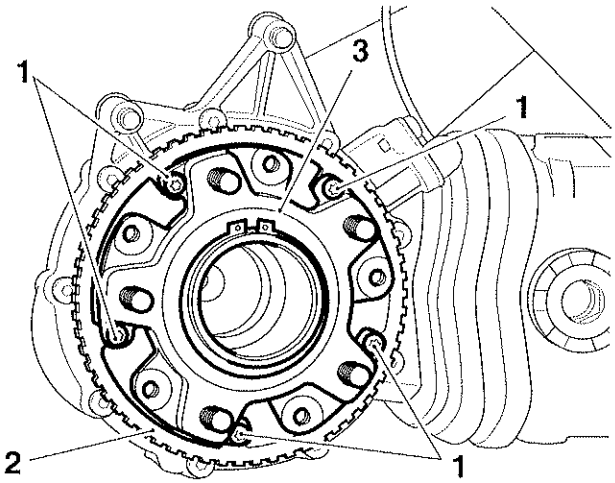
8. Remove and discard the five fixings and remove the brake disc.



chll_1

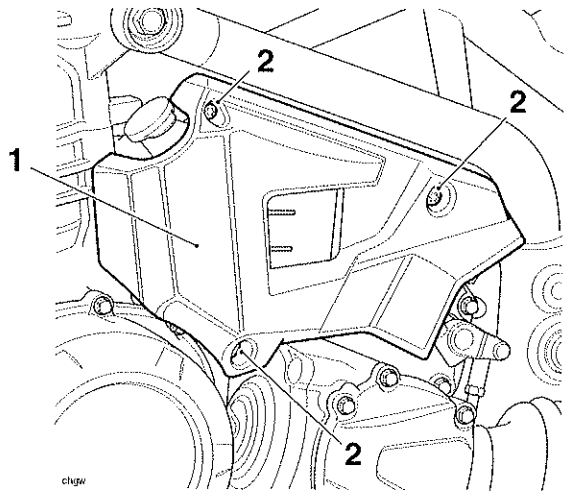
1. **Fixings**
2. **Brake disc**

9. Remove and discard the five fixings and remove the pulser ring.



1. **Fixings**
2. **Pulser ring**
3. **Hub**

10. Remove the three fixings and remove the expansion tank cover.



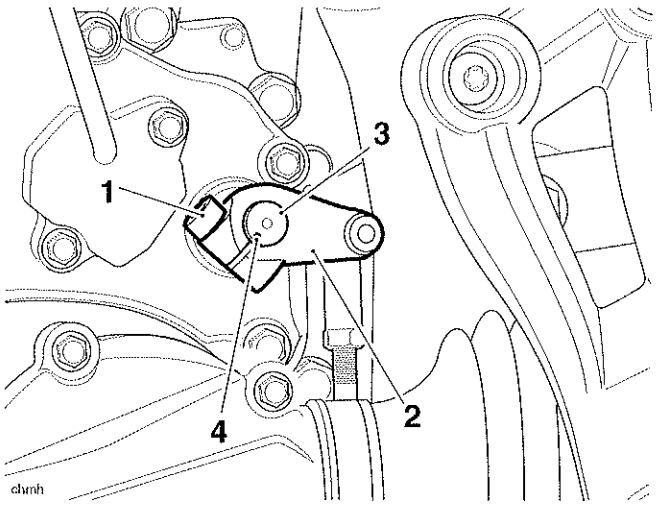
chgw

1. **Expansion tank cover**
2. **Fixings**

Note:

- **Note the position of the transmission linkage in relation to the punch mark on the gear change mechanism.**

11. Select neutral, remove the pinch bolt and disconnect the transmission linkage from the gear change mechanism.

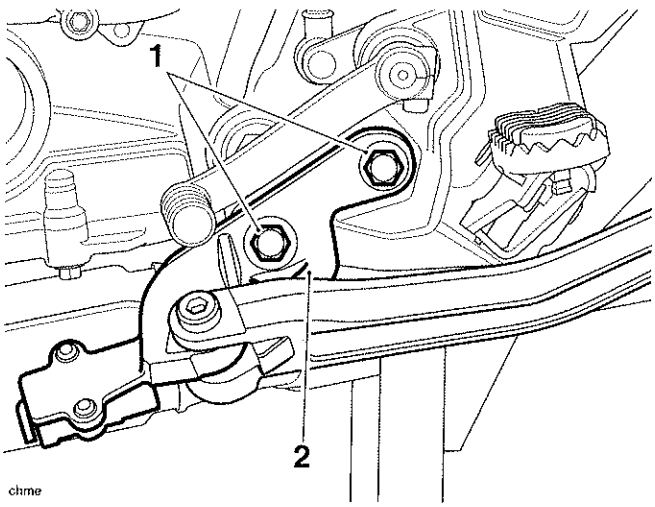


1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

Note:

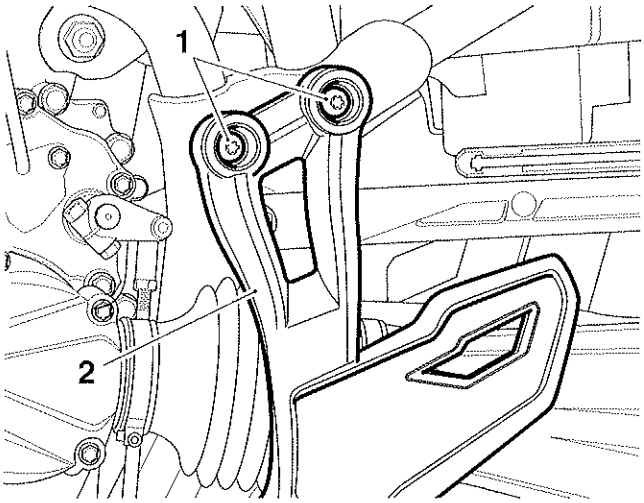
- **Do not allow the side stand to hang on the harness for the side stand switch.**
- **Note the routing of the harness for the side stand switch for installation.**

12. Release the fixings, detach the side stand and position aside.



1. **Fixings**
2. **Side stand**

13. Release the fixings and remove the left hand control plate.

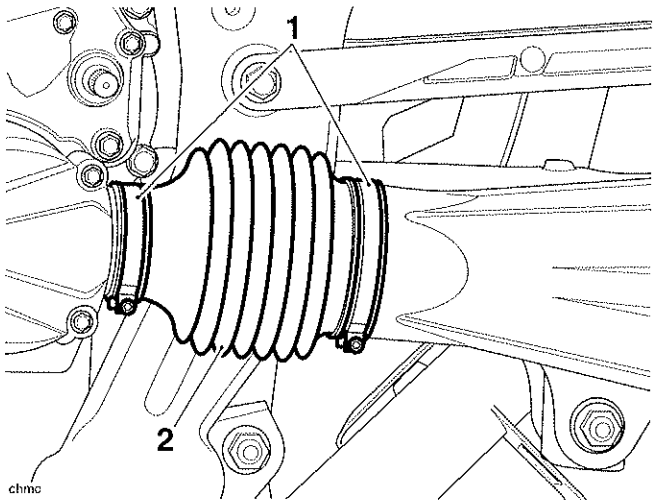


1. **Fixings**
2. **Control plate**

Note:

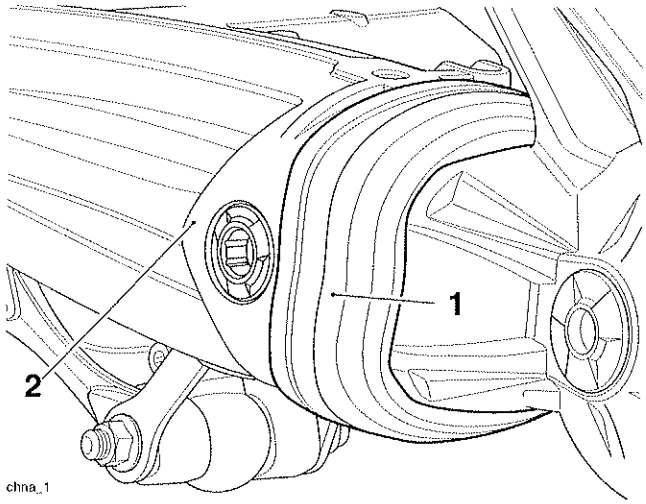
- **Note the position and orientation of the clamps for installation.**

14. Release the two clamps and detach the rubber boot from the front of the swinging arm and the transmission.



1. **Clamps**
2. **Boot**

15. Detach the rubber boot from the rear of the swinging arm.

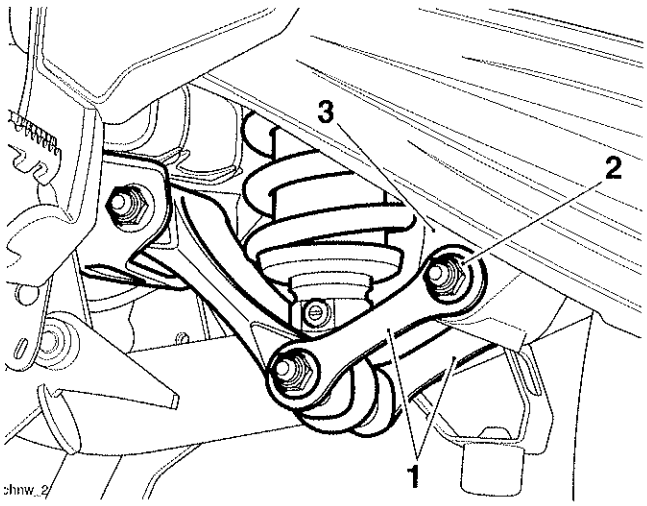


1. **Boot**
2. **Swinging arm**

Note:

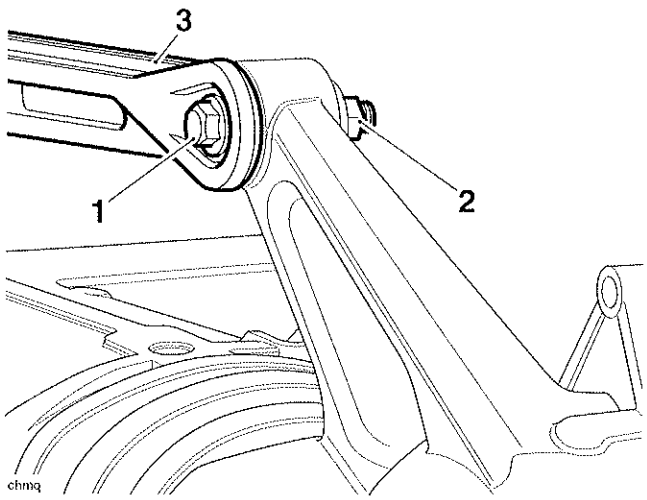
- **It is possible that the swinging arm may obstruct the drive shaft detaching from the transmission.**

16. To allow for movement of the swinging arm, remove the lock nut and bolt securing the drop links to the swinging arm. Discard the lock nut.



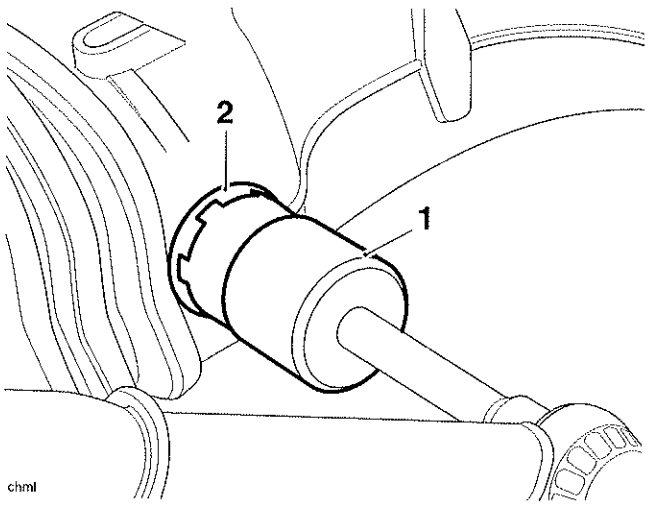
1. **Drop links**
2. **Lock nut**
3. **Swinging arm**

17. Remove the bolt and lock nut securing the rear bevel box to the torque arms. Discard the lock nut.



1. **Bolt**
2. **Lock nut**
3. **Torque arms**

18. Using service tool Adjuster Socket, 48 mm T3880620 loosen the locking ring for the right hand pivot pin.

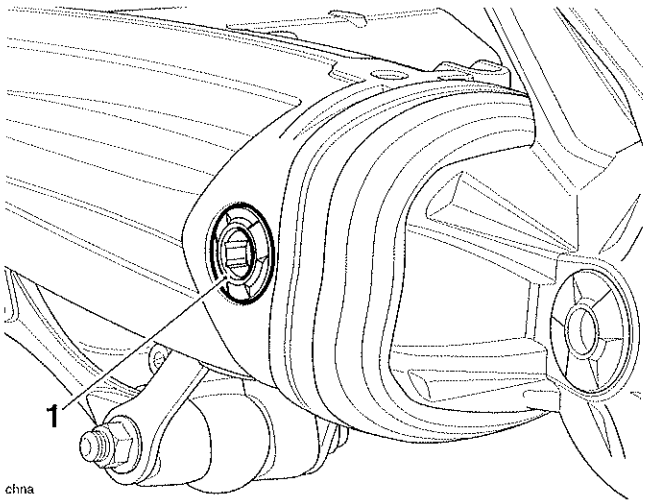


1. **Adjuster Socket, 48 mm T3880620**
2. **Locking ring**

Note:

- **The drive shaft is secured to the rear bevel box by a spring clip and will also be removed with the bevel box.**

19. While supporting the rear bevel box, remove both pivot pins and move the bevel box rearwards to disengage the drive shaft from the transmission.



1. Pivot pin, left hand side shown

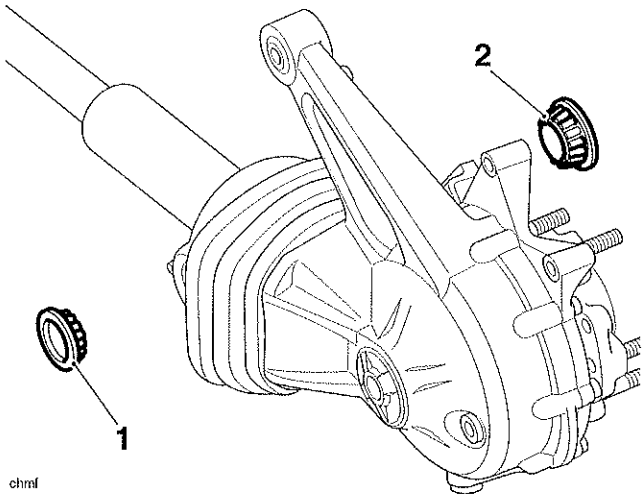
20. While supporting the drive shaft, continue to move the bevel box and drive shaft assembly rearwards for complete removal.

Inspection

1. Inspect the rear bevel box bearings and the bearings outer race for damage, cracks and signs of bearing rollers indenting the outer race. Renew the bearings if damage is present in either bearing (see page *14-11*).
2. Inspect the pivot pins for damage and deformation. Renew as necessary.
3. Inspect the rubber boot for splits and other damage. Replace as necessary.
4. Inspect the drive shaft and its universal joints for damage. Renew as necessary.

Installation

1. Apply a smear of grease, to NLGI 2 specification, to the splines of the drive shaft and the transmission output shaft.
2. Lubricate the threads of both pivot pins with a smear of proprietary high temperature copper based grease.
3. Thoroughly lubricate the pivot pin bearings with grease, to NLGI 2 specification, and fit them to the rear bevel box.

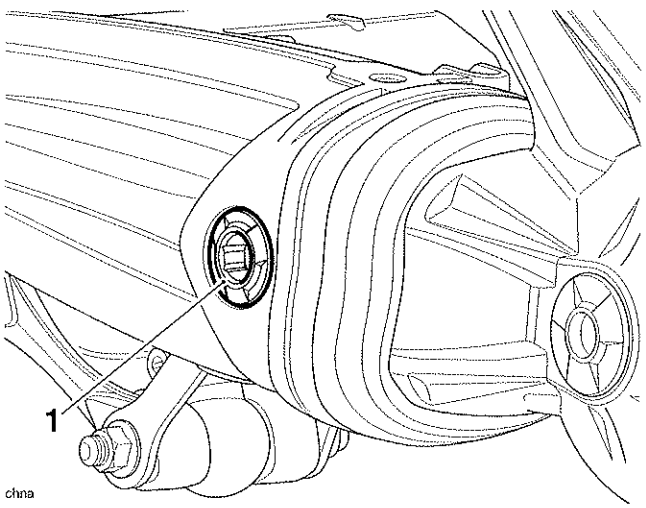


1. Left hand bearing
2. Right hand bearing

Note:

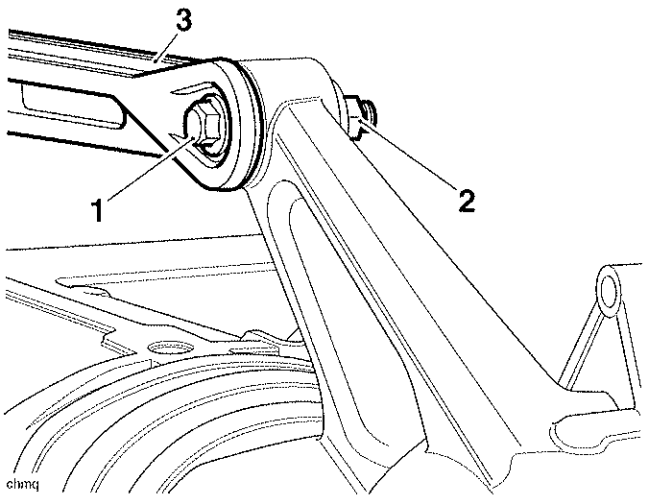
- **It may be necessary to raise the rear of the swinging arm to align the drive shaft on to the transmission shaft.**

4. With the aid of an assistant, position the drive shaft through the swinging arm and fit it onto the transmission output shaft.
5. Align the rear bevel box to the swinging arm and fit the pivot pins. Do not fully tighten at this stage.



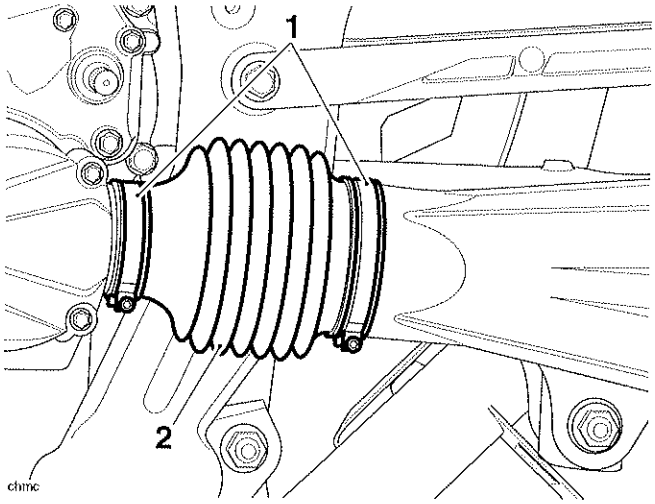
1. Pivot pin, left hand side shown

6. Fit the locking ring to the right hand pivot pin. Do not fully tighten at this stage.
7. Attach the torque arms to the rear bevel box. Fit the bolt and new lock nut but do not fully tighten at this stage.
8. Attach the drop arms to the swinging arm with the original bolt and a new lock nut. Do not fully tighten at this stage.
9. Tighten the pivot pins in the sequence described below:
   a) tighten the left hand pivot pin to **100 Nm**;
   b) tighten the right hand pivot pin to **48 Nm**;
   c) lubricate the threads of locking ring with a smear of proprietary high temperature copper based grease then fit to the right hand pivot pin and tighten to **100 Nm**.
10. Tighten the torque arms bolt and lock nut to **48 Nm**.



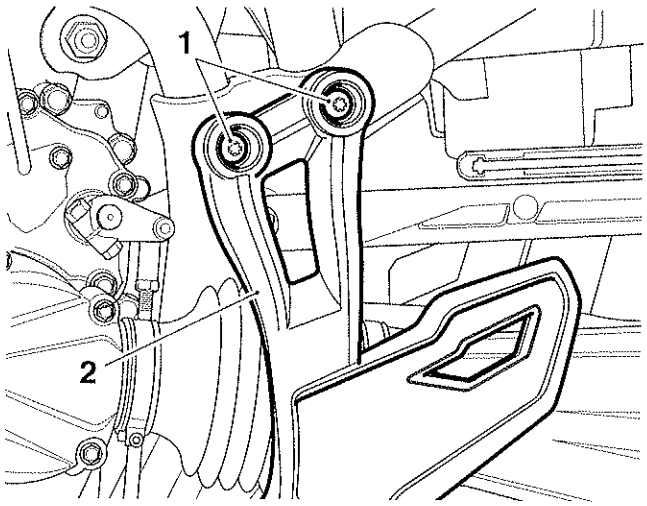
1. Bolt
2. Lock nut
3. Torque arms

11. Attach the rubber boot to the rear of the swinging arm.
12. Attach the rubber boot to the front of the swinging arm and the transmission. Position the clips as noted for removal and tighten to **1.5 Nm**.



1. Clamps
2. Boot

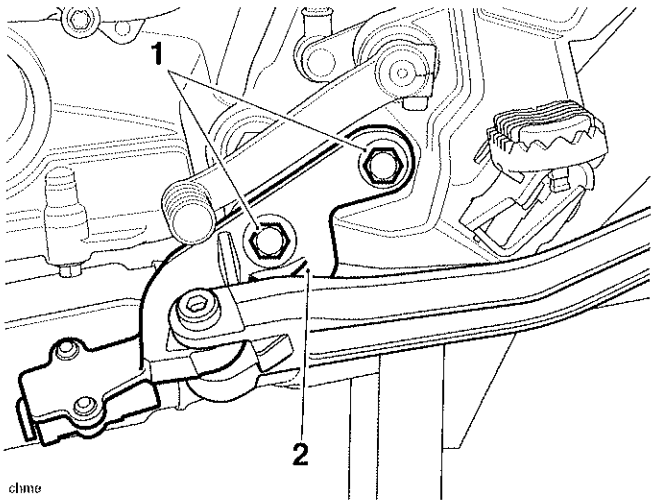
13. Align the left hand control plate to the frame and fit the two upper fixings. Do not fully tighten at this stage.



1. Fixings
2. Control plate

14. Route the harness for the side stand switch as noted for removal.

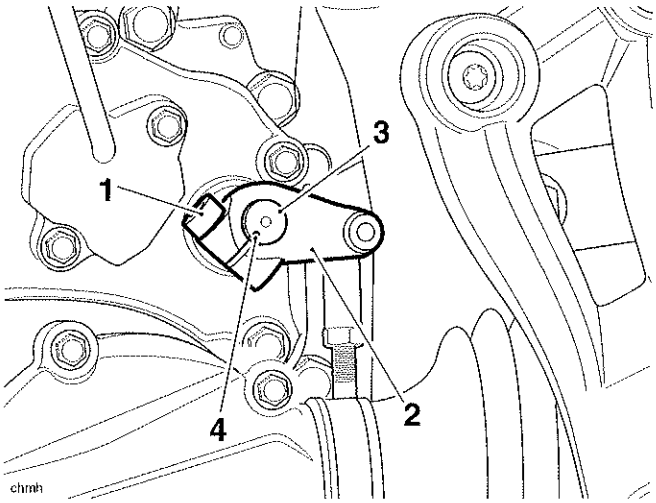
15. Fit the side stand and tighten its fixings to **70 Nm**.



chme

1. **Fixings**
2. **Side stand**

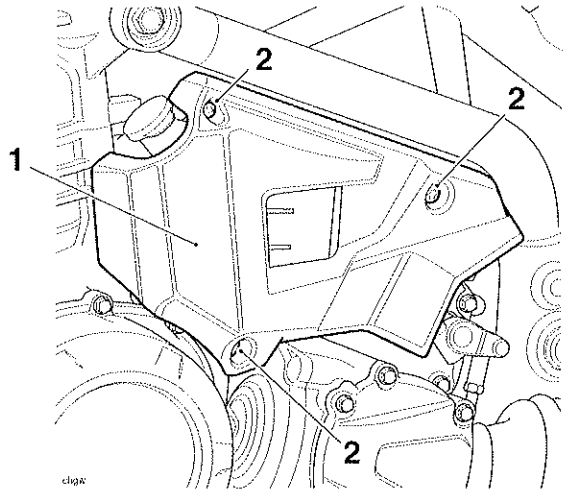
16. Tighten the upper fixings for the left hand control plate to **18 Nm**.
17. Fit the transmission linkage to the gear change mechanism as noted for removal.
18. Fit the pinch bolt and tighten it to **9 Nm**.



chmh

1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

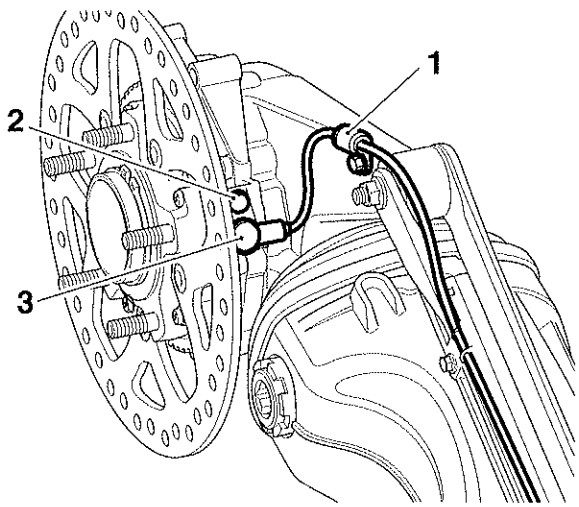
19. Refit the expansion tank cover and secure with three new fixings. Tighten the upper fixing to **3 Nm** and the lower to **7 Nm**.



chgw

1. **Expansion tank cover**
2. **Fixings**

20. Align the pulser ring to the hub. Fit new fixings and tighten to **5 Nm**.
21. Align the brake disc to the hub. Fit new fixings and tighten to **22 Nm**.
22. Fit the rear wheel speed sensor and tighten the new fixing to **9 Nm**.
23. Secure the harness for the rear wheel speed sensor and its P-clip to the rear bevel box.



chnb

1. **P-clip**
2. **Fixing**
3. **Wheel speed sensor**

24. Position the caliper over the disc ensuring the pads are correctly aligned on both sides of the disc.
25. Fit the caliper retaining bolts and tighten to **40 Nm**.
26. Fit the rear wheel (see page *16-9*).
27. With the weight of the motorcycle on its wheels, tighten the drop link to swinging arm fixing to **85 Nm**.
28. Check and, if necessary, adjust the oil level in the rear bevel box (see page *14-3*).
29. Reconnect the battery, positive (red) lead first.
30. Fit the rider's seat (see page *17-16*).
31. Check for correct brake operation. Rectify as necessary.

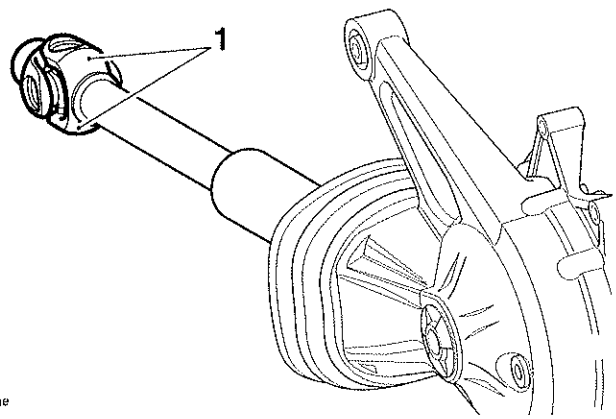
Rear Bevel Box Bearings

Removal

Warning

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

1. Remove the rear bevel box (see page *14-4*).
2. With the aid of an assistant holding the rear bevel box, align the drive shaft such that it is straight.
3. Using a soft faced mallet, give a sharp tap to one of the universal joint yokes on the drive shaft, indicated below, to release the snap ring securing the drive shaft to the bevel box.



chne

1. Universal joint yoke

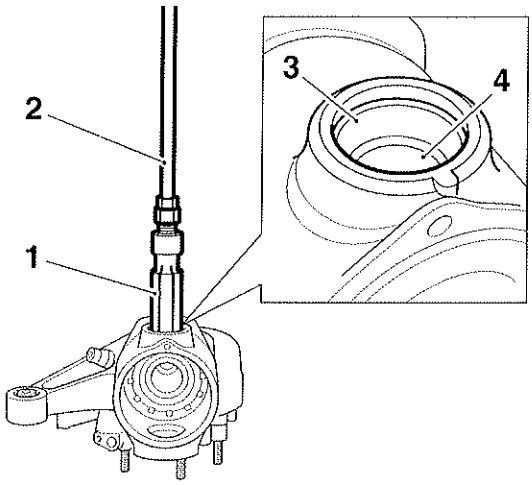
4. Remove the drive shaft.

Note:

- **When removing the bearing outer race, the cap will separate from the outer race.**

5. Fit the Bearing Puller 32-42 mm T3880627 such that the lugs of the tool are between the bearing outer race and its cap.
6. Assemble the Bearing Puller 32-42 mm T3880627 to the Slide Hammer T3880208, fully engaging the threads.

7. Draw back the slide part of the hammer swiftly to facilitate the removal of the bearing outer race.



chmm

1. **Bearing Puller 32-42 mm T3880627**
2. **Slide Hammer T3880208**
3. **Bearing outer race**
4. **Cap**

8. Repeat for the other bearing race.

Installation

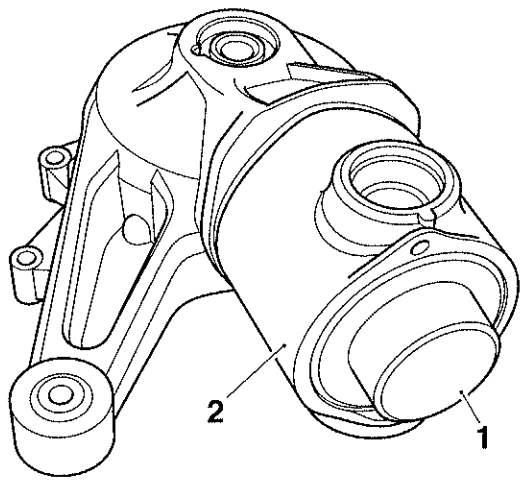
Note:

- **The left hand replacement bearing is supplied with the cap attached to the outer race by means of an adhesive.**
- **The right hand replacement bearing is supplied with the cap detached from the bearing race.**

⚠ Caution

Service tool Housing Support T3880624 must be used when pressing in the bearing outer race. Failure to use this service tool may result in damage to the bevel box housing.

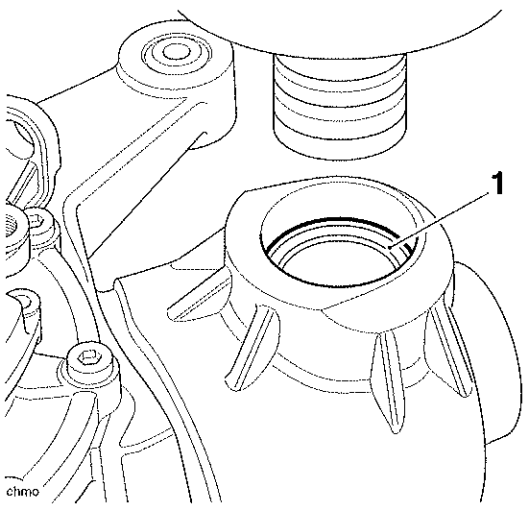
1. Fit service tool Housing Support T3880624 into the bevel box housing, as shown below.



chmn

1. **Service tool, Housing Support T3880624**
2. **Bevel box**

2. If not attached to the bearing race, fit the cap into the bearing housing, ensuring that it is central, as shown below.



chmo

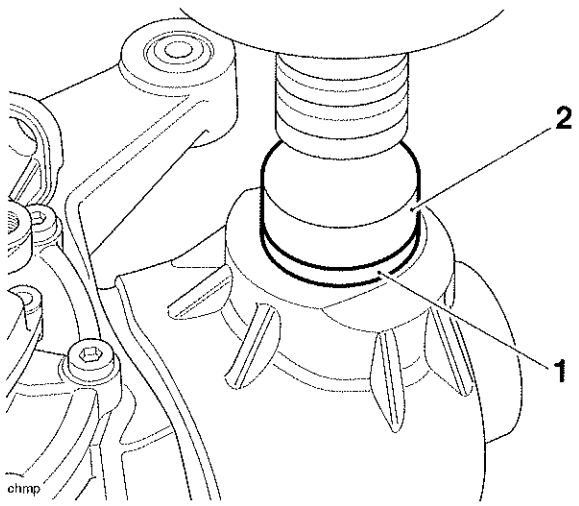
1. **Cap**

Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

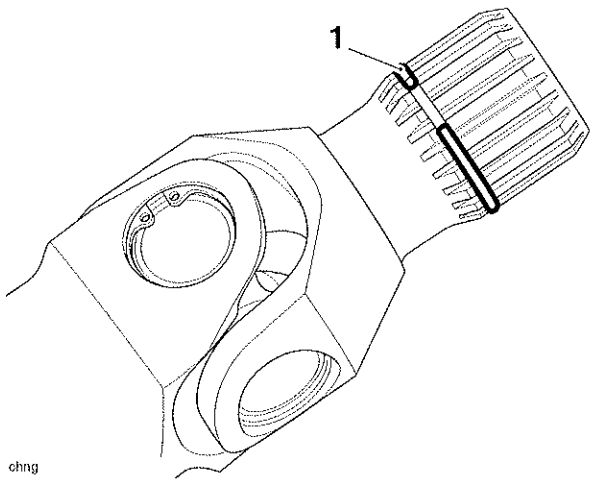
Never wear loose clothing which could become trapped in the press and cause a crushing injury to the hand, arms or other parts of the anatomy.

3. Using service tool Bearing Installer, 39 mm T3880625, press the new bearing race to the left hand side of the rear bevel box until it is pressed fully to the locating shoulder in the bevel box.
4. Using service tool Bearing Installer, 46 mm T3880626, press the new bearing race to the right hand side of the rear bevel box until it is pressed fully to the locating shoulder in the bevel box.



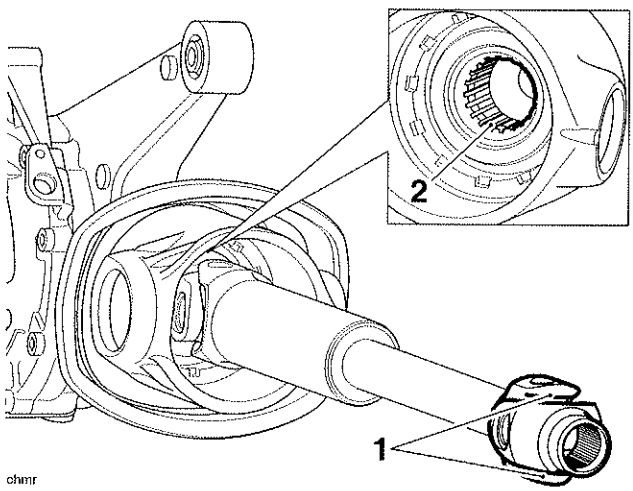
1. Bearing race, right hand side
2. Service tool Bearing Installer, 46 mm T3880626

5. Remove the service tools.
6. Using a suitable tool, remove the snap ring on the drive shaft and fit a new snap ring.



1. Snap ring

7. Apply a smear of grease, to NLGI 2 specification, to the splines of the drive shaft.
8. With the aid of an assistant holding the rear bevel box, align the drive shaft to the bevel box such that it is straight.
9. Using a soft faced mallet, give a sharp tap to one of the universal joint yokes on the drive shaft, indicated below, to locate the snap ring into its groove in the bevel box.



1. Universal joint yoke
2. Groove, for snap ring

10. Thoroughly lubricate the bearings with grease, to NLGI 2 specification, and fit them to the rear bevel box.
11. Fit the bevel box to the motorcycle (see page *14-8*).

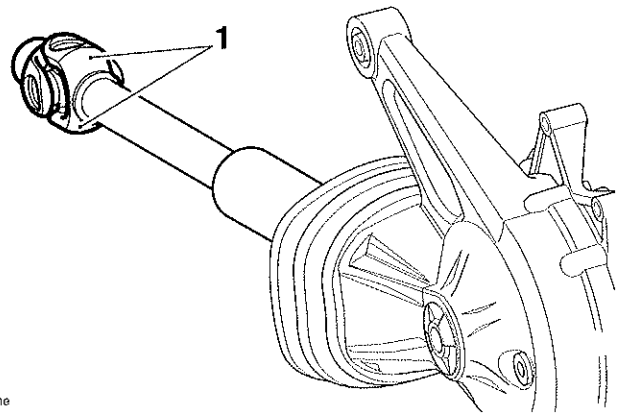
Rear Bevel Box Oil Seal

Removal

Warning

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

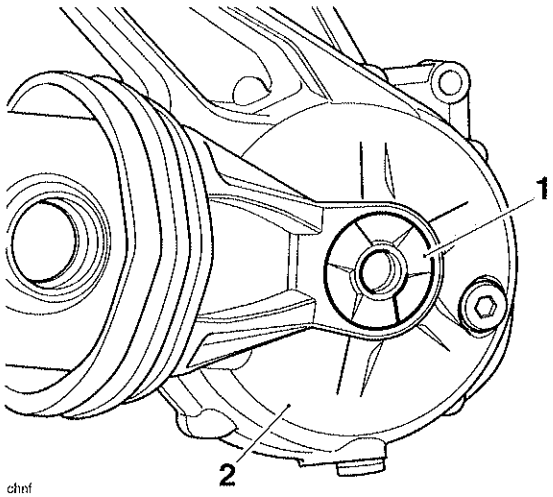
1. Drain the oil from the rear bevel box (see page *14-4*).
2. Remove the rear bevel box (see page *14-4*).
3. With the aid of an assistant holding the rear bevel box, align the drive shaft such that it is straight.
4. Using a soft faced mallet, give a sharp tap to one of the universal joint yokes on the drive shaft, indicated below, to release the snap ring securing it to the bevel box.



chne

1. Universal joint yoke

5. Remove the drive shaft.
6. Remove the cap from the bevel box housing.

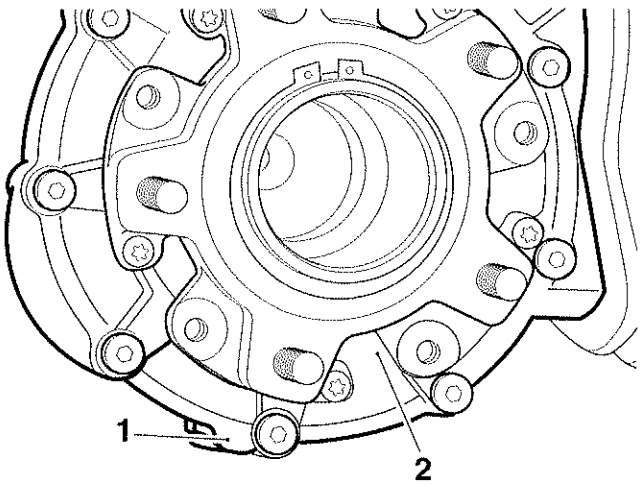


chnf

1. Cap
2. Housing

Note:

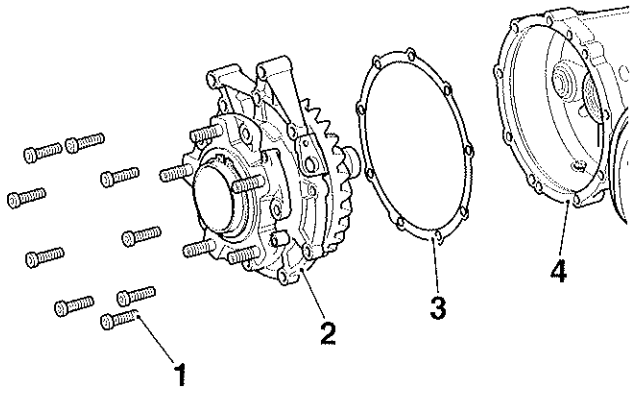
- **A shim or shims are fitted between the back plate assembly and the bevel box housing. Ensure the shims are kept clean when removed from the bevel box.**
- **The shims and back plate assembly will only fit the bevel box housing in one position. Note the position of the boss lug on the backing plate, shim(s) and housing for installation.**



chmg

1. Boss
2. Back plate assembly

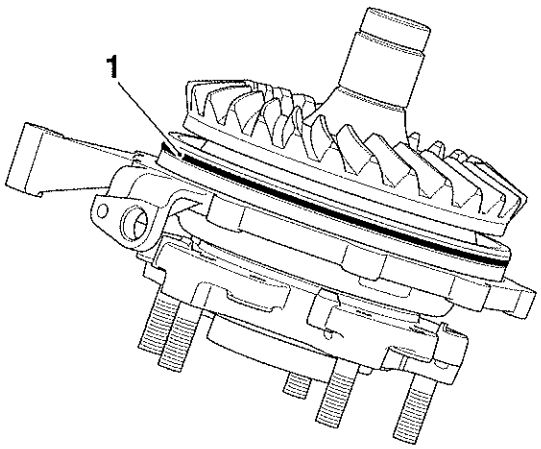
7. Release the nine fixings and remove the back plate assembly. Collect the shim(s) and ensure they are kept clean.



chnd

1. **Fixings**
2. **Back plate assembly**
3. **Shim, one shown**
4. **Housing**

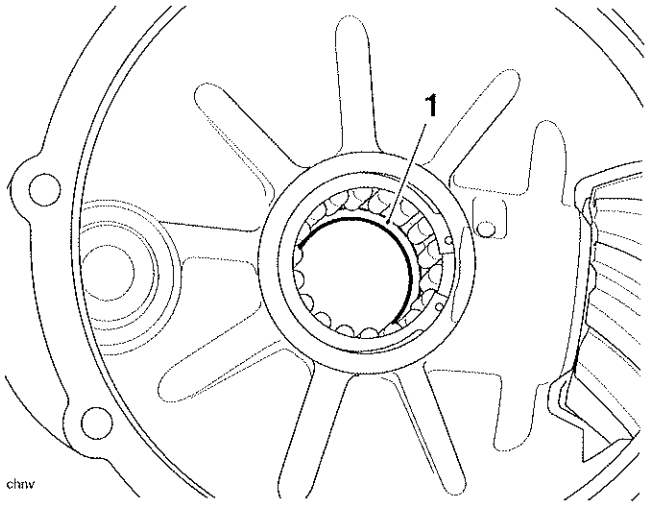
8. Remove and discard the O-ring.



chmy

1. **O-ring**

9. Working from the opposite side of the housing to the seal, drift out the oil seal.



chnv

1. **Seal**

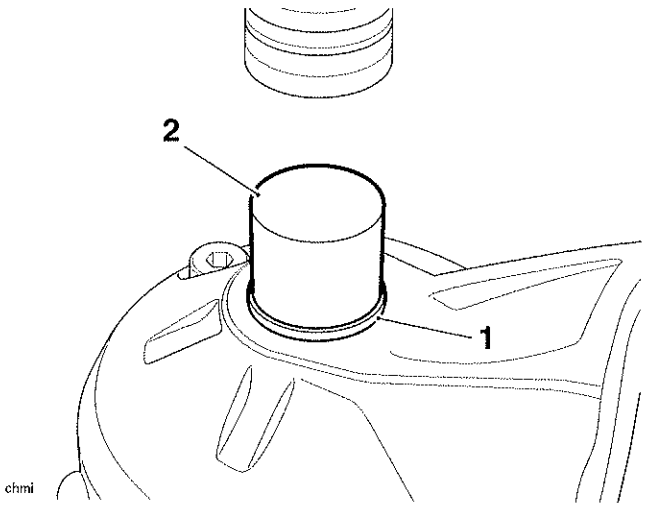
Installation

Warning

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing which could become trapped in the press and cause a crushing injury to the hand, arms or other parts of the anatomy.

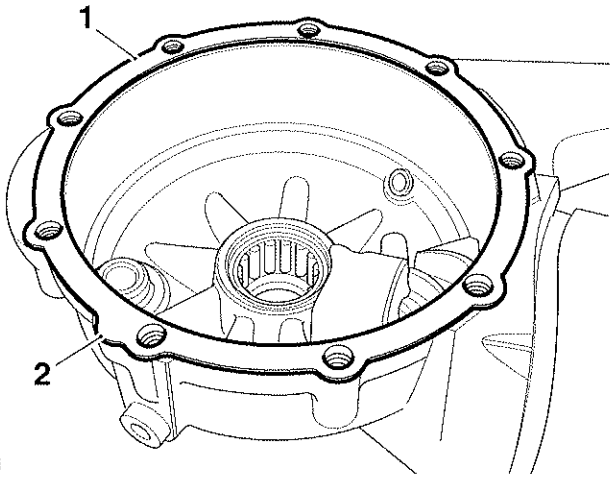
1. Using a suitable drift, press in the new seal until it is against the bearing with the manufacturer's marks facing outwards.



chmi

1. **Seal**
2. **Drift**

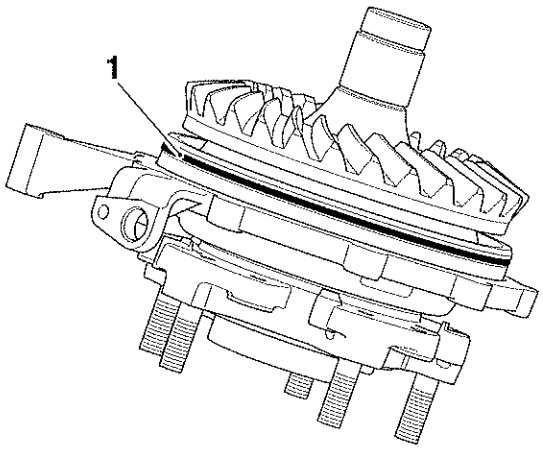
2. Align the shim(s) to the rear bevel box housing as noted for removal.



chmj

1. Shim(s)
2. Boss

3. Lubricate a new O-ring with clean oil for the rear bevel box and fit it to the back plate assembly.



chmy

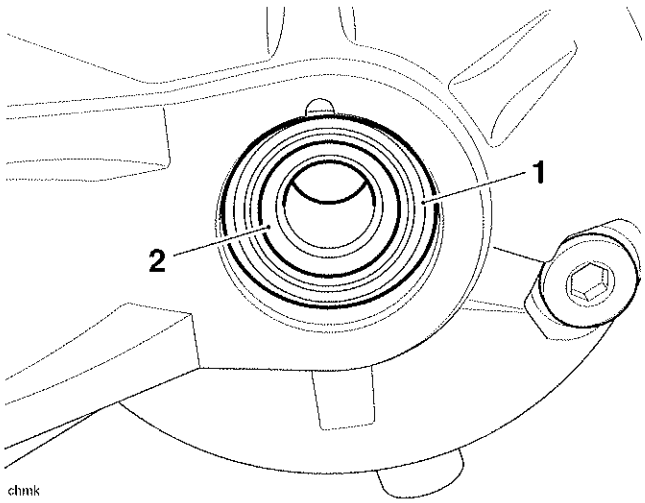
1. O-ring

4. Lubricate the sealing lips of the new seal with clean oil for the rear bevel box.
5. Align the back plate to the bevel box housing and shim(s) as noted for removal.

Note:

- **When fitting the back plate to the bevel box housing, ensure that the sealing lips of the seal fit evenly around the shaft for the hub.**

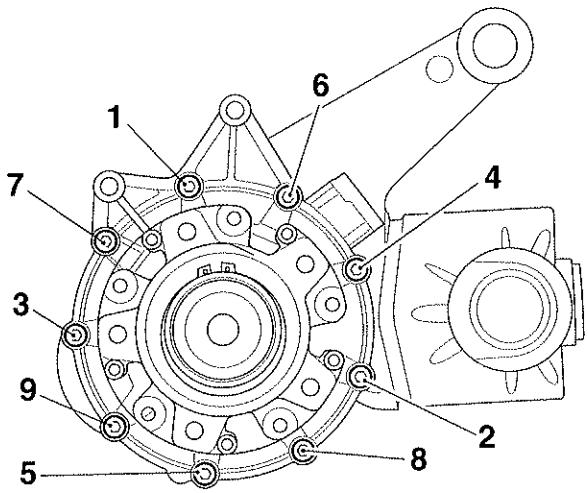
6. Carefully press the back plate and bevel box housing together ensuring that the seal fits around the shaft for the hub evenly.



chmk

1. Seal
2. Shaft

7. Fit the fixings and tighten in the sequence shown below to **30 Nm**.



Tightening Sequence

8. Fit the rear bevel box to the motorcycle (see page *14-8*).
9. Fill the rear bevel box with 75W/90 fully synthetic hypoid oil that meets specification API Service Level GL5, such as Castrol SAF-XO fully synthetic hypoid oil (see page *14-4*).
10. Operate the motorcycle then check the rear bevel box for oil leaks. Rectify if necessary.

15 Brakes

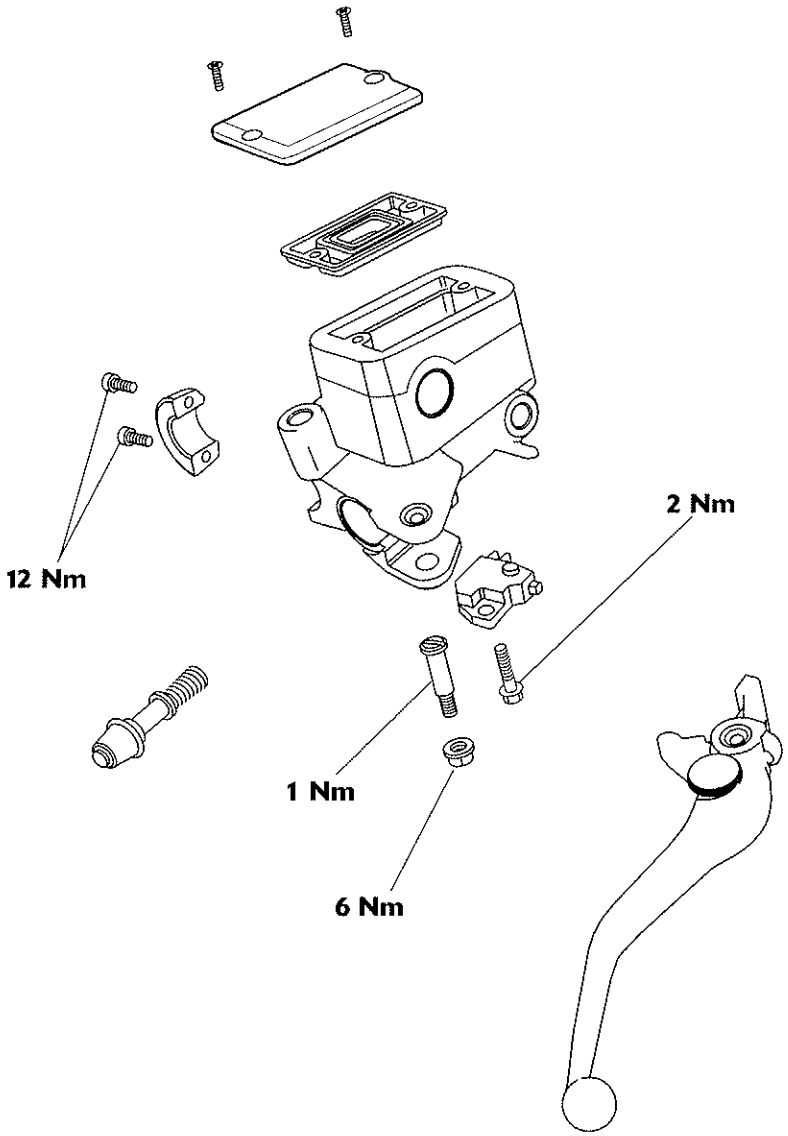
Table of Contents

Exploded View - Front Brake Master Cylinder 15.4
Exploded View - Front Brake Caliper 15.5
Exploded View - Rear Brake Master Cylinder 15.6
Exploded View - Rear Brake Caliper 15.7
Exploded View - ABS System 15.8
Braking System Maintenance Safety Precautions 15.9
Brake Light Switches 15.9
Front Brake Fluid Level Inspection 15.10
Rear Brake Fluid Level Inspection 15.10
Changing Brake Fluid 15.11
Brake Pads 15.11
Brake Wear Inspection 15.11
Breaking-in New Brake Pads and Discs 15.11
Bleeding the Front Brakes, Renewing Brake Fluid 15.11
Front Brake Pads 15.14
Removal 15.14
Inspection 15.14
Installation 15.14
Front Brake Caliper 15.15
Removal 15.15
Disassembly 15.16
Inspection 15.16
Assembly 15.17
Installation 15.17
Front Discs 15.18
Wear 15.18
Removal 15.19
Installation 15.19
Front Brake Master Cylinder 15.19
Removal 15.19
Disassembly 15.20
Inspection 15.20

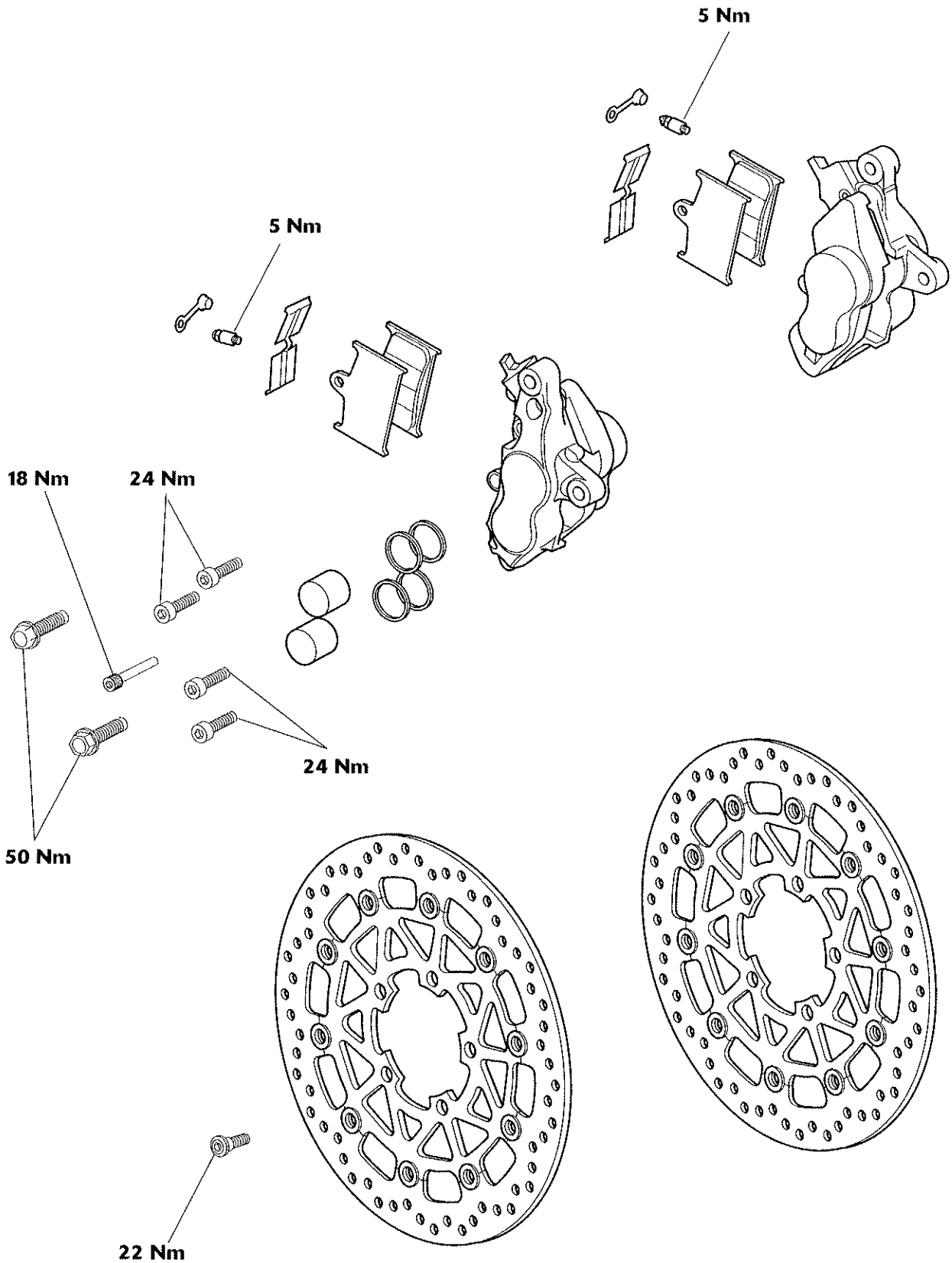
Assembly 15.21
Installation 15.21
Bleeding the Rear Brakes, Renewing Brake Fluid 15.22
Rear Brake Pads 15.24
Removal 15.24
Installation 15.25
Rear Brake Caliper 15.26
Removal 15.26
Disassembly 15.26
Inspection 15.26
Assembly 15.27
Installation 15.28
Rear Brake Disc 15.28
Wear 15.28
Removal 15.29
Installation 15.29
Rear Master Cylinder 15.30
Removal 15.30
Disassembly 15.30
Inspection 15.30
Assembly 15.31
Installation 15.32
Rear Brake Light Switch 15.32
Removal 15.32
Installation 15.33
Front ABS Wheel Speed Sensor 15.34
Removal 15.34
Installation 15.35
Front ABS Pulser Ring 15.36
Removal 15.36
Inspection 15.36
Installation 15.36
Rear ABS Wheel Speed Sensor 15.37
Removal 15.37
Installation 15.38
Rear ABS Pulser Ring 15.38
Removal 15.38
Inspection 15.38
Installation 15.38
ABS Hydraulic Modulator/ECM 15.39
Removal 15.39
Installation 15.41
ABS 15.42
System Description 15.42
Component Location 15.43

ABS System Circuit Diagram 15.44
Key to Wiring Diagram 15.44
Key to Wiring Colour Codes 15.44
ABS System Circuit Diagram 15.45
System Diagnostics 15.46
Diagnostic Tool Connection 15.46
Triumph Diagnostic Tool 15.47
Build Data 15.47
Current Data 15.47
Bleed System 15.47
Diagnostic Trouble Codes 15.48
Diagnostic Trouble Codes 15.49
Electrical Connectors 15.51
Before Disconnection: 15.51
When Disconnecting a Connector: 15.51
When Inspecting a Connector: 15.51
When Connecting a Connector 15.51
Disconnection of ABS ECM Connector 15.51
Reconnection of ABS ECM Connector 15.52
Further Diagnosis 15.52
Pinpoint Tests 15.52
ABS Warning Light ON (No DTCs Stored) 15.53
ABS Warning Light Does Not Illuminate (No DTCs Stored) 15.54
Front Wheel Sensor Open Circuit/Short Circuit 15.56
Rear Wheel Sensor Open Circuit/Short Circuit 15.58
Front Wheel Sensor Abnormal Input/Losing Contact 15.60
Rear Wheel Sensor Abnormal Input/Losing Contact 15.61
Front Wheel Pulser Gear Missing Teeth 15.62
Rear Wheel Pulser Gear Missing Teeth 15.63
Front or Rear Input/Output Solenoid Open/Short Circuit 15.64
Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock 15.65
Motor - Lock; Motor Stuck OFF; Motor Stuck ON 15.66
Power Source Voltage Drop/Voltage Rise 15.67
Different Tyre Diameter 15.68
Abnormal ECU 15.69
ABS Hydraulic Circuit Layout 15.70

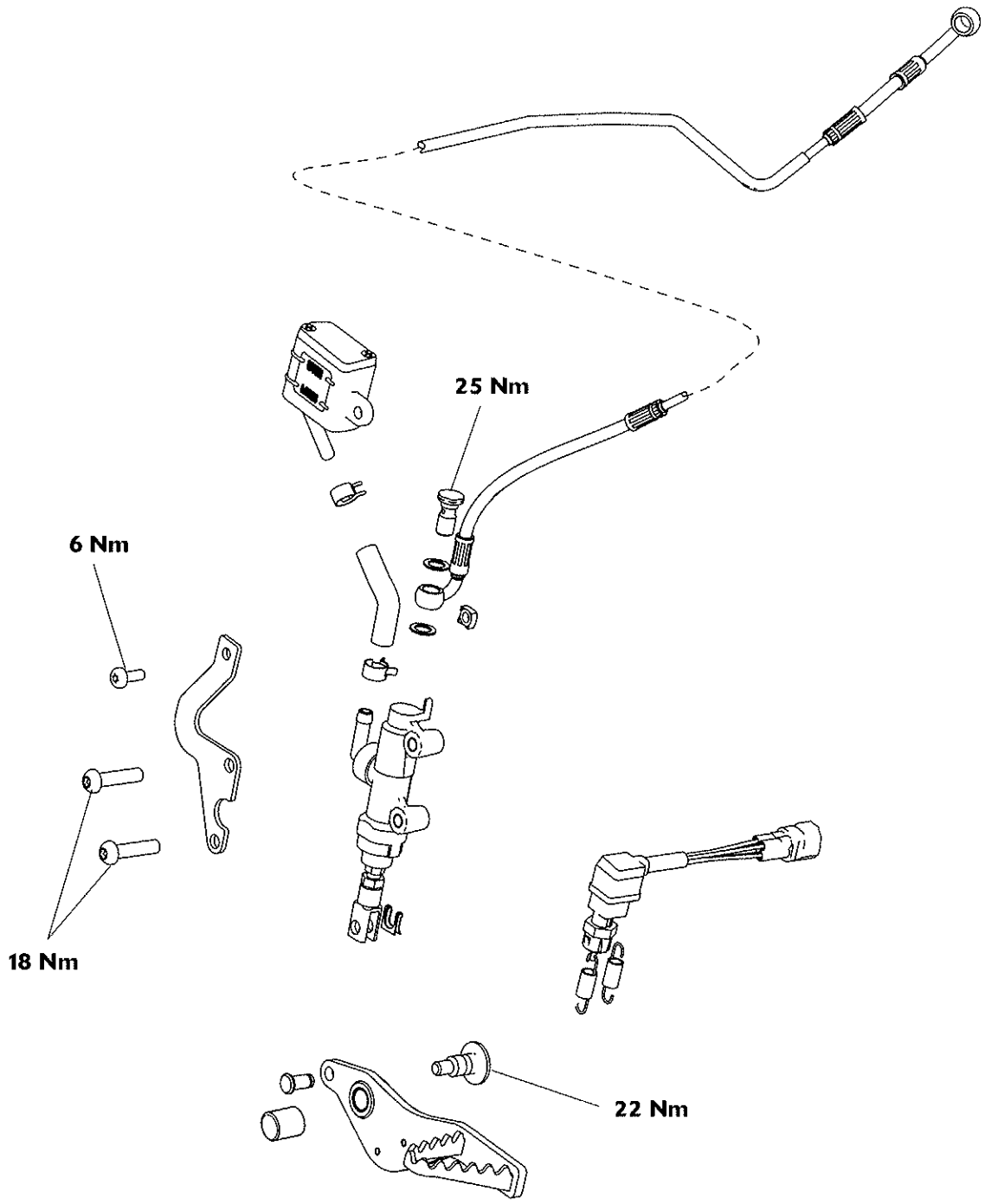
Exploded View - Front Brake Master Cylinder



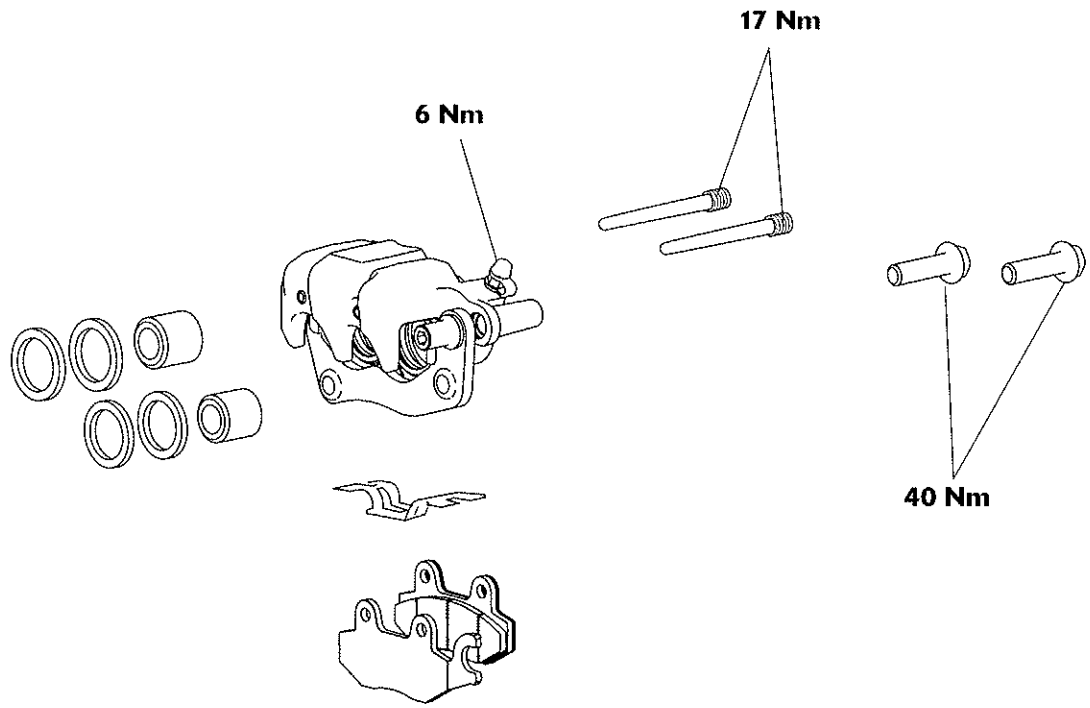
Exploded View - Front Brake Caliper

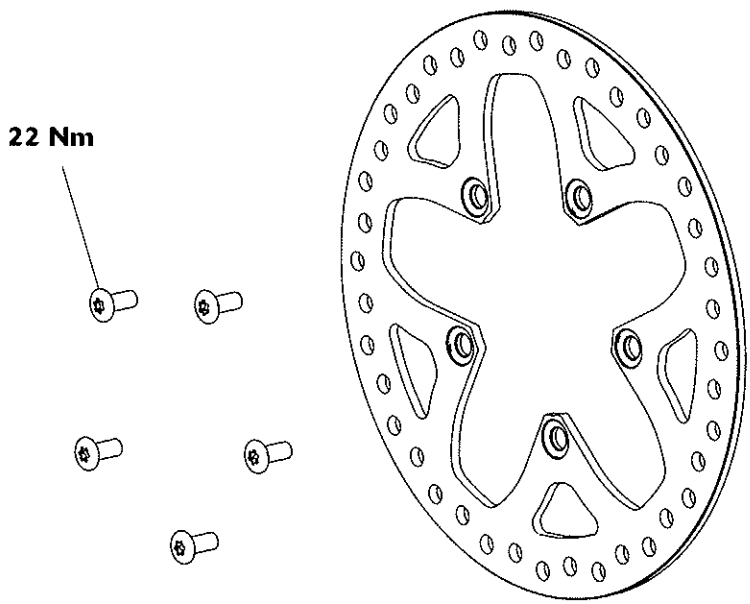


Exploded View - Rear Brake Master Cylinder

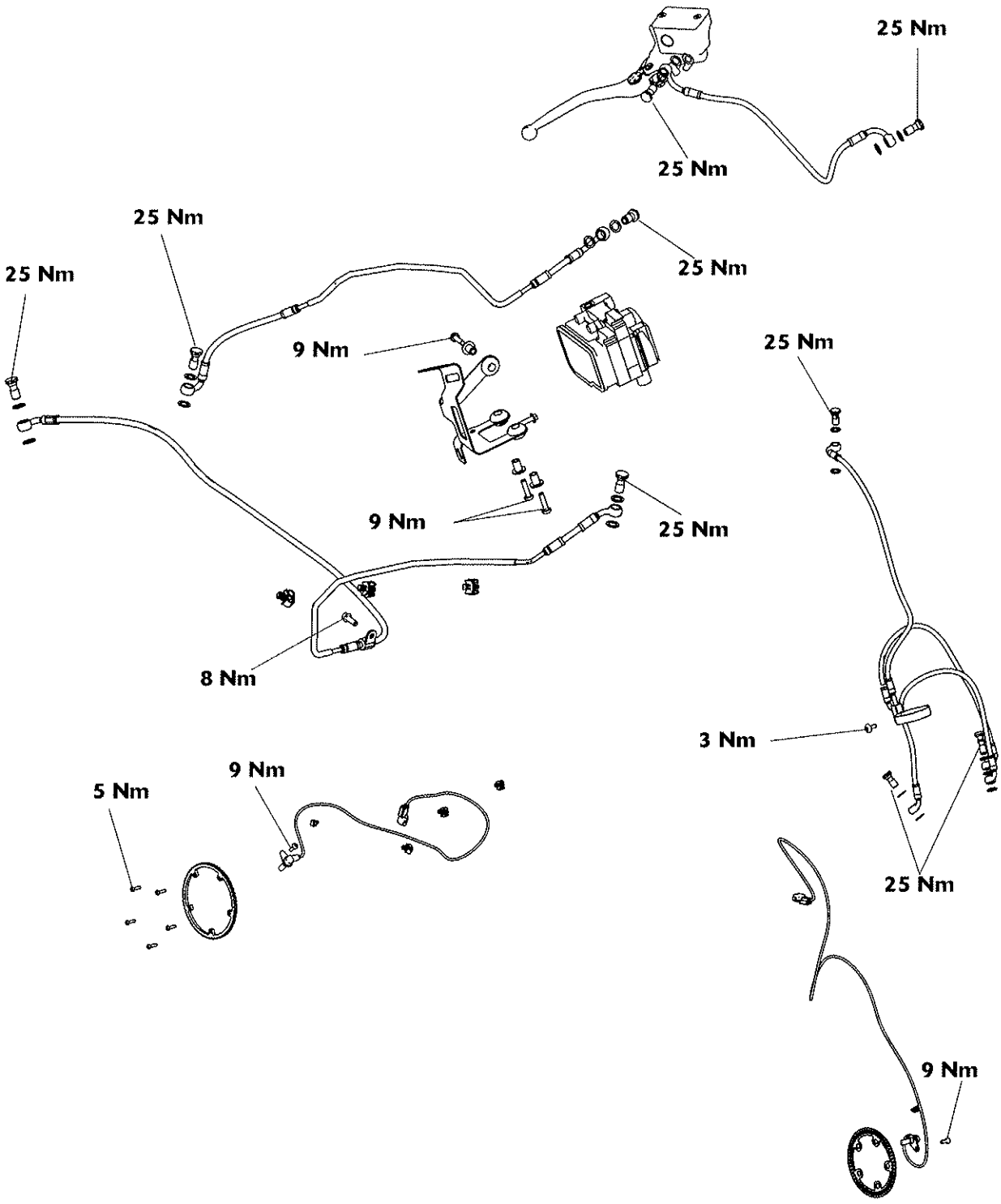


Exploded View - Rear Brake Caliper





Exploded View - ABS System



Braking System Maintenance Safety Precautions

Warning

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

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

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

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

Do not mix different brands of 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 or clutch fluid reservoirs, consult your authorised Triumph dealer for advice before riding.

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

It is dangerous to operate the motorcycle under such conditions and remedial action must be taken by your authorised Triumph dealer before riding the motorcycle. Failure to take remedial action may reduce braking efficiency leading to an accident.

Warning

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

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

Warning

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

Brake Light Switches

Warning

The front and rear brake light switches are an integral part of the cruise control system. To ensure the brake light switches and brake light functions correctly after a replacement or adjustment, the cruise control switch test must be carried out as described on page *10-33*.

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

The front brake light switch is an integral part of the right hand switch cube. If the front brake light switch requires replacement, the right hand switch cube and brake light switch assembly must be replaced.

For the removal, installation and adjustment of the rear brake light switch see page *15-32*.

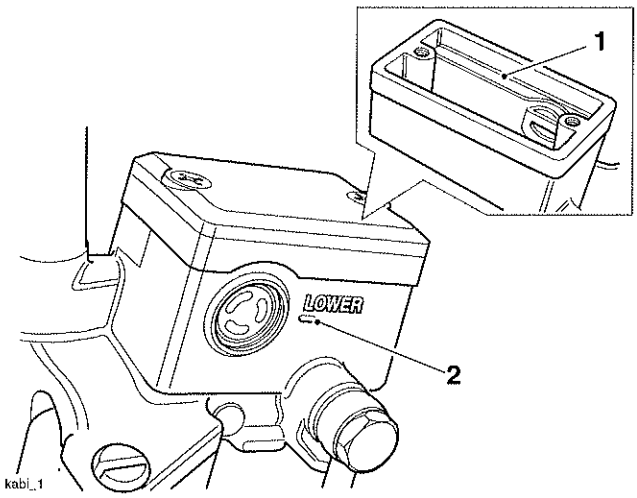
Front Brake Fluid Level Inspection

Warning

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

In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

1. To inspect the fluid level, check the level of fluid visible in the window at the front of the reservoir body.



1. Front reservoir upper level
2. Front reservoir lower level

2. Ensure that the brake fluid level in the front brake fluid reservoir is between the upper and lower level lines (reservoir held horizontal).
3. To adjust the fluid level:
   - Release the cap screws and detach the cover noting the position of the sealing diaphragm.
   - Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
   - Refit the cover, ensuring that the diaphragm seal is correctly positioned between the cap and reservoir body. Tighten the cap retaining screws.

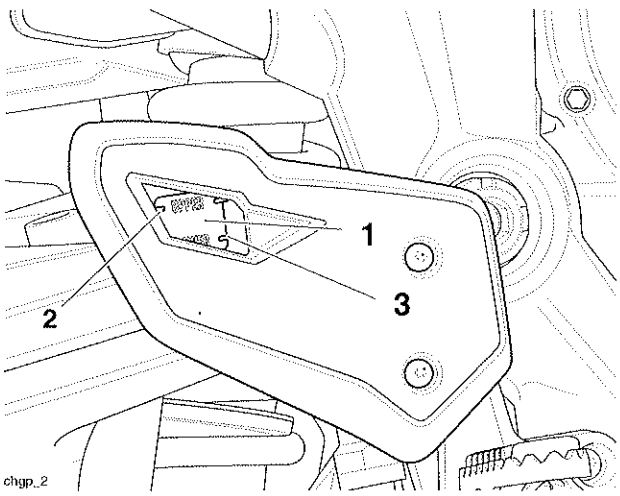
Rear Brake Fluid Level Inspection

Warning

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

In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

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



1. Rear brake fluid reservoir
2. Rear reservoir upper level
3. Rear reservoir lower level

Changing Brake Fluid

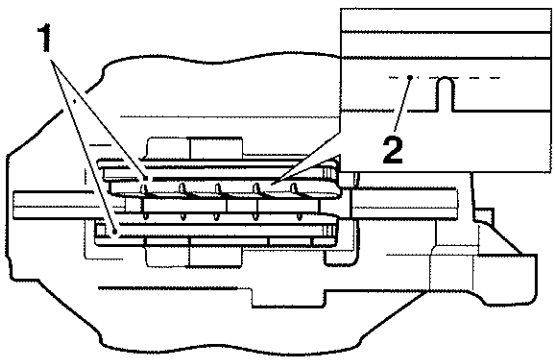
Brake fluid should be changed at the interval specified in the scheduled maintenance chart.

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 **1.5 mm**. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



cbmz

1. **Lining material thickness**
2. **Minimum thickness line**

Warning

Do not replace individual brake pads, replace both pads in the brake caliper. On the front where two calipers are mounted on the same wheel, all the pads in both calipers must be replaced together. Replacing individual pads will reduce braking efficiency and may cause an accident.

Breaking-in New Brake Pads and Discs

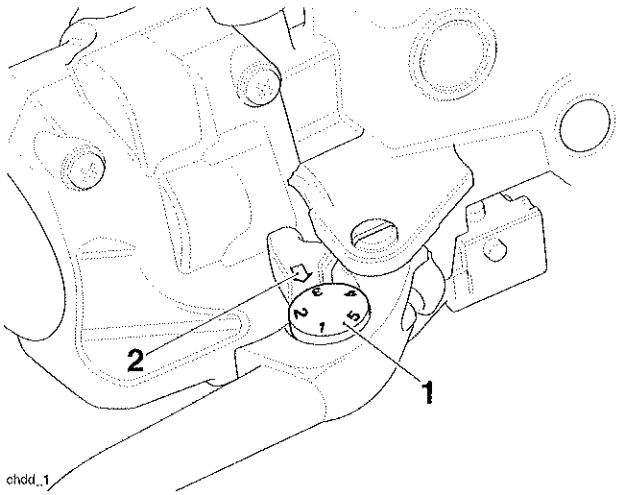
After replacement brake discs and/or pads have been fitted to the motorcycle, we recommend a period of careful breaking-in that will optimise the performance and longevity of the discs and pads. The recommended distance for breaking-in new pads and discs is 200 miles (300 km).

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 wheel**
2. **Arrow mark**

2. Turn the handlebars to bring the fluid reservoir to a level position.
3. Remove the screws from the reservoir cover.

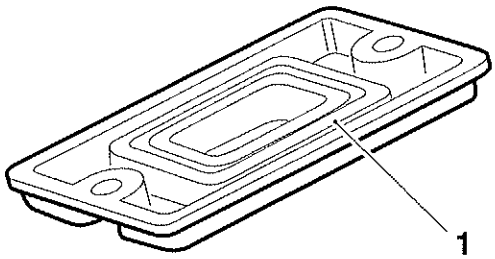
Warning

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

Caution

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

4. Check the condition of the reservoir sealing diaphragm. Replace if necessary.



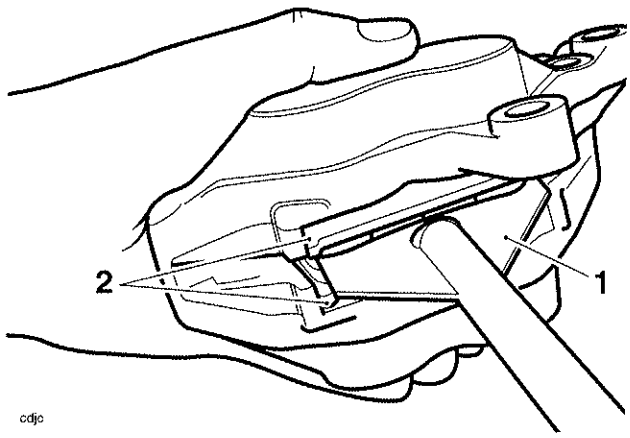
1. Sealing diaphragm

5. Undo and remove the bolts securing the right hand front brake caliper to the fork and manoeuvre the caliper clear of the brake disc. Do not remove the brake hose connected to the caliper.

⚠ Warning

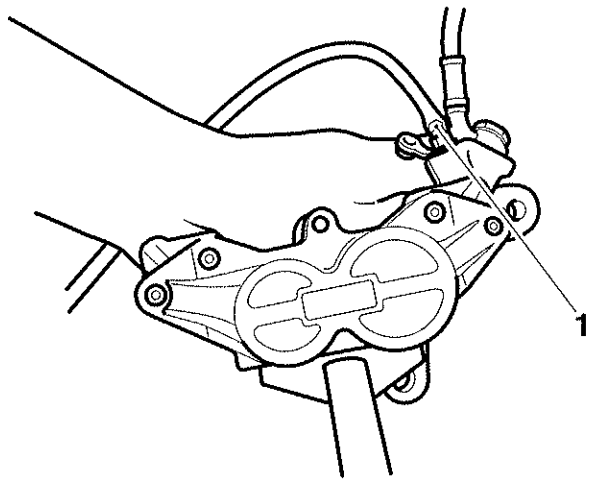
Do not allow the caliper to hang on the brake hose as this may damage the hose and could lead to an accident.

6. Obtain a suitable, wide, flat metal plate which is approximately 2 mm thick and place it between the brake pads. Pump the front brake lever a few times until the metal plate is held in place by the brake pads.



1. Plate
2. Brake pads

7. Remove the rubber cap from the bleed nipple on the caliper.
8. Whilst supporting the front brake caliper, attach a transparent tube to the bleed nipple and place the other end of the tube in a suitable receptacle containing new brake fluid. Keep the tube end below the level of fluid.
9. Support the caliper so that the bleed nipple is uppermost.



1. Bleed nipple

10. Release the bleed nipple.

Note:

- **During bleeding, do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.**

11. Get an assistant to slowly pull the brake lever to the handlebar.
12. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
13. Repeat steps 11 and 12 until no more air appears in the bleed tube.
14. When all air has been expelled from the system, hold the lever fully against the handlebar and close the bleed nipple.

Note:

- **Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.**

15. Tighten the bleed nipple to **5 Nm**.
16. Connect the Triumph diagnostic tool (see page *15-46*).
17. Follow the on screen menu to ABS Diagnostics. From the menu, select 'BLEED SYSTEM' (see the Triumph Diagnostic Tool User Guide).

Note:

- **On pressing the Start button, the diagnostic software will send a command to the ABS ECM to open the 2nd circuit solenoid.**
- **The front brake lever travel will increase as ABS modulator solenoids are opened and will then decrease as the solenoids are automatically closed.**
- **Pressure must be applied to the front brake lever before operating the bleed sequence on the diagnostic tool. An assistant will be required to open the bleed nipple while pressure is applied to the brake lever.**

18. Apply pressure to the front brake lever, press the Start button to activate the bleed sequence on the diagnostic tool, and with assistance, release one of the bleed nipples.
19. Get an assistant to slowly pull the brake lever to the handlebar.
20. With the lever held fully against the handlebar, close the bleed nipple. Once the bleed nipple is closed, release the brake lever.
21. The bleed sequence will run for a maximum of 90 seconds. Press the Stop button to end the bleed sequence at any time. Once the bleed sequence has completed the diagnostic tool will display a message '**ABS system bleed complete**'.

⚠ Caution

The ABS modulator must be allowed to cool between bleeding operations. Always allow the ABS modulator to cool for 5 minutes before starting the bleed procedure again. Failure to follow this instruction may result in damage to the ABS modulator.

22. Repeat the above procedure as necessary until all air is expelled from the system, maintaining the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
23. When all air has been expelled from the system, apply pressure to the brake lever and close the bleed nipple. Tighten the nipple to **6 Nm**.
24. Disconnect the Triumph diagnostic tool.
25. Repeat steps 10 to 12 until no more air appears in the bleed tube.
26. When all air has been expelled from the system, hold the lever fully against the handlebar and close the bleed nipple.
27. Remove the bleed tube.
28. Replace the bleed nipple cap.
29. Fill the reservoir to the upper level with new DOT 4 fluid.

⚠ Warning

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

Observe the brake and clutch fluid handling warnings given earlier in this section of the manual.

⚠ Caution

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

30. Repeat the bleed procedure for the left hand caliper.
31. When both calipers have been bled, ensure the brake lever operation has a firm resistive feel to it, does not feel spongy and that the lever cannot be pulled directly back to the handlebar. Take remedial action as necessary.
32. Refit the diaphragm and reservoir cover. Refit the screws and tighten to **1.5 Nm**.

⚠ Warning

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

33. Reset the brake lever adjuster to the original setting.
34. Check the operation of the front brake. Rectify as necessary.

⚠ Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake 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.

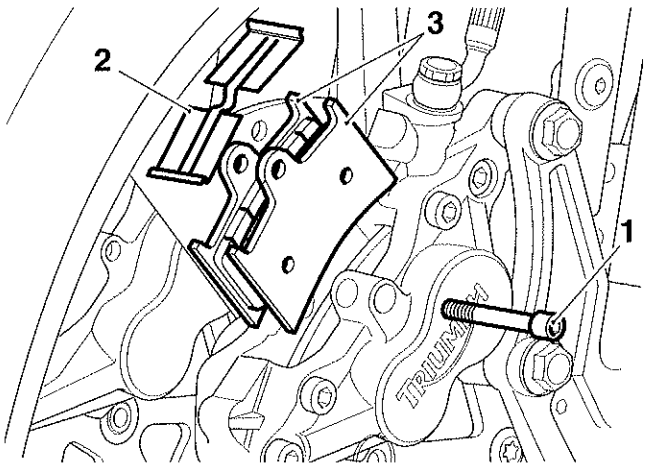
1. Remove the brake pad retaining pin after removing and discarding its split pin.
2. Remove the anti rattle spring.

Caution

In the following operation, never lever directly against the disc, caliper or pad lining material. Always use a levering tool made from a soft material that will not cause damage to the load-bearing surfaces.

Brake fluid will be displaced as the caliper pistons are compressed. To prevent paint 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 to allow withdrawl of the pads.



1. **Pad retaining pin**
2. **Anti rattle spring**
3. **Brake pads**

Note:

- **Complete the installation of the brake pads to one caliper (see installation for details) before removing the pads from the other caliper.**

Inspection

1. Check the pad retainer, anti rattle spring and retaining pin. Renew any component which shows signs of damage or corrosion.

Installation

Warning

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

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.

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 brake 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 pin to **18 Nm**, and secure with a new split pin.
5. Pump the brake lever to correctly position the caliper pistons.
6. Repeat the removal, inspection and installation process for the other caliper.

Warning

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

Observe the brake and clutch fluid handling warnings given earlier in this section of the manual.

7. Check the front brake fluid level and top up as required with new DOT 4 fluid.
8. Check for correct brake operation. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Caliper

Removal

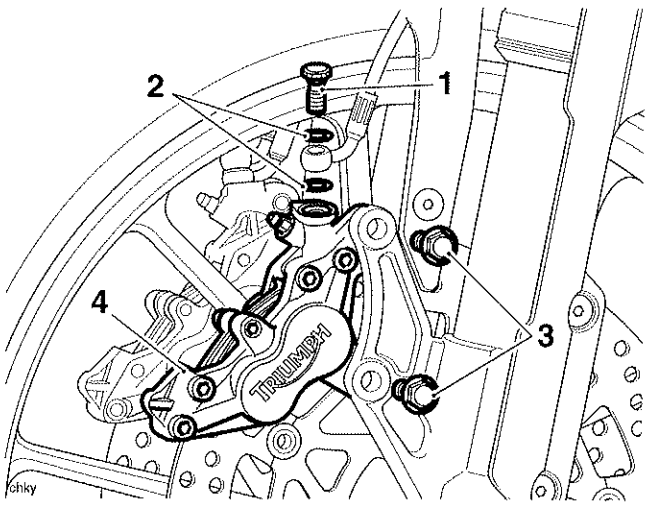
Warning

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

Caution

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

1. Remove the brake pads (see page *15-14*).
2. Disconnect the brake hose at the caliper (two hoses on left hand caliper), and place the free end of the hose(s) in a suitable container to collect the brake fluid. Discard the sealing washers.
3. Remove the two caliper bolts.



1. **Banjo bolt**
2. **Sealing washers**
3. **Bolts**
4. **Front brake caliper, left hand side**

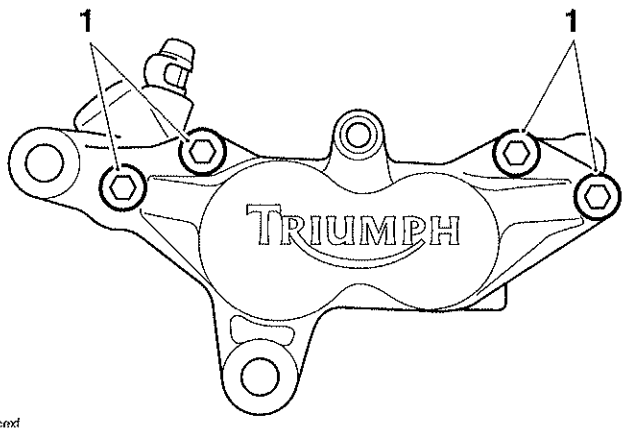
4. Manoeuvre the caliper clear of the disc, taking care not to damage the wheel.

Disassembly

Warning

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

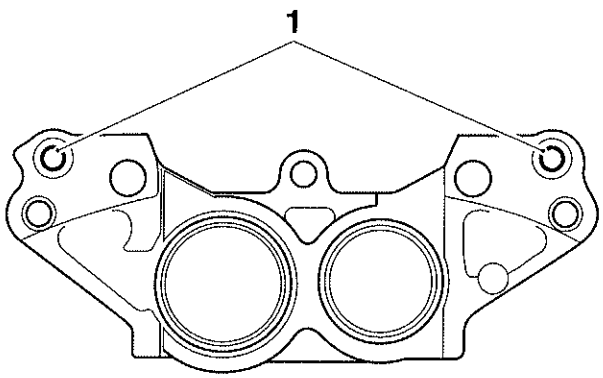
1. Remove the four bolts which secure the two halves of the brake caliper together. Discard the bolts.



cexd

1. Bolts

2. Carefully split the two halves of the caliper then remove and discard the two joint seals.



cexg

1. Joint seals

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 or brake fluid.

Warning

Ensure the seal grooves in the caliper bores are not damaged during the removal of the seals. Damage to the seal grooves may allow brake fluid to leak past the seals resulting in a dangerous riding condition leading to loss of motorcycle control and an accident.

3. Cover the caliper half with a clean, heavy cloth and, using compressed air, remove the pistons one at a time.

Warning

Ensure the seal grooves in the caliper are not damaged during the removal of the seals. Damage to the seal grooves may allow brake fluid to leak past the seals resulting in a dangerous riding condition leading to loss of motorcycle control and an accident.

4. Remove the old piston seals and the dust seals then thoroughly clean and dry the caliper bores. Discard the old seals.

Inspection

1. Check the pistons, caliper bores for corrosion, scoring and damage. Renew as necessary.
2. If all components are serviceable, obtain a piston seal kit and reassemble the caliper as follows:

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.

Assembly

Warning

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

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

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

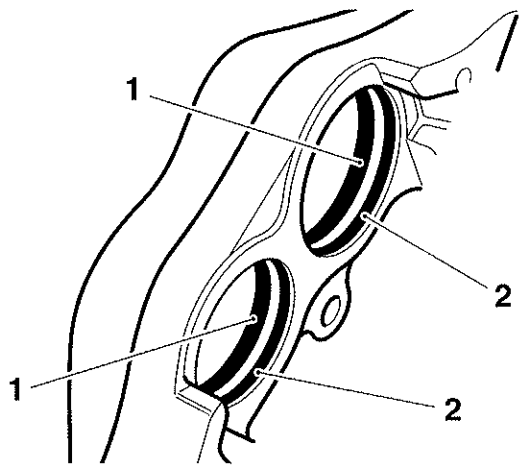
Warning

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

Note:

- **The piston seals are slightly thicker than the dust seals.**

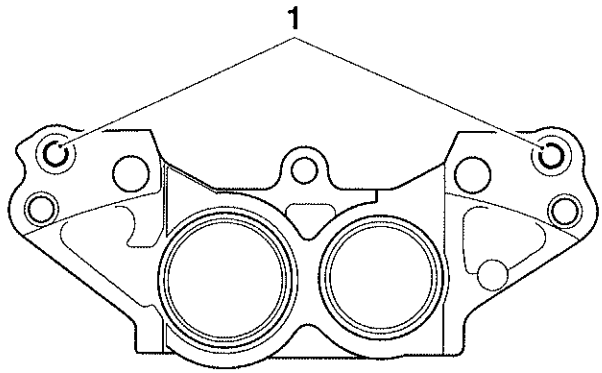
3. Ensure all components are clean, then fit the new seals to their grooves in the caliper bores.



cdff1

1. **Piston seal**
2. **Dust seal**

4. Lubricate the fluid seals, caliper bore and the outside of the new pistons with clean DOT 4 brake and clutch fluid.
5. Ease the pistons squarely back into the bores, taking care not to displace the seals.
6. Once all seals and pistons have been fitted, carefully clean the mating faces of both sides of the caliper.
7. Fit new joint seals to the recess in one half of the caliper.



coxg

1. **Joint seals**

Warning

Ensure the mating surfaces of the caliper halves are clean and free from dust prior to assembly. Failure to ensure that the mating faces are clean and free from dust will result in a dangerous riding condition leading to loss of motorcycle control and an accident.

8. Apply a small drop of thread locking compound (ThreeBond 1305 or equivalent) to the threads of the new caliper bolts and secure the two halves of the caliper together. Tighten the caliper bolts to **24 Nm**.

Installation

1. Position the caliper over the disc taking care not to damage the wheel.
2. Tighten the caliper bolts to **50 Nm**.
3. Refit the brake pads (see page *15-14*).
4. Connect the brake hose(s) to the caliper incorporating new sealing washers on each side of the union(s). Ensure that the brake hose is located into its retaining lug on the mudguard.
5. Tighten the brake hose union bolt to **25 Nm**.

Warning

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

Observe the brake and clutch fluid handling warnings given earlier in this section of the manual.

Caution

To prevent body damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

6. Fill the master cylinder with new, DOT 4 brake and clutch fluid from a sealed container.
7. Bleed the front brake line (see page *15-11*).
8. Check the operation of the front brake. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

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 that exceeds the disc run-out limit.

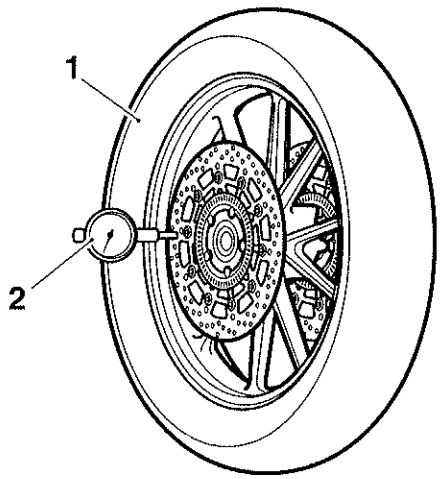
Front Disc Thickness

Standard:	4.5 mm
Service Limit:	4.0 mm

Disc Run-out

Service Limit:	0.15 mm

Measure disc run-out using an accurate dial gauge mounted on a surface plate.



chlc

1. **Disc**
2. **Dial gauge**

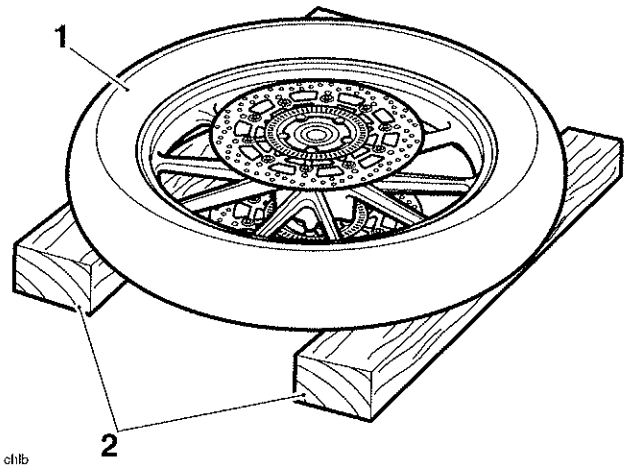
Removal

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 (see page *16-6*).
2. Support the wheel on blocks as illustrated to avoid damage to the wheel centre.



chtb

1. Wheel
2. Support blocks

3. Remove and discard the bolts.
4. Detach the disc. On ABS models, collect the ABS pulser ring from the left hand disc.
5. Repeat for the other disc.

Installation

1. Locate the first disc to the wheel. On ABS models, refit the ABS pulser ring to the left hand brake disc.
2. Fit new bolts and tighten to **22 Nm**.
3. Fit the other disc in the same way.
4. Refit the front wheel (see page *16-7*).
5. Check for correct brake operation. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Master Cylinder

Removal

Warning

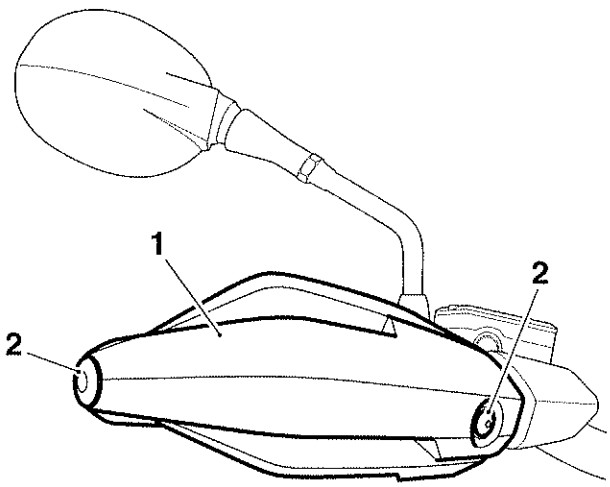
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

Caution

To prevent paint damage, do not spill brake and clutch fluid onto any area of the bodywork. Spilled brake and clutch fluid will damage paintwork.

3. 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.
4. **For motorcycles with handguards fitted only:** Release the two fixings and remove the handguards and the handlebar end weights.

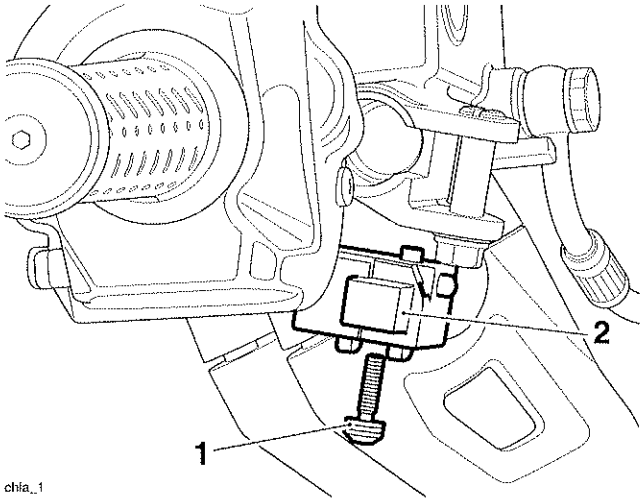


chnl

1. Handguard (left hand shown)
2. Fixings

5. Note the setting of the brake lever adjuster to ensure it is returned to the same position when the overhaul operation is complete.
6. Remove the pivot lock nut and bolt securing the brake lever to the master cylinder, and remove the lever.
7. Disconnect the brake hose from the master cylinder. Discard the two sealing washers.

8. Release the fixing and detach the brake light switch from the master cylinder.



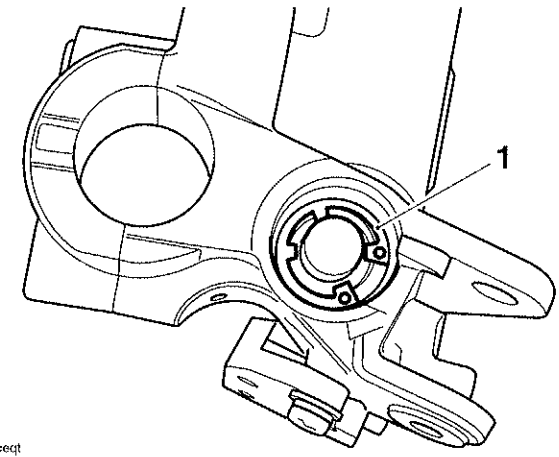
chla_1

1. Fixing
2. Brake light switch

9. Release the clamp bolts from the handlebar and remove the master cylinder.

Disassembly

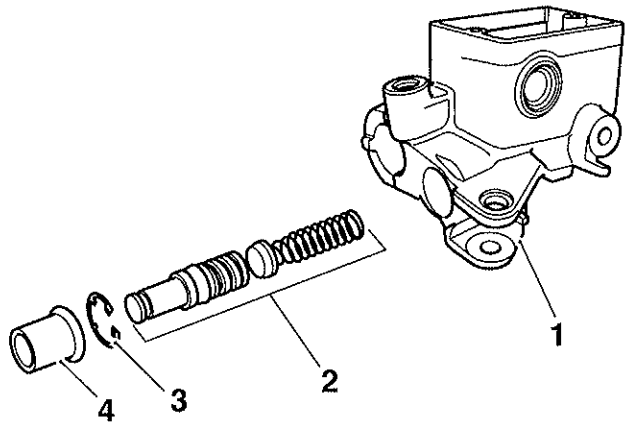
1. Detach the rubber boot from the lever end of the cylinder.
2. Remove the circlip from beneath the boot.



ceqt

1. Circlip

3. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.

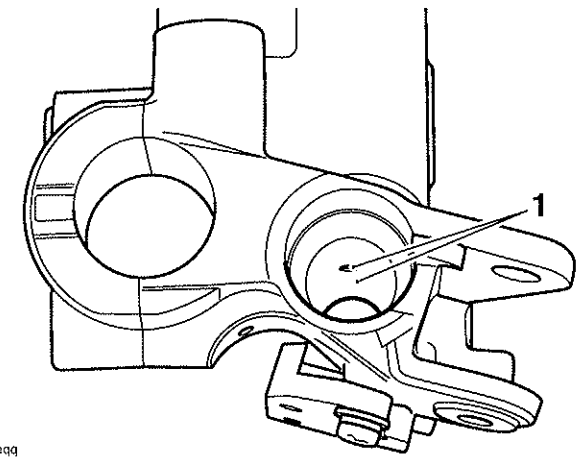


cequ

1. Master cylinder
2. Spring and piston assembly
3. Circlip
4. Rubber boot

Inspection

1. Check the following for wear, damage, cracks or deterioration:
   - cylinder bore;
   - rubber boot;
   - spring;
   - piston;
   - pivot bolt.
2. Always renew the piston and seal set if the cylinder is dismantled.
3. Check that the two ports in the master cylinder bore are not blocked.



ceqq

1. Ports

Assembly

Warning

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

Warning

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

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

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

1. Lubricate the piston and cylinder with new, clean brake and clutch fluid.

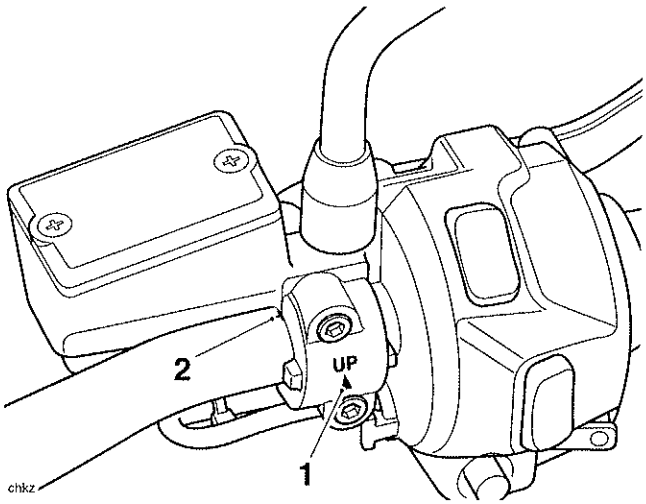
Warning

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

2. Fit the new piston set into the master cylinder and retain with a new circlip.
3. Refit the master cylinder boot.

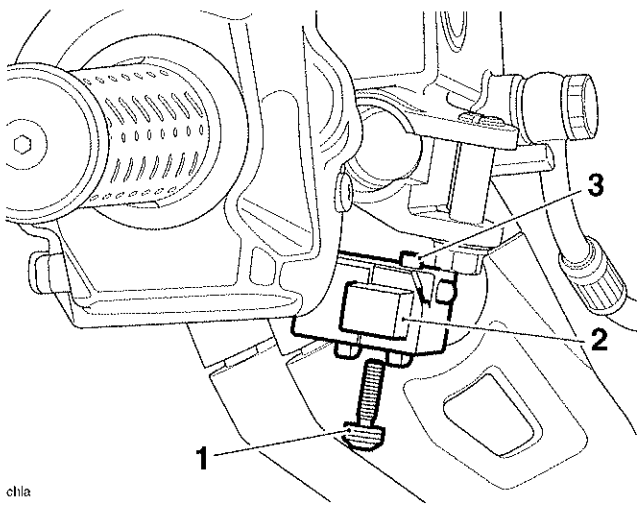
Installation

1. Locate the master cylinder to the handlebars and position the clamp with the 'UP' arrow pointing upwards.



1. 'UP' Arrow
2. + mark

2. Align the master cylinder/clamp split line with the + mark on the handlebar.
3. Tighten the clamp bolts, upper first and then the lower to **12 Nm**.
4. Connect the brake hose to the master cylinder incorporating new sealing washers. Tighten the banjo bolt to **25 Nm**.
5. Refit the brake light switch. Ensure its locating lug is in its recess in the master cylinder. Tighten the fixing to **2 Nm**.



1. Fixing
2. Brake light switch
3. Locating lug

6. Position the brake lever ensuring that the pivot boss is correctly aligned to the push rod. Fit and tighten the pivot bolt to **1 Nm**.

7. Counter hold the pivot bolt, fit and tighten the lock nut to **6 Nm**.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

8. Fill and bleed the front brakes (see page *15-11*).

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.

9. Reset the brake lever adjuster to the original setting.
10. Examine the system for correct operation and fluid leaks. Rectify as necessary.
11. **For motorcycles with handguards fitted only:** Position the handlebar end weights and the handguards to the handlebar, secure with the two fixings and tighten to **8 Nm**.
12. Connect the battery, positive (red) lead first.
13. Refit the rider's seat (see page *17-16*).
14. Check for correct brake operation. Rectify as necessary.

Warning

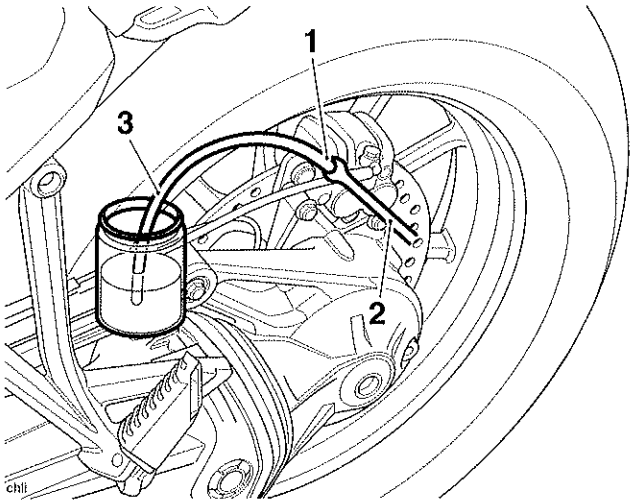
It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

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 cap from the rear bleed nipple.
2. Attach a transparent tube to the bleed nipple.



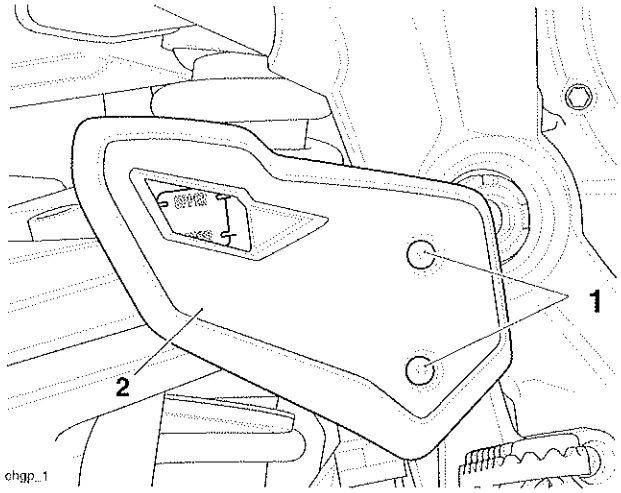
1. Bleed nipple
2. Spanner
3. Bleed tube

3. Place the other end of the tube in a suitable receptacle containing new brake fluid.

Caution

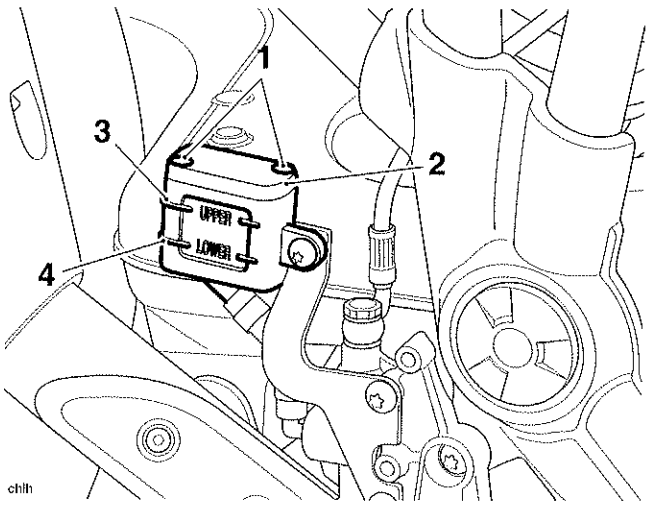
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

4. Release the fixings and remove the right hand heel guard.



1. **Fixings**
2. **Heel guard**

5. Unscrew and remove the rear brake reservoir cover taking care not to spill any fluid.



1. **Fixings**
2. **Rear reservoir cap**
3. **Upper level**
4. **Lower 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.
9. Repeat steps 7 and 8 until no more air appears in the bleed tube.
10. Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
11. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **6 Nm**.
12. Connect the Triumph diagnostic tool (see page *15-46*).
13. Follow the on screen menu to ABS Diagnostics. From the menu, select BLEED SYSTEM (see the Triumph Diagnostic Tool User Guide).

Note:

- **On pressing the Start button, the diagnostic software will send a command to the ABS ECM to open the 2nd circuit solenoid.**
- **The rear brake pedal travel will increase as ABS modulator solenoids are opened and will then decrease as the solenoids are automatically closed.**
- **Pressure must be applied to the rear brake pedal before operating the bleed sequence on the diagnostic tool. An assistant will be required to open the bleed nipple while pressure is applied to the brake pedal.**

14. Apply pressure to the rear brake pedal, press the Start button to activate the bleed sequence on the diagnostic tool, and with assistance, release the bleed nipple.
15. Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple. Repeat until no more air appears in the bleed tube, maintaining the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
16. The bleed sequence will run for a maximum of 90 seconds. Press the Stop button to end the bleed sequence at any time. Once the bleed sequence has completed the diagnostic tool will display a message 'ABS system bleed complete'.

Caution

The ABS modulator must be allowed to cool between bleeding operations. Always allow the ABS modulator to cool for 5 minutes before starting the bleed procedure again. Failure to follow this instruction may result in damage to the ABS modulator.

17. Repeat the above procedure as necessary until all air is expelled from the system, maintaining the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
18. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **6 Nm**.
19. Disconnect the Triumph diagnostic tool.
20. Repeat steps 7 and 8 until no more air appears in the bleed tube.
21. Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
22. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **6 Nm**.
23. Fill the reservoir to the maximum level with new DOT 4 fluid.

Warning

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

24. Fit the reservoir cover and diaphragm. Check for correct diaphragm fitment before final tightening of the cover.
25. Remove the bleed tube from the nipple.
26. Replace the bleed nipple cap.
27. Check for correct brake operation. Rectify as necessary.
28. Refit the heel guard and tighten its fixings to **7 Nm**.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Pads

Removal

Warning

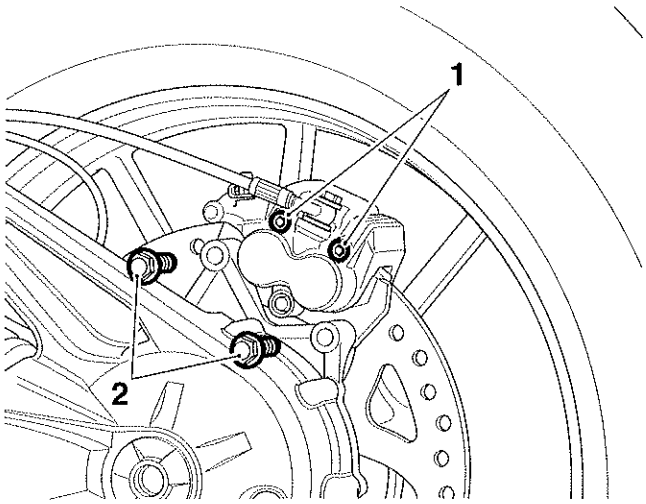
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Slacken the brake pad retaining pins.

Warning

Do not allow the caliper to hang on the brake hoses as this may damage the hoses and could lead to loss of motorcycle control and an accident.

2. Remove the caliper mounting bolts and position the caliper to allow withdrawl of the pad retaining pins.



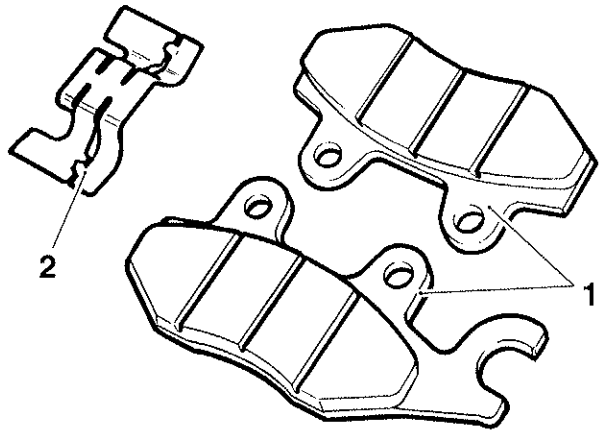
1. **Pad retaining pins**
2. **Caliper mounting bolts**

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.**

3. Press downwards on both pads and remove the pad retaining pins.
4. Remove the brake pads and inspect for damage or wear beyond the service limit. Replace if necessary.

5. Remove the anti-rattle spring and inspect for damage. Replace if necessary.



1. **Brake pads**
2. **Anti-rattle spring**

Installation

Warning

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

Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. If fitting new pads, use hand pressure to compress the caliper piston fully into its bore.
2. Fit the anti-rattle spring into the caliper.
3. Renew the brake pads as a pair or, if both pads are in a serviceable condition, clean the pad grooves before fitting them.
4. Fit the brake pads to the caliper in the positions noted during removal.

Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

5. Lubricate the pad retaining pin using a minimum amount of proprietary high temperature copper based grease. Press down on both pads and fit the retaining pins.
6. Position the caliper over the disc ensuring both pads are correctly fitted.
7. Fit the caliper bolts and tighten to **40 Nm**.
8. Tighten the pad retaining pin to **17 Nm**.
9. Pump the brake pedal to correctly position the caliper pistons.
10. Check the brake fluid level in the rear reservoir and top-up as required with new DOT 4 fluid.

Warning

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

11. Check for correct brake operation. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Caliper

Removal

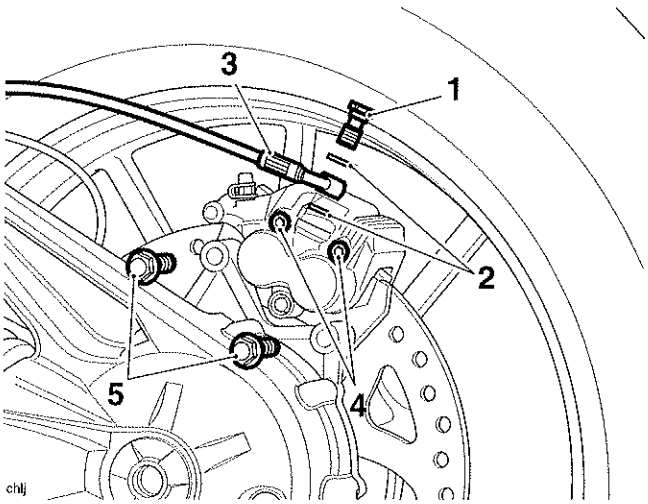
Warning

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

Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Disconnect the rear brake hose at the caliper and place the free end of the hose in a suitable container to collect the brake fluid. Discard the sealing washers.
2. Slacken the pad retaining pins.
3. Remove the caliper mounting bolts.
4. Remove the brake caliper assembly.



1. **Banjo bolt**
2. **Sealing washers**
3. **Brake hose**
4. **Pad retaining pins**
5. **Caliper mounting bolts**

Disassembly

1. Remove the brake pads and anti-rattle spring (see page *15-24*).

Warning

To prevent injury, never place fingers or hands inside the caliper opening when removing the piston. 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 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 (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders. Damage caused by contact with mineral based grease may reduce braking efficiency resulting in an accident.

Warning

Ensure that the caliper bores do not become scratched during removal and assembly.

A dangerous riding condition leading to an accident could result if this warning is ignored.

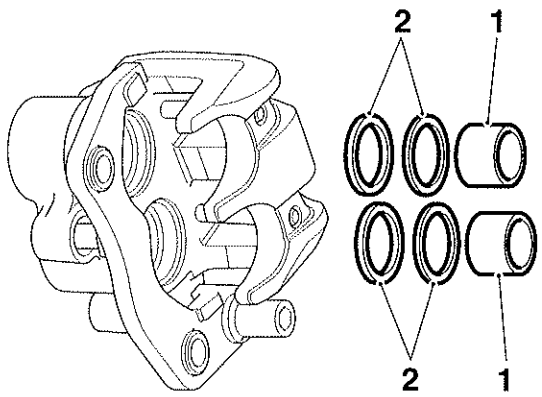
Warning

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

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

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

1. Fit new fluid seals to the caliper. Apply brake fluid to the outside of the caliper pistons and fluid seal.



chlp

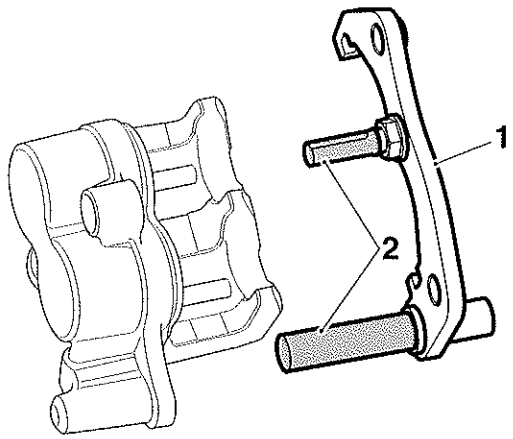
1. **Pistons**
2. **Seals**

Warning

Ensure that the piston does not tip during assembly as this could damage the caliper.

A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Carefully push the piston into the caliper by hand.
3. Lubricate the mounting bracket pins with silicone based grease (such as T2022021 supplied by Triumph) then reassemble the bracket and caliper. Ensure the pin gaiters are correctly located on both the bracket and caliper.



chlo

1. **Mounting bracket**
2. **Sliding pins**

Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

4. Fit the brake pads (see page *15-25*).

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. Connect the brake hose to the caliper incorporating new washers on each side of the banjo bolt.
4. Tighten the banjo bolt to **25 Nm**.

Warning

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

5. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
6. Bleed the rear brake (see page *15-22*).
7. Check for correct brake operation. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

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 worn beyond the service limit or that exceeds the disc run-out limit.

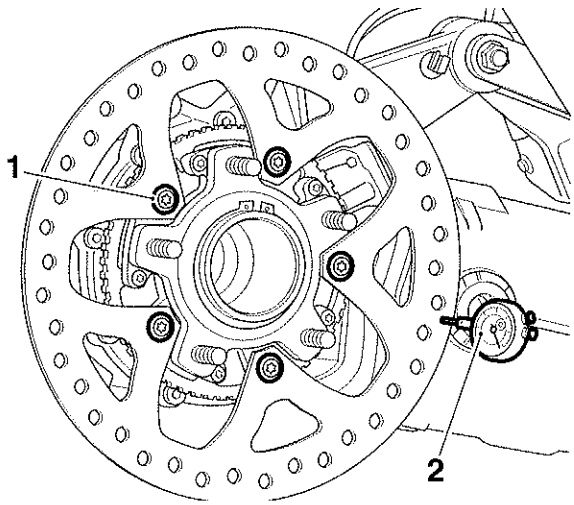
Rear Disc Thickness

Standard:	5.0 mm
Service Limit:	4.5 mm

Disc Run-out

Service Limit:	0.50 mm

Measure disc run-out using an accurate dial gauge mounted on a surface plate.



chll

1. **Disc**
2. **Dial gauge**

Removal

Warning

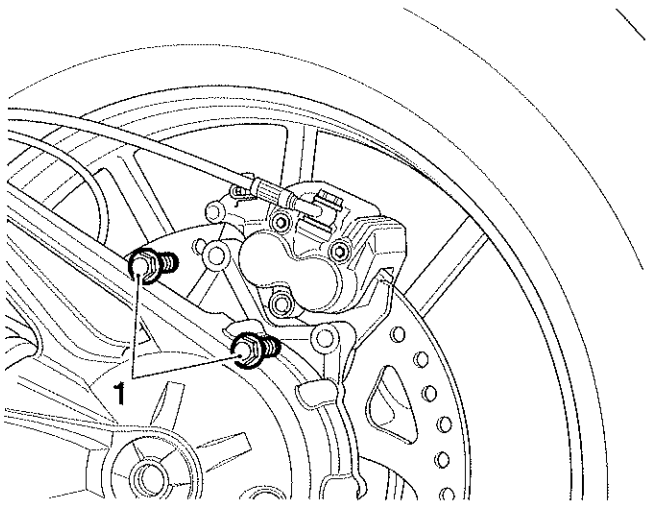
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rear wheel (see page *16-8*).

Warning

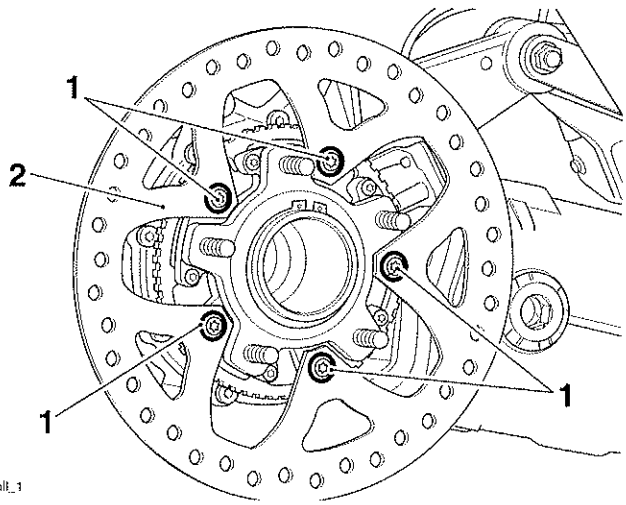
Do not allow the caliper to hang on the brake hoses as this may damage the hoses and could lead to loss of motorcycle control and an accident.

2. Detach and support the front brake calipers such that the weight of the caliper is not supported by the brake hose.



1. Caliper mounting bolts

3. Remove and discard the fixings securing the brake disc, remove the disc.



chlt_1

1. Fixings
2. Brake disc

Installation

1. Align the brake disc to the hub.
2. Fit new fixings and tighten to **22 Nm**.
3. Position the caliper over the disc ensuring the pads are correctly aligned on both sides of the disc.
4. Fit the caliper retaining bolts and tighten to **40 Nm**.
5. Refit the rear wheel (see page *16-9*).
6. Check the operation of the rear brake. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes and you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Master Cylinder

Removal

Warning

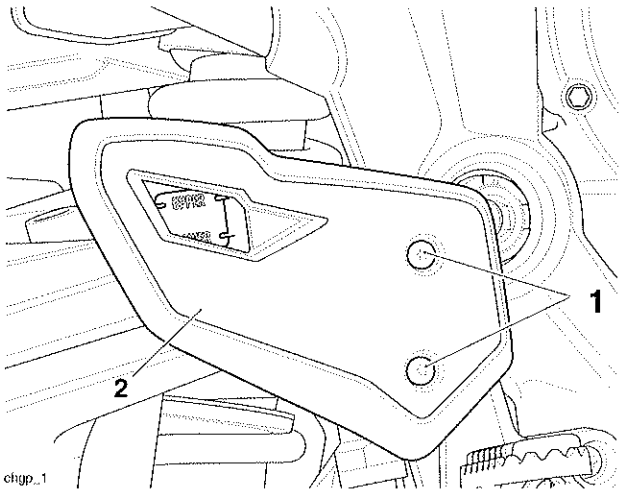
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

Caution

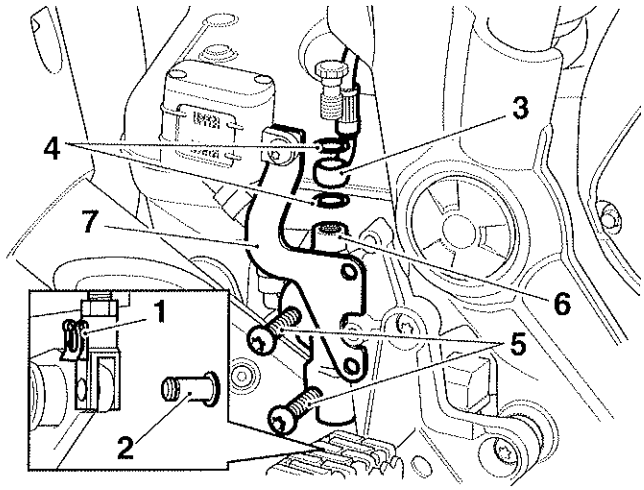
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

3. Release the fixings and remove the right hand heel guard.



1. Fixings
2. Heel guard

4. Drain the fluid from the master cylinder by bleeding the system at the rear caliper until all fluid has been expelled (see page *15-22*).
5. Detach the brake fluid reservoir from its bracket.
6. Remove the clip from the clevis pin at the lower end of the brake pushrod and remove the clevis pin.
7. Disconnect the rear brake hose from the master cylinder, noting its orientation. Discard the two sealing washers.
8. Remove the fixings and remove the master cylinder and reservoir bracket assembly.



1. Clip
2. Clevis pin
3. Brake hose
4. Sealing washers
5. Fixings
6. Master cylinder
7. Reservoir bracket

9. Disconnect the reservoir hose from the master cylinder.

Disassembly

1. Remove the boot from the cylinder and pushrod.
2. Remove the circlip retaining the pushrod to the cylinder. Discard the circlip.
3. Remove the pushrod and piston set from the master cylinder bore, noting the relative position of the seals and piston components.

Inspection

1. Visually inspect the master cylinder bore for wear, scratches or corrosion. Replace as necessary.
2. Check the piston and cylinder bore for damage, wear or deterioration. Replace as necessary.
3. Always renew the piston and seal set if the cylinder is dismantled.
4. Examine the pushrod for bends and damage. Replace as necessary.

Assembly

Warning

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

Warning

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

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

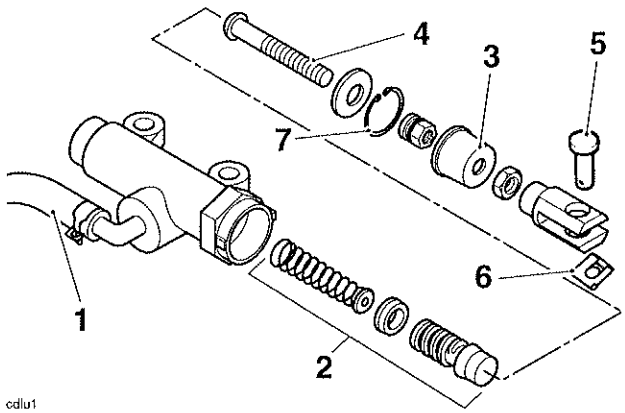
A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Clean the master cylinder bore, piston and seals, with new brake fluid.
2. Ensure all ports are clear of obstruction.

Warning

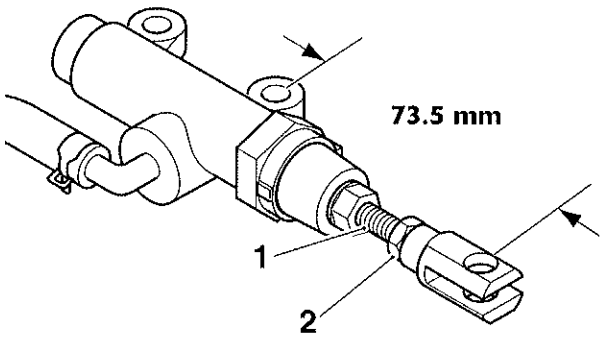
Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

3. Install the spring and piston set together.
4. Apply a small amount of brake grease to the pushrod.
5. Install the pushrod in the master cylinder and retain with a new circlip.
6. Refit the boot.



1. **Reservoir hose**
2. **Piston set**
3. **Dust boot**
4. **Push rod**
5. **Clevis pin**
6. **Clip**
7. **Circlip**

7. If the pushrod has been disassembled, set the pushrod free length to 73.5 mm, as shown below:



1. **Pushrod**
2. **Lock nut**

8. Tighten the lock nut to **18 Nm**.

Installation

1. Fit the reservoir hose to the master cylinder.
2. Fit the master cylinder and reservoir bracket assembly to the frame and tighten the fixings to **18 Nm**.
3. Connect the push rod to the brake pedal using a new clevis pin and clip.
4. Incorporating new washers, fit the brake hose to the master cylinder. Ensuring correct orientation of the brake hose, tighten the banjo bolt to **25 Nm**.
5. Refit the brake fluid reservoir to its mounting bracket and tighten the fixing to **6 Nm**.

Warning

Use only DOT 4 specification brake fluid as listed in the general information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the general information section may reduce the efficiency of the braking system leading to loss of motorcycle control and an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

6. Fill and bleed the rear brake system (see page *15-22*).
7. Refit the right hand heel guard, tightening the fixings to **7 Nm**.
8. Reconnect the battery, positive (red) lead first.
9. Refit the rider's seat (see page *17-16*).
10. Check for correct brake operation. Rectify as necessary.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Light Switch

Removal

Warning

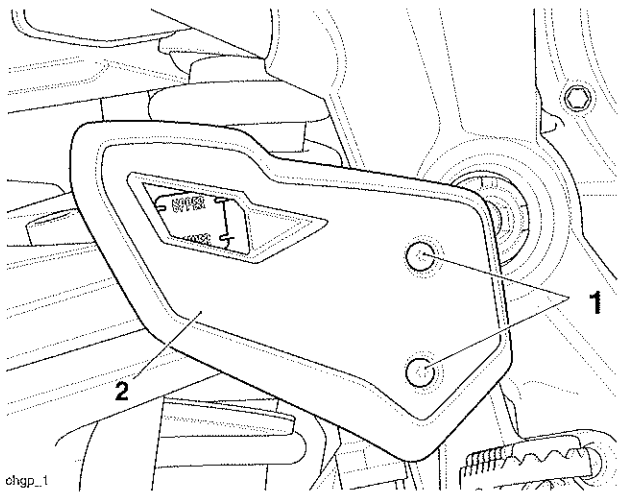
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

Caution

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

3. Release the fixings and remove the right hand heel guard.



1. Fixings
2. Heel guard

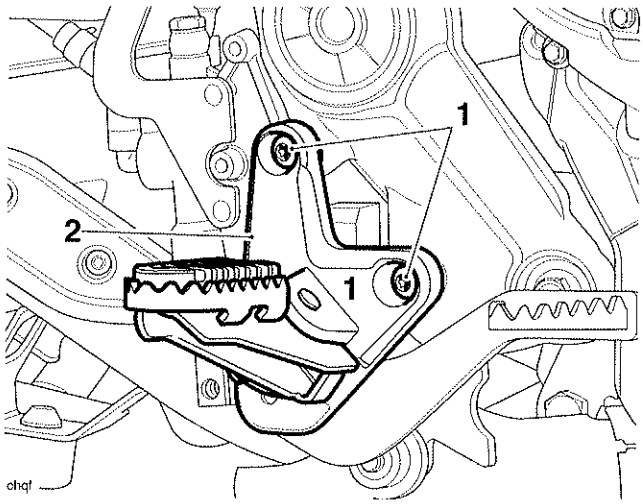
4. Remove the clip from the clevis pin at the lower end of the brake pushrod and remove the clevis pin.
5. Release the fixings and remove the master cylinder and reservoir bracket assembly. Position the master cylinder to one side, ensure the brake fluid reservoir remains in an upright position.

Note:

- **Note the routing of the harness for installation.**

6. Follow the routing of the harness for the brake light switch and disconnect it from the main harness.

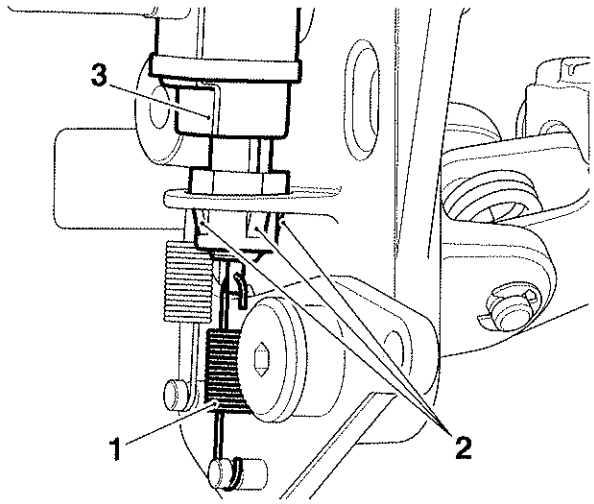
7. Release the fixings and remove the right hand control plate from the frame.



chqf

1. **Fixings**
2. **Control plate**

8. Remove the spring from the brake light switch.
9. Press in the three locking devices and remove the brake light switch from the control plate.

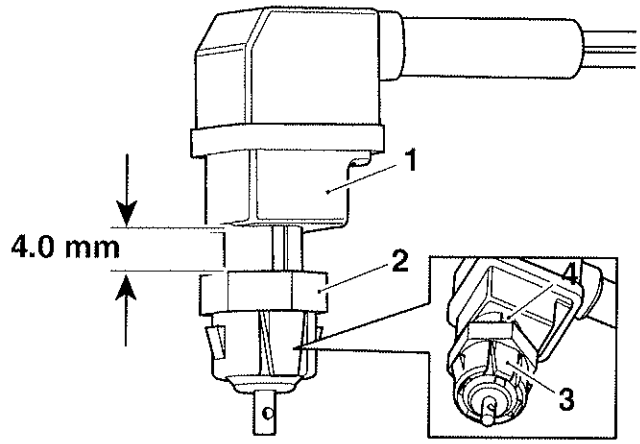


chqd

1. **Spring**
2. **Locking devices**
3. **Brake light switch**

Installation

1. Before fitting the brake light switch to the control plate check and, if necessary, adjust the 4.0 mm gap between the switch body and the retaining nut.
2. When the gap is set, ensure that the locating lug on the retaining nut is aligned to one of the two cut outs in the thread of the brake switch. If it is not aligned, move it to the closest one.



chqe

1. **Brake light switch body**
2. **Retaining nut**
3. **Locating lug**

3. While holding the retaining nut in position, fit the brake light switch to the control plate.
4. Fit the spring to the brake light switch.
5. Fit the control plate to the frame and tighten its fixings to **18 Nm**.
6. Route the harness for the brake light switch as noted for removal and connect it to the main harness.
7. Fit the master cylinder and reservoir bracket assembly to the control plate and tighten the fixings to **18 Nm**.
8. Connect the push rod to the brake pedal using a new clevis pin and clip.
9. Reconnect the battery, positive (red) lead first.
10. Refit the rider's seat (see page *17-16*).
11. Check for correct rear brake light operation. If necessary, adjust the rear brake light switch gap.
12. Refit the right hand heel guard, tightening the fixings to **7 Nm**.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you ride the motorcycle again. Failure to take remedial action may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

Warning

The rear brake light switch is an integral part of the cruise control system. To ensure the brake light switch and brake light functions correctly after a replacement or adjustment, the cruise control switch test must be carried out as described on page *10-33*.

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

Front ABS Wheel Speed Sensor

Removal

Warning

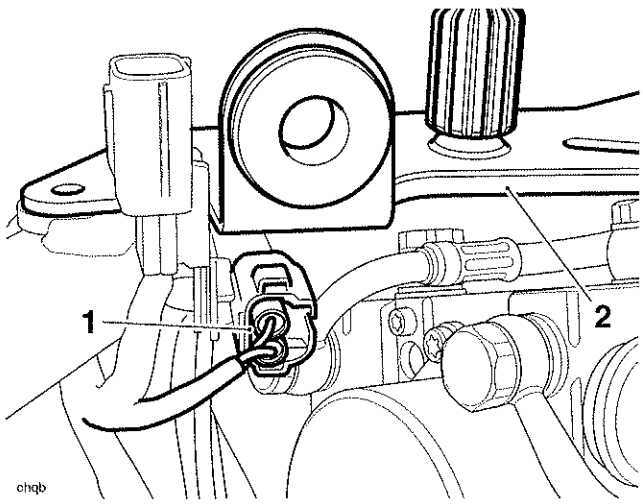
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-117*).
4. Remove the airbox (see page *10-126*).

Note:

- **Note the routing of the harness and its retaining clips for installation.**

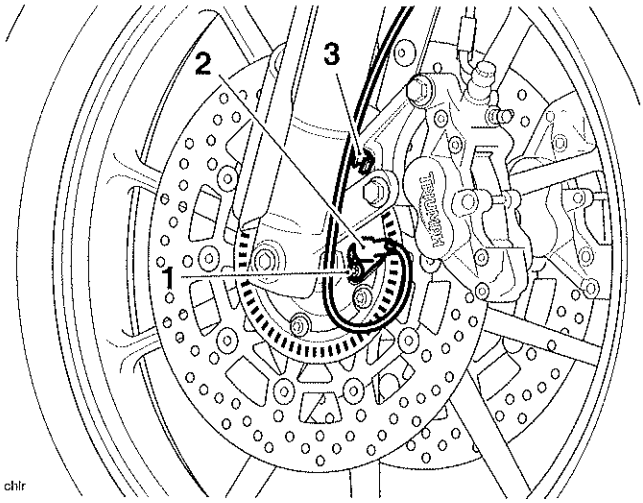
5. Disconnect the wheel speed sensor multi-plug, identified as the white connector, located below the headstock brace.



1. Wheel speed sensor connector
2. Headstock brace

6. Release the wheel speed sensor harness from its clip on the front fork.

7. Release the fixing and remove the sensor. Collect the shim from between the sensor and fork leg and discard fixing.



chlr

1. **Fixing**
2. **Front ABS wheel speed sensor**
3. **Clip**

Installation

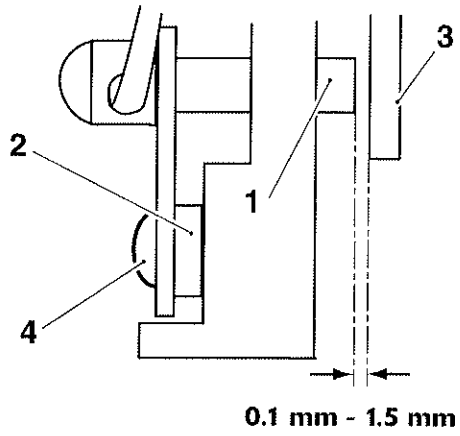
Note:

- **Check the condition of the shim before use. Do not use a shim which is bent or damaged.**

1. Position the wheel speed sensor to the fork leg with its shim between the sensor and fork leg. Temporarily fit the original bolt and tighten to **5 Nm**.
2. Check and adjust the wheel speed sensor air gap as described in Air Gap Measurement on page *15-35*.
3. Route the harness and secure to the brake hose clips as noted for removal.
4. Connect the wheel speed sensor multi-plug to the main harness.
5. Refit the airbox (see page *10-127*).
6. Refit the fuel tank (see page *10-119*).
7. Connect the battery, positive (red) lead first.
8. Refit the rider's seat (see page *17-16*).
9. Check that the brakes operate correctly.

Air Gap Measurement

1. Using feeler gauges, measure the air gap between the front wheel speed sensor and its pulser ring.



cdhj_1

1. **ABS sensor**
2. **Shim**
3. **Pulser ring**
4. **Fixing**

2. Rotate the wheel and repeat the measurement in several places to ensure the pulser ring is not distorted or bent. Renew a damaged pulser ring.
3. Adjust the air gap using the correct shim(s) to achieve an air gap between 0.1 mm to 1.5 mm.

Note:

- **Shims are available in the following sizes, 0.8 mm and 1.6 mm.**
- **Do not install more than two shims. If the required air gap cannot be achieved using two shims, investigate and rectify the cause before proceding.**

4. If necessary, remove the wheel speed sensor, fit the correct thickness shim(s) and refit the wheel speed sensor.
5. If removed, install a new fixing and tighten to **5 Nm**.
6. Repeat the air gap measurement. Re-adjust as necessary.
7. Once the wheel speed sensor air gap measurement is correct, install a new bolt (if not already replaced during air gap adjustment) and tighten to **5 Nm**.

Front ABS Pulser Ring

Removal

Warning

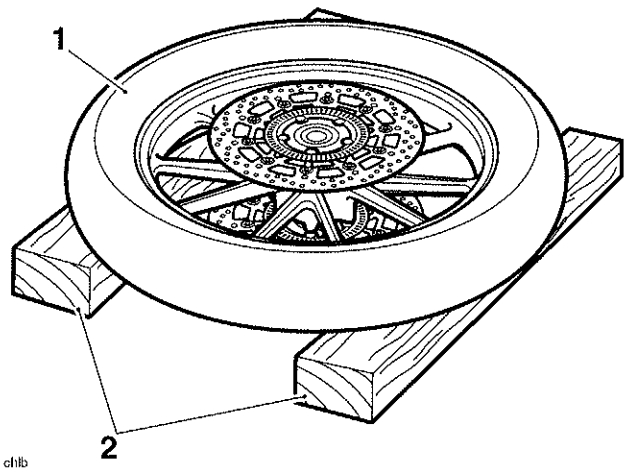
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle

1. Remove the front wheel (see page *16-6*).

Warning

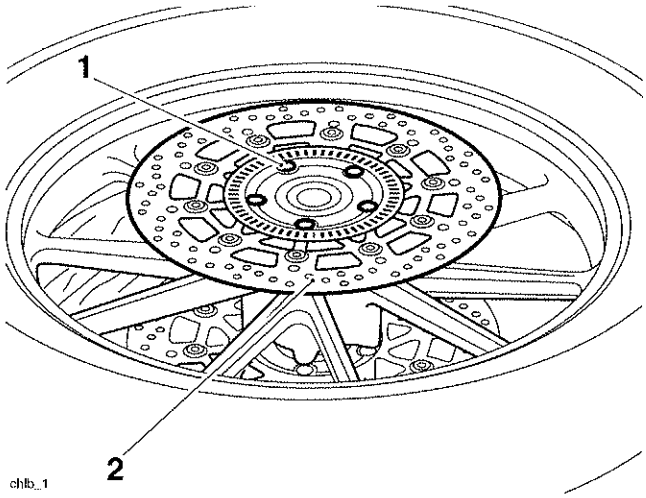
Damage to the wheel centre could cause misalignment of the wheel when refitted. A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Support the wheel on blocks as illustrated below.



1. Wheel
2. Support block

3. Remove and discard the five disc bolts and remove the pulser ring from the brake disc.



1. Disc bolt
2. Pulser ring

Inspection

1. Check the pulser ring for damage, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Installation

1. Locate the brake disc and pulser ring on to the wheel, fit new disc bolts and tighten to **22 Nm**.
2. Refit the front wheel (see page *16-7*).
3. Check, and if necessary, adjust the air gap between the front wheel speed sensor and the pulser ring (see page *15-35*).
4. Check that the brakes operate correctly.

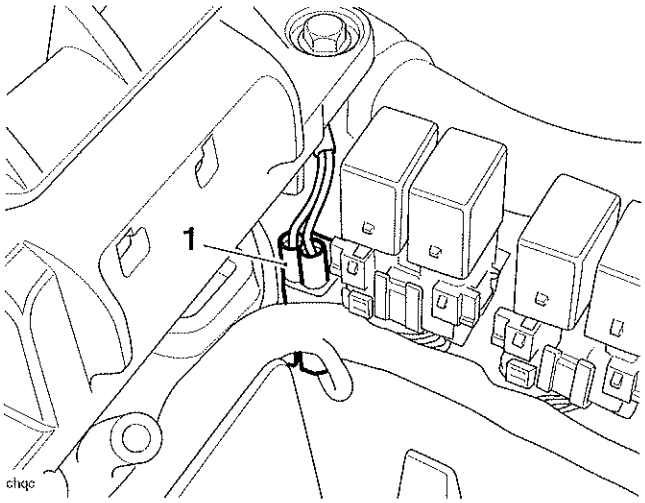
Rear ABS Wheel Speed Sensor

Removal

Warning

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

1. Remove the rider's seat (see page *17-16*).
2. Remove the battery (see page *18-8*).
3. Disconnect the wheel speed sensor multi-plug, identified as the white connector, located in the under seat tray next to the front edge of the battery.

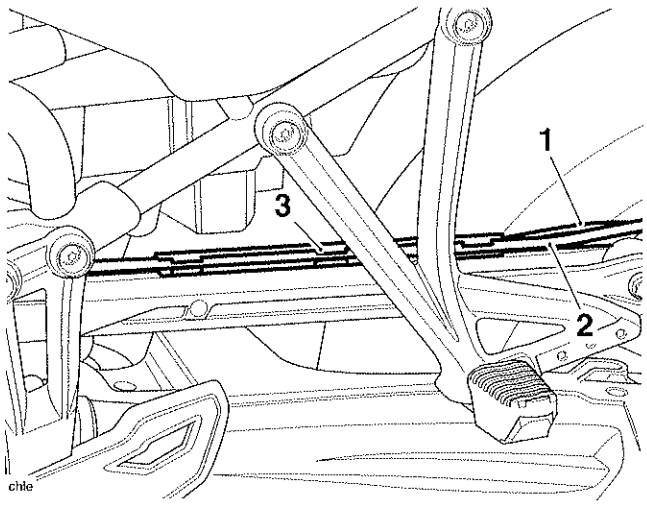


1. Wheel speed sensor connector

Note:

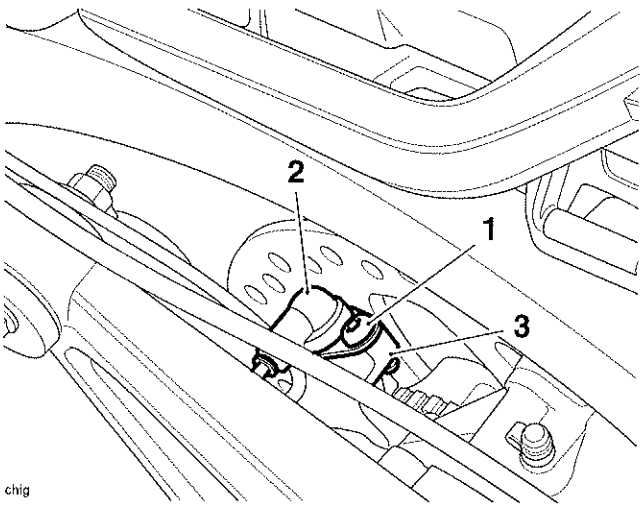
- **Note the routing of the harness and its retaining clips for installation.**

4. Detach the brake line and the harness for the rear wheel speed sensor from the cable guide.



1. Harness
2. Brake line
3. Cable guide

5. Detach the harness from its clip on the final drive unit.
6. Release the fixing securing the wheel speed sensor to the final drive unit and remove the sensor. Discard the fixing.



1. Fixing
2. Rear ABS wheel speed sensor
3. Final drive unit

Installation

1. Fit the wheel speed sensor to the brake caliper carrier as noted during removal.
2. Install a new bolt and tighten to **9 Nm**.
3. Route the ABS sensor harness as noted for removal.
4. Connect the wheel speed sensor multi-plug.
5. Refit the battery (see page *18-8*).
6. Refit the rider's seat (see page *17-16*).
7. Check that the brakes operate correctly.

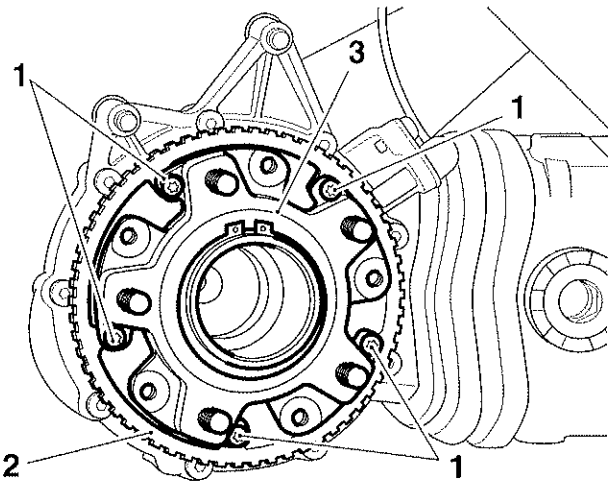
Rear ABS Pulser Ring

Removal

Warning

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

1. Remove the rear wheel (see page *16-8*).
2. Remove the rear brake disc (see page *15-29*).
3. Remove and discard the five fixings and remove the pulser ring.



1. **Fixings**
2. **Pulser ring**
3. **Hub**

Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Installation

1. Locate the pulser ring to the hub.
2. Install new fixings and tighten to **5 Nm**.
3. Rift the rear brake disc (see page *15-29*).
4. Refit the rear wheel (see page *16-9*).
5. Check that the brakes operate correctly.

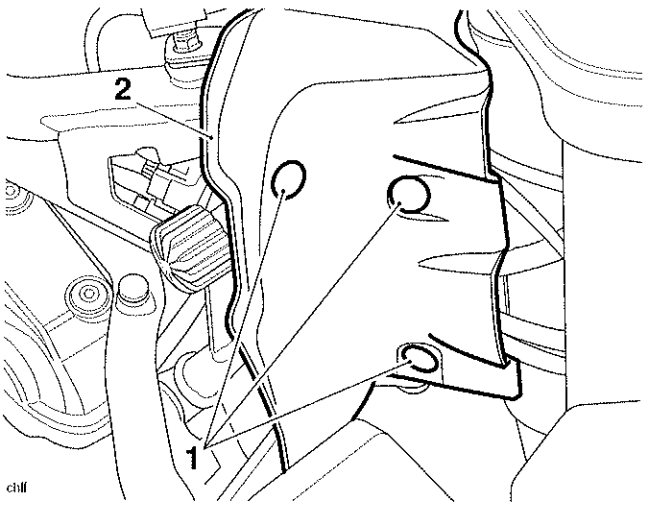
ABS Hydraulic Modulator/ECM

Removal

Warning

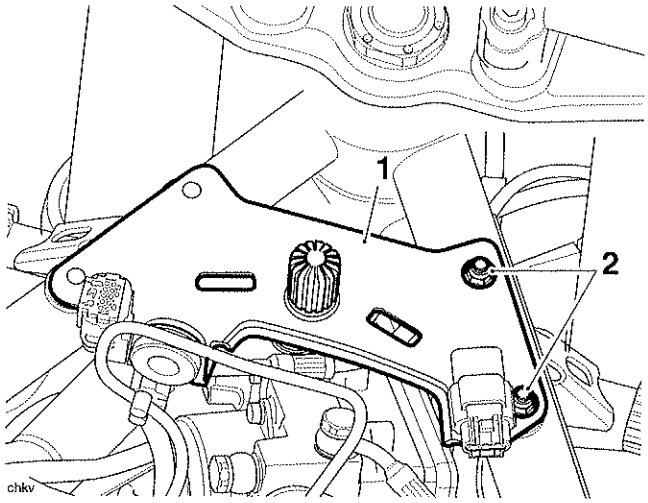
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the radiator infill panels (see page *17-22*).
4. Remove the fuel tank (see page *10-117*).
5. Remove the airbox (see page *10-126*).
6. Remove the firtrees and detach the headstock infill panel from the frame.



1. Firtrees
2. Infill panel

7. Remove the lock nuts and position the headstock brace aside to access the ABS modulator. Discard the two lock nuts.



1. Headstock brace
2. Lock nuts

Caution

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

8. Drain the brake fluid from the front and rear master cylinders (for front brake master cylinder see page *15-11*, and for rear brake master cylinder see page *15-22*).
9. Disconnect the ABS modulator multi-plug (see page *15-51*).

Warning

Before the disassembly of any brake lines in the ABS hydraulic circuit, always mark their position so that they can be returned to the same position when assembled.

If the brake lines are incorrectly assembled the performance of the ABS system will be seriously compromised, leading to loss of motorcycle control and an accident.

Warning

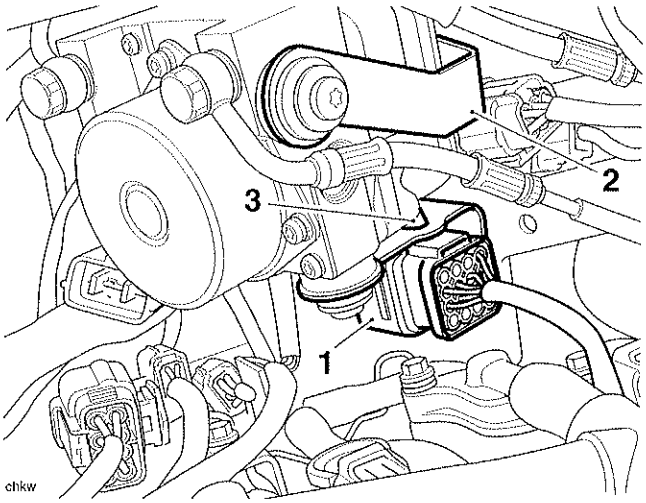
Do not allow the brake hard lines to become bent or kinked during ABS modulator removal.

If the brake lines are bent or kinked the performance of the ABS system will be seriously compromised, leading to loss of motorcycle control and an accident.

Caution

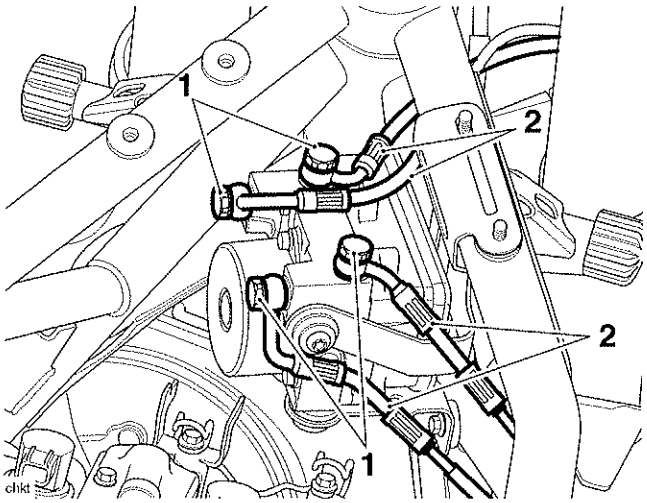
To prevent body damage, do not spill brake fluid onto any area of the bodywork or engine covers.

10. Detach the multi-plug from the ABS module bracket.



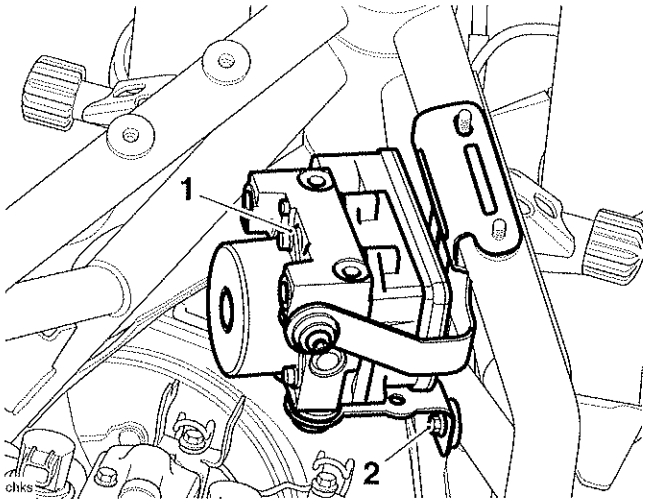
1. **Multi-plug**
2. **Bracket**
3. **Multi-plug retaining clip**

11. Remove the banjo bolts and carefully disconnect the four brake lines from the ABS modulator. Discard the sealing washers.



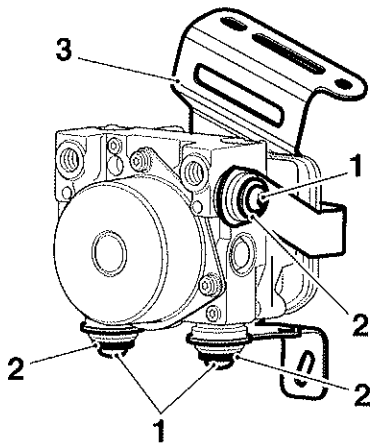
1. **Banjo bolts**
2. **Brake lines**

12. Remove the lower ABS modulator fixing.



1. **ABS module**
2. **Lower fixing**

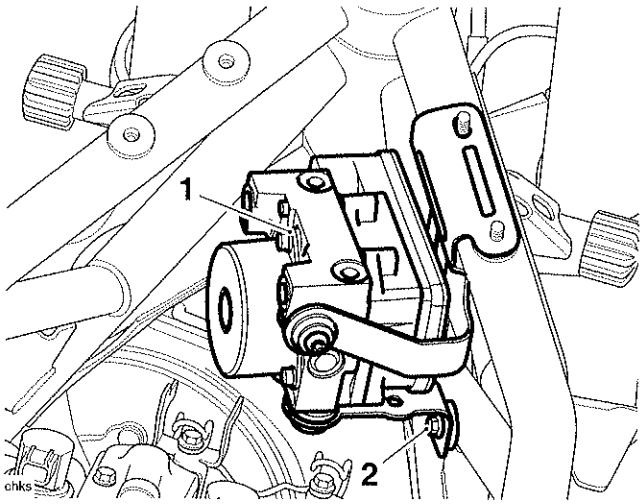
13. Release the fixings, collect the washers and remove the mounting bracket from the ABS module.



1. **Fixings**
2. **Washers**
3. **Bracket**

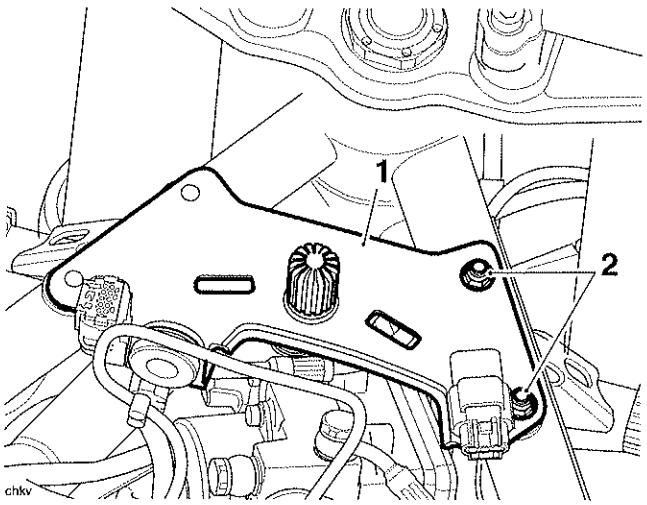
Installation

1. Align the ABS modulator to its bracket, fit new screws and tighten to **9 Nm**.
2. Carefully manoeuvre the ABS modulator and bracket assembly to its fitted position on the frame.
3. Fit the lower fixing and tighten to **9 Nm**.



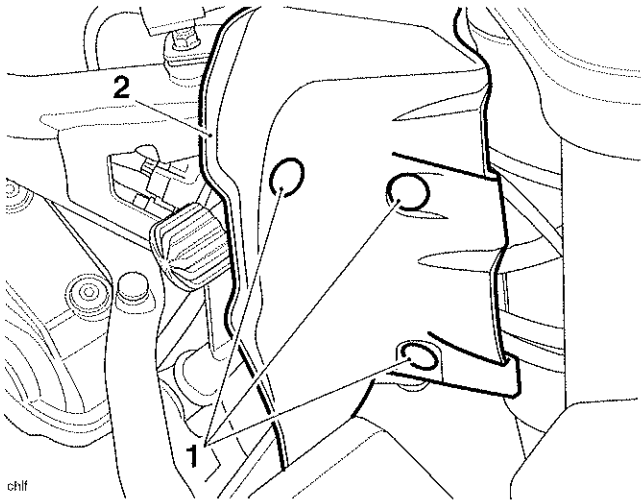
1. ABS module
2. Lower fixing

4. Refit the multi-plug to the ABS module bracket.
5. Incorporating new sealing washers to either side of the unions, refit the brake lines to the ABS module as marked for removal.
6. Tighten the four unions to **25 Nm**, taking care to ensure the brake lines do not twist during tightening.
7. Reconnect the ABS modulator multi-plug (see page *15-51*).
8. Refit the headstock brace and tighten the new lock nuts to **12 Nm**.



1. Headstock brace
2. Lock nuts

9. Incorporating new firtrees, refit the headstock infill panel.



1. Firtrees
2. Infill panel

10. Refit the airbox (see page *10-127*).
11. Refit the fuel tank (see page *10-119*).
12. Refit the radiator infill panels (see page *17-22*).
13. Reconnect the battery, positive (red) lead first.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

14. Fill and bleed the front brakes (see page *15-11*).
15. Fill and bleed the rear brakes (see page *15-22*).
16. Refit the rider's seat (see page *17-16*).

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph Dealer take remedial action. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

17. Check that the brakes operate correctly.

ABS

System Description

The ABS version of the Tiger Explorer is fitted with an electronic anti-lock brake system (ABS) which is designed to prevent the wheels from locking or skidding by reducing braking effort to the front or rear brake caliper when wheel-lock is detected.

The system consists of a hydraulic modulator and ECM assembly mounted to a bracket to the right hand side of the frame near the headstock, a front wheel speed sensor mounted to the front fork, and a rear wheel speed sensor mounted to the rear bevel box.

The front pulser ring is mounted to the left hand brake disc and the rear pulser ring is mounted to the rear bevel box hub.

The front and rear master cylinders are connected via lines to the modulator and from the modulator the pipes connect to the brake calipers.

The front and rear brake circuits operate as separate systems. The front and rear brakes are not connected in any way inside the modulator.

The modulator ECM continuously calculates the front and rear wheel speeds, and from these inputs the ECM calculates the estimated motorcycle speed, wheel deceleration/acceleration, the wheel speed difference and the wheel slip (skid) rate. This is calculated by comparing the calculated wheel speeds with the calculated vehicle speed, so that if one wheel speed deviates significantly from the other two readings, this wheel is determined to be skidding.

Under braking, if the modulator detects that either wheel is about to slip, due to the brake force exceeding the available traction between the tyre and road surface (the wheel will begin to slip or 'skid'), the ECM very rapidly releases and re-applies the brake pressure to prevent the wheel from skidding.

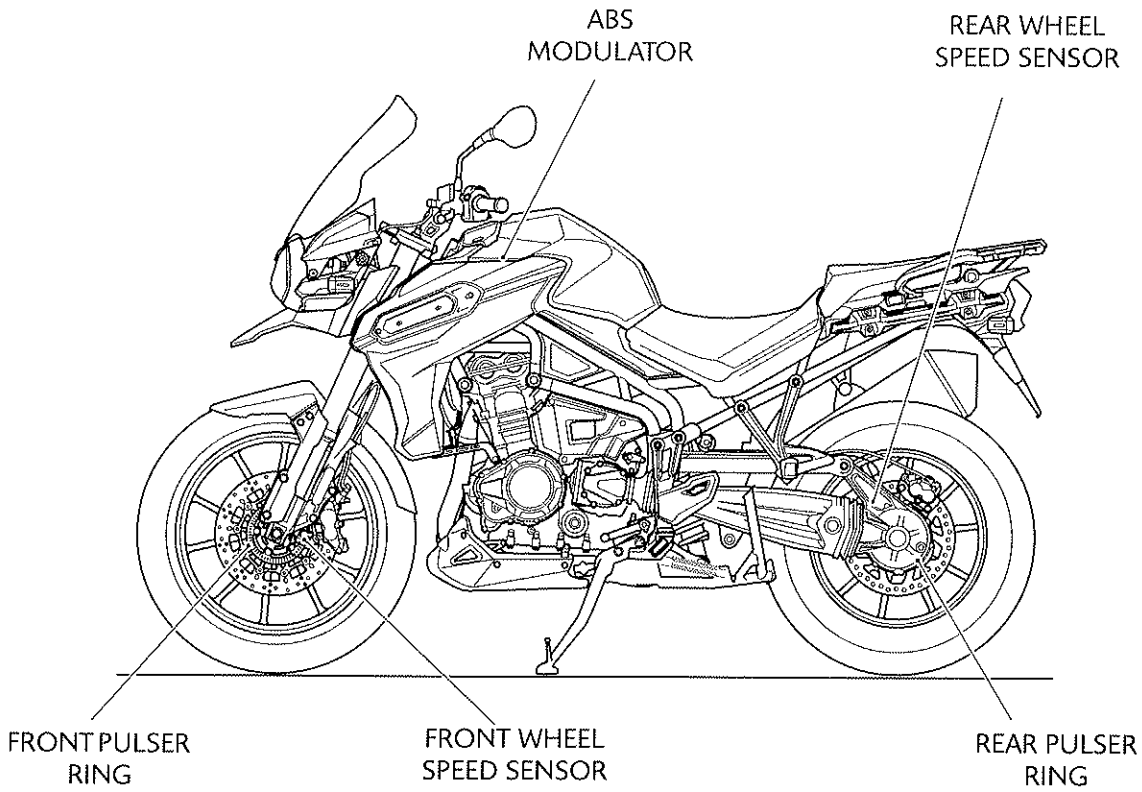
This is felt through the brake pedal or lever as a rapid 'pulsing'.

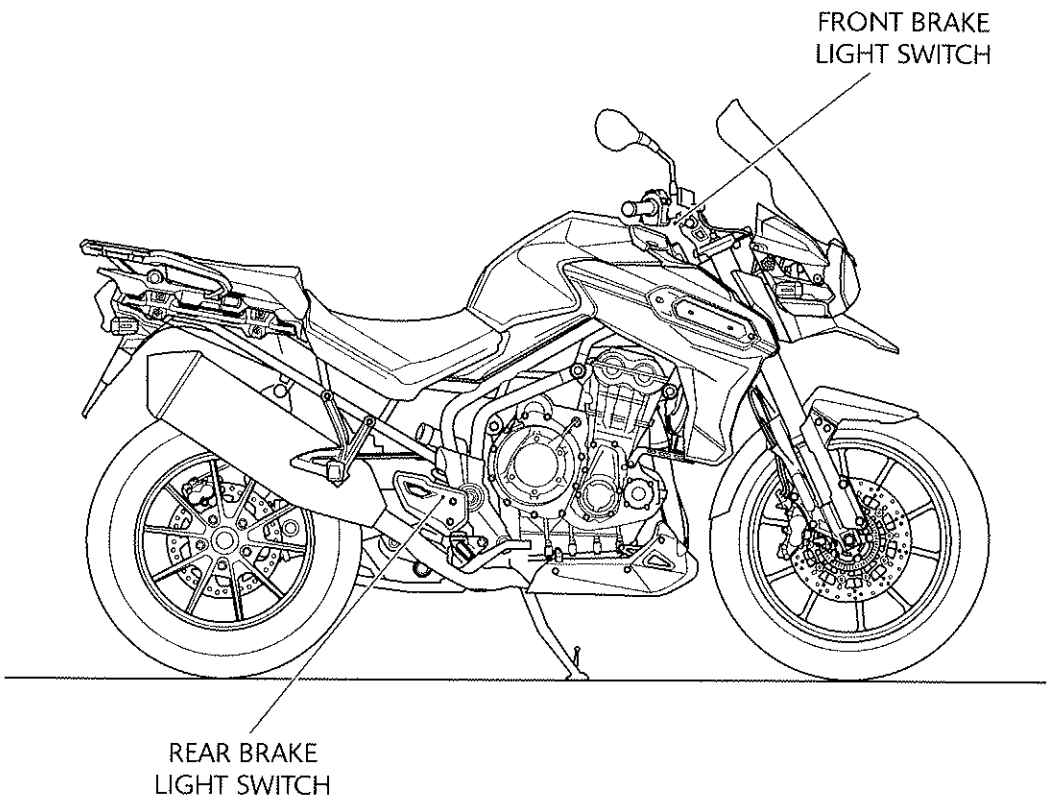
If the rider reduces braking effort, or traction increases (so that traction exceeds braking force, the wheel will rotate once more) the wheel will no longer lock up. The ABS system will detect this and stop controlling brake pressure, and return to its monitoring state.

The system has a self diagnostic function built-in which monitors the fail safe relay, solenoid valves, motor relay, wheel speed sensors, power supply and ground, as well as internal ECM functions. In the event of a malfunction being detected, the ECM will illuminate the ABS warning light, and store a diagnostic trouble code in the system memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

Under normal operation, the ABS warning light will flash on and off after ignition on until the vehicle speed exceeds 6 mph (10 km/h). If a trouble code is stored the ABS warning light will stay illuminated and the ABS will not function, however the brakes will operate normally. If the ABS warning light does not extinguish, or illuminates whilst the motorcycle is being ridden, refer to the ABS system diagnostics (see page *15-46*).

Component Location





ABS System Circuit Diagram

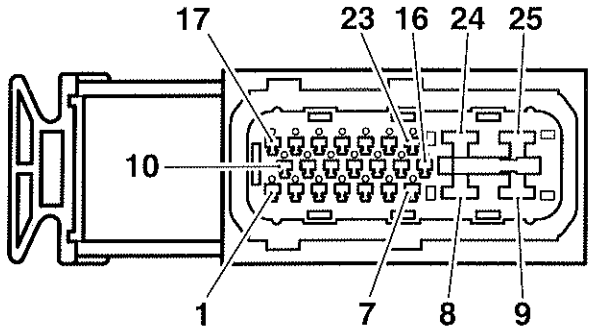
Key to Wiring Diagram

Key	Item Description
1	ABS Modulator
2	ABS Fuse Box
3	Ignition Switch
4	Brake Switch Relay
5	Rear Light
6	Right Hand Switch Cube
7	Front Wheel Speed Sensor
8	Rear Wheel Speed Sensor
9	Instruments
10	Diagnostic Connector
11	Engine Control Module Connector A

Key to Wiring Colour Codes

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

ABS ECM Connector Pin Numbering

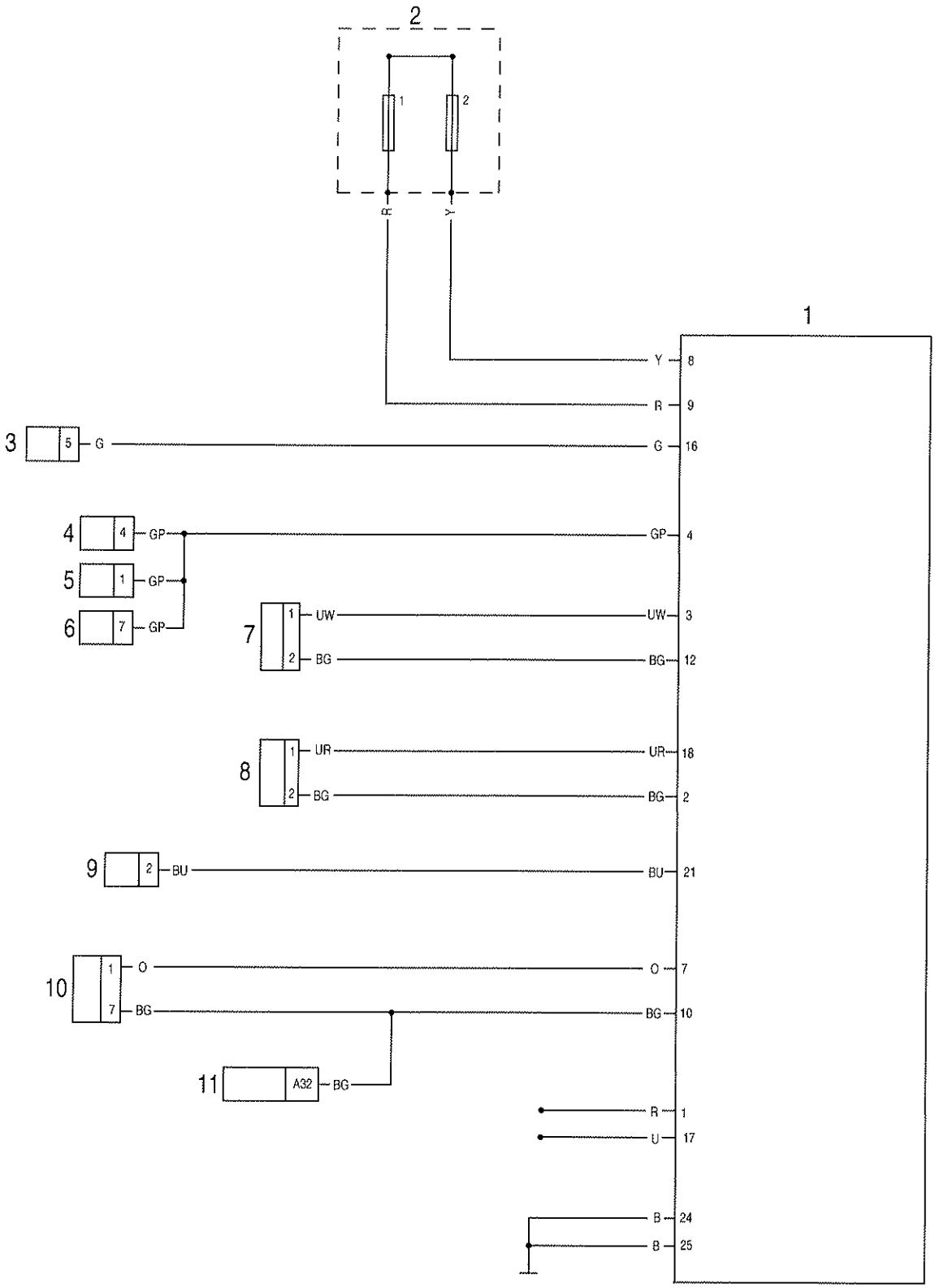


cdhg

The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from left to right with number one in the bottom left hand corner.

ABS System Circuit Diagram



System Diagnostics

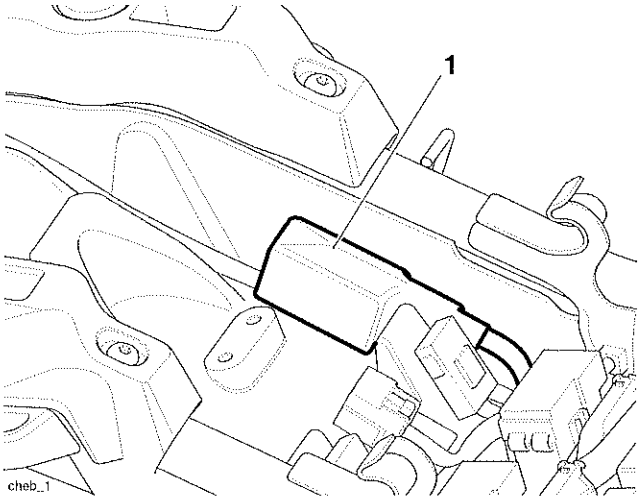
The ABS system has an on-board diagnostics feature which allows service technicians to retrieve stored data from the ECM using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation are given in the Triumph Diagnostic Tool User Guide.**

The software is connected, via an interface cable, to the motorcycle using a dedicated diagnostic plug situated under the seat. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

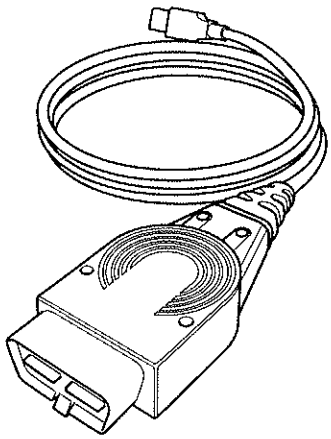
Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the rider's seat (see page *17-16*) and release the diagnostic connector from its locating tang.



1. Diagnostic connector

2. Plug the diagnostic interface directly in to the diagnostic connector.



Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its locating tang and refit the pillion seat (see page *17-15*).

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 diagnostic software.

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

Note:

- **Full details of how to operate the software can be found in the Triumph Diagnostic Tool User Guide, which can be downloaded by authorised Triumph dealers from www.triumphonline.net.**

Build Data

The **Build Data** screen will display the following information:

Function Examined
ECM type
ECM ID number
Software version number

Current Data

The **Current Data** screen will display the following information:

Function Examined	Result Reported (Scale)
Front wheel speed	Kph
Rear wheel speed	Kph
Brake switch status	On/Off
ABS warning light status	On/Off

Bleed System

Using the Triumph diagnostic tool, it is possible to bleed the ABS modulator of trapped air. This is necessary when the hydraulic brake system has been dismantled, or the ABS modulator renewed.

Full details of this procedure are provided on page *15-11* for front brakes or page *15-22* for rear brakes.

Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the ABS ECM memory when there is a confirmed fault in the system.
The codes are reported to the Triumph diagnostic tool as a four digit code.
DTCs can be removed at any time using the Triumph diagnostic tool.
The system will log the diagnostic trouble codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description
C1611	Front wheel sensor short circuit to ground or open circuit
C1612	Front wheel sensor abnormal input or dropping out
C1613	Rear wheel sensor short circuit to ground or open circuit
C1614	Rear wheel sensor abnormal input or dropping out
C1621	Front wheel pulser gear missing teeth
C1623	Rear wheel pulser gear missing teeth
C1631	Front wheel input solenoid short circuit to ground or open circuit
C1632	Front wheel output solenoid short circuit to ground or open circuit
C1633	Rear wheel input solenoid short circuit to ground or open circuit
C1634	Rear wheel output solenoid short circuit to ground or open circuit
C1641	Front Wheel Actuator (Hydraulic Control) Wheel Lock
C1643	Rear Wheel Actuator (Hydraulic Control) Wheel Lock
C1651	Motor - Lock
C1652	Motor - Stick at OFF
C1653	Motor - Stick at ON
C1654	Solenoid relay - stick at OFF and ON
C1661	Power Source Voltage Drop
C1662	Power Source Voltage Rise
C1671	Different Tyre Diameter
C1681	Abnormal ECU

Diagnostic Trouble Codes

Dependant on the DTC stored, the ABS ECM will act in one of two ways:

a) Inhibit ABS operation immediately, irrespective of the ABS operating mode;

or

b) Allow the ABS operation to complete before inhibiting the ABS.

Once the ABS ECM has inhibited ABS function, the ECM will act in one of three ways:

a) Allow the ABS to resume operation if the fault clears;

or

b) Allow ABS operation after an ignition cycle if the fault clears;

or

c) Inhibit the ABS function until the fault is rectified and the DTC erased.

The ABS system will act on the DTC stored according to the tables on the following pages:

Fault Description	**ABS warning light illuminated when fault is logged**	**ABS operation is inhibited when fault is logged**	**ABS continues to operate when fault is logged (Only when ABS is Active. When ABS is no longer active, operation is inhibited)**	**ABS will resume operation if fault clears**
Front Wheel Sensor Open Circuit/Short Circuit	Yes	Yes		No
Front Wheel Sensor Abnormal Input/Losing Contact	Yes	Yes	Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Rear Wheel Sensor Open Circuit/Short Circuit	Yes	Yes		No
Rear Wheel Sensor Abnormal Input/Losing Contact	Yes	Yes	Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Front Wheel Pulser Gear Missing Teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected for 1 second and speed exceeds 30 km/h. DTC remains stored
Rear Wheel Pulser Gear Missing Teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected for 1 second and speed exceeds 30 km/h. DTC remains stored
Front Wheel Input Solenoid Open/Short Circuit	Yes	Yes		No
Front Wheel Output Solenoid Open/Short Circuit	Yes		Yes	No
Rear Wheel Input Solenoid Open/Short Circuit	Yes	Yes		No
Rear Wheel Output Solenoid Open/Short Circuit	Yes		Yes	No

Fault Description	ABS warning light illuminated when fault is logged	ABS operation is inhibited when fault is logged	ABS continues to operate when fault is logged (Only when ABS is Active. When ABS is no longer active, operation is inhibited)	ABS will resume operation if fault clears
Front Wheel Actuator (Hydraulic Control) Wheel Lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Rear Wheel Actuator (Hydraulic Control) Wheel Lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Motor - Lock	Yes		Yes	No
Motor - Stuck OFF	Yes		Yes	No
Motor - Stuck ON	Yes		Yes	No
Solenoid Relay - Stuck OFF/ON	Yes	Yes		No
Power Source Voltage Drop	Yes, Light will extinguish if fault clears	Yes		Yes, if voltage rises above a preset threshold for more than 10 seconds
Power Source Voltage Rise	Yes, Light will extinguish if fault clears	Yes		Yes, if voltage drops below a preset threshold for more than 10 seconds
Different Tyre Diameter	Yes	Yes		No
Abnormal ECU	Yes	Yes		No

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 multi-plugs.

For example, the ABS electronic control modulator (ABS ECM) relies on the supply of accurate information to enable it to monitor and control the brake system. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

Before Disconnection:

- If testing with a voltmeter, the voltage across a connector should be virtually battery volts (unless a resistor is fitted in the circuit). If there is a noticeable change, suspect faulty/dirty connections.

When Disconnecting a Connector:

- Check for a security device that must be released before the connector can be separated. E.G. barb, hook and eye etc.

When Inspecting a Connector:

- Check that the individual pins have not been bent.
- Check for dampness/dirt/corrosion.
- Check cables for security.
- Check cable pin joints for damage.

When Connecting a Connector.

- Ensure there is no dirt around the connector/seal.
- Push together squarely to ensure terminals are not bent or incorrectly located.
- Push the two halves together positively.

Disconnection of ABS ECM Connector

⚠ Caution

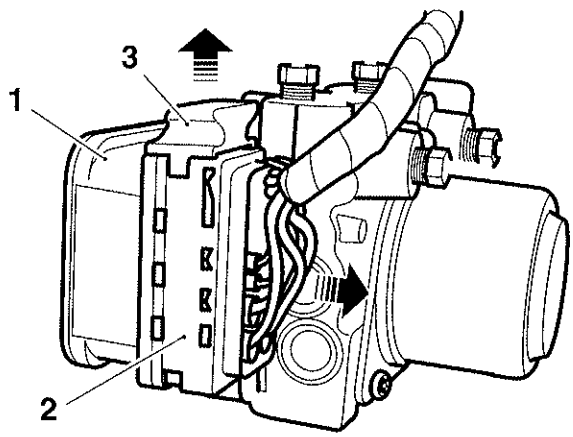
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

⚠ Caution

Never disconnect the ABS ECM when the ignition switch is in the ON position as this may cause multiple fault codes to be logged in the ECM memory.

Always disconnect an ECM after disconnecting the battery, negative (black) lead first.

1. Lift up the locking device and gently pull back on the connector to release it from the ECM.



clyr_6

1. **ABS modulator**
2. **Connector**
3. **Locking device**

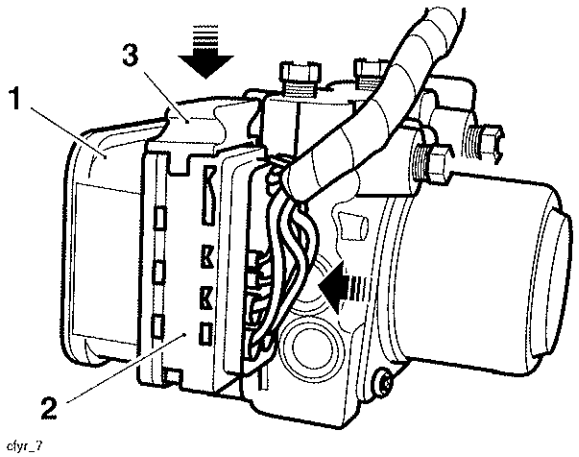
Note:

- **The ABS ECM is an integral part of the ABS modulator. Under no circumstances should the ECM be removed from the ABS modulator. If a new ECM is required, repair is by replacement of the ABS modulator and ECM as an assembly only.**

Reconnection of ABS ECM Connector

Caution

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



clyr_7

1. **ABS modulator**
2. **Connector**
3. **Locking device**

1. Fit the connector into its socket and, whilst holding the connector in place, push down gently on the locking device until it locks.

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Pinpoint Tests

Before starting pinpoint tests

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.

Warning

If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated proceed to the relevant pinpoint test.
4. If the DTC is not repeated this indicates the DTC may have been stored due to external influences such as bad road surfaces or electrical interference.

After Completion of the Pinpoint Tests

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated proceed to the relevant pinpoint test.
4. If a DTC is stored there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

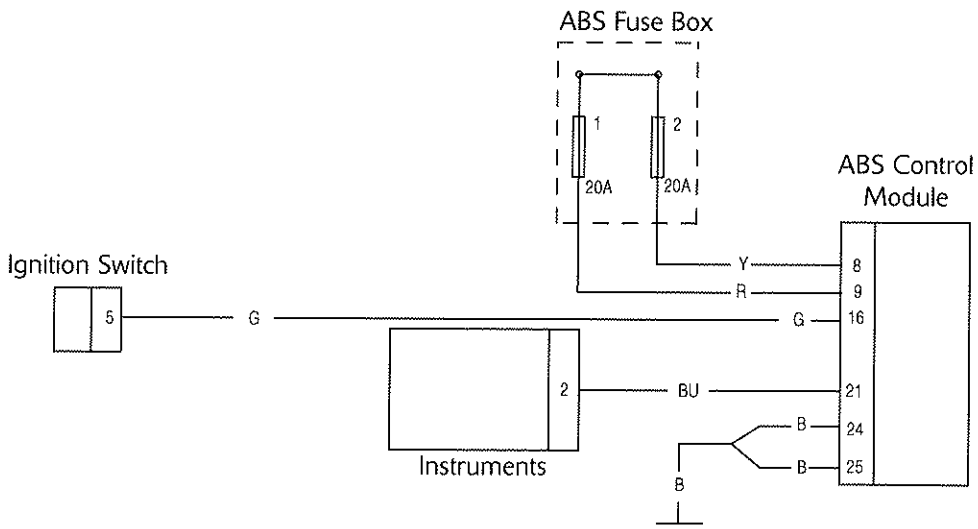
ABS Warning Light ON (No DTCs Stored)

Fault Code	Possible cause	Action
ABS Warning Light ON (No DTCs Stored)	ABS Ignition supply fuse/circuit fault ABS Warning light circuit fault	Ensure ABS ECM connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ABS ECM connector pin 16 and Ground pin 24	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable continuity of the ABS ignition supply circuit: With Ignition 'ON', check voltage between: - ABS ECM connector pin 16 and Ground	Same as 'across battery' voltage	Proceed to test 3
	Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity of the ABS warning light circuit: Check voltage between: - ABS ECM connector pin 21 and Ground	Voltage greater than 1.5 V	Proceed to test 4
	Voltage less than 1.5 V	Locate and rectify fault, proceed to test 5
4 Check cable continuity of the ABS warning light circuit: - Short ABS ECM connector pin 21 and Ground pin 24 together: Turn Ignition 'ON'	ABS warning light 'OFF'	Proceed to test 5
	ABS warning light 'ON'	Locate and rectify fault, proceed to test 5
5 Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



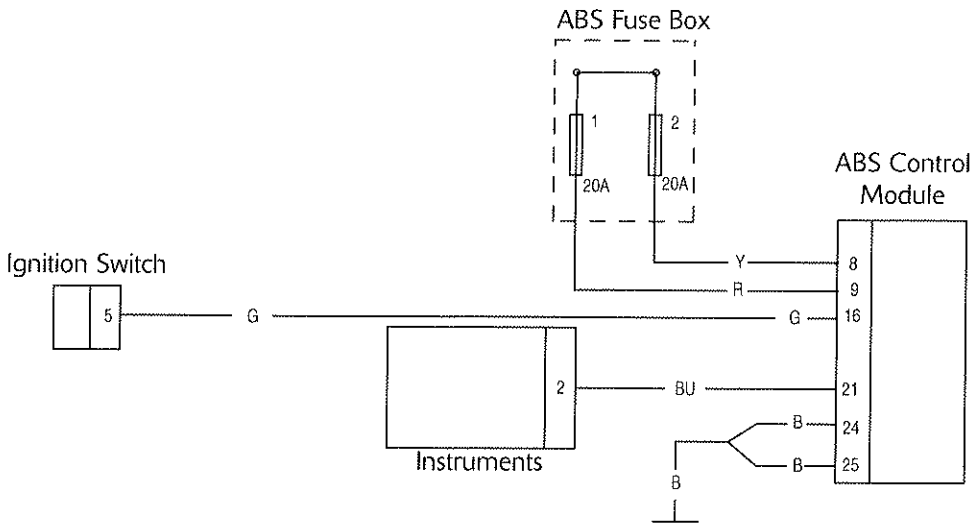
ABS Warning Light Does Not Illuminate (No DTCs Stored)

Fault Code	Possible cause	Action
ABS Warning Light OFF (No DTCs Stored)	Warning light circuit fault ABS ECM ground circuit fault	Ensure ABS ECM connector is secure Ensure ABS ECM ground connection is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 16 and Ground	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check the ABS warning light circuit fuse (ABS fuse box, fuses 1 and 2):	OK	Proceed to test 3
		Faulty	Replace fuse, proceed to test 6
3	Check cable for short to voltage: With Ignition 'OFF', check voltage between: - ABS ECM connector pin 16 and Ground	0 V	Proceed to test 4
		Above 3 V	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short to ground: With ignition 'ON', Check the ABS warning light circuit voltage between: - ABS ECM connector pin 21 and Ground	Voltage greater than 1.5 V	Proceed to test 5
		Voltage less than 1.5 V	Locate and rectify fault, proceed to test 6
5	Check cable for continuity: ABS ECM connector pin 24 and Ground: Turn Ignition 'ON'	OK	Proceed to test 6
		Faulty	Locate and rectify fault, proceed to test 6
6	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Front Wheel Sensor Open Circuit/Short Circuit

Fault Code	Possible cause	Action
C1611	Front wheel sensor short circuit to ground or open circuit	Ensure ABS ECM connector is secure Ensure wheel speed sensor connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:

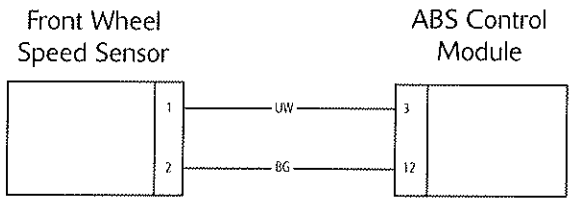
Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity:	OK	Proceed to test 2
	- ABS ECM connector pin 3 and ABS ECM connector pin 12	Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit:	OK	Proceed to test 4
	- ABS ECM connector pin 12 and Ground	Short circuit	Proceed to test 3
3	Disconnect the front wheel speed sensor connector. Check cable for short circuit:	OK	Replace the wheel speed sensor, proceed to test 9
	Wheel speed sensor connector pin 2 (motorcycle harness side) and Ground	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4	Check cable for short circuit:	OK	Proceed to test 6
	- ABS ECM connector pin 3 and Ground	Short circuit	Proceed to test 5
5	Check cable for short circuit:	OK	Replace the wheel speed sensor, proceed to test 9
	- Wheel speed sensor connector pin 1 (motorcycle harness side) and Ground	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6	Check cable continuity:	OK	Proceed to test 7
	- ABS ECM connector pin 12 and Wheel speed sensor connector pin 2 (motorcycle harness side)	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7	Check cable continuity:	OK	Proceed to test 8
	- ABS ECM connector pin 3 and Wheel speed sensor connector pin 1 (motorcycle harness side)	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8	Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation:	3 mA to 14 mA	Proceed to test 9
	- Connect a suitable voltage supply between 4.5 V and 16 V between ABS ECM connector pin 12 (positive) and pin 3 (negative), and measure the current consumption of the wheel speed sensor	Faulty	Replace the wheel speed sensor, proceed to test 9
9	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	3.1 mA	4.1 mA	5.3 mA
High (16 V)	8.1 mA	10.5 mA	13.6 mA



Rear Wheel Sensor Open Circuit/Short Circuit

Fault Code	Possible cause	Action
C1613	Rear wheel sensor short circuit to ground or open circuit	Ensure ABS ECM connector is secure Ensure wheel speed sensor connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:

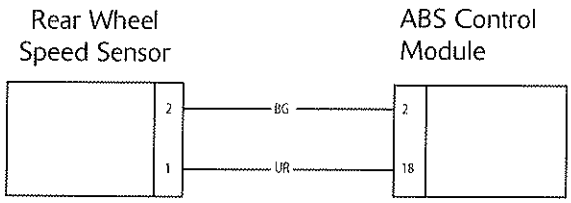
Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 2 and ABS ECM connector pin 18	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit: - ABS ECM connector pin 2 and Ground	OK	Proceed to test 4
		Short circuit	Proceed to test 3
3	Disconnect the front wheel speed sensor connector. Check cable for short circuit: - Wheel speed sensor connector pin 2 (motorcycle harness side) and Ground	OK	Replace the wheel speed sensor, proceed to test 9
		Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4	Check cable for short circuit: - ABS ECM connector pin 18 and Ground	OK	Proceed to test 6
		Short circuit	Proceed to test 5
5	Check cable for short circuit: - Wheel speed sensor connector pin 1 (motorcycle harness side) and Ground	OK	Replace the wheel speed sensor, proceed to test 9
		Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6	Check cable continuity: - ABS ECM connector pin 2 and Wheel speed sensor connector pin 2 (motorcycle harness side)	OK	Proceed to test 7
		Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7	Check cable continuity: - ABS ECM connector pin 18 and Wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
		Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8	Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 4.5 V and 16 V between ABS ECM connector pin 2 (positive) and pin 18 (negative), and measure the current consumption of the wheel speed sensor	3 mA to 14 mA	Proceed to test 9
		Faulty	Replace the wheel speed sensor, proceed to test 9
9	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	3.1 mA	4.1 mA	5.3 mA
High (16 V)	8.1 mA	10.5 mA	13.6 mA



Front Wheel Sensor Abnormal Input/Losing Contact

Fault Code	Possible cause	Action
C1612	Front wheel sensor abnormal input or dropping out Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure Ensure wheel speed sensor connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the wheel speed sensor circuit (see page *15-56*)	OK	Contact Triumph service
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Rear Wheel Sensor Abnormal Input/Losing Contact

Fault Code	Possible cause	Action
C1614	Rear wheel sensor abnormal input or dropping out Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque:	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the wheel speed sensor circuit (see page *15-58*)	OK	Contact Triumph service
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Front Wheel Pulser Gear Missing Teeth

Fault Code	Possible cause	Action
C1621	Incorrect Wheel speed sensor air gap Front wheel pulser gear missing teeth Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring:	OK	Proceed to test 2
	- Air gap between 0.1 mm to 1.5 mm	Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque:	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the motorcycle wheel for damage/incorrect size	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Rear Wheel Pulser Gear Missing Teeth

Fault Code	Possible cause	Action
C1623	Incorrect Wheel speed sensor air gap Rear wheel pulser gear missing teeth Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque:	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the motorcycle wheel for damage/incorrect size	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

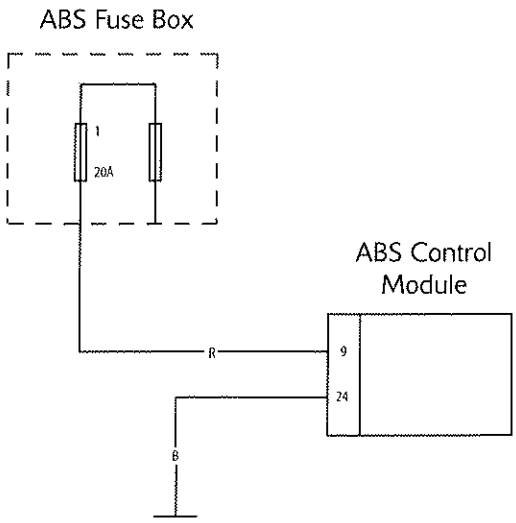
Front or Rear Input/Output Solenoid Open/Short Circuit

Fault Code	Possible cause	Action
C1631	Front wheel input solenoid short circuit to ground or open circuit	Ensure ABS ECM connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:
C1632	Front wheel output solenoid short circuit to ground or open circuit	
C1633	Rear wheel input solenoid short circuit to ground or open circuit	
C1634	Rear wheel output solenoid short circuit to ground or open circuit	
C1654	Solenoid relay - stick at OFF and ON	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 9 and Ground	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check the ABS solenoid fuse (ABS fuse box fuse 1):	OK	Proceed to test 3
		Faulty	Replace fuse, proceed to test 5
3	Check cable continuity: With Ignition 'ON', check voltage between - ABS ECM connector pin 9 and Ground	Same as 'across battery' voltage	Proceed to test 4
		Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
4	Check cable for continuity: - ABS ECM connector pin 24 and Ground	OK	Proceed to test 5
		Faulty	Locate and rectify fault, proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock

Fault Code	Possible cause	Action
C1641	Front wheel Actuator (Hydraulic control) wheel lock	Ensure ABS ECM connector is secure Proceed to pinpoint test 1:
C1643	Rear wheel Actuator (Hydraulic control) wheel lock	

Pinpoint Tests

	Test	Result	Action
1	Check the relevant wheel for brake bind caused by caliper or master cylinder faults, or other mechanical causes	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 4
2	Measure the air gap of the wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 3
		Faulty	Rectify the fault and proceed to test 4
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 4
4	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

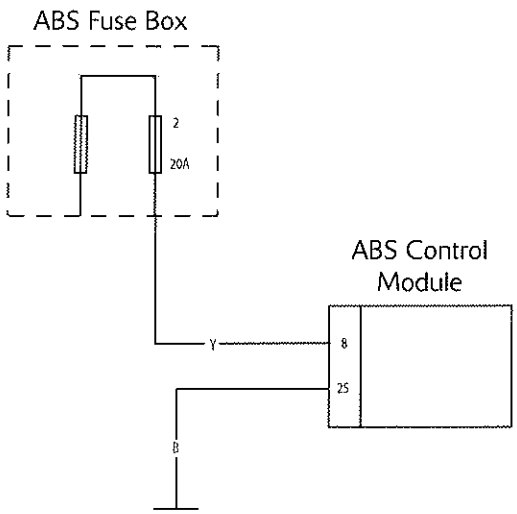
Motor - Lock; Motor Stuck OFF; Motor Stuck ON

Fault Code	Possible cause	Action
C1651	Motor - Lock	Ensure ABS ECM connector is secure Turn the ignition 'ON' Proceed to pinpoint test 1:
C1652	Motor - Stick at OFF	
C1653	Motor - Stick at ON	

Pinpoint Tests

	Test	Result	Action
1	Check the motor function: Check that with the motorcycle stationary and the ABS ECM modulator connected, the motor does not operate	OK	Proceed to test 2
		Motor runs continually	Contact Triumph service
2	Check the ABS motor circuit fuse ABS fuse box, (fuse 2)	OK	Proceed to test 3
		Faulty	Replace fuse and proceed to test 5
3	Check cable continuity: With Ignition 'ON', check voltage between: - ABS ECM connector pin 8 and Ground	Same as 'across battery' voltage	Proceed to test 4
		Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
4	Check cable for continuity: - ABS ECM connector pin 25 and Ground	OK	Proceed to test 5
		Faulty	Locate and rectify fault, proceed to test 5
5	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



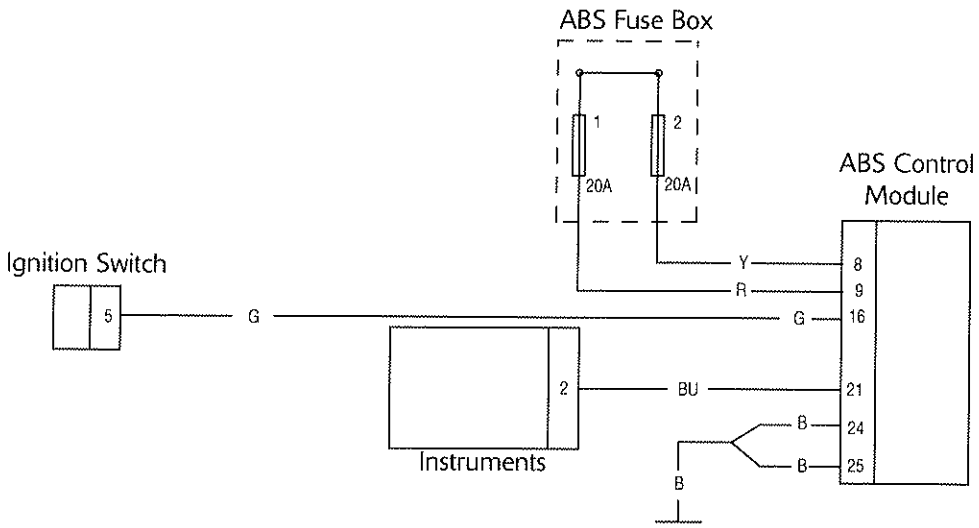
Power Source Voltage Drop/Voltage Rise

Fault Code	Possible cause	Action
C1661	Power source voltage drop	Ensure ABS ECM connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:
C1662	Power source voltage rise	

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 16 and Ground pin 24	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check the cable for continuity: - ABS ECM connector pin 24 and Ground	OK	Proceed to test 3
		Faulty	Rectify wiring harness fault, proceed to test 5
3	Check battery voltage: With ignition 'ON', Check the voltage between: - ABS ECM connector pin 16 and Ground pin 24	Voltage greater than 10 V	Proceed to test 4
		Voltage less than 10 V	Locate and rectify fault, proceed to test 5
4	Check battery voltage: Reconnect ABS ECM connector and start the engine. Check the voltage between: - Battery positive (red) terminal and negative (black) terminal	Voltage between 10 V and 16 V	Proceed to test 4
		Voltage greater than 16 V	Check the battery charging circuit. Locate and rectify fault, proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Different Tyre Diameter

Fault Code	Possible cause	Action
C1671	Different tyre diameter	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check for installation of wheels and tyres of the correct size	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check the tyre pressures	OK	Proceed to test 3
		Faulty	Rectify fault, proceed to test 5
3	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 4
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
4	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 5
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Abnormal ECU

Fault Code	Possible cause	Action
C1681	Abnormal ECM	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the wheel speed sensors between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 1
		Faulty	Rectify the fault and proceed to test 4
2	Check the pulser rings for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 2
		Faulty	Clean or replace the ABS pulser ring, proceed to test 4
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 4
4	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

ABS Hydraulic Circuit Layout

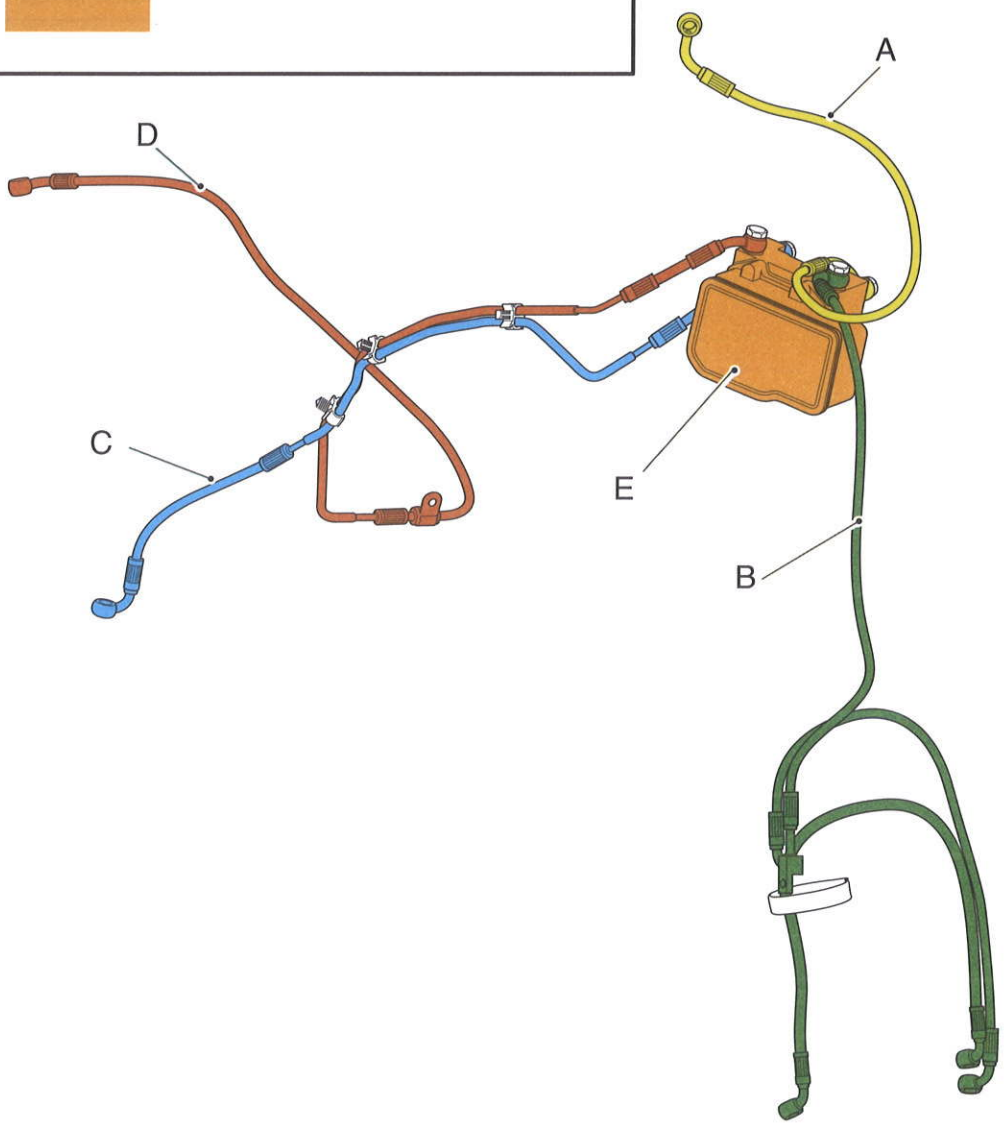
A. Front Brake Circuit from Master Cylinder to ABS Modulator

B. Front Brake Circuit from ABS Modulator to Front Calipers

C. Rear Brake Circuit from Master Cylinder to ABS Modulator

D. Rear Brake Circuit from ABS Modulator Rear Caliper

E. ABS Modulator



16 Wheels/Tyres

Table of Contents

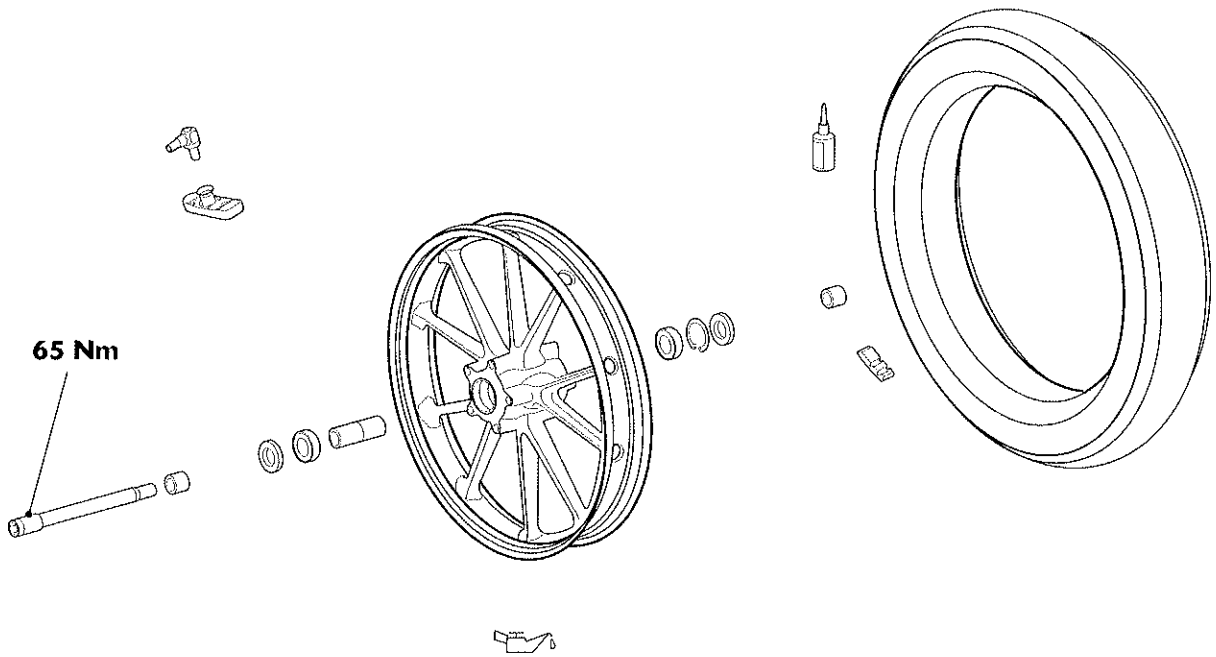
Exploded View - Front Wheel 16.2
Exploded View - Rear Wheel 16.3
Tyres 16.4
- Tyre Pressures 16.4
- Tyre Wear/Wheel Inspection 16.4
- Important Tyre Information 16.5

Front Wheel 16.6
- Removal 16.6
- Installation 16.7

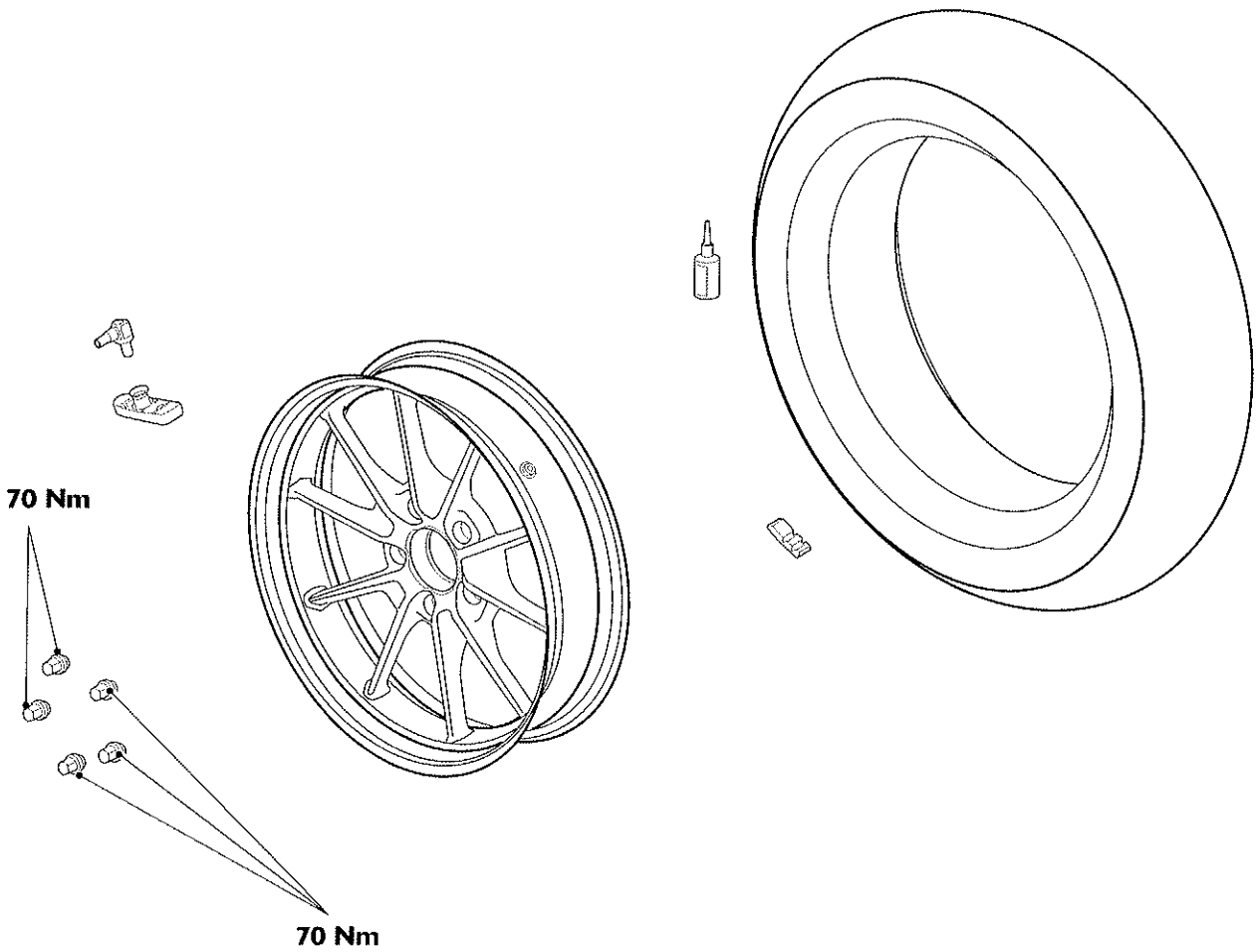
Rear Wheel 16.8
- Removal 16.8
- Installation 16.9

Front Wheel Bearings 16.9
- Removal 16.9
- Inspection 16.10
- Installation 16.10

Exploded View - Front Wheel

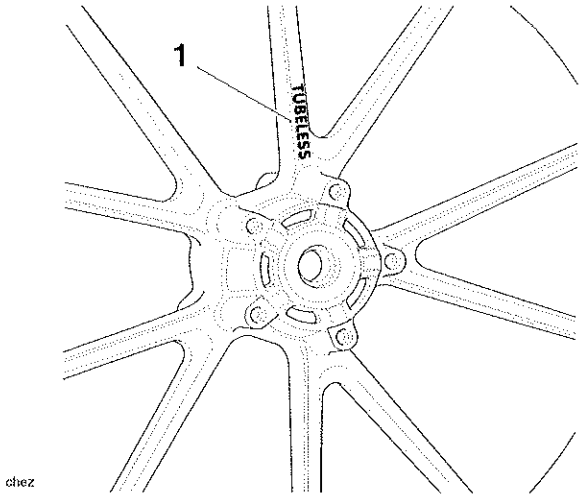


Exploded View - Rear Wheel

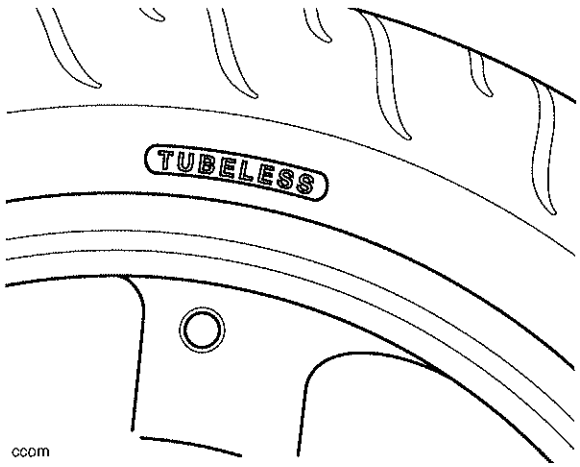


Tyres

This model is equipped with tubeless tyres, valves and wheel rims. Use only tyres marked 'TUBELESS' and tubeless valves on rims marked 'SUITABLE FOR TUBELESS TYRES'.



Typical Wheel Marking



Typical Tyre Marking

Warning

Tyres that have been used on a rolling road dynamometer may become damaged. In some cases, the damage may not be visible on the external surface of the tyre.

Tyres must be replaced after such use as continued use of a damaged tyre may lead to instability, loss of control and an accident.

Tyre Pressures

Correct inflation pressure will provide maximum stability, rider comfort and tyre life.

Always check tyre pressures before riding when the tyres are cold. Check tyre pressures daily and adjust if necessary.

Tyre Pressure - Front	2.5 bar (36 psi)
Tyre Pressure - Rear	2.90 bar (42 psi)

Warning

Incorrect tyre inflation will cause abnormal tread wear and instability problems which may lead to loss of control and an accident.

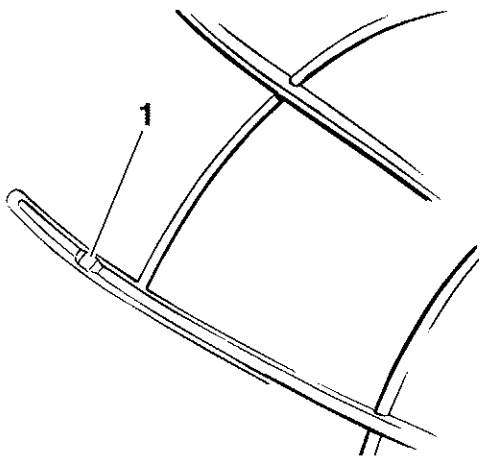
Under-inflation may result in the tyre slipping on, or coming off the rim. Over-inflation will cause instability and accelerated tread wear.

Both conditions are dangerous as they may cause loss of control leading to an accident.

Tyre Wear/Wheel Inspection

As the tyre tread wears down, the tyre becomes more susceptible to puncture and failure. It is estimated that 90% of all tyre failures occur during the last 10% of tread life (90% worn). It is false economy and unsafe to use tyres until they are worn to their minimum.

All tyres are fitted with tread wear indicators. When the tyre becomes worn down as far as the top of a tread wear indicator, the tyre is worn beyond its service life and must be replaced.



1. Tread wear indicator

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 tyres become punctured, leakage is often very slow. Always inspect tyres very closely for punctures.

Check the tyres for cuts, embedded nails or other sharp objects.

Check the rims for dents or deformation and spokes for damage. Operation with damaged or defective wheels, spokes 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 (80 mph)	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 tyres 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, loss of control and an accident.

On models fitted with ABS, different wheel speeds, caused by non-approved tyres, can affect the function of the ABS computer.

See the Specification section for details of approved tyre combinations. Always have tyres fitted and balanced by your authorised Triumph dealer who has the necessary training and skills to ensure safe, effective fitment.

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 an accident.

Warning

When replacement tyres are required, consult your authorised Triumph dealer who will arrange for the tyres to be fitted according to the tyre manufacturer's instructions.

When tyres are replaced, allow time for the tyres to seat to the rim (approximately 24 hours). During this seating period, ride cautiously as an incorrectly seated tyre could cause instability, loss of motorcycle control and an accident.

Initially, the new tyres will not produce the same handling characteristics as the worn tyres and the rider must allow adequate riding distance (approximately 100 miles) to become accustomed to the new handling characteristics.

24 hours after fitting, the tyre pressures must be checked and adjusted, and the tyres examined for correct seating. Rectification must be carried out as necessary.

The same checks and adjustments must also be carried out when 100 miles have been travelled after fitting.

Use of a motorcycle when not accustomed to its handling characteristics may lead to loss of motorcycle control and an accident.

Front Wheel

Removal

Warning

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

1. Position the motorcycle on a paddock stand.
2. Raise and support the front of the motorcycle.

Warning

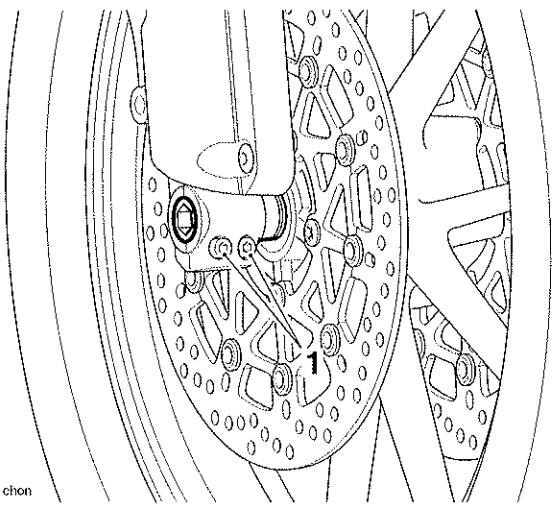
Do not allow the calipers to hang on the brake hoses as this may damage the hoses.

Damaged hoses could cause brake failure leading to loss of control and an accident.

Note:

- **It is not necessary to disconnect the brake hoses.**

3. Detach and support the front brake calipers such that the weight of the caliper is not supported by the brake hose (see page *15-15*).
4. Slacken both pinch bolts at the lower end of the right hand fork.



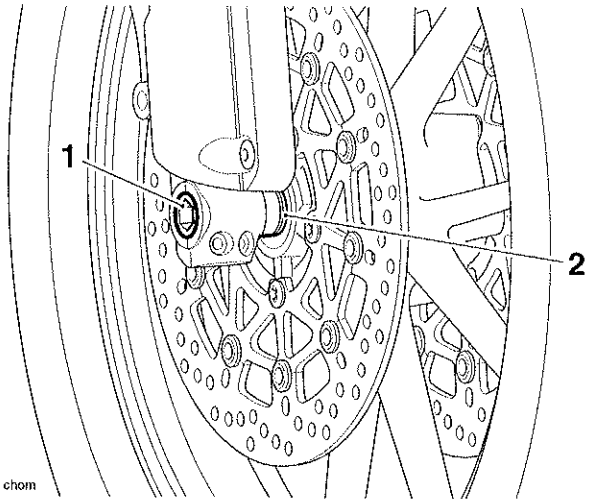
1. Fork pinch bolts

5. Release and remove the wheel spindle, which is threaded into the left hand fork.

Note:

- **The right hand spacer is longer than the left. To identify the spacers, the right hand spacer has two machined rings while the right has a single machined ring.**
- **Note the position of the spacers.**

6. Remove the wheel and the wheel spacers.



1. Wheel spindle
2. Wheel spacer (right hand shown)

7. Place the wheel on wooden blocks.

⚠ Warning

Do not allow the wheel to rest on either brake disc as this may damage the disc and could lead to an accident.

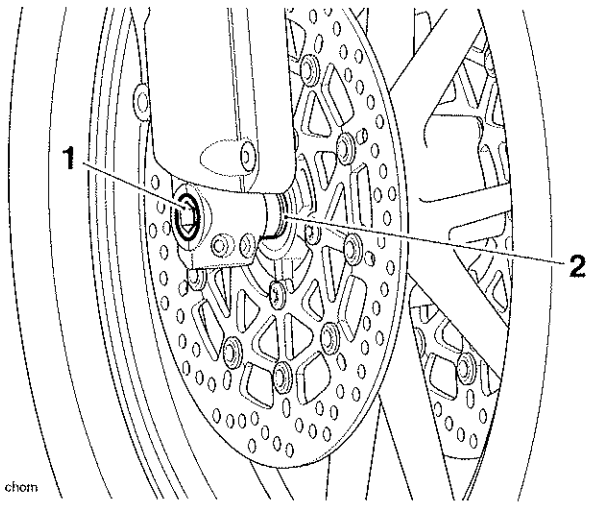
⚠ Caution

To prevent wheel and bearing damage, observe absolute cleanliness and ensure there is no dirt ingress to the wheel bearings while the wheel is removed.

8. Thoroughly clean all components and inspect for wear or damage.

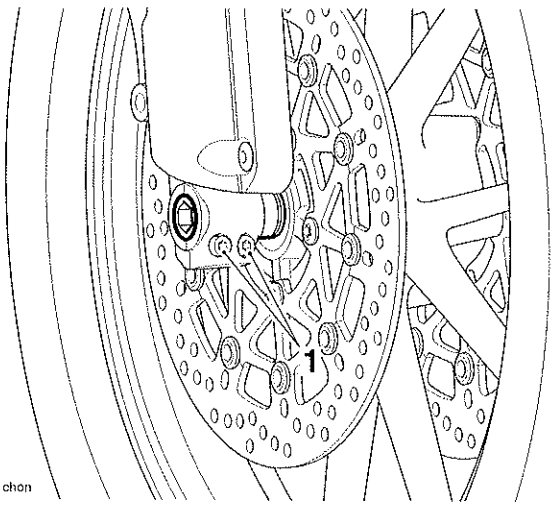
Installation

1. Lightly smear the wheel spacers with grease and locate in the hubs as noted for removal.
2. Position the wheel between the forks ensuring the spacers remain in position on both sides.



1. Wheel spacers (right hand shown)

3. Refit the wheel spindle from the right hand side and tighten to **65 Nm**.
4. Tighten the fork pinch bolts to **22 Nm**.



1. Fork pinch bolts

5. Thoroughly clean and degrease the brake discs.
6. Refit the front brake calipers and tighten their fixings to **50 Nm**.
7. 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.
8. Check that the brake discs are centrally located to the calipers. If not, apply gentle pressure to the fork to ensure the disc is centred with the calipers.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

9. Check the air gap between the wheel speed sensor and the pulser ring (see page *15-35*).
10. Check the operation of the front brake.

Rear Wheel

Removal

Warning

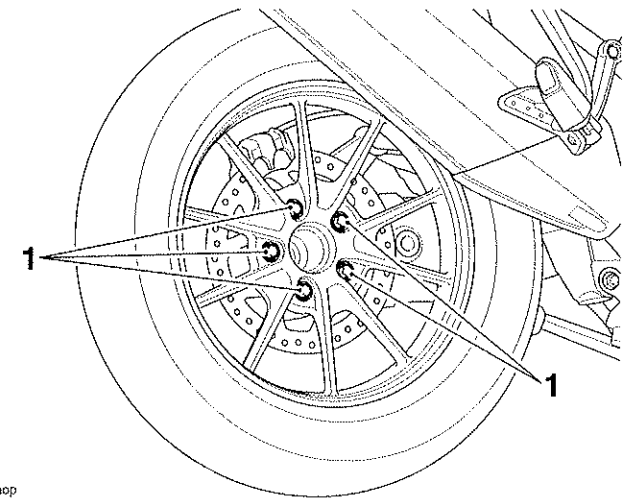
Before starting work, ensure the motorcycle is stabilised and adequately supported. This will help prevent it from falling and causing injury to the operator or damage to the motorcycle.

1. Raise and support the rear of the motorcycle to allow removal of the rear wheel.

Warning

If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

2. Release the five nuts and remove the rear wheel.



chop

1. Rear wheel nuts

3. The rear brake disk and caliper will remain in position on the final drive unit when the wheel is removed.

Installation

1. Lift the rear wheel into position, aligning the wheel, onto the five studs on the final drive unit.
2. Fit and tighten the nuts to **70 Nm**.
3. Lower the motorcycle to the ground.

Warning

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

4. Check the operation of the rear brake.
5. Inform the owner to check and, if necessary, tighten the rear wheel nuts to **70 Nm**.

Front Wheel Bearings

Removal

1. Remove the front wheel (see page *16-6*).

Caution

Do not allow the wheel to rest on the brake discs, as this may damage the discs. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake discs are raised above the ground.

2. Place the wheel on wooden blocks to prevent damage to the brake discs.
3. Remove and discard the seals and the bearing circlip.

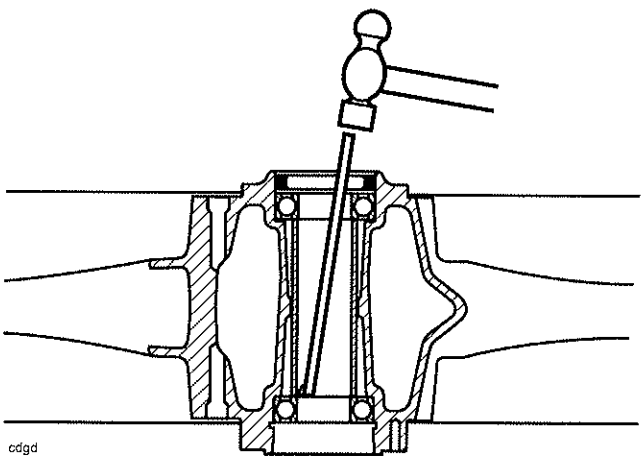
Warning

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

Caution

To prevent wheel damage and to aid bearing removal, always apply force evenly on both sides of the bearing to prevent it from 'tipping' and becoming stuck. Application of uneven force will lead to difficulty in removing the bearing and to a damaged wheel.

4. Using a suitable pin punch, through the centre of the wheel, drift out the wheel bearings. Collect the centre sleeve.



Wheel Bearing Removal

Inspection

⚠ Warning

Only remove raised witness marks from within the wheel. Removal of material below any raised areas will reduce the level of interference between the wheel and the bearings. Loss of interference could cause the bearing to become loose in the wheel leading to loss of motorcycle control and an accident.

1. Examine the wheel for any raised witness marks caused by the removal process. Remove any such marks with fine emery paper or a gentle file.

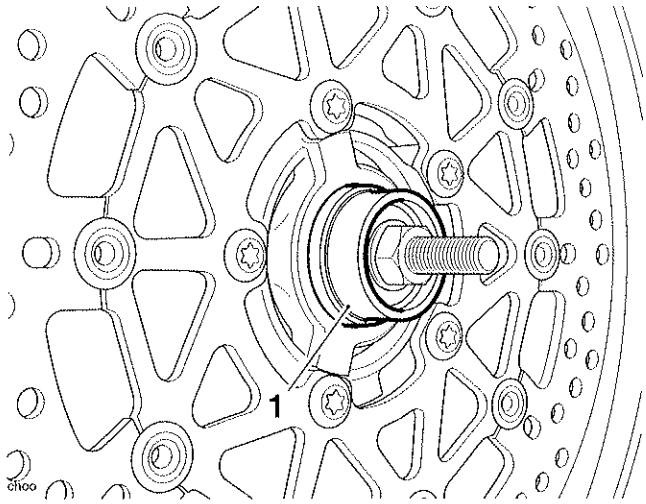
Installation

Note:

- **Refer to the chart below for the correct tool and tool face when inserting bearings. Bearings are inserted by means of a draw-bolt acting on the insertion tool. A support tool is located on the opposite side of the wheel to the insertion tool and as the bolt is tightened, the bearing is drawn into the wheel.**
- **Insert bearings with the marked or shielded side facing outwards and always fit a new bearing circlip and seals.**

	Bearing insertion tool	Support tool
Left bearing	T3880053 Large face to bearing	3880070 - T0301 Large face to wheel
Right bearing	T3880053 Large face to bearing	3880070 - T0301 Large face to wheel

1. Fit the wheel bearing to the left hand side of the wheel using the method described above.
2. Fit the wheel bearings and centre sleeve using the method described opposite.



1. Tool T3880053

3. Fit a new circlip.
4. Lubricate and fit new seals to the front wheel. Lubricate the seal's knife-edge with grease to NLGI 2 specification.
5. Fit the front wheel (see page *16-6*).

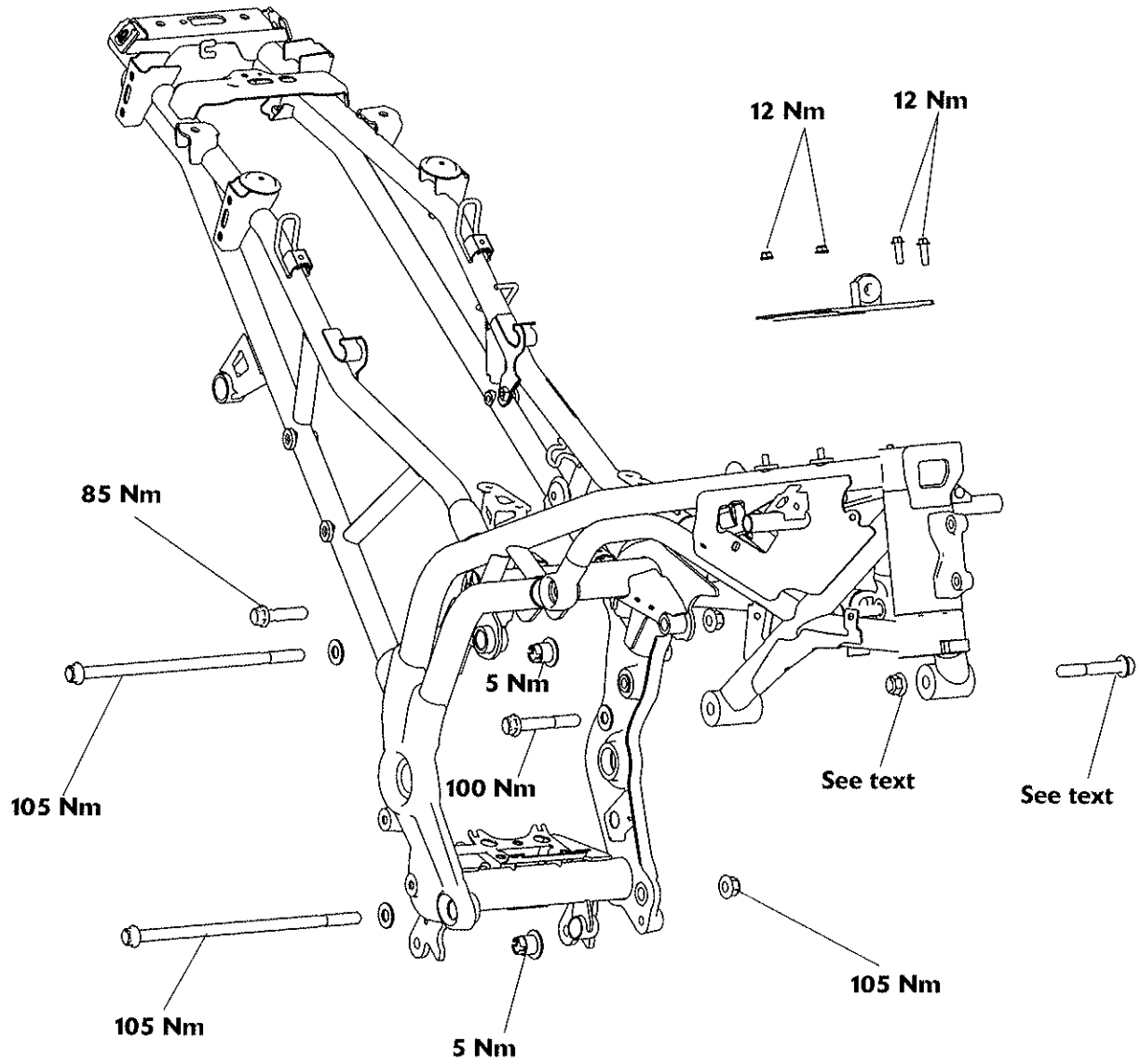
17 Frame and Bodywork

Table of Contents

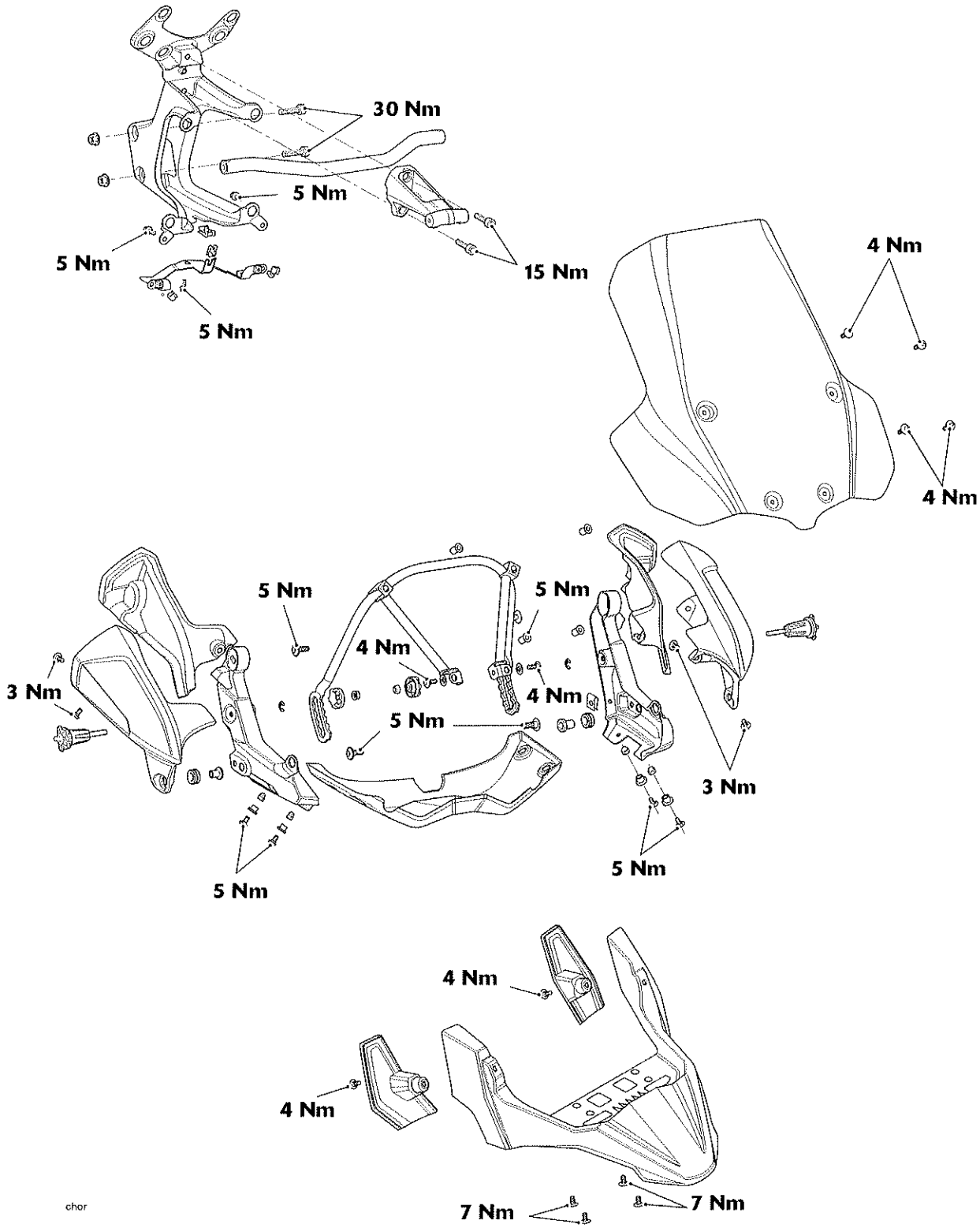
Exploded View - Frame 17.3
Exploded View - Cockpit and Mountings. 17.4
Exploded View - Side Fairings 17.5
Exploded View - Hand Guards (If Fitted) 17.6
Exploded View - Mirrors 17.6
Exploded View - Seats 17.7
Exploded View - Rear Panels and Luggage Rack 17.8
Exploded View - Sump Guard. 17.9
Exploded View - Footrests and Mountings 17.10
Exploded View - Side Stand and Centre Stand 17.11
Exploded View - Engine Protection Bars (If Fitted) 17.12
Exploded View - Front Mudguard. 17.13
Exploded View - Rear Mudguard 17.14
Frame, Footrests and Fixings 17.15
Inspection 17.15
Rear Seat 17.15
Removal 17.15
Installation 17.16
Rider's Seat 17.16
Removal 17.16
Installation 17.16
Engine Bars 17.17
Removal 17.17
Installation 17.19
Radiator Infill Panel 17.22
Removal 17.22
Installation 17.22
Fuel Tank Infill Panels 17.22
Removal 17.22
Installation 17.23

Side Fairings 17.23
Removal 17.23
Installation 17.24
Seat Infill Panel 17.26
Removal 17.26
Installation 17.26
Windscreen 17.27
Removal 17.27
Installation 17.27
Cockpit Cover and Infill Panel Assembly 17.27
Removal 17.27
Installation 17.28
Headlight Support 17.28
Removal 17.28
Installation 17.29
Front Mudguard 17.30
Removal 17.30
Installation 17.31
Pannier Rails 17.31
Removal 17.31
Installation 17.31
Luggage Rack 17.32
Removal 17.32
Installation 17.32
Rear Panel 17.32
Removal 17.32
Installation 17.32
Rear Mudguard 17.33
Removal 17.33
Installation 17.34
Sump Guard 17.34
Removal 17.34
Installation 17.34
Mirror 17.35
Removal 17.35
Installation 17.35
Pannier Link Bar Adjustment - If Fitted 17.36
Check 17.36
Adjustment 17.37

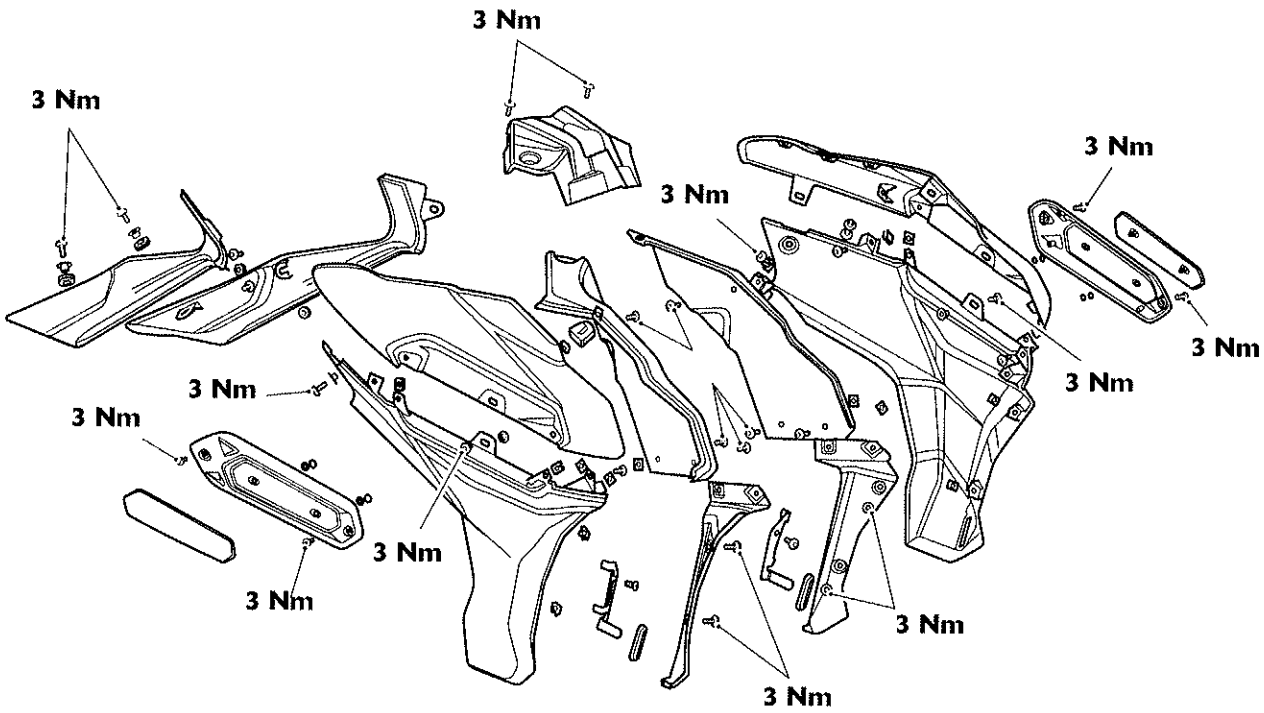
Exploded View - Frame



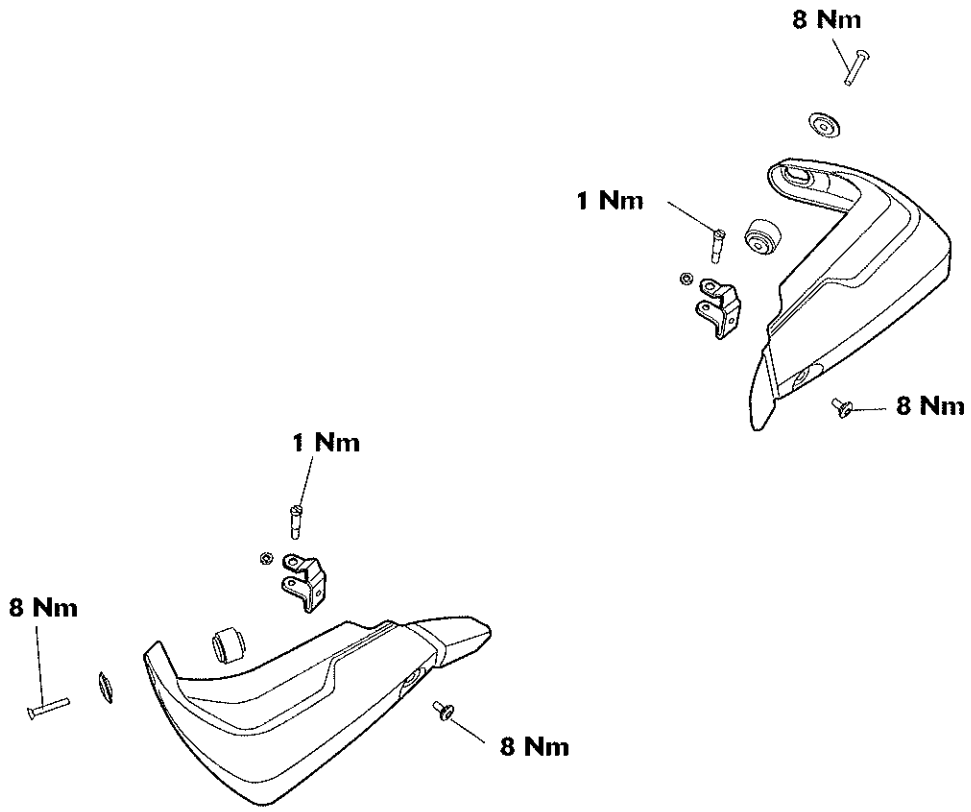
Exploded View - Cockpit and Mountings



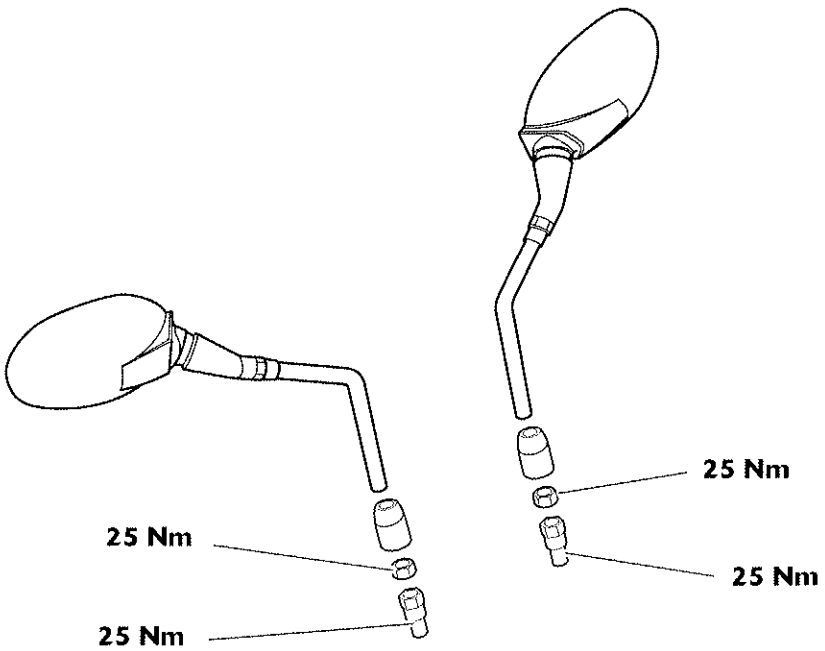
Exploded View - Side Fairings



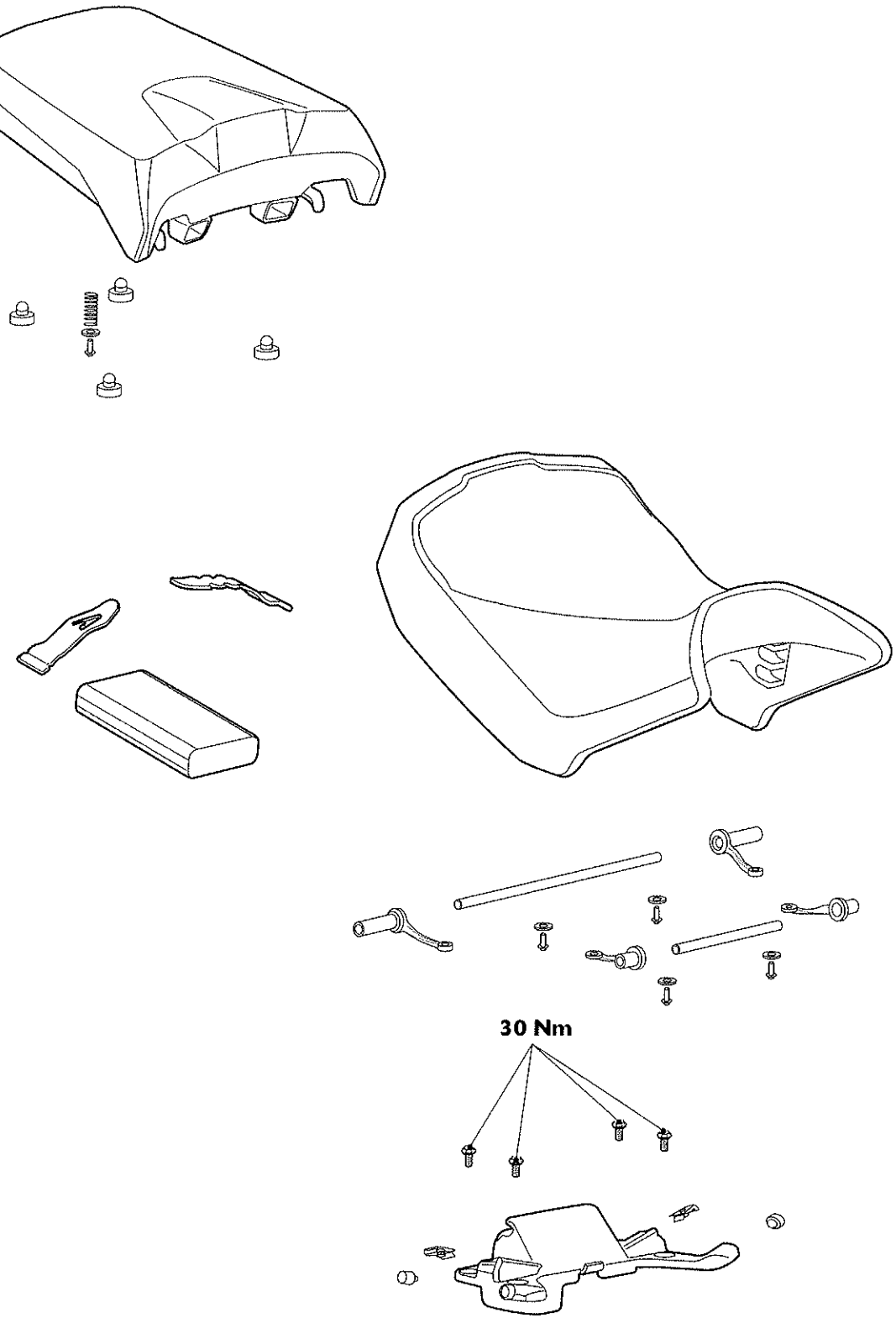
Exploded View - Hand Guards (If Fitted)



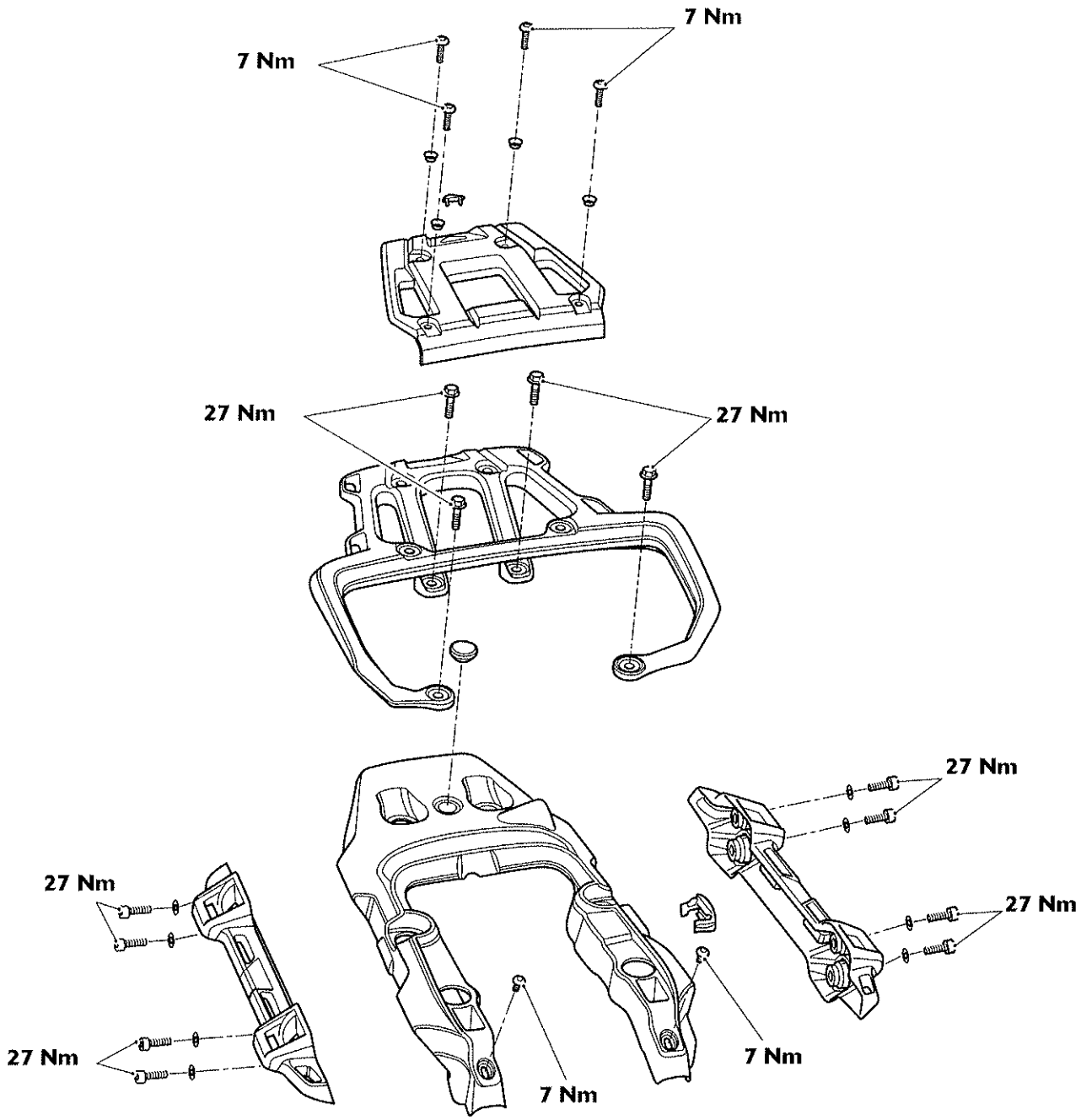
Exploded View - Mirrors



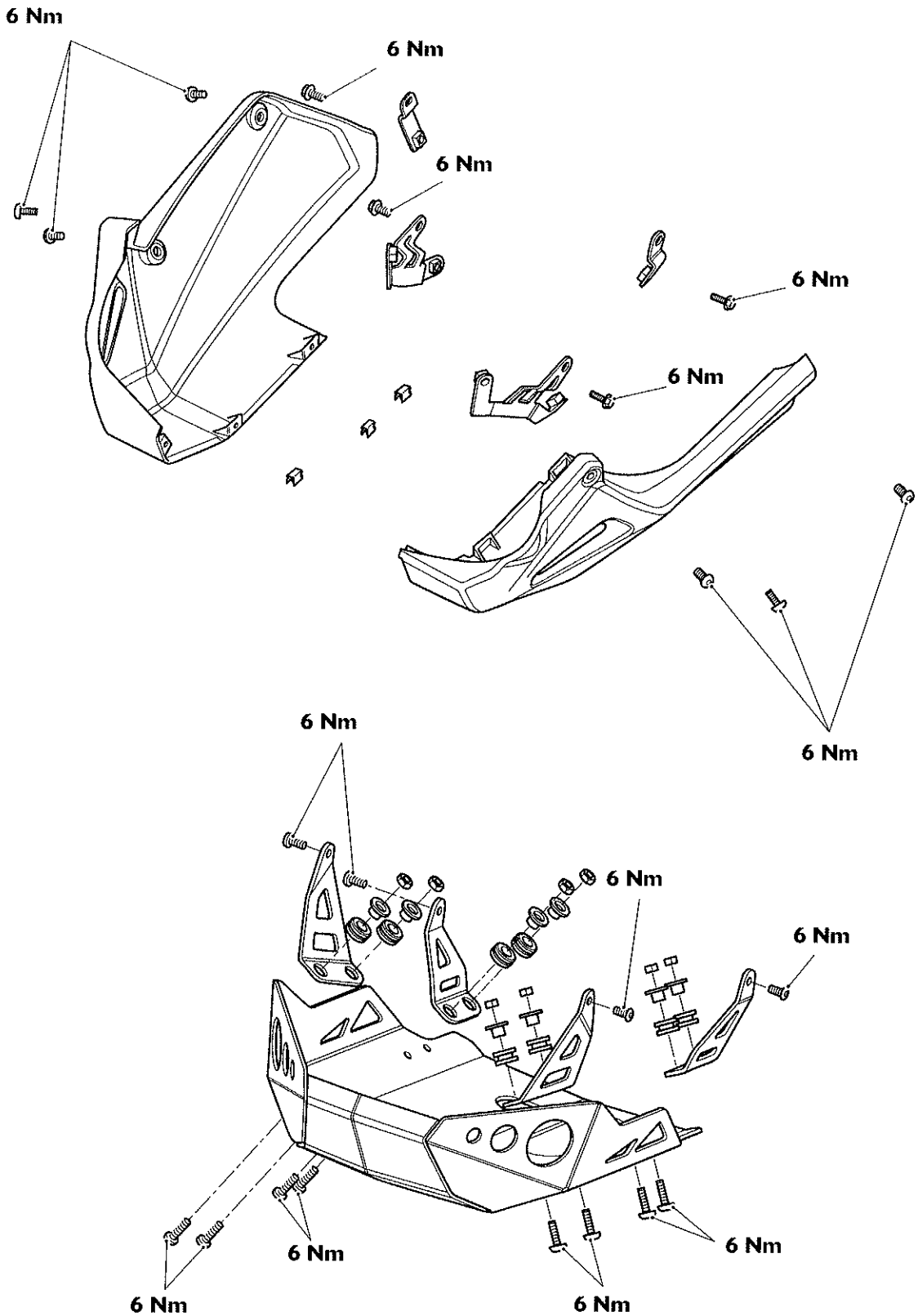
Exploded View - Seats



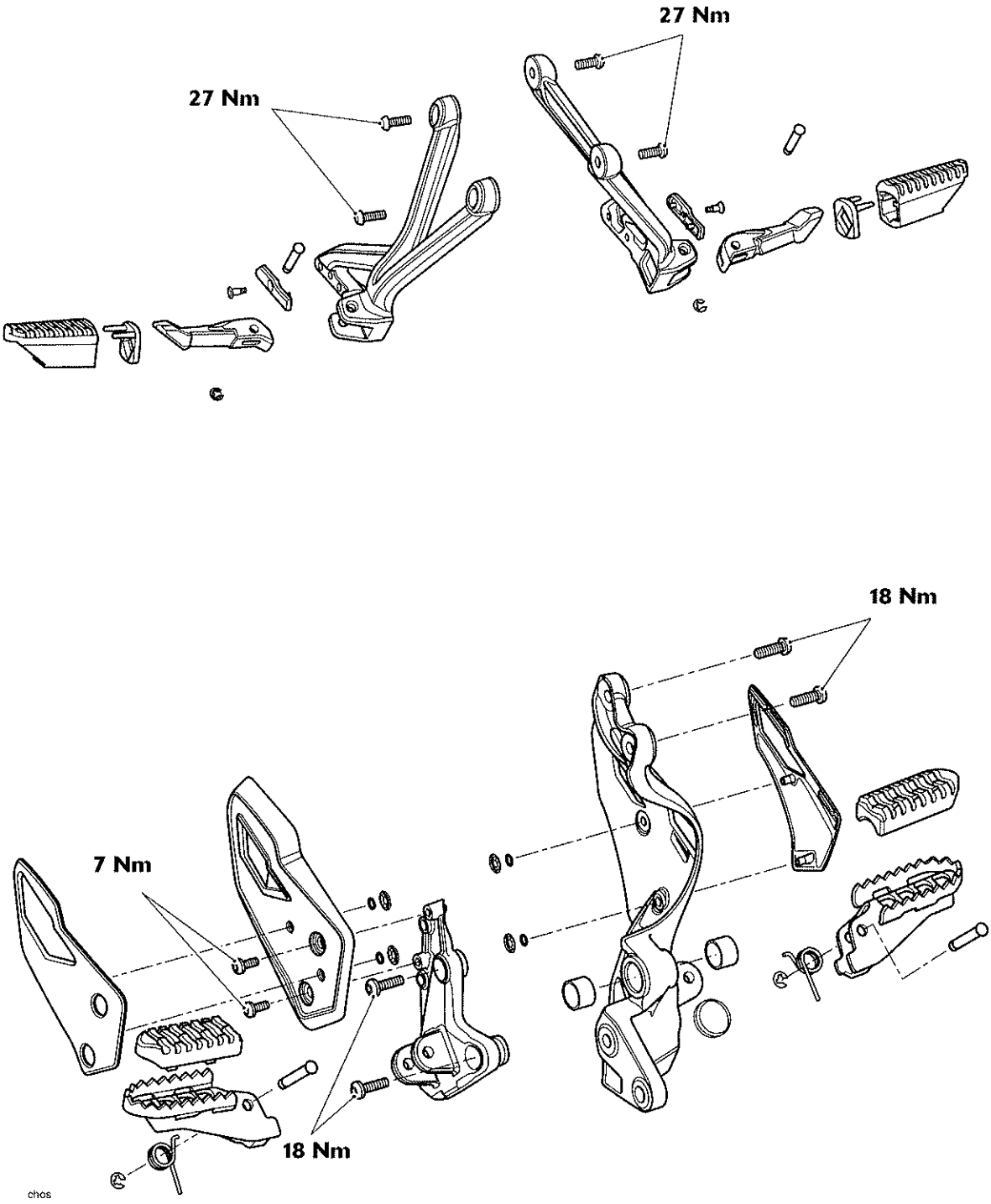
Exploded View - Rear Panels and Luggage Rack



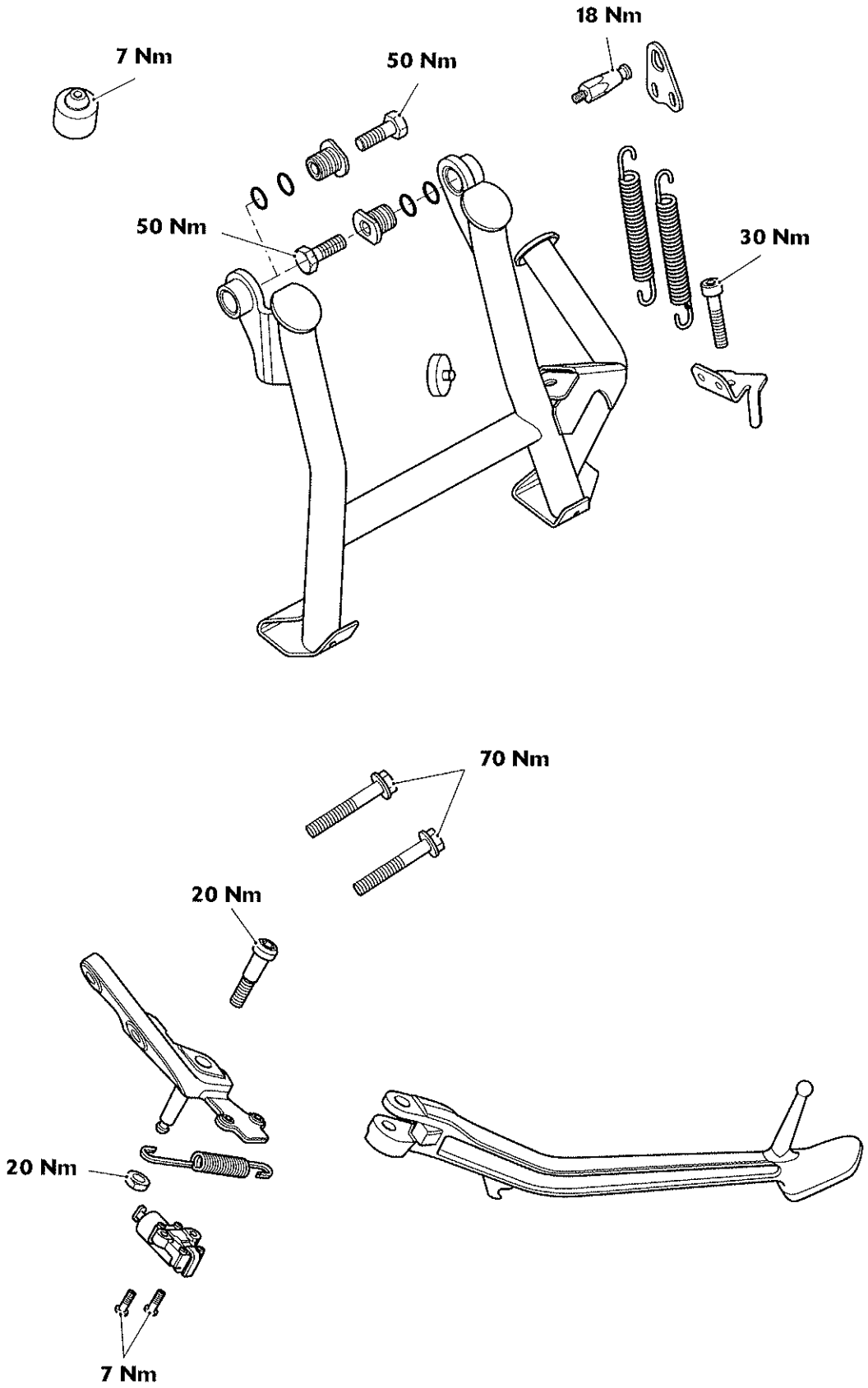
Exploded View - Sump Guard



Exploded View - Footrests and Mountings

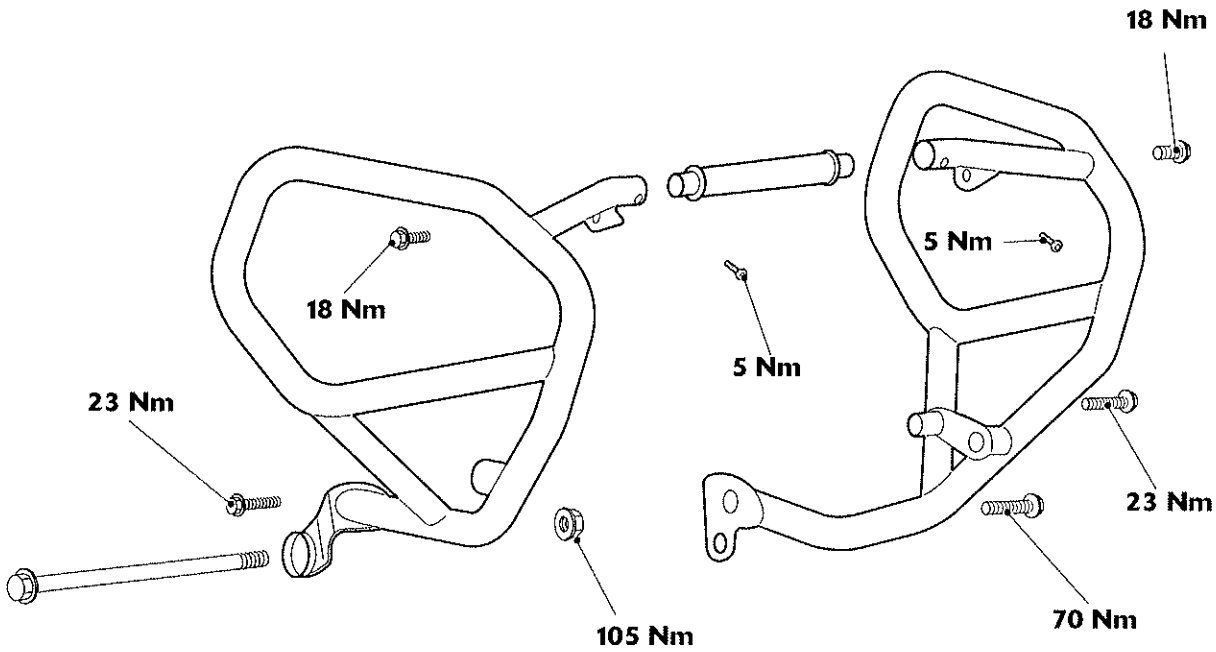


Exploded View - Side Stand and Centre Stand

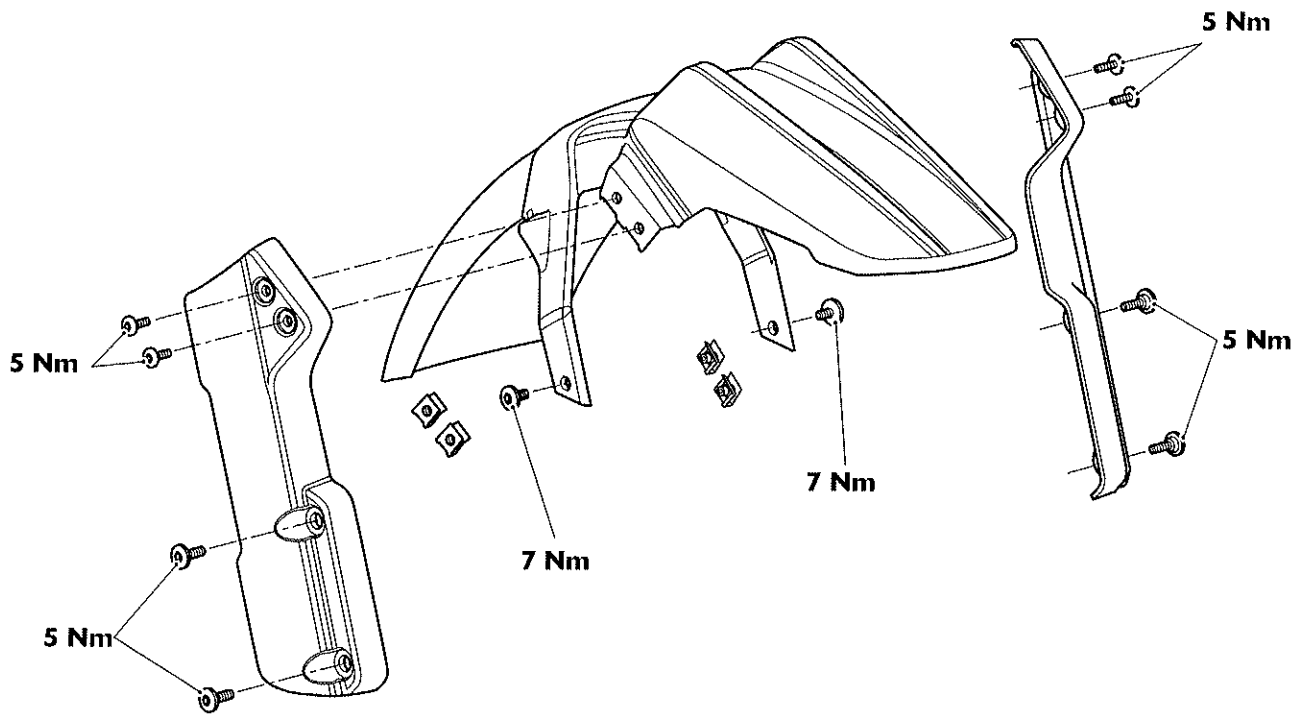


choq

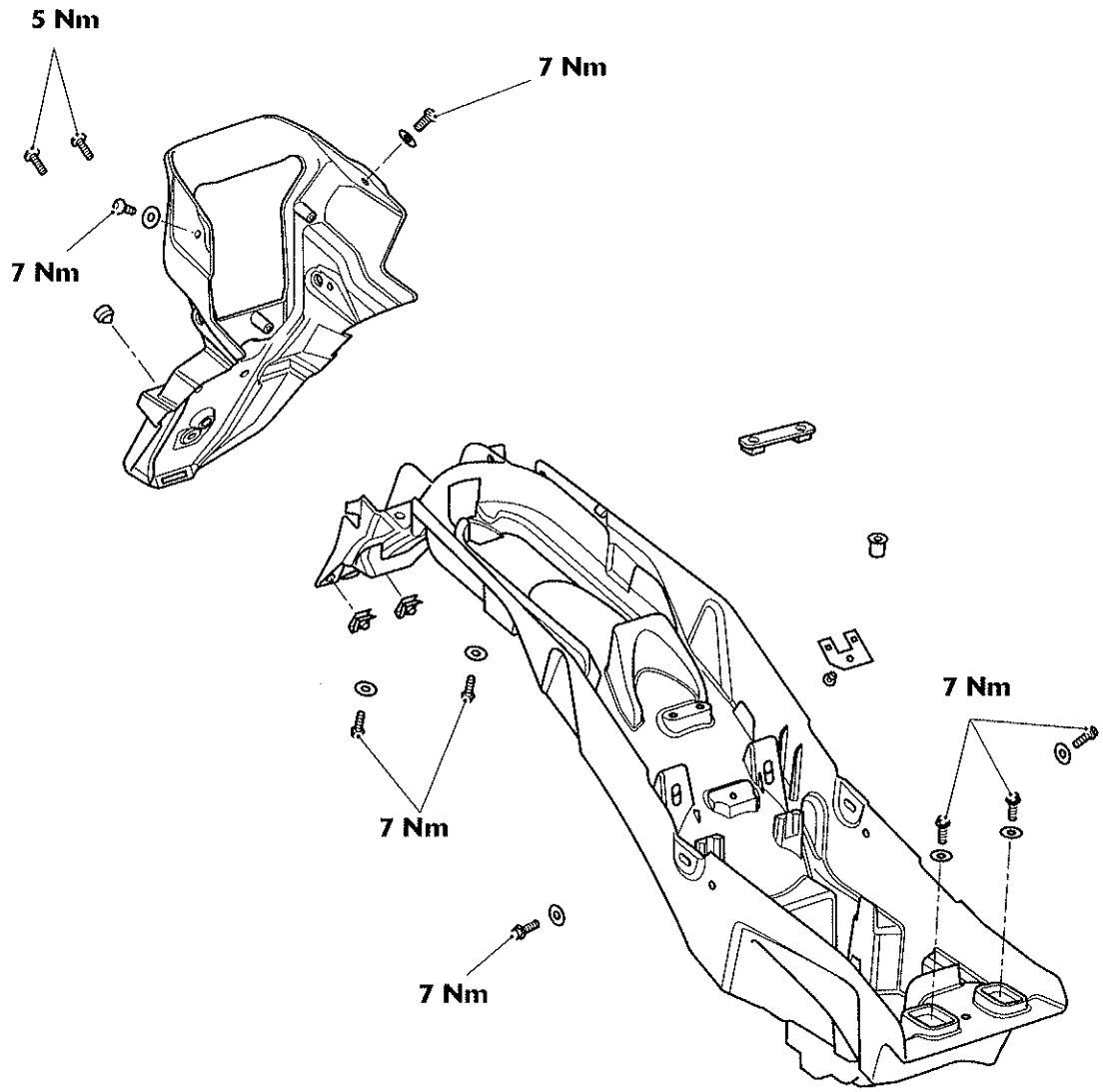
Exploded View - Engine Protection Bars (If Fitted)



Exploded View - Front Mudguard



Exploded View - Rear Mudguard



Frame, Footrests and Fixings

Inspection

1. Inspect the frame footrests and bodywork for damage, cracks, chafing and other dangerous conditions. Check bodywork and frame fixings for security.

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 loss of motorcycle control and an accident.

Warning

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

Rear Seat

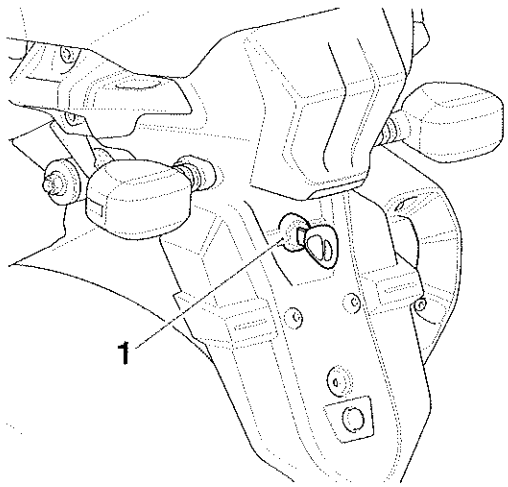
Removal

Caution

To prevent damage to the seat and its cover, care must be taken not to drop the seat. Do not lean the seat against the motorcycle or any surface which may damage the seat or cover. Instead, place the seat, with the seat cover facing up, on a flat surface which is covered with a soft cloth.

Do not place any item on the seat which may cause damage or staining to the seat cover.

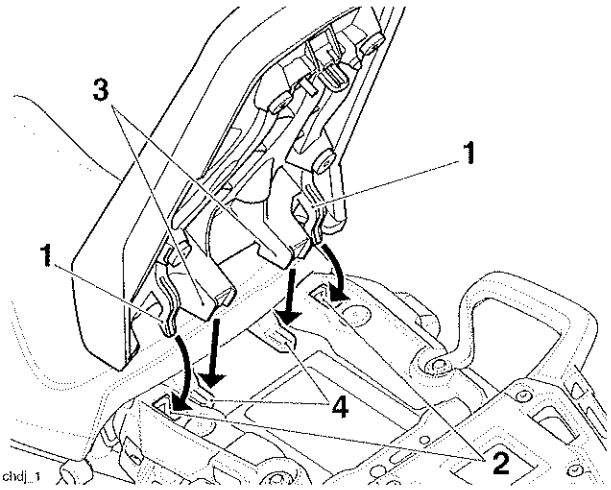
The rear seat lock is located on the rear mudguard, below the rear light unit. To remove the rear seat, insert the ignition key into the seat lock and turn it anti-clockwise. This will release the seat from its lock and allow it to be slid rearwards for complete removal from the motorcycle.



1. Seat lock

Installation

To refit the rear seat, engage the seat's two outer brackets under the loops on the subframe and the two inner brackets to the brackets on the rider's seat. Gently push the seat forwards and press down at the rear to engage the seat lock.



1. **Rear seat outer brackets**
2. **Subframe loops**
3. **Rear seat inner brackets**
4. **Rider seat brackets**

Warning

To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured, it will detach from the lock. A loose or detached seat could cause loss of motorcycle control and an accident.

Rider's Seat

Removal

Caution

To prevent damage to the seat and its cover, care must be taken not to drop the seat. Do not lean the seat against the motorcycle or any surface which may damage the seat or cover. Instead, place the seat, with the seat cover facing up, on a flat surface which is covered with a soft cloth.

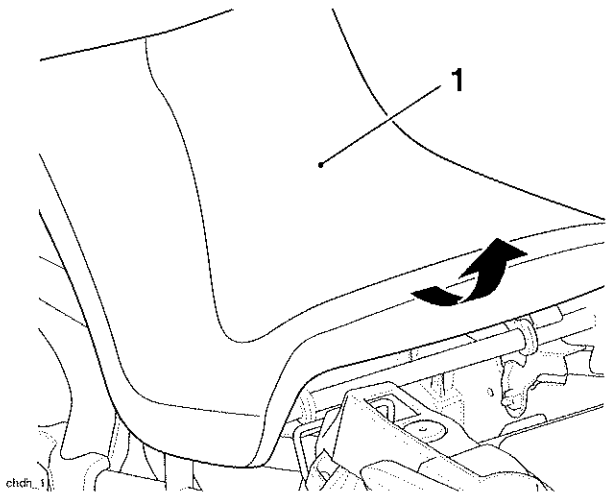
Do not place any item on the seat which may cause damage or staining to the seat cover.

To remove the rider's seat, remove the rear seat (see page *17-16*).

Grasp the rider's seat on either side, and slide it rearwards and upwards for complete removal from the motorcycle.

Installation

To refit the seat, engage the seat's front rail into the bracket at the rear of the fuel tank and lower the rear rail in to the rear brackets. Push down firmly on the rear of the seat. Refit the rear seat (see page *17-16*).



1. **Rider's seat**

Warning

To prevent detachment of the seat during riding, after fitting always grasp the seat and pull firmly upwards. If the seat is not correctly secured it will detach from the lock. A loose or detached seat could cause loss of motorcycle control and an accident.

Engine Bars

Removal

Warning

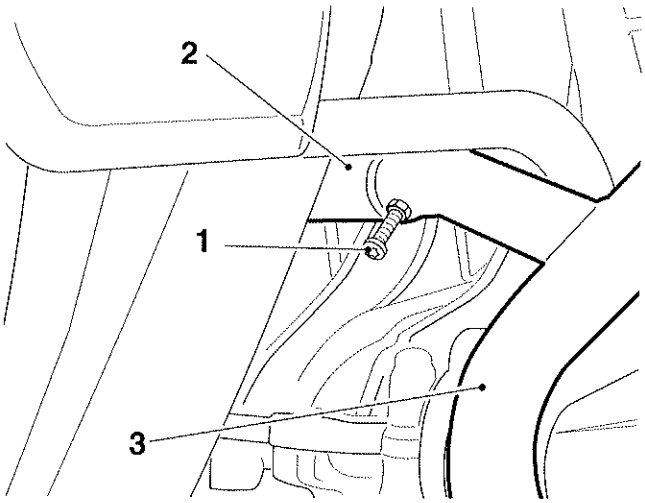
Throughout this operation, ensure that the motorcycle is stabilised and adequately supported to prevent risk of injury from the motorcycle falling.

1. Place the motorcycle on a paddock stand.

Note:

- **If the right hand engine bar is to be removed, the left hand engine bar must be removed first. This will allow access to the lock nut for the lower crankcase mounting bolt.**

2. Release the fixing securing the link bar to the left hand engine bar.

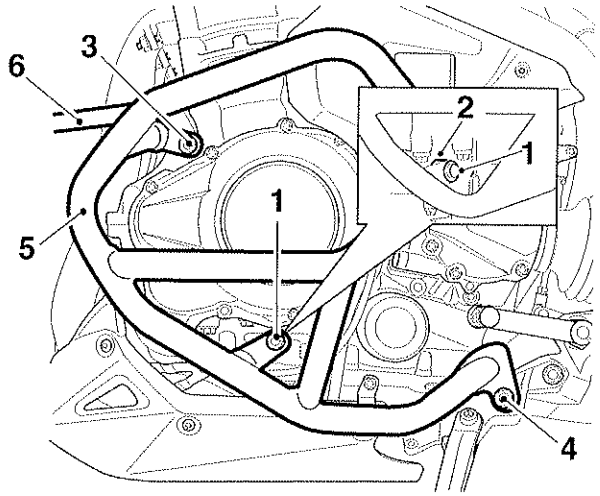


1. **Fixing**
2. **Link bar**
3. **Engine bar, left hand side**

Note:

- **Note that there is a 25 mm spacer between the left hand engine bar's centre mounting and the engine for installation.**
- **Note that the radiator mounting bracket is positioned between the engine bar and the engine for installation.**

3. Release the three mounting bolts and remove the right hand engine bar. Collect the 25 mm spacer from the centre mounting.

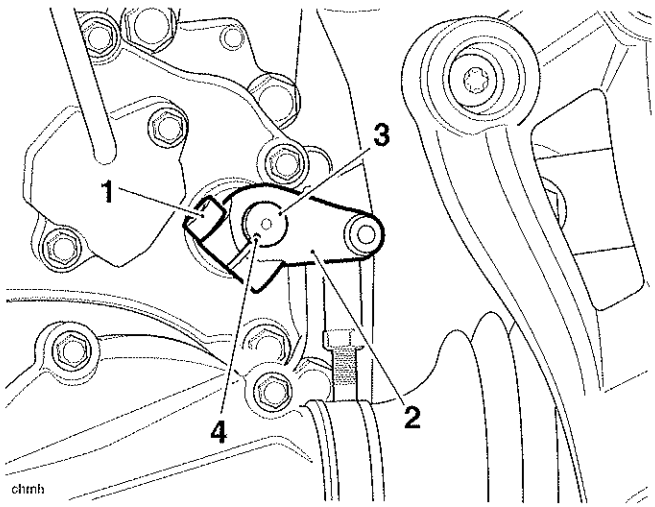


1. **Centre mounting bolt**
2. **Spacer, 25 mm**
3. **Upper mounting bolt**
4. **Side stand bolt**
5. **Engine bar, left hand side**
6. **Radiator mounting bracket**

Note:

- **To access the lock nut for the lower crankcase mounting bolt, the left hand control plate must be removed.**
- **Note the position of the transmission linkage in relation to the punch mark on the gear change mechanism.**

4. Select neutral, remove the pinch bolt and disconnect the transmission linkage from the gear change mechanism.

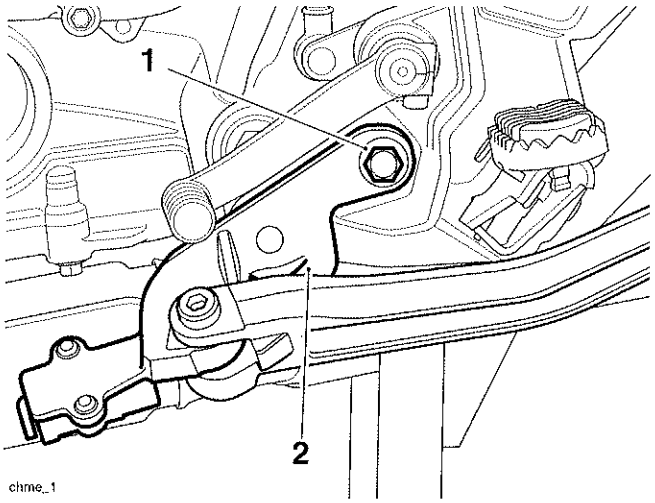


1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

Note:

- **Do not allow the side stand to hang on the harness for the side stand switch.**
- **Note the routing of the harness for the side stand switch for installation.**

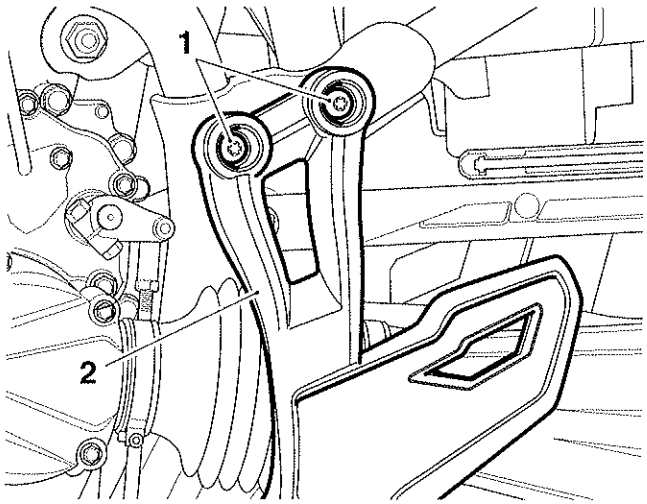
5. Release the remaining fixing, detach the side stand and position aside.



chme_1

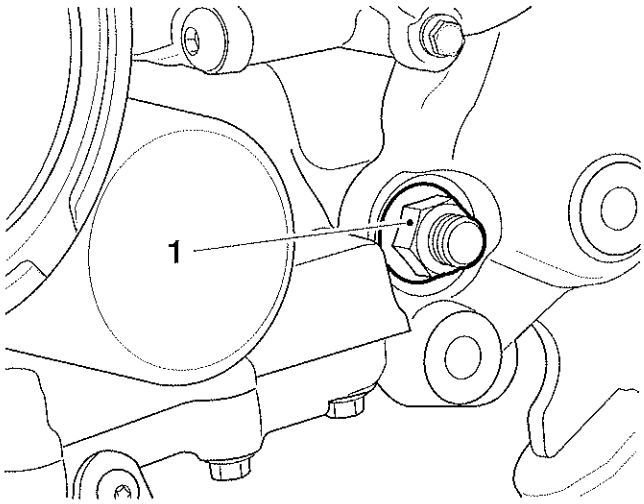
1. **Fixing**
2. **Side stand**

6. Release the fixings and remove the left hand control plate.



1. **Fixings**
2. **Control plate**

7. Remove and discard the lock nut for the lower crankcase mounting bolt.



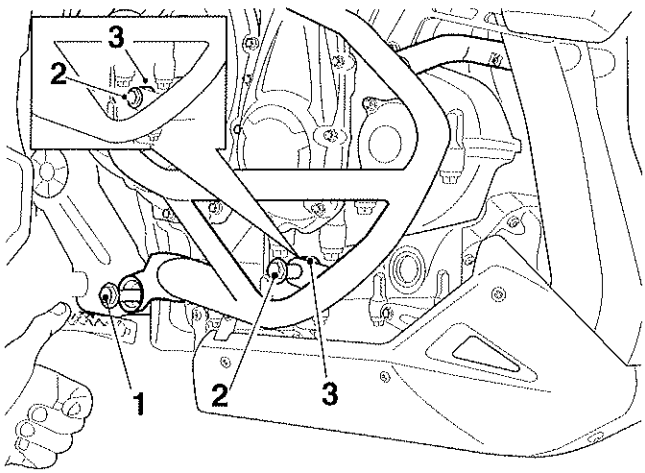
1. **Lock nut**

8. While holding down the rear brake pedal, remove the lower crankcase mounting bolt.

Note:

- **Note that there is a 13 mm spacer between the right hand engine bar's centre mounting and the engine for installation.**
- **Note that the radiator mounting bracket is positioned between the engine bar and the engine for installation.**

9. Remove the centre mounting bolt and collect the 13 mm spacer from the centre mounting.

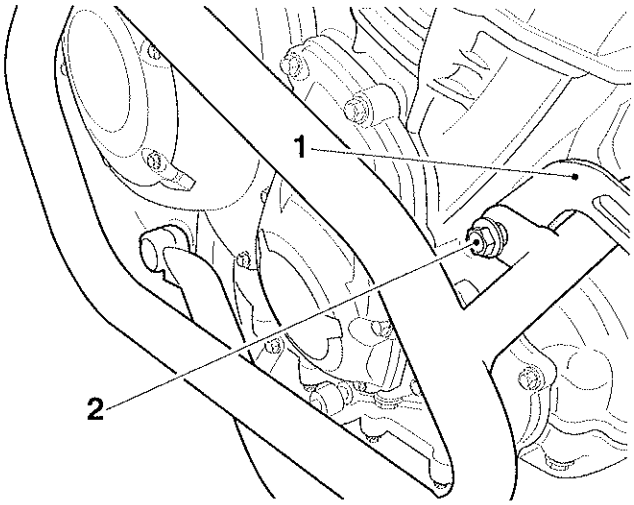


1. **Lower crankcase mounting bolt**
2. **Centre mounting bolt**
3. **Spacer, 13 mm**

Note:

- **Note that the radiator mounting bracket is positioned between the engine bar and the engine for installation.**

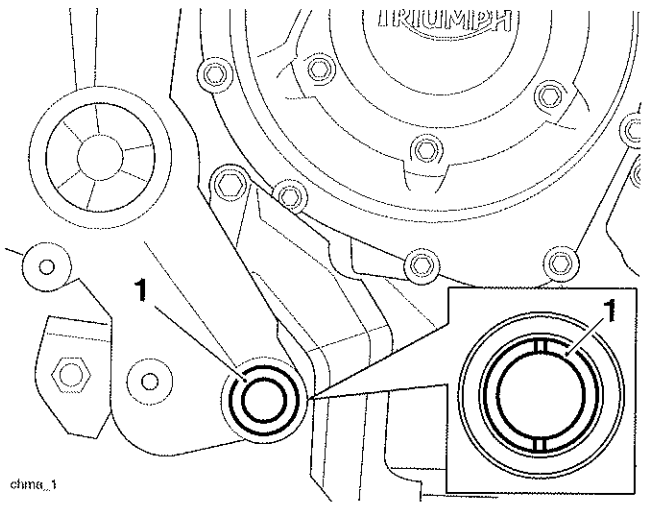
10. Release the upper mounting bolt and remove the left hand engine bar and link bar assembly.



1. **Radiator mounting bracket**
2. **Upper mounting bolt**

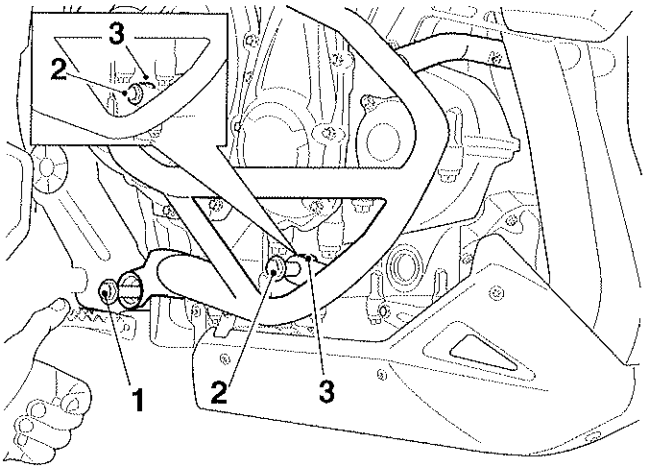
Installation

1. Using tool Engine Mounting Adjuster Wrench T3880377, tighten the lower crankcase adjuster to **5 Nm**.



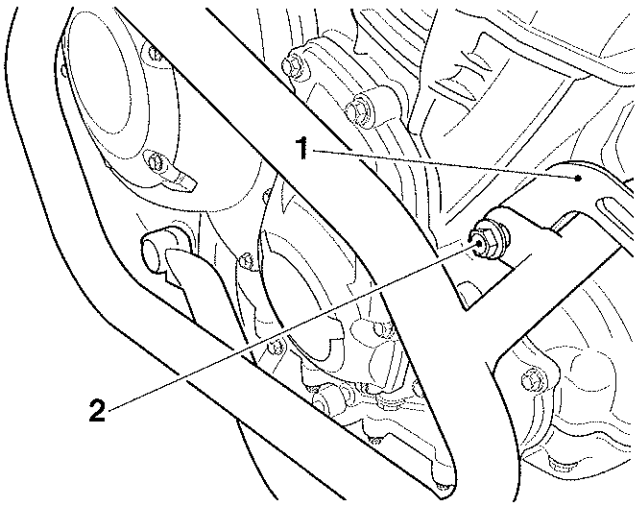
1. **Adjuster**

2. Align the right hand engine bar and link bar assembly to the engine.
3. While holding down the rear brake pedal, fit the lower crankcase mounting bolt through the rear mounting of the engine bar, frame and lower crankcase. Fit a new lock nut but do not fully tighten at this stage.
4. Position the 13 mm spacer between the centre mounting and the engine as noted for removal. Fit the M8 x 33 mm bolt, do not fully tighten at this stage.



1. **Lower crankcase mounting bolt**
2. **Bolt, M8 x 33 mm**
3. **Spacer, 13 mm**

5. Ensure that the radiator mounting bracket is between the upper mounting for the engine bar and the engine as noted for removal. Fit a M8 x 25 mm bolt, do not fully tighten at this stage.



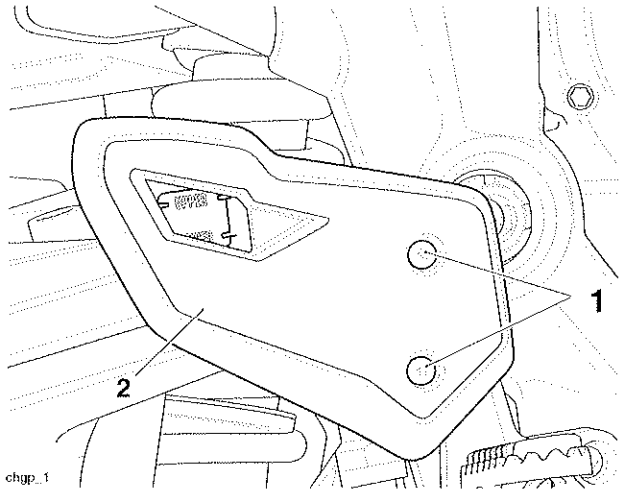
1. **Radiator mounting bracket**
2. **Bolt, M8 x 25 mm**

6. Tighten the lower crankcase mounting lock nut to **105 Nm**.
7. Tighten the centre and upper mounting bolts for the engine bar to **23 Nm**.

Note:

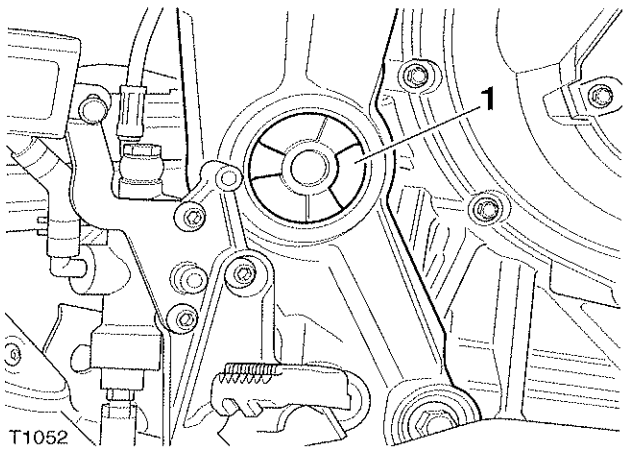
- **Because the lower crankcase mounting bolt had been removed and refitted, the swinging arm's right hand pivot bolt must be re-torqued.**

8. Release the fixings and remove the right hand heel guard.



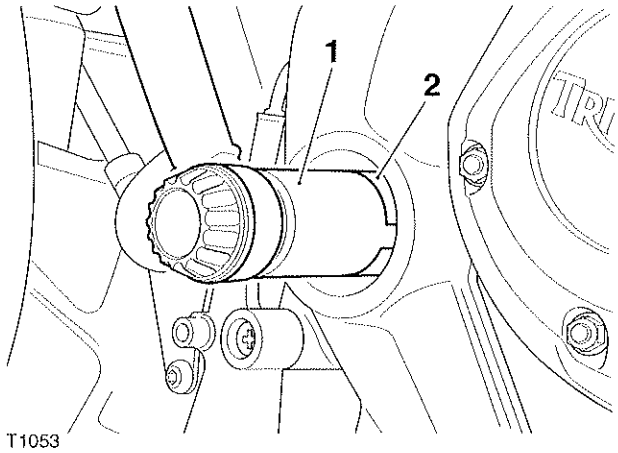
1. Fixings
2. Heel guard

9. Carefully remove the cover from the swinging arm's right hand pivot pin.



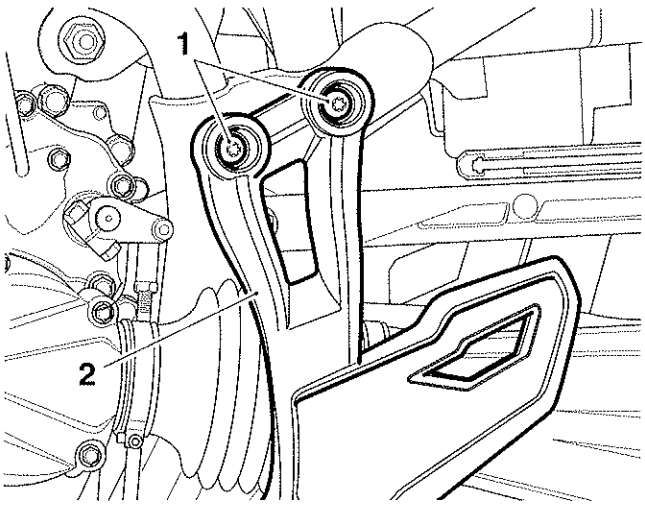
1. Cover

10. Using the service tool Lock Ring Wrench, 38 mm T3880062, remove the locking ring from the right hand pivot pin.



1. Lock Ring Wrench, 38 mm T3880062
2. Locking ring

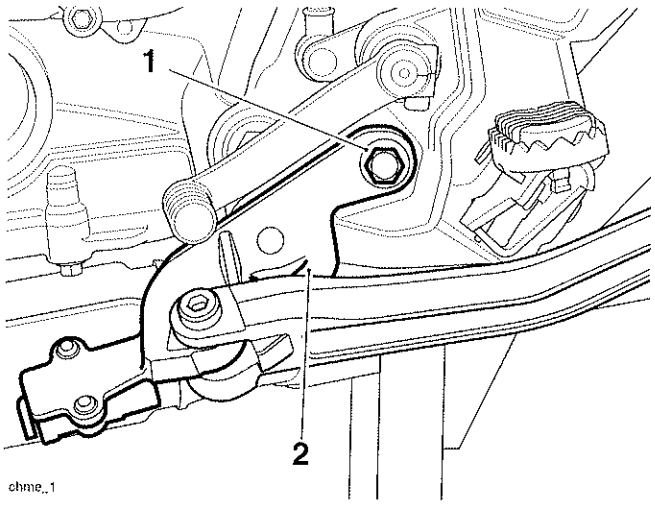
11. Tighten the right hand pivot bolt to **45 Nm**.
12. Lubricate the threads of the locking ring with a smear of proprietary high temperature copper based grease then fit to the right hand pivot pin and tighten to **110 Nm**.
13. Refit the cover to the swinging arm's right hand pivot pin.
14. Refit the right hand heel guard and tighten its fixings to **7 Nm**.
15. Align the left hand control plate to the frame and fit the two upper fixings. Do not fully tighten at this stage.



1. Fixings
2. Control plate

16. Route the harness for the side stand switch as noted for removal.

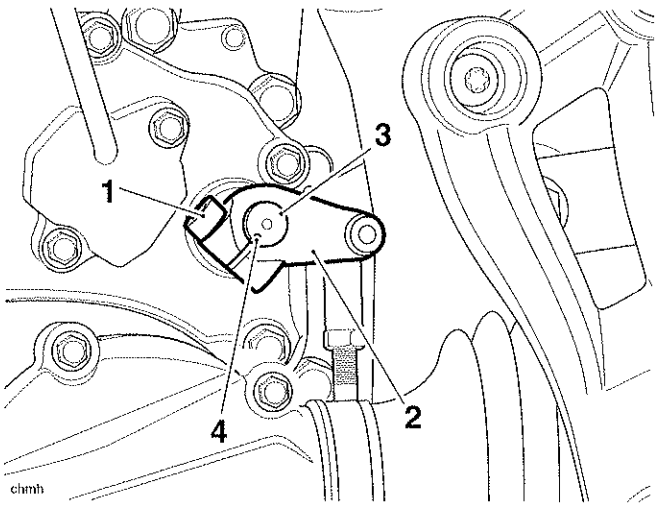
17. Align the side stand to the frame and fit its rear fixing only. Do not fully tighten at this stage.



chme_1

1. **Rear fixing**
2. **Side stand**

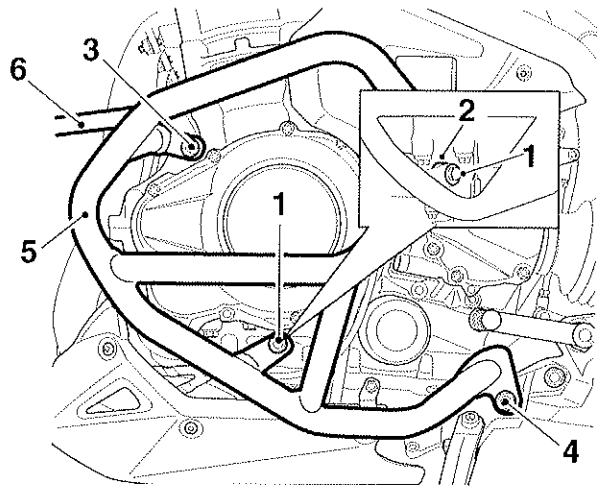
18. Tighten the upper fixings for the left hand control plate to **18 Nm**.
19. Fit the transmission linkage to the gear change mechanism as noted for removal.
20. Fit the pinch bolt and tighten it to **9 Nm**.



chmh

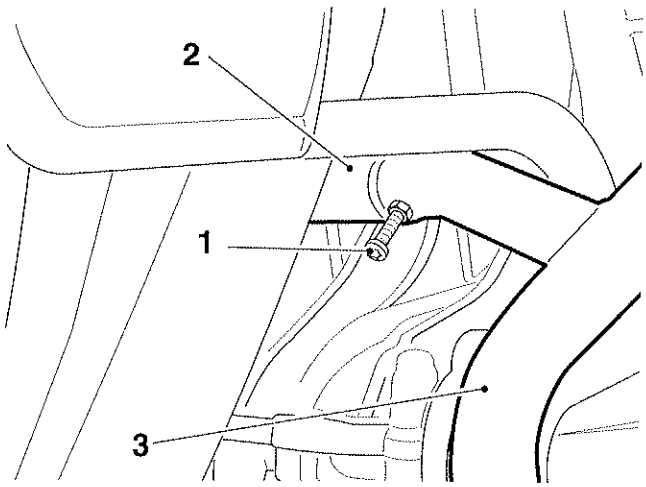
1. **Pinch bolt**
2. **Transmission linkage**
3. **Gear change mechanism**
4. **Punch mark**

21. Align the left hand engine bar to the link bar and engine.
22. Ensure that the radiator mounting bracket is between the upper mounting for the engine bar and the engine. Fit the M8 x 25 mm bolt, do not fully tighten at this stage.
23. Position the 25 mm spacer between the centre mounting and the engine as noted for removal. Fit the M8 x 45 mm bolt, do not fully tighten at this stage.
24. Fit the side stand bolt to the lower mounting for the engine bar. Do not fully tighten at this stage.



1. **Bolt, M8 x 45 mm**
2. **Spacer, 25 mm**
3. **Bolt, M8 x 25 mm**
4. **Side stand bolt**
5. **Engine bar, left hand side**
6. **Radiator mounting bracket**

25. Refit the fixing securing the left hand engine bar to the link bar. Do not fully tighten at this stage.
26. Loosen the fixing securing the right hand engine bar to the link bar.



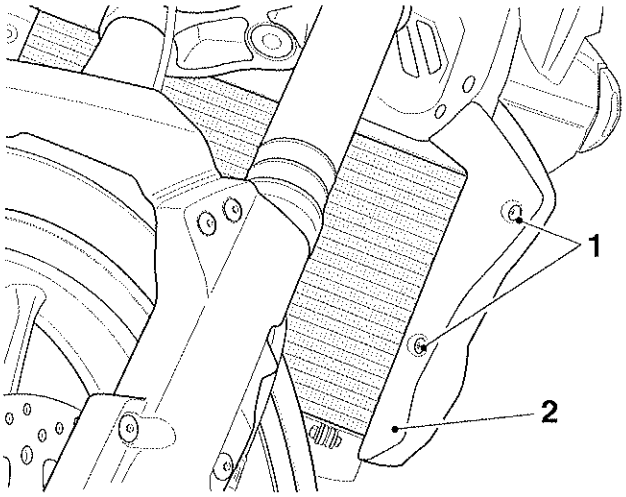
1. **Fixing**
2. **Link bar**
3. **Engine bar, left hand side**

27. Tighten the side stand bolts to **70 Nm**.
28. Tighten the engine bar upper mounting bolt to **18 Nm**.
29. Tighten the engine bar centre mounting bolt to **18 Nm**.
30. Position the link bar equally between the left hand and right hand engine bars. Tighten the fixings to **5 Nm**.
31. Remove the motorcycle from the paddock stand and support it on its side stand.

Radiator Infill Panel

Removal

1. Remove the fuel tank infill panels (see page *17-22*).
2. Remove the two fixings securing the radiator infill panel to the side fairings.



1. Fixings
2. Infill panel, left hand side shown

3. Raise the infill panel up to disengage its locating lug from the radiator cowl and remove the panel.

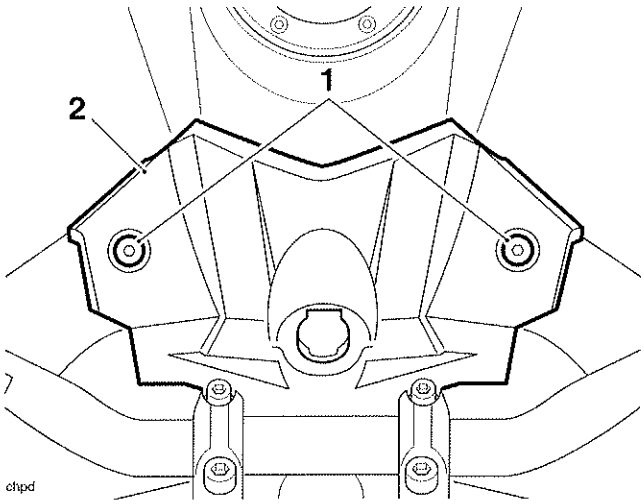
Installation

1. Align the locating lug on the infill panel to its slot in the radiator cowl. Secure with the two fixings and tighten to **3 Nm**.
2. Refit the fuel tank infill panels (see page *17-23*).

Fuel Tank Infill Panels

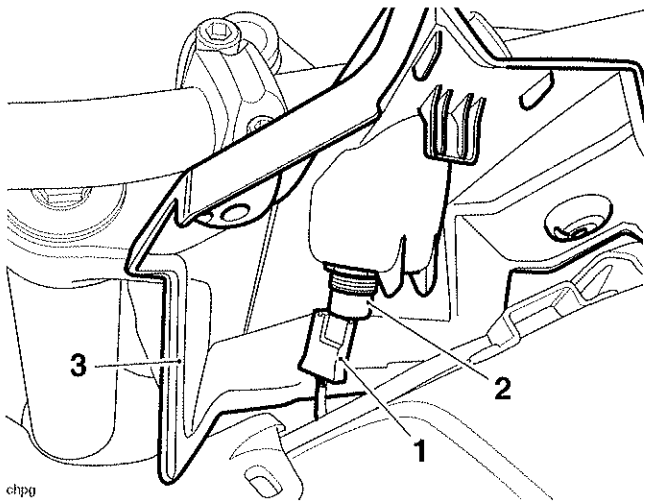
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Release the fixings and lift the front panel upwards to detach it from the fuel tank.



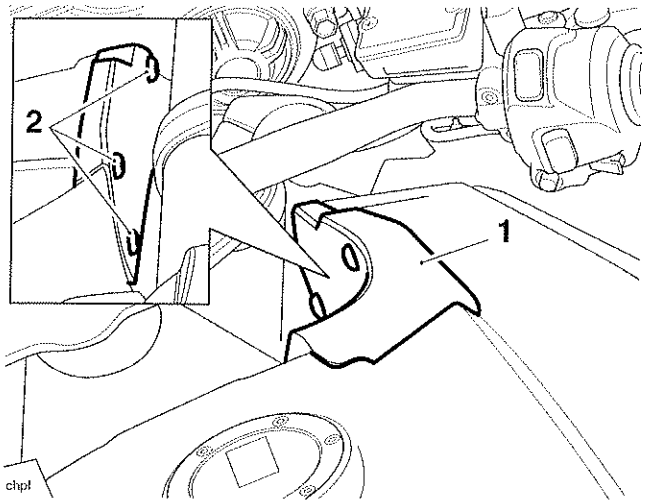
1. Front panel
2. Fixings

4. Disconnect the electrical connector from the auxiliary socket and remove the front panel.



1. Electrical connector
2. Auxiliary socket
3. Front panel

5. Release the three fixings and remove the fuel tank infill panel.

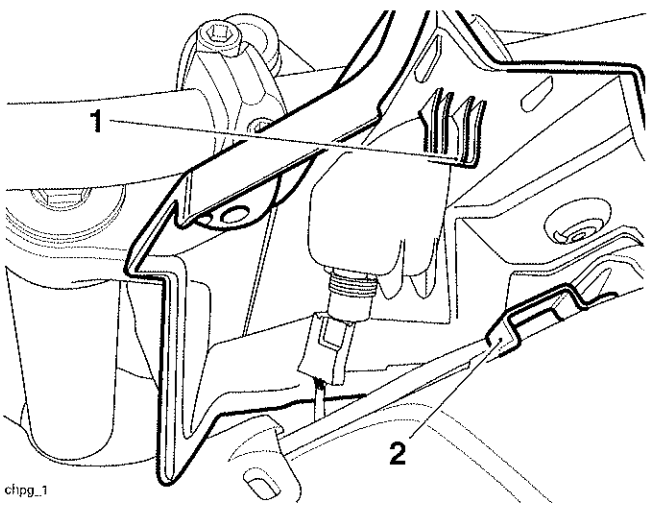


1. **Fixings**
2. **Infill panel, right hand side shown**

6. Repeat step 5 for the other infill panel.

Installation

1. Position the fuel tank infill panel to the fuel tank and tighten its fixings to **3 Nm**.
2. Repeat step 1 for the other infill panel.
3. Connect the electrical connector to the auxiliary socket on the front panel.
4. Position the front panel onto the fuel tank, ensuring that its locating lug fits into its bracket on the fuel tank.



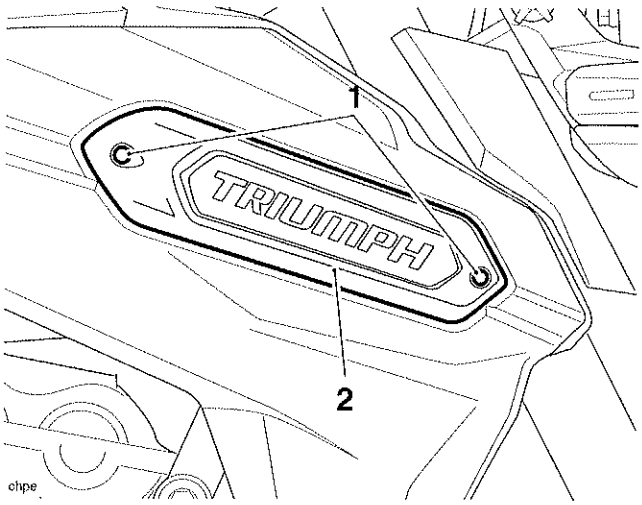
1. **Locating lug**
2. **Bracket**

5. Fit the fixings for the front panel and tighten them to **3 Nm**.

Side Fairings

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank infill panels (see page *17-22*).
4. Remove the radiator infill panels (see page *17-22*).
5. Release the torx screws and remove the badge housing from the side fairings. Discard the torx screws.

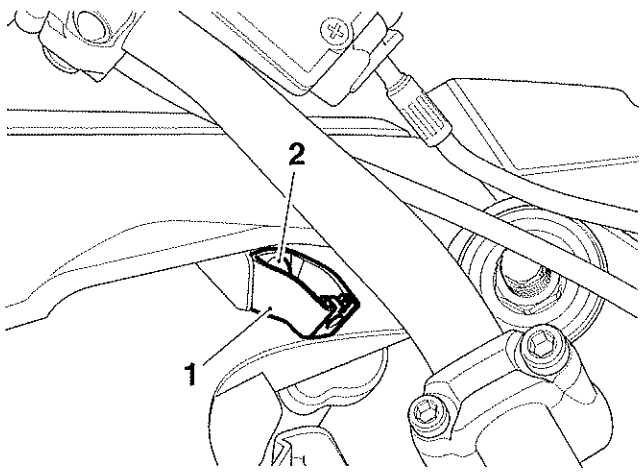


1. **Torx screws**
2. **Badge housing, right hand side shown**

Note:

- **Note the orientation of the mounting bracket for the fuel tank infill panels for installation.**

6. Release the fixing and remove mounting bracket for the fuel tank infill panel.

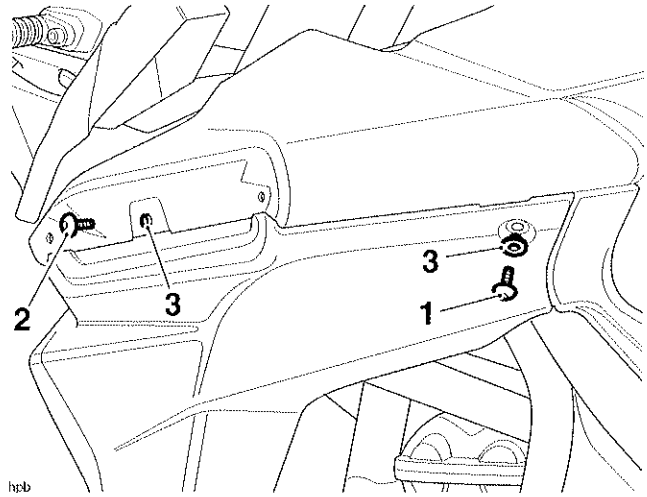


1. **Mounting bracket**
2. **Fixing**

Note:

- **Note that there are flanged sleeves behind the fixings. Note their orientation for installation.**

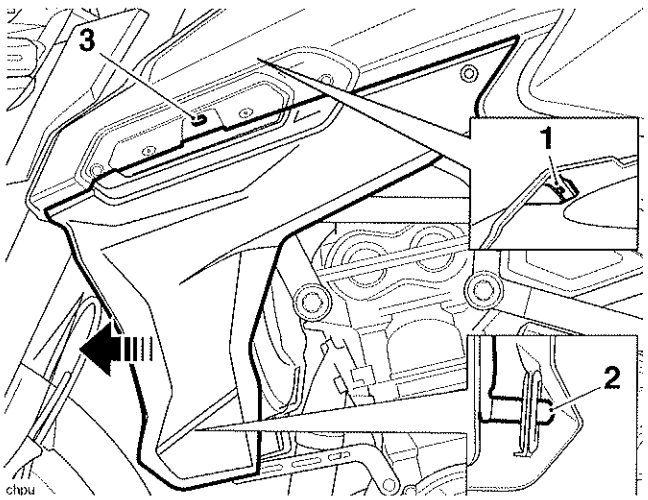
7. Release the two fixings and collect the flanged sleeve for the rear fixing.



hpb

1. **Rear fixing**
2. **Front fixing**
3. **Flanged sleeves**

8. Raise the upper edge of the side fairing to release its upper mounting from the fuel tank.
9. Move the side fairing forward to disengage it from the locating lug on the radiator. Collect the flanged sleeve for the front fixing from inside the side fairing.

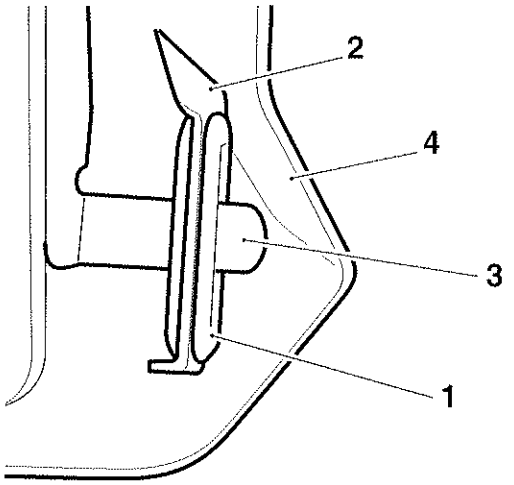


chpu

1. **Upper mounting**
2. **Locating lug**
3. **Flanged sleeve**

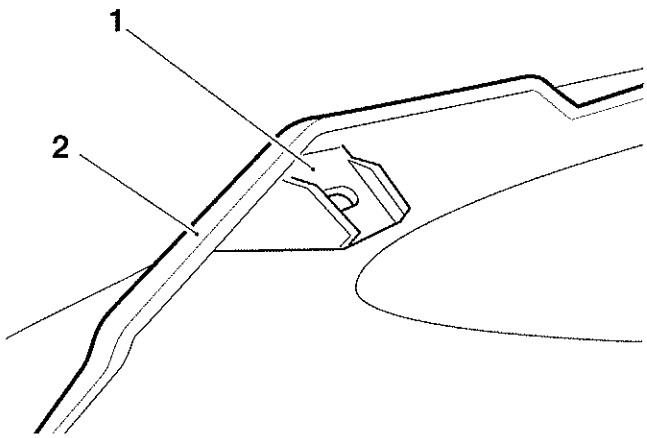
Installation

1. Fit the flanged sleeve for the front mounting to the inside of the side fairings as noted for removal.
2. Ensure that the rubber grommet is fitted to its bracket on the lower fairing.
3. Align the slot with the rubber grommet in the lower fairing to its locating lug on the radiator mounting bracket.



1. **Rubber grommet**
2. **Bracket**
3. **Locating lug**
4. **Lower fairing**

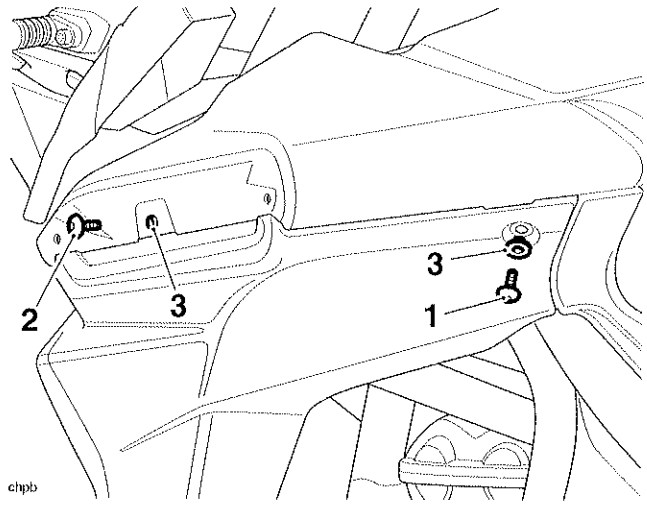
4. Position the upper fairing's mounting to its mounting bracket on the fuel tank.



1. **Mounting**
2. **Upper fairing**

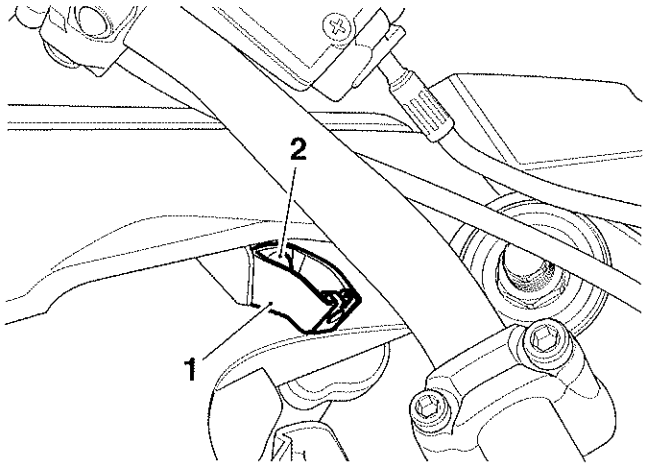
5. Fit the flanged sleeve for the rear fixing as noted for removal.

6. Fit the front and rear fixings and tighten to **3 Nm**.



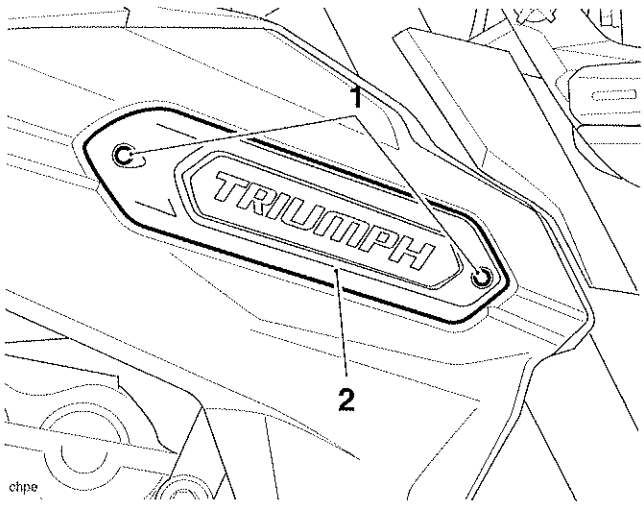
1. **Rear fixing**
2. **Front fixing**
3. **Flanged sleeves**

7. Fit the mounting brackets for the fuel tank infill panels as noted for removal and tighten the fixing to **3 Nm**.



1. **Mounting bracket, left hand side shown**
2. **Fixing**

8. Fit the badge housing to the side fairings and tighten the new torx screws to **3 Nm**.



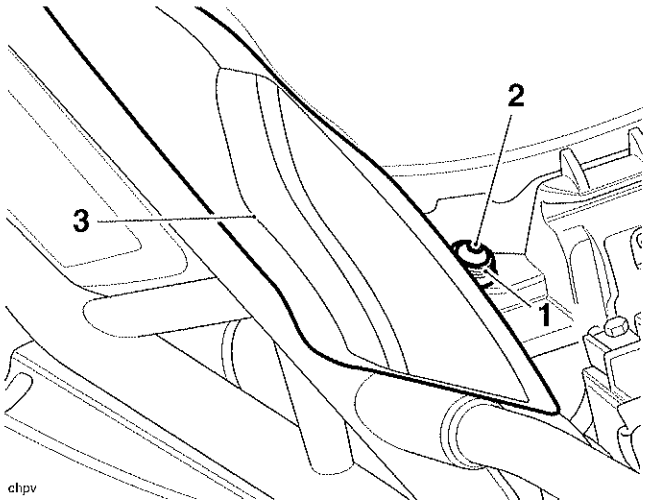
1. **Torx screws**
2. **Badge housing, right hand side shown**

9. Refit the radiator infill panels (see page *17-22*).
10. Refit the fuel tank infill panels (see page *17-23*).
11. Reconnect the battery, positive (red) lead first.
12. Refit the rider's seat (see page *17-16*).

Seat Infill Panel

Removal

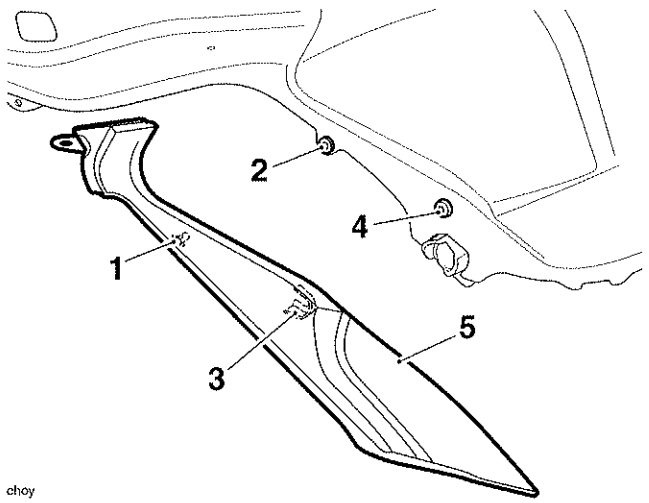
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the side fairing (see page *17-23*).
4. Release the fixing securing the rear of the seat infill panel to the frame. Remove the flanged sleeve.



chpv

1. Fixing
2. Flanged sleeve
3. Seat infill panel, left hand side shown

5. Carefully pull the front of the infill panel away from the fuel tank to release its front locating lug from its rubber grommet on the fuel tank.
6. Slide the infill panel rearwards to release the centre locating lug from its mounting screw on the fuel tank and remove the panel.



choy

1. Front locating lug
2. Rubber grommet
3. Centre locating lug
4. Mounting screw
5. Seat infill panel, left hand side shown

Installation

1. Align the centre locating lug on the infill panel to the rear of its mounting screw on the fuel tank. Move the infill panel forward to fully engage the centre lug to the mounting screw.
2. Align the front locating lug to its rubber grommet on the fuel tank and push it fully in.
3. Fit the flanged sleeve and fixing to the rear of the seat infill panel and tighten to **3 Nm**.
4. Fit the side fairings (see page *17-24*).
5. Reconnect the battery, positive (red) lead first.
6. Fit the rider's seat (see page *17-16*).

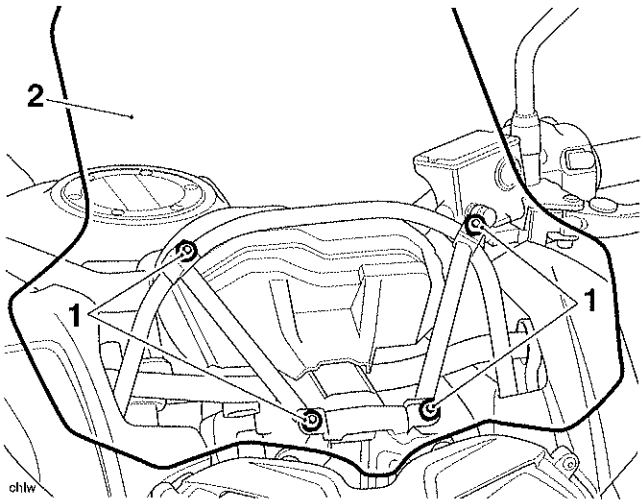
Windscreen

Removal

Caution

Care must be taken when removing or installing the windscreen. Damage to the windscreen surfaces could result from inadequate care during the removal or installation process.

1. Release the four fixings, remove the windscreen and place it on a clean soft surface.



1. Fixings
2. Windscreen

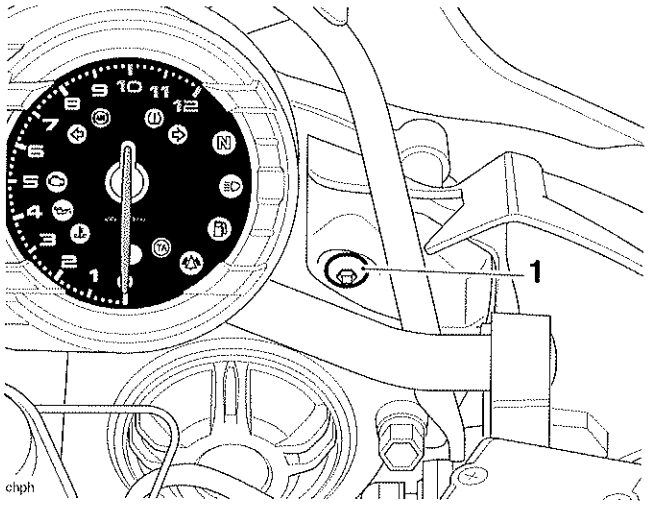
Installation

1. Fit the windscreen to its mounting frame and tighten its fixings to **4 Nm**.

Cockpit Cover and Infill Panel Assembly

Removal

1. Remove the fixing securing the cockpit infill panels to the headlight.

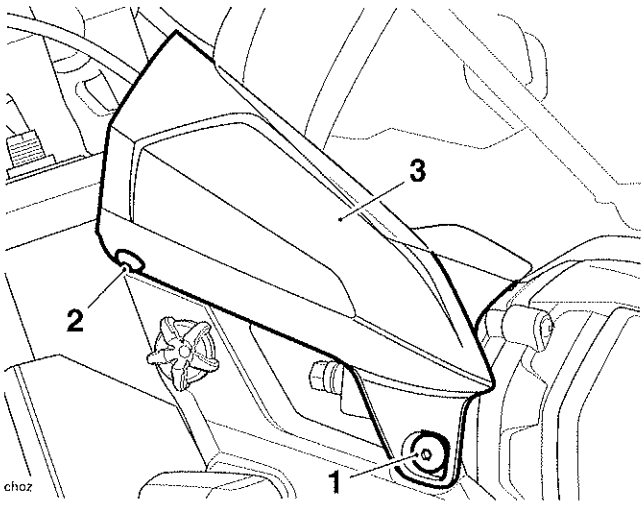


1. Fixing
2. Cockpit infill panel, right hand side shown

Note:

- **The cover and infill panel will separate when removed from the cockpit.**

2. Release the two fixings and remove the cover and infill panel assembly.



1. Front fixing
2. Rear fixing
3. Cover, right hand side shown

Installation

1. Fit the infill panel into the cover.
2. Fit the cover and infill panel assembly to the cockpit and:
   - tighten the front fixing to **4 Nm**;
   - tighten the rear fixing to **3 Nm**;
   - tighten the infill panel to the headlight fixing to **3 Nm**.

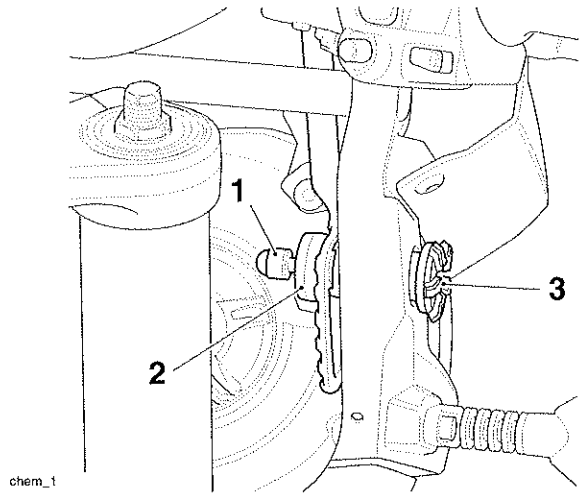
Headlight Support

Removal

Note:

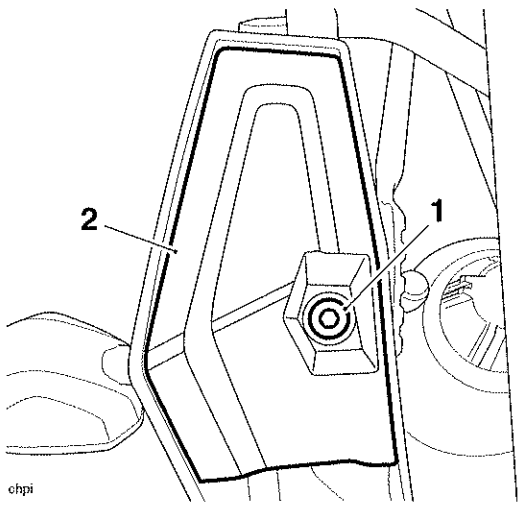
- **Note the position of the windscreen adjustment for removal.**

1. Release the lock nut then unscrew and remove the windscreen adjustment block and adjuster knob assembly.



1. **Lock nut**
2. **Adjuster block**
3. **Adjuster knob**

2. Remove the cockpit cover and infill panel assembly (see page *17-27*).
3. Remove the front indicator (see page *18-20*).
4. Release the fixing and remove the infill panel for the high mudguard. Discard the fixing.

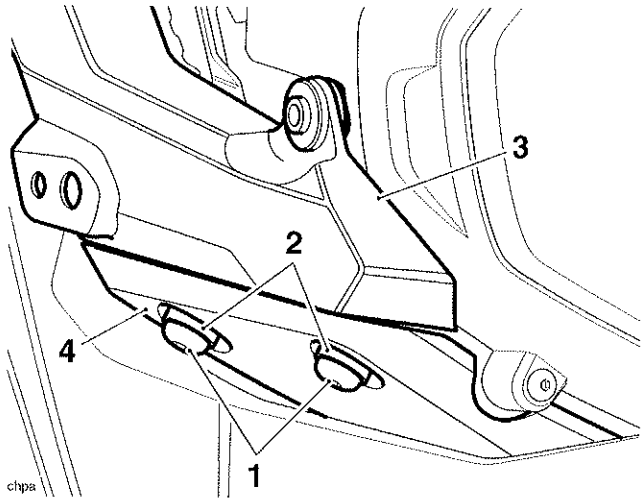


1. **Fixing**
2. **Infill panel**

Note:

- **Note the orientation of the flanged sleeves for installation.**

5. Remove the screws, lock nuts and flanged sleeves securing the headlight support to the chin panel.

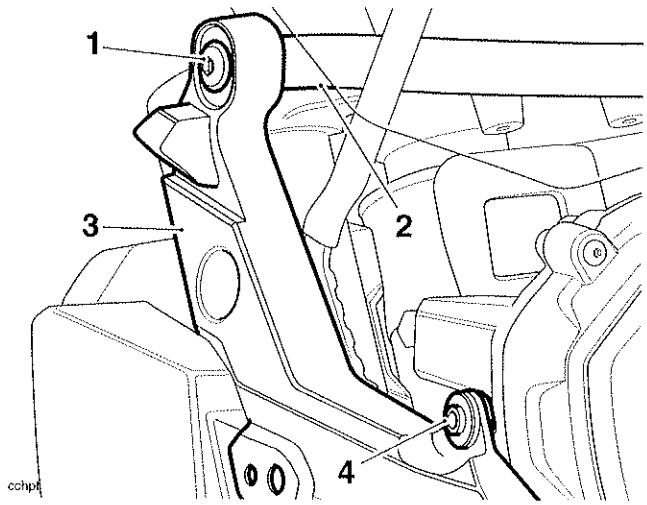


1. **Screws**
2. **Flanged sleeves**
3. **Headlight support**
4. **Chin panel**

Note:

- **Note the orientation of the flanged sleeve at the front of the headlight support for installation.**

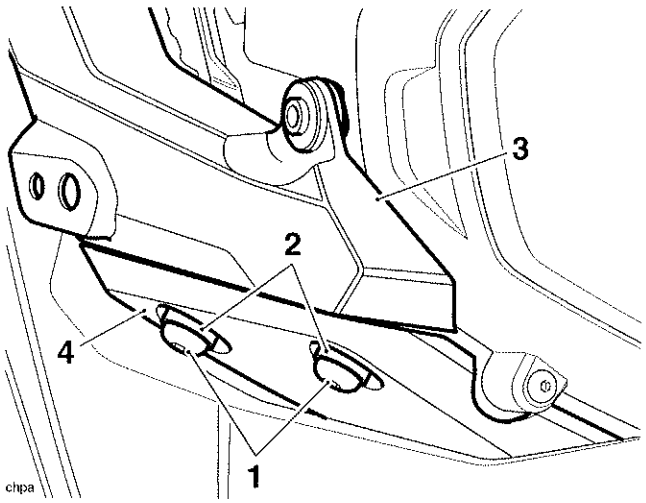
6. Release the fixing securing the headlight support the the cockpit frame and remove the headlight support. If necessary, collect the flanged sleeve.



1. **Fixing**
2. **Cockpit frame**
3. **Headlight support**
4. **Flanged sleeve**

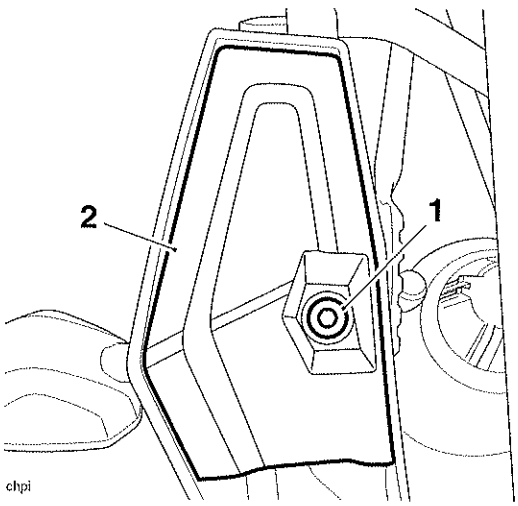
Installation

1. If removed, refit the flanged sleeve to the front of the headlight support, as noted for removal.
2. Position the headlight support to the cockpit and fit the fixing. Do not fully tighten at this stage.
3. Secure the headlight support to the chin panel using the screws, lock nuts and flanged sleeves as noted for removal. Do not fully tighten the screws and lock nuts at this stage.



1. **Screws**
2. **Flanged sleeves**
3. **Headlight support**
4. **Chin panel**

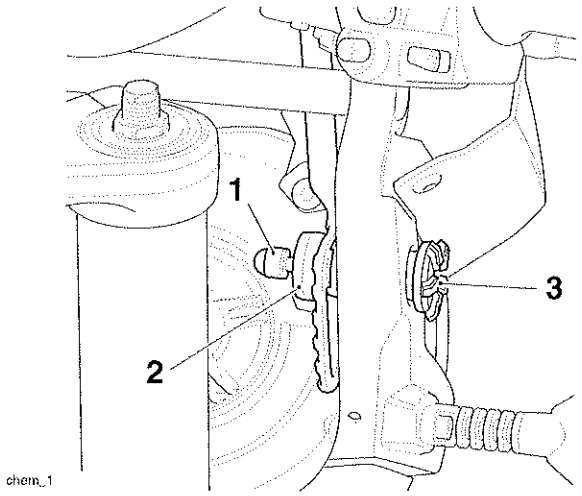
4. Fit the infill panel to the high mudguard and tighten its new fixing to **4 Nm**.



1. **Fixing**
2. **Infill panel**

5. Tighten the fixings securing the headlight support to the chin panel to **5 Nm**.
6. Tighten the fixing securing the headlight support to cockpit frame to **5 Nm**.
7. Refit the front indicator (see page *18-20*).

8. Refit the cockpit cover and infill assembly (see page *17-28*).
9. Refit the windscreen adjustment block, adjuster knob assembly and its lock nut.



1. **Lock nut**
2. **Adjuster block**
3. **Adjuster knob**

10. Adjust the windscreen position to the noted position for removal.

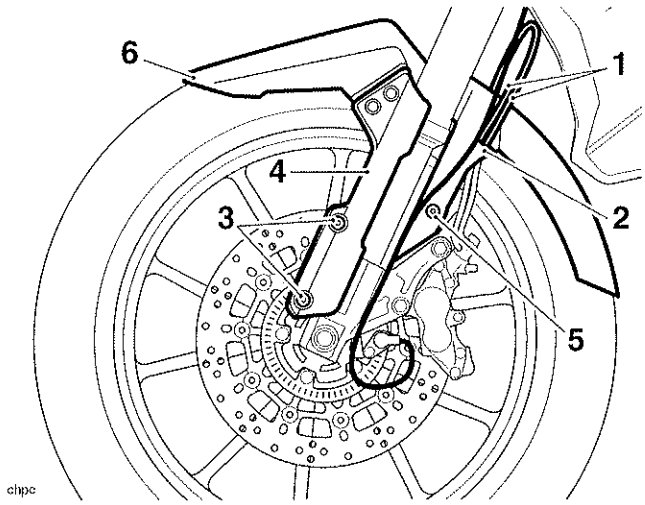
Front Mudguard

Removal

Note:

- **Note the position of the front brake lines for installation.**

1. Detach the front brake hose(s) from their locating lugs on either side of the front mudguard.
2. Remove the shouldered bolts securing the front fork protectors to the front forks.
3. While supporting the front mudguard and fork protector assembly, remove the screws securing the front mudguard to the forks.



1. **Brake hoses**
2. **Locating lug**
3. **Shouldered bolts**
4. **Front fork protector, left hand side shown**
5. **Screw, left hand side shown**
6. **Front mudguard**

Note:

- **Note the routing of the front brake hoses for installation.**

4. Carefully manoeuvre the mudguard and fork protector assembly towards the front to remove it from the motorcycle.

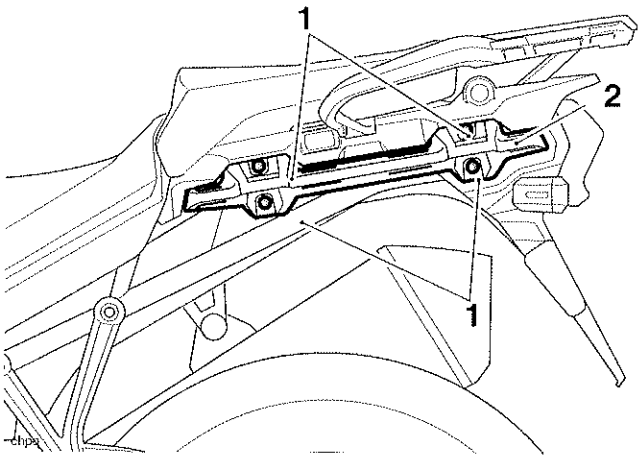
Installation

1. Position the front mudguard and fork protector assembly to the front forks. Ensure that the front brake hoses are routed as noted for removal.
2. Fit the shouldered bolts to secure the fork protectors to the fork. Do not tighten the bolts at this stage.
3. Fit the screws to secure the front mudguard to the front forks. Tighten all the fixings to **5 Nm**.
4. Position the front brake hose(s) to their locating lugs on the mudguard as noted for removal.

Pannier Rails

Removal

1. Remove the fixings and their washers then remove the pannier rail.



1. **Fixings**
2. **Pannier rail**

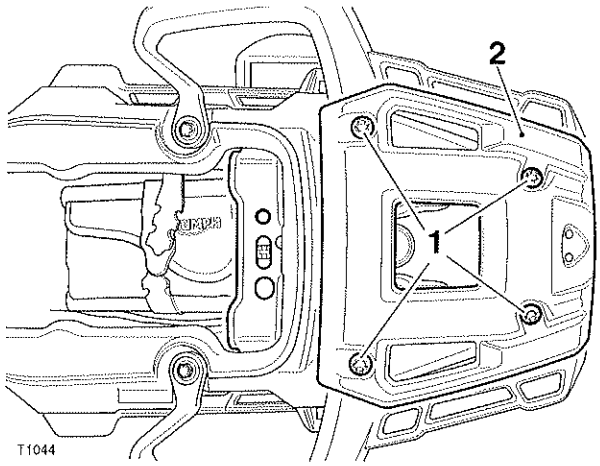
Installation

1. Align the pannier rail to the frame.
2. Fit the fixing with their washers and tighten to **27 Nm**.

Luggage Rack

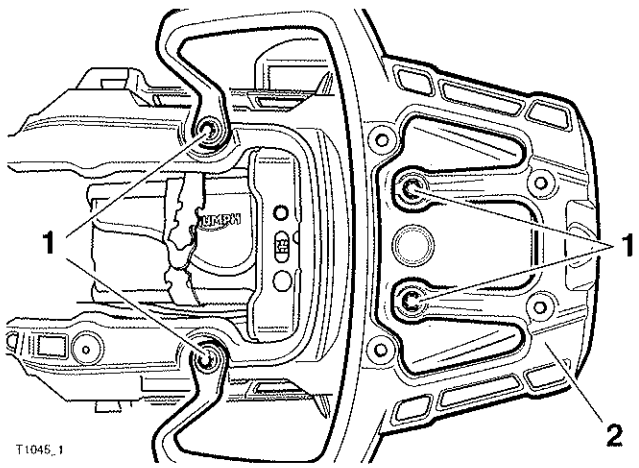
Removal

1. Remove the rear seat (see page *17-15*).
2. Remove the four bolts and lock nuts and remove the luggage rack cover. Discard the lock nuts.



1. Rack cover
2. Fixings

3. Release the four fixings and remove the luggage rack.



1. Fixings
2. Luggage rack

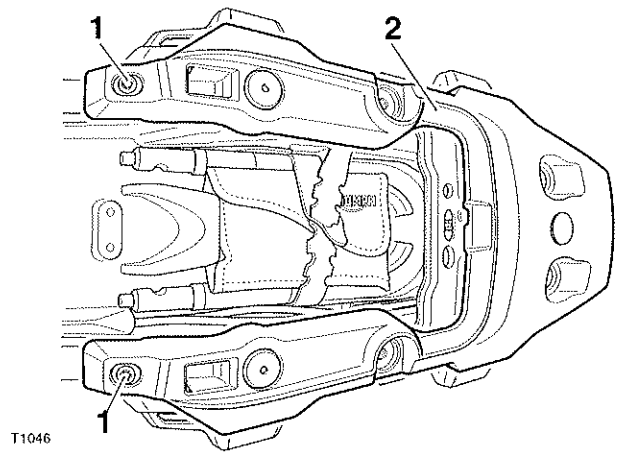
Installation

1. Position the luggage rack to the motorcycle.
2. Refit the four fixings and tighten to **27 Nm**.
3. Position the cover to the luggage rack. Fit the bolts and new lock nuts and tighten to **7 Nm**.
4. Refit the rear seat (see page *17-15*).

Rear Panel

Removal

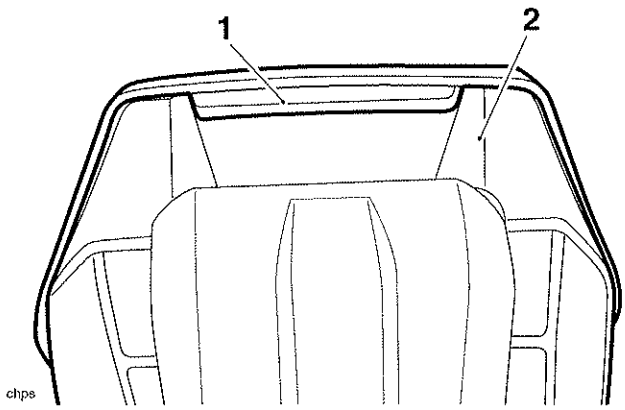
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the luggage rack (see page *17-32*).
4. Remove the fixings at the front of the rear panel then slide the rear panel rearwards for complete removal.



1. Fixings
2. Rear panel

Installation

1. Fit the rear panel to the motorcycle. Ensure that the lip at the rear of the panel is located over the rear mudguard, as shown below.



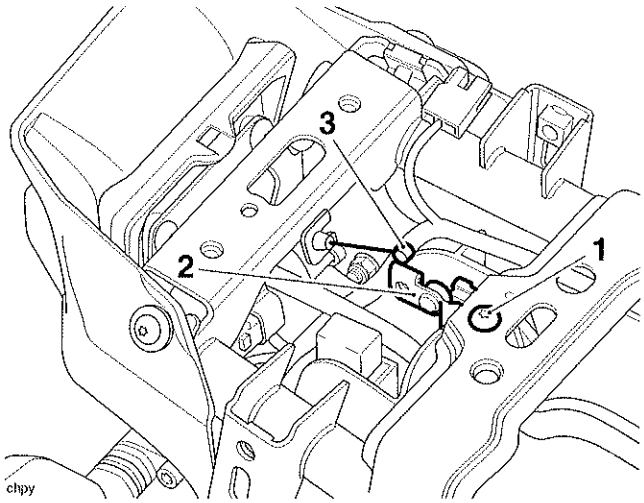
1. Lip, rear panel
2. Rear mudguard

2. Tighten the front fixings to **7 Nm**.
3. Refit the luggage rack (see page *17-32*).
4. Reconnect the battery, positive (red) lead first.
5. Refit the rider's seat (see page *17-16*).

Rear Mudguard

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the pannier rails (see page *17-31*).
4. Remove the rear panel (see page *17-32*).
5. Release the fixing and detach the seat latch from the frame. Discard the fixing.
6. Detach the seat latch cable from the seat's latch.



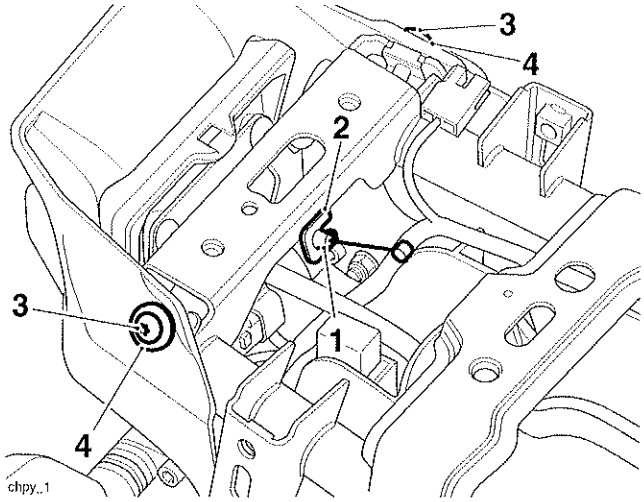
1. **Fixing**
2. **Seat latch**
3. **Cable**

7. Detach the seat latch outer cable from the subframe.

Note:

- **Note that the fixings for the top of the rear mudguard are fitted with washers. The lower two fixings are not fitted with washers.**

8. Remove the two fixings and washers from the top of the rear mudguard. Discard the fixings.

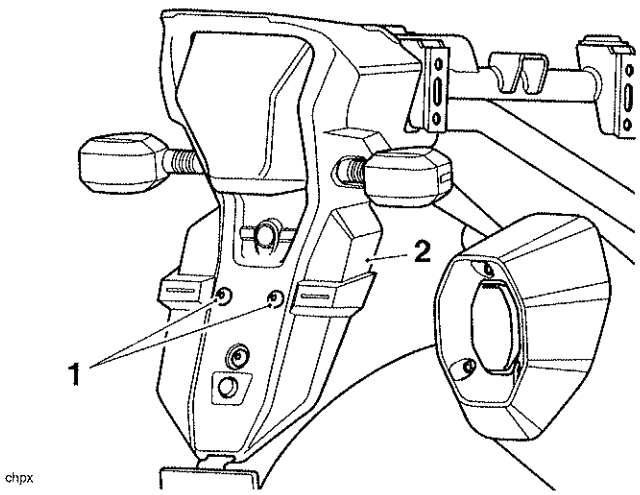


1. **Outer cable**
2. **Subframe**
3. **Fixings**
4. **Washers**

Note:

- **Note the position of the adjustable bracket for the rear reflector. It may have the under seat tray between it and the rear mudguard.**

9. Remove the two fixings shown below and detach the rear mudguard from the frame. Do not allow the rear mudguard to hang from the rear light and direction indictor harnesses.



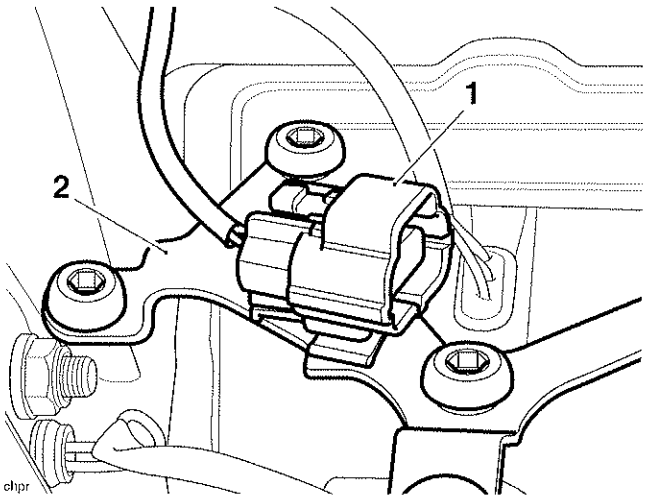
1. **Fixings**
2. **Rear mudguard**

Note:

- **The right hand indicator wiring is identified by a red tape on it.**

10. Disconnect the electrical connectors for the rear light and direction indicators.

11. Detach the rear light connector block from the rear light bracket and remove the rear mudguard.



1. Connector block
2. Bracket

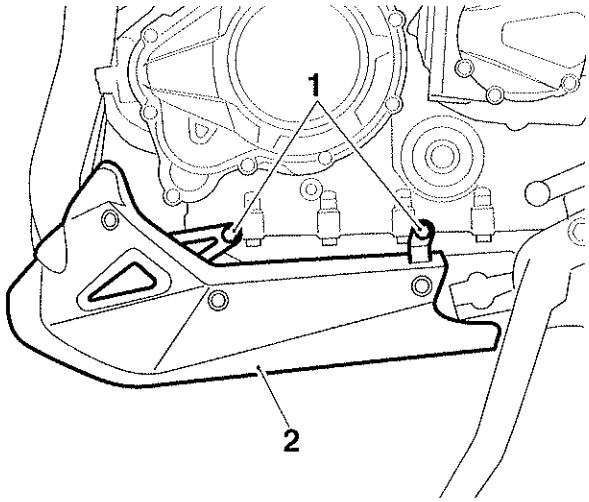
Installation

1. Attach the rear light connector block to the rear light bracket.
2. Connect the electrical connectors for the rear light and indicators as noted for removal.
3. Align the rear mudguard to the subframe while routing the seat latch cable as noted for removal.
4. Fit new fixings with the original washers to the top of the rear mudguard. Do not fully tighten at this stage.
5. Fit the lower fixings and tighten to **5 Nm**.
6. Tighten the fixings at the top of the rear mudguard to **7 Nm**.
7. Attach the seat latch outer cable to the subframe.
8. Attach the seat latch inner cable to the seat's latch.
9. Fit the seat latch to the frame and tighten its new fixing to **9 Nm**.
10. Fit the rear panel (see page *17-32*).
11. Fit the pannier rails (see page *17-31*).
12. Reconnect the battery, positive (red) lead first.
13. Refit the rider's seat (see page *17-16*).

Sump Guard

Removal

1. Remove and discard the four fixings securing the sump guard mounting brackets to the engine and remove the sump guard.



1. Fixings, left hand side shown
2. Sump guard

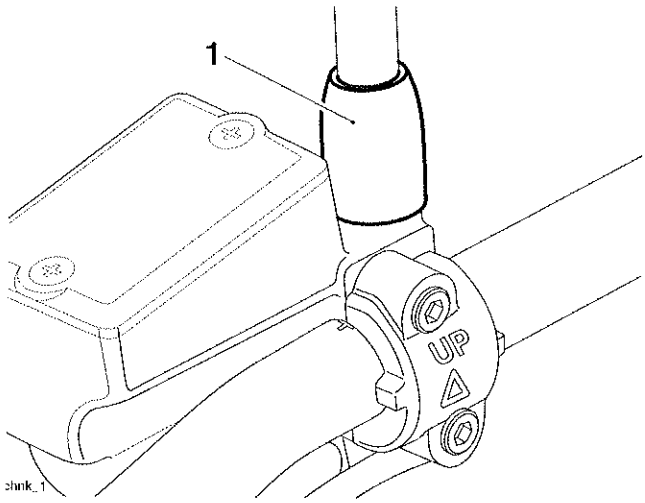
Installation

1. Align the sump guard and mounting bracket assembly to the motorcycle, secure with four new fixings and tighten to **6 Nm**.

Mirror

Removal

1. Slide the rubber cover off the mirror boss and lock nut.



1. **Rubber cover**

Note:

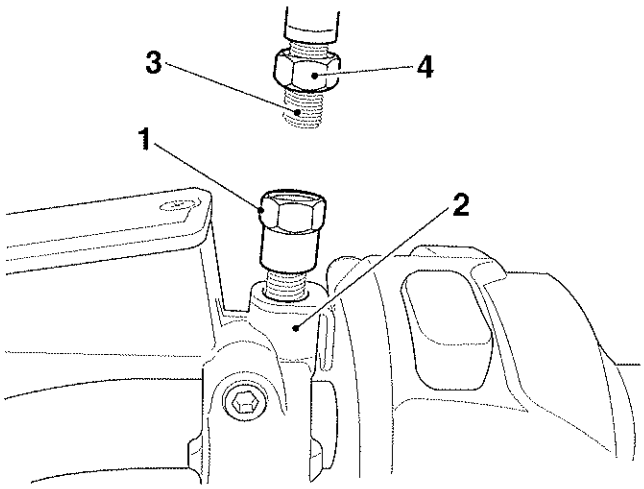
- **The mirror arm and its lock nut has a left hand thread.**

2. Loosen the lock nut and remove the mirror from the mirror boss.

Note:

- **The external thread on the mirror boss is a right hand thread.**

3. If necessary, remove the mirror boss from the master cylinder housing.



1. **Mirror boss (external right hand thread)**
2. **Master cylinder housing**
3. **Mirror arm (left hand thread)**
4. **Lock nut (left hand thread)**

Installation

Warning

If the mirror fixing is too loose, the mirror may blow back at speed. This will result in a loss of vision to the rear of the motorcycle. It is dangerous to ride a motorcycle without sufficient rearward vision.

Note:

- **The external thread on the mirror boss is a right hand thread.**

1. If removed, fit the mirror boss to the master cylinder housing and tighten to **25 Nm**.

Note:

- **The mirror arm and its lock nut has a left hand thread.**

2. Fit the mirror arm to the mirror boss, tighten by hand until the lock nut makes contact with the mirror boss. Do not fully tighten at this stage.
3. Loosen the mirror arm by one complete turn.
4. Position the mirror arm to give rear visibility in the riding position.

Caution

Use an open ended spanner to counter-hold the mirror boss as the mirror lock nut is tightened. Failure to counter-hold the boss will cause damage to the thread and the mirror to become loose.

5. Counter-hold the mirror boss and tighten the lock nut to **25 Nm**.
6. Slide the rubber cover over the lock nut and mirror boss.
7. Repeat the procedure for the other mirror.

Pannier Link Bar Adjustment - If Fitted

Check

Warning

If fitted, the two panniers are linked by a link bar to enhance stability.

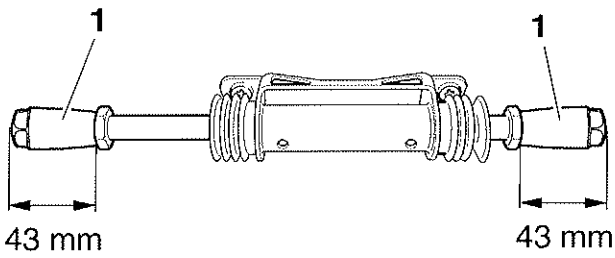
This link bar allows a small amount of sideways pannier movement, independently of the motorcycle.

Riding the motorcycle with panniers fitted and the link bar removed or incorrectly adjusted may cause the motorcycle to become unstable leading to loss of control and an accident.

The pannier link bar must be checked and if necessary adjusted:

- in accordance with the scheduled maintenance requirements (see page *2-3*);
- if the pannier link bar has been removed/replaced;
- if the pannier rails have been removed/replaced;
- if the rear footrest hangers have been removed/replaced;
- if the pannier third mounts have been removed/replaced;
- if new panniers have been fitted.

1. Remove the panniers and check that the link bar is free to move smoothly and is unobstructed. Rectify if necessary.
2. Check the length of the end caps on the pannier link. Renew the end caps if they are less than 43 mm in length.

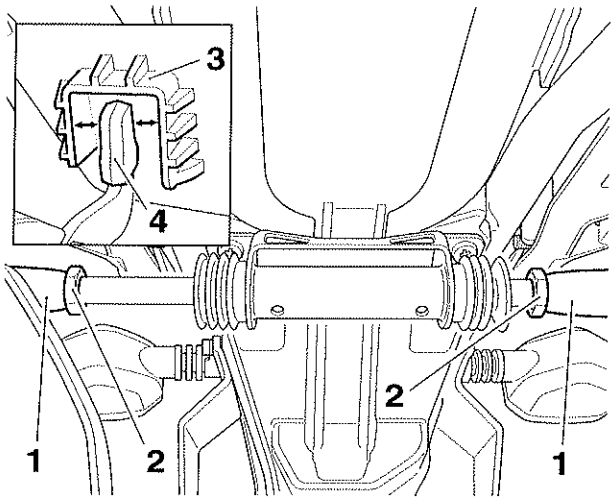


1. End caps

3. Refit the panniers and check that the third mounts are centrally located in their locating cups on each of the panniers.
4. Check that a clearance gap is visible between the pannier and the third mount.
5. If the third mounts are not central in their locating caps or there is not a visible gap between the third mounts and the pannier, adjust the pannier link bar as described on page *17-37*.

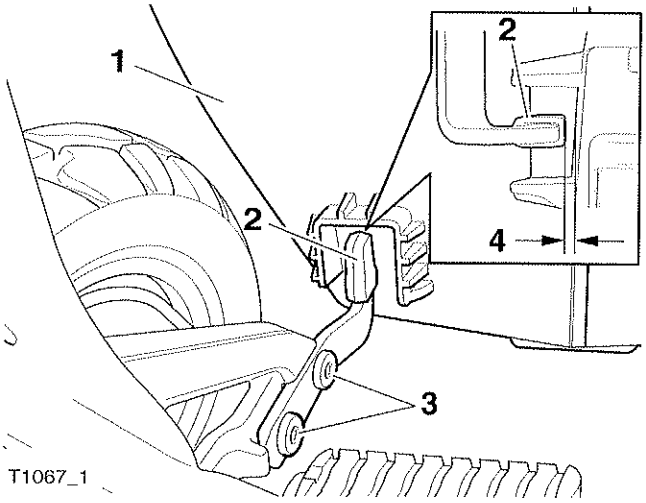
Adjustment

1. Position the motorcycle upright and on the centre stand.
2. Remove the panniers from the motorcycle.
3. Loosen the lock nuts securing the two end caps on the link bar.
4. Loosen the fixings securing the third mounts to the rear footrest hangers.
5. Refit the panniers to the motorcycle.
6. Adjust the link bar end caps evenly until the third mount rubber boots align centrally in their locating cup on the panniers, as shown below.



1. **End cap**
2. **Lock nut**
3. **Locating cup**
4. **Third mount**

7. Adjust the third mounts until a gap is visible between the pannier and the rear of the rubber boot. Tighten the screws to **8 Nm**.



1. **Pannier**
2. **Third mount**
3. **Screws, M6 x 20 mm**
4. **Visible gap**

8. Hold the link bar end caps and tighten the lock nuts to **8 Nm**.
9. Check that the link bar is free to move smoothly and is unobstructed. Rectify if necessary.

Warning

Do not ride the motorcycle with the third mounts removed or incorrectly adjusted.

Riding the motorcycle with the third mounts removed or incorrectly adjusted may cause the motorcycle to become unstable leading to loss of control and an accident.

10. Remove the motorcycle from the centre stand.

This page intentionally left blank

18 Electrical

Table of Contents

Exploded View - Instruments 18.3
Exploded View - Headlight 18.4
Exploded View - Rear Light and Reflectors 18.4
Exploded View - Direction Indicators 18.5
Front Fog Lights - If Fitted 18.6
Exploded View - Alternator and Starter Motor 18.7
Battery 18.8
- Battery Removal 18.8
- Battery Installation 18.8
- Battery Commissioning and Charging 18.9
- New Battery 18.9
- Battery Maintenance 18.10
- Battery Already in Service 18.10
- Table of Battery Charging Times 18.10

Relays 18.11
- Relay Identification 18.11

Fuses 18.11
- Fuse Identification 18.11
- Left Hand Fuse Box 18.12
- Right Hand Fuse Box 18.12
- ABS Fuse Box 18.12

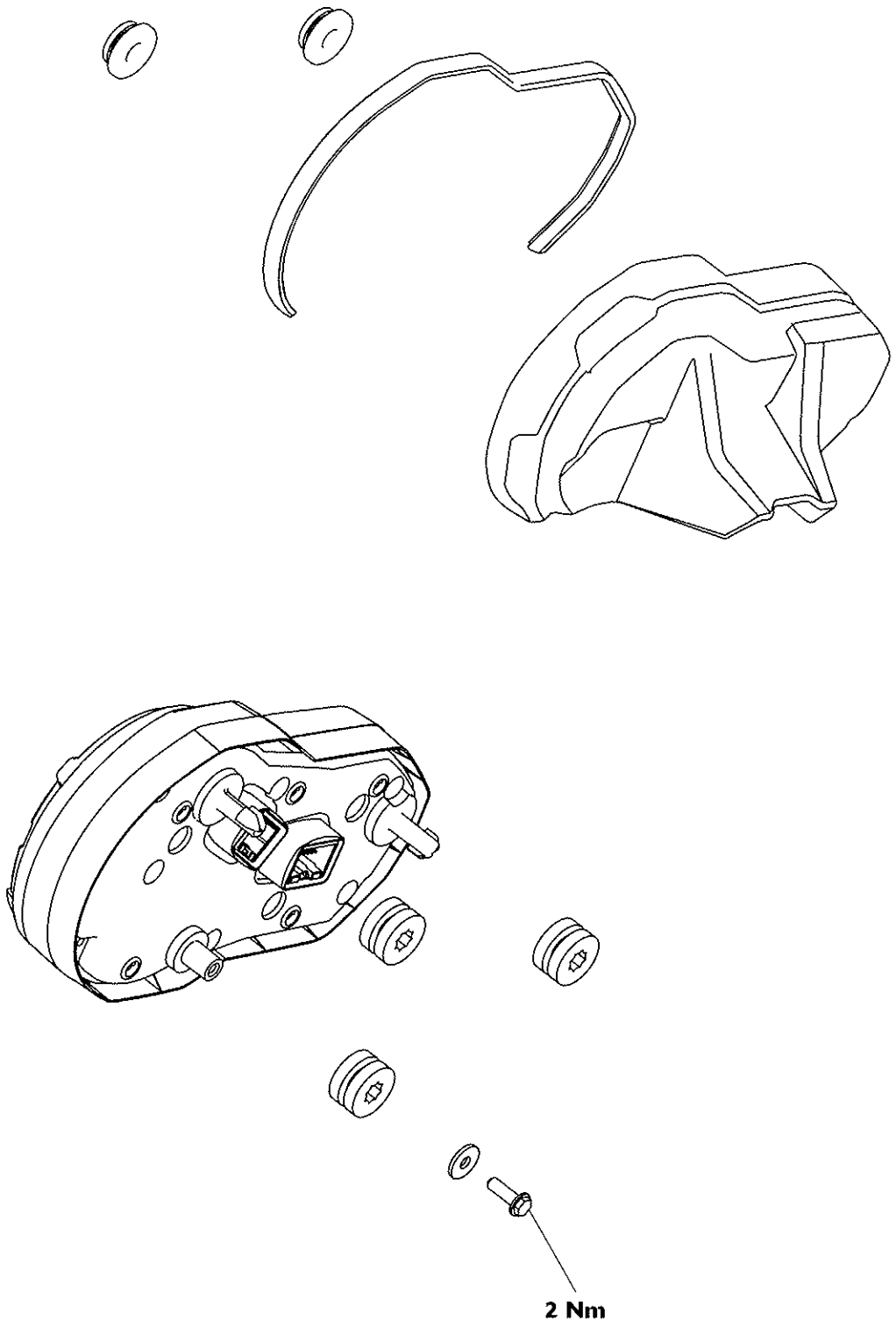
Instrument Pack 18.13
- Removal 18.13
- Installation 18.13

Headlights 18.14
- Headlight Adjustment 18.14
- Headlight Bulb Replacement 18.14
- Installation 18.14
- Position Light Bulb Replacement 18.15
- Installation 18.15

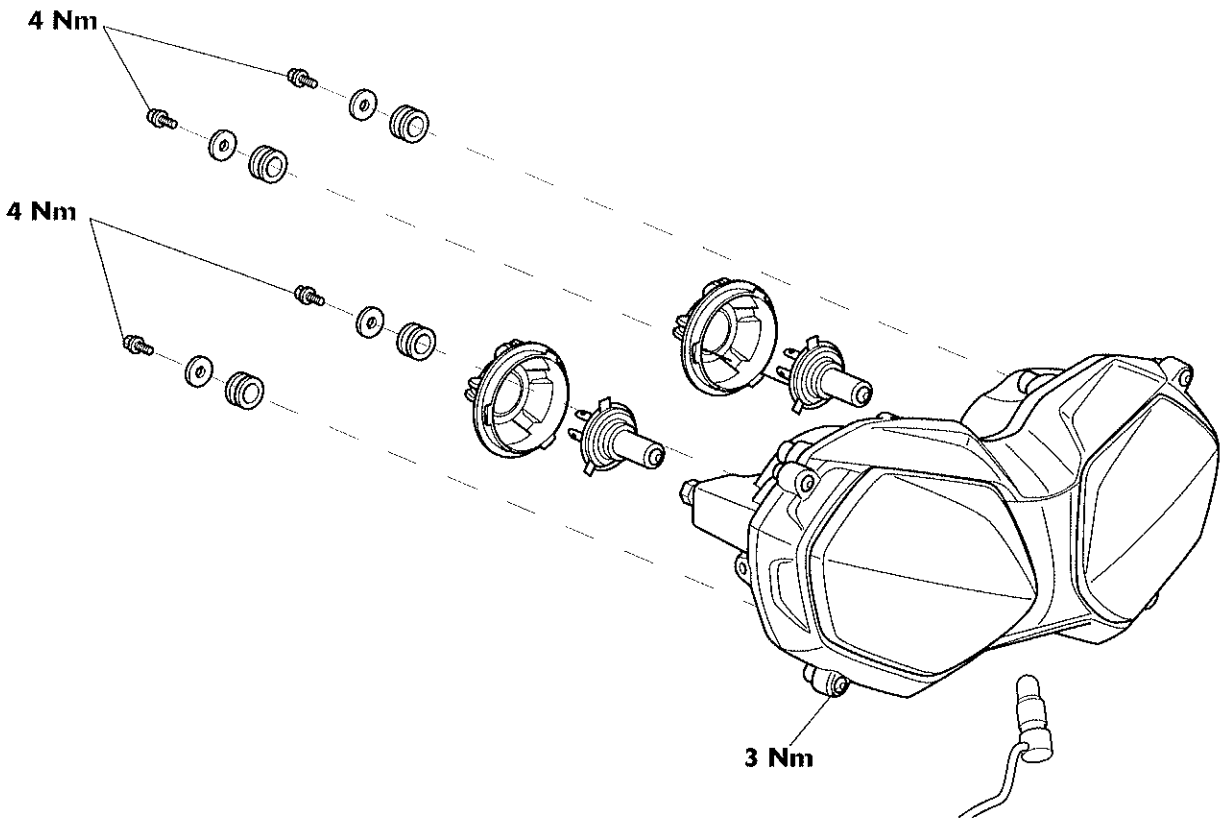
Headlight Assembly 18.15
- Removal 18.15
- Installation 18.16

Front Fog Lights - If Fitted 18.17
Front Fog Light Replacement 18.17
Rear Light 18.18
Removal 18.18
Installation 18.18
Direction Indicators 18.19
Bulb Replacement 18.19
Rear Direction Indicator 18.19
Removal 18.19
Installation 18.19
Front Direction Indicator 18.20
Removal 18.20
Installation 18.20
Starter Motor 18.20
Removal 18.20
Inspection 18.21
Installation 18.21
Alternator 18.21
Removal 18.21
Disassembly 18.22
Assembly 18.23
Installation 18.23
Alternator 18.24
Lighting Circuit 18.26
Key to Circuit Diagram 18.26
Key to Wiring Colours 18.26
Starting and Charging Circuit 18.28
Key to Circuit Diagram 18.28
Key to Wiring Colours 18.28
Auxiliary and Accessory Circuit 18.30
Key to Circuit Diagram 18.30
Key to Wiring Colours 18.30
Engine Management Circuit Diagram 18.32
Key To Circuit Diagram 18.32
Key To Wiring Colours 18.32
Complete System - Tiger Explorer 18.34
Key to Circuit Diagram 18.34

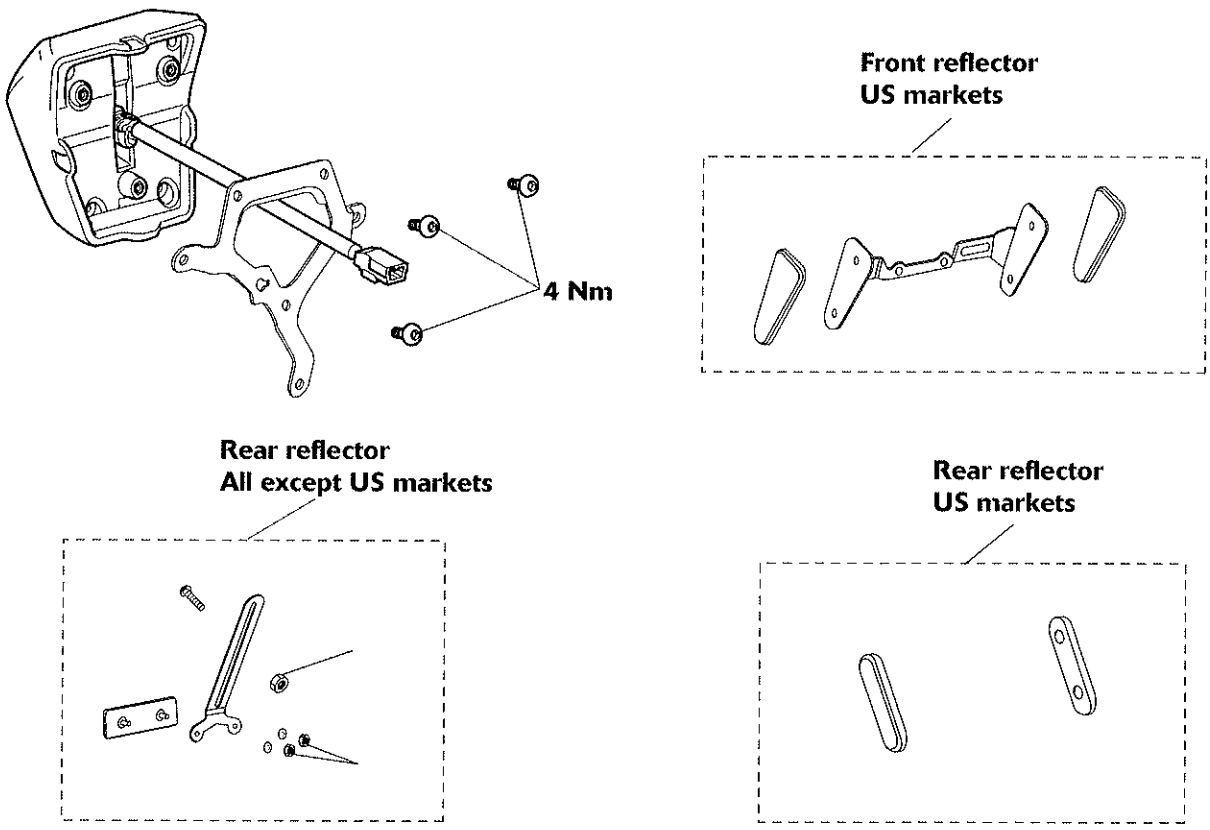
Exploded View - Instruments



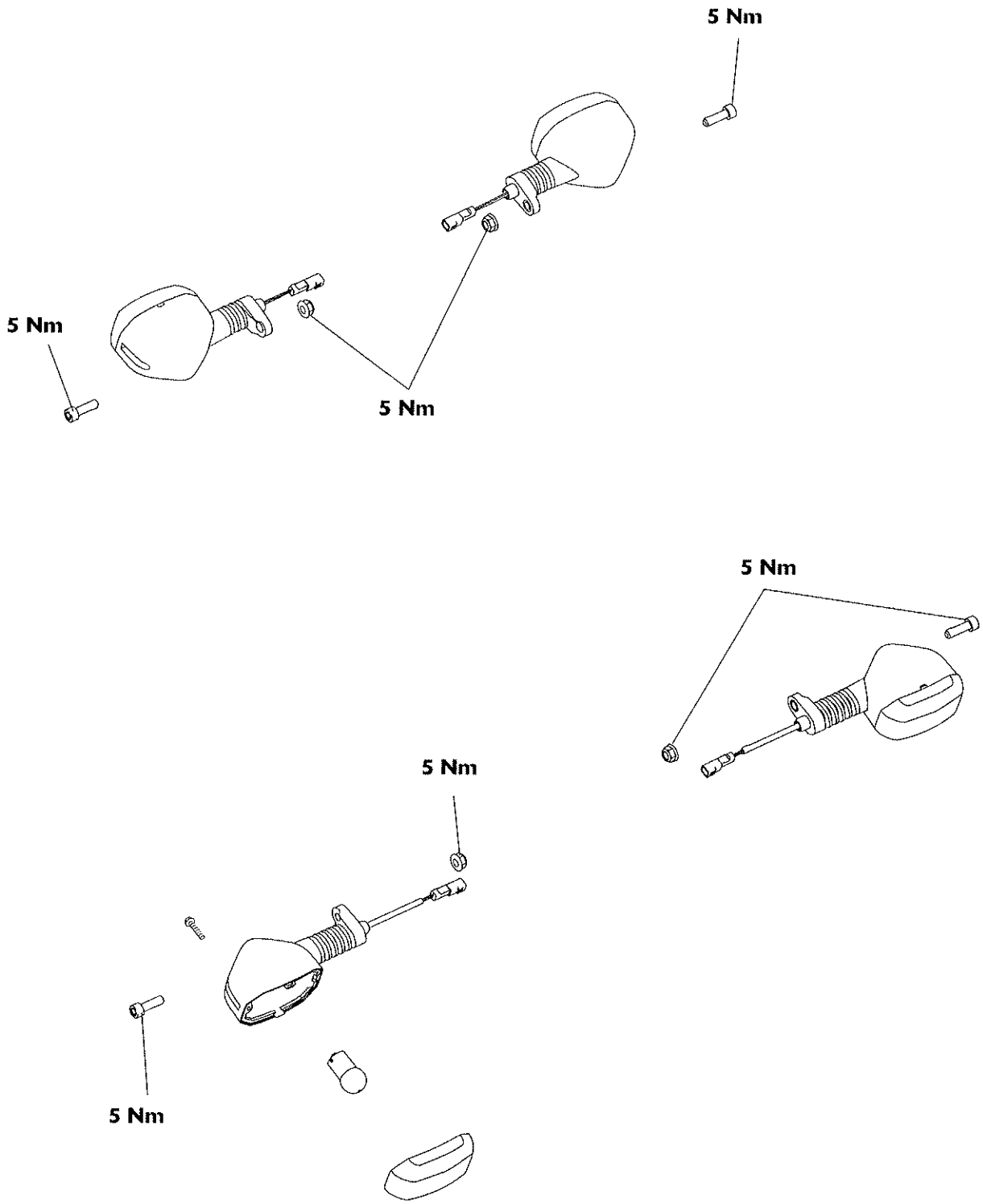
Exploded View - Headlight



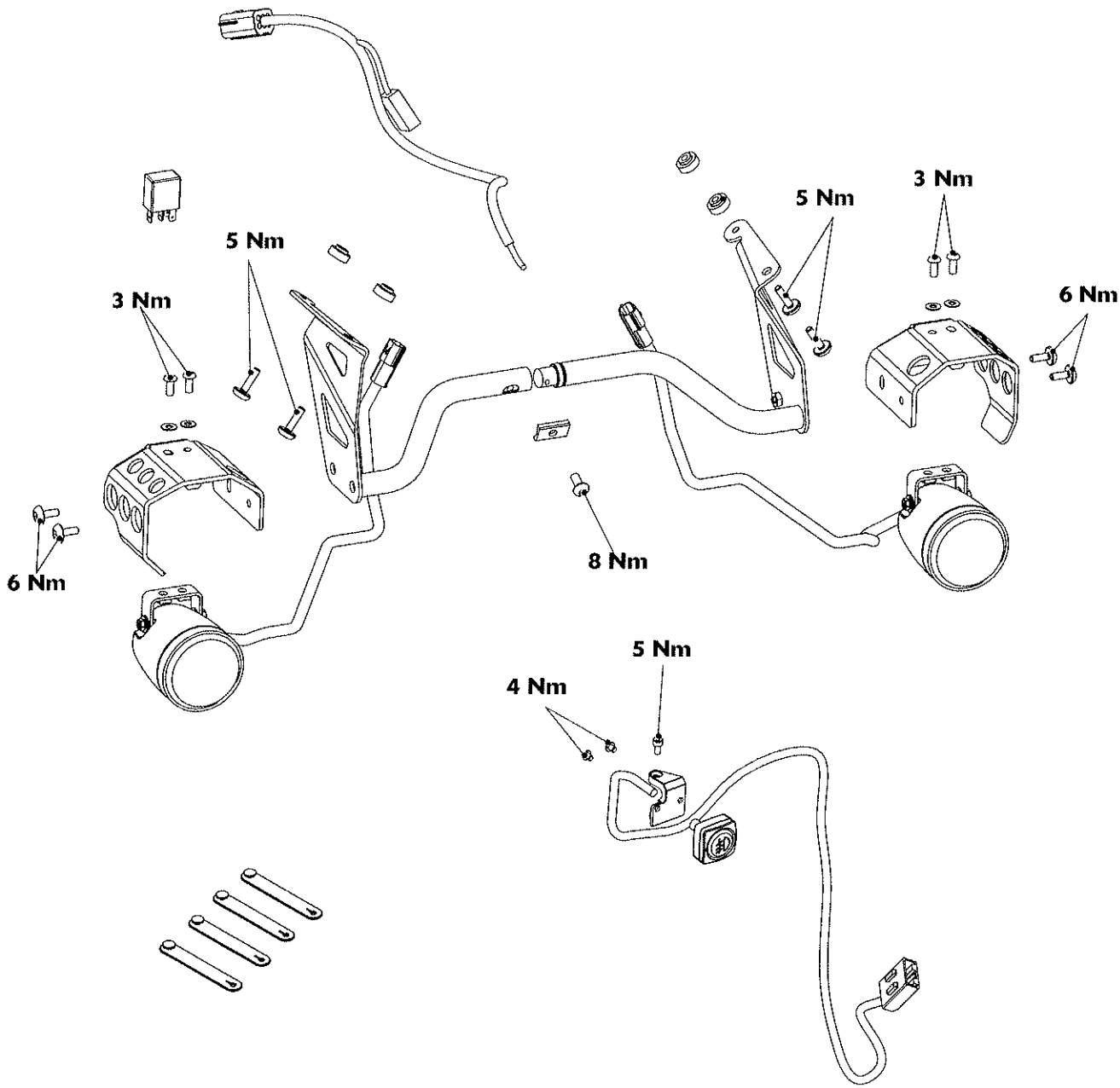
Exploded View - Rear Light and Reflectors



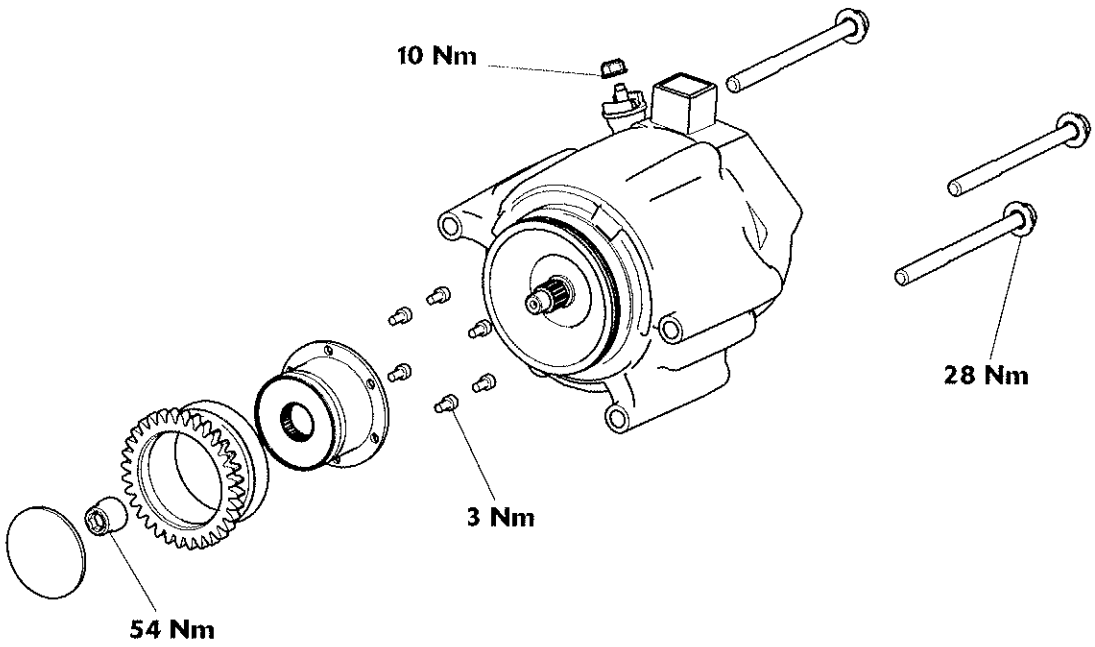
Exploded View - Direction Indicators

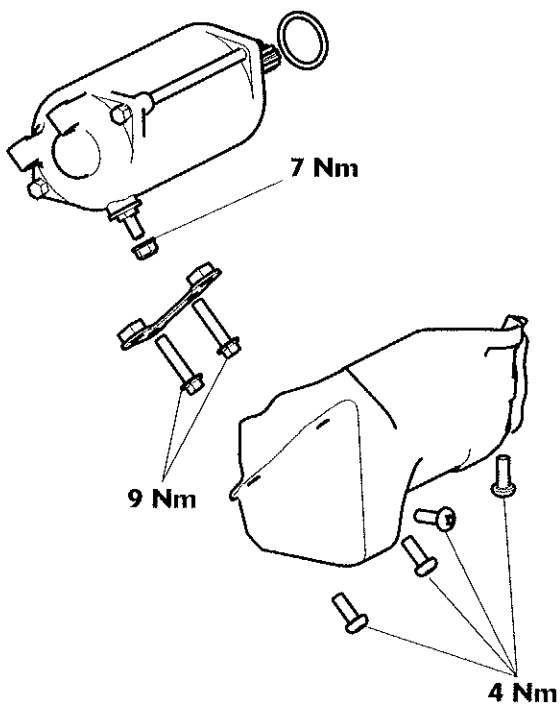


Front Fog Lights - If Fitted



Exploded View - Alternator and Starter Motor





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

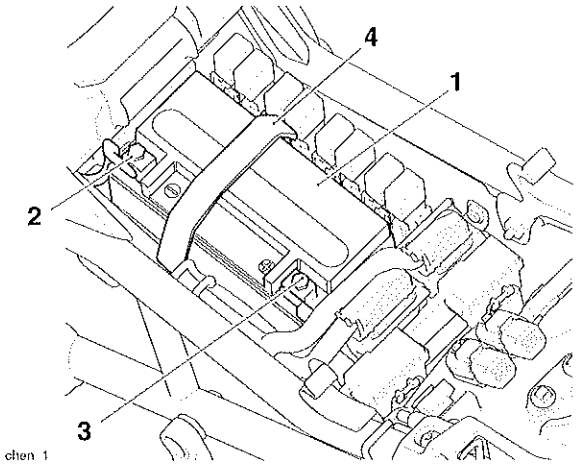
The battery contains harmful materials. Always keep children away from the battery whether or not it is fitted in the motorcycle.

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 electrolyte to come into contact with the skin. Always wear eye and skin protection when adjusting the electrolyte level.

Battery Removal



1. **Battery**
2. **Negative (-) terminal**
3. **Positive (+) terminal**
4. **Battery strap**

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the battery strap.
4. Take the battery out of the under seat tray.

Warning

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark which would ignite battery gases causing a risk of personal injury.

Battery Installation

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 underseat tray.
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 rider's seat (see page *17-16*).

Battery Commissioning and Charging

New Battery

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 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.

1. Ensure the VIN number printed on the anti-tamper label attached to the battery matches the motorcycle VIN.
2. Read the instructions and warnings delivered with the battery.
3. Place the battery on a flat level surface and remove the sealing foil.

⚠ Caution

Ensure the electrolyte container part number matches the battery part number to be filled. Battery life will be greatly reduced if the incorrect volume (either too little or too much) of acid is added to the battery.

4. Remove the battery sealing strip from the electrolyte container (if applicable) and save for later in this procedure. Place the sealing strip on a clean surface, with the upper side facing downwards to avoid contamination of the sealing strip. Do not break the seal on the electrolyte container.
5. Place the electrolyte container and adapter (if applicable) on the battery and fill the battery according to the manufacturer's instructions.
6. After starting to fill the battery with electrolyte, allow the battery to stand for 30 minutes with the filling container in place.
7. Check that all of the electrolyte has drained from the container. Do not remove the container at this point. If the container has not completely drained, tap the sides of the container to start the electrolyte flowing again.
8. 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 3 Ah - 12 Ah or 1 hour for batteries greater than 12 Ah.
9. Remove the electrolyte container and adapter carefully, and dispose of immediately.
10. Place the sealing cap strip LOOSELY over the filling holes of the battery.
11. Charge the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9.

⚠ Caution

The caps must be fitted (after charging) within two hours of filling the battery with acid. Leaving the battery open to the atmosphere for longer than is necessary will start to reverse the chemical reaction which takes place within the battery, greatly reducing the battery life.

12. After charging is complete, press down firmly with both hands to seat the caps (do not use tools or force the caps into position).
13. Disconnect the charger and allow the battery to stand for 1 hour before fitting to the motorcycle.
14. Fit the battery to the motorcycle, positive (red) lead first.

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.

Note:

- **The charge level in the battery must be maintained to maximise the battery life.**

With normal use of the motorcycle, the charging system will keep the battery charged. If the motorcycle is unused the battery will gradually discharge due to battery self-discharge and the continuous current drain for the clock and the engine control module memory. The rate of battery discharge can be greatly increased by the addition of electrical security systems or other accessories.

If the motorcycle is used for very short journeys, the alternator will not have enough time to replenish the charge used to start and run it. Therefore, the battery should be charged after each return journey following the instructions and advice given here and in the owner's handbook under the sections Battery Discharge and Battery Discharge During Storage and Infrequent Use of the Motorcycle.

Allowing a battery to discharge, or leaving it discharged over a period of time, causes sulphation of the lead plates within the battery.

Sulphation is a normal chemical reaction inside the battery and over a period of time sulphate will crystallise on to the lead plates making charging difficult or impossible. The result is a permanently damaged battery, which would not be covered by the motorcycle warranty.

Keeping a battery at full charge reduces the chance of it freezing in cold conditions. Allowing a battery to freeze can cause serious internal damage to the battery.

When leaving the motorcycle standing for more than a few days, regularly check the battery Voltage using a digital multimeter. Should the battery Voltage fall below 12.8 V, charge the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9.

For extended periods of storage (beyond two weeks) the battery should be removed and the battery Voltage checked regularly and charged when below 12.8 V.

Battery Already in Service

Use the guidelines in the table below for charging. Always verify the battery condition before charging, and 30 minutes after charging.

Note:

- **A fully charged battery should read 12.8 Volts or higher after the battery has been off the charger for 30 minutes or more.**

State of charge	Voltage	Action	Charge time (using BatteryMate 150-9)
100%	12.8 V - 13.0 V	None. Check at 6 months from date of manufacture	None required
75% - 100%	12.5 V - 12.8 V	May need slight charge. If no charge given, check in 3 - 4 months	3 - 6 hours
50% - 75%	12.0 V - 12.5 V	Needs charge	5 - 11 hours
25% - 50% V	11.5 V - 12.0 V	Needs charge	at least 13 hours
0% - 25%	11.5 V or less	Needs recovery using BatteryMate 150-9. Re-test after recovery	20 hours

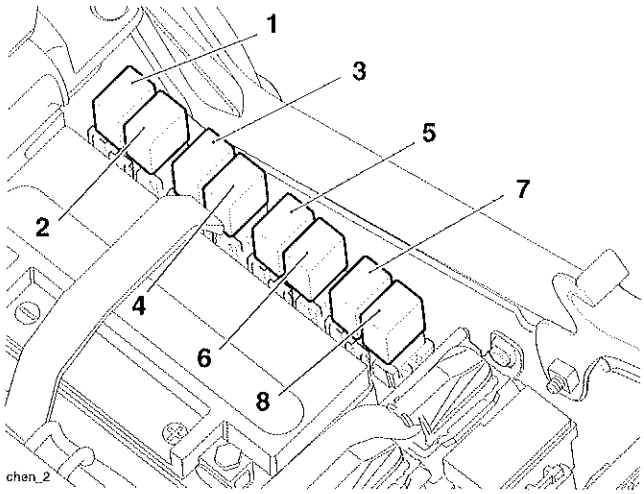
Relays

Note:

- **The Tiger Explorer is not equipped with a direction indicator relay. The direction indicators are controlled by the instrument pack.**

The relay pack is located beneath the rider's seat, adjacent to the battery. To gain access to the relays, remove the rider's seat (see page *17-16*).

Relay Identification



1. **Headlight relay**
2. **Cooling fan relay**
3. **Starter relay**
4. **Fuel pump relay**
5. **Engine management system (EMS)**
6. **Accessories relay**
7. **Rear brake switch relay**
8. **Accessory lights relay**

Fuses

If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of the correct current rating.

A blown fuse is indicated when all of the systems protected by that fuse become inoperative. When checking for a blown fuse, refer to the fuse box tables (see page *18-12*) to establish which fuse has blown.

Warning

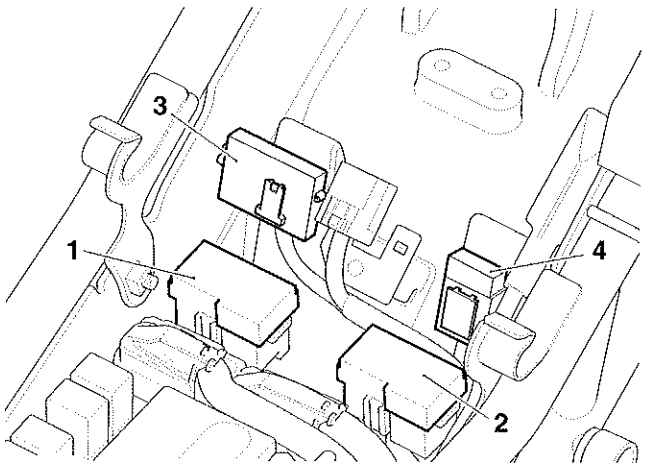
Always replace blown fuses with new ones of the correct current rating (as specified on the fuse box cover) and never use a fuse of higher rating.

Use of an incorrect fuse could lead to an electrical problem, resulting in motorcycle damage, loss of motorcycle control and an accident.

Fuse Identification

The fuse boxes are located beneath the rider's seat.

To allow access to the fuse boxes, the rider's seat must be removed (see page *17-16*).



1. **Right hand fuse box**
2. **Left hand fuse box**
3. **ABS fuse box**
4. **Main fuse, 40 Amp**

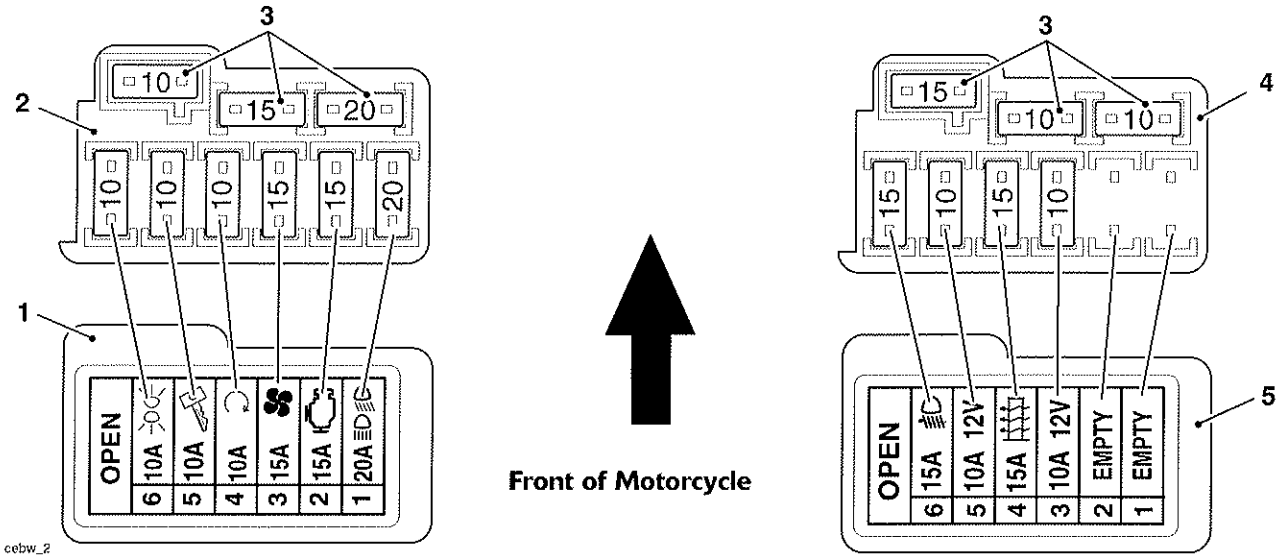
The fuse identification numbers listed correspond with those printed on the fuse box cover.

Left Hand Fuse Box

Fuse No.	Circuits Protected	Rating (Amps)
1	Headlight	20
2	Engine management	15
3	Cooling fan	15
4	Fuel pump	10
5	Ignition, instruments	10
6	Rear light, brake light, horn	10

Right Hand Fuse Box

Fuse No.	Circuits Protected	Rating (Amps)
1	Empty	-
2	Empty	-
3	Rider auxiliary socket	10
4	Heated grips, heated seats and pillion auxiliary socket	15
5	Top box auxiliary socket	10
6	Fog lights	15



1. **Left hand fuse box cover**
2. **Left hand fuse box**
3. **Spare fuses**
4. **Right hand fuse box**
5. **Right hand fuse box cover**

ABS Fuse Box

Fuse No.	Circuit Protected	Rating (Amps)
1	ABS	20
2	ABS	20

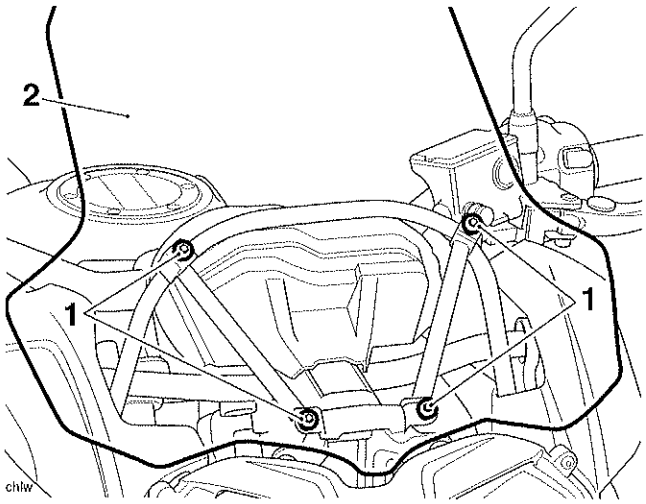
Instrument Pack

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.

> **⚠ Caution**
>
> Care must be taken when removing components from the windscreen. Damage to the windscreen surfaces could result from inadequate care during the dismantling process.

3. Release the fixings and remove the windscreen and place it on a clean soft surface.

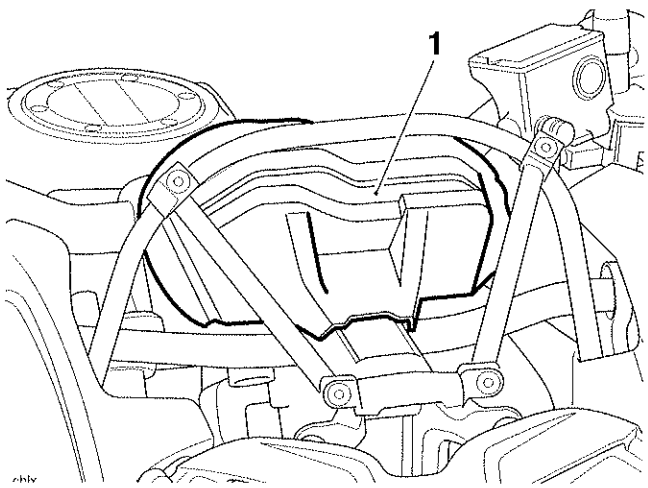


1. **Fixings**
2. **Windscreen**

Note:

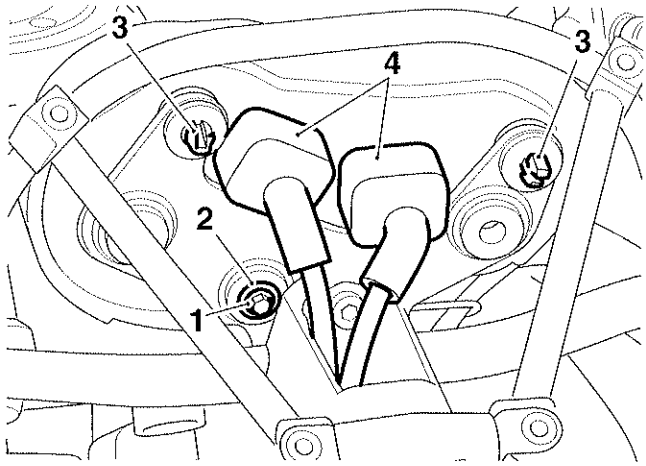
- **The cover is held in place by a bayonet type fixing. Gently pull on the cover to release it.**

4. Remove the cover attached to the rear of the instruments.



1. **Instrument cover**

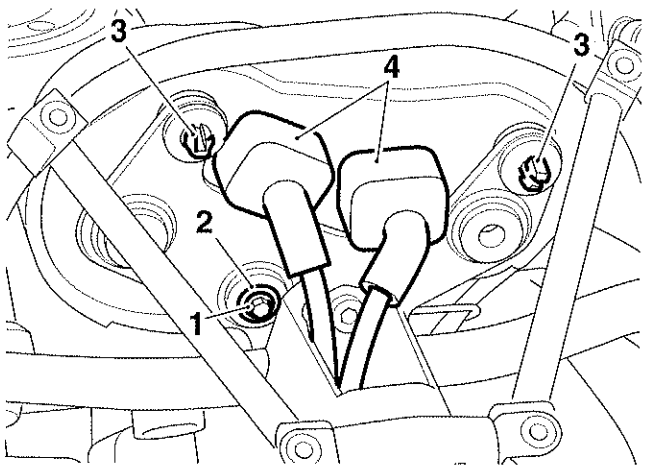
5. Disconnect the electrical connectors from the instrument pack.
6. Remove the screw and release the instrument pack from the bracket bayonet fixings. Collect the washer.



1. **Screw**
2. **Washer**
3. **Bayonet fixings**
4. **Electrical connectors**

Installation

1. Position the instrument pack to the bracket.
2. Insert the bayonet fixings into the grommets. Fit the washer, fixing and tighten to **2 Nm**.
3. Connect the electrical connectors to the instrument pack.



1. **Screw**
2. **Washer**
3. **Bayonet fixings**
4. **Electrical connectors**

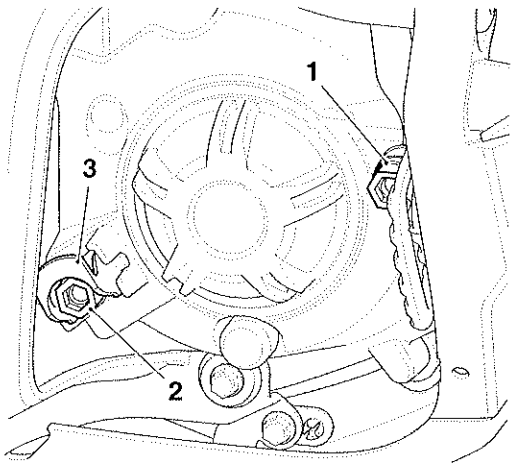
4. Install the cover and gasket to the rear of the instruments, ensuring the bayonet fixing is fully inserted in the grommets on the instrument bracket.
5. Refit the windscreen and tighten its fixings to **4 Nm**.
6. Reconnect the battery, positive (red) lead first.
7. Refit the rider's seat (see page *17-16*).

Headlights

Headlight Adjustment

Note:

- **The headlight can be adjusted by means of vertical and horizontal adjustment screws located on the rear of the headlight.**



1. **Horizontal adjustment screw**
2. **Vertical adjustment screw**
3. **Headlight adjuster lever for loaded conditions**

1. Switch the headlight dipped beam on.
2. Turn the vertical adjustment screw on the headlight clockwise to raise the beam or anti-clockwise to lower the beam.
3. Turn the horizontal adjustment screw clockwise to move the beam to the right or anti-clockwise to move the beam to the left.
4. Switch the headlights off when the beam settings are satisfactory.

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 a headlight beam when the motorcycle is in motion.

Any attempt to adjust a headlight beam when the motorcycle is in motion may result in loss of control and an accident.

Headlight Bulb Replacement

Each headlight bulb can be replaced as follows:

Warning

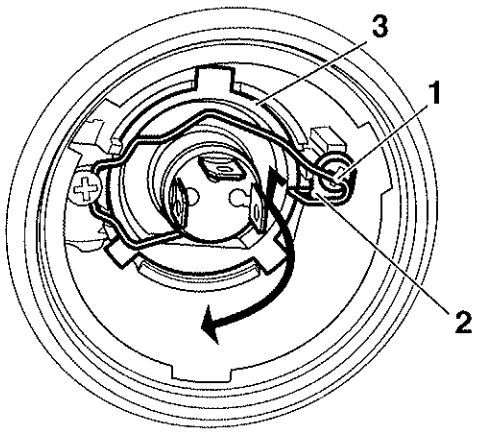
The bulb becomes hot during use. Always allow sufficient time for the bulb to cool before handling.

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. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the bulb cover from the bulb to be replaced by rotating it anti-clockwise.
4. Disconnect the multi-plug from the bulb retainer.
5. Detach the bulb retainer from the hook on the headlight assembly and rotate it away from the bulb as shown.



1. **Bulb retainer (right hand shown)**
2. **Bulb retainer hook**
3. **Bulb**

6. Remove the bulb from the bulb retainer.

Installation

1. Installation is the reverse of removal, noting the following:

Note:

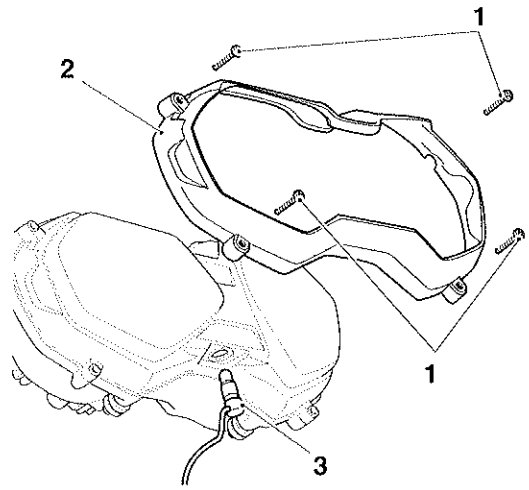
- **When reconnecting the battery, connect the positive (red) lead first.**

Position Light Bulb Replacement

Note:

- **The position light is fitted to the centre of the headlight.**

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the four fixings and remove the headlight surround.
4. Detach the rubber retainer from the headlight and pull out the bulb.



1. **Headlight surround**
2. **Fixings**
3. **Position light bulb**

Installation

1. Installation is the reverse of removal, noting the following:

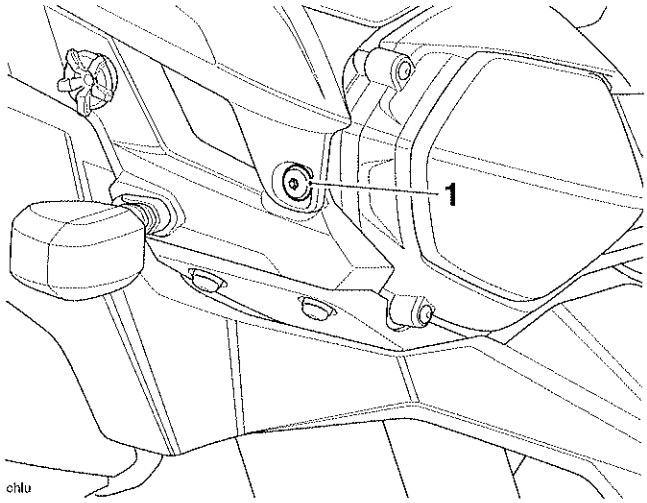
Note:

- **Tighten the headlight surround fixings to 3 Nm.**
- **Reconnect the battery, positive (red) lead first.**

Headlight Assembly

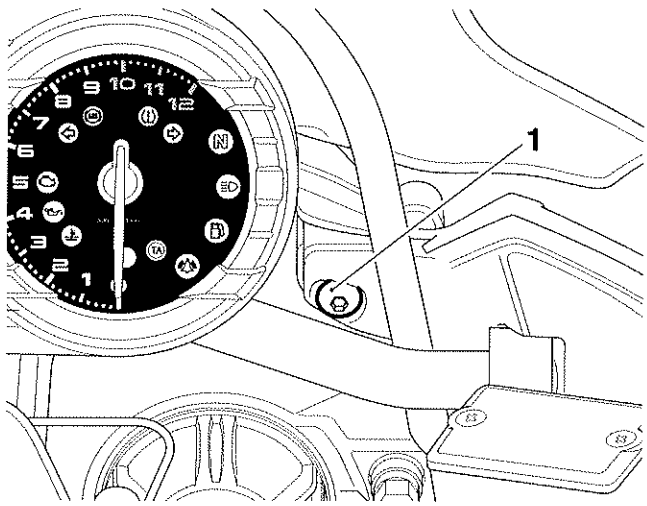
Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fixings securing the headlight to its support.



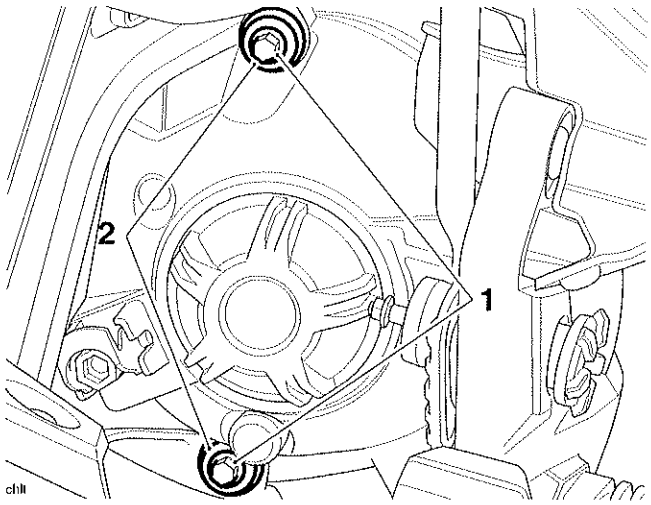
1. **Fixing, right hand side shown**

4. Remove the fixing securing the cockpit infill panels to the headlight.



1. **Fixing, right hand side shown**

5. Release the four fixings and washers securing the headlight to the front subframe.

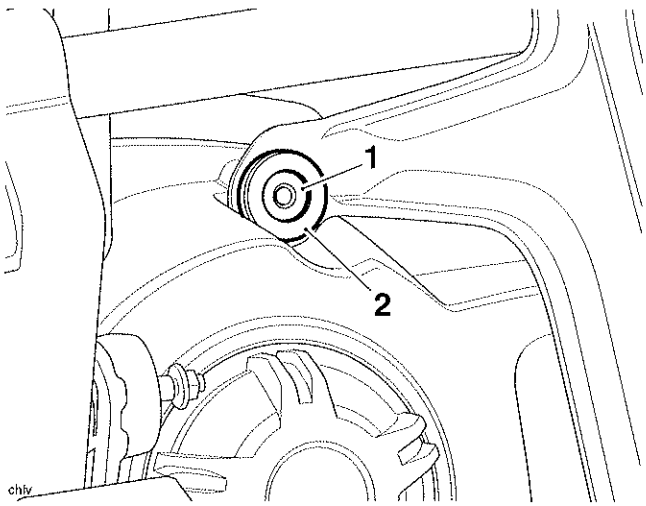


1. Fixings (right hand shown)
2. Washers

6. Disconnect the electrical connector and remove the headlight.

Installation

1. Connect the electrical connector and align the four mountings on the headlight to their rubber grommets on the frame.
2. Carefully and evenly, push the headlight into its four mounting grommets. Fit the washers, fixings and tighten to **4 Nm**.



1. Headlight mounting, upper left hand
2. Grommet

3. Refit the fixing securing the cockpit infill panels to the headlight and tighten to **3 Nm**.
4. Refit the fixings securing the headlight to its support and tighten to **4 Nm**.
5. Reconnect the battery, positive (red) lead first.
6. Refit the seat (see page *17-16*).

Front Fog Lights - If Fitted

Front Fog Light Replacement

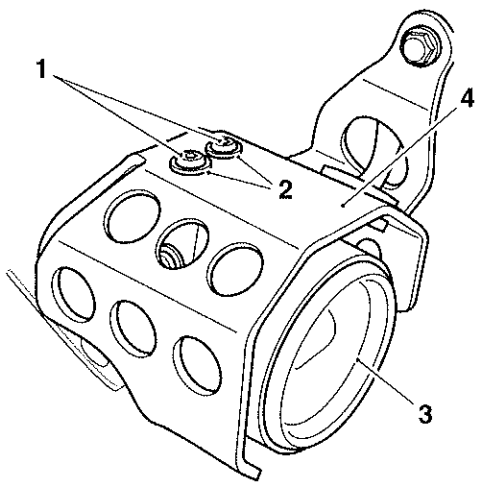
Warning

The bulbs become 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 reuse.

Caution

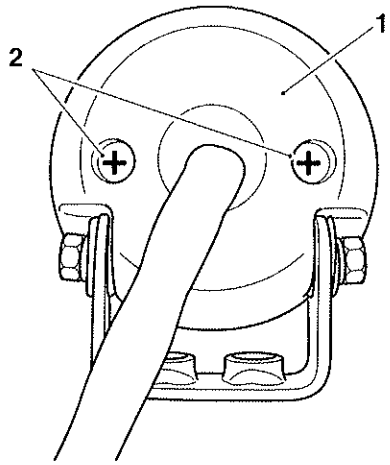
Do not allow the fog light to hang unsupported from the harness during bulb replacement. Allowing the fog light to hang from the harness will cause damage to the fog light.

1. Release the fixings and washers then detach the fog light from its shroud.



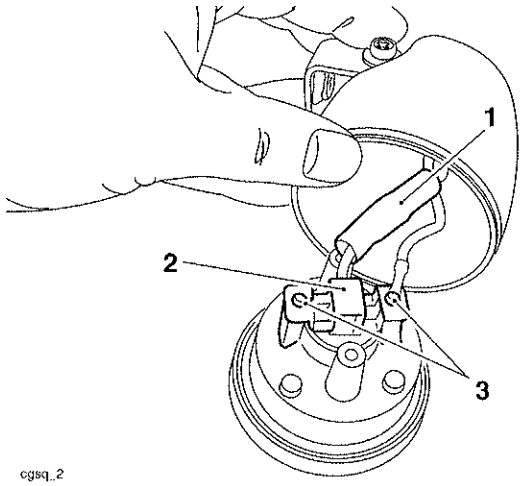
1. **Fixings**
2. **Washers**
3. **Fog light**
4. **Shroud**

2. Remove the two fixings from the rear of the light unit.



1. **Fog light**
2. **Fixings**

3. Pull the lens out of the case.
4. Disconnect the bullet connector inside the light unit.
5. Remove the two fixings securing the bulb retainer and remove the bulb.



1. **Connector**
2. **Bulb retainer**
3. **Fixings**

6. Installation is the reverse of the removal process.

Note:

- **Tighten the fog light to its shroud to 3 Nm.**

Caution

Use a genuine Triumph supplied bulb as specified in the Triumph Parts Catalogue.

Always have replacement bulbs installed by an authorised Triumph dealer.

Rear Light

Removal

Note:

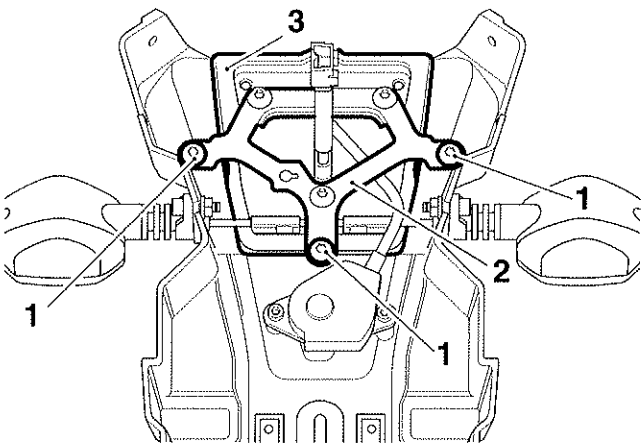
- **The rear light is a sealed for life unit and must be replaced in the event of a failure.**

1. Remove the seats (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear mudguard (see page *17-33*).

Note:

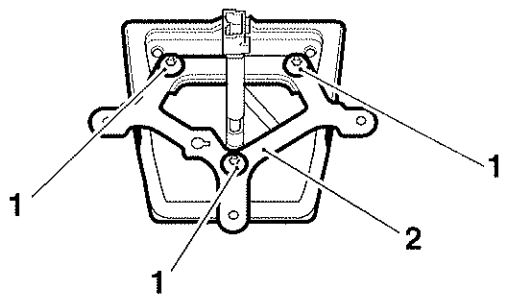
- **Note the routing of the seat lock cable for installation.**

4. Release the three fixings shown below and remove the rear light and bracket assembly.



1. **Fixings**
2. **Bracket**
3. **Rear light**

5. If necessary, release the fixings and remove the bracket.



chlz_2

1. **Fixings**
2. **Bracket**

Installation

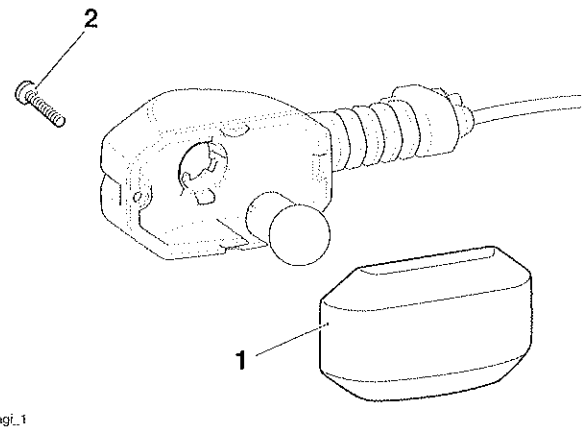
1. Installation is the reverse of the removal procedure, noting the following:

Note:

- **Route the seat lock cable as noted for removal.**
- **Tighten all the fixings for the rear light to 4 Nm.**
- **Reconnect the battery, positive (red) lead first.**

Direction Indicators

Bulb Replacement



chgi_1

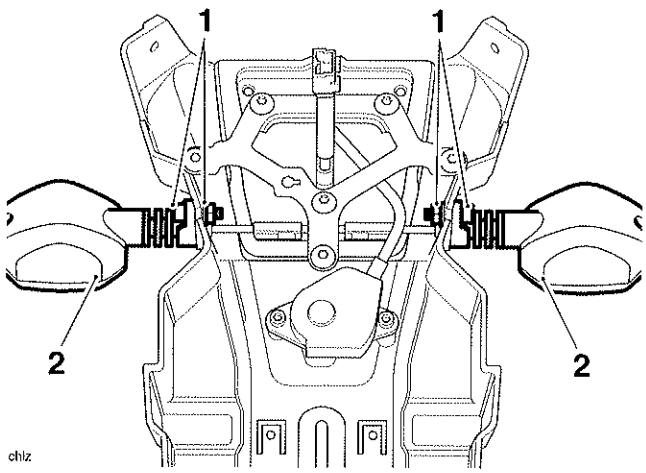
1. Direction indicator lens
2. Screw

1. Release the screw and remove the lens to gain access to the bulb for replacement.

Rear Direction Indicator

Removal

1. Remove the seats (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear mudguard (see page *17-33*).
4. Release the fixings securing direction indicators to the rear mudguard.



chlz

1. Fixings
2. Direction indicators

5. Remove the direction indicators.

Installation

1. Installation is the reverse of the removal procedure, noting the following.

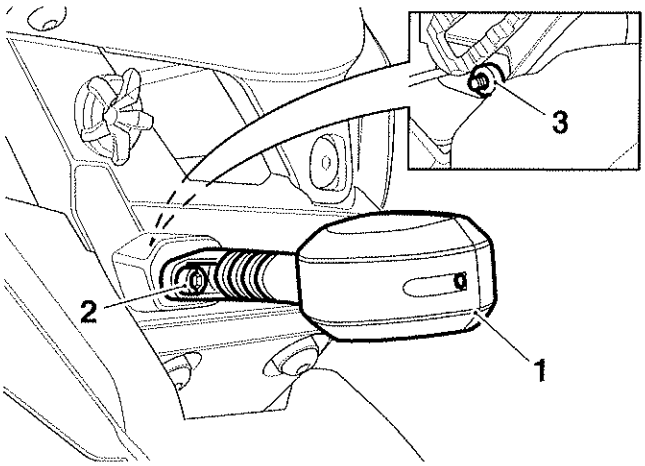
Note:

- **Ensure that the drain hole in the indicator lens is at the bottom.**
- **Tighten the direction indicator fixing to 5 Nm.**
- **Reconnect the battery, positive (red) lead first.**

Front Direction Indicator

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the indicator from the main harness.
4. Release the fixing securing the direction indicator to the cockpit and remove the unit.



1. **Direction indicator (right hand shown)**
2. **Fixing**
3. **Nut**

Installation

1. Installation is the reverse of the removal procedure, noting the following.

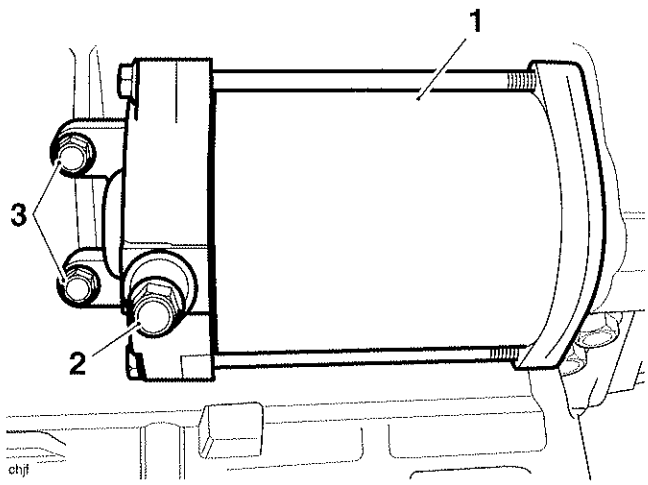
Note:

- **Ensure that the drain hole in the indicator lens is at the bottom.**
- **Tighten the direction indicator fixing to 5 Nm.**
- **Reconnect the battery, positive (red) lead first.**

Starter Motor

Removal

1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the sump guard (see page *17-34*).
4. Remove the fixings and remove the starter motor cover, located at the front of the engine.
5. Ease the boot from the starter cable terminal and then release the cable nut.
6. Detach the cable.
7. Release the fixings securing the starter motor to the crankcase.



1. **Starter motor**
2. **Starter cable fixing**
3. **Fixings**

8. Ease the starter motor from the lower crankcase.

Inspection

1. Ensure the starter turns freely and without binding.
2. Check the starter O-ring for damage and deterioration. Replace as necessary.

Installation

1. Lubricate the starter motor O-ring with a small amount of petroleum jelly.
2. Fit the starter motor to the lower crankcase ensuring that the O-ring does not become damaged during installation.
3. Fit and tighten the starter bolts to **9 Nm**.
4. Refit the starter cable and secure with the nut. Tighten to **7 Nm**.
5. Refit the starter cable boot.
6. Refit the starter motor cover and secure with the four fixings. Tighten to **4 Nm**.
7. Refit the sump guard (see page *17-34*).
8. Reconnect the battery, positive (red) lead first.
9. Refit the rider's seat (see page *17-16*).

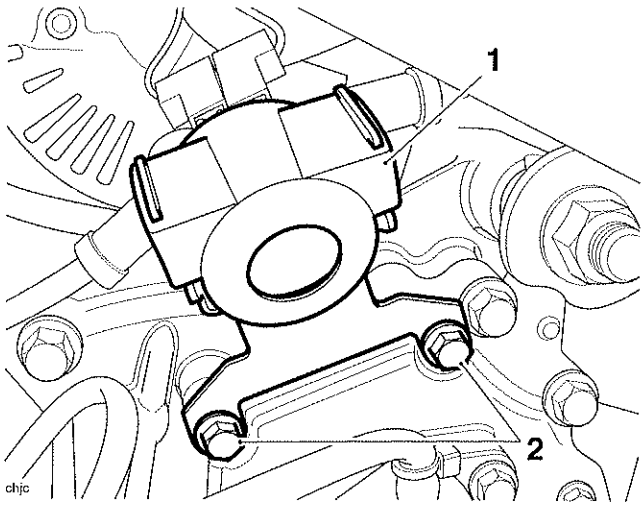
Alternator

The high output alternator is externally mounted to the engine, and is gear driven from the clutch primary gear. The regulator/rectifier is integral to the alternator and does not contain any serviceable parts.

The alternator features a de-coupler mounted to the drive gear, which disengages the alternator from the engine in certain conditions. This removes shock loading from the alternator which would otherwise cause premature wear or damage to various alternator components.

Removal

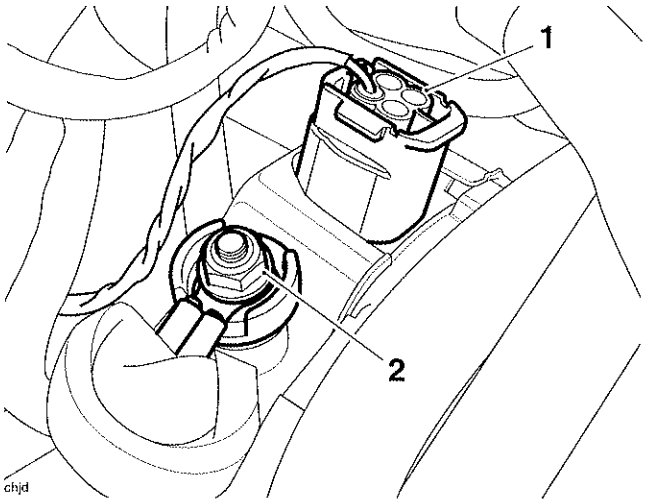
1. Remove the rider's seat (see page *17-16*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the expansion tank (see page *11-14*).
4. Remove the throttle bodies (see page *10-135*).
5. Remove the two upper selector cover fixings and detach the starter solenoid and bracket. Position the starter solenoid aside.



1. Starter solenoid
2. Fixings

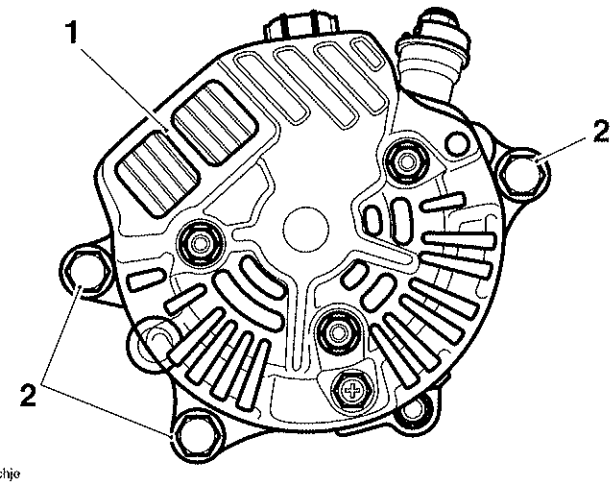
6. Disconnect the alternator multi-plug.

7. Ease the boot from the alternator cable terminal and then release the cable nut.



1. Alternator multi-plug
2. Cable nut

8. Release the fixings securing the alternator to the crankcase.

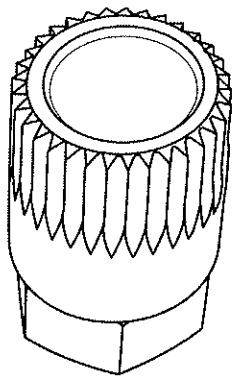


1. Alternator
2. Fixings

9. Withdraw the alternator from the crankcase and remove from the motorcycle in an upwards direction.

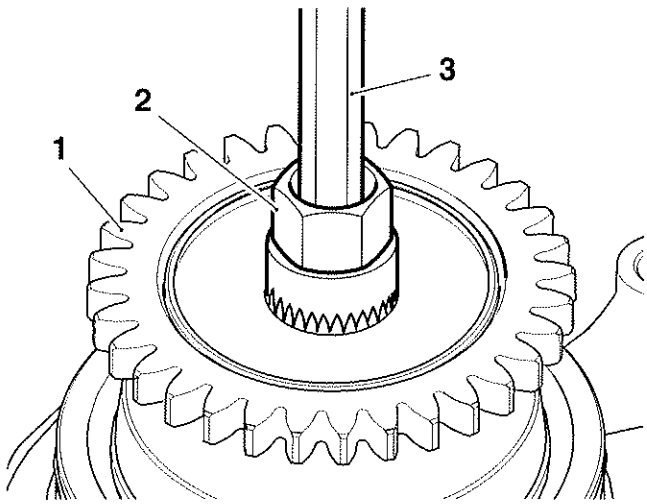
Disassembly

1. Remove and discard the rubber cap from the alternator de-coupler and drive gear assembly.
2. Fit Alternator Wrench T3880602 to the splines of the alternator de-coupler and drive gear assembly.



Alternator Wrench T3880602

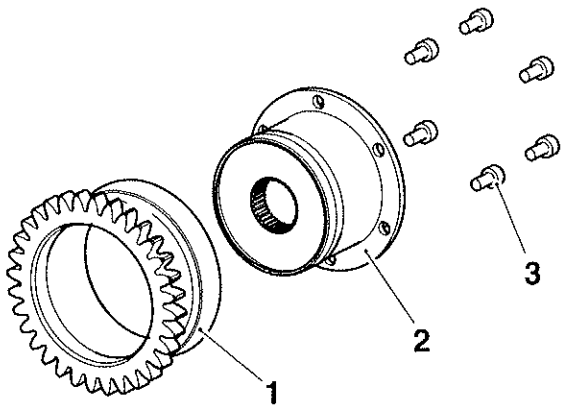
3. Prevent the alternator from turning using a spanner on the Alternator Wrench T3880602, and loosen the de-coupler and drive gear assembly nut using an 8 mm Allen key.



1. Alternator de-coupler
2. Alternator Wrench T3880602
3. 8 mm Allen key

4. Remove the Alternator Wrench T3880602 and fully remove the nut. Discard the nut.
5. Remove the de-coupler and drive gear assembly from the alternator spline.

6. Release the fixings and remove the drive gear from the de-coupler.



1. **Drive gear**
2. **De-coupler**
3. **Fixings**

Assembly

Assembly is the reverse of disassembly, noting the following:

Note:

- **Tighten the drive gear to de-coupler fixings to 3 Nm.**
- **Always fit a new nut when refitting the de-coupler and drive gear assembly.**
- **Tighten the de-coupler and drive gear assembly nut to 54 Nm.**

Installation

1. Fit a new O-ring to the alternator body.
2. Refit the alternator to the crankcase and align the three fixing holes. Fit and tighten the fixings to **28 Nm**.
3. Refit the alternator cable and secure with the nut. Tighten to **10 Nm**.
4. Refit the alternator cable boot.
5. Reconnect the alternator multi-plug.
6. Reposition the starter solenoid to the selector cover and secure with the two fixings. Tighten to **11 Nm**.
7. Refit the throttle bodies (see page *10-137*).
8. Refit the expansion tank (see page *11-15*).
9. Reconnect the battery, positive (red) lead first.
10. Refit the rider's seat (see page *17-16*).

Alternator

The alternator and regulator/rectifier are integrated in the same unit. It is not possible to check for continuity and short circuit through the coils and to earth.

Note:

- **Do not attempt to open the alternator.**
- **If the battery is not fully charged, the charging Voltage may be lower than specified when checking at 2000 rpm.**
- **Ensure all additional accessories (auxiliary lights, heated grips etc.) are switched off.**

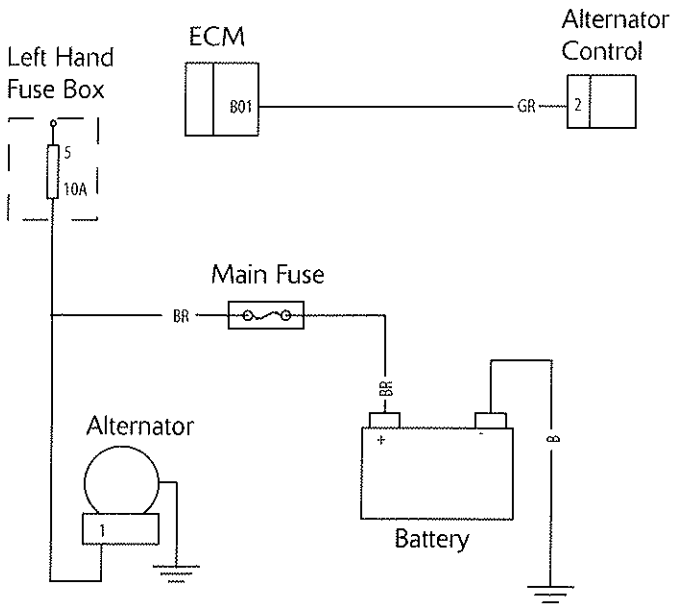
Fault	Possible cause	Action
Battery not charging	Battery	Check the condition of the battery Test the battery using the BatteryMate 150-9. Refer to the instructions supplied with the BatteryMate 150-9 Ensure the battery is serviceable
	Alternator/Rectifier/Regulator	Proceed to pinpoint test 1:-

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Battery positive (+) - Battery negative (-) - Alternator control connector pin 2 - Regulator/Rectifier terminal - Battery positive connector	OK	Disconnect the battery leads, negative (black) lead first and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check fuses: - Main fuse 40 A - Fuse No 5, left hand fuse box Check cable continuity: - Battery positive (+) to Regulator/Rectifier terminal - Battery negative (-) to engine ground	OK	Reconnect the battery leads, positive (red) lead first and proceed to test 3
		Open circuit	Locate and rectify wiring fault, proceed to test 4
3	Check alternator control Voltage: - Disconnect alternator control connector - Turn ignition on - Measure the Voltage through alternator control pin 2 and battery negative (-)	Same as battery Voltage (~12.5 V)	Turn the ignition off, reconnect the alternator control connector. Proceed to test 4
		Faulty	Rectify fault Reconnect the alternator control connector Proceed to test 4
4	Ensure the alternator control connector is plugged and secured. Run the engine. Check the charging Voltage at 2000 rpm: - Through the regulator/rectifier terminal and the engine ground	13 V - 15 V	Proceed to test 5
		Fault still present	Contact Triumph service

Test		Result	Action
5	Ensure the alternator control connector is plugged and secured. Run the engine. Check the charging Voltage at 2000 rpm: - Through the battery positive (+) and the battery negative (-)	13 V - 15 V	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Lighting Circuit

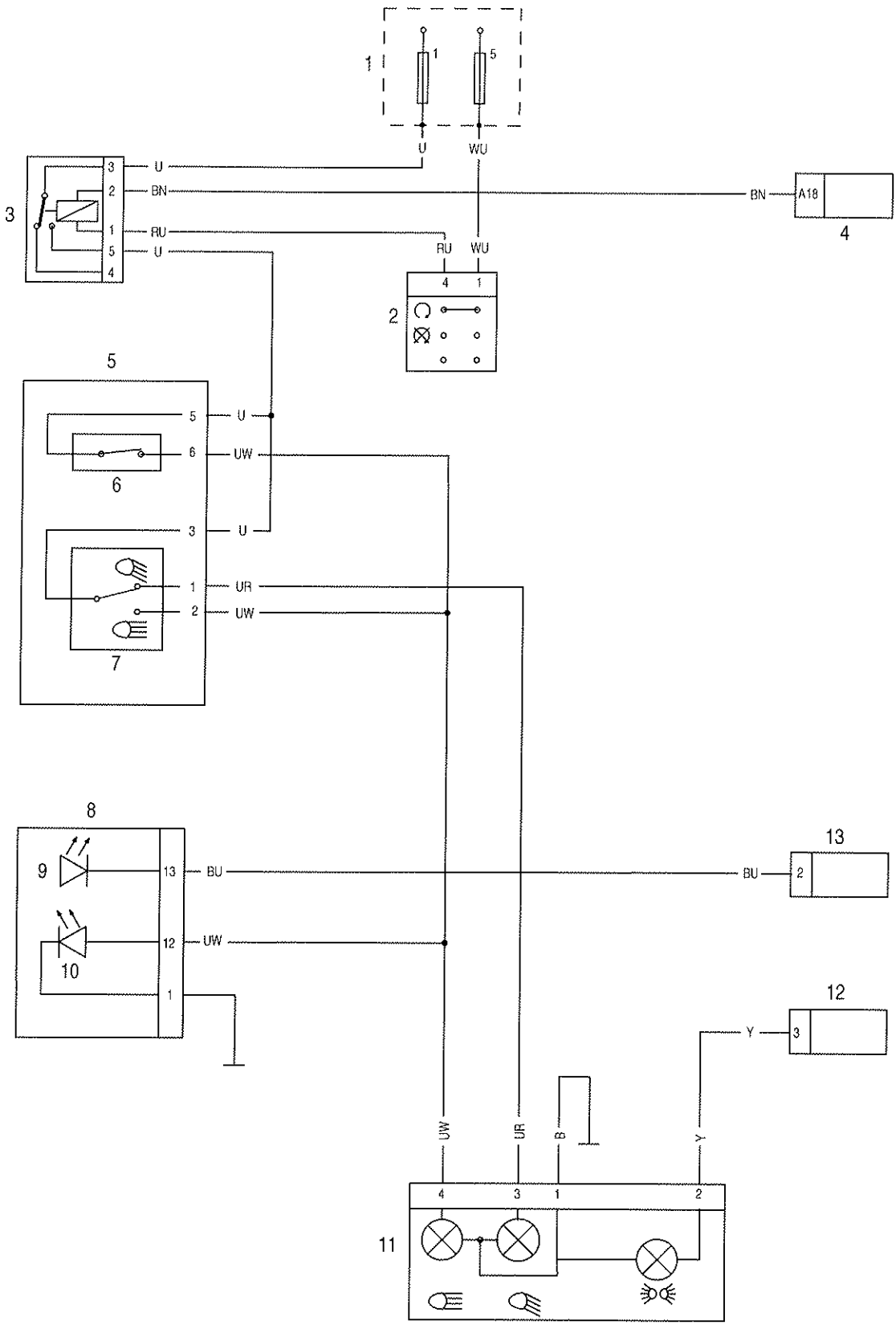
Key to Circuit Diagram

Key	Item Description
1	Left Hand Fuse Box (fuses 1 and 5)
2	Ignition Switch
3	Headlight Relay
4	Engine Control Module - Connector A
5	Left Hand Switch Cube
6	Pass Light Switch
7	Dipped/Main Beam Switch
8	Instruments
9	Oil Pressure LED
10	Main Beam LED
11	Headlight
12	Rear Light
13	Oil Pressure Switch

Key to Wiring Colours

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

Lighting Circuit



Starting and Charging Circuit

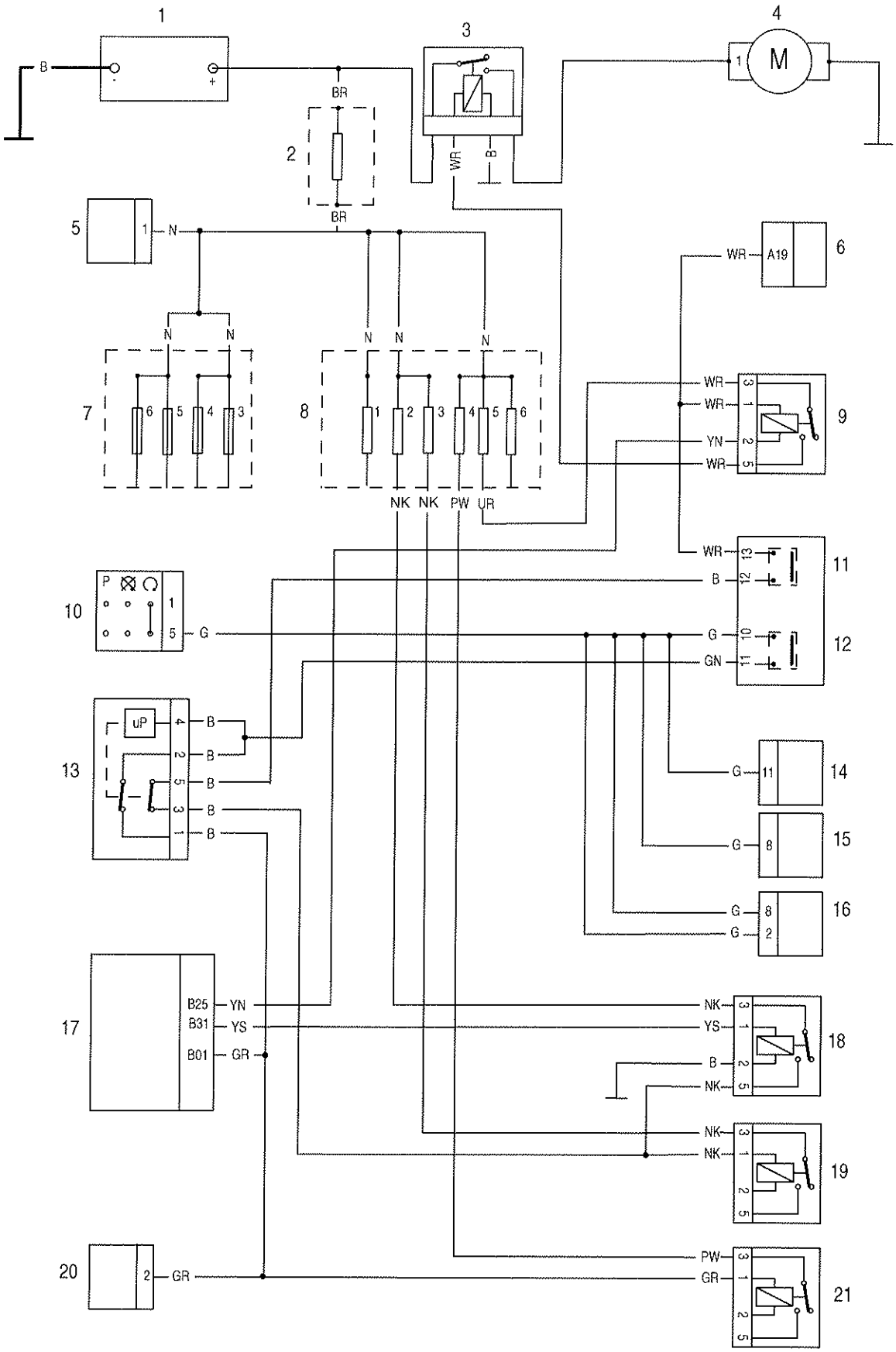
Key to Circuit Diagram

Key	Item Description
1	Battery
2	Main Fuse
3	Starter Solenoid
4	Starter Motor
5	Alternator
6	Engine Control Module - Connector A
7	Right Hand Fuse Box
8	Left Hand Fuse Box
9	Starter Relay
10	Ignition Switch
11	Starter Switch
12	Engine Stop Switch
13	Alarm
14	Instruments
15	Instruments
16	Immobiliser
17	Engine Control Module - Connector B
18	Engine Management Relay
19	Cooling Fan Relay
20	Alternator Control
21	Fuel Pump Relay

Key to Wiring Colours

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

Starting and Charging Circuit



Auxiliary and Accessory Circuit

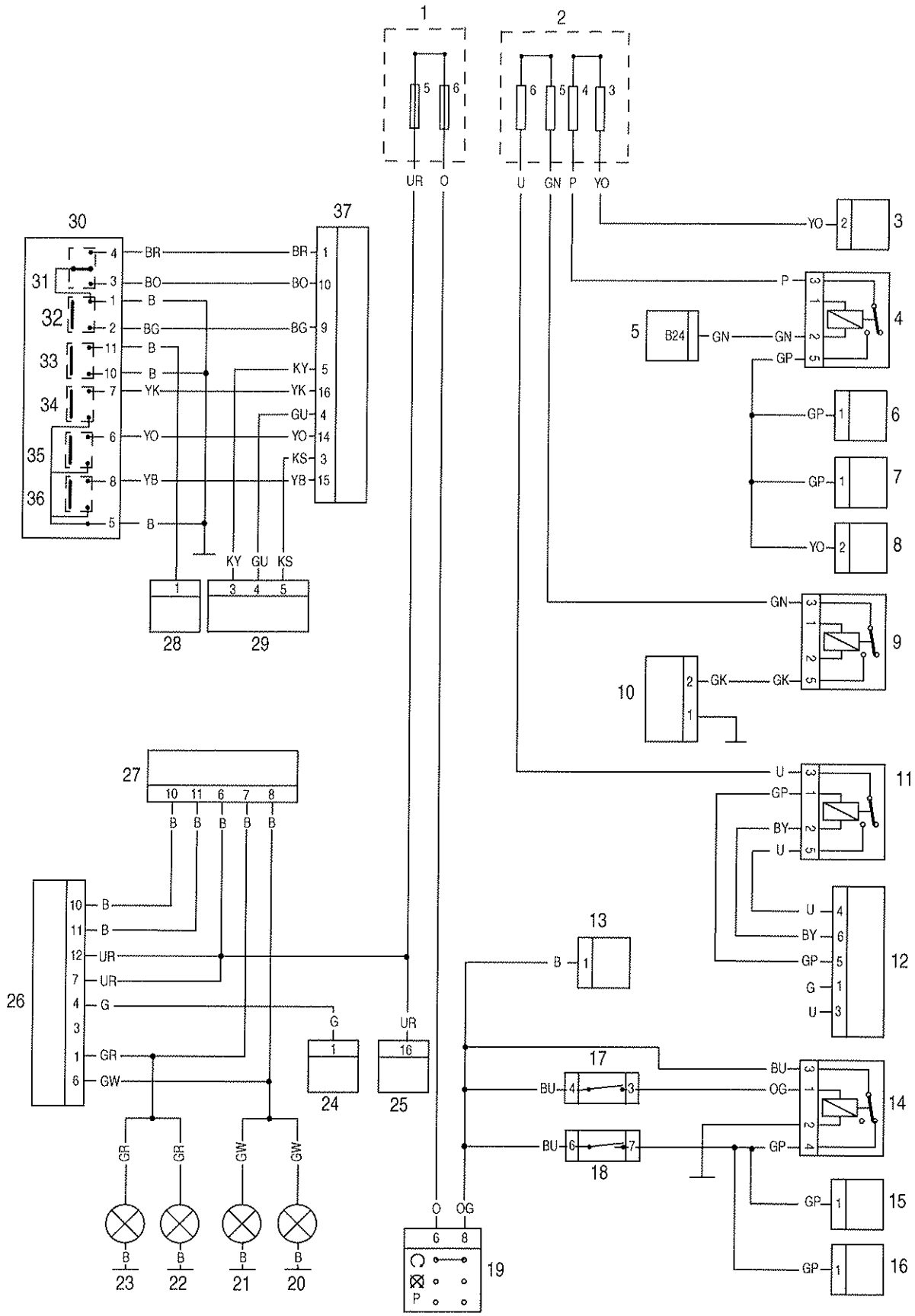
Key to Circuit Diagram

Key	Item Description
1	Left Hand Fuse Box
2	Right Hand Fuse Box
3	Rider Accessory Socket
4	Heated Accessory Relay
5	Engine Control Module - Connector B
6	Heated Seats
7	Heated Grips
8	Accessory Socket - Pillion
9	Top Box Relay
10	Top Box
11	Accessory Lights Relay
12	Fog Lights
13	Horn Connector 2
14	Rear Brake Switch Relay
15	Rear Light
16	ABS Module
17	Rear Brake Switch
18	Right Hand Switch Cube
19	Ignition Switch
20	Right Hand Front Indicator
21	Right Hand Rear Indicator
22	Left Hand Front Indicator
23	Left Hand Rear Indicator
24	External Air Temperature
25	Diagnostic Connector
26	Instruments Connector B
27	Alarm
28	Horn Connector 1
29	Heated Seats
30	Left Hand Switch Cube
31	Scroll Switch
32	Select Switch
33	Horn Switch
34	Left Indicator Switch
35	Cancel Indicator
36	Right Indicator Switch
37	Instruments Connector A

Key to Wiring Colours

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

Auxiliary and Accessory Circuit



Engine Management Circuit Diagram

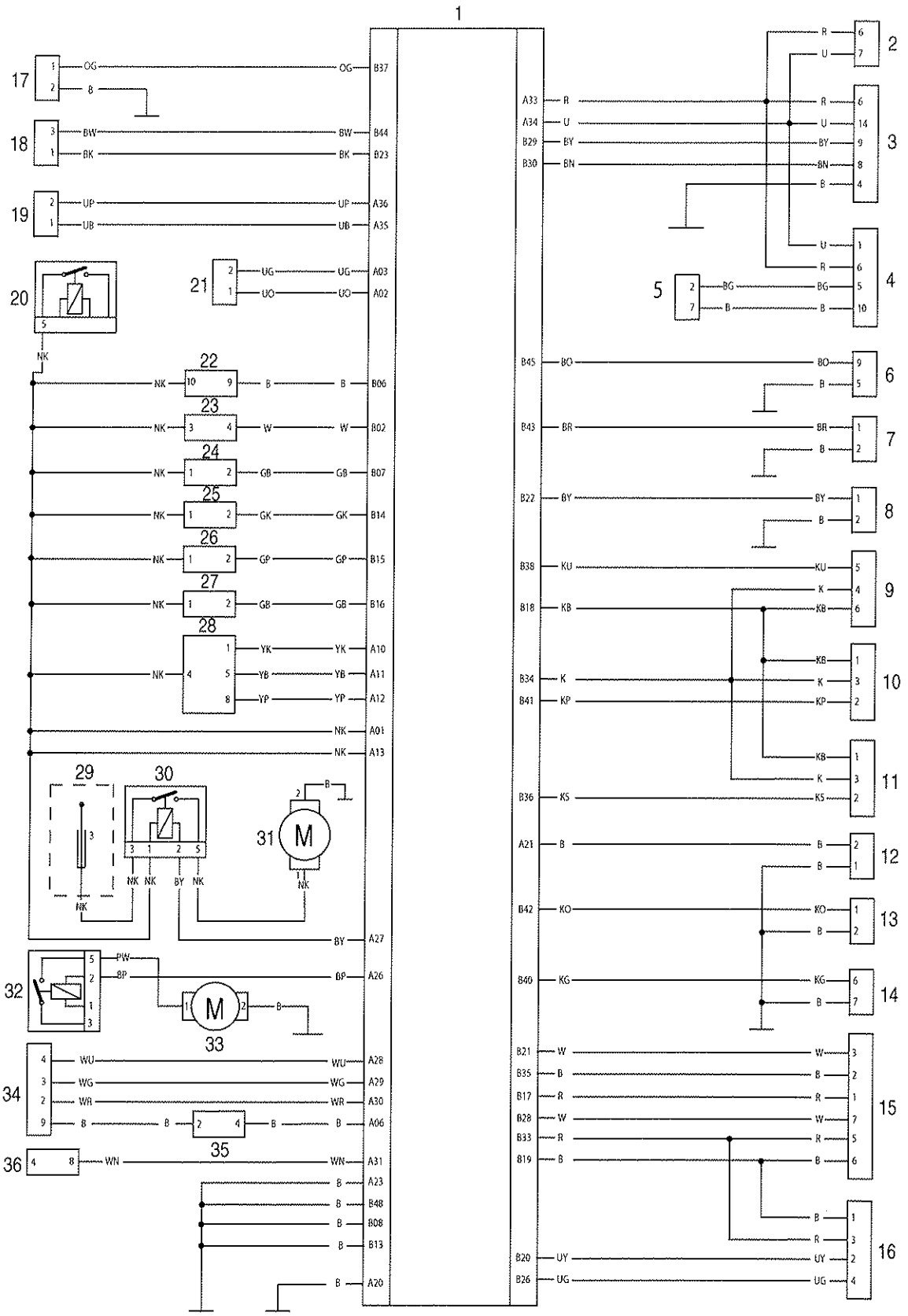
Key to Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Instruments
3	Diagnostic Connector
4	Immobiliser
5	Ignition Switch
6	Clutch Switch
7	Side Stand Switch
8	Fuel Level Sender
9	Fall Detection Switch
10	Ambient Pressure Switch
11	Manifold Pressure Switch
12	Oxygen Sensor
13	Intake Air Temperature Sensor
14	Coolant Temperature Sensor
15	Right Hand Switch Cube
16	Throttle Position Sensor
17	Oil Level Switch
18	Gear Position Sensor
19	Crankshaft Position Sensor
20	Engine Management Relay
21	Throttle Control
22	Purge Valve
23	Oxygen Sensor
24	Secondary Air Injection Solenoid
25	Coil 1
26	Coil 2
27	Coil 3
28	Injectors
29	Left Hand Fuse box
30	Cooling Fan Relay
31	Cooling Fan
32	Fuel Pump Relay
33	Fuel Pump
34	Right Hand Switch Cube
35	Rear Brake Switch
36	Cruise Control Grip Cancel

Key to Wiring Colours

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

Engine Management Circuit



Complete System - Tiger Explorer

Key to Circuit Diagram

Key	Item Description
1	Instrument Assembly
2	Engine Control Module
3	Start Switch
4	Engine Stop Switch
5	Throttle Position Sensor
6	Right Hand Switch Cube B
7	Right Hand Switch Cube A
8	Rear Brake Switch
9	Rear Brake Switch Relay
10	Oxygen Sensor
11	Oil Pressure Switch
12	Coolant Temperature Sensor
13	Purge Valve
14	Injector 1
15	Injector 2
16	Injector 3
17	Intake Air Temperature Sensor
18	Fall Detection Switch
19	Ambient Pressure Sensor
20	MAP Sensor
21	Crankshaft Position Sensor
22	Throttle Control
23	Heated Accessory Relay
24	Accessory Socket - Pillion
25	Gear Position Switch
26	Engine Management Relay
27	Coil 1
28	Coil 2
29	Coil 3
30	Fuel Pump Relay
31	Cooling Fan Relay
32	Secondary Air Solenoid
33	Top Box Relay
34	Top Box
35	Fuel Level Sensor
36	Side Stand Switch
37	Oil Level Switch
38	Ground
39	Heated Seat
40	Accessory Lights Relay
41	Fog Lights

Key	Item Description
42	Fuel Pump
43	Cooling Fan
44	Heated Grips
45	External Air Temperature
46	Right Hand Front Indicator
47	Horn
48	Sidelight
49	Main Headlight
50	Dipped Headlight
51	Left Hand Front Indicator
52	Diagnostic Connector
53	Right Hand Rear Indicator
54	Rear Light
55	Left Hand Rear Indicator
56	Alarm
57	Alternator Control
58	ABS Module
59	Rear Wheel Speed Sensor
60	Front Wheel Speed Sensor
61	ABS Fuse Box
62	Headlight Switch
63	Pass Switch
64	Left Indicator Switch
65	Cancel Switch
66	Right Indicator Switch
67	Scroll
68	Select
69	Horn Switch
70	Clutch Switch
71	Headlight Relay
72	Ignition Switch
73	Immobiliser
74	Left Hand Fuse Box
75	Right Hand Fuse Box
76	Accessory Socket - Rider
77	Starter Relay
78	Alternator
79	Main Fuse
80	Starter Solenoid
81	Battery
82	Starter Motor