

Introduction

Introduction

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

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

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

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

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

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

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

To maximise the life of your motorcycle:

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

How to use this manual

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

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

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

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

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

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

Warnings, Cautions and Notices

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.	
NOTICE	⤴
This notice symbol indicates points of particular interest for more efficient and convenient operation.	

Noise Control System

Owners are warned that the law may prohibit:

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

Among those acts presumed to constitute tampering are the acts listed below:

- Removal of, or puncturing the muffler, baffles, header pipes or any other component which conducts exhaust gases.
- Removal of, or puncturing of any part of the intake system.
- Lack of proper maintenance.
- Replacing any moving parts of the vehicle, or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.

References

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

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

Dimensions

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

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

Repairs and Replacements

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

Force

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

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

Edges

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

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

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

Fixings

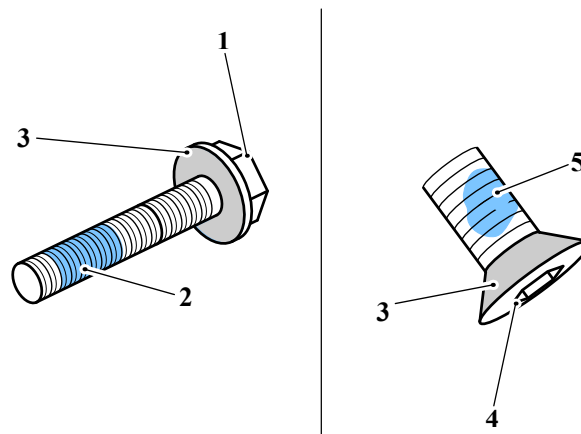
Locking devices, where specified, must be fitted.

If the efficiency of a locking device is impaired during removal it must be renewed.

Micro-encapsulated and patch locked fixings must always be replaced if disturbed.

Where necessary, the text in this manual will indicate where such a fixing is used.

- An encapsulated fixing can be identified by the diameter of threads is encompassed by the locking agent.
- A patch locked fixing can be identified by a coloured section of thread which is treated with a locking agent.



1. Fixing
2. Encapsulation
3. Mating surface
4. Screw
5. Patch locking

Tightening procedure

Generally, when installing a part with several bolts, nuts or screws, they should all be started in their holes and tightened to a snug fit, evenly and in a cross pattern. This is to avoid distortion of the part and/or gas or oil leakage. Conversely, bolts, nuts, or screws, should all be loosened (in sequence if specified) by about a quarter of a turn and then removed.

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

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

Torque Tolerance

Torque	Tolerance
0 Nm to 25 Nm	+/- 10%
26 Nm to 100 Nm	+10% -0%
101 Nm to 200 Nm	+10% -0%

Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed.

This applies particularly to micro-encapsulated fixings which must always be replaced if disturbed.

Where necessary, the text in this manual will indicate where such a fixing is used.

Use of Crow Foot Spanner Adapters with Torque Wrenches

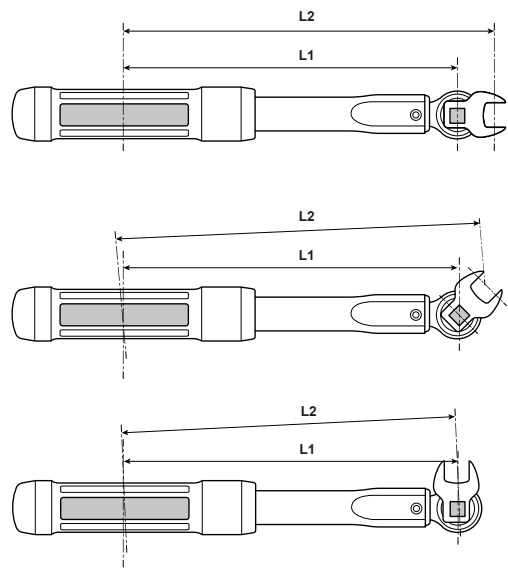
The use of a crow foot spanner adapter will effectively lengthen the lever arm of a torque wrench. The amount of torque applied to a fastener is increased as the torque wrench lever arm is extended, therefore the torque wrench setting must be adjusted in order to achieve the correct tightening torque.

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

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

NOTICE

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



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

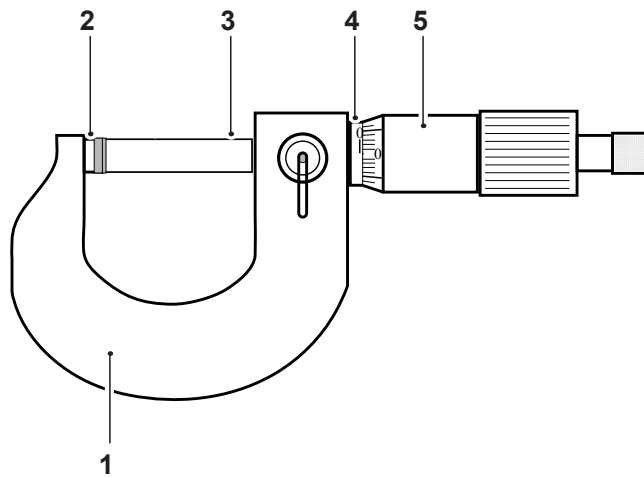
Using a Micrometer

Calibration

NOTICE

When calibrating, always refer to the instructions supplied with the micrometer.

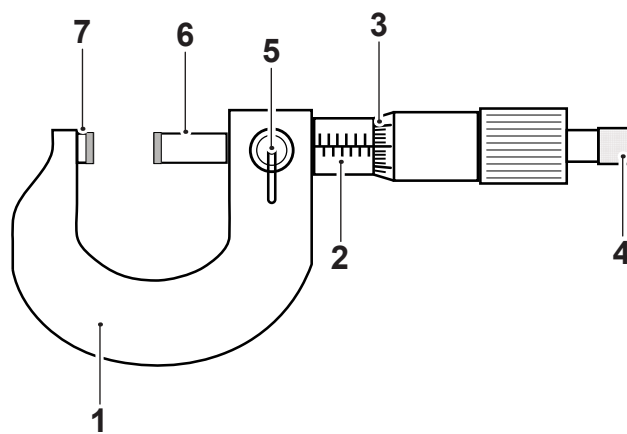
- The thimble is fixed to the spindle so that both components turn together.
- The sleeve is fixed to one end of the frame. It has graduations and an index line to aid the reading of the graduations on the thimble.



1. Micrometer frame
2. Anvil
3. Spindle
4. Sleeve
5. Thimble

Measuring

1. Hold the micrometer frame and place the item to be measured between the anvil and spindle.
2. Using the ratchet adjuster, close the spindle until the ratchet freely clicks.
3. Lock the thimble using the locking device.



- 1. Micrometer frame
- 2. Sleeve
- 3. Thimble
- 4. Ratchet adjuster
- 5. Locking device
- 6. Spindle
- 7. Anvil

Component Serviceability

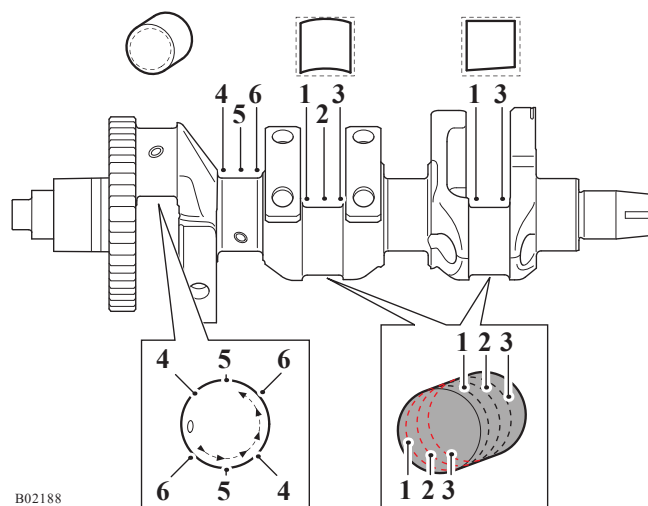
Premature wear of a surface finish should be visually checked for:

- Abrasive wear;
- Corrosion and oxidation;
- Erosive wear;
- Fretting;
- Surface fatigue.

Examples

- Taper - to become gradually smaller toward one end.
- Wear - the continuing loss of material from the surface of a solid body.
- Ovality - the difference between the maximum and minimum dimensions of the overall diameter.

The following illustration measures a crankshaft as an example.



1. Wear check/ Taper
2. Wear check/ Taper
3. Wear check
4. Ovality check
5. Ovality check
6. Ovality check

General Information

Ignition System Safety Precautions

WARNING



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

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

WARNING



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

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

Dangerous Substances

WARNING



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

NEVER DISREGARD THESE INSTRUCTIONS!

Third Party Products

WARNING



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

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

Fluoroelastomers

WARNING



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

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

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

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

Oils

WARNING



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

WARNING



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

Health Protection Precautions

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

WARNING



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

Environmental Protection Precautions

CAUTION



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

Burning of used engine oil in small space heaters or boilers can be recommended only for units of approved design. If in doubt, check with the appropriate local authority and/or manufacturer of the approved appliance.

Dispose of used oil and used filters through authorised waste disposal contractors, to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact your local authority for advice on disposal facilities.

Brakes

⚠ WARNING

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

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

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

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

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

Check regularly for brake hose damage.

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

⚠ WARNING

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

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

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

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

⚠ WARNING

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

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

⚠ WARNING

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

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

 WARNING



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

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

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

Safety Instructions

Diagnostic Trouble Codes

⚠️ WARNING

If the motorcycle falls over or is involved in an accident, diagnostic trouble codes may be triggered and stored.

If the motorcycle has fallen over or been involved in an accident, always clear any diagnostic trouble codes.

If diagnostic codes reappear, address them immediately.

Jacking and Lifting

⚠️ WARNING

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

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

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

Precautions Against Damage

Avoid spilling brake fluid or battery acid on any part of the bodywork. Wash spillages off with water immediately.

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

Always use the recommended service tool where specified.

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

Coolant

⚠️ WARNING

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

⚠️ WARNING

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

CAUTION



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

CAUTION



Distilled water must be used with the antifreeze (see specification for antifreeze) in the cooling system.

If hard water is used in the system, it causes scale accumulation in the water passages, and considerably reduces the efficiency of the cooling system. Reduced cooling system efficiency may lead to the engine overheating and engine damage.

Cleaning Components

A high flashpoint solvent is recommended to reduce fire hazard.

Always follow container directions regarding the use of any solvent.

Always use the recommended cleaning agent or equivalent.

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

Lubrication

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

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

Joints and Joint Faces

Assemble joints dry unless otherwise specified in this manual.

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

Gaskets, O-rings

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

Liquid Gasket, Non-permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly as excessive amounts of sealer may block engine oil passages and cause serious damage.

Prior to reassembly, blow through any pipes, channels or crevices with compressed air.

WARNING



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

Screw Threads

Metric threads to ISO standard are used.

Damaged nuts, bolts and screws must always be discarded.

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

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

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

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

WARNING

Never lubricate a thread unless instructed to do so.

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

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

Locking Devices

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

Fitting a Split Pin

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

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

Circlips, Retaining Rings

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

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

Self-Locking Nuts

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

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

Encapsulated Bolts

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

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

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 reused, would cause an oil leak.

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

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

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

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

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

Press

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

Ball Bearing

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

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

Chassis Bearing Lubrication

NOTICE

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.

NOTICE

In all cases, use the lubricant recommended.

Grease the bearing, not the cavity where it is located.

A bearing that is not regularly checked and lubricated will have a reduced life span.

New Bearings

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

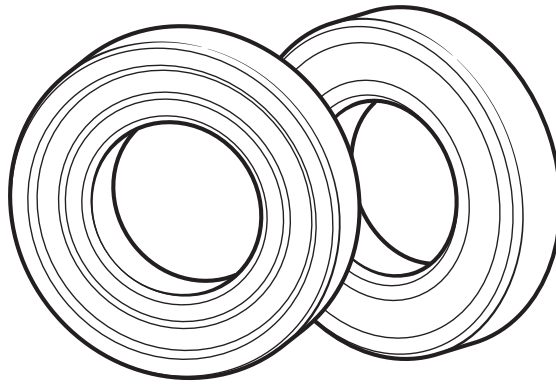
When lubricating a new bearing with grease the following steps should be taken:

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

Lubrication and Checks While Servicing a Bearing

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

Several common bearing types and the lubrication procedures for each are identified below:



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Sealed Bearings

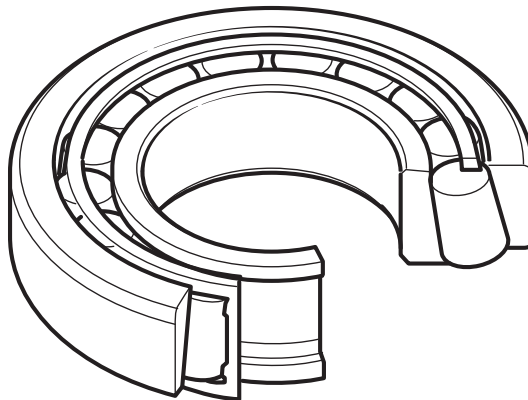
NOTICE



Sealed bearings can be identified by their integrated seals.

Sealed bearings are lubricated for life by the manufacturer.

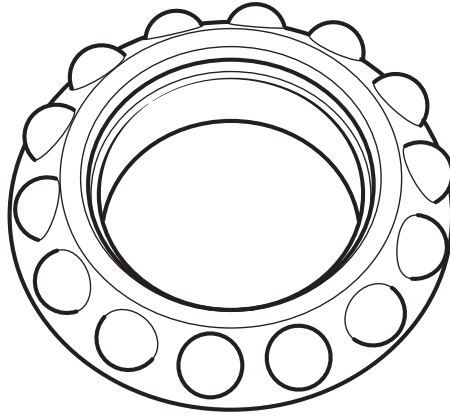
Any attempt to change the grease in a sealed bearing will damage the integrated seals. If the seals are damaged, dirt and water will ingress and the life of the bearing will be greatly reduced.



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Taper Bearings

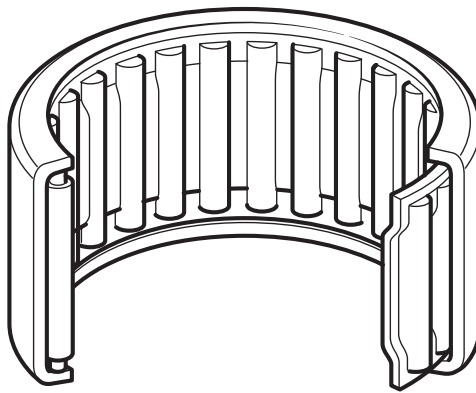
1. Grease must be forced between the inner race and the roller carrier.
2. Rotate the bearing to ensure that the grease is distributed over the entire circumference of the internal parts.
3. Any excess grease should be smeared on the outside of the rollers.



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Angular Contact and Ball Bearing

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



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Needle Roller Bearings

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

Metal Bushes

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

Fuel Handling Precautions

General

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

Petrol – Gasoline

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

WARNING

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

Turn the motorcycle ignition switch OFF.

Do not smoke.

Always have a suitable fire extinguisher close at hand when handling or draining fuel or fuel systems. Fire extinguishers must also be present in areas where fuel is stored.

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

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

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

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

WARNING

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

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

WARNING

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

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

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

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

Fuel Tank Removal

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

Chassis Repairs

WARNING



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

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

Electrical Precautions

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

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

⚠ WARNING

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

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

⚠ WARNING

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

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

⚠ WARNING

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

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

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

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

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

Battery Disconnecting

Before disconnecting the battery, switch off all electrical equipment.

⚠ WARNING

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

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

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

Disciplines

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

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

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

Electrical Wires

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

Glossary of Circuit Diagram Symbols

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

Connector



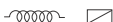
This illustration is used to show all multiplug type electrical connectors on Triumph circuit diagrams. The numbers in the box relate to the terminal numbers of the connector pins. On ECMs with two connectors, the number would be prefixed with the letters 'A' or 'B' to identify each connector. An additional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

Diode



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

Electromagnetic Winding (solenoid)



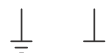
An electromagnetic winding (or solenoid) is used to convert an electrical current into a lateral movement. This can then be used to operate switches (as used in relays) or other components such as fuel injectors or secondary air injection solenoids.

Fuse



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

Ground Point



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

Lamp or Bulb



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

LED (Light Emitting Diode)



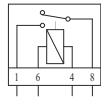
Triumph use LEDs for the alarm warning light, instrument illumination and warning lights, gear change lights and rear light/brake lights on various models.

Motor



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

Relay



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

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

Resistor



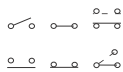
A device placed in a cable to reduce a voltage or restrict the maximum current a device can draw.

Splice



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

Switches



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

Electrical Testing

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

Ohm's Law

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

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

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

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

Power is calculated by multiplying Volts x Amps -

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

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

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

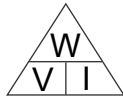
- the current flowing in the circuit can be calculated by using -

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

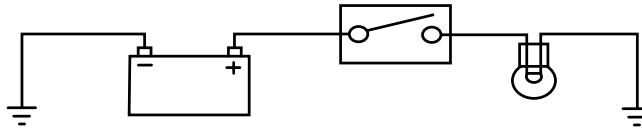
- the bulb resistance can be calculated by using -

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

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



Basic Electrical Circuits



Basic Circuit Diagram

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

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

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

Circuit Diagrams

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

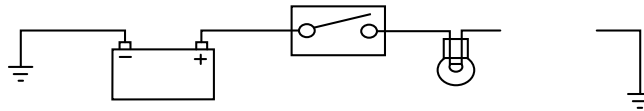
Circuit diagrams also depict the inner workings of a switch housing (i.e. which wire connects to which when a switch is turned from one position to another) so that a test of that switch can be made using the wire terminals in the connector instead of disassembling the switch itself.

More information can be found in Circuit Diagrams, in the Electrical section of the Service Manual.

Tracing Circuits

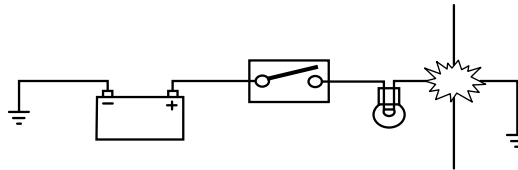
The following is a description of two types of common electrical failures, and some of the methods which may be used to find them.

Open Circuit



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

Short Circuit



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

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

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

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

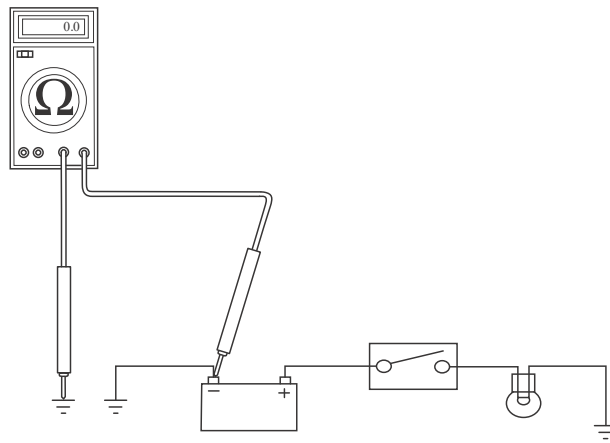
- a wire may diverge at a splice and go off to feed other circuits. If these circuits are working, check for wiring faults from the splice onwards.
- the circuit diagram is not an accurate guide to the actual location of the parts when fitted on the motorcycle. It is a schematic diagram of the circuits.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

To Check Continuity:

⚠ CAUTION

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

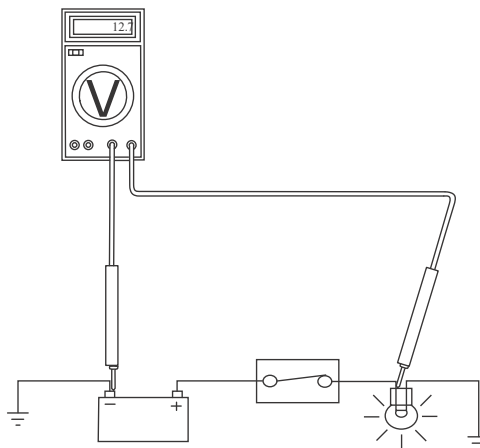
In the example below, the ground circuit continuity is being tested from the battery to the frame.



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

To Measure Voltage:

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



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

- Read the voltage from meter.

Splices

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

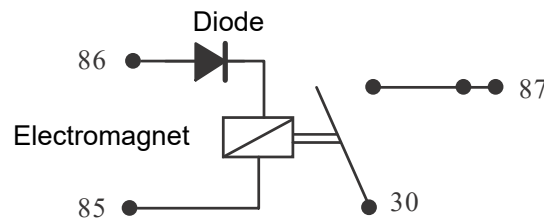
To locate a splice, it is necessary to peel back the insulation and examine the splice for its integrity. The most common fault is where one of the wires at the joint has come adrift usually causing the circuit it feeds or grounds to become 'dead'.

Switches

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



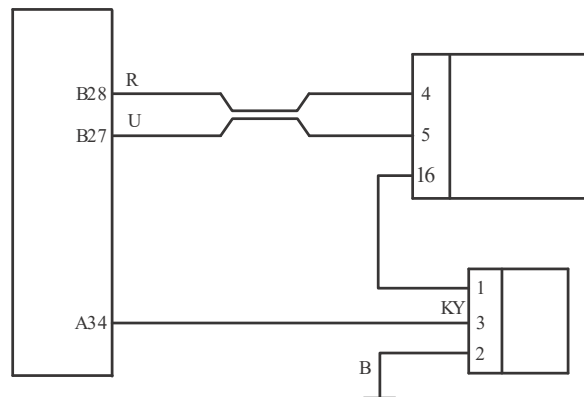
Make continuity checks across the electromagnet first, usually from pin 86 (positive) to pin 85 (negative). If a diode appears in the circuit use the diode check on the multimeter (Volts scale) in the direction of current flow. If there is no diode, use the resistance check facility. An open circuit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



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

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

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

Triumph currently uses CAN for communication between the following ECMs:

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

- Suspension ECM (if fitted)

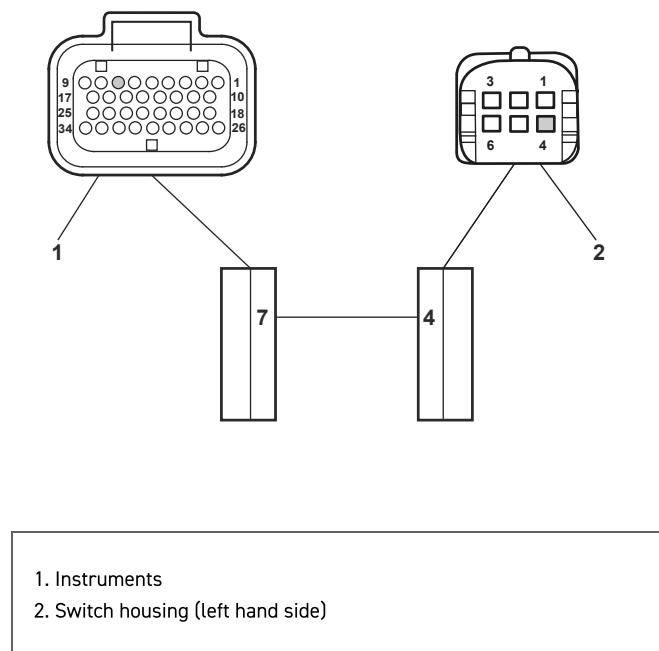
LIN (Local Interconnect Network)

LIN (Local Interconnect Network) is a serial network protocol used for communication between components in vehicles. The bus is a single master/multiple slave bus that uses a single wire to transmit data.

By using LIN, the amount of cabling required to allow components 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.

The instruments use some of this data internally and also broadcasts it on the CANbus (Controller Area Networking) for use on the motorcycle as necessary.

Information (such as headlight main beam) is being requested continuously by the Instruments, once a confirmation of the request is recognised the instruments will react accordingly.



Example

- Pressing the headlight main beam button on the switch housing (left hand handlebar) confirms to the instruments that headlight main beam is required.
- The instruments confirm the data has been received correctly and that the data is valid.
- Once confirmed the headlight main beam is switched on.

Triumph currently uses LIN on certain models for communication between the instruments and the following components:

- Fog light button
- Heated seat
- Dip beam/Daytime running lights (DRL) switch (if equipped)
- Mode button
- Turn signal switch
- Joystick button

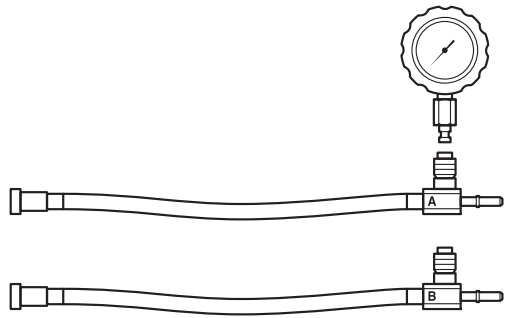
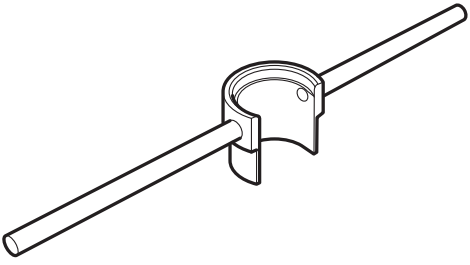
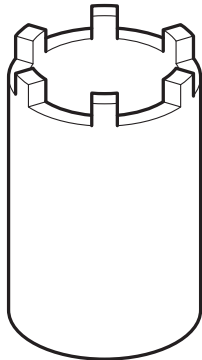
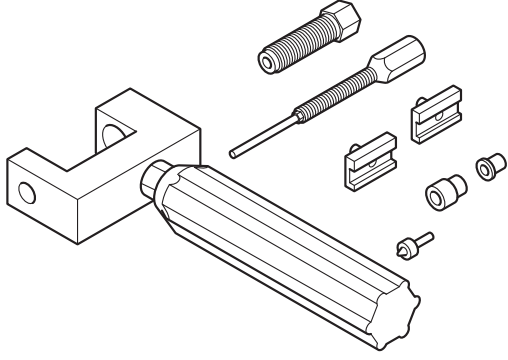
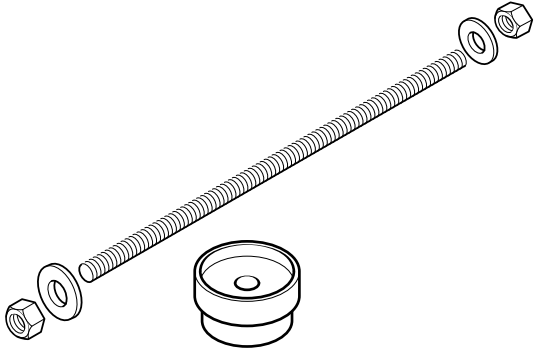
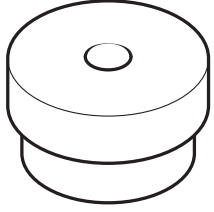
- Horn button
- High beam button

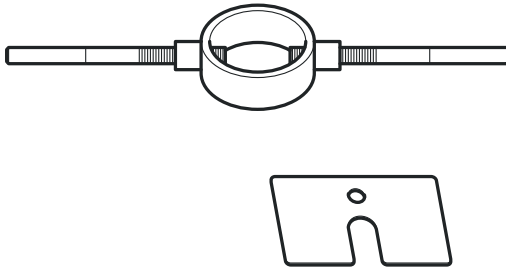
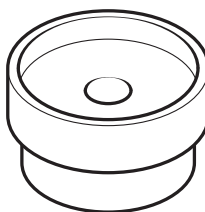
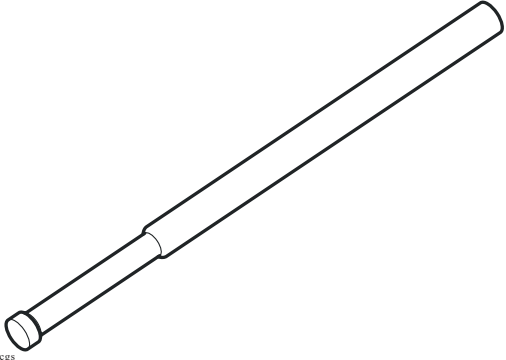
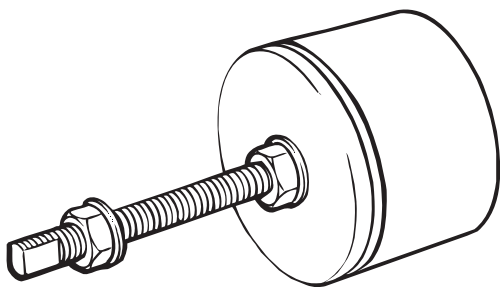
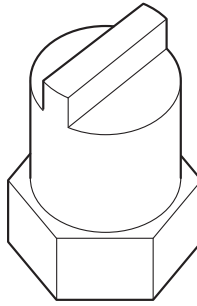
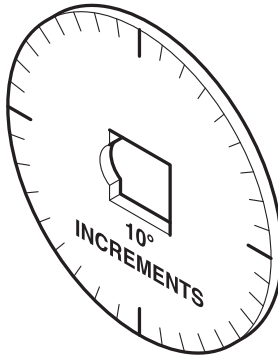
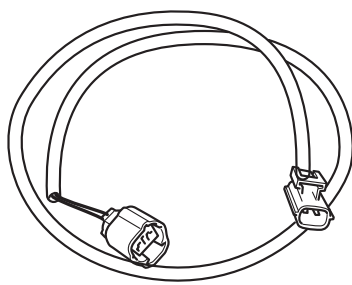
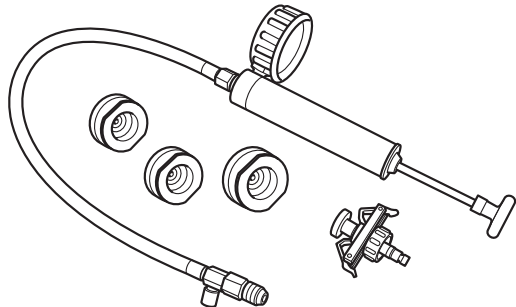
Service Tools

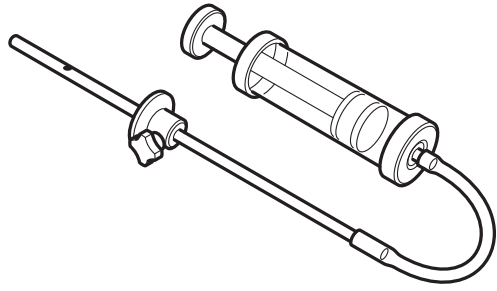
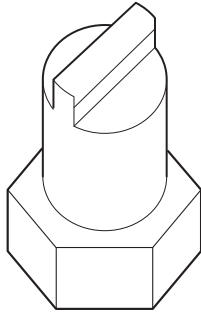
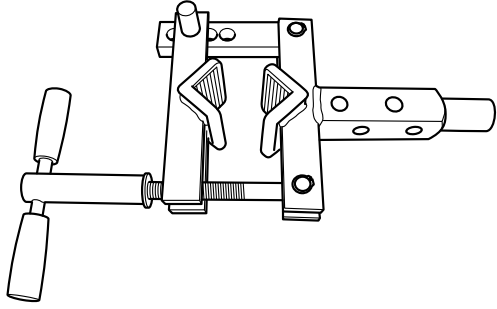
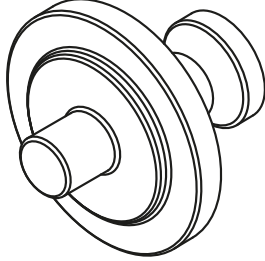
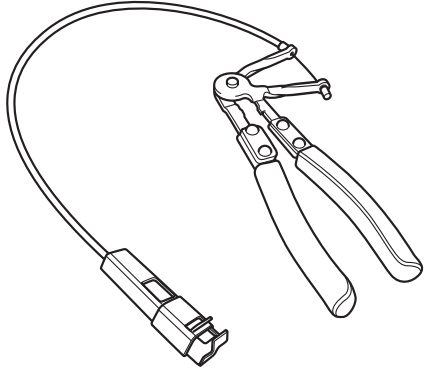
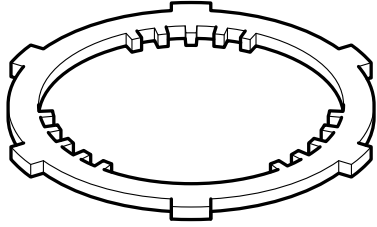
Service Tools and Garage Equipment

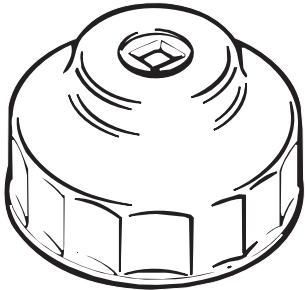
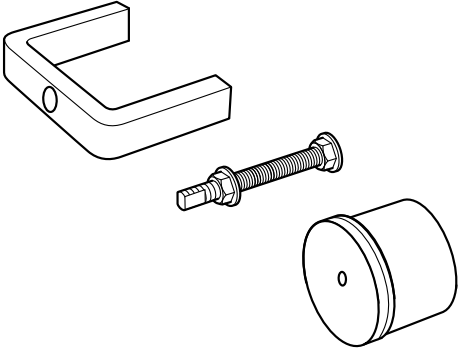
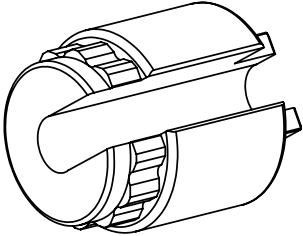
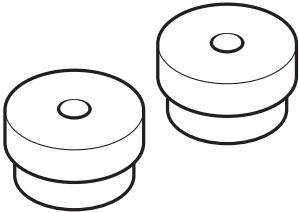
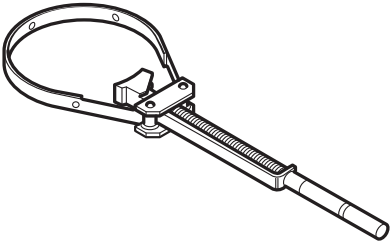
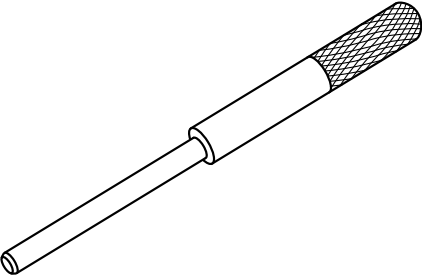
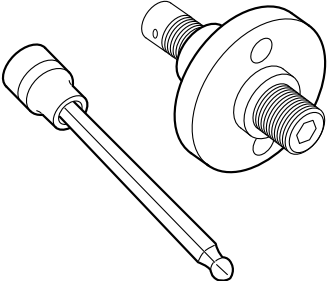
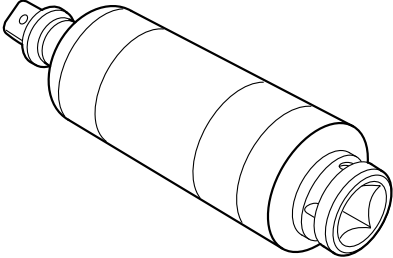
Special service tools have been developed to facilitate removal, dismantling and assembly of certain mechanical components in a practical manner without causing damage. Some operations in this service manual cannot be carried out without the aid of the relevant service tools. Where this is the case,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

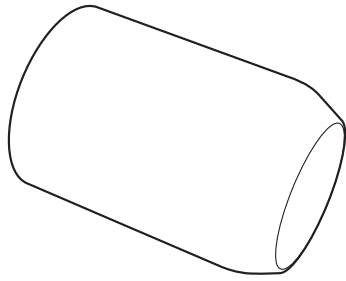
Special Service Tools

 Diagram of a fuel pressure gauge with two hoses labeled A and B. The gauge has a circular face with a needle. The hoses are flexible and have metal fittings at the ends. The label 'cdgh' is at the bottom left.	 Diagram of a front fork seal installer. It consists of a long, thin metal rod with a curved, hook-like end that has a small circular opening.
T3880001 - Fuel Pressure Gauge	T3880003 - Front Fork Seal Installer
 Diagram of a 50 mm socket. It is a cylindrical tool with a hexagonal base and a hexagonal top. The top has six raised points for gripping a nut or bolt head.	 Diagram of a chain link tool kit. It includes a large, L-shaped metal bracket, a long threaded rod, a smaller threaded rod, a hex nut, a hex washer, a small metal pin, and several small metal clips or spacers.
T3880023 - 50 mm Socket	T3880027 - Chain Link Tool Kit
 Diagram of a wheel bearing extraction kit. It includes a long threaded rod, a hex nut, a hex washer, a small metal pin, and a small metal cup or cap.	 Diagram of a bearing installer. It is a cylindrical tool with a hexagonal base and a hexagonal top. The top has a small circular opening in the center.
T3880053 - Wheel Bearing Extraction Kit	T3880065 - Bearing Installer

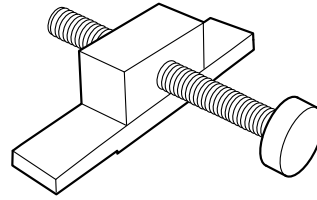
 A line drawing of a fork spring compressor. It consists of a central cylindrical body with two long, threaded rods extending from opposite sides. Below the main body is a separate, flat, rectangular plate with a U-shaped cutout in the center.	 A line drawing of a bearing installer. It is a cylindrical tool with a wider base and a narrower top section. A small circular hole is visible in the center of the top surface.
T3880067 - Fork Spring Compressor	T3880070 - Bearing Installer
 A line drawing of a long, thin, cylindrical rod. It has a slightly wider section in the middle and a small circular feature at one end. The text "ccgs" is printed near the bottom left.	 A line drawing of a cylinder liner extractor. It features a large, cylindrical body with a threaded rod passing through the center. The rod has a hexagonal nut at one end and a smaller, tapered section at the other.
T3880085 - Fork Piston Holder	T3880101 - Extractor, Cylinder Liners
 A line drawing of a swinging arm adjuster wrench. It has a hexagonal base and a cylindrical body with a rectangular slot on top. The text "cdoa" is printed near the bottom left.	 A line drawing of a torque angle gauge. It is a circular dial with a scale around the perimeter. The text "10° INCREMENTS" is visible on the dial. A small rectangular slot is in the center.
T3880104 - Swinging Arm Adjuster Wrench	T3880105 - Torque Angle Gauge
 A line drawing of an extension cable. It is a coiled cable with a connector at one end and a plug at the other. The text "T3880123" is printed near the bottom left.	 A line drawing of a radiator and cap tester kit. It includes a long, flexible hose, a pressure gauge, a pump handle, and several small fittings and connectors. The text "cgwp" is printed near the bottom left.
T3880123 - Extension Cable	T3880147 - Radiator and Cap Tester Kit

 ccha	
T3880160 - Fork Oil Filler/Evacuator	T3880166 - Wrench, Engine Mounting Adjuster
 cjlx	
T3880171 - Fork Holding Tool	T3880172 - Pulser Ring Alignment Tool
 cczh	
T3880174 - Alternator Housing Puller	T3880207 - Hose Clip Pliers
	 ccmi
T3880215 - Fork Seal Cleaner, 35-45 mm forks	T3880307 - Clutch Anti-rotation Jig

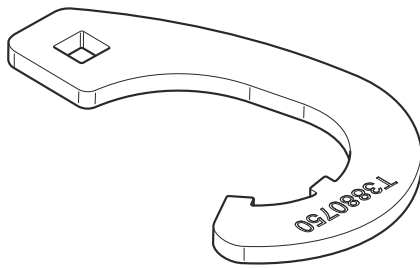
 gahc	 cjbb
T3880313 - Oil Filter Wrench	T3880315 - Extractor, Cylinder Liner
	
T3880367 - Wrench, Damper Cylinder, 33mm	T3880368 - Bearing Installer
	
T3880375 - Alternator Rotor Holder	T3880601 - Camshaft Timing Pin
	
T3880607 - Camshaft Timing Tensioner	T3880609 - Timing Torque Limiter



T3880642 - Fork Seal Guide/Protector

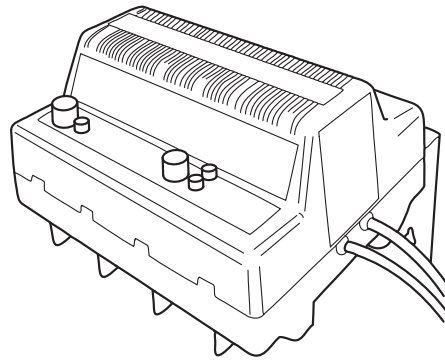


T3880640 - Camshaft Timing Plate



T3880750

T3880750 - Headstock Service Tool



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

Specifications

Specification

Dimensions, Weights, and Performance

A list of model specific dimensions, weights and performance figures is available from your authorised Triumph dealer, or on the Internet at www.triumph.co.uk.

Engine

Engine Configuration	3 cylinder 12 valve DOHC
Arrangement	Transverse in-line
Displacement	659.3 cc
Bore x Stroke	74 x 51.1 mm
Compression Ratio	11.95:1
Cylinder numbering	Left to Right (no.3 adjacent to camshaft drive)
Cylinder Sequence	Number 1 at left
Firing order	1.2.3.

Cylinder Head

Valve Head Diameter	Inlet	30.50 mm
	Exhaust	24.20 mm
Valve Lift	Inlet	8.50 mm
	Exhaust	7.36 mm
Valve Stem Diameter	Inlet	3.975-3.990 mm
Service Limit		3.965 mm
Valve Stem Diameter	Exhaust	3.965-3.980 mm
Service Limit		3.955 mm
Valve Guide Bore Diameter	Inlet	4.000 - 4.015 mm
Service Limit		4.043 mm
Valve Guide Bore Diameter	Exhaust	4.000 - 4.015 mm
Service Limit		4.043 mm
Valve Stem to Guide Clearance	Inlet	0.010-0.040 mm
Service Limit		0.078 mm
Valve Stem to Guide Clearance	Exhaust	0.020-0.050 mm
Service Limit		0.088 mm
Valve Seat Width (in head)	Inlet	1.20 mm
Service Limit		1.50 mm
Valve Seat Width (in head)	Exhaust	1.00 mm
Service Limit		1.70 mm
Valve Seat Width (valve)	Inlet	0.990-1.838 mm
	Exhaust	1.065-1.918 mm
Valve Seat Angle		45°
Inlet/Exhaust Valve Spring Load at Length		508 N +/- 25 N @27.5 mm
Valve Clearance	Inlet	0.10 - 0.20 mm
	Exhaust	0.325 - 0.375 mm

Valve Bucket Diameter	Inlet	25.385 - 25.399 mm
Service Limit		25.375 mm
Valve Bucket Diameter	Exhaust	25.385 - 25.399 mm
Service Limit		25.375 mm
Valve Bucket Bore Diameter	Inlet	25.421 - 25.431 mm
Service Limit		25.449 mm
Valve Bucket Bore Diameter	Exhaust	25.421 - 25.431 mm
Service Limit		25.449 mm

Camshafts

Camshaft Timing	Inlet	Open = 3° BTDC (@1 mm lift)
		Close = 34° ABDC (@1 mm lift)
	Duration	217° (@1 mm lift)
	Exhaust	Open = 27° BBDC (@1 mm lift)
		Close = 2° BTDC (@1 mm lift)
	Duration	205° (@1 mm lift)
Camshaft Journal Diameter		23.940 - 23.960 mm
Camshaft Journal Clearance		0.040 - 0.081 mm
Service Limit		0.17 mm
Camshaft Journal Bore Diameter		24.000 - 24.021 mm
Camshaft End Float		0.23 - 0.33 mm
Service Limit		0.40 mm
Camshaft Run-out		0.15 mm max.

Clutch and Primary Drive

Primary Drive Type	Gear
Reduction Ratio	1.854 (41/76)
Clutch Type	Wet multi-plate, slip assist
Number of Friction Plates	7
Plate Flatness	Within 0.1 mm
Friction Plate Thickness	3.80 mm
Service Limit	3.62 mm
Clutch Pack Height	38.90 mm
Clutch Actuation Method	Cable
Cable Free Play (at lever)	2-3 mm

Balancer

End Float	0.68 mm
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Pistons

Cylinder Bore Diameter	74.040-74.058 mm
Service Limit	74.11 mm
Piston Diameter (at 90° to gudgeon pin)	73.974-73.990 mm
Service Limit	73.930 mm
Piston Ring to Groove Clearances	
Top	0.02-0.06 mm
Service Limit	0.075 mm
Second	0.30-0.45 mm
Service Limit	0.075 mm
Piston Ring End Gaps	
Top	0.15-0.30 mm
Service Limit	0.42 mm
Second	0.30-0.45 mm
Service Limit	0.57 mm
Oil	0.20-0.70 mm
Service Limit	0.84 mm
Gudgeon Pin Bore Diameter in Piston	16.994-17.001 mm
Service Limit	17.030 mm
Gudgeon Pin Diameter	16.984-16.989 mm
Service Limit	16.970 mm

Connecting Rods

Connecting Rod Small End Diameter	17.014-17.027 mm
Service Limit	17.037 mm
Connecting Rod Big End Side Clearance	0.15-0.30 mm
Service Limit	0.50 mm

Crankshaft

Crankshaft Big End Journal Diameter	32.994-33.010 mm
Service Limit	32.950 mm
Crankshaft Big End Bearing Clearance	0.032-0.064 mm
Service Limit	0.070 mm
Crankshaft Main Bearing Journal Diameter	32.972-32.988 mm
Service Limit	32.948 mm
Crankshaft Main Bearing Clearance	0.020-0.046 mm
Service Limit	0.070 mm
Crankshaft End Float	0.15-0.30 mm
Service Limit	0.5 mm
Crankshaft Run-out	0.02 mm or less
Service Limit	0.05 mm

Transmission

Type		6 speed, constant mesh
Gear Ratios	1st	2.867 (15/43)
	2nd	2.053 (19/39)
	3rd	1.565 (23/36)
	4th	1.286 (21/27)
	5th	1.107 (28/31)
	6th	0.967 (30/29)
Gear Selector Fork Thickness		5.90-6.00 mm
Service Limit		5.80 mm
Gear Selector Groove Width		6.10-6.17 mm
Service Limit		6.27 mm
Gear Selector Fork to Groove Clearance		0.47 mm max

Final Drive

Final Drive	Chain
Final Drive Ratio	3.188 (16/51)
Chain Type	RK520KMW
Number of Links	120
20 Link Length	319 mm
Drive Chain Play	43 - 55 mm
Chain Lubrication	Chain spray suitable for XW-ring chains

Lubrication

Type	Pressure Lubrication, Wet Sump
Oil Capacity (dry fill)	3.2 litres
Oil Capacity (wet fill including filter)	2.8 litres
Oil Capacity (wet fill excluding filter)	2.6 litres
Recommended Oil Approval Rating	API SH (or higher) and JASO MA
Viscosity	10W/40 or 10W/50
Type	Semi or fully synthetic
Oil pressure (in main gallery)	30.0 lb/in ² min. @80°C oil temperature @ 5,000 rpm
Oil Pump Rotor Tip Clearance	0.15 mm
Service Limit	0.20 mm
Oil Pump Body Clearance	0.15 - 0.22 mm
Service Limit	0.35 mm
Oil Pump Rotor End Float	0.04 - 0.09 mm
Service Limit	0.17 mm

Ignition System

Type	Digital Inductive
Electronic Rev Limiter	10,500 rpm
Primary Coil Resistance	10 K Ohms +/- 15%
Ignition Coil Type	Plug-top
Spark Plug Type	NGK CR9EK
Spark Plug Gap	0.60-0.75 mm

Fuel System

Fuel Type	Unleaded, 91 RON (U.S. 87 CLC/AKI)
Fuel Tank Capacity (motorcycle upright)	14.4 litres
Low Level Warning Lamp	4 litres remaining
Fuel Pump Type	Submerged electric
Fuel Pressure (nominal)	3.5 bar (50.8 lb/in²)
Purge Control System	Electronic, via fuel system ECM

Fuel Injection System

Type	Electronic, sequential
Idle Speed	1300rpm
Injector Type	Twin jet, solenoid operated plate valve
Throttle	Electronically controlled throttle body
Control Sensors	Atmospheric air pressure, throttle position, twist grip position, coolant temperature, crankshaft position sensor, oxygen sensor, intake air temperature, gear position sensor, MAP, road speed (from ABS).

Emissions Controls

Catalytic converter	1 between Headers and Silencer
Oxygen sensor	Heated, in front of Catalyst
Evaporative Control	Activated carbon canister (certain markets only)
Secondary Air Injection	Solenoid controlled, reed valve type

Coolant System

Anti-Freeze Type	Triumph D2053 OAT
Freezing point	-35°C
Cooling System Capacity	2.20 litres
Radiator Cap Opening Pressure	1.1 bar
Thermostat Opening Temperature	71°C +/-2°C
Cooling Fan Switch On Temperature	103°C
Temperature Gauge Sensor Resistance	2.46 K Ohms +/-10% @ 20°C

Suspension

Front Fork Travel	120 mm
Recommended Fork Oil Grade	Showa SS47G
Left Hand Fork Oil Level (fork fully compressed)	125 mm
Right Hand Fork Oil Level (fork fully compressed)	115 mm
Left Hand Fork Oil Volume (dry fill)	560 cc
Right Hand Fork Oil Volume (dry fill)	475 cc
Fork Pull Through (measured from the flat/machined surface on the underside of the upper yoke to the top of the fork outer tube)	39.50 mm +/- 0.5 mm
Rear Wheel Travel	133.5 mm

Frame

Frame Type	Tubular steel perimeter frame
Rake	24.6°
Trail	107.3 mm
Maximum Payload (rider, passenger, luggage and accessories)	205 kg (452 lb)

Brakes

Front Type	Two hydraulically actuated twin piston sliding calipers acting on twin discs
Front Caliper Piston Diameter	27 mm
Front Disc Diameter	310 mm
Front Disc Thickness	4.5 mm
Service Limit	4.0 mm
Front Disc Run-out	0.25 mm
Front Master Cylinder Diameter	14 mm
Recommended Fluid	DOT 4
Rear Type	Hydraulically actuated single piston caliper, single disc
Rear Caliper Piston Diameter	27 mm
Rear Disc Diameter	255 mm
Rear Disc Thickness	5.5 mm
Service Limit	5.0 mm
Rear Disc Run-out	0.25 mm
Rear Master Cylinder Diameter	12.7 mm
Recommended Fluid	DOT 4

Wheels and Tyres

Front Wheel Size	MT 3.5 x 17
Front Tyre Size	120/70 ZR 17
Front Tyre Pressure	2.34 bar (34 lb/in ²)
Recommended Front Tyre	A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the Internet at www.triumph.co.uk
Front Wheel Rim Axial Run-out	0.5 mm
Front Wheel Rim Radial Run-out	0.5 mm
Rear Wheel Size	MT 5.5 x 17
Rear Tyre Size	180/55 ZR 17
Rear Tyre Pressure	2.90 bar (42 lb/in ²)
Recommended Rear Tyres	A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the Internet at www.triumph.co.uk
Rear Wheel Rim Axial Run-out	0.5 mm
Rear Wheel Rim Radial Run-out	0.5 mm

Electrical Equipment

Battery Type	YTX9-BS
Battery Rating	12V - 8 Amp. Hour
Alternator Rating	29 A @ 5,000 rpm
Fuses	See Fuse Identification

Torque Wrench Settings

Cylinder Head

Application	Torque (Nm)	Notes
Camshaft cover to cylinder head	10 Nm	See Camshaft Cover - Installation Apply clean engine oil to the seal(s)
Camshaft drive chain tensioner to cylinder barrel	8 Nm	
Camshaft ladder to cylinder head	*	See Camshaft - Installation and Timing
Camshaft sprocket to camshaft	22 Nm	Fit new fixing(s) if loosened or removed
Cylinder head bypass spigot	15 Nm	Fit new fixing(s) if loosened or removed
Cylinder head M6 fixings	10 Nm	
Exhaust stud to cylinder head	10 Nm	Fit new fixing(s) if loosened or removed
Secondary air injection valve covers to camshaft cover	9 Nm	
Sound suppression bolt	12 Nm	
Spark plugs	12 Nm	
Timing torque limiter	0.6 Nm	

Clutch

Application	Torque (Nm)	Notes
Clutch cable bracket	9 Nm	
Clutch centre nut	98 Nm	Fit new fixing(s) if loosened or removed Fit new Belleville washer
Clutch lever clamp bolts	9 Nm	
Clutch lever nut	6 Nm	
Clutch support plate to centre	10 Nm	
Clutch switch to switch housing	2 Nm	

Balancer, Crankshaft and Crankcase

Application	Torque (Nm)	Notes
Camshaft drive sprocket to crankshaft	27 Nm	Fit new fixing(s) if loosened or removed
Crankcase dry seal plug	33 Nm	Fit new fixing(s) if loosened or removed
Crankcase to crankcase fixings	*	See Crankcases - Assembly
Connecting rod big end bolts	*	See Connecting Rods - Installation
Sprag clutch to crankshaft	16 Nm	See Starter Drive/Sprag Clutch - Installation

Engine Covers

Application	Torque (Nm)	Notes
Alternator cover to crankcase	10 Nm	See Alternator Cover - Installation
Balancer cover	8 Nm	
Camshaft cover to cylinder head	10 Nm	See Camshaft Cover - Installation Apply clean engine oil to the seal(s)
Clutch cover to crankcase	8 Nm	See Clutch Cover - Installation
Engine breather cover to crankcase	10 Nm	See Engine Breather Cover - Installation
Front sprocket cover to crankcase	9 Nm	See Front Sprocket Cover - Installation
Right hand side crankcase cover	8 Nm	Crankcase Right Hand Cover - Installation
Sump to crankcase	10 Nm	See Sump - Installation
Sump plug	25 Nm	Fit new sealing washer(s)

Transmission

Application	Torque (Nm)	Notes
Detent arm fixing	12 Nm	Fit new fixing(s) if loosened or removed
Detent wheel to selector drum	12 Nm	Fit new fixing(s) if loosened or removed
Front sprocket to output shaft nut	85 Nm	
Gear change clamp pinch bolt	9 Nm	
Gear change pedal bolt	22 Nm	Fit new fixing(s) if loosened or removed
Gear change rod lock nuts	6 Nm	
Input shaft bearing retainer	12 Nm	Fit new fixing(s) if loosened or removed
Input selector shaft retainer	12 Nm	Fit new fixing(s) if loosened or removed
Output selector shaft retainer	12 Nm	Fit new fixing(s) if loosened or removed
Selector drum bearing retaining screw	12 Nm	Fit new fixing(s) if loosened or removed
Spring abutment bolt	15 Nm	Fit new fixing(s) if loosened or removed

Lubrication System

Application	Torque (Nm)	Notes
Crankcase breather baffle plate	9 Nm	Fit new fixing(s) if loosened or removed
Oil breather drain pipe	9 Nm	Fit new fixing(s) if loosened or removed
Oil filter	10 Nm	Apply clean engine oil to the seal(s)
Oil filter adapter	16 Nm	Fit new fixing(s) if loosened or removed
Oil level dipstick	1.2 Nm	
Oil pick up pipe	12 Nm	Fit new fixing(s) if loosened or removed
Oil pressure relief valve	15 Nm	Apply ThreeBond 1305 to the threads
Oil pressure switch	13 Nm	Fit new sealing washer(s)
Oil pump drive chain retainer plate	9 Nm	Fit new fixing(s) if loosened or removed
Oil pump drive sprocket to oil pump	12 Nm	Fit new fixing(s) if loosened or removed
Oil pump to crankcase	12 Nm	Fit new fixing(s) if loosened or removed
Oil transfer pipe	12 Nm	Fit new fixing(s) if loosened or removed

Final Drive

Application	Torque (Nm)	Notes
Chain rubbing strip to swinging arm	4 Nm	
Drive chain adjuster nut	3 Nm	See Drive Chain Free Movement - Adjustment
Drive chain adjuster lock nut	15 Nm	See Drive Chain Free Movement - Adjustment
Rear sprocket to sprocket carrier	55 Nm	See Rear Sprocket - Installation
Rear sprocket carrier stud	*	See Rear Sprocket - Installation
Rear hugger and chain guard moulding to swinging arm	4 Nm	

Cooling System

Application	Torque (Nm)	Notes
Coolant drain (on water pump outlet pipe)	10 Nm	
Coolant expansion tank	5 Nm	Fit new fixing(s) if loosened or removed
Coolant inlet to crankcase	8 Nm	
Coolant temperature sensor	18 Nm	
Cooling fan to radiator	8.5 Nm	
Radiator lower mounting bracket to coolant inlet cover bracket	6 Nm	
Radiator to frame upper	9 Nm	
Radiator to lower bracket	6 Nm	
Thermostat housing	9 Nm	
Water pump inlet pipe to crankcase	12 Nm	Fit new fixing(s) if loosened or removed
Water pump outlet pipe to crankcase	12 Nm	Fit new fixing(s) if loosened or removed

Fuel System, Exhaust System and Airbox

Application	Torque (Nm)	Notes
Air temperature sensor (inlet manifold)	1 Nm	Apply ThreeBond 1360 to the threads
Airbox front band clamp	1.5 Nm	
Airbox to frame	6 Nm	
Airbox upper to lower	1.5 Nm	
Ambient air pressure sensor	3 Nm	
Catalytic converter heat shield	5 Nm	
Crankshaft position sensor	6 Nm	Fit new fixing(s) if loosened or removed
Exhaust header to cylinder head	15 Nm	See Exhaust System - Installation
Exhaust silencer to frame fixings	19 Nm	
Fall detection switch	3 Nm	Fit new fixing(s) if loosened or removed
Fuel pump mounting plate to fuel tank	9 Nm	See Fuel Pump Assembly - Installation
Fuel rail to inlet manifold	4 Nm	
Fuel tank to frame (pivot nut)	8 Nm	
Fuel tank front mounting fixings	9 Nm	
Fuel tank rear mounting bracket to frame	12 Nm	See Fuel Tank - Installation
Fuel tank bodywork fixings	3 Nm	
Gear position sensor	5 Nm	
Inlet manifold casting	8 Nm	See Inlet Manifold - Installation
Inlet manifold moulding	8 Nm	See Inlet Manifold - Installation
Immobiliser module	1.5 Nm	
Left hand switch housing	2.5 Nm	
MAP sensor	5 Nm	
Oxygen sensor	25 Nm	
Purge valve	3 Nm	
Right hand switch housing	2.5 Nm	

Application	Torque (Nm)	Notes
Silencer rear finisher	5 Nm	
Throttle body to intake manifold	8 Nm	
Twist grip housing	2.5 Nm	

Front Suspension

Application	Torque (Nm)	Notes
Fork top cap	35 Nm	
Handlebar clamp bolt	26 Nm	
Handlebar end weights	3 Nm	Fit new fixing(s) if loosened or removed
Headstock bearing adjuster and lock nut	*	See Steering Head Bearing - Adjustment
Left hand grip	3 Nm	
Lower yoke pinch bolt	22 Nm	
Upper yoke centre nut	90 Nm	
Upper yoke pinch bolt	26 Nm	

Rear Suspension

Application	Torque (Nm)	Notes
Drag link to drop link	48 Nm	See Rear Suspension Unit - Installation
Drag link to frame	48 Nm	See Rear Suspension Unit - Installation
Drive chain rubbing strip	4 Nm	
Drive chain slack adjuster lock nut	15 Nm	
Rear hugger and drive chain guard moulding to swinging arm	4 Nm	
Rear suspension unit drop link to swinging arm	48 Nm	See Rear Suspension Unit - Installation
Rear suspension unit lower mounting to drop link	48 Nm	See Rear Suspension Unit - Installation
Rear suspension unit upper mounting	48 Nm	
Swinging arm pivot bolt adjuster	6 Nm	See Swinging Arm - Installation
Swinging arm pivot nut	110 Nm	See Swinging Arm - Installation

Wheels

Application	Torque (Nm)	Notes
Fork to wheel spindle pinch bolts	22 Nm	
Front wheel spindle/axle bolt	65 Nm	
Rear wheel spindle lock nut	110 Nm	Make sure the wheel spindle is fully inserted before tightening the lock nut.
Sprocket carrier stud	*	See Rear Sprocket - Installation

Front Brakes

Application	Torque (Nm)	Notes
Brake caliper to front fork	21 Nm	
Brake hose to front caliper	25 Nm	Fit new sealing washer(s)
Brake hose to front master cylinder	25 Nm	Fit new sealing washer(s)
Brake lever pivot bolt	1 Nm	
Brake lever pivot bolt lock nut	6 Nm	
Brake master cylinder reservoir cap fixings	1.5 Nm	
Brake pad retaining pin	18 Nm	
Caliper bleed screw	6 Nm	
Front brake disc to wheel	22 Nm	Fit new if loosened or removed
Front brake master cylinder to handlebar	12 Nm	
Front brake switch bracket	2 Nm	

Rear Brakes

Application	Torque (Nm)	Notes
Brake caliper bleed screw	6 Nm	
Brake caliper to carrier (external hex fixing)	29 Nm	
Brake caliper to carrier (internal hex fixing)	22 Nm	
Brake disc to wheel	22 Nm	Fit new fixing(s) if loosened or removed
Brake hose to rear caliper	25 Nm	Fit new sealing washer(s)
Brake light switch bracket	3 Nm	
Brake master cylinder reservoir to frame	6 Nm	Fit new fixing(s) if loosened or removed
Brake master cylinder to frame	16 Nm	
Brake pad retaining pin	18 Nm	
Brake pedal pivot bolt	22 Nm	Fit new fixing(s) if loosened or removed
Master cylinder push rod lock nuts	17 Nm	
Return spring bracket	3 Nm	

ABS System

Application	Torque (Nm)	Notes
ABS modulator bracket to frame	9 Nm	Fit new fixing(s) if loosened or removed
ABS modulator to bracket	9 Nm	Fit new fixing(s) if loosened or removed
ABS wheel speed sensors	9 Nm	
Brake line union to modulator	25 Nm	Fit new sealing washer(s)
Rear brake line protector moulding to alternator regulator/rectifier bracket	9 Nm	

Frame, Footrests, Control Plates and Engine Mountings

Application	Torque (Nm)	Notes
Bank angle indicator	9 Nm	Fit new fixing(s) if loosened or removed
Battery tray front fixings	5 Nm	
Battery tray side fixings	4 Nm	Fit new fixing(s) if loosened or removed
Battery tray rear fixings	3 Nm	
Engine mounting bolts	48 Nm	See Engine - Installation
Frame adjusters	3 Nm	See Engine - Installation
Frame side covers	3 Nm	
Front control plate	24 Nm	
Front mudguard to front forks	6 Nm	
Front mudguard centre moulding	1.5 Nm	
Fuel tank bracket to frame	12 Nm	See Fuel Tank - Installation
Gear change bracket to frame	24 Nm	
Grab handle bolts - Applicable markets only	24 Nm	
Grab handle lower fixings - Applicable markets only	9 Nm	
Mirror	17 Nm	
Radiator cowls	2.5 Nm	Fit new fixing(s) if loosened or removed
Rear footrest hanger	24 Nm	
Rear bodywork bracket fixings	12 Nm	
Rear mudguard side arm to swinging arm	32 Nm	
Rear mudguard to side arm	3 Nm	Fit new fixing(s) if loosened or removed
Rear mudguard to rear light moulding	6 Nm	
Rear mudguard side arm harness cover plate	1 Nm	
Rear panels to rear undertray	1 Nm	
Rear undertray to frame	3 Nm	
Seat lock latch	5 Nm	Fit new fixing(s) if loosened or removed

Application	Torque (Nm)	Notes
Side panels	3 Nm	

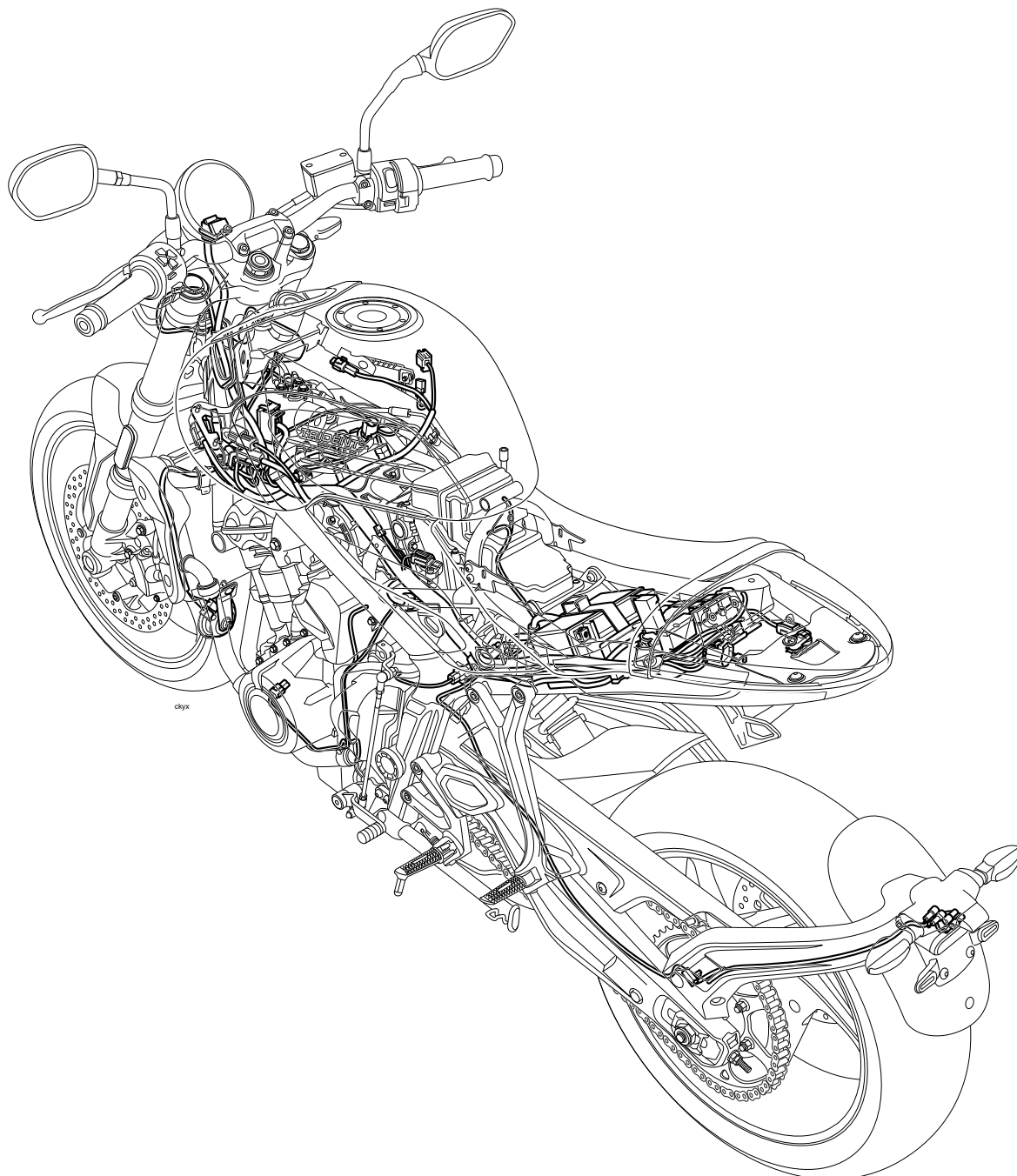
Electrical

Application	Torque (Nm)	Notes
Alternator rotor to crankshaft	120 Nm	
Alternator stator to cover	12 Nm	Fit new fixing(s) if loosened or removed
Alternator cable bracket to cover	6 Nm	Fit new fixing(s) if loosened or removed
Alternator regulator/rectifier to bracket	9 Nm	
Alternator regulator/rectifier bracket to frame	5 Nm	
Battery terminal fixings	4.5 Nm	
Front direction indicator	3 Nm	
Immobiliser ECM	1.5 Nm	
Ignition switch	16 Nm	Fit new fixing(s) if loosened or removed
Instrument assembly	3 Nm	
Instruments bracket to upper yoke	3 Nm	
Headlight to headlight bracket	3 Nm	
Headlight rear cover	3 Nm	
Headlight pivot lock nut	26 Nm	
Horn	9 Nm	
Negative battery lead to ground lock nut	10 Nm	
Negative battery lead to ground stud	4 Nm	Fit new fixing(s) if loosened or removed
Main harness front connector bracket	5 Nm	
Rear direction indicator	3 Nm	
Rear licence plate light	0.5 Nm	
Rear light	3 Nm	
Side stand switch	7 Nm	Fit new fixing(s) if loosened or removed
Starter motor power lead connection	3 Nm	
Starter motor solenoid lead connection	5 Nm	
Starter motor to crankcase	10 Nm	

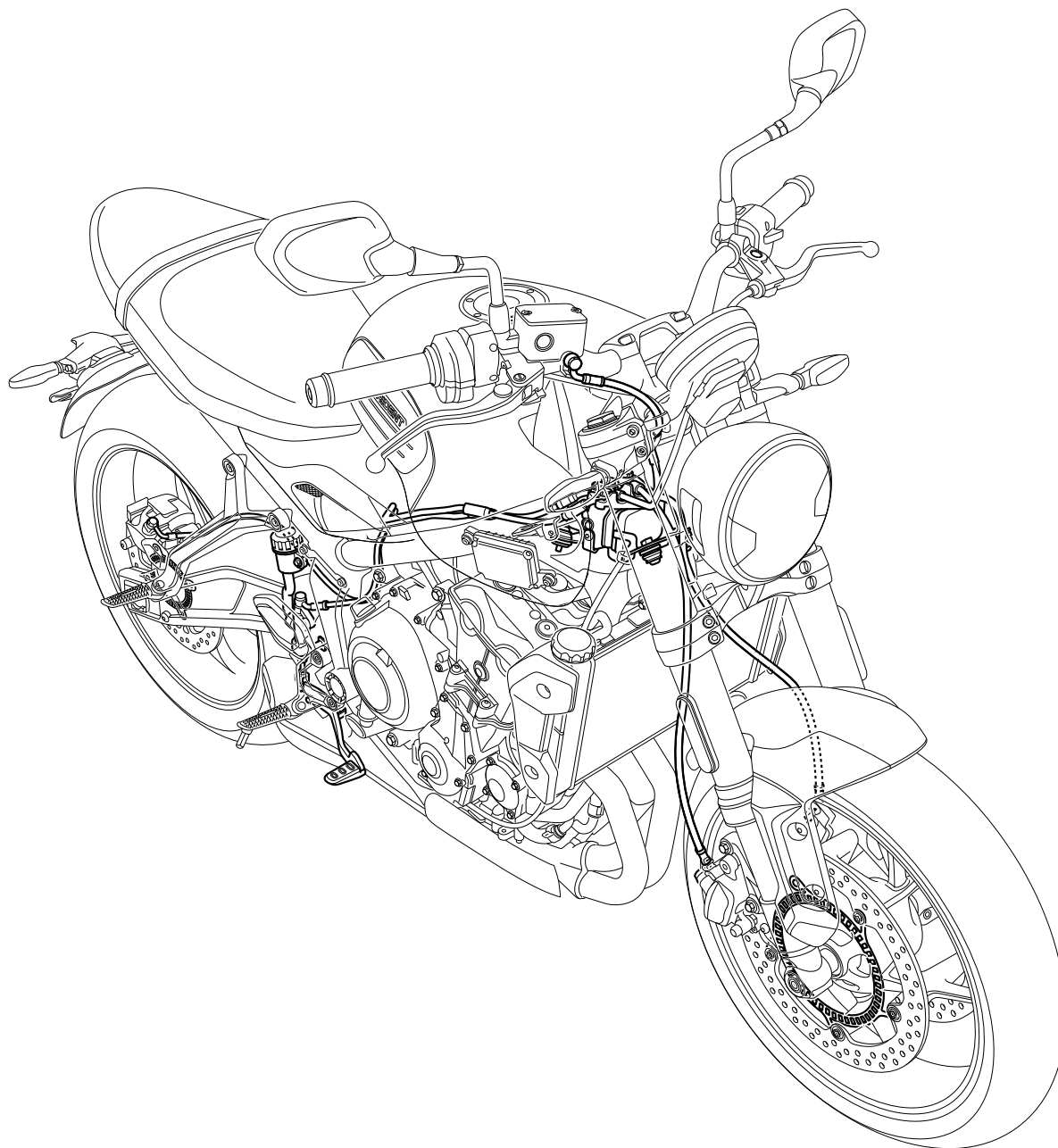
Application	Torque (Nm)	Notes
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Routings

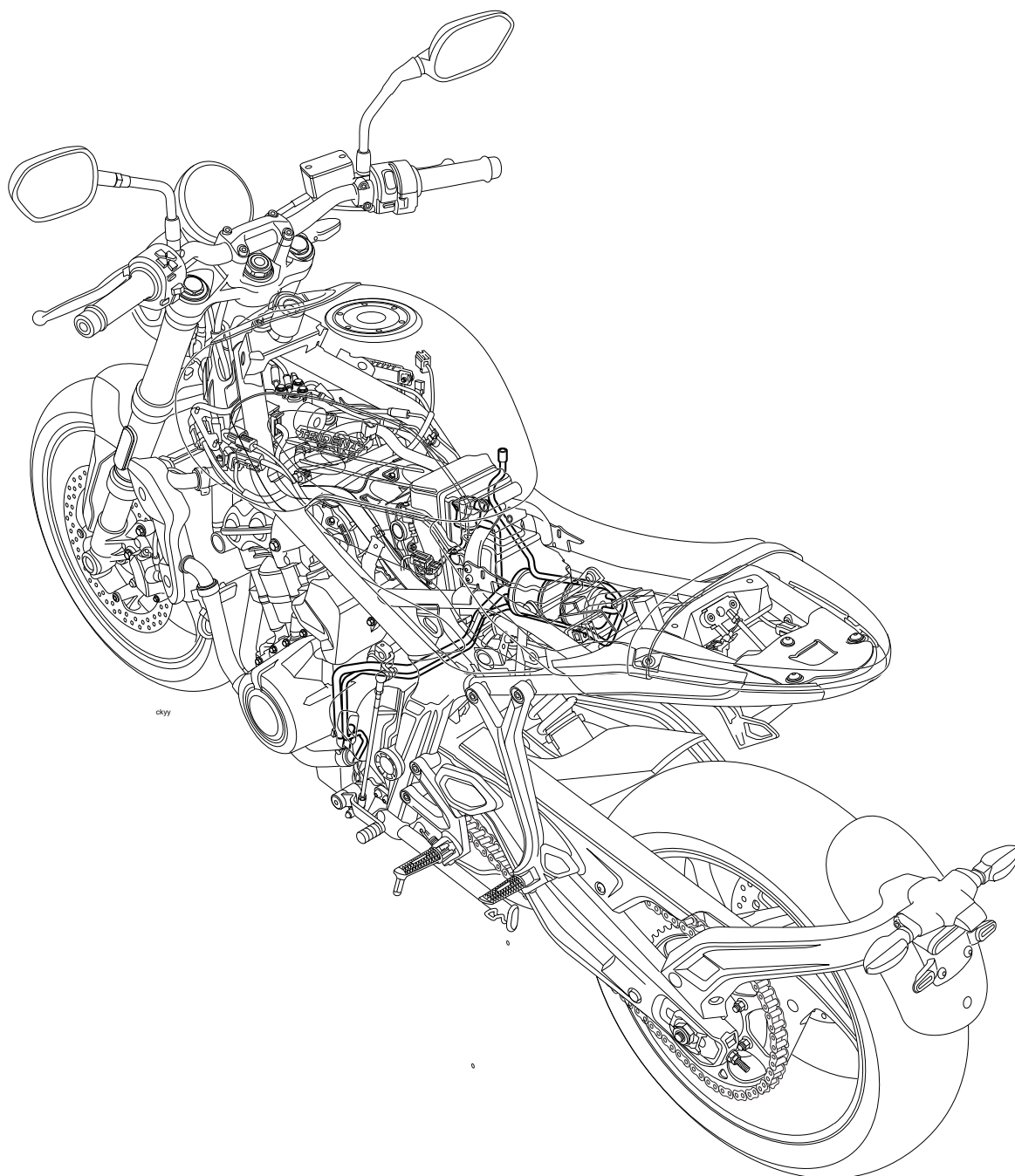
Routings - Main Harness



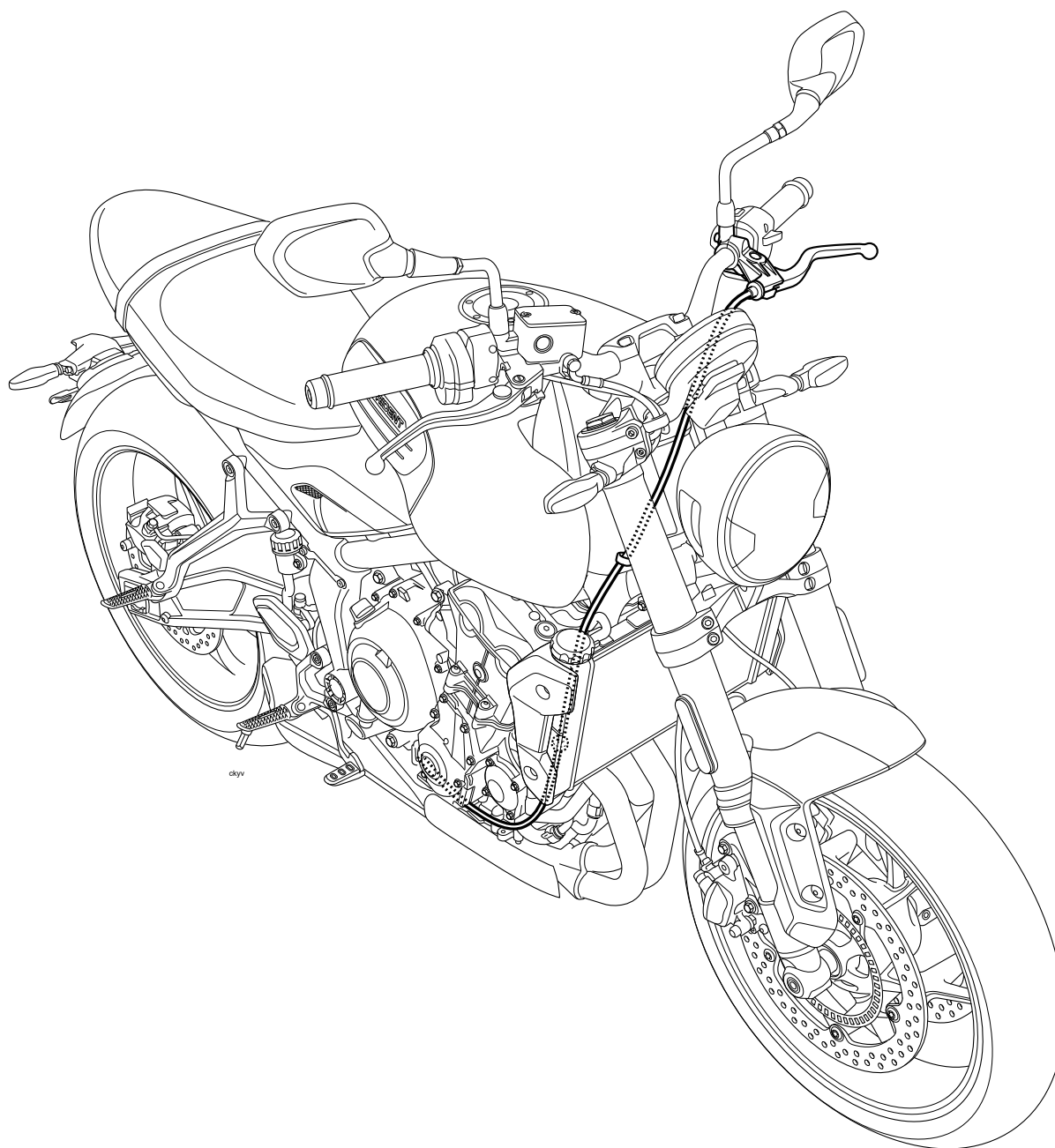
Routings - ABS



Routings - Evaporative Hose Routing



Routings - Clutch Cable



Scheduled Maintenance

Scheduled Maintenance

 **WARNING** 

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

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.

 **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 may lead to loss of control and an accident.

Weather, terrain and geographical location affect maintenance. The maintenance schedule should be adjusted to match the particular environment in which the motorcycle is used and the demands of the individual owner.

Special tools, knowledge and training are required in order to correctly carry out the maintenance items listed in the scheduled maintenance chart. Only an authorised Triumph dealer will have this knowledge and equipment.

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.

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. The information that follows describes the procedures to follow when carrying out the daily checks and some simple maintenance and adjustment items.

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

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

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

Triumph Motorcycles cannot accept any responsibility for damage or injury resulting from incorrect maintenance or improper adjustment.

Service Symbol/General Warning Symbol

🔑 The service symbol will illuminate for five seconds after the motorcycle start up sequence as a reminder that a service is due in approximately 60 miles (100 km). The service symbol will illuminate permanently when the mileage is reached, it will remain permanently illuminated until the service interval is reset using the Triumph Diagnostic tool.

🔑 The general warning symbol will flash if an ABS or engine management fault has occurred and the ABS and/or MIL warning lights are illuminated. Contact an authorised Triumph dealer as soon as possible to have the fault checked and rectified.

NOTICE



Items marked * in the following table are subject to additional labour charge, above the cost and time allowance for the basic service, which includes time to check only.

Scheduled Maintenance Table

Operation Description	Odometer Reading in Miles (Km) or time period, whichever comes first					
	Every	First Service	Annual Service	Mileage Based Service		
		600 (1000) six months	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Lubrication						
Engine and oil cooler - check for leaks	Day	•	•	•	•	•
Engine oil - renew	-	•	•	•	•	•
Engine oil filter - renew	-	•	•	•	•	•
Fuel System and Engine Management						
Fuel system - check for leaks	Day	•	•	•	•	•
Air filter - renew (replace more often if consistently riding in wet or dusty conditions)	-	-	-	•	•	•
Spark plugs - renew	-	-	-	-	•	•
Cooling System						
Cooling system - check for leaks	Day	•	•	•	•	•
Coolant level - check/adjust	Day	•	•	•	•	•
Cooling system - check coolant hoses for chafing, cracks or damage. Replace if necessary	-	•	•	•	•	•
Coolant - renew - every 3 years, regardless of mileage*	Every 3 years, regardless of mileage					
Engine						
Clutch - Check operation	Day	•	•	•	•	•
Clutch cable - check function and adjust as necessary (models fitted with a cable clutch only)	Day	•	•	•	•	•
Clutch lever pivot - clean/grease	-	-	•	•	•	•
Valve clearances - check/adjust*	-	-	-	-	•	•
Camshaft timing - check/adjust*	-	-	-	-	•	•

Operation Description	Odometer Reading in Miles (Km) or time period, whichever comes first					
	Every	First Service	Annual Service	Mileage Based Service		
		600 (1000) six months	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Wheels and Tyres						
Wheels - inspect for damage	Day	•	•	•	•	•
Tyre wear/tyre damage - check	Day	•	•	•	•	•
Tyre pressures - check/adjust	Day	•	•	•	•	•
Wheel bearings - check for wear/smooth operation	-	-	-	-	•	•
Steering and Suspension						
Steering - check for free operation	Day	•	•	•	•	•
Front and rear suspension - check for damage/leaks/smooth operation	Day	•	•	•	•	•
Headstock bearings - check/adjust	-	-	-	-	•	•
Rear suspension unit and linkage - lubricate (single rear suspension unit models only)	-	-	-	-	•	•
Fork oil - renew	-	-	-	-	-	•
Swinging arm spindle - lubricate	-	-	-	-	-	•
Brakes						
Brake system - check operation	Day	•	•	•	•	•
Brake pads - check wear levels*	Day	•	•	•	•	•
Brake fluid levels - check	Day	•	•	•	•	•
Brake fluid - renew - every 2 years, regardless of mileage*	Every 2 years, regardless of mileage					
Final Drive						
Drive chain slack - check/adjust	Day	•	•	•	•	•
Drive chain rubbing strip - check for wear, cracks or damage*	-	•	•	•	•	•
Drive chain - wear check*	-	•	•	•	•	•
Drive chain - lubricate	-	•	•	•	•	•
Electrical						
Lights, instruments and electrical systems - check/adjust	Day	•	•	•	•	•
General						

Operation Description	Odometer Reading in Miles (Km) or time period, whichever comes first					
	Every	First Service	Annual Service	Mileage Based Service		
		600 (1000) six months	Year	10,000 and 30,000 (16,000 and 48,000)	20,000 (32,000)	40,000 (64,000)
Bank angle indicators - check for wear*	Day	•	•	•	•	•
Centre and/or side stand - check for wear/smooth operation	Day	•	•	•	•	•
Instruments and engine ECM - check for latest calibration download using the Triumph diagnostic tool	-	•	•	•	•	•
Autoscan - carry out a full Autoscan using the Triumph diagnostic tool (print a customer copy)	-	•	•	•	•	•
Carry out all outstanding Service Bulletin and warranty work	-	•	•	•	•	•
Carry out road test	-	•	•	•	•	•
Complete the service record book and reset the service indicator (if fitted)	-	•	•	•	•	•

Service Specifications

Engine Oil Type	Semi or fully synthetic 10W/40 or 10W/50 motorcycle engine oil which meets specification API SH (or higher) and JASO MA, such as Castrol Power 1 Racing 4T 10W-40 (fully synthetic)
Engine Oil Capacity (Wet Fill Including Filter)	2.8 litres
Spark Plug Type	NGK CR9EK
Spark Plug Gap	0.60-0.75 mm
Coolant Type	Triumph D2053 OAT
Coolant Capacity	2.20 litres
Cutch Lever Free Play	2-3 mm
Valve Clearances - Inlet	0.10 - 0.20 mm
Valve Clearances - Exhaust	0.325 - 0.375 mm
Front Tyre Pressure	2.34 bar (34 lb/in ²)
Rear Tyre Pressure	2.90 bar (42 lb/in ²)
Fork Oil Grade	Showa SS47G
Fork Oil Level - Left Hand Fork	125 mm
Fork Oil Level - Right Hand Fork	115 mm
Fork Oil Volume - Left Hand Fork	560 cc
Fork Oil Volume - Right Hand Fork	475 cc
Front Fork Pull Through	39.50 mm +/- 0.5 mm
Front Brake Disc Maximum Run Out	0.25 mm
Rear Brake Disc Maximum Run Out	0.25 mm
Front Brake Disc Minimum Thickness	4.0 mm
Rear Brake Disc Minimum Thickness	5.0 mm
Brake Fluid Type	DOT 4
Front Brake Pad Minimum Thickness	1.5 mm
Rear Brake Pad Minimum Thickness	1.5 mm
Drive Chain Type	RK520KMW

Drive Chain Play Measurement	43 - 55 mm
Drive Chain 20 Link Limit	319 mm
Drive Chain Lubrication	Chain spray suitable for XW-ring chains
Bank Angle Indicator Service Limit	15 mm

Service Torque Wrench Settings

Oil Filter	10 Nm	Apply clean engine oil to the seal(s)
Sump Plug	25 Nm	Fit new sealing washer(s)
Upper Airbox Fixings	1.5 Nm	
Spark Plugs	12 Nm	
Camshaft Cover	10 Nm	See Camshaft Cover - Installation Apply clean engine oil to the seal(s)
Front Wheel Spindle	65 Nm	
Front Wheel Spindle Pinch Bolts	22 Nm	
Upper Yoke Centre Nut	90 Nm	
Swinging Arm Spindle Nut	110 Nm	
Front Brake Master Cylinder Reservoir Cap	1.5 Nm	
Front Brake Hose to Caliper	25 Nm	Fit new sealing washer(s)
Front Brake Hose to Master Cylinder	25 Nm	Fit new sealing washer(s)
Front Brake Caliper	21 Nm	
Front Brake Caliper Bleed Screw	6 Nm	
Rear Brake Master Cylinder Reservoir	6 Nm	Fit new fixing(s) if loosened or removed
Rear Brake Hose to Master Cylinder	25 Nm	Fit new sealing washer(s)
Rear Brake Master Cylinder to Control Plate	16 Nm	
Rear Brake Pad Retaining Pins	18 Nm	
Rear Brake Caliper Bleed Screw	6 Nm	
Fuel Tank Bracket to Frame	12 Nm	See Fuel Tank - Installation
Fuel Tank Front Fixings	9 Nm	
Fuel Tank Rear Fixing	3 Nm	
Fuel Tank Rear Pivot Fixing	8 Nm	

Battery Terminals	4.5 Nm	
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Engine Check For Fluid Leaks

WARNING



Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Standard required:

All engine components must be free from fluid leaks.

Check:

Check the visible areas of the crankcase, cylinder head and transmission for fluid leaks.

Visually inspect the oil hoses (if fitted) for fluid leaks and signs of damage or chafing (where accessible).

Rectification if required:

A leaking or damaged component must be replaced.

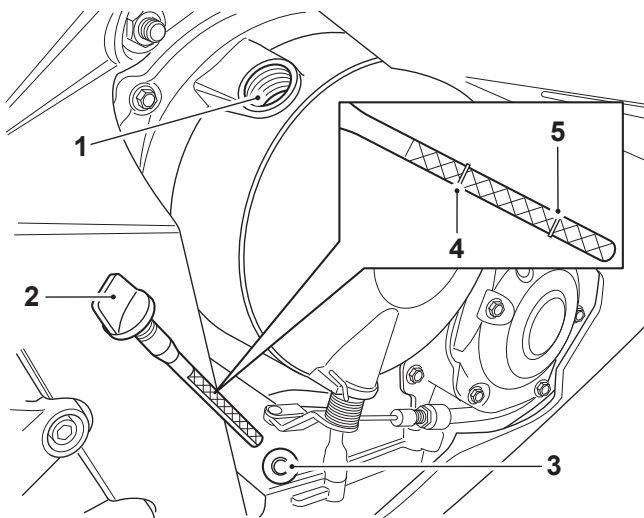
Oil Level Inspection

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 resulting in engine or transmission seizure. Seizure of the engine or transmission may lead to loss of motorcycle control and an accident.

1. Start the engine and run at idle for approximately five minutes.
2. Stop the engine, then wait for at least three minutes to allow the oil to settle.
3. Remove the dipstick, wipe clean and screw fully home in the crankcase.



1. Filler
2. Dipstick
3. Dipstick location in crankcase
4. Upper marking
5. Lower marking

NOTICE

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

Do not add oil through the dipstick hole in the crankcase.

4. Remove the dipstick.
5. The oil level is indicated by lines on the dipstick. When full, the indicated oil level must be level with the upper marking on the dipstick.
6. If the oil level is too low, remove the filler plug and add oil a little at a time through the filler plug hole in the clutch cover, until the correct level is reached.
7. Once the correct level is reached, fit the dipstick and the filler plug.

Oil and Oil Filter Change

⚠ WARNING

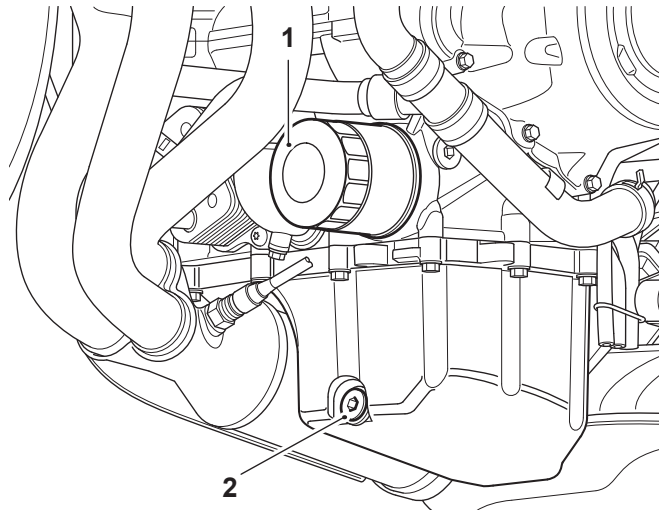
Prolonged or repeated contact with engine oil can lead to skin dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contamination which can cause cancer. Wear suitable clothing and avoid skin contact.

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

⚠ WARNING

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

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.
3. Remove the oil drain plug.



1. Oil drain plug
2. Oil filter

4. Unscrew and remove the oil filter using service tool T3880313 - Oil Filter Wrench. Dispose of the old oil filter in an environmentally friendly way.
5. Apply a smear of clean engine oil to the sealing ring of the new oil filter.
6. Fit the oil filter and tighten to 10 Nm using T3880313 - Oil Filter Wrench.
7. After the oil has completely drained out, fit a new sealing washer to the drain plug. Fit and tighten the plug to 25 Nm.
8. Fill the engine with a 10W/40 or 10W/50 semi or fully synthetic motorcycle engine oil that meets specification API SH (or higher) and JASO MA, such as Castrol Power 1 Racing 4T 10W-40 (fully synthetic).
9. Start the engine and allow it to idle for a minimum of 30 seconds.

⚠ CAUTION



Raising the engine speed above idle before the oil reaches all parts of the engine can cause engine damage or seizure. Only raise engine speed after running the engine for 30 seconds to allow the oil to circulate fully.

⚠ 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.

10. Ensure that the low oil pressure warning light remains off and the oil pressure message is not visible in the instrument display screen.
11. Stop the engine and check the oil level. Adjust if necessary.

Fuel/Evaporative System - Check For Leaks, Routing, Chafing and Security

Standard required:

Fuel/evaporative hoses must be secure and routed in such a way that they do not chafe against moving parts of the motorcycle.

Fuel/evaporative hoses must not be routed around sharp curves. This could cause restrictions in the flow of fuel.

Fuel/evaporative system components must be free from damage.

The fuel tank cap must be easy to open and close.

The fuel tank cap seal must be free from damage.

The fuel cap lock barrel and key (if fitted) must operate easily and smoothly.

Check:

Visually check fuel/evaporative system components for signs of fuel leakage.

Visually check fuel/evaporative system components for signs of damage.

Visually check fuel/evaporative system components for security (where accessible).

Check the operation of the fuel filler cap and lock (if fitted).

Visually inspect the fuel cap seal for signs of damage.

Rectification if required:

Fuel/evaporative leaks must be rectified.

Damaged fuel/evaporative system components must be replaced.

An incorrectly fitting fuel cap must be replaced.

Air Filter Element - Renew

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

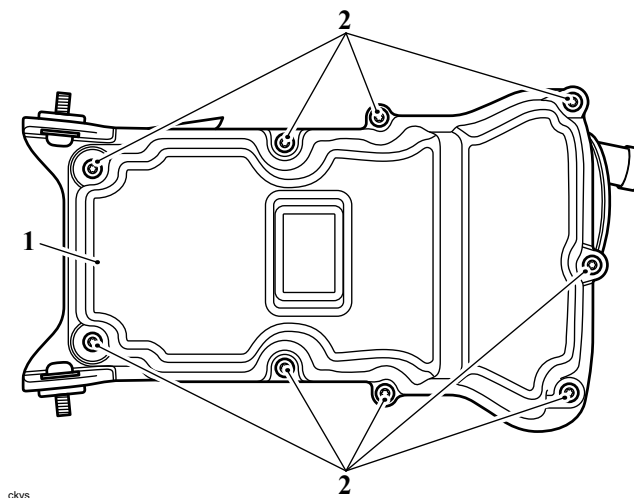
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Removal

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

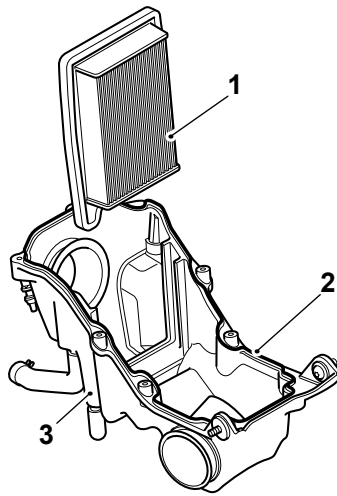
1. Remove the nine fixings and separate the airbox upper from the airbox.



ckvs

1. Airbox upper
2. Fixings

2. Remove the air filter from the airbox.

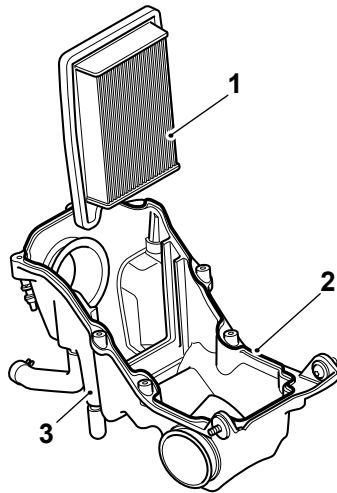


ckvn

- 1. Air filter
- 2. Seal
- 3. Airbox

Installation

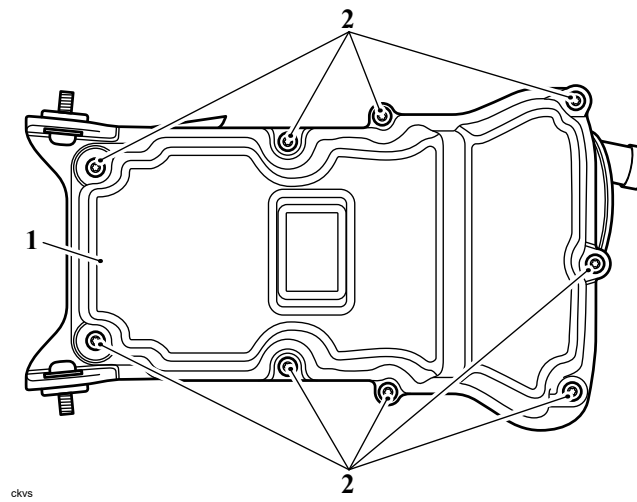
1. Install the air filter into the airbox.
2. Check the condition of the seal and, if necessary, replace.



ckvn

- 1. Air filter
- 2. Seal
- 3. Airbox

3. Fit the airbox upper to the airbox and secure with nine fixings. Tighten to 1.5 Nm.



- 1. Airbox upper
- 2. Fixings

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Spark Plugs - Inspection

Assessing the condition of a spark plug can be a valuable aid to a technician, and a good source of information about the engines overall operating condition.

In general, a light brown/grey colour tells you that the spark plug is operating at optimum temperature and that the engine is in good condition.

Dark colouring, such as heavy wet or dry deposits, can indicate:

- an overly rich condition
- too cold a heat range spark plug
- a possible vacuum leak
- low compression
- overly retarded timing
- too large a spark plug gap.

If the deposits are wet, it can be an indication of:

- a breached head gasket
- poor oil control from the piston rings
- valve train problems
- an extremely rich condition - depending on the actual liquid present at the firing tip.

Signs of fouling or excessive heat must be traced quickly to prevent further deterioration of performance and possible engine damage.

Normal Condition



An engines condition can be judged by the appearance of the spark plugs firing end. If the firing end of a spark plug is light brown or grey, the condition can be judged to be good and the spark plug is functioning optimally.

Dry and Wet Fouling



Although there are many different scenarios, if the insulation resistance between the centre electrode and the shell is over 10 Ohms, the engine can be started normally. If the insulation resistance drops to 0 Ohms, the firing end is fouled by either wet or dry carbon.

Overheating



When a spark plug overheats, deposits that have accumulated on the insulator tip melt and give the insulator a glazed or glossy appearance.

Deposits



The accumulation of deposits on the firing end is influenced by oil leakage, fuel quality and the engines operating duration.

Breakage



Breakage is usually caused by thermal expansion and thermal shock due to sudden heating or cooling.

Normal Life



A worn spark plug not only wastes fuel but also strains the whole ignition system because the expanded gap (due to erosion) requires higher voltages. Normal rates of gap growth are:

0.00063 - 0.000126 inches per 1000 miles (0.01 - 0.02 mm per 1000 km).

Melting



Melting is caused by overheating. Mostly, the electrode surface is rather lustrous and uneven. The melting point of nickel alloy is 1200 to 1300 °C (2200 to 2400 °F).

Erosion, Corrosion and Oxidation



The material of the electrodes has oxidised, and when the oxidation is heavy, it will be green on the surface. The surface of the electrodes will also be fretted and rough.

Spark Plugs - Renew

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [ABS Modulator - Removal](#)

1. Detach the electrical connections from the ignition coils.
2. Remove the ignition coils from the cylinder head.
3. Using a suitable tool remove the spark plugs from the cylinder head.
4. Fit new spark plugs and tighten to 12 Nm.
5. Inspect the ignition coils seal for damage and replace if necessary.
6. Refit the ignition coils and reconnect the ignition coils electrical connections.

Perform the following operations:

- [ABS Modulator - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Coolant System - Check For Fluid Leaks

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠️ WARNING

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

⚠️ 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.

All cooling system components must be free from fluid leaks.

Check the visible areas of the radiator heat exchanger/oil cooler (if fitted) for fluid leaks.

Visually inspect the coolant hoses for fluid leaks.

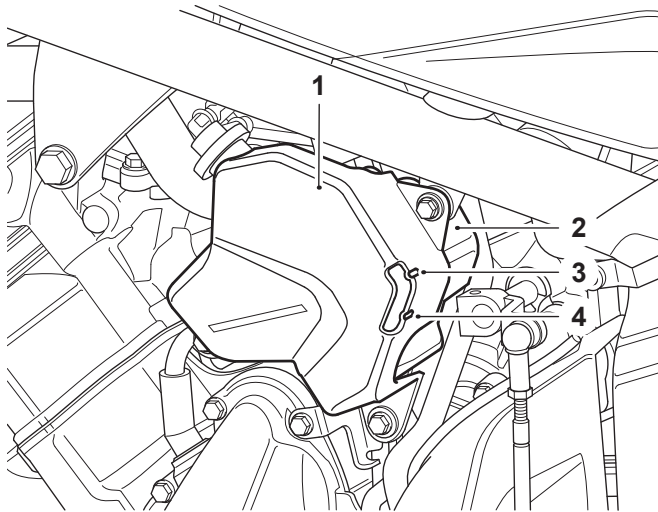
A leaking or damaged cooling system component must be replaced.

Coolant Level Inspection

NOTICE

The coolant level should be checked when the engine is cold (at room or ambient temperature).

1. Position the motorcycle on level ground and in an upright position. The expansion tank can be viewed from the left hand side of the motorcycle, below and towards the rear of the fuel tank.
2. Check the coolant level in the expansion tank. The coolant level must be between the MAX and MIN marks. If the coolant is below the minimum level, the coolant level must be adjusted.



1. Expansion tank cover
2. Expansion tank
3. MAX mark
4. MIN mark

Coolant Level Adjustment

⚠ WARNING

Do not remove the expansion tank or 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.

NOTICE

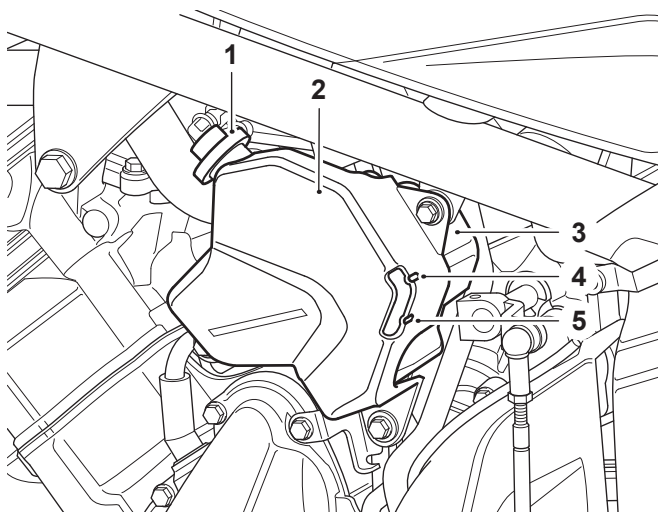
If the coolant level is being checked because the coolant has overheated, with the motorcycle on level ground and in an upright position, also check the level in the radiator and top up if necessary.

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 reduce the efficiency of the cooling system. Reduced cooling system efficiency may cause the engine to overheat and suffer severe damage.

1. Allow the engine to cool.
2. Remove the cap from the expansion tank and add coolant mixture through the filler opening until the level reaches the MAX mark. Refit the cap.



1. Expansion tank cap
2. Expansion tank cover
3. Expansion tank
4. MAX mark
5. MIN mark

Clutch Cable - Check/adjust

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Standard required:

It should be possible to pull the clutch lever easily and smoothly towards the handlebar grip.

The clutch cable must be routed such that it does not chafe against moving parts of the motorcycle.

When the clutch lever is released, check for correct clutch free play at the lever is as described in the [Service Specifications](#).

Check:

Check the action of the clutch by pulling the clutch lever towards the handlebar grip in order to disengage the clutch.

Check that the clutch cable is correctly routed and free from sharp bends or twists along its length.

Check that the clutch lever returns to the fully forward position when released (allowing for the specified free-play).

Check the operation of the clutch lever span adjuster.

Rectification if required:

If necessary, adjust the clutch cable as described in the Owner's Handbook.

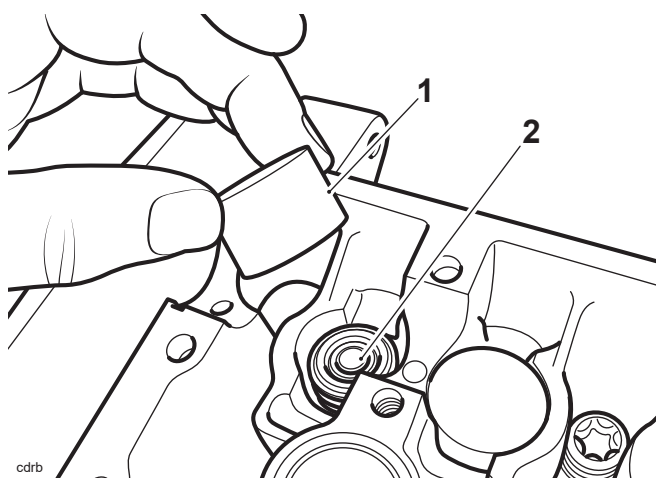
If undue resistance is felt when pulling the clutch lever towards the handlebar grip, check that the clutch cable is correctly routed. Twists or sharp bends in the cable will result in increased friction between the inner and outer cables.

Valve Clearance Adjustment

NOTICE

To adjust the valve clearances the camshafts must be removed. Follow the camshaft removal procedure.

1. Remove the camshafts (see [Camshaft - Removal](#)).
2. Remove the tappet bucket from the cylinder head.
3. Remove the shim from the valve head.



1. Tappet bucket
2. Shim

NOTICE

The shim may withdraw with the tappet bucket.

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.

NOTICE

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 [Camshaft - Installation and Timing](#)).
9. Re-check all valve clearances.
10. Repeat the procedure if the valves require further adjustment.
11. Fit the camshaft cover (see [Camshaft Cover - Installation](#)).

Camshaft Timing Adjust

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Camshaft Cover - Removal](#)
- [Crankcase Right Hand Cover - Removal](#)
- [Valve Clearance Measurement](#)

NOTICE

After the initial camshaft timing has been completed and T3880640 - Camshaft Timing Plate removed, it will not be possible to refit it without first loosening the camshafts.

⚠️ 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 valve timing using the service tools and timing procedure described below. Severe engine damage will result from incorrect camshaft adjustment.

NOTICE

The camshaft sprocket fixings need only be loosened sufficiently to allow the sprockets to rotate on the camshafts.

Removing the spark plugs reduces compression resistance when turning the engine

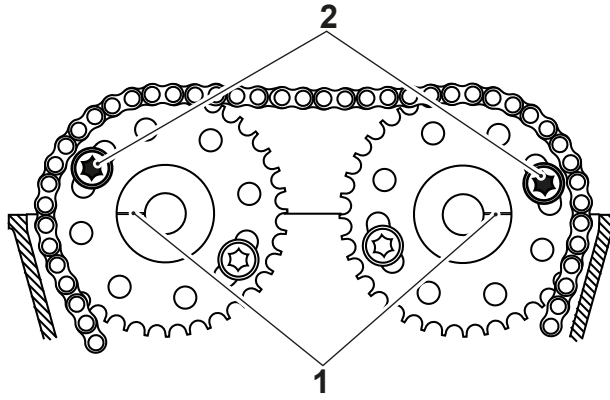
1. Remove the spark plugs to reduce compression resistance when turning the engine.

NOTICE

While rotating the crankshaft, ensure that the front camshaft drive chain rubbing blade remains in its mounting.

Before inserting the timing pin, ensure the dot on the primary gear is aligned with the line on the crankcase.

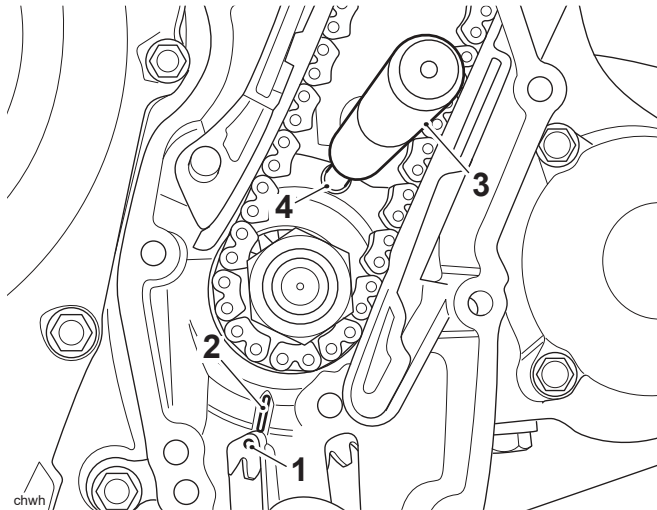
2. Using the bolt fitted to the end of the crankshaft, rotate the crankshaft clockwise (the normal direction of rotation). Stop rotation when the camshaft alignment marks are positioned outwards as shown below and the dot mark on the primary gear aligns with the line on the crankcase.



naaa 14

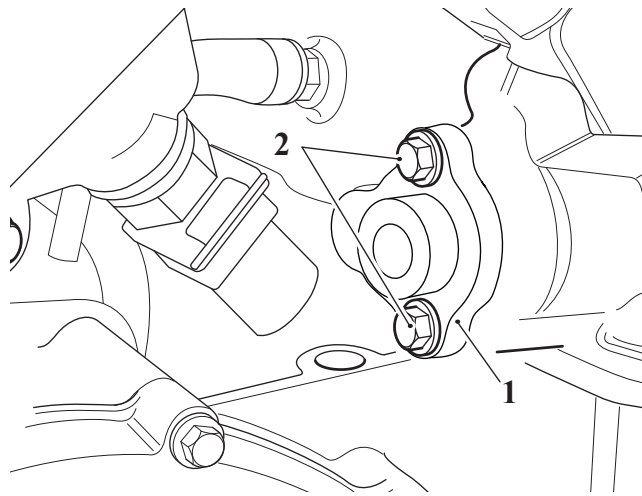
1. Camshaft alignment marks
2. Fixings

3. Insert service tool T3880601 into the timing holes in the crankcase and crankshaft.



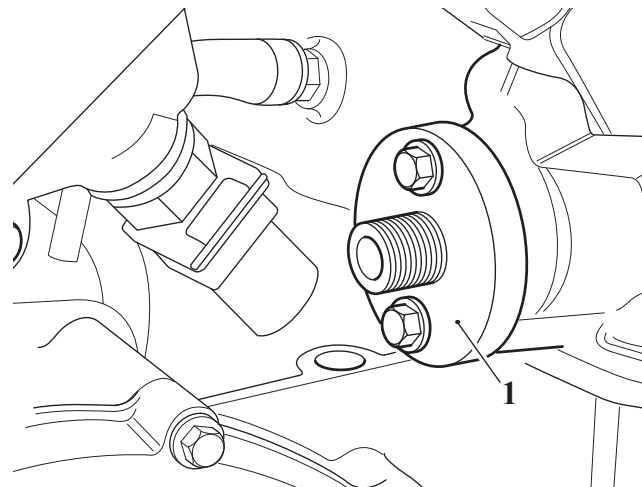
1. DOT alignment mark
2. Marker line
3. T3880601 - Camshaft Timing Pin
4. Timing hole in crankcase

4. Evenly release the camshaft drive chain tensioner mounting bolts until the plungers spring tension has been released.
5. Remove the tensioner and discard the O-ring and gasket.



- 1. Tensioner
- 2. Fixings

6. Fit the service tool T3880607 using the original fixings and tighten to 8 Nm.



- 1. T3880607 - Camshaft Timing Tensioner

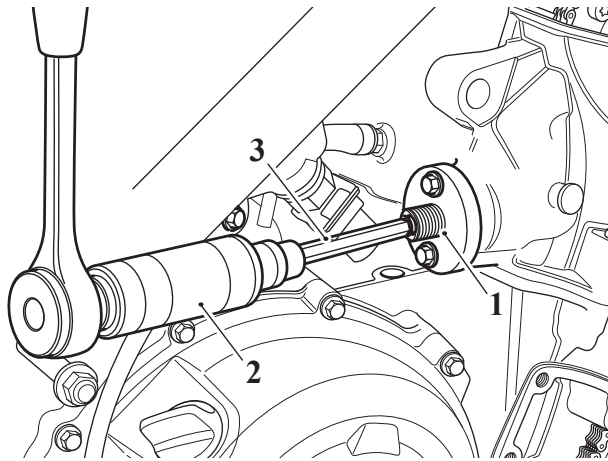
⚠ CAUTION

The torque value stated is very important to accurate timing. Always use the correct value of 0.6 Nm, as set using the service tool 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.

7. Using the service tool T3880609 and a 6 mm Ball Ended Allen Key, tighten the service tool T3880607 to 0.6 Nm preset by the service tool T3880609.

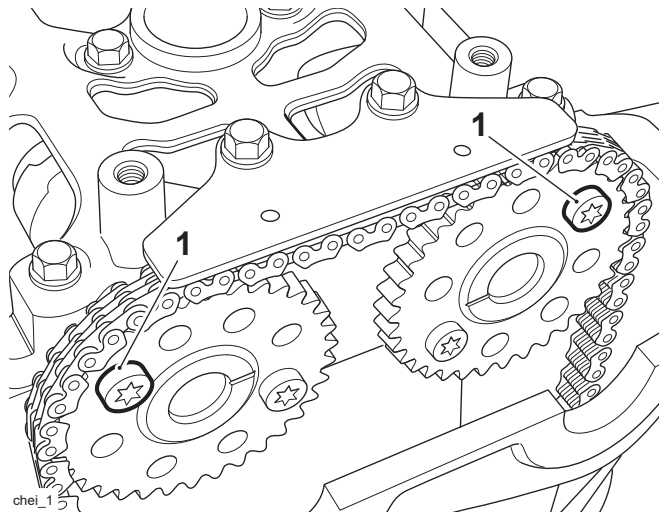


- 1. T3880607 - Camshaft Timing Tensioner
- 2. T3880609 - Timing Torque Limiter
- 3. 6 mm Ball Ended Allen Key

NOTICE

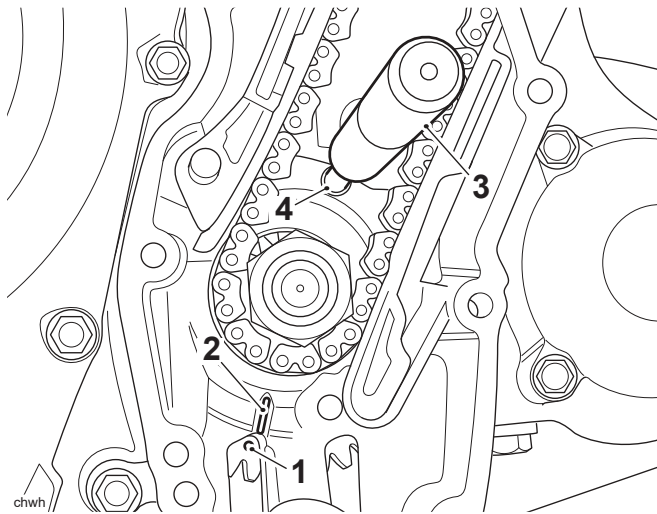
Loosen the camshaft sprocket fixings just enough to allow the sprocket and camshaft to be able to move independently.

- 8. Make sure there is no slack in the chain between the crankshaft and the sprockets.
- 9. Loosen but do not remove the two accessible fixings.



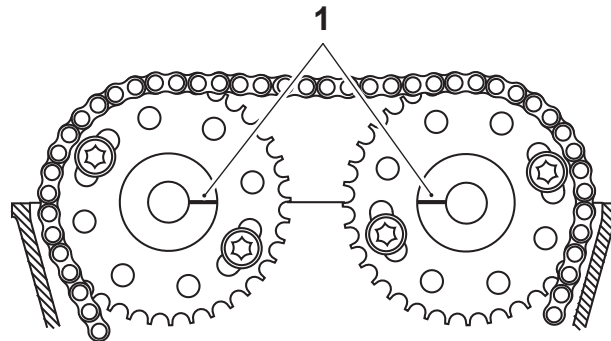
- 1. Fixings

- 10. Remove service tool T3880601 from the crankcase and crankshaft.



- 1. DOT alignment mark
- 2. Marker line
- 3. T3880601 - Camshaft Timing Pin
- 4. Timing hole in crankcase

11. Using the bolt fitted to the end of the crankshaft, rotate the crankshaft 360° clockwise (the normal direction of rotation). Stop rotation when the camshaft alignment marks are positioned inwards as shown below and the dot mark on the primary gear aligns with the line on the crankcase.
12. In addition to the crankshaft alignment mark, at TDC, the alignment marks on the camshaft bosses will point inwards.



gaaa_12

- 1. Camshaft alignment marks

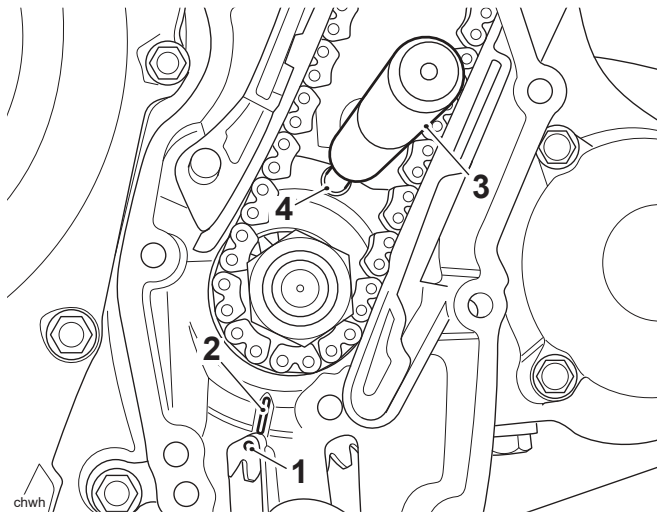
⚠ CAUTION

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.

Valve to piston contact will cause serious engine damage.

13. Insert service tool T3880601 into the timing holes in the crankcase and crankshaft.

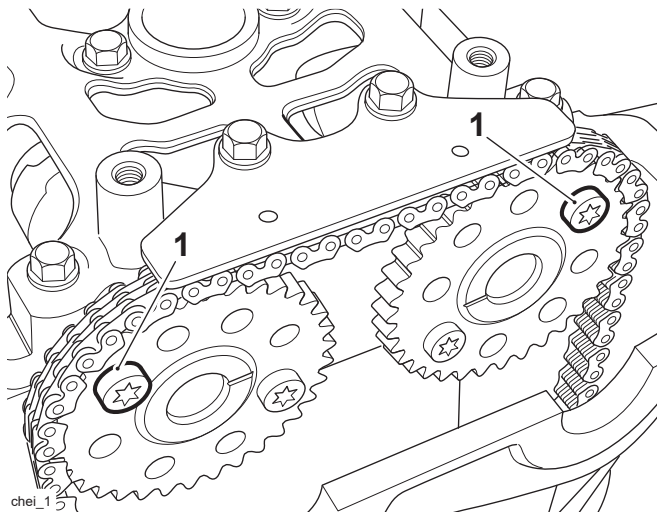


- 1. DOT alignment mark
- 2. Marker line
- 3. T3880601 - Camshaft Timing Pin
- 4. Timing hole in crankcase

NOTICE

Loosen the camshaft sprocket fixings just enough to allow the sprocket and camshaft to be able to move independently.

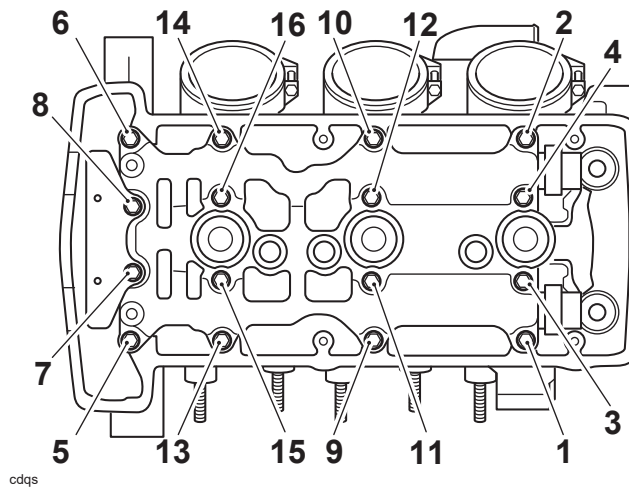
14. Loosen but do not remove the remaining two fixings.



- 1. Fixings

15. Note the orientation of the camshaft ladder in relation to the cylinder head.

16. Progressively release the fixings securing the camshaft ladder to the cylinder head in the sequence shown below.



Camshaft Ladder Fixing Release Sequence

17. Remove the camshaft ladder, top pad, dowels and spark plug tower O-rings, noting their orientation for installation.

NOTICE

Adjust the valve clearances as required using the data collected prior to removal of the camshafts (see [Valve Clearance Adjustment](#)).

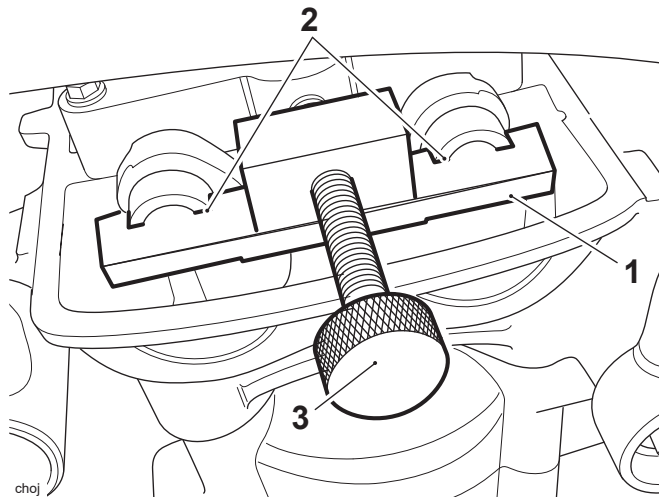
CAUTION

Make sure the service tool T3880640 removal screw is unscrewed fully.

The service tool T3880640 must be positioned so that it is located centrally between the camshafts.

Failure to fit the service tool T3880640 correctly may lead to the irreparable damage to the camshafts.

18. Insert the service tool T3880640 into the camshaft slots as shown below.

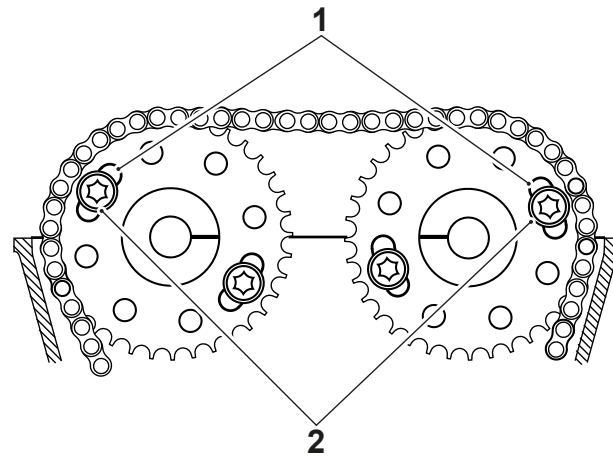


1. T3880640 - Camshaft Timing Plate
2. Camshaft slots
3. Removal screw

NOTICE

Make sure the alignment marks on the camshaft bosses are pointing inwards.

19. Rotate both sprockets on the camshafts until the fixings are positioned centrally within the slots.



gaaa_15

- 1. Elongated slots
- 2. Fixings

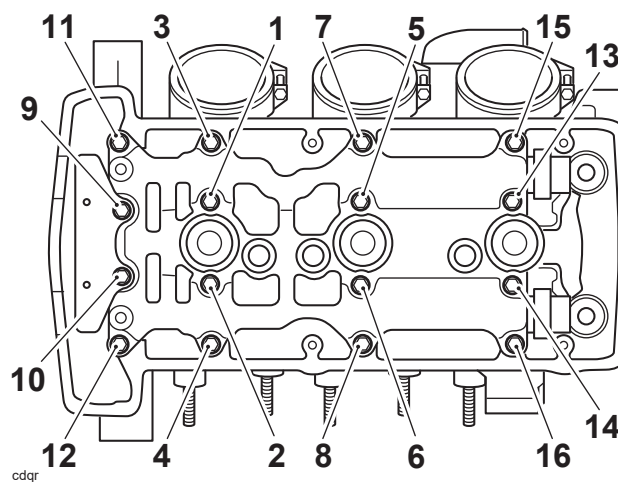
20. Check that the chain is correctly located around the crankshaft, and both camshaft sprockets.

21. Assemble the dowels, spark plug tower O-rings, camshaft ladder and top pad in the same location and orientation as prior to removal.

NOTICE

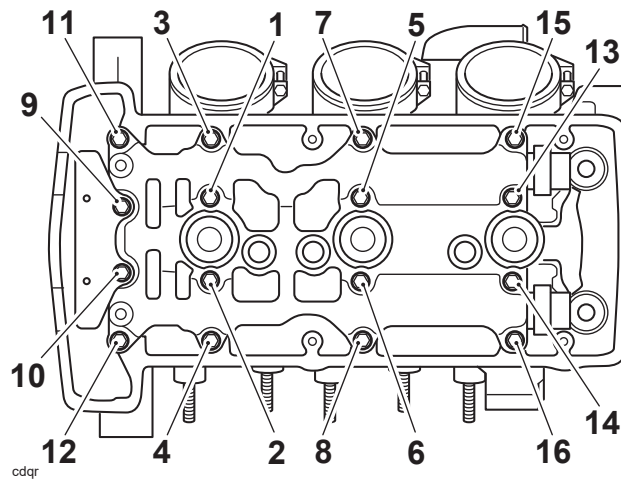
The bolts for the camshaft cap ladder are tightened in two stages.

22. **Stage 1** - Fit and evenly tighten the fixings to 5 Nm, in the sequence shown below.



Camshaft Cover Fixings Tightening Sequence

23. **Stage 2** - Fit and evenly tighten the fixings to 10 Nm, in the sequence shown below.



Camshaft Cover Fixings Tightening Sequence

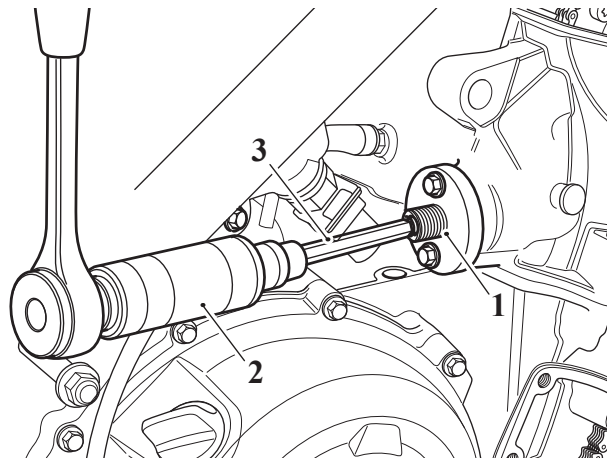
⚠ CAUTION

The torque value stated is very important to accurate timing. Always use the correct value of 0.6 Nm, as set using the service tool 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.

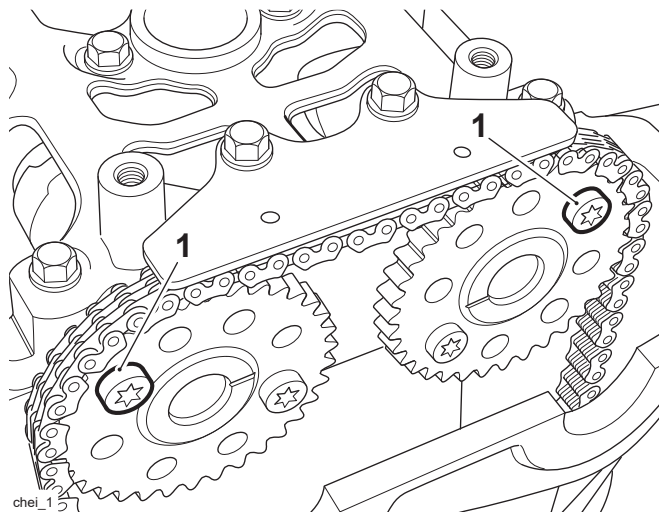
Either condition may result in serious damage to the engine, reduced engine performance, or reduced fuel economy.

24. Using the service tool T3880609 and a 6 mm Ball Ended Allen Key, tighten the service tool T3880607 to 0.6 Nm preset by the service tool T3880609.



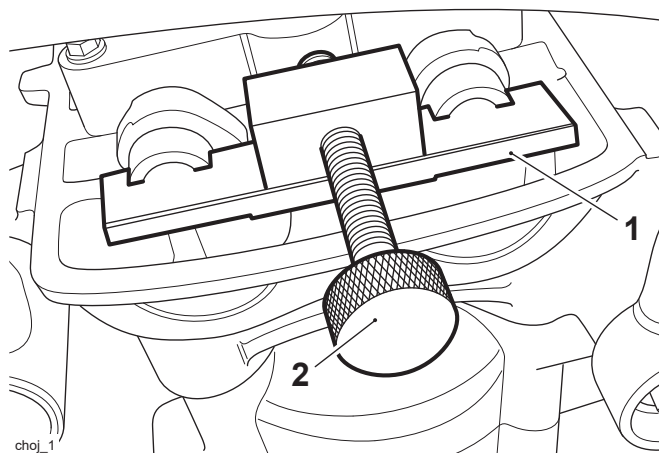
- 1. T3880607 - Camshaft Timing Tensioner
- 2. T3880609 - Timing Torque Limiter
- 3. 6 mm Ball Ended Allen Key

25. Tighten the two accessible (uppermost) camshaft sprocket fixings to 22 Nm.



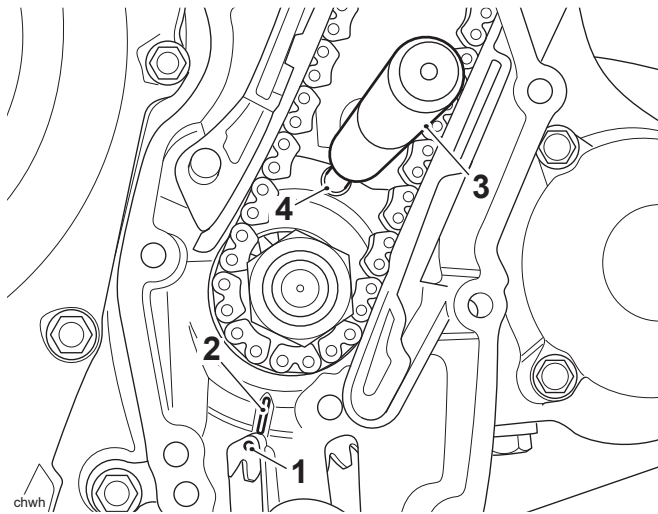
1. Uppermost fixings

26. Remove the service tool T3880640 by rotating the removal screw clockwise as shown below.



1. T3880640 - Camshaft Timing Plate
2. Removal screw

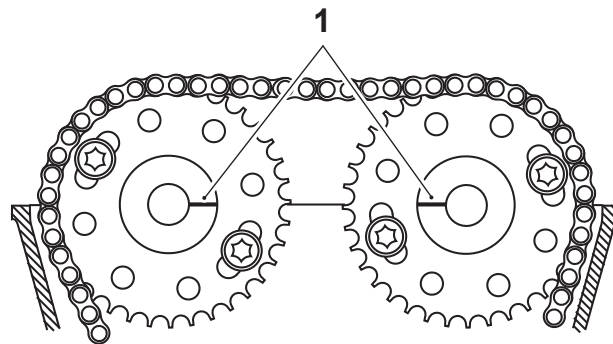
27. Remove service tool T3880601 from the crankcase and crankshaft.



- 1. DOT alignment mark
- 2. Marker line
- 3. T3880601 - Camshaft Timing Pin
- 4. Timing hole in crankcase

28. Rotate the crankshaft until the remaining two fixings are accessible.

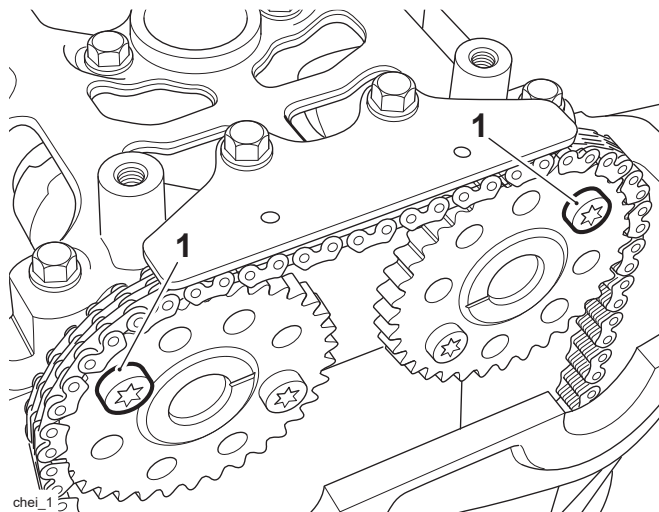
29. Make sure there is no slack between the crankshaft and exhaust sprocket when the sprocket fixings are centrally located within the slotted holes and the alignment marks on the end of the camshaft journals are pointing inwards.



gaaa_12

Camshaft Alignment Marks

30. Tighten the two remaining (uppermost) camshaft sprocket fixings to 22 Nm.



1. Uppermost fixings

31. Check that the chain is correctly located around the crankshaft, and both camshaft sprockets.

CAUTION

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

32. Set the hydraulic tensioner onto the first tooth of the ratchet (minimum extension) carry out the following:

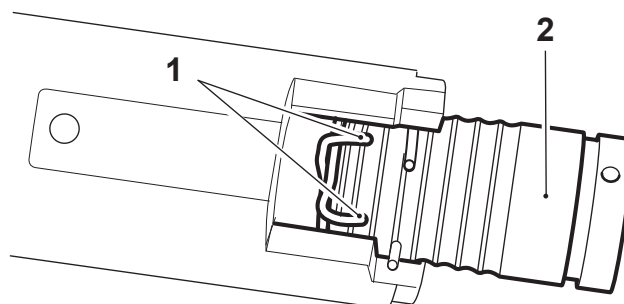
NOTICE

If installing a new hydraulic tensioner, do not release the plunger before fitting.

If installing the original hydraulic 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.

Prior to installation the hydraulic tensioner must be set to the first tooth on the ratchet (minimum extension).

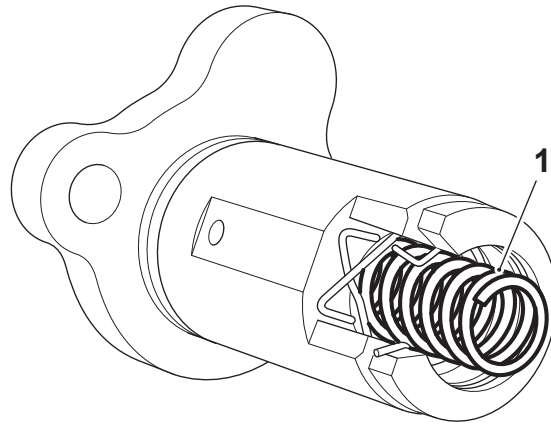
33. Hold the resister ring ends together and pull out the plunger.



cfei_2

1. Resister ring ends
2. Plunger

34. Remove the spring.

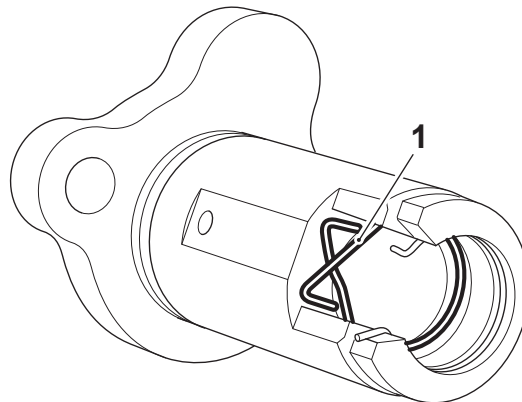


cfhp

1. Spring

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

36. Make sure the resister ring is correctly located as shown in the illustration below.



cfho

1. Resister ring

37. Refit the spring.

⚠ CAUTION



When resetting the tensioner, care must be taken to avoid activating the tensioner when there is no resistance on the plunger.

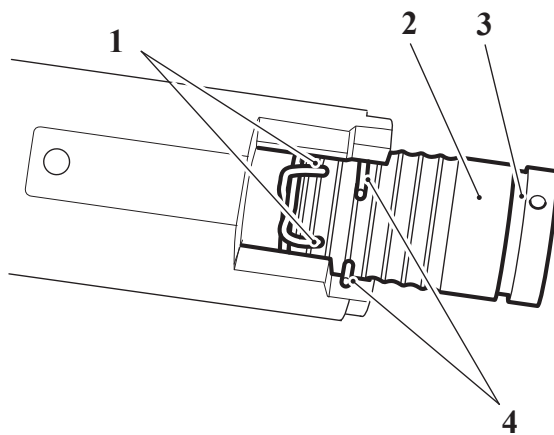
Activating the tensioner when there is no resistance on the plunger may cause internal damage to the tensioner housing.

It is recommended that the plunger is pushed into the tensioner housing in a controlled manner using a suitable soft jawed vice. Once the snap ring is located into its groove, the vice should be released slowly to ensure that the plunger is held in place.

38. Hold the resister ends together and insert the plunger into the tensioner housing.

39. Place the tensioner in a soft jawed vice.

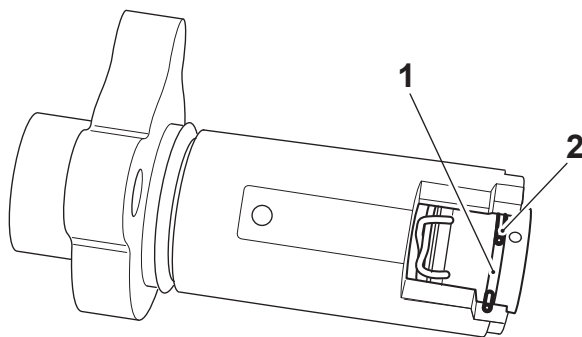
40. While holding the resister ends together, use the vice to push the plunger through the resister ring until the groove for the snap ring aligns with the snap ring.



cfej_3

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

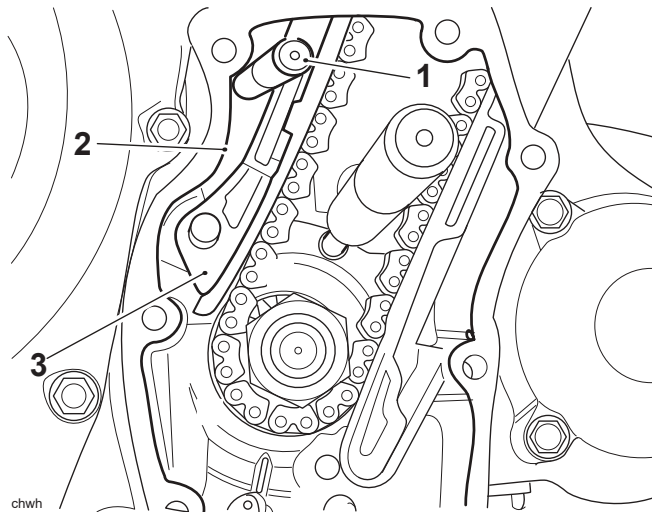
41. When the groove aligns with the snap ring, release the resister ring and move one end of the snap ring into the groove. Slowly release the vice to ensure that the plunger is held in place.



cfej

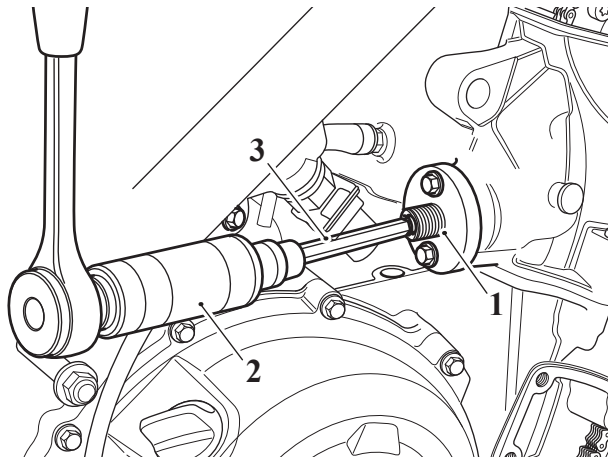
- 1. Groove for snap ring
- 2. Snap ring

42. Place a suitable wedge between the camshaft drive chain tensioner blade and crankcase, to hold the camshaft drive chain taut during removal of the service tool T3880607.



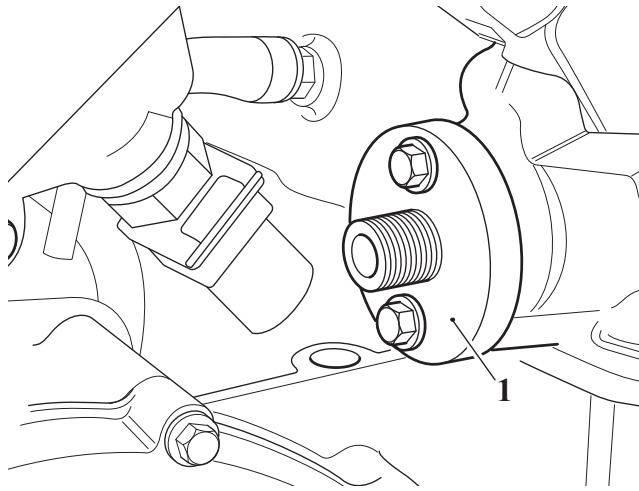
- 1. Wedge
- 2. Crankcase
- 3. Tensioner blade

43. Release the tension on Camshaft Timing Tensioner T3880607 and remove the T3880609 - Timing Torque Limiter .



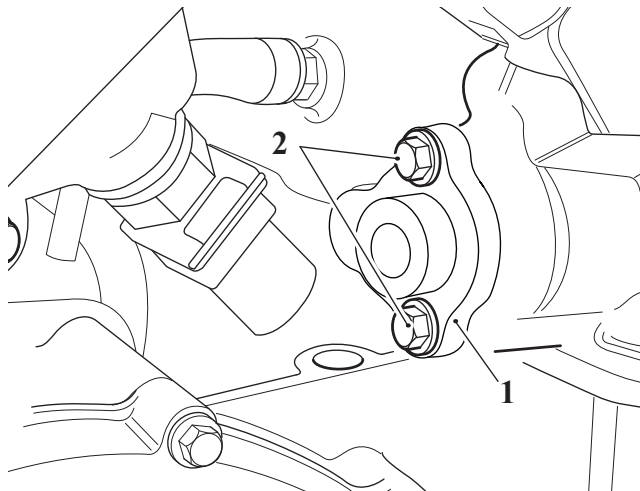
- 1. T3880607 - Camshaft Timing Tensioner
- 2. T3880609 - Timing Torque Limiter
- 3. 6 mm Ball Ended Allen Key

44. Remove the T3880607 - Camshaft Timing Tensioner.



1. T3880607 - Camshaft Timing Tensioner

45. Fit the timing chain tensioner, incorporating a new gasket and O-ring. Tighten the fixings to 8 Nm.



1. Tensioner
2. Fixings

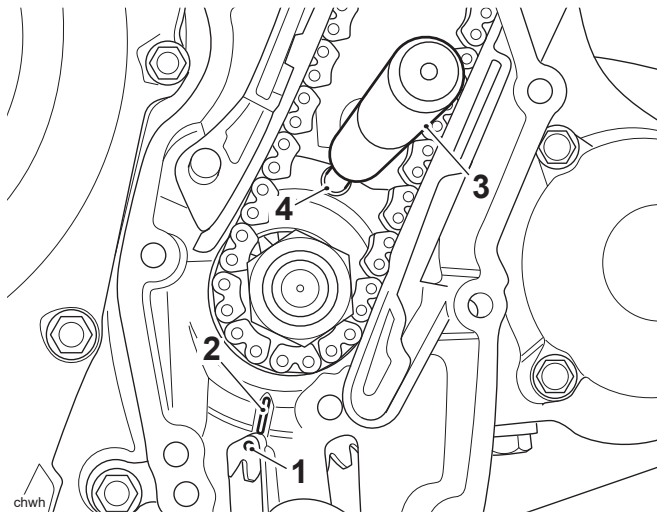
46. Remove the wedge from between the camshaft drive chain tensioner blade and crankcase.

47. To release the hydraulic tensioner, rotate the crankshaft 1/4 of a turn anticlockwise using the bolt fitted to the end of the crankshaft. Then rotate the crankshaft clockwise two revolutions until the 'dot' mark on the primary gear aligns with the line on the crankcase.

NOTICE

Before inserting the timing pin, make sure the 'dot' on the primary gear is aligned with the line on the crankcase.

48. Insert the service tool T3880601 into the timing holes in the crankcase and crankshaft.



- | |
|--|
| <ul style="list-style-type: none">1. Dot mark2. Marker line3. T3880601 - Camshaft Timing Pin4. Timing hole in crankcase |
|--|

49. Check that the timing marks are still approximately aligned (to check that the camshaft timing has not moved during service tool T3880607 removal).

50. Remove the service tool T3880601.

Perform the following operations:

- **Camshaft Cover - Installation**
- **Crankcase Right Hand Cover - Installation**
- **Crankshaft Position Adaption (European Markets Only)**

Wheels - Check For Damage

WARNING



Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

WARNING



Check the wheel rims for dents or deformation.

Operation with damaged or defective wheels is dangerous and loss of motorcycle control or an accident could result.

Always consult your authorised Triumph dealer for a safety inspection of the wheels, or for wheel replacement.

1. Check the wheel rims for broken or damaged spokes.
2. Check the wheel hubs for any visible signs of cracks, damage or deformation.

Wheel Bearings - Inspection

⚠ WARNING

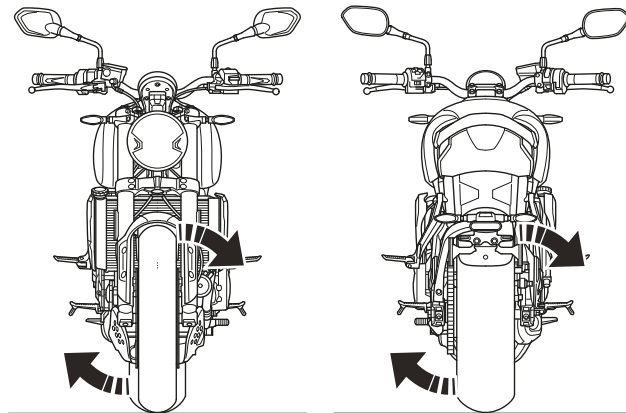
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Position the motorcycle on level ground and place on a paddock stand.
1. Hold the wheel at the top and bottom and rock the wheel checking for movement when a force is applied.
 2. Check the wheel bearings spin smoothly with no signs of play.
 3. If the bearings do not spin smoothly or there is excessive play in the wheel bearings, replace all bearings in that wheel.



Bearing check

Tyres - Check For Wear/Damage

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control and an accident.

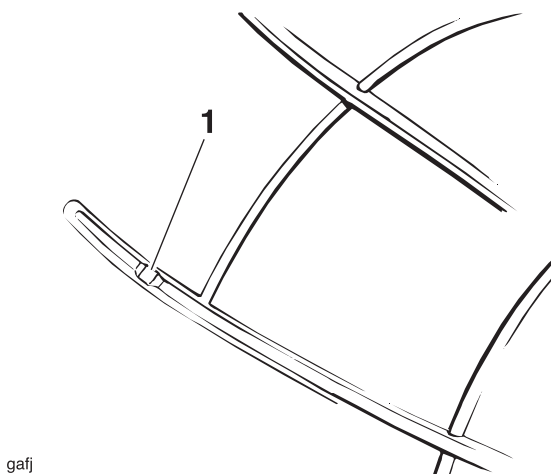
When tubeless tyres, used without a tube, become punctured, leakage is often very slow. Always inspect tyres very closely for punctures. Check the tyres for cuts, embedded nails or other sharp objects. Operation with punctured or damaged tyres will adversely affect motorcycle stability and handling which may lead to loss of control or an accident.

Check the rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.

Always consult your authorised Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

As the tyre tread wears down, the tyre becomes more susceptible to puncture and failure. It is estimated that 90% of all tyre failures occur during the last 10% of tread life (90% worn). It is false economy and unsafe to use tyres until they are worn to their minimum.

All tyres are fitted with tread wear indicators. When the tyre becomes worn down as far as the top of a tread wear indicator, the tyre is worn beyond its service life and must be replaced.



1. Tread wear indicator

Attention must also be paid to the legal limits for tread wear, which differ from country to country. Tyres that have worn to the legal limit in the country or region in which the motorcycle is operated must be replaced, even if tread wear has not yet reached the level of the tread wear indicators.

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 tyres for cracks, splits and kerb damage. Always replace tyres that are suspected of having become damaged.

Damaged tyres must be replaced.

Tyre Pressures - Check/Adjust

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

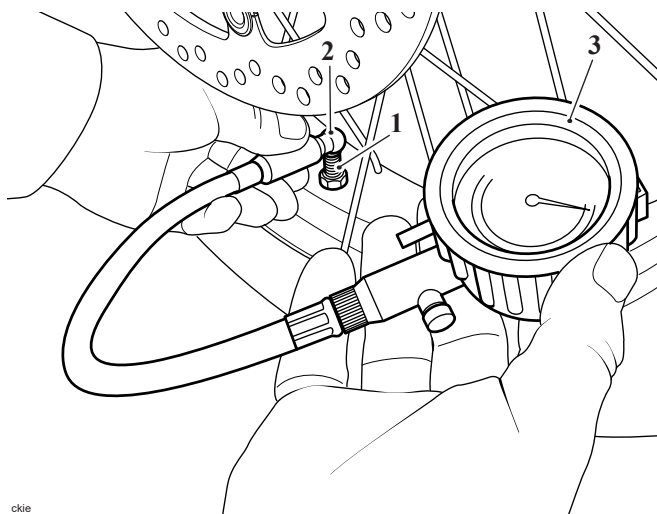
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

Always check the tyre pressures when they are cold.

Checking tyre pressures when they are cold will achieve a more accurate reading on the tyre pressure gauge.

1. Remove the caps from the tyre valves.
2. Position the tyre pressure gauge onto the end of the valve body making sure the tyre valve is in contact with the tyre inflator.
3. Momentarily deflate the tyre to equalise the pressure in the tyre and the gauge.
4. Check that the correct pressure is displayed on the gauge.
5. If the air pressure is below the recommended setting, inflate the tyre until the correct pressure is achieved.
6. If it is greater than the recommended setting, slowly deflate the tyre checking the gauge regularly until the correct reading is achieved.



1. Tyre Valve
2. Tyre gauge (valve connector)
3. Tyre gauge

7. Repeat the process for the remaining tyre.
8. Refit the caps to the tyre valves.

Steering Check

WARNING



Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Move the handlebars to left and right full lock while checking that the brake hose, clutch cable and electrical harnesses do not bind or that the steering feels tight or difficult to turn. Rectify as necessary.

Fork Inspection

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

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 the Front suspension section of this service manual 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.

Rear Suspension Unit - Inspection

⚠️ WARNING

Contents under pressure. Never attempt to open this rear suspension unit. Never attempt to service this rear suspension unit. Never incinerate, puncture, or disassemble this rear suspension unit. Opening this rear suspension unit may result in severe injuries or even death.



The rear suspension units are sealed units and do not have any internally user serviceable parts.

Perform the following operations:

- **Rear Suspension Unit - Removal**

1. Clean all components and inspect for damage/wear to:
 - rear suspension unit upper and lower mounting sleeve and bearing
 - drag link, bearings, sleeves and seals
 - rocker, its bearings, sleeves and seals.
2. Renew as necessary, see the following:
 - **Rear Suspension Unit Upper Mounting Bush Replacement**
 - **Rear Suspension Unit Lower Mounting Bearing Replacement**
 - **Drag Link Bearing Replacement**
 - **Rocker Bearing Replacement**

Perform the following operations:

- **Rear Suspension Unit - Installation**

Headstock Bearing - 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 suitable file.

Headstock Bearings - Lubricate

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

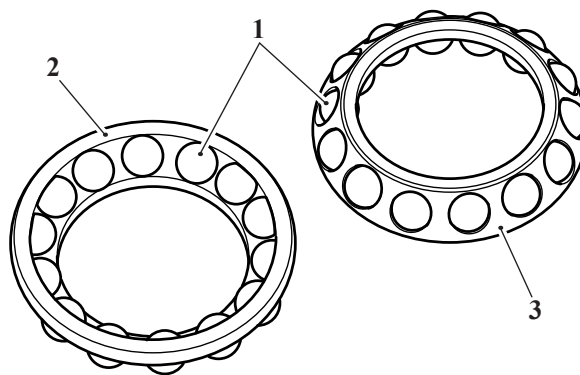
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Lower Yoke and Headstock Bearings - Removal**

1. Inspect the headstock bearings for damage/wear (see [Headstock Bearing - Inspection](#)).
2. Lubricate the headstock bearings, using finger pressure, force five grammes of Castrol LCX 222 or an equivalent heavy duty lithium based grease between the inner race and the carrier.
3. Rotate the ball 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.



ckid

- | |
|---|
| <ul style="list-style-type: none">1. Roller bearing2. Inner carrier face3. Outer carrier face |
|---|

Perform the following operations:

- **Lower Yoke and Headstock Bearings - Installation**

Steering Head Bearing - Check

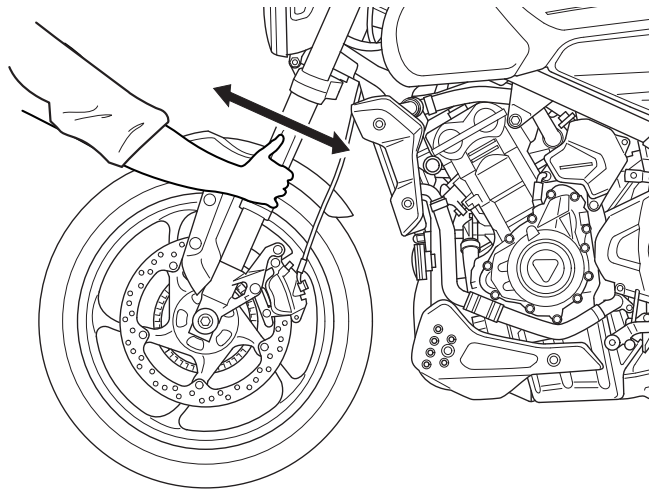
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Raise and support the front of the motorcycle.



2. Hold the bottom end of the front fork outer tubes as illustrated and rock with a front-to-rear motion. If free play can be detected, the headstock bearings require adjustment.

Steering Head Bearing - Adjustment

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Raise and support the front of the motorcycle.
2. Release the fixings securing the handlebar clamp to the upper yoke, detach the clamp and release the handlebar.
3. As an assembly, raise the handle bars until clear of the upper yoke. Rest the assembly forward of the steering stem such that access to the headstock top nut and the adjustment nuts is unrestricted. Ensure the master cylinder remains in an upright position.
4. Loosen the upper yoke pinch bolts.

⚠ WARNING

If the lower yoke fixings are also loosened, the forks will no longer support the weight of the motorcycle.

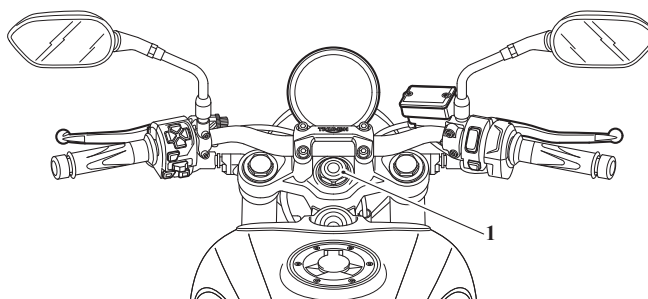
Do not loosen the lower yoke fixings as, in this condition, the motorcycle could topple over causing damage and/or risk of injury.

⚠ CAUTION

Care must be taken when removing the upper yoke centre nut, to ensure that the centre nut and upper yoke do not become scratched.

Protect the surfaces with a suitable cloth or tape to prevent scratching.

5. Remove the upper yoke centre nut from the steering stem.



1. Upper yoke centre nut

6. Ease the upper yoke and instrument assembly from the forks and support while detached.

NOTICE

When adjusting the bearing free play, ensure that the threaded part of the stem is free from grease.

NOTICE

Keep the torque wrench at 90 degrees to the centre line of service tool T3880750 when you tighten the adjustment nut in the stage that follows. This will apply the correct torque to the adjustment nut.

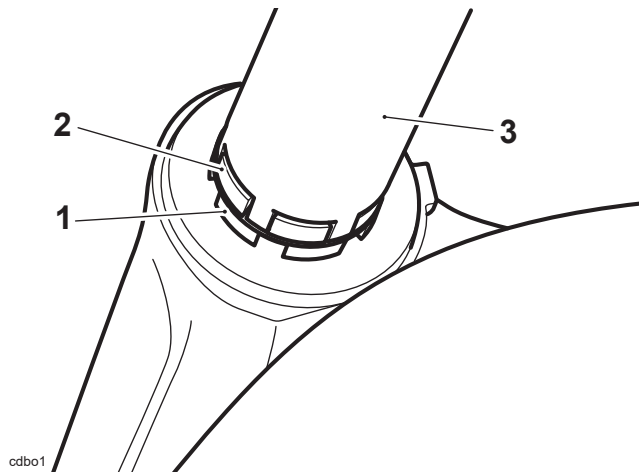
7. Adjust the bearing free play as follows, using service tool T3880023 and service tool T3880750:

- Remove the lock nut and tab washer using service tool T3880023. Discard the washer.
- Thoroughly clean the threads on the steering stem.
- Loosen the adjuster nut using service tool T3880750, then tighten to 40 Nm. Keep the torque wrench at 90 degrees to the centre line of the tool.
- Loosen the adjuster nut using service tool T3880750, then retighten to 10 Nm. Keep the torque wrench at 90 degrees to the centre line of the tool.
- Fit a new tab washer and the lock nut.

⚠ WARNING

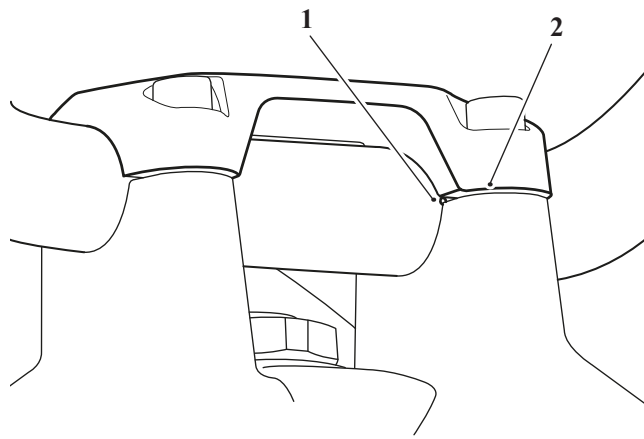
It is essential that the adjuster nut is not over-tightened. If the adjuster nut is over-tightened it will cause a pre-load on the headstock bearings. This will introduce tight steering, which could cause loss of control and an accident.

- Hold the adjuster nut in position while tightening the lock nut to 40 Nm.



- | |
|----------------------------|
| 1. Adjuster nut |
| 2. Lock nut |
| 3. T3880023 - 50 mm Socket |

8. Refit the upper yoke and instrument assembly to the forks.
9. Fit the upper yoke centre nut and tighten to 90 Nm.
10. Tighten the upper yoke pinch bolts to 26 Nm.
11. Locate the handlebar assembly in the lower halves of the clamps. Fit the upper clamps and bolts.
12. Rotate the handlebars so that the alignment mark on the handlebar aligns with the split line.
13. Tighten the front clamp bolts to 26 Nm, then the rears.



- 1. Alignment mark
- 2. Split line

14. Recheck the bearing adjustment (see [Steering Head Bearing - Check](#)).

Maintenance - Fork Oil Renew

WARNING



Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

- Drain the fork oil (see [Fork Oil Change - Oil Draining](#)).
- Refill the fork with Showa SS47G oil (see [Fork Oil Change - Oil Refilling](#)).

Brake Master Cylinders - Inspection

WARNING



Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

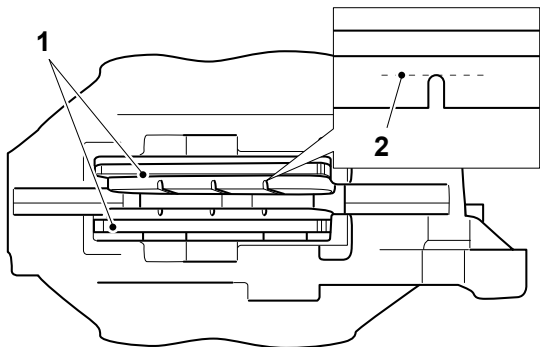
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Inspect both the front and rear master cylinders for fluid leaks. Rectify as necessary.

Front Brake Wear inspection

Brake pads must be inspected in accordance with scheduled requirements and replaced if worn to, or beyond the minimum service thickness.



cbmz_1

1. Carrier plate

2. Brake pad

Minimum lining thickness
1.5 mm

If the lining thickness of any pad is less than that specified in the table, replace all the pads on the wheel.

⚠️ WARNING

⬆️

Always have replacement brake pads supplied and fitted by your Triumph dealer.

The ABS calibration is optimised for use with the friction material provided on brake pads supplied by Triumph.

The use of proprietary brands of brake pads is not recommended as differing friction material specifications will affect the performance of the ABS, potentially causing loss of motorcycle control and an accident.

⚠️ WARNING

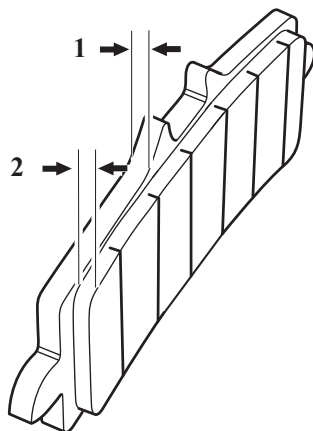
⬆️

Brake pads for this model supplied by Triumph are specifically designed for use with the brake calipers fitted to your motorcycle.

The use of proprietary brands of brake pads is not recommended as these may have a reduced carrier plate thickness when compared with the Triumph genuine parts.

Brake pads with an incorrect carrier plate thickness can potentially become dislodged from the caliper body as they wear, leading to brake failure, loss of motorcycle control and an accident.

Brake pads for this model supplied by Triumph will have the carrier plate at the correct thickness. Always have replacement brake pads supplied and fitted by your Triumph dealer.



chbe_2

- 1. Carrier plate
- 2. Brake pad lining

Rear Brake Wear inspection

If the lining thickness of any pad is less than that specified in the table, replace all the pads on the wheel.

Minimum lining thickness
1.5 mm

⚠ WARNING

Always have replacement brake pads supplied and fitted by your Triumph dealer.

The ABS calibration is optimised for use with the friction material provided on brake pads supplied by Triumph.

The use of proprietary brands of brake pads is not recommended as differing friction material specifications will affect the performance of the ABS, potentially causing loss of motorcycle control and an accident.

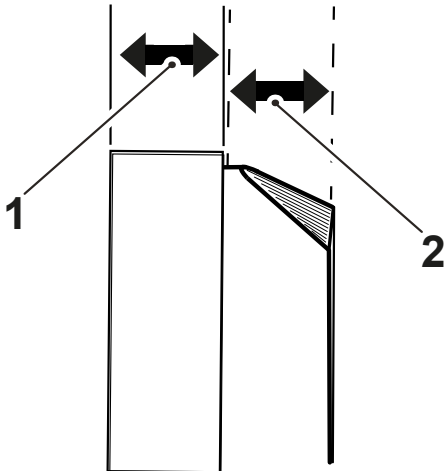
⚠ WARNING

Brake pads for this model supplied by Triumph are specifically designed for use with the brake calipers fitted to your motorcycle.

The use of proprietary brands of brake pads is not recommended as these may have a reduced carrier plate thickness when compared with the Triumph genuine parts.

Brake pads with an incorrect carrier plate thickness can potentially become dislodged from the caliper body as they wear, leading to brake failure, loss of motorcycle control and an accident.

Brake pads supplied by Triumph will have the carrier plate at the correct thickness. Always have replacement brake pads supplied and fitted by your Triumph dealer.



1. Carrier plate
2. Brake pad lining

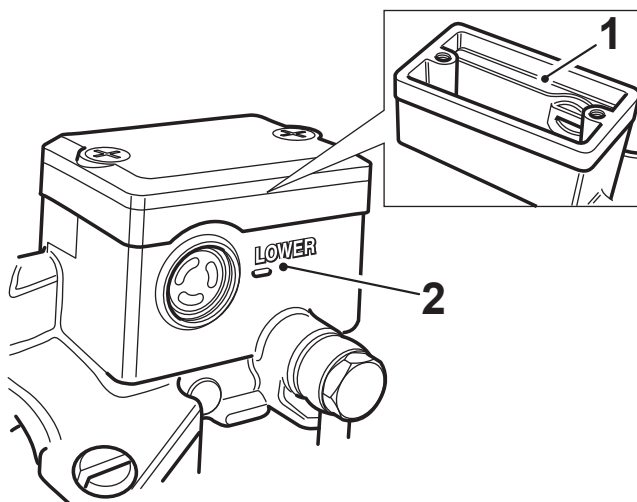
Front Brake Fluid Level Inspection

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



- 1. Front brake fluid reservoir, upper level line
- 2. Lower level line

1. The brake fluid level in the reservoirs must be kept between the upper and lower level lines (reservoir held horizontal).
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 screws and remove the cover.
4. Noting its position, remove the sealing diaphragm.
5. Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
6. Refit the cover, ensuring that the diaphragm seal is correctly positioned between the cover and reservoir body.
7. Tighten the cover retaining screws to 1.5 Nm.

⚠ WARNING

If there has been an appreciable drop in the level of the fluid in either fluid reservoir, consult your authorised Triumph dealer for advice before riding. Riding with depleted brake fluid levels, or with a brake fluid leak is dangerous and will cause reduced brake performance potentially leading to loss of motorcycle control and an accident.

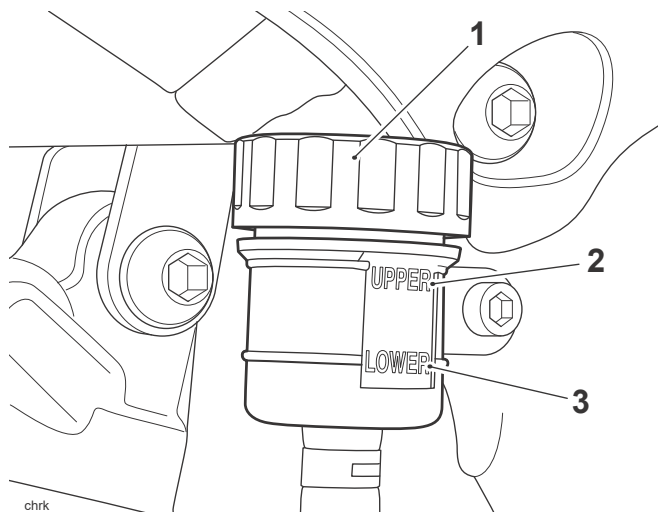
Rear Brake Fluid Level Inspection

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



1. Rear reservoir cap
2. Rear reservoir upper level
3. Rear reservoir lower level

1. The reservoir is visible from the right hand side of the motorcycle, forward of the silencer, below the rider's seat.
2. To inspect the fluid level, check the level of fluid visible in the reservoir. The fluid level must be kept between the upper and lower level lines (reservoir held horizontal).
3. To adjust the fluid level, remove the reservoir cap and diaphragm seal. Fill the reservoir to the upper level line using new DOT 4 fluid from a sealed container.
4. Refit the reservoir cap ensuring that the diaphragm seal is correctly fitted.

⚠ WARNING

If there has been an appreciable drop in the level of the fluid in either fluid reservoir, consult your authorised Triumph dealer for advice before riding. Riding with depleted brake fluid levels, or with a brake fluid leak is dangerous and will cause reduced brake performance potentially leading to loss of motorcycle control and an accident.

Brake Fluid - Renew

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ 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 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

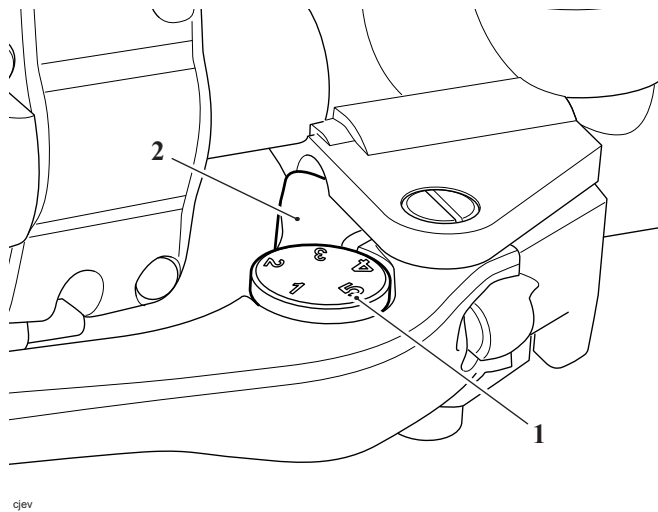
Do not allow the fluid level to fall below the lower level mark in the reservoir. If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

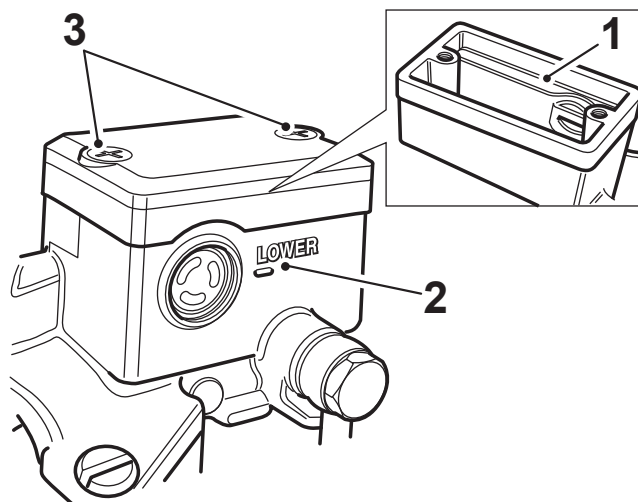
Front Brake Fluid

- 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

1. Turn the handlebars to bring the fluid reservoir to a level position.



- 1. Front reservoir upper level
- 2. Front reservoir lower level
- 3. Screws

2. Remove the screws from the brake reservoir cover.

⚠ WARNING

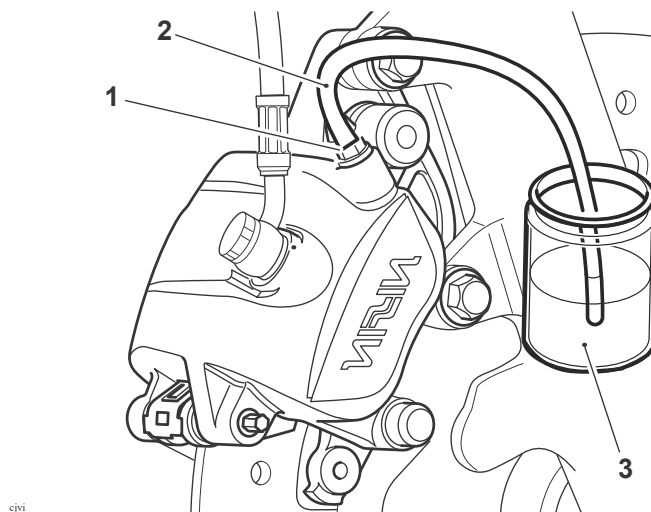
Ensure absolute cleanliness when adding brake fluid to the brake fluid reservoir. Do not allow moisture or debris to enter the cylinder as this will adversely affect the fluid properties. Always use fluid from a sealed container and do not use fluid from a container which has been opened for any period of time. Always check for fluid leakage around hydraulic fittings and for damage to hoses.

A dangerous riding condition leading to an accident could result if this warning is ignored.

⚠ CAUTION

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

3. Carefully remove the reservoir cover taking care not to spill any fluid.
4. Check the condition of the sealing diaphragm for the reservoir. Replace if necessary.
5. Remove the rubber cap from the bleed screw on the right hand caliper.
6. Attach a transparent tube to the bleed screw.



- | |
|---|
| <ol style="list-style-type: none"> 1. Bleed screw 2. Bleed tube 3. Container |
|---|

7. Place the other end of the tube in a suitable receptacle containing new brake fluid. Keep the tube end below the level of fluid.

NOTICE

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

8. Partially open the bleed screw.

NOTICE

Pressure applied to the brake lever during the brake fluid renew process must be applied and removed smoothly and slowly. It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to do this slowly can allow air to be drawn in to the system through the bleed screw threads.

9. Get an assistant to slowly pull the brake lever to the handlebar and then slowly release the brake lever.
10. Repeat step 9 until fresh brake fluid appears in the bleed tube.
11. When fresh brake fluid is in the system, apply pressure to the brake lever, close the bleed screw and tighten it to 6 Nm.
12. Remove the bleed tube and replace the bleed screw cap.
13. Fill the reservoir to the upper level with new DOT 4 fluid.
14. Repeat steps 5 to 13 for the other front brake caliper.
15. When the brake fluid has been renewed, make sure 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.
16. Refit the reservoir cap ensuring that the diaphragm seal is correctly positioned between the cap and the reservoir body. Tighten the fixings to 1.5 Nm.

WARNING

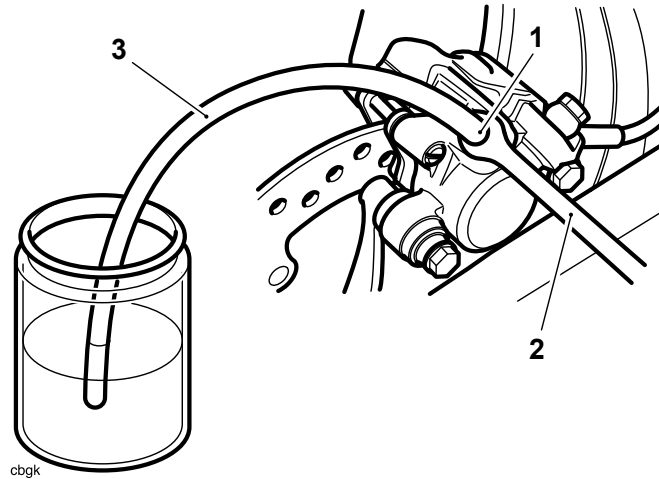
Always return the lever adjuster to the original setting as noted in paragraph 1. Operating the motorcycle with lever settings that are unfamiliar may lead to loss of control or an accident.

⚠ WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Fluid

1. Remove the cap from the rear bleed screw.
2. Attach a transparent tube to the bleed screw.



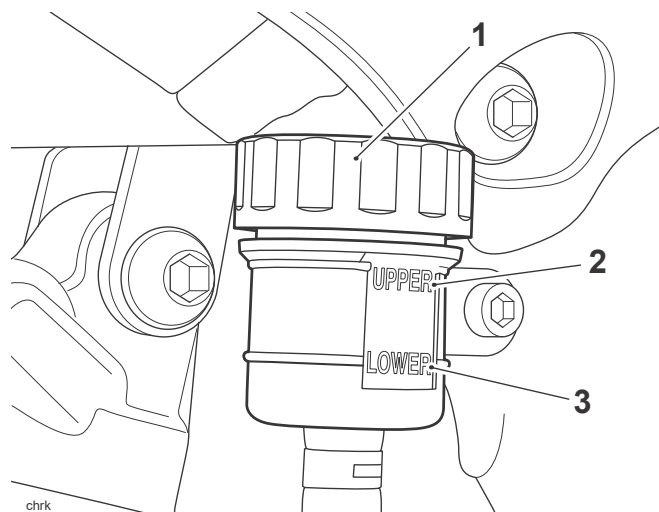
1. Bleed screw
2. Spanner
3. Bleed tube

3. Place the other end of the tube in a suitable receptacle containing new brake fluid.

⚠ CAUTION

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

4. Unscrew and remove the rear brake reservoir cap taking care not to spill any fluid.



1. Rear reservoir cap
2. Rear reservoir upper level
3. Rear reservoir 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.

5. Check the condition of the sealing diaphragm. Replace the diaphragm as necessary.

NOTICE



The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pressing the brake pedal or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

6. Partially open the bleed screw.

NOTICE



Pressure applied to the brake pedal during the brake fluid renew process must be applied and removed smoothly and slowly. It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to do this slowly can allow air to be drawn in to the system through the bleed screw threads.

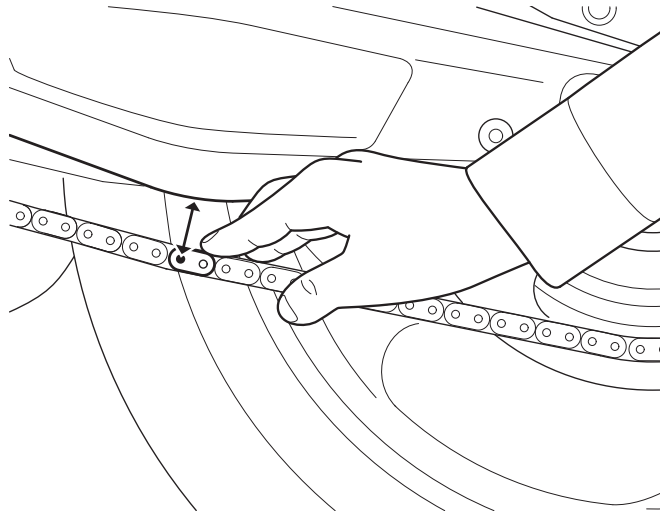
7. Get an assistant to slowly depress the brake pedal and then slowly release the brake lever.
8. Repeat step 7 until fresh brake fluid appears in the bleed tube.
9. When fresh brake fluid is in the system, apply pressure to the brake pedal, close the bleed screw and tighten it to 6 Nm.
10. Remove the bleed tube and replace the bleed screw cap.
11. Refit the reservoir cap ensuring that the diaphragm seal is correctly positioned between the cap and the reservoir body.
12. Check the operation of the rear 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.

Drive Chain Free Movement - Inspection



⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Place the motorcycle on a level surface and hold it in an upright position with no weight on it.
2. Rotate the rear wheel by pushing the motorcycle to find the position where the chain is tightest.
3. Stretch the chain taut by applying pressure on the chain.
4. Measure from the bottom of the swingarm to the centre of the chain pin, as shown in the illustration.
5. The measurement must be in the range of 43 - 55 mm.
6. If the measurement exceeds the range, then the chain needs to be adjusted, see [Drive Chain Free Movement - Adjustment](#).

Drive Chain Free Movement - Adjustment

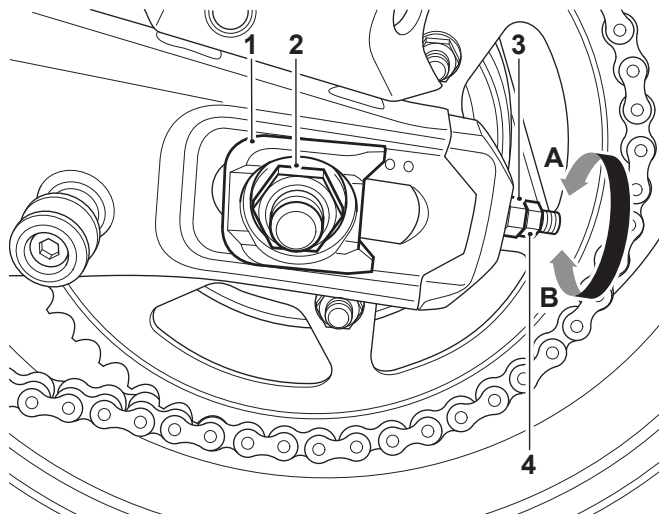
⚠ WARNING

Operation of the motorcycle with insecure adjuster lock nuts or a loose wheel spindle may result in impaired stability and handling of the motorcycle.

This impaired stability and handling may lead to loss of control or an accident.

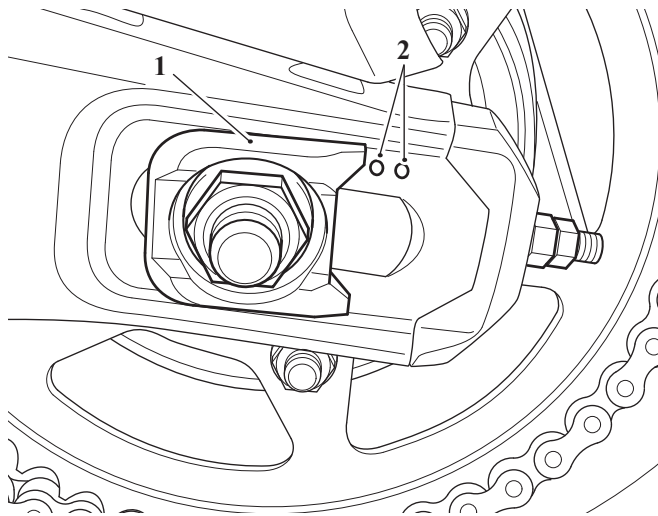
If the drive chain free movement measurement is incorrect, adjustments must be made as follows:

1. Loosen the rear wheel spindle nut.
2. Loosen the adjuster lock nut on both the left and right hand side drive chain adjusters.



- A. Clockwise direction
- B. Anticlockwise direction
- 1. Spindle adjuster
- 2. Rear wheel spindle nut
- 3. Adjuster nut
- 4. Adjuster lock nut

3. Equally turn both the left and right hand adjuster nuts clockwise (A) to decrease drive chain free movement and anticlockwise (B) to increase drive chain free movement.
4. Make sure the same adjuster marking is aligned with the spindle adjuster on both sides of the swinging arm.



- 1. Spindle adjuster (left hand side shown)
- 2. Adjuster markings

5. Make sure that both the left and right hand adjuster nuts are set to the same measurement.
6. Set the amount of drive chain free movement to 43 - 46 mm and tighten the rear wheel spindle nut to 110 Nm.
7. Repeat the drive chain adjustment check. Readjust if necessary.
8. Tighten both left and right hand side adjuster nuts to 3 Nm.
9. Hold the adjuster nuts in place, and tighten the adjuster lock nuts to 15 Nm.
10. Repeat the drive chain adjustment check. Readjust if necessary.
11. Check the rear brake effectiveness. Rectify if necessary.

WARNING



It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again.

Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control or an accident.

Drive Chain Rubbing Strip - Check

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

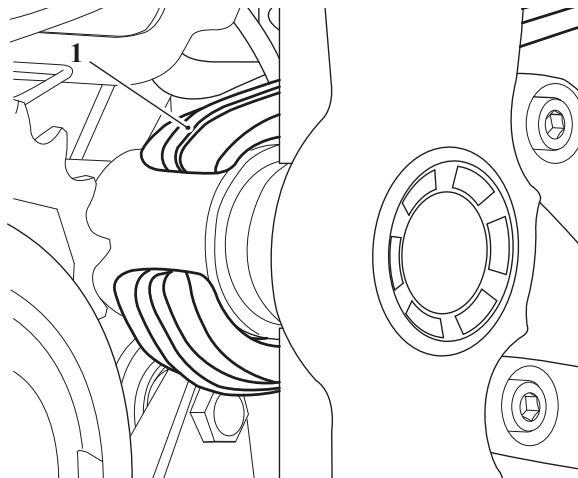
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Gear Change Linkage - Removal](#)
- [Front Sprocket Cover - Removal](#)

1. Inspect the drive chain rubbing strip, including the underside, for cracks, damage or excessive wear.



1. Drive chain rubbing strip

2. If the drive chain rubbing strip needs replacing, see [Drive Chain Rubbing Strip - Removal](#) and [Drive Chain Rubbing Strip - Installation](#).
Perform the following operations:

- [Front Sprocket Cover - Installation](#)
- [Gear Change Linkage - Installation](#)

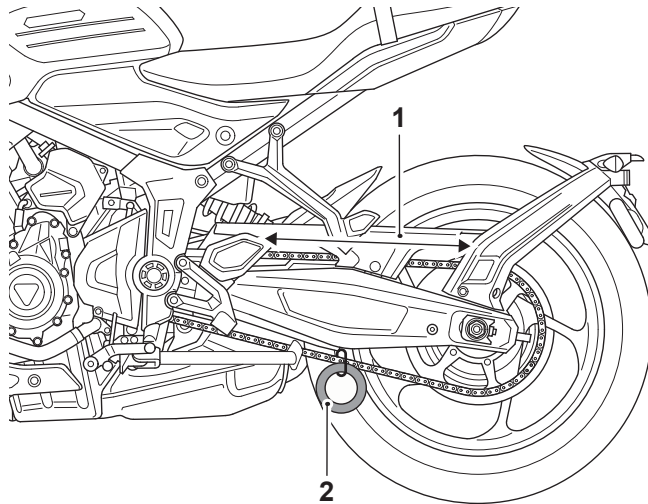
Final Drive Chain and Sprocket Wear Inspection

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

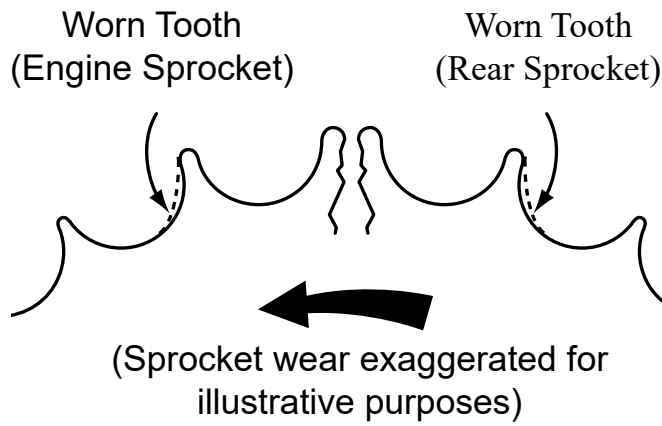
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



- 1. Measure across 20 links
- 2. Weight

1. Remove the chain guard.
2. Stretch the chain taut by hanging a 10 - 20 kg (20 - 40 lb) weight on the chain.
3. Measure the length of 20 links on the straight part of the chain from pin centre of the 1st pin to the pin centre of the 21st pin. Since the chain may wear unevenly, take measurements in several places.
4. If the length exceeds the maximum service limit of 319 mm, the chain must be replaced.
5. Rotate the rear wheel and inspect the drive chain for damaged rollers, and loose pins and links.
6. Also inspect the sprockets for unevenly or excessively worn or damaged teeth.



ccol

7. If there is any irregularity, have the drive chain and/or the sprockets replaced by an authorised Triumph dealer.
8. Refit the chain guard, tightening the fixings to 4 Nm.

⚠ WARNING

Never neglect chain maintenance and always have chains installed by an authorised Triumph dealer.

Use a genuine Triumph-supplied chain as specified in the Triumph Parts Catalogue.

The use of non-approved chains may result in a broken chain or may cause the chain to jump off the sprockets leading to loss of motorcycle control or an accident.

⚠ CAUTION

If the sprockets are found to be worn, always replace the sprockets and drive chain together.

Replacing worn sprockets without also replacing the chain will lead to premature wear of the new sprockets.

Final Drive Chain Lubrication

Lubrication is necessary every 200 miles (300 km) and also after riding in wet weather, on wet roads, or any time that the chain appears dry.

Use the special drive chain lubricant as recommended in the specification section.

Correct application is critical for drive chain lubrication. Apply the lubricant for one full drive chain revolution only, then leave for eight hours before riding. This allows the lubricant's solvent (used to thin the oil) to evaporate and the oil to 'soak' into all parts of the drive chain. If the lubricant is applied and the motorcycle is ridden shortly afterwards, the lubricant is unlikely to reach all parts and the majority will be flung off and wasted. Applying excessive amounts is not helpful under any circumstances.

It should be noted that the lubricant is applied to the drive chain to lubricate its action across the sprockets. In an O-ring chain, external lubrication does not penetrate to the bushes and rollers as the O-ring seals prevents this from happening.

CAUTION



Do not use a power jet washer to clean the chain as this may cause damage to the chain components.

Check Lights, Instruments and Electrical Systems

WARNING



Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

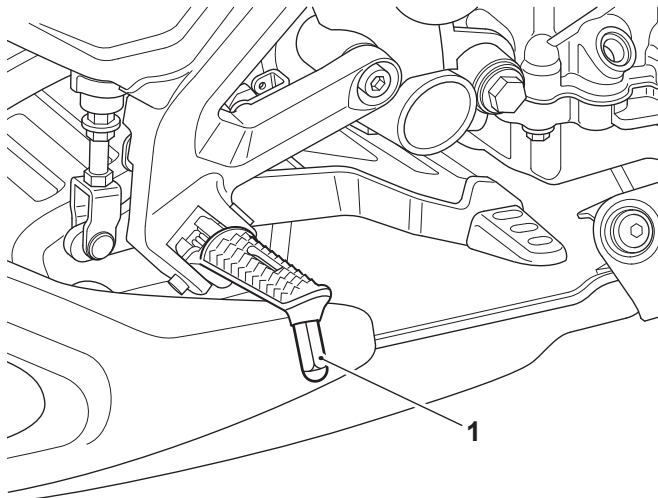
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Check the instruments, lights and electrical systems for functionality. Rectify if necessary.

Bank Angle Indicators

1. Inspect the bank angle indicators on the rider's footrests for wear. The bank angle indicators are worn out when 15 mm of the bank indicator remains.



1. Bank angle indicator

⚠️ WARNING

Use of a motorcycle with bank angle indicators worn beyond the maximum limit (when the bank angle indicator is worn to a minimum 15 mm in length) will allow the motorcycle to be banked to an unsafe angle. Therefore, always replace the bank angle indicator pegs when they are worn to 15 mm in length.

Banking to an unsafe angle may cause instability, loss of motorcycle control and an accident.

⚠️ WARNING

The bank angle pegs must not be used as a guide to how far the motorcycle may be safely banked. This depends on many various conditions including, but not limited to, road surface, tyre condition and weather. Banking to an unsafe angle will lead to loss of motorcycle control and an accident.

Latest Calibrations Check

WARNING

Make sure the motorcycle is stabilised and adequately supported.

Do not support the motorcycle on any ancillary component, the exhaust system or any other non structural parts of the motorcycle frame.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Check for the latest calibration download for the following using the Triumph Diagnostic Tool:

- Instruments (if applicable)
- Chassis ECM (if fitted)
- Keyless ECM (if fitted)
- Engine ECM
- Suspension ECM (if fitted)

See the Triumph Diagnostic Tool User Guide for more information.

Autoscan

Actions required

Perform an Autoscan using the Triumph Diagnostic Software in accordance with the Triumph Diagnostic Tool User Guide.

Check

Check all results pass the Autoscan, and save the results.

Print a customer copy.

Additional Work

Standard required:

Check Triumph Online for all additional work required by relevant Triumph issued Service Bulletins, Recalls and Technical News Bulletins. These must be completed prior to the road test.

Road Test

⚠ WARNING

When riding the motorcycle the rider must always wear a safety helmet, eye protection, gloves, boots, trousers (close fitting around the knee and ankle) and a brightly coloured jacket. Brightly coloured clothing will considerably increase a rider's visibility to other operators of road vehicles. Although full protection is not possible, wearing correct protective clothing can reduce the risk of injury when riding.

⚠ WARNING

A safety helmet is one of the most important pieces of riding gear as it offers protection against head injuries. Your safety helmet should be carefully chosen and should fit your head comfortably and securely. A brightly coloured safety helmet will increase a rider's visibility to other operators of road vehicles. An open face helmet offers some protection in an accident though a full face helmet will offer more. Always wear a visor or approved goggles to help vision and to protect your eyes.

⚠ WARNING

Do not attempt to test the ABS function of the motorcycle's braking system during road test. The ABS function is for use in emergency situations only. Any attempt to artificially create an emergency situation is extremely hazardous and could lead to a collision with a following vehicle or loss of motorcycle control and an accident.

NOTICE

For the first 1,000 miles, the motorcycle should be ridden within the running in procedure (see Owner's Handbook), checking for abnormalities, unusual noises and for satisfactory operation.

When checking the brakes on road test, a suitable safe place should be found to carry out the test.

NOTICE

Faults detected during road test or post road test inspection, must be rectified before the motorcycle is released to the customer.

The distance covered on the road test should be long enough to allow a satisfactory check to be made in the following areas:

Engine Cold Start Performance

Standard required:

The engine must start quickly and idle smoothly.

NOTICE

This check is to be carried out when the engine is cold.

Action:

Turn the ignition switch to the ON position.

Start the engine and allow to idle.

ABS (anti-lock brake system) indicator light (models fitted with ABS only)

Standard required:

Refer to the Owner's Handbook for further information regarding the ABS indicator light illumination sequence for the relevant model.

The ABS indicator light should flash on and off and continue to flash after engine start up until the motorcycle first reaches a speed exceeding 6 mph (10 km/h).

Clutch

Standard required:

The clutch should engage smoothly, without judder, slipping or noise.

Gear Change

Standard required:

Changing between gears must be smooth and easily accomplished.

Throttle Response

Standard required:

The engine should be quick to respond to any movement of the throttle.

There should be no pronounced misfires.

The idle speed must not change when the handlebars are turned from lock to lock.

Brakes

Standard required:

The brakes should have a firm, responsive feel.

The brakes should act smoothly and silently without judder.

Upon activation of the brakes, the motorcycle should come to rest without deviating from a straight line.

Instrument Panel

Standard required:

All instruments must operate correctly.

Check:

Check that the warning lights on the instruments operate correctly.

Steering and Suspension

Standard required:

The motorcycle should be easy to steer and should not pull to one side.

Cornering should be precise with the motorcycle leaning naturally into the corner and returning to the upright position upon exiting the corner.

The front and rear suspension operation should be smooth with no excessive stiffness, roughness or tight spots.

Check:

Check the correct action of the front suspension, including the damper action.

Check the correct action of the rear suspension, including the damper action.

Cruise Control (if fitted)

Standard required:

All cruise control switches must operate correctly. All functions and displays must operate as described in the Owner's Handbook.

Check:

Once the relevant conditions have been met as described in the Owner's Handbook, turn the cruise control ON and OFF.

Check the functionality of all following actions:

- SET the speed
- Resume the SET speed
- Increase the SET speed
- Decrease the SET speed
- Throttle cancel - twist the throttle fully forward to cancel the cruise control
- Brake cancel - make sure the cruise control is cancelled by use of the front brake, then the rear brake
- Clutch cancel - make sure the cruise control is cancelled by pulling the clutch lever in
- Gear change cancel - make sure the cruise control is cancelled when changing gear
- Sixty second overtake cancel - make sure the cruise control is cancelled after increasing the speed with the throttle for more than sixty seconds.

Post Road Test

⚠️ WARNING

Certain components of the motorcycle will be hot immediately after road test. Care must be taken to avoid burn injuries caused by contact with hot components.

NOTICE

The following tests should be carried out immediately after the motorcycle returns from the road test.

Faults detected during road test or post road test inspection, must be rectified before the motorcycle is released to the customer.

Cooling Fan Operation (liquid cooled engines only)

Standard required:

NOTICE

Some models are fitted with a cooling fan variable speed controller. This controls the speed of the cooling fan(s) at various speeds depending on the temperature of the coolant.

The fan(s) may come on earlier and at a slower speed. Depending on the ambient temperature, it is possible the fan(s) may not reach 100% speed.

The fan should operate when the coolant temperature rises above normal operating temperature. It will stop automatically.

The blades of the cooling fan must not come into contact with the radiator or the guard which surrounds the cooling fan blades.

There must be no abnormal noises when the cooling fan is operating.

⚠️ WARNING

The cooling fan operates automatically, even with the ignition switched off. To prevent injury, keep hands and clothing away from the fan blades at all times.

Action:

With the engine idling, allow the engine temperature to rise to above normal operating temperature.

⚠️ CAUTION

Do not allow the engine temperature to rise too high. Serious damage may result if the engine is allowed to overheat.

Check:

Check the cooling fan for correct operation.

Action:

Switch off the engine.

Hot Start

NOTICE



This test should be carried out when the engine is at normal operating temperature.

Standard required:

The engine should start easily when at normal operating temperature and run smoothly at idle.

Action:

Switch off the engine (if running) and wait thirty seconds.

Start the engine and allow to idle.

Switch off the engine.

Engine

Standard required:

The engine must be free from fluid leaks.

Fuel System

Standard required:

The fuel system must be free from leaks.

Tyres

Standard required:

Front and rear tyres must be free from damage.

WARNING



Check the tyres for cuts, embedded nails or other sharp objects.

Check the wheel rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.

Bodywork

Standard required:

The motorcycle bodywork must be clean and free from damage.

Check:

Check the motorcycle bodywork for new damage.

Check the motorcycle bodywork for cleanliness.

Service Indicator and Service Maintenance Book

Reset the service indicator using the Triumph Diagnostic Tool.

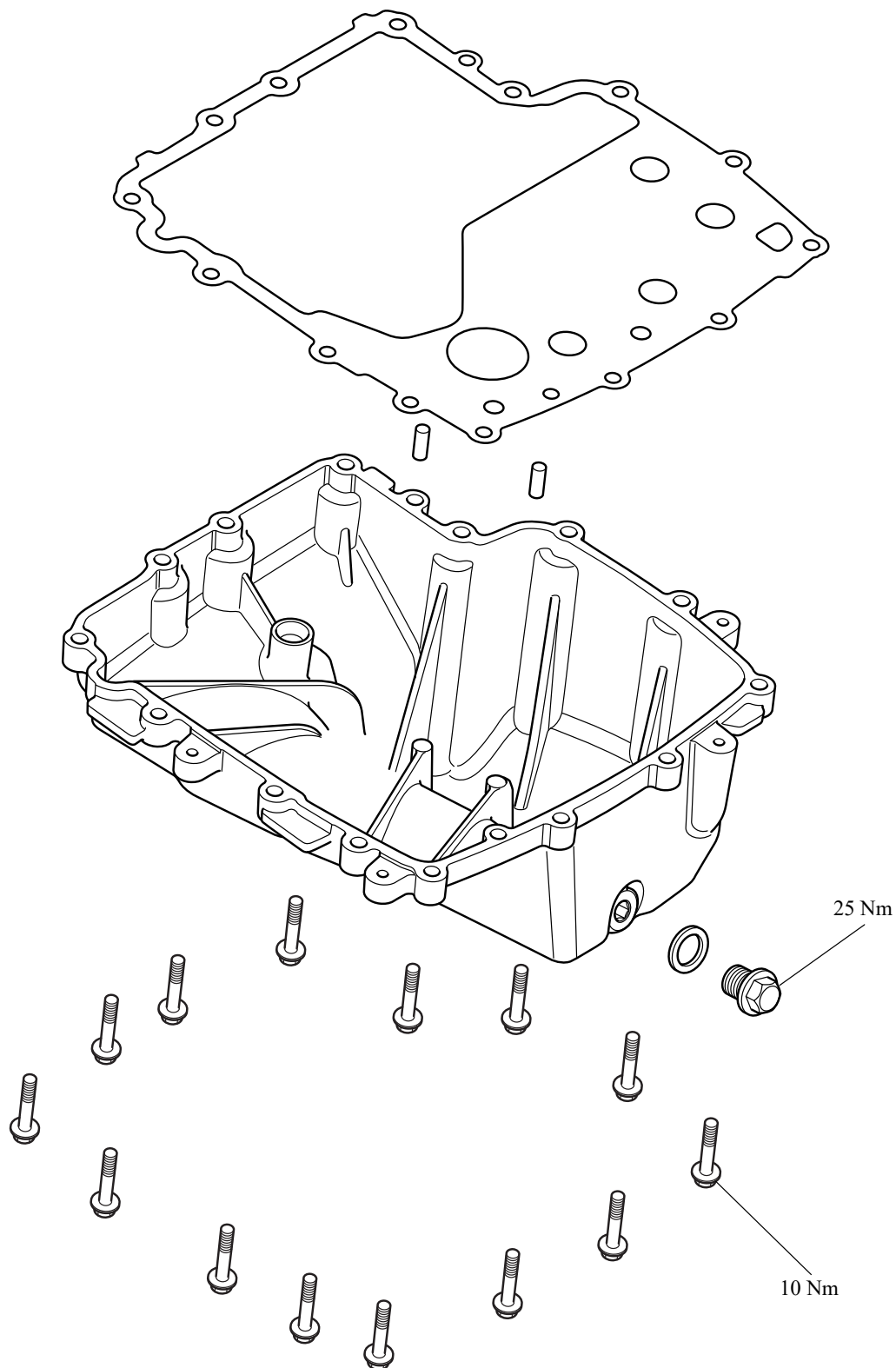
See the Triumph Diagnostic Tool User Guide for more information.

Stamp and date the relevant section of the Service Record.

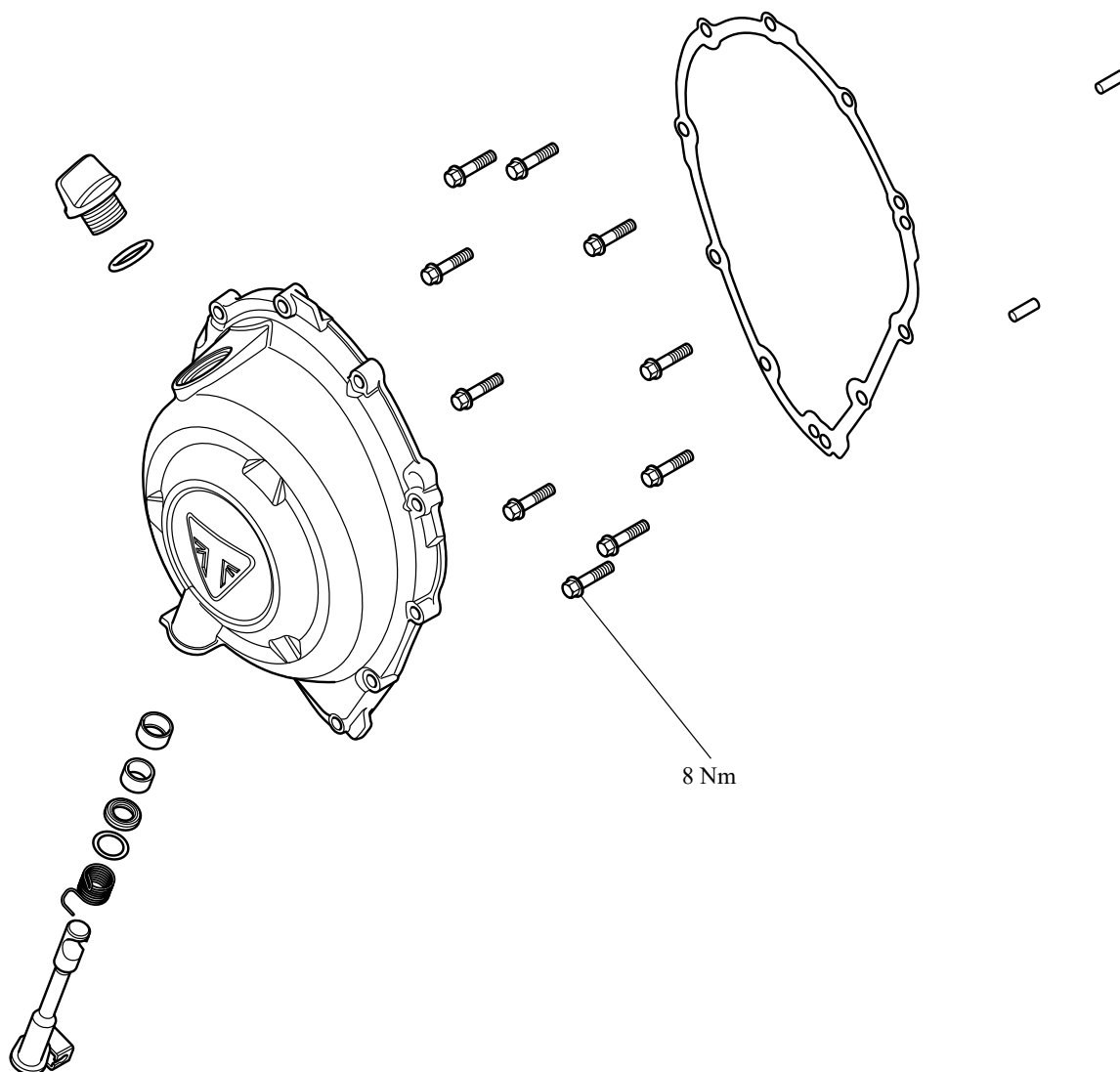
 / Engine Covers

Engine Covers

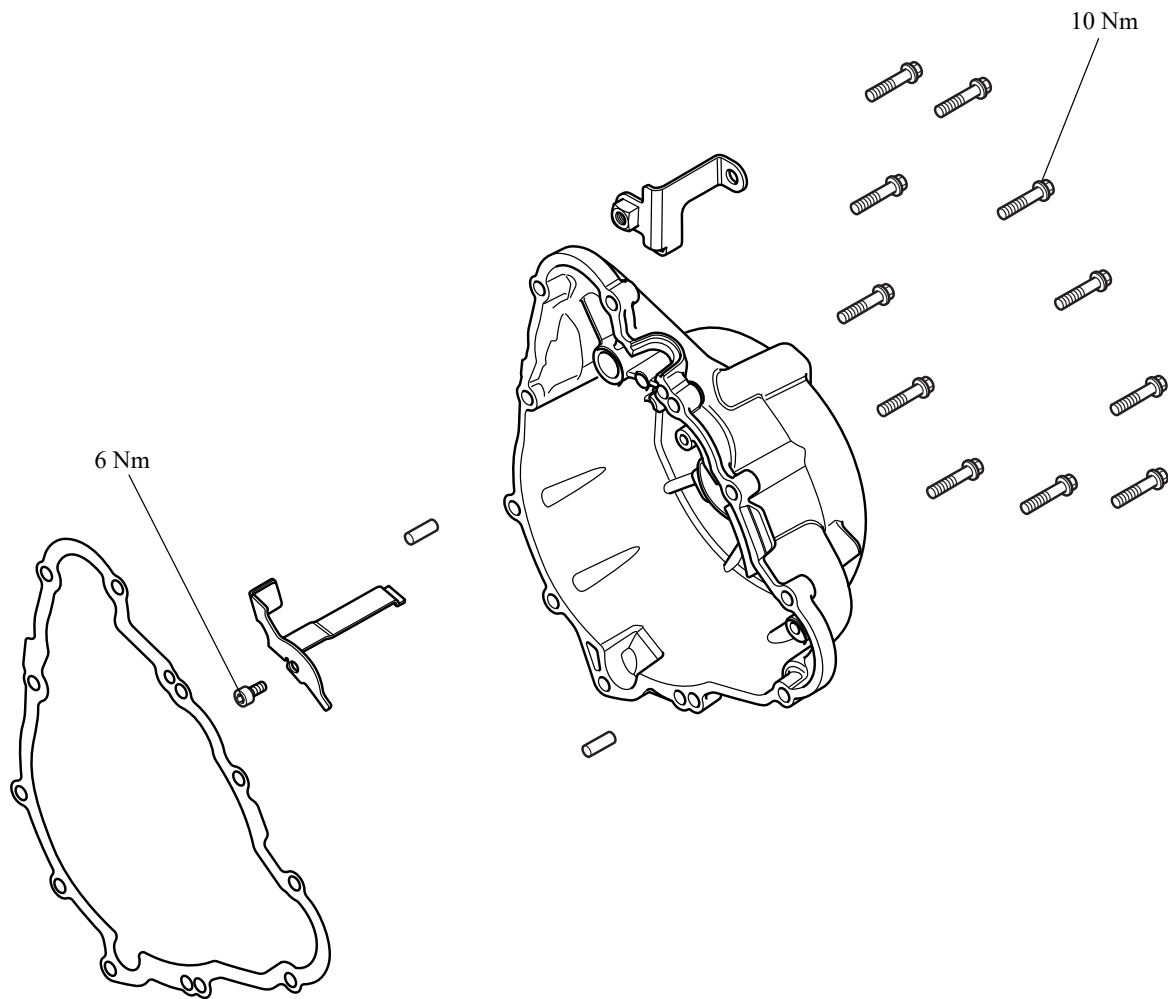
Exploded View - Sump



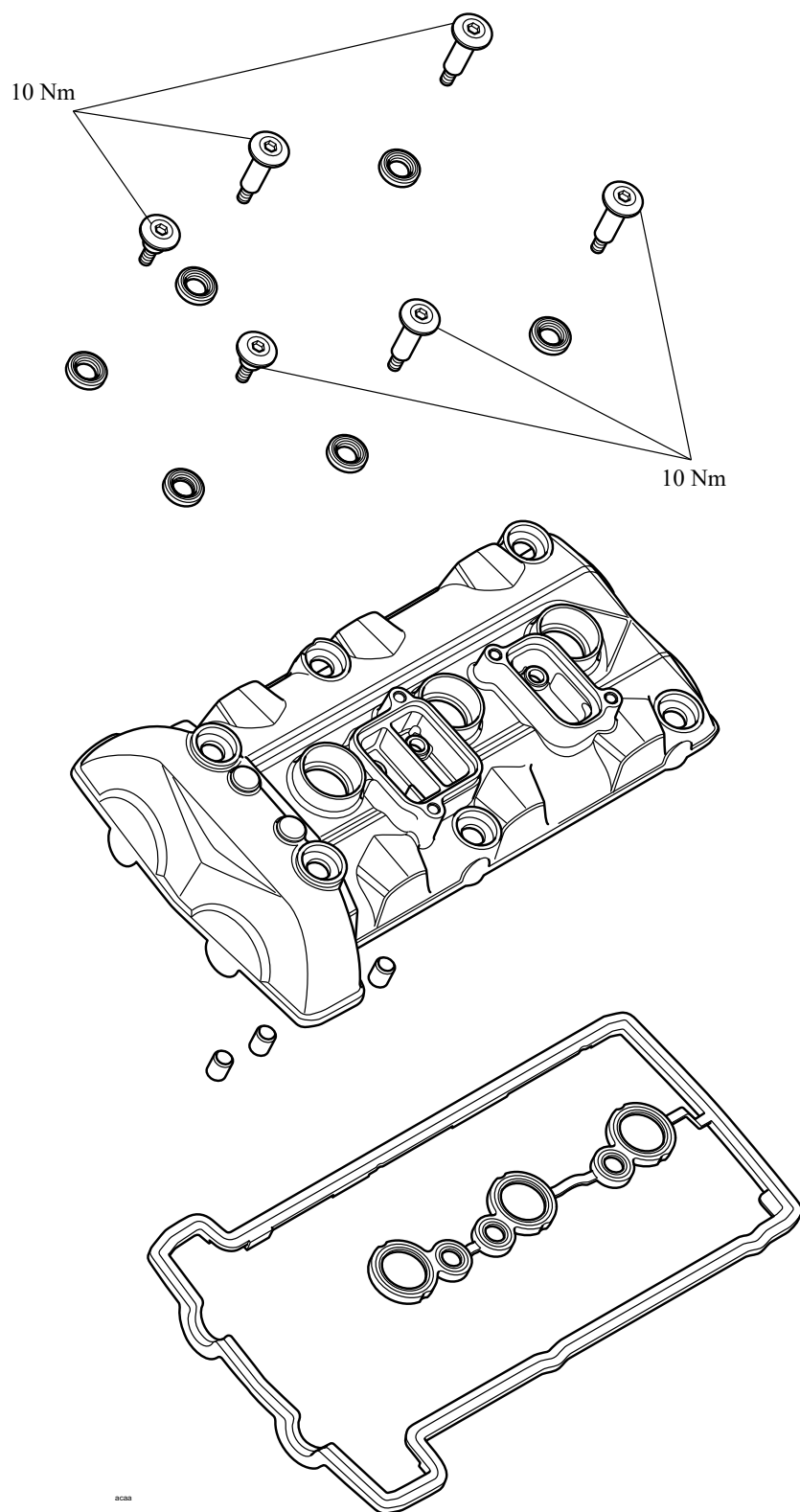
Exploded View - Clutch Cover



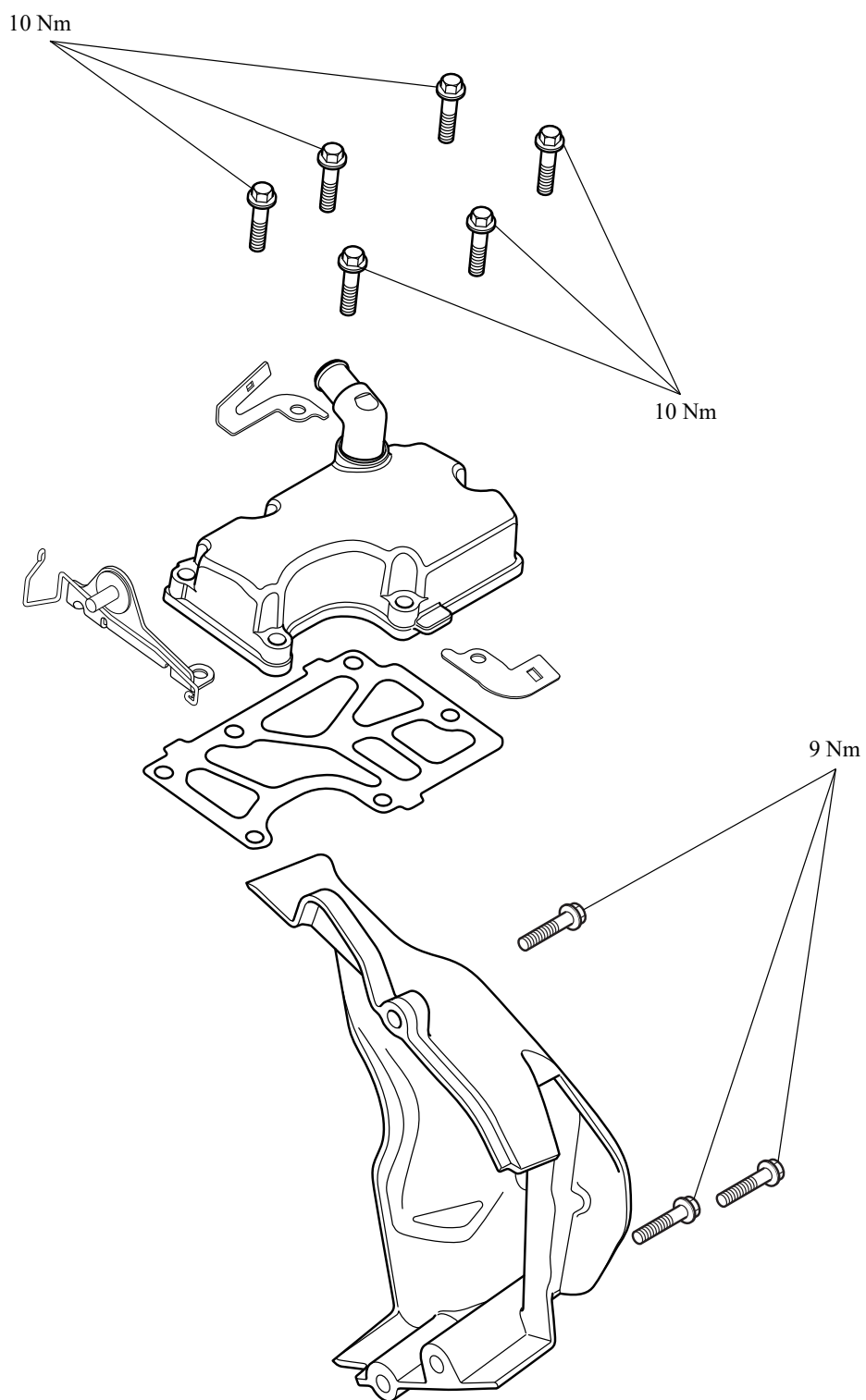
Exploded View - Alternator Cover



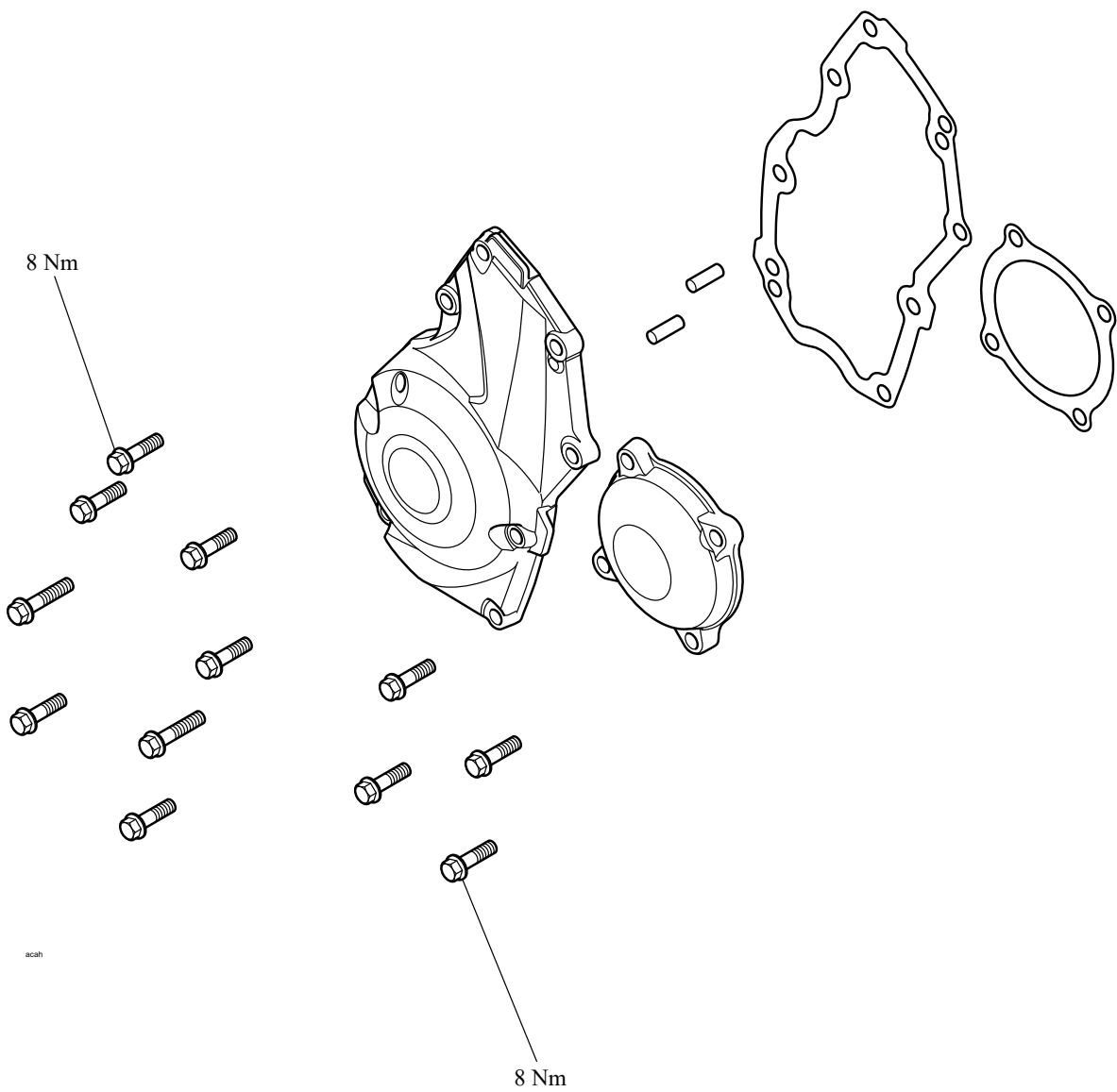
Exploded View - Camshaft Cover



Exploded View - Front Sprocket Cover and Breather Cover



Exploded View - Crankcase Right Hand Cover and Balancer Cover



Sump - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Exhaust System - Removal](#)

⚠ WARNING

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

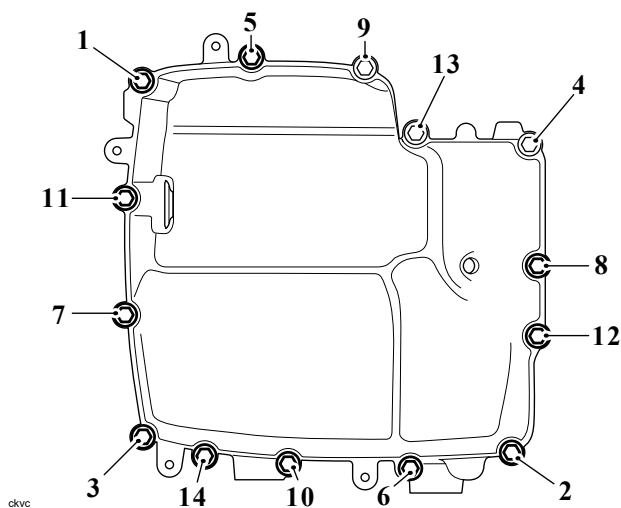
⚠ WARNING

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.

- Drain the engine oil (see [Oil and Oil Filter Change](#)).

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

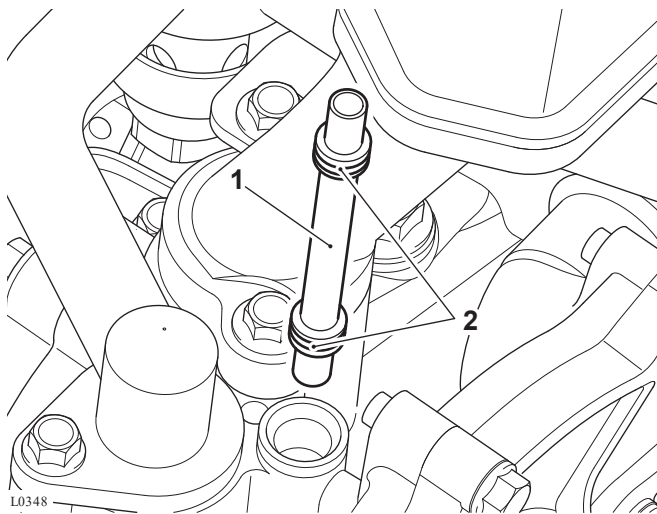


Sump Fixings Release Sequence

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

NOTICE

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

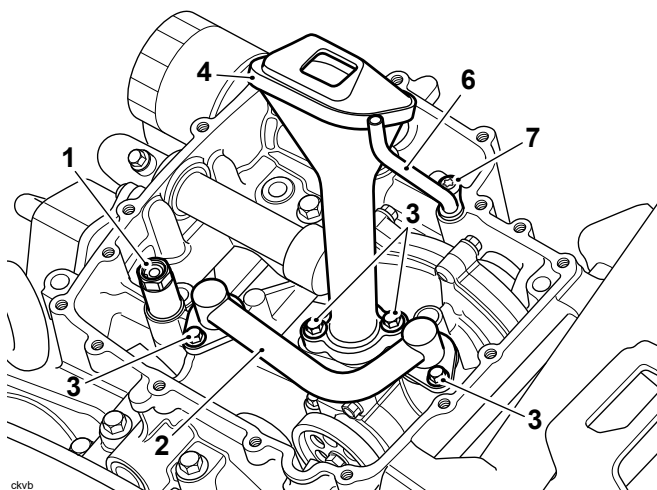


- 1. Water pump drain tube
- 2. O-rings

3. Remove and discard the sump gasket.

4. If necessary, remove the oil transfer pipe, oil pick up pipe and breather drain pipe. Discard the fixings and the four O-rings.

5. If necessary, remove the oil pressure relief valve.



- 1. Oil pressure relief valve
- 2. Oil transfer pipe
- 3. Fixings
- 4. Oil pick up pipe
- 5. Fixings
- 6. Oil breather drain pipe
- 7. Fixing

Sump - Installation

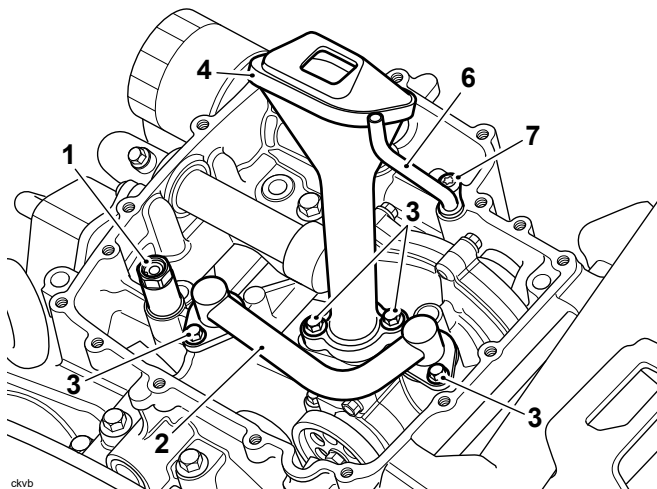
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

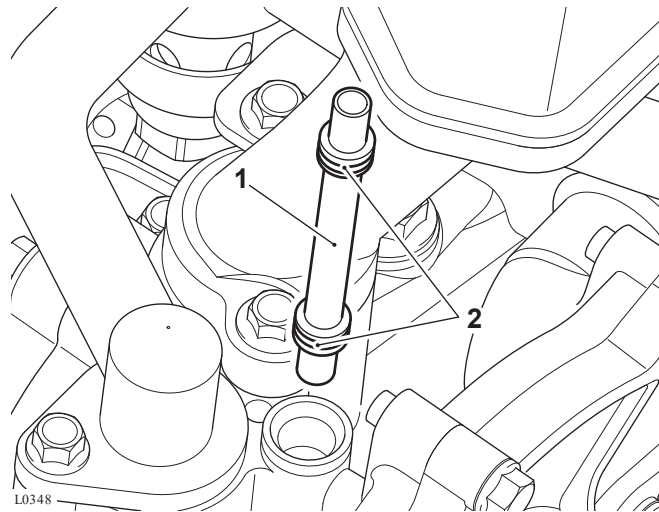
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, refit the oil pressure relief valve. Tighten to 15 Nm.
2. If removed, fit the oil transfer pipe incorporating new O-rings. Fit new fixings and tighten to 12 Nm.
3. If removed, refit the oil pick up pipe incorporating a new O-ring. Fit new fixings and tighten to 12 Nm.
4. If removed, refit the oil breather drain pipe incorporating a new O-ring. Fit a new fixing and tighten to 9 Nm.



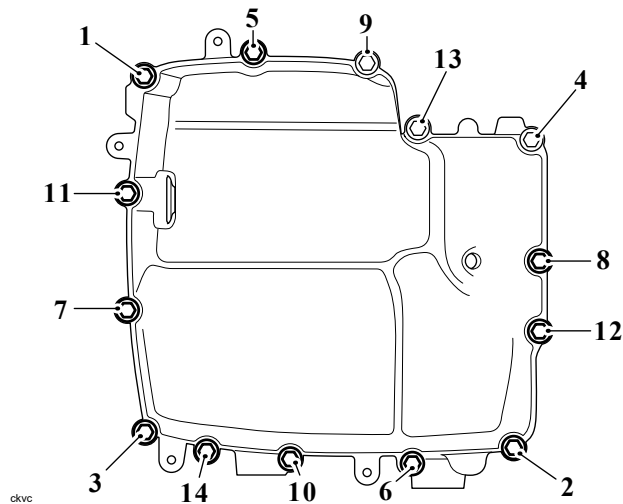
1. Oil pressure relief valve
2. Oil transfer pipe
3. Fixings
4. Oil pick up pipe
5. Fixings
6. Oil breather drain pipe
7. Fixing

5. Incorporating new O-rings, position the water pump drain tube to the oil pump.



1. Water pump drain tube
2. O-rings

6. Incorporating a new sump gasket, position the sump to the lower crankcase.
7. Tighten the sump fixings to 10 Nm in the sequence shown below.
8. Re-tighten the fixings one and two to 10 Nm.



Sump Fixings Tightening Sequence

Perform the following operations:

- **Exhaust System - Installation**
- Fill the engine with the correct grade of engine oil (see [Oil and Oil Filter Change](#))
- **Battery - Installation**
- Start the engine and ensure that the low oil pressure warning light goes out shortly after starting
- Stop the engine and check the engine oil level. Adjust if necessary (see [Oil Level Inspection](#))
- **Seat - Installation**

Clutch Cover - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

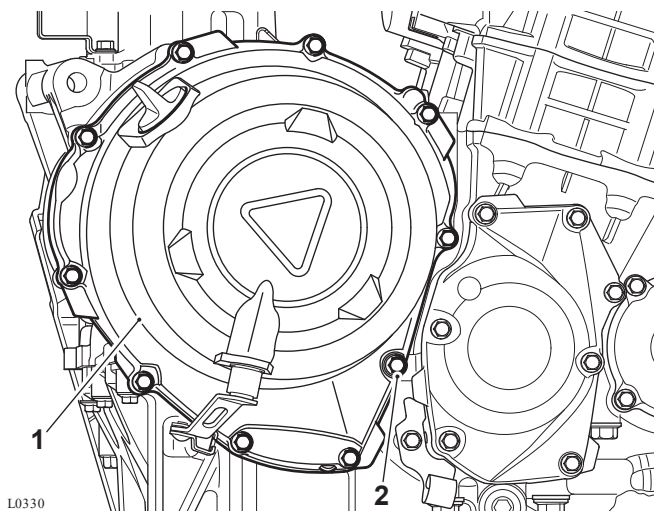
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. Release the clutch cable from the actuating arm (see [Clutch Cable - Removal](#)).
2. Place an oil catch tray beneath the clutch cover to collect any oil that may spill out on removal.
3. Release the fixings securing the clutch cover to the crankcases. Note the position of the copper washer for installation.



1. Clutch cover
2. Copper washer position

4. Carefully withdraw the cover.
5. Remove the gasket and clean the surfaces of the crankcase and the clutch cover using a lint free cloth.

Clutch Cover - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

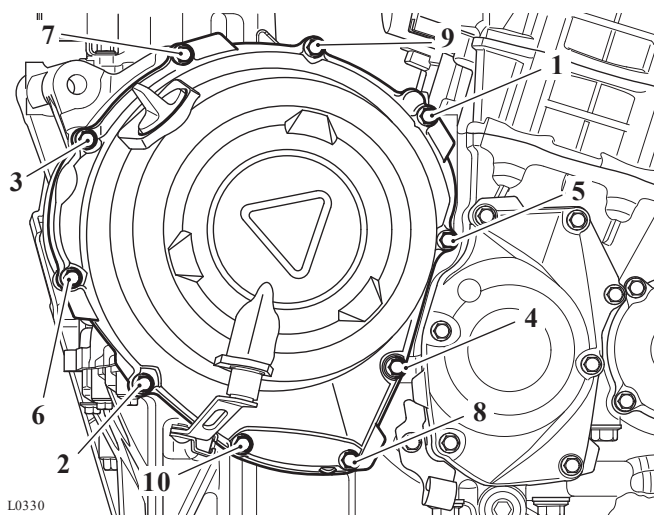
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

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

1. Incorporating a new clutch cover gasket, position the clutch cover to the crankcase.
2. Install the clutch cover fixings and the copper washer in the position noted during removal.
3. Tighten the clutch cover fixings to 8 Nm in the sequence shown below.
4. Re-tighten the fixings one and two to 8 Nm.



Clutch Cover Fixings Tightening Sequence

5. Refit the clutch cable to the actuating arm (see [Clutch Cable - Installation](#)).
 6. Set the clutch adjustment (see [Clutch Cable - Installation](#)).
- Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Alternator Cover - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

The rotor magnets are very strong. When handling the alternator cover the magnets may 'grab' the stator, causing injury to the hands or fingers. When handling the alternator cover wear suitable gloves and only grip the alternator cover by the outside surfaces; always keep hands and fingers clear when handling the alternator cover.

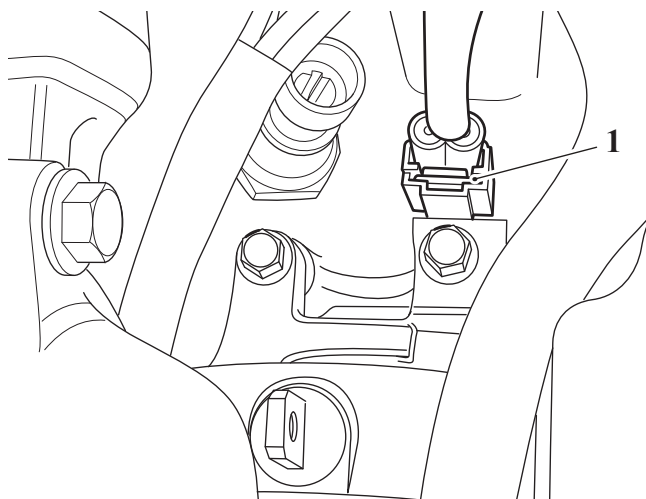
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Throttle Body - Removal](#)
- [Front Sprocket Cover - Removal](#)
- [Coolant Expansion Tank - Removal](#)

NOTICE

Note the routing of the crankshaft position sensor harness for installation.

1. Disconnect the crankshaft position sensor from the sub harness. Route the harness back to the alternator cover.

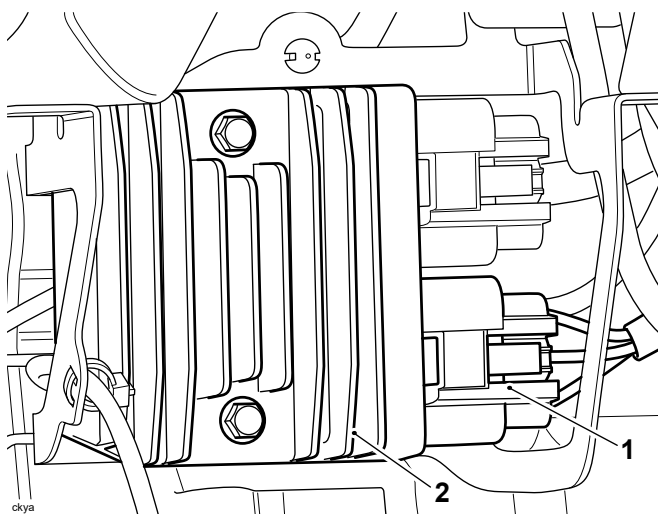


1. Crankshaft position sensor connector

NOTICE

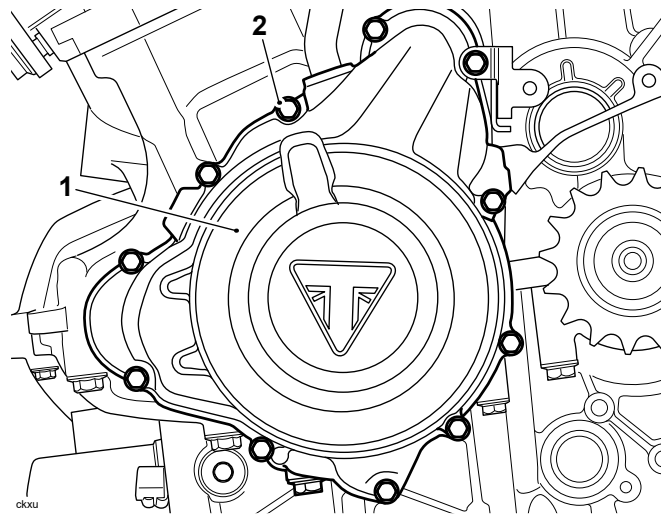
Note the routing of the alternator harness for installation.

2. Disconnect the grey connector from the regulator/rectifier. Route the harness back to the alternator cover.



1. Grey connector
2. Regulator/rectifier

3. Place an oil catch tray beneath the alternator cover to collect any oil that may spill out on removal.
4. Release the fixings securing the alternator cover to the crankcases, noting the position of the coolant expansion tank bracket.



- 1. Alternator cover
- 2. Fixings

5. Withdraw the cover from the crankcase and discard the gasket.

Alternator Cover - Installation

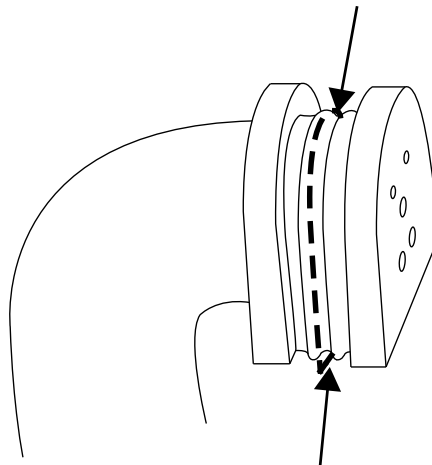
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

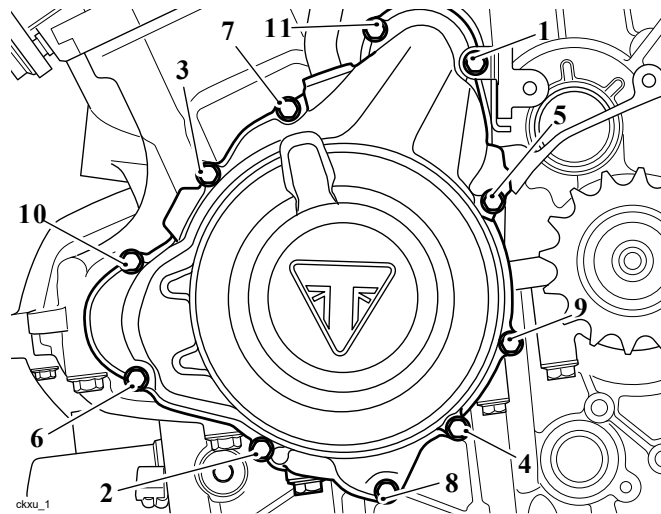
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Apply ThreeBond 1216E sealant to the grommet on the path shown below. The bead of sealant should extend around the grommet perimeter (including the underside) and be approximately 3.5 mm wide.



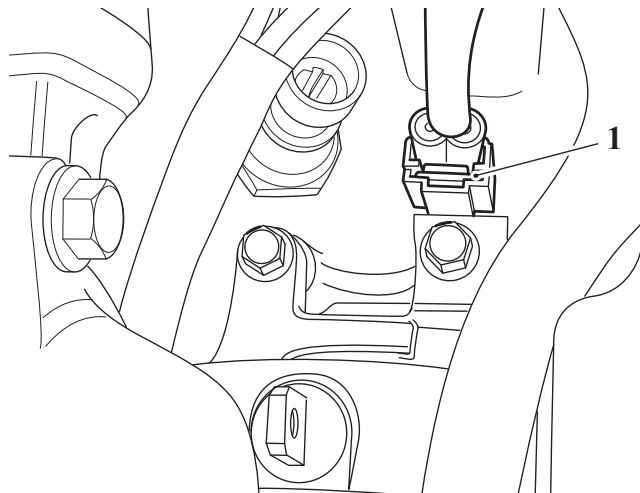
Alternator Cover Grommet Sealant Path

2. Position the grommet to the alternator cover.
3. Position a new gasket to the crankcase dowels then refit the alternator cover, refitting the coolant expansion tank bracket as noted during removal.
4. Make sure a copper washer is fitted under fixing position 7 in the image below.
5. Tighten the cover bolts to 10 Nm in the sequence shown below.
6. Re-tighten the fixings one and two to 10 Nm.



Alternator Cover Fixings Tightening Sequence

7. Route the alternator harness to the regulator/rectifier as noted for removal.
8. Connect the grey connector to the regulator/rectifier.
9. Route the crankshaft position sensor harness to the main harness as noted for removal.
10. Connect the crankshaft position sensor the main harness.



1. Crankshaft position sensor connector

Perform the following operations:

- **Coolant Expansion Tank - Installation**
- **Front Sprocket Cover - Installation**
- **Throttle Body - Installation**
- **Airbox - Installation**
- **Fuel Tank - Installation**
- **Battery - Installation**
- **Seat - Installation**

Camshaft Cover - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

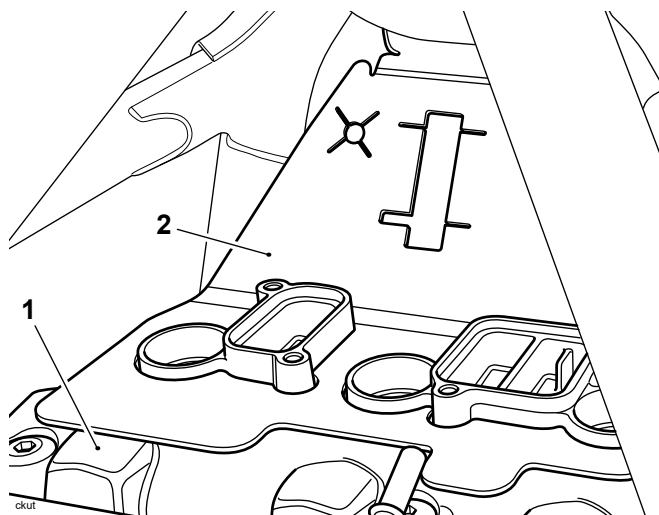
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [ABS Modulator - Removal](#)
- [Secondary Air Injection Solenoid Valve - Removal](#)
- [Secondary Air Injection Reed Valves - Removal](#)

1. Disconnect the electrical connections to the ignition coils and remove the coils.
2. Remove the air deflector plate from on top of the camshaft cover and fold forwards towards the radiator.

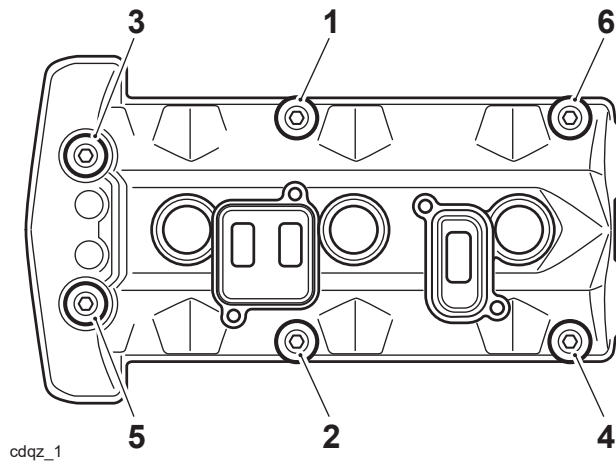


1. Camshaft cover
2. Air deflector

3. Progressively release the camshaft cover fixings in the sequence shown below.

NOTICE

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



Camshaft Cover Fixings Release Sequence

4. Remove the camshaft cover from the motorcycle.

⚠ CAUTION

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

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

5. Remove the camshaft cover gasket. If necessary, recover the three dowels from the secondary air injection holes in the camshaft ladder (these may come away in the camshaft cover or gasket).
6. Discard the camshaft cover gasket and bolt seals.
7. Remove any residual oil from the front of the head using a syringe or lint free cloth.

Camshaft Cover - Installation

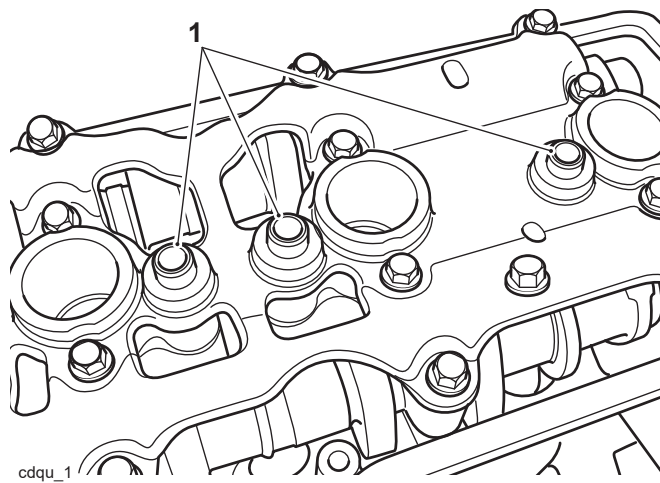
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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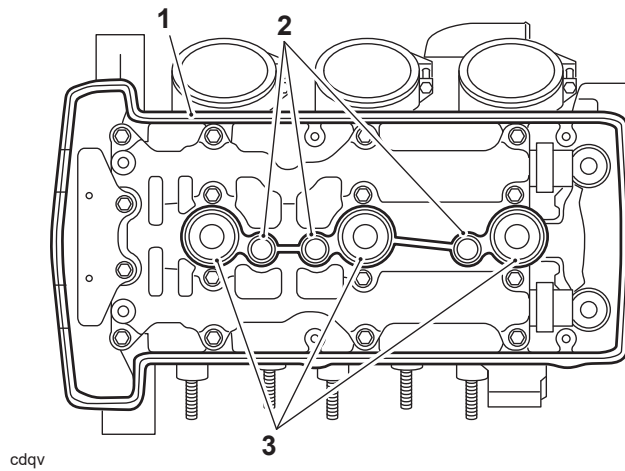
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Refit the three dowels to the camshaft ladder.



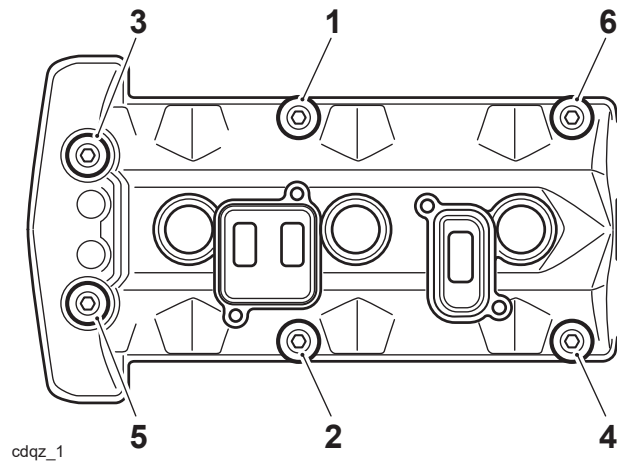
1. Dowels

2. Fit a new camshaft cover seal to the cylinder head. Ensure the groove in the gasket is correctly seated to the head. Ensure the plug tower seals and the dowels are correctly located.



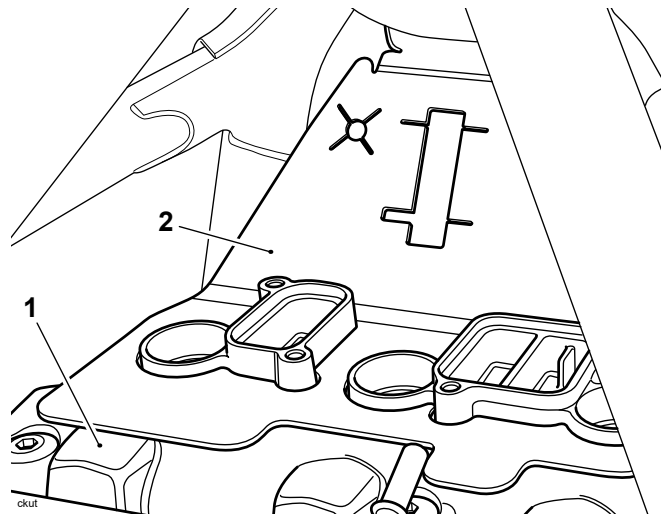
1. Camshaft cover seal
2. Dowels
3. Plug tower seals

3. Fit the camshaft cover, ensuring that the gasket remains in the correct position.
4. Lubricate the new camshaft cover screw seals with clean engine oil. Fit the camshaft cover screws and screw seals and tighten until finger tight.
5. Tighten the camshaft cover fixings, in the sequence shown below, to 10 Nm.



Camshaft Cover Fixings Tightening Sequence

6. Re-tighten fixings 1 and 2 to 10 Nm.
7. Refit the air deflector plate on top of the camshaft cover.



- | |
|--|
| <p>1. Camshaft cover</p> <p>2. Air deflector</p> |
|--|

8. Inspect the ignition coils seal for damage and replace if necessary.

9. Fit the ignition coils and reconnect the electrical connections.

Perform the following operations:

- **Secondary Air Injection Reed Valves - Installation**
- **Secondary Air Injection Solenoid Valve - Installation**
- **ABS Modulator - Installation**
- **Fuel Tank - Installation**
- **Battery - Installation**
- **Seat - Installation**

Front Sprocket Cover - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

Rotating the rear wheel will cause the drive chain to rotate on the sprockets. To prevent injury, never place loose clothing, fingers or hands near the drive chain or sprockets. Loose clothing, fingers or the hands could become trapped as the drive chain rotates on the sprockets causing a crushing injury to the fingers, hands or other parts of the anatomy.

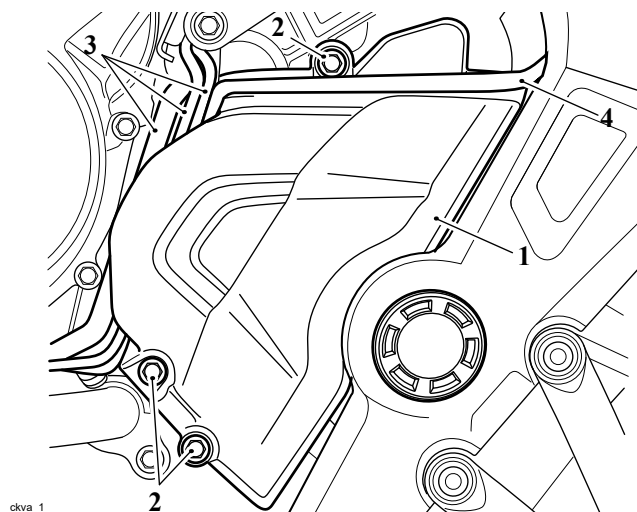
Perform the following operations:

NOTICE

Note the routing of the breather hoses and harnesses in front of the sprocket cover for installation.

- **Gear Change Linkage - Removal**

1. Remove the fixings securing the sprocket cover to the crankcase.
2. Manoeuvre the evaporative drain hose upwards, noting its position for installation, and remove the front sprocket cover.



1. Front sprocket cover
2. Fixings
3. Breather hoses and harnesses
4. Evaporative canister drain hose

Front Sprocket Cover - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

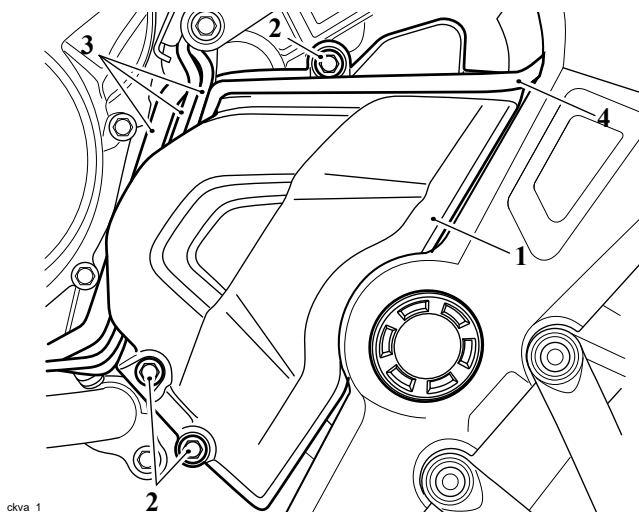
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⚠ WARNING

Rotating the rear wheel will cause the drive chain to rotate on the sprockets. To prevent injury, never place loose clothing, fingers or hands near the drive chain or sprockets. Loose clothing, fingers or the hands could become trapped as the drive chain rotates on the sprockets causing a crushing injury to the fingers, hands or other parts of the anatomy.

1. Fit the sprocket cover, ensuring that the breather hoses and harnesses are routed as noted for removal.
2. Fit the sprocket cover fixings and evenly tighten to 9 Nm.
3. Position the evaporative drain hose as noted during removal.



1. Front sprocket cover
2. Fixings
3. Breather hoses and harnesses
4. Evaporative canister drain hose

Perform the following operations:

- [Gear Change Linkage - Installation](#)

Crankcase Right Hand Cover - Removal

⚠ WARNING

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

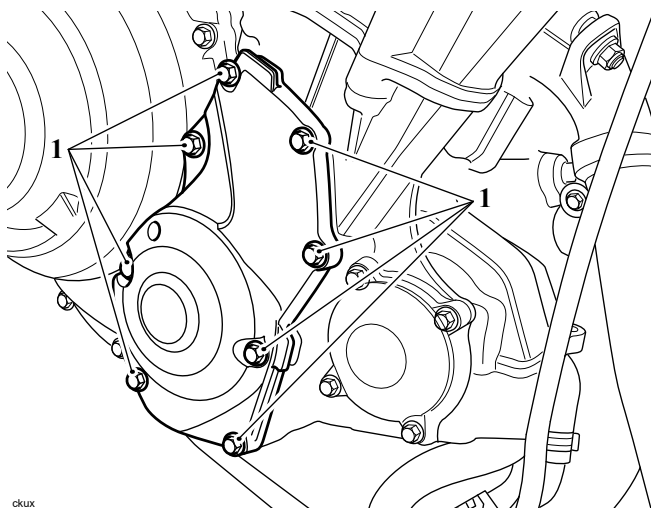
If the engine has recently been running, the engine oil will be hot to the touch. Contact with the hot oils may cause damage to exposed skin. To avoid skin damage, do not touch hot oil.

⚠ WARNING

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. Place an oil catch tray beneath the crankcase right hand cover to collect any oil that may spill out on removal.
2. Release the eight fixings and remove the right hand crankcase cover. Note the position of the copper washer for installation. Discard the gasket.



1. Fixings

Crankcase Right Hand Cover - Installation

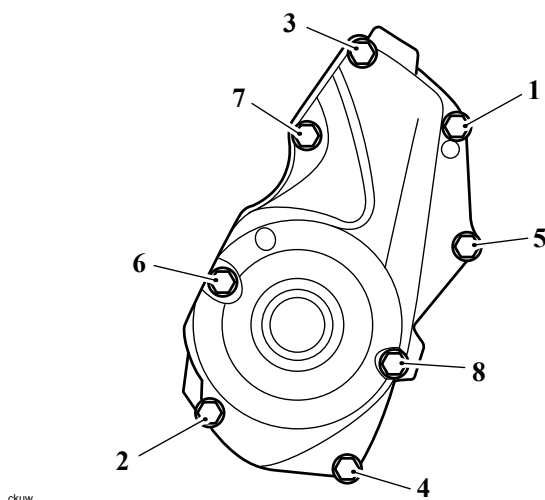
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new gasket to the crankcase right hand cover.
2. Fit the crankcase right hand cover with the copper washer in the position noted during removal. Tighten its fixings to 8 Nm in the sequence shown below.
3. Re-tighten the fixings one and two to 8 Nm.



Crankcase Right Hand Cover Fixings Tightening Sequence

Engine Breather Cover - Removal

⚠️ WARNING

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Perform the following operations:

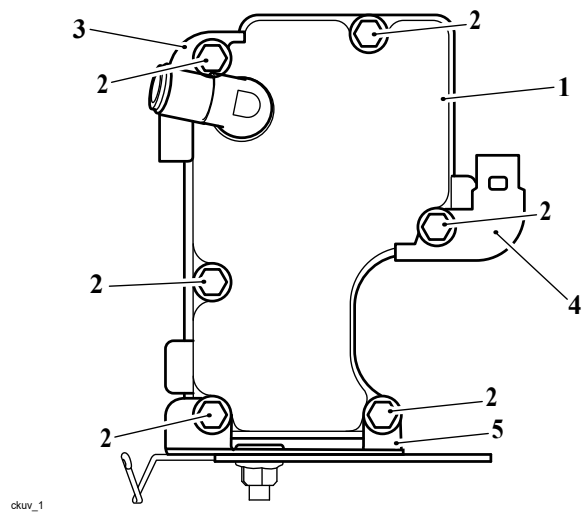
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Side Panels - Removal](#)
- [Airbox - Removal](#)
- [Throttle Body - Removal](#)
- [Inlet Manifold - Removal](#)

1. Release the retaining clip and detach the engine breather hose from the engine breather cover.

NOTICE

Note the positions of the two harness brackets and the inlet manifold bracket mounted to the engine breather cover for installation.

2. Detach the harness from the two brackets mounted to the breather cover.
3. Release the six fixings and remove the engine breather cover.

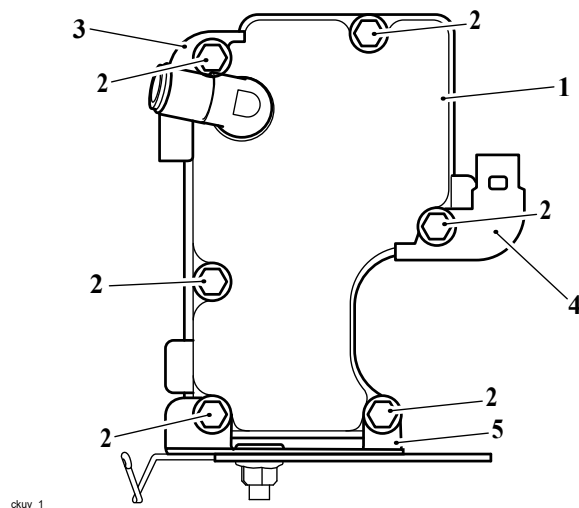


- 1. Engine breather cover
- 2. Fixings
- 3. Harness bracket
- 4. Harness bracket
- 5. Inlet manifold bracket

4. Discard the gasket.

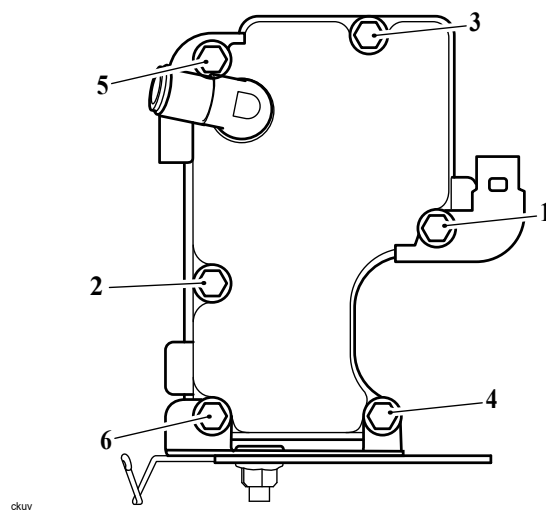
Engine Breather Cover - Installation

1. Fit a new engine breather cover gasket to the crankcase.
2. Fit the engine breather cover, ensuring that the gasket remains in the correct position.
3. Position the harness brackets and the inlet manifold bracket to the engine breather cover as noted during removal.



1. Engine breather cover
2. Fixings
3. Harness bracket
4. Harness bracket
5. Inlet manifold bracket

4. Install the fixings to the engine breather cover and tighten to 10 Nm in the sequence shown.



Engine Breather Cover fixings Tightening Sequence

5. Re-tighten the fixings one and two to 10 Nm.
- Perform the following operations:

- [Inlet Manifold - Installation](#)
- [Throttle Body - Installation](#)
- [Airbox - Installation](#)
- [Side Panels - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Balancer Cover - Removal

⚠ WARNING

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

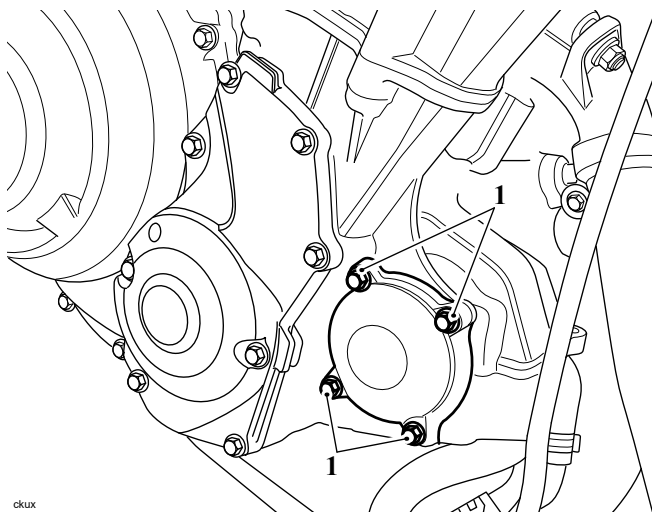
If the engine has recently been running, the engine oil will be hot to the touch. Contact with the hot oils may cause damage to exposed skin. To avoid skin damage, do not touch hot oil.

⚠ WARNING

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. Place an oil catch tray beneath the balancer cover to collect any oil that may spill out on removal.
2. Release the four fixings and remove the balancer cover. Discard the gasket.



1. Fixings

Balancer Cover - Installation

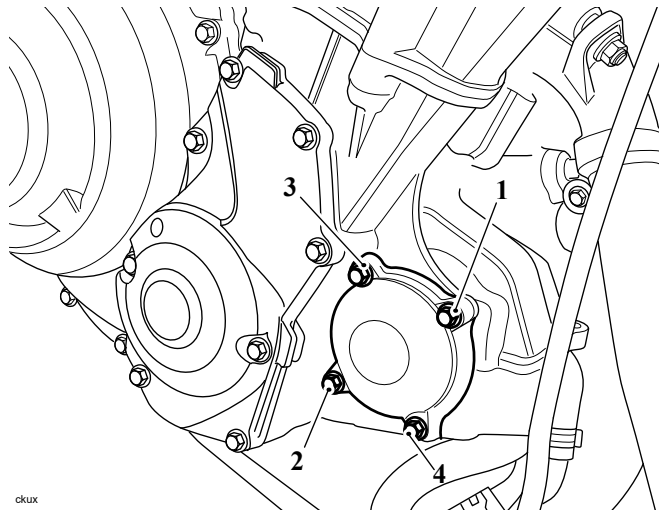
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new gasket to the balancer cover.
2. Fit the balancer cover and tighten its fixings to 8 Nm in the sequence shown below.
3. Re-tighten the fixings one and two to 8 Nm.

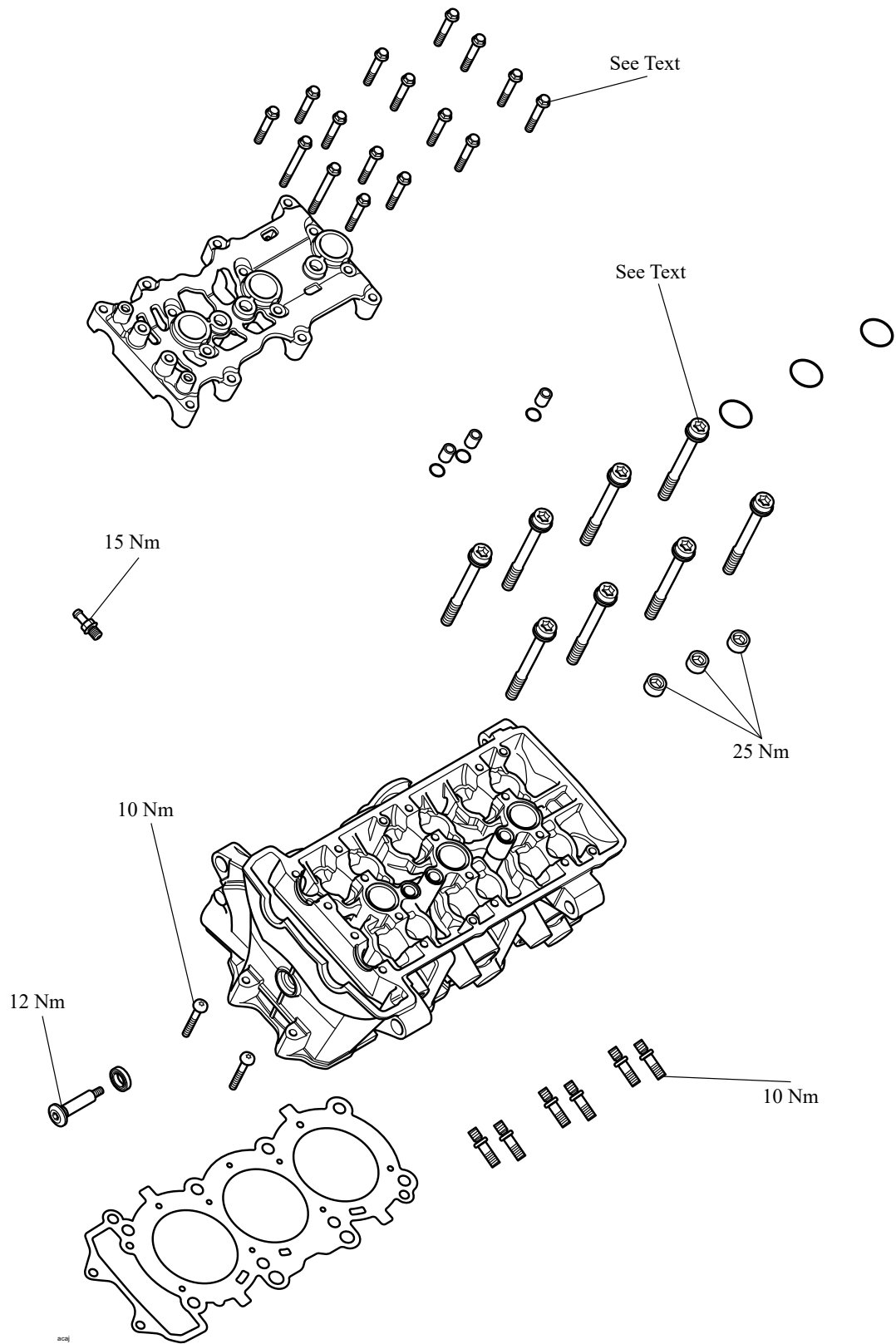


Balancer Cover Fixings Tightening Sequence

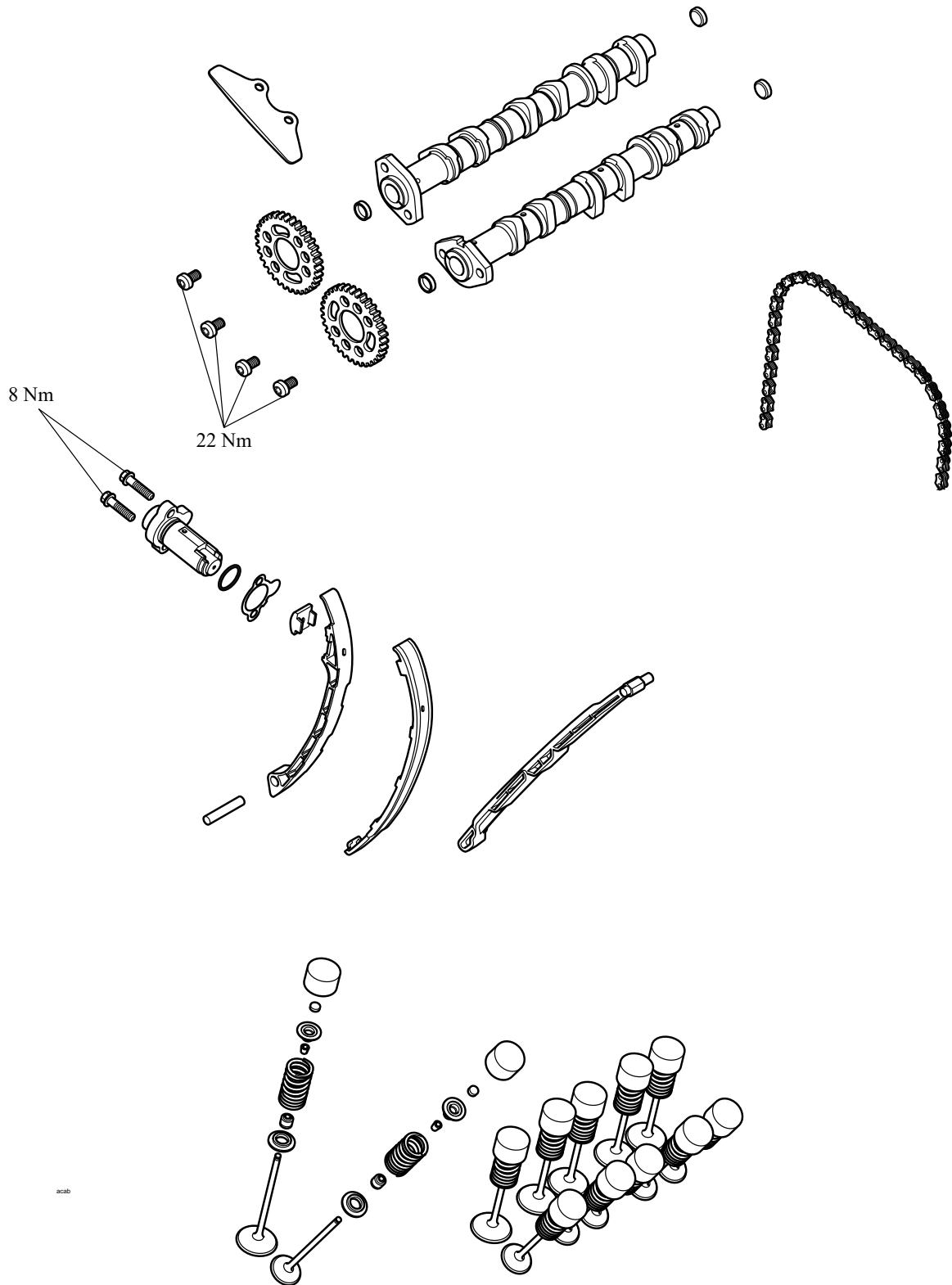
[🏠](#) / [Cylinder Head](#)

Cylinder Head

Exploded View - Cylinder Head



Exploded View - Camshaft, Camshaft Drive and Valves



Cylinder Head Description

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

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

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

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

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

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

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

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

⚠ CAUTION



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

Cylinder Head Description

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

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

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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.

Camshaft Drive Chain Tensioner - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

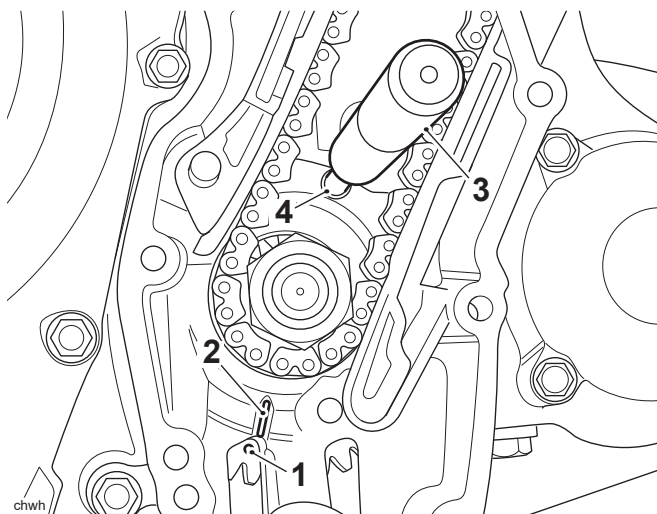
- [Camshaft Cover - Removal](#)
- [Crankcase Right Hand Cover - Removal](#)

NOTICE

While rotating the crankshaft, ensure that the front camshaft drive chain rubbing blade remains in its mounting.

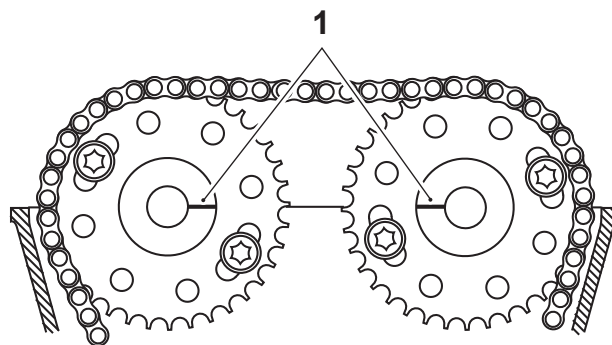
Before inserting the timing pin, ensure the dot on the primary gear is aligned with the line on the crankcase.

1. Rotate the crankshaft clockwise (the normal direction of rotation), using the bolt fitted to the end of the crankshaft. Stop rotation when number 1 cylinder is at Top Dead Centre (TDC), that is when the dot mark on the primary gear aligns with the line on the crankcase.
2. Insert service tool T3880601 into the timing holes in the crankcase and crankshaft.



1. DOT alignment mark
2. Marker line
3. T3880601 - Camshaft Timing Pin
4. Timing hole in crankcase

3. In addition to the dot mark alignment, at TDC, the alignment marks on the camshaft bosses will point inwards.



gaaa_12

1. Camshaft alignment marks

4. 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.

NOTICE

Note the orientation of the hydraulic tensioner.

5. Evenly release the hydraulic tensioner mounting bolts until the plunger spring tension has been released.
6. Remove the hydraulic tensioner and discard the O-ring and gasket.

Camshaft Drive Chain Tensioner - Inspection

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

Camshaft Drive Chain Tensioner - Installation

⚠ WARNING

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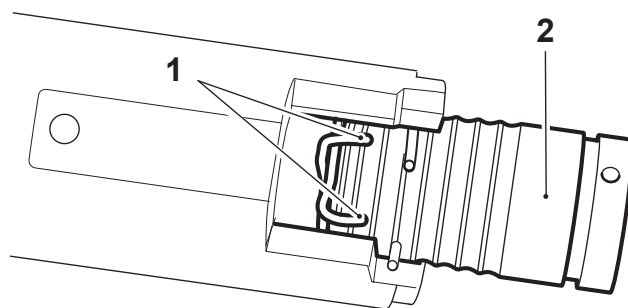
1. Check that the dot mark on the primary gear is still aligned with the line on the crankcase and the service tool T3880601 is installed.
Ensure the crankshaft cannot rotate.
2. Ensure that the wedge fitted earlier is still holding the camshaft drive chain tensioner blade in contact with the camshaft drive chain.
3. Check that the camshaft alignment marks point inwards.
4. To set the hydraulic tensioner onto the first tooth of the ratchet (minimum extension) carry out the following:

NOTICE

If installing a new hydraulic tensioner, do not release the plunger before fitting.

If installing the original hydraulic 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.

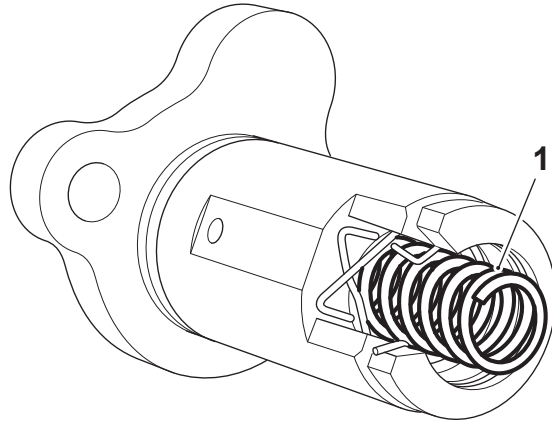
5. Hold the resister ring ends together and pull out the plunger.



cfe1_2

1. Resister ring ends
2. Plunger

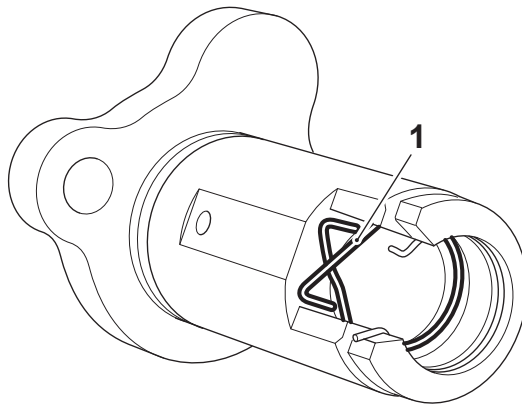
6. Remove the spring.



cfhp

1. Spring

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



cfho

1. Resister ring

9. Refit the spring.

⚠ CAUTION

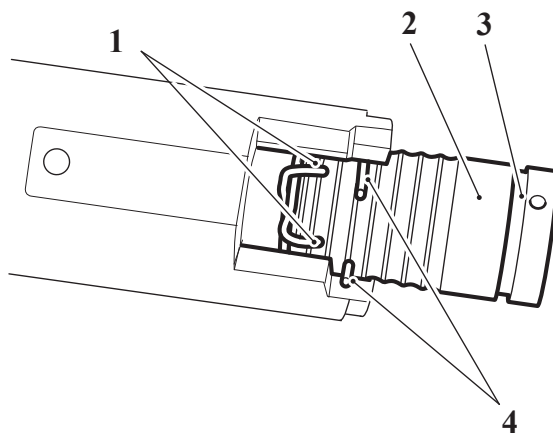


When resetting the tensioner, care must be taken to avoid activating the tensioner when there is no resistance on the plunger.

Activating the tensioner when there is no resistance on the plunger may cause internal damage to the tensioner housing.

It is recommended that the plunger is pushed into the tensioner housing in a controlled manner using a suitable soft jawed vice. Once the snap ring is located into its groove, the vice should be released slowly to ensure that the plunger is held in place.

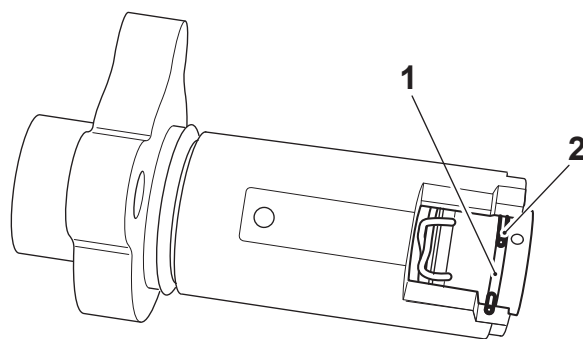
10. Hold the resister ends together and insert the plunger into the tensioner housing.
11. Place the tensioner in a soft jawed vice.
12. While holding the resister ends together, use the vice to push the plunger through the resister ring until the groove for the snap ring aligns with the snap ring.



cfej_3

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

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



cfej

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

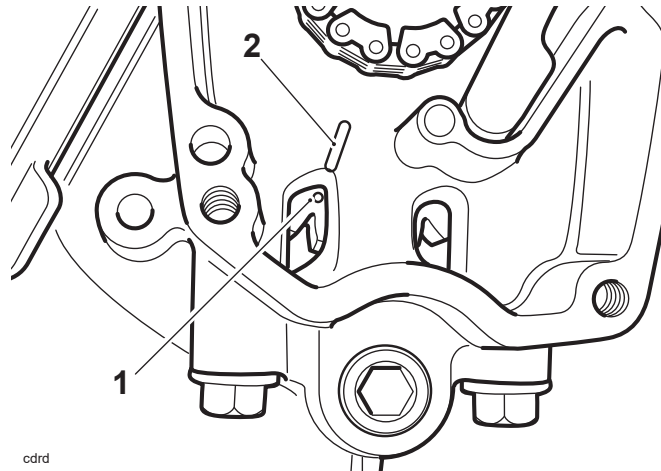
- 14. Fit a new O-ring and gasket to the hydraulic tensioner.
- 15. Fit the tensioner to the cylinder head as noted for removal. Tighten the bolts to 8 Nm.
- 16. Remove the wedge, taking care not to move or damage the tensioner blade.
- 17. Remove the service tool T3880601.
- 18. To release the hydraulic tensioner, rotate the crankshaft 1/4 of a turn anticlockwise using the bolt fitted to the end of the crankshaft.
Then rotate the crankshaft clockwise two revolutions until the 'dot' mark on the primary gear aligns with the line on the crankcase.
- 19. Check that there is tension in the camshaft drive chain and the timing marks at the camshaft sprockets are correctly aligned.

NOTICE



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 pressure is felt at the tensioner plunger. This could take up to 5 seconds.

20. Check that the tensioner plunger is correctly located in the middle of the camshaft drive chain tensioner blade when viewed from above.
21. Rotate the engine through 4 full revolutions, and reset number 1 cylinder to TDC. Ensure that the dot mark on the primary gear aligns with the line on the crankcase.

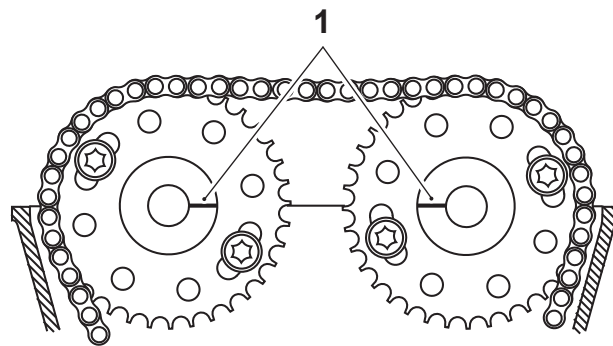


1. Dot mark
2. Marker line

NOTICE

The alignment marks do not need to be perfectly in line to each other, they only need to be pointing to each other.

22. Check that the camshaft timing marks point as illustrated below.



Camshaft Alignment Marks

23. Re-check the tensioner plunger location against the camshaft drive chain tensioner blade.
Perform the following operations:

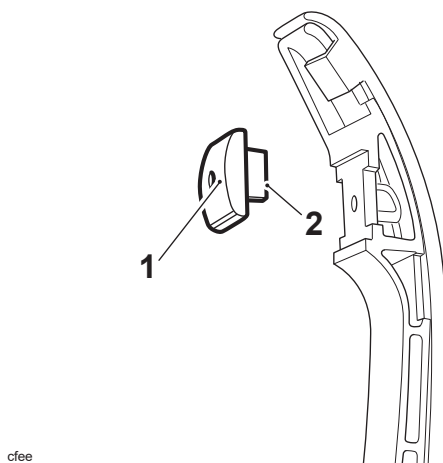
- [Camshaft Cover - Installation](#)
- [Crankcase Right Hand Cover - Installation](#)

Camshaft Drive Chain Tensioner Blade - Disassembly

NOTICE

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

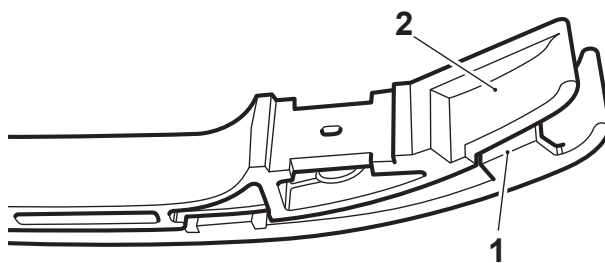
1. Release the clips and remove the pad.



cfee

1. Pad
2. Clip (one side shown)

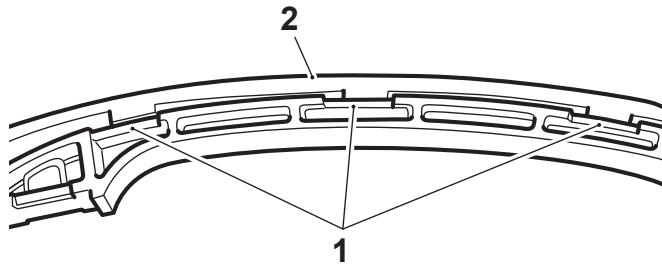
2. Detach the top hook from the tensioner blade.



cfeef

1. Top hook
2. Tensioner blade

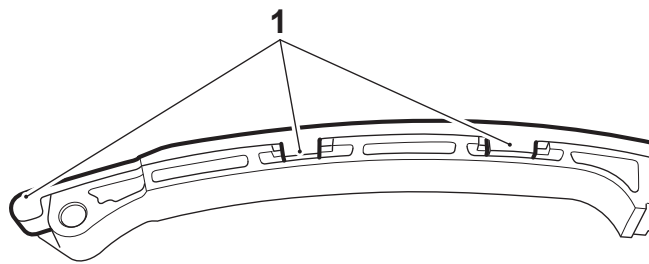
3. Release the three side locating devices.



cfeg

- 1. Locating devices
- 2. Facing blade

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



cfeh

- 1. Hooks

Camshaft Drive Chain Tensioner Blade and Rubbing Strip - Inspection

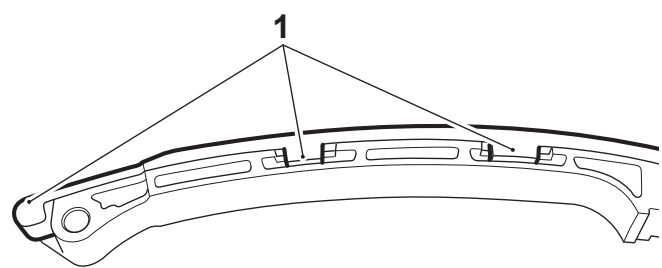
1. Check the camshaft drive chain tensioner blade and rubbing strip for wear or damage. Renew if worn or damaged.

Camshaft Drive Chain Tensioner Blade - Assembly

NOTICE

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

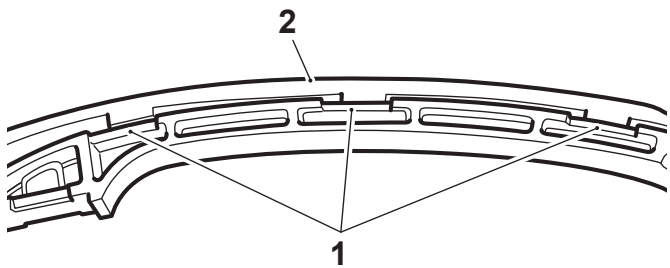
1. Align the three hooks and fit the facing blade.



cfeh

1. Hooks

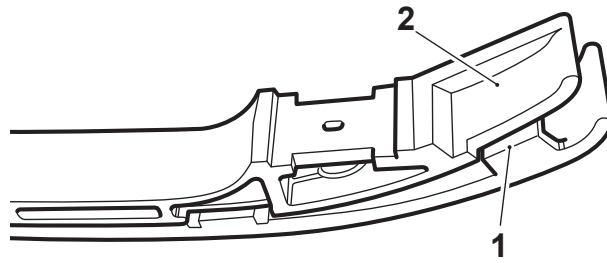
2. Align the three side locating devices.



cfeg

1. Locating devices
2. Facing blade

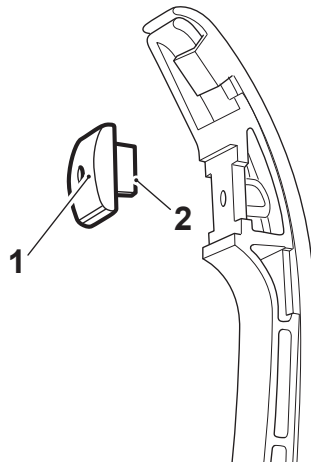
3. Attach the top hook to the tensioner blade.



cief

- 1. Top hook
- 2. Tensioner blade

4. Fit the pad and secure the clips..



cfee

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

Camshaft - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

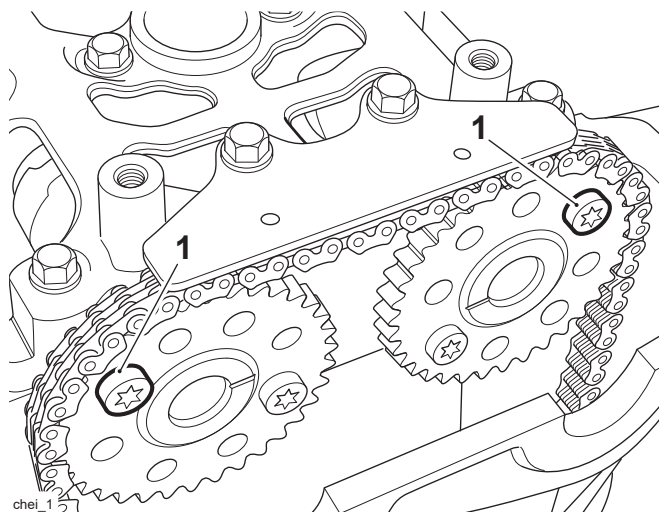
- [Camshaft Cover - Removal](#)
- [Crankcase Right Hand Cover - Removal](#)

1. Remove the spark plugs to reduce compression resistance when turning the engine.

NOTICE

The camshaft sprocket fixings need only be loosened sufficiently to allow the sprockets to rotate on the camshafts.

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



1. Fixings

NOTICE

While rotating the crankshaft, ensure that the front camshaft drive chain rubbing blade remains in its mounting.

3. Rotate crankshaft until the remaining two fixings are accessible.

⚠ CAUTION

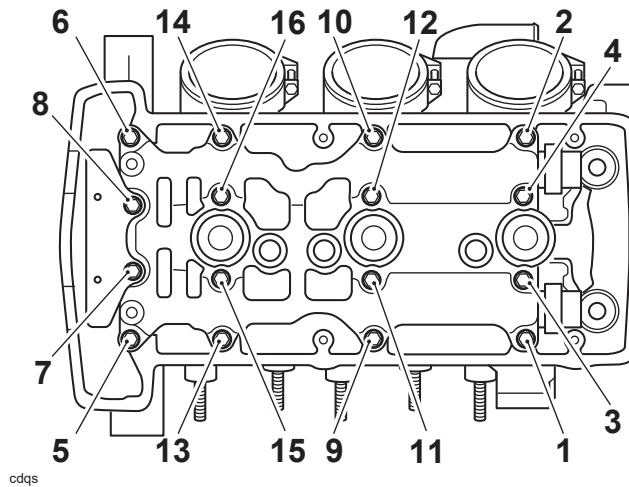
Do not rotate the engine further once the four camshaft sprocket bolts have been loosened. Rotation of the engine with the four sprocket bolts loose will result in valve to piston contact and serious engine damage.

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

NOTICE

Note the orientation of the tensioner before removal.

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



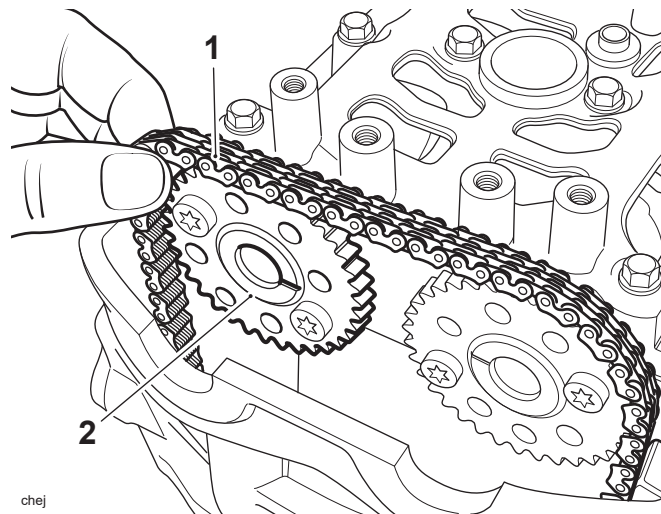
Camshaft Ladder Bolt Release Sequence

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

NOTICE

Each camshaft and sprocket is removed as an assembly.

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



- 1. Camshaft drive chain
- 2. Inlet camshaft

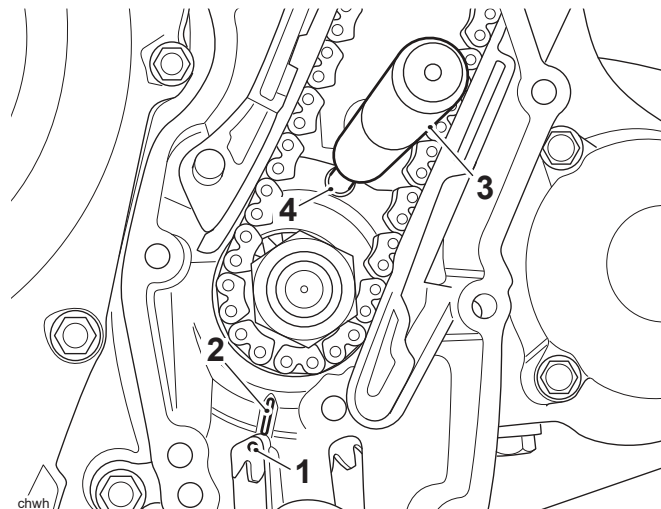
12. For the removal of the camshaft drive chain (see [Camshaft Drive Chain - Removal](#)).

13. Rotate the crankshaft clockwise (the normal direction of rotation), using the bolt fitted to the end of the crankshaft. Stop rotation when number 1 cylinder is at Top Dead Centre (TDC), that is when the dot mark on the primary gear aligns with the line on the crankcase.

NOTICE

Before inserting the timing pin, ensure the dot on the primary gear is aligned with the line on the crankcase.

14. Insert the service tool T3880601 into the timing holes in the crankcase and crankshaft.



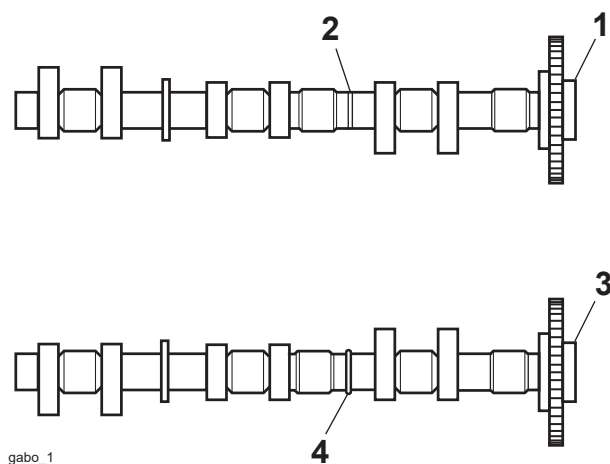
- 1. Dot mark
- 2. Marker line
- 3. T3880601 - Camshaft Timing Pin
- 4. Timing hole in crankcase

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

Camshaft and Sprocket Identification

NOTICE

The inlet and exhaust camshafts are different. They can be identified by a raised feature in the centre of the exhaust camshaft, which is machined off on the inlet camshaft. The camshafts can be further identified by a letter I for inlet or E for exhaust stamped on the end of the sprocket boss.



- 1. Inlet camshaft
- 2. Machined section
- 3. Exhaust camshaft
- 4. Raised section

⚠ CAUTION

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

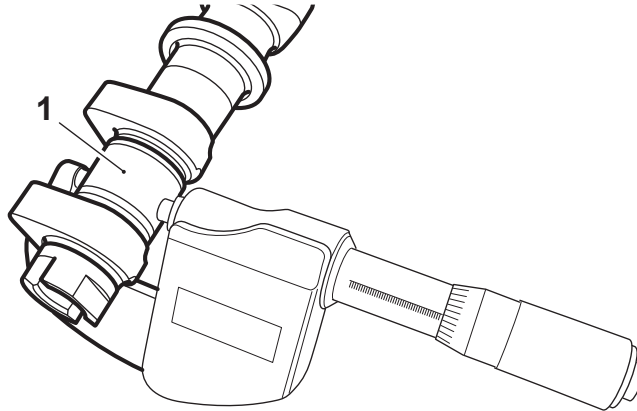
The same sprocket is used for both inlet and exhaust camshafts, and is attached to the camshaft using slotted bolt holes. The same holes are used when fitting the sprocket to either camshaft.

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 [Camshaft - Installation and Timing](#) in this chapter.

Camshaft and Bearing Cap Inspection

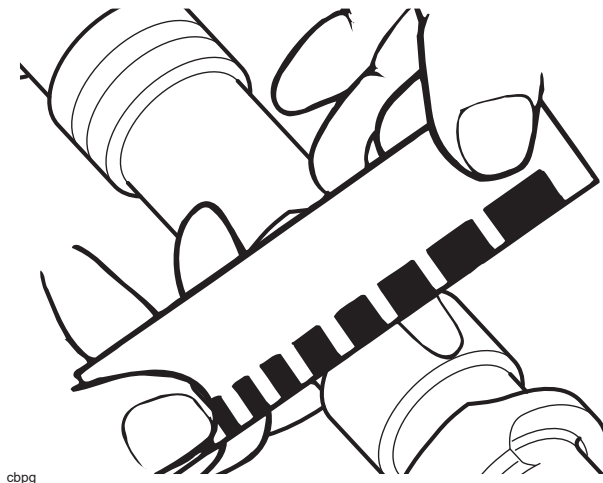
1. Inspect the camshaft sprockets for damaged and worn teeth. Replace as necessary.
2. Measure the camshaft journals with a micrometer. If any journal is outside the specified tolerance, replace the camshaft. For specifications refer to [Camshafts](#).



cheg

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 5 Nm and then to 10 Nm in the correct sequence (see [Camshaft - Installation and Timing](#)).
 - 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

NOTICE

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.
6. For specifications refer to [Camshafts](#).
7. If the clearance measured is within the specified tolerance, remove the cap/ladder and clean off all traces of Plastigauge. Assemble the camshafts (see [Camshaft - Installation and Timing](#)).

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.

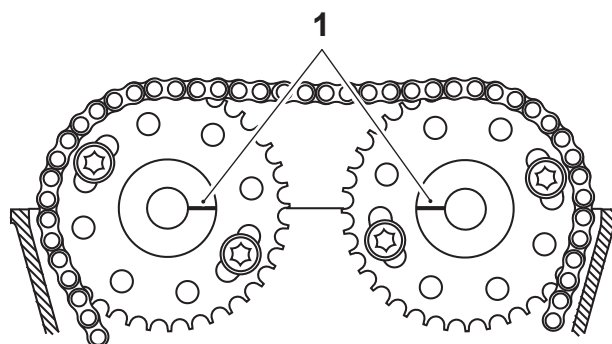
Never fit the camshaft sprockets without correctly setting the camshaft timing using the service tools and timing procedure described below. Severe engine damage will result from incorrect valve timing adjustment.

1. Check that the dot mark on the primary gear is still aligned with the line on the crankcase and the service tool 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 head.
3. If removed, refit the camshaft sprockets noting their orientation, and secure using the original bolts. DO NOT tighten the fixings at this stage; the sprockets must be free to rotate.
4. Refit the camshaft drive chain and, if removed, the tensioner blade and rubbing strip (see [Camshaft Drive Chain - Installation](#)).

NOTICE

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. Ensure alignment marks on the end of the camshaft journals are pointing inwards.
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. Ensure alignment marks on the end of the camshaft journals are pointing inwards.
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 inwards.



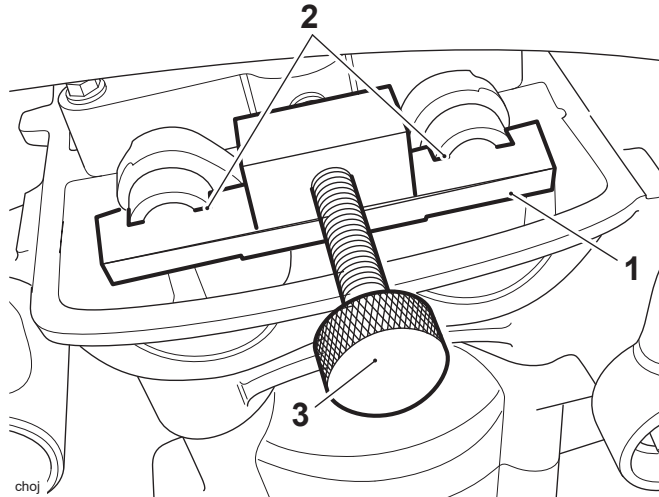
gaaa_12

Camshaft Alignment Marks

CAUTION

The service tool T3880640 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 service tool T3880640 into the camshaft slots, ensuring the removal screw is unscrewed fully, as shown below. Ensure that the tool is centrally located between the camshafts.



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

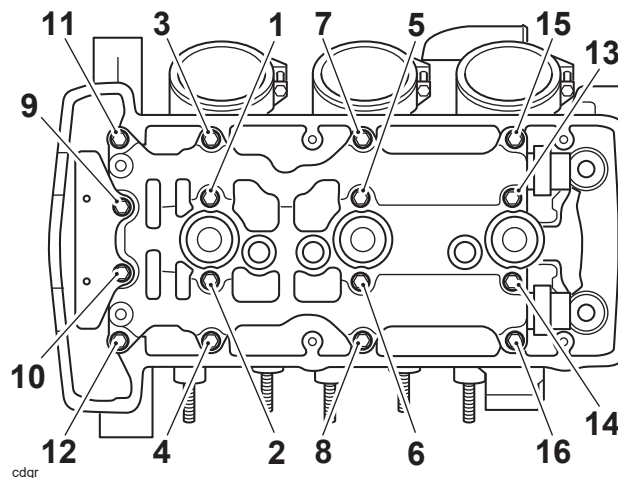
12. Assemble the dowels, spark plug tower O-rings, camshaft ladder and top pad in the same location and orientation as prior to removal.

NOTICE

The bolts for the camshaft cap ladder are tightened in two stages.

Stage 1

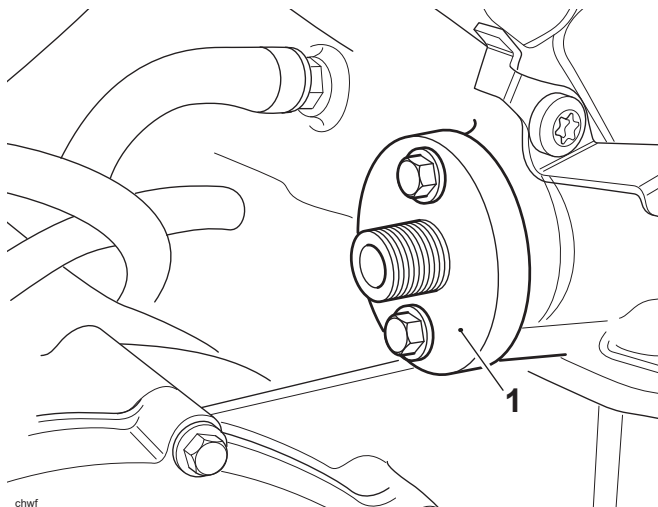
1. Fit and evenly tighten the fixings to 5 Nm, in the sequence shown below.



Camshaft Cover Fixings Tightening Sequence

Stage 2

1. In the sequence shown above, tighten the bolts to 10 Nm.
2. Fit the service tool T3880607 using the original fixings and tighten to 8 Nm.

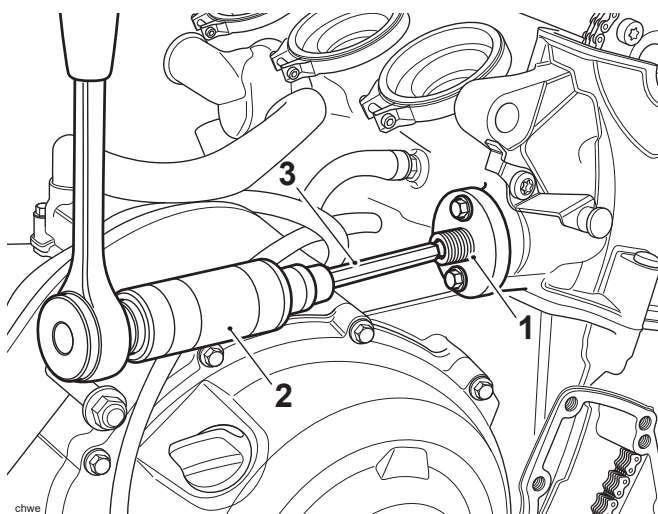


1. T3880607 - Camshaft Timing Tensioner

⚠ CAUTION

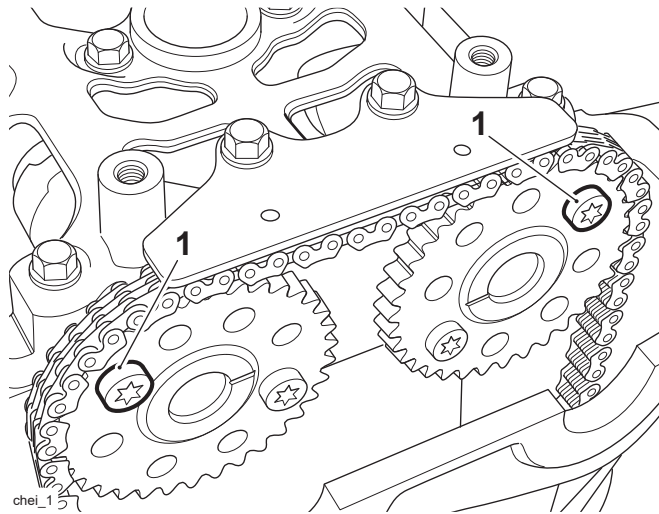
The torque value stated is very important to accurate timing. Always use the correct value of 0.6 Nm, as set using the service tool T3880609. Using an incorrect torque value will result in incorrect valve timing being set, or damage to the tensioner blade or other valve train components. Either condition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

3. Using the service tool T3880609 and a 6 mm Ball Ended Allen Key, tighten the service tool T3880607 to 0.6 Nm preset by the service tool T3880609.



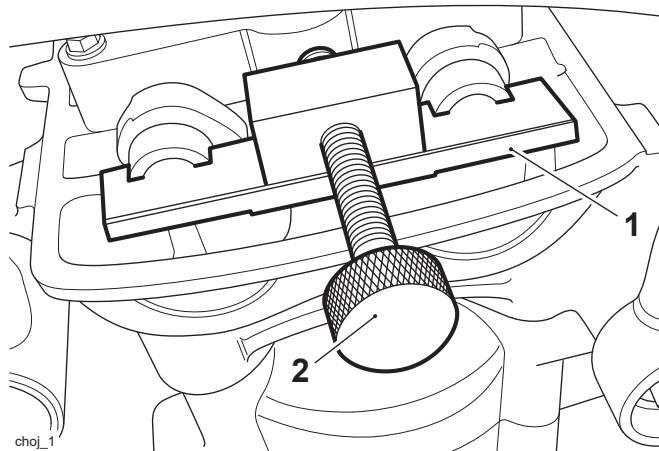
1. T3880607 - Camshaft Timing Tensioner
2. T3880609 - Timing Torque Limiter
3. 6 mm Ball Ended Allen Key

4. Tighten the two accessible (uppermost) camshaft sprocket fixings to 22 Nm.



1. Uppermost fixings

5. Remove the service tool T3880601 by rotating the removal screw clockwise as shown below.



1. T3880640 - Camshaft Timing Plate
2. Removal screw

6. Remove the service tool T3880601.

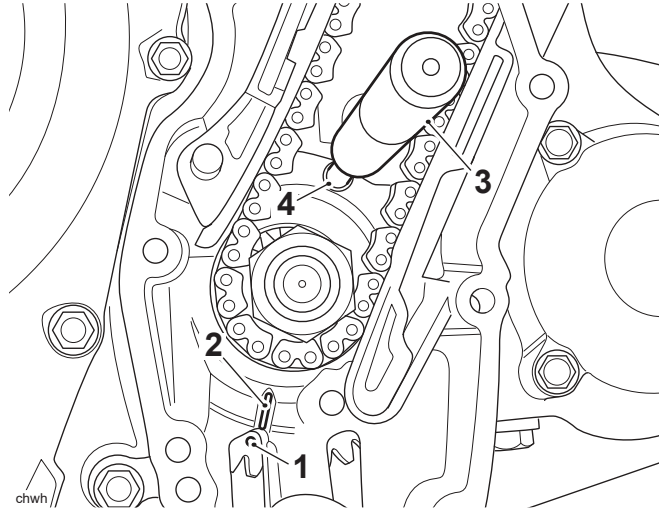
⚠ CAUTION

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

7. Rotate the engine until the remaining two sprocket fixings are accessible.
8. Tighten the two remaining camshaft sprocket fixings to 22 Nm.
9. Place a suitable wedge between the camshaft drive chain tensioner blade and crankcase, to hold the camshaft drive chain taut during removal of the service tool T3880607.
10. Release the tension on Camshaft Timing Tensioner T3880607 and remove it.
11. Refit the timing chain tensioner, incorporating a new gasket and O-ring (see [Camshaft Drive Chain Tensioner - Installation](#)).
12. Rotate the crankshaft clockwise 2 complete turns, using the bolt fitted to the end of the crankshaft. Stop rotation when number 1 cylinder is at Top Dead Centre (TDC), that is when the dot mark on the primary gear aligns with the line on the crankcase.

Before inserting the timing pin, ensure the 'dot' on the primary gear is aligned with the line on the crankcase.

13. Insert the service tool T3880601 into the timing holes in the crankcase and crankshaft.



1. Dot mark
2. Marker line
3. T3880601 - Camshaft Timing Pin
4. Timing hole in crankcase

14. Check that the timing marks are still approximately aligned (to check that the camshaft timing has not moved during service tool T3880607 removal).

15. Remove the service tool T3880601.

16. Check the valve clearances. Adjust as necessary (see [Valve Clearance Measurement](#)).

Perform the following operations:

- [Camshaft Cover - Installation](#)
- [Crankcase Right Hand Cover - Installation](#)

Valve Clearance Measurement

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

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

When replacing a valve shim, always refer to the EPC.

For valve clearance specifications (see [Cylinder Head](#)).

1. Remove the camshaft cover (see [Camshaft Cover - Removal](#)).
2. Remove the spark plugs to reduce compression resistance when turning the engine.
3. Select a high gear and, using the rear wheel, turn the engine until a pair of camshaft lobes are positioned pointing away from the valves.
4. Using feeler gauges, measure and record the clearances for this pair of valves only.
5. Repeat the process until the valve clearances for all valves have been checked.

NOTICE

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

⚠️ CAUTION

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

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

Typical Valve Clearance Chart

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

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

Camshaft Drive Chain - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

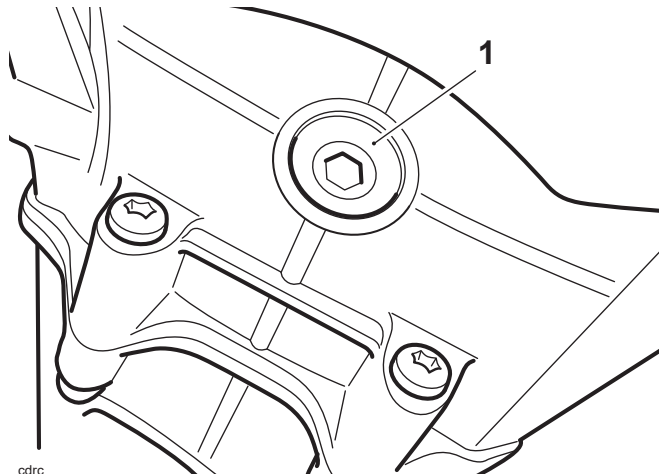
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Camshaft - Removal**

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



1. Centre bolt

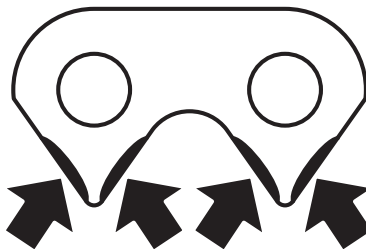
2. Raise the front camshaft drive chain rubbing blade and detach the camshaft drive chain from the crankshaft gear.

3. The camshaft drive chain is removed from inside the head-space.

Camshaft Drive Chain - Inspection

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

1. Check for significant blue discolouration of the drive chain plates indicating excessive heat build-up.
2. Examine all 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.



cctv

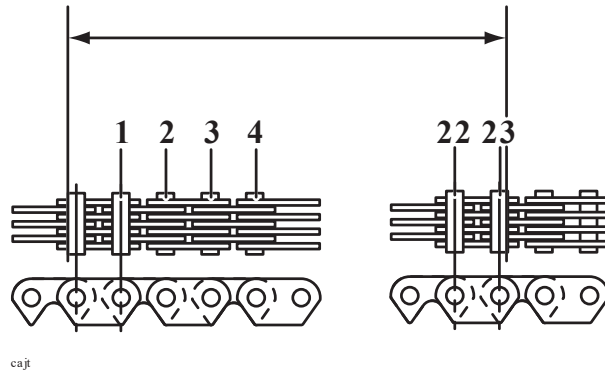
For a more thorough check, proceed as follows:

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

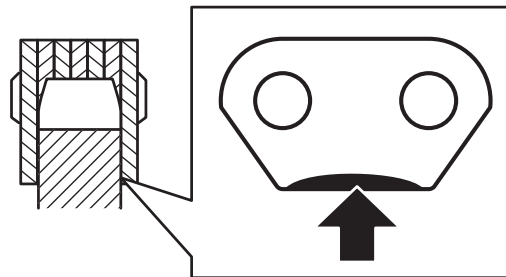


cajs

3. Measure across 23 links as shown in the diagram below. If the drive chain is within limits, the measurement should be no longer than 149.48 mm. Measurements beyond 149.48 mm indicate that the drive chain must be replaced.

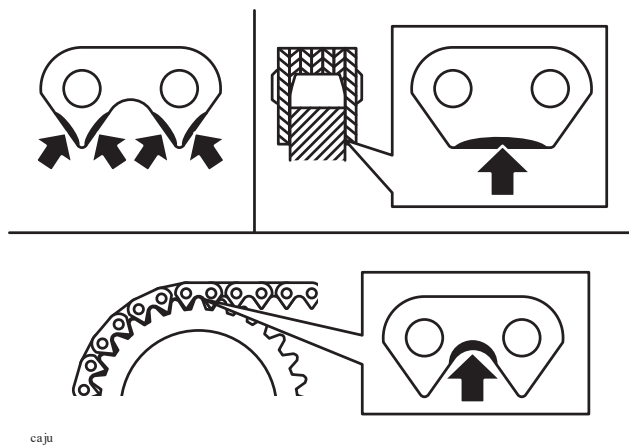


4. Check for severe wear of the inner surface of the outer plates at the side-contact points with the sprocket teeth.



5. Check for signs of stiffness or kinking.

6. Check for severe wear of the plates in the area shown below.



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

Camshaft Drive Chain - Installation

1. Fit the camshaft drive chain and locate the lower end around the crankshaft gear.
 2. Incorporating a new seal, refit the bolt to the centre of the camshaft drive chain housing in the cylinder head, tightening to 12 Nm.
- Perform the following operations:

- [Camshaft - Installation and Timing](#)

Cylinder Head - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

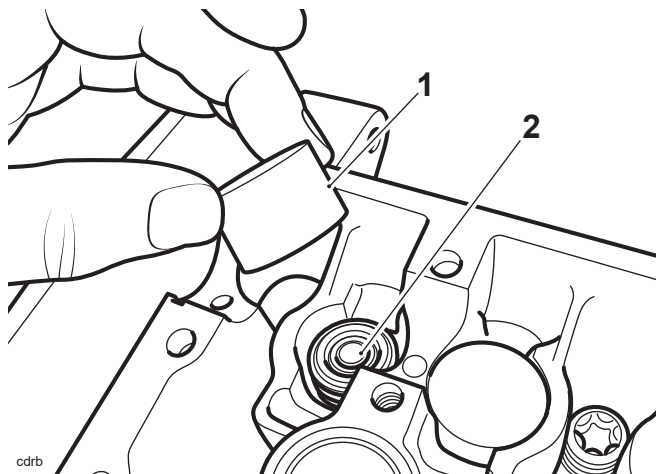
NOTICE

Removal of the cylinder head is not possible with the engine in the frame.

Perform the following operations:

- [Engine - Removal](#)
- [Camshaft - Removal](#)
- [Camshaft Drive Chain - Removal](#)

1. Remove the camshaft drive chain tensioner blades.
2. Note the position of all tappet buckets and shims such that they can be refitted in the same positions. Remove all the tappet buckets and shims.



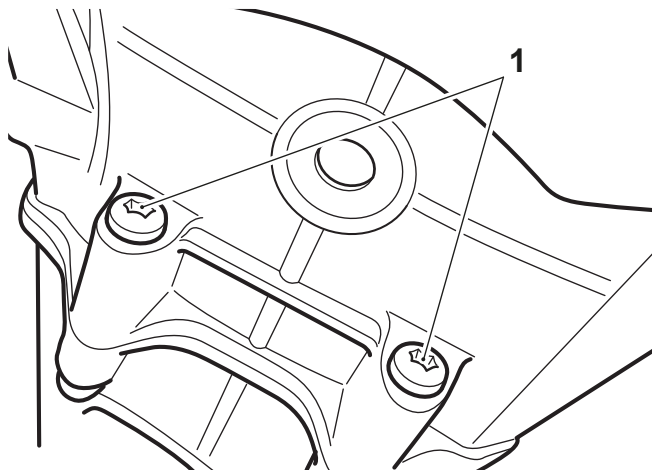
1. Tappet bucket
2. Shim

NOTICE

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.

3. Disconnect the coolant bypass hose from the rear of the cylinder head.

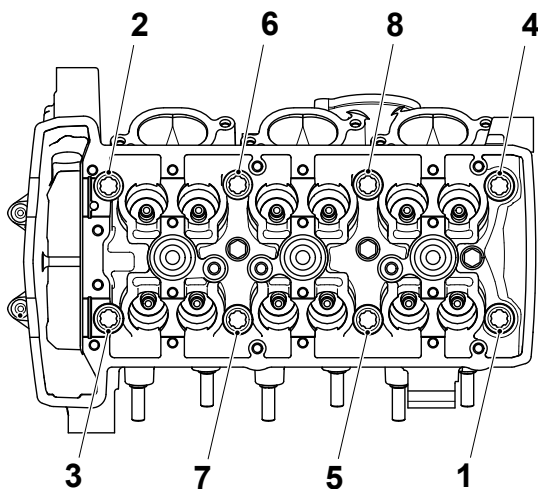
4. Release the screws securing the outside of the cylinder head to the upper crankcase.



cdra_1

1. Cylinder head to upper crankcase screws

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



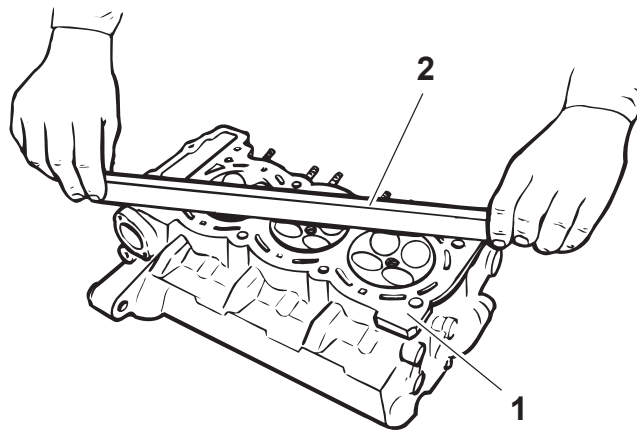
Cylinder Head Release Sequence

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

7. Remove the cylinder head. Discard the cylinder head gasket and the nuts and washers.

Cylinder Head - Inspection

1. Thoroughly clean the surface of the cylinder head and check for damage and/or pitting of the combustion chambers.
2. Using a straight edge and feeler gauges, check the cylinder head face for warp, which could lead to gasket failure. Replace the cylinder head if warped beyond the flatness limit. For specifications refer to [Cylinder Head](#).



- | |
|---|
| <ol style="list-style-type: none">1. Cylinder head2. Straight edge |
|---|

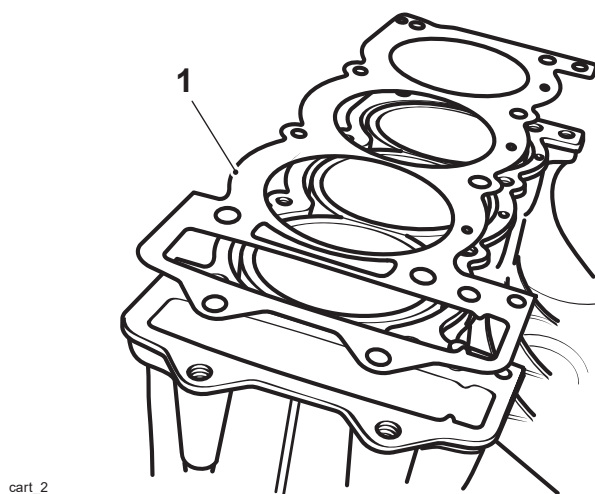
3. Inspect the valve guides for damage or wear.
4. If a valve guide is found to be worn beyond the service limit, the complete cylinder head must be renewed. For specifications refer to [Cylinder Head](#).
5. Check the camshaft drive chain rubbing blades. Renew if worn or damaged.

⚠ CAUTION

Ensure all traces of fluid (coolant, oil etc.) are removed from the threaded holes in the crankcase. Should any fluid remain in any of the threaded holes, severe crankcase damage could result from hydraulic locking of head bolts on assembly of the engine.

Cylinder Head - Installation

1. Fit a new cylinder head gasket ensuring that the head to crankcase location dowels are correctly in place.



cart_2

1. Cylinder head gasket

2. Ensure that the cylinder head face is completely clean.
3. Carefully lower the cylinder head over the camshaft drive chain and locate the head onto the dowels.

⚠ CAUTION

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

Clean each bolt, paying particular attention to the threads. If any of the threads are damaged, replace the bolt(s).

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

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

Failure to observe these important items may lead to engine damage through a damaged head gasket.

NOTICE

New cylinder head bolts and washers must be fitted.

4. Lubricate the threads on the bolts and the top surface of the hardened washer with clean engine oil.
5. Fit new bolts and washers to the cylinder head as noted for removal and tighten until finger tight.
6. The cylinder head bolts are tightened in four stages, in the sequence shown below. This is to ensure that the cylinder head gasket seals correctly to the head and crankcase.

NOTICE

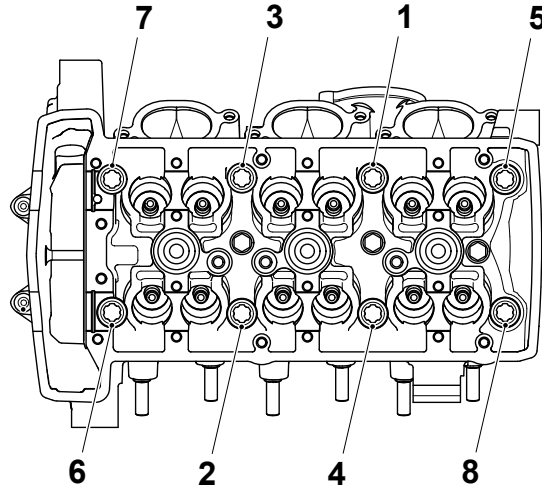


For stages one, two and four of the cylinder head tightening operation, a torque wrench of known, accurate calibration must be used.

For stage three of the cylinder head tightening operation, the bolts must be turned through a set number of degrees to reach the final setting. To accurately gauge the turn, T3880105 - Torque Angle Gauge must be used.

Stage 1

- Tighten the cylinder head bolts to 15 Nm, in the sequence shown below.



Cylinder Head Tightening Sequence

Stage 2

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

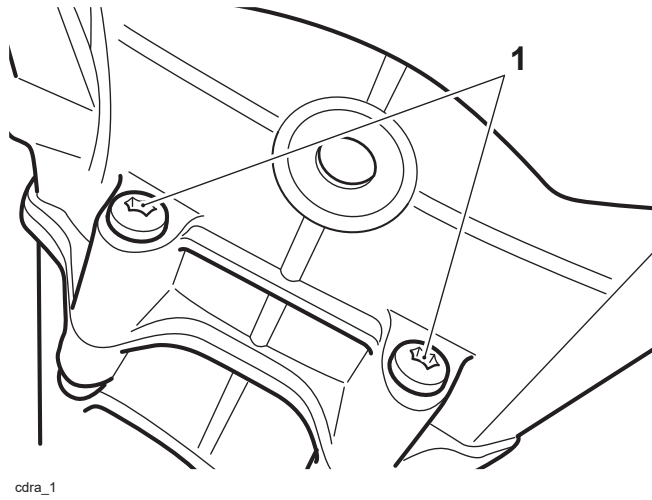
Stage 3

Fit the service tool T3880105 between the Torx socket and the drive handle and locate the Torx drive to the bolt. Pick an increment point on the torque turn gauge which aligns with a suitable reference point on the head.

- Tighten the cylinder head bolts through 120° of bolt rotation as measured using the service tool T3880105, in the sequence shown above.

Stage 4

- Tighten the cylinder head bolts to 40 Nm, in the sequence shown above.
1. Fit the screws securing the side of the cylinder head to the crankcase and tighten to 10 Nm.



Cylinder head to upper crankcase screws

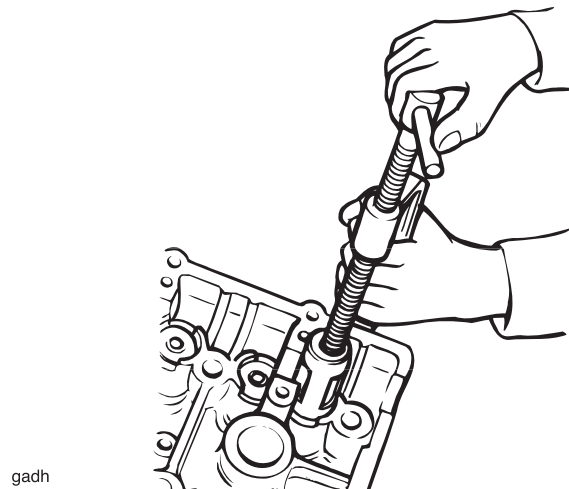
2. Install the camshaft drive chain tensioner blades.
3. Clean and lubricate the tappet buckets with a 50/50 solution of engine oil and molybdenum disulphide grease and refit the buckets and shims in the same locations from which they were removed.

Perform the following operations:

- [Camshaft Drive Chain - Installation](#)
- [Camshaft - Installation and Timing](#)
- [Engine - Installation](#)

Valves and Valve Stem Seals - Removal

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



Valve removal

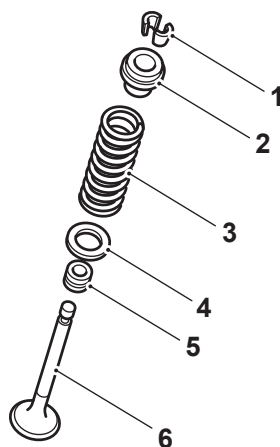
2. Once the collets are released, remove the following items:

- Valve spring retainer
- Valve spring
- Valve spring base
- Valve stem oil seal
- Valve (deburr before removal).



1. Valve stem seal

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



ccrx

1. Collets
2. Valve spring retainer
3. Valve spring
4. Valve spring base
5. Valve stem oil seal
6. Valve

Cylinder Head Valve Guide Wear Check

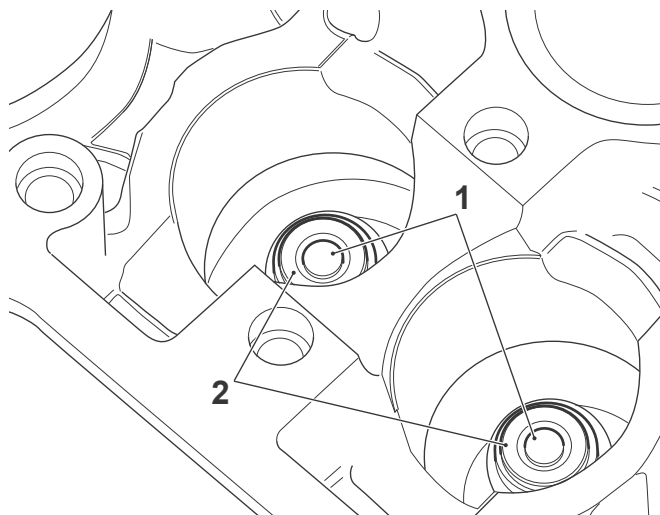
Perform the following operations:

- [Cylinder Head - Removal](#)
- [Valves and Valve Stem Seals - Removal](#)

NOTICE

Do not remove the valve or valve stem seal.

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



1. Valve stem ends
2. Valve stem seals

2. Complete each step below for each valve in the cylinder head.

NOTICE

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

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

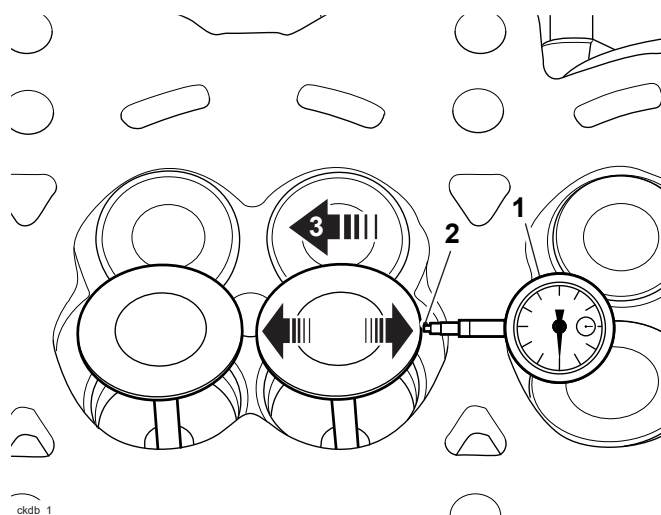
NOTICE

A flat ended contact point must be fitted to the dial gauge.

Ensure the dial gauge is level and is in line with the directional movement of the valve being checked.

4. Secure a dial gauge to the cylinder head such that the clamping device will not damage any of the cylinder head surfaces.

5. Position the dial gauge to the valve head on the opposite side to where the valve has made contact to the valve guide, as shown in the illustration below.

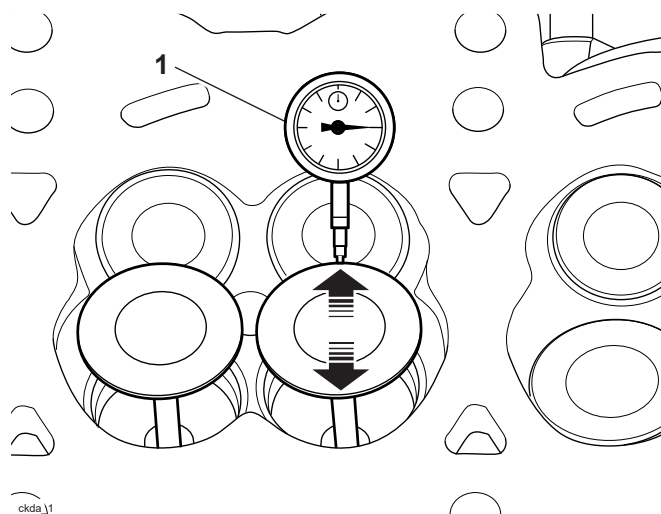


- 1. Dial gauge
- 2. Flat ended contact point
- 3. Direction valve rocked to valve guide

6. Zero the dial gauge.

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

8. Repeat steps 3 to 7 but with the rocking of the valve head at 90° to the original measurement, as shown in image below. Note the reading on the dial.



- 1. Dial gauge

9. The maximum movement of the valve in either direction must be less than 0.96 mm.

NOTICE

Due to the methods used to assemble the valve guides, these parts cannot be replaced. If the maximum movement of the valve exceeds 0.96 mm in either direction, the cylinder head must be replaced.

Perform the following operations:

- **Valves and Valve Stem Seals - Installation**

- [Cylinder Head - Installation](#)

Valves and Valve Stem Seals - Installation

1. Lubricate the valve stems with new engine oil which meets specification API SH (or higher) and JASO MA.
2. Install the valve into the valve guide.
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.

NOTICE

During fitment of the valve stem seal, two distinctly different degrees of resistance will be noted when the seal is correctly fitted.

Firstly, press the seal down the valve stem until the lower side of the seal comes into contact with the valve guide. Greater resistance is felt at this contact point and further gentle pressure is then required to locate the seal over the top end of the valve guide.

On application of this pressure, the seal can be felt to positively locate over the top face of the valve guide. Once correctly positioned, the seal cannot be pushed down any further.

⚠ CAUTION

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

4. Install the valve spring over the valve stem. Ensure the close wound, colour coded ends of the springs are fitted downwards (towards the piston).
5. Fit the valve spring retainer.
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	0.010-0.040 mm
Service limit	0.078 mm

Exhaust	0.020-0.050 mm
Service limit	0.088 mm

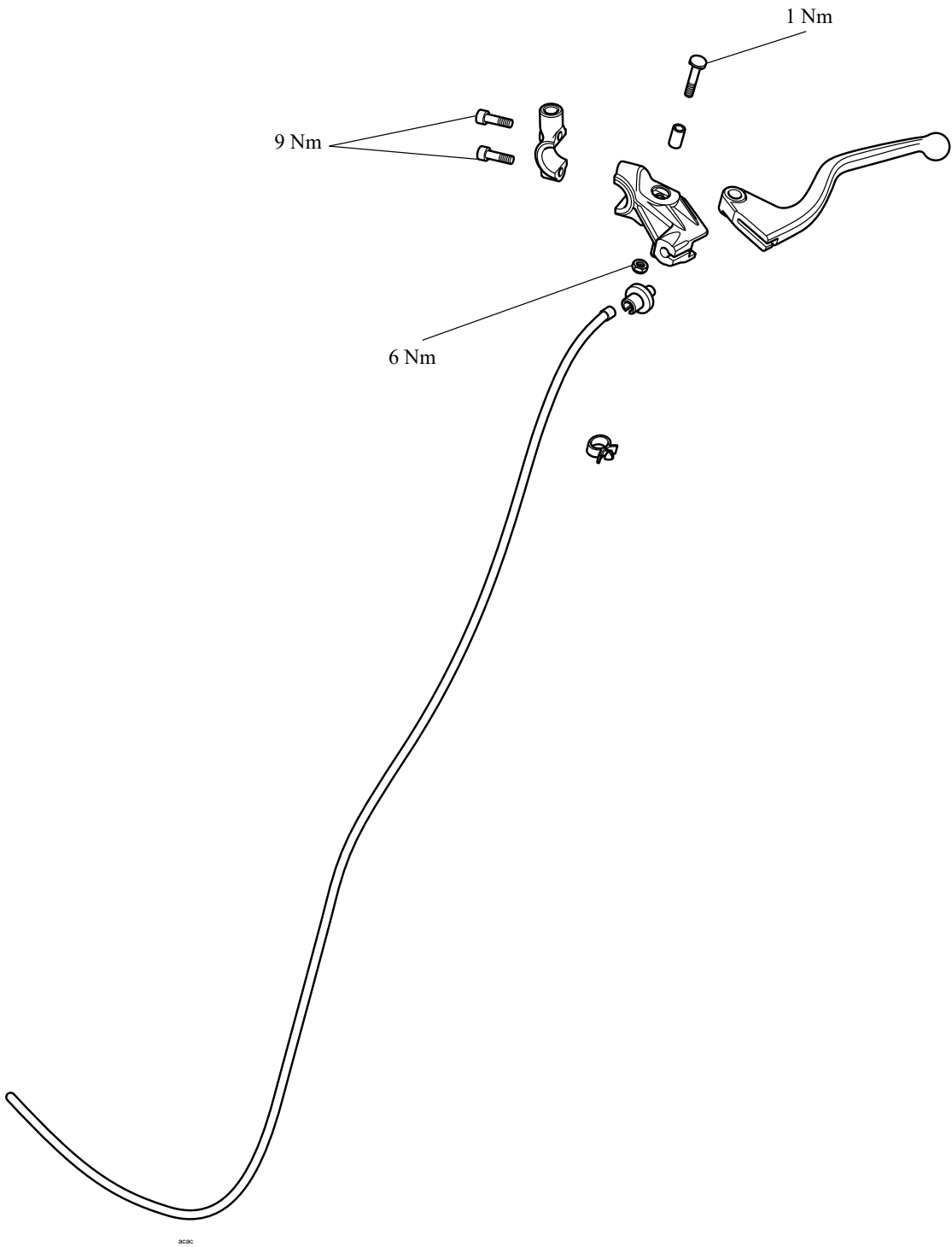
Valve Guides

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

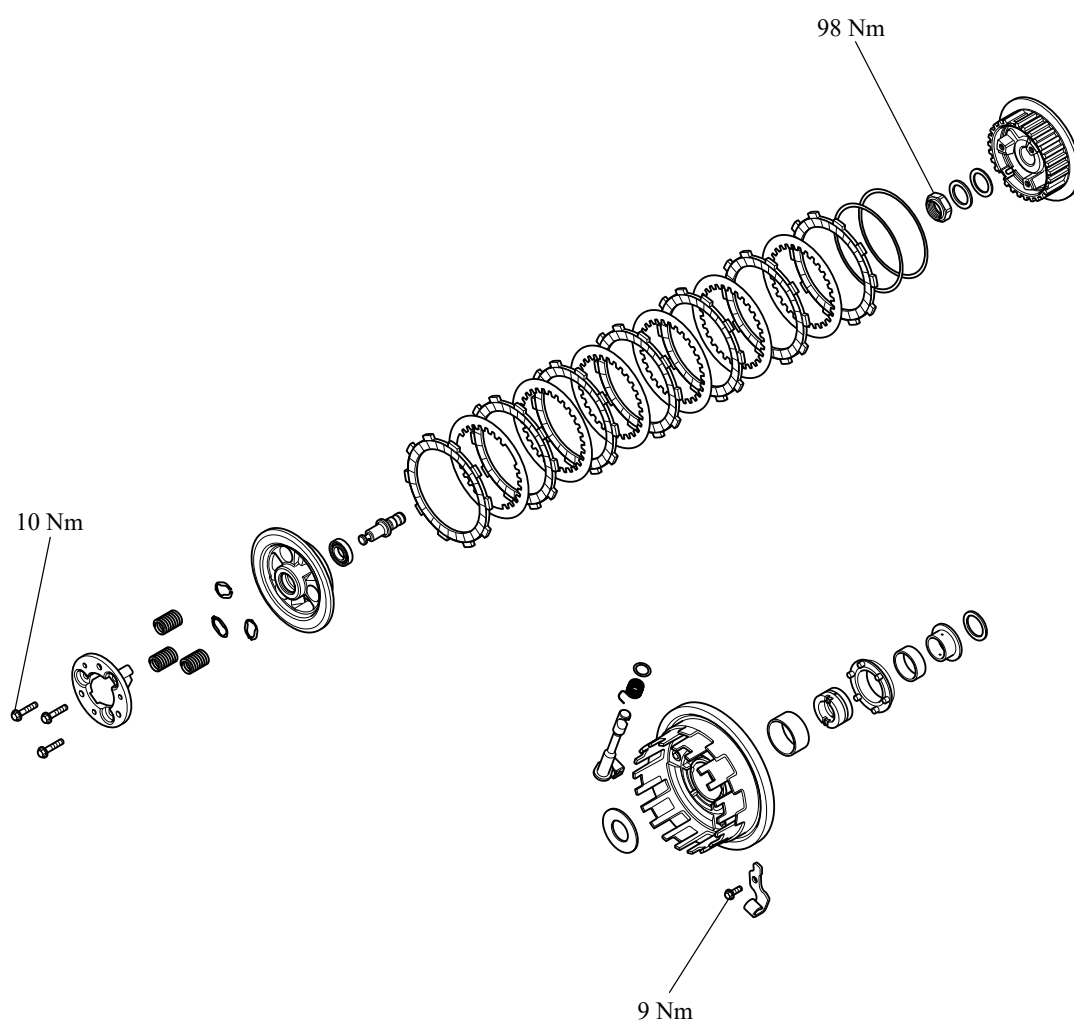
 / Clutch

Clutch

Exploded View - Clutch Controls



Exploded View - Clutch



Clutch Cable - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

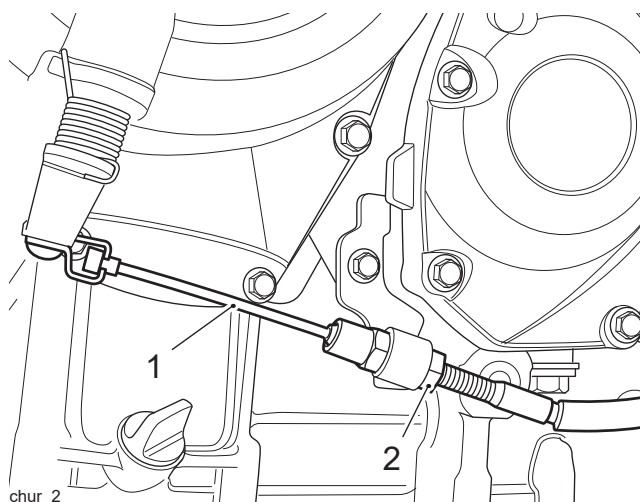
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

NOTICE

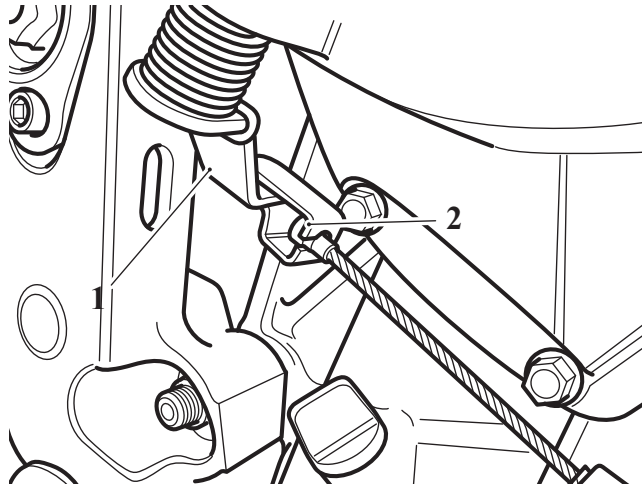
Note the routing of the clutch cable and the position of the retaining clips/grommets for installation.

1. Detach the clutch cable retaining clip from the right hand headstock gusset.
2. Loosen the cable lock nut and release the adjuster at the clutch cover end to give maximum play in the cable.



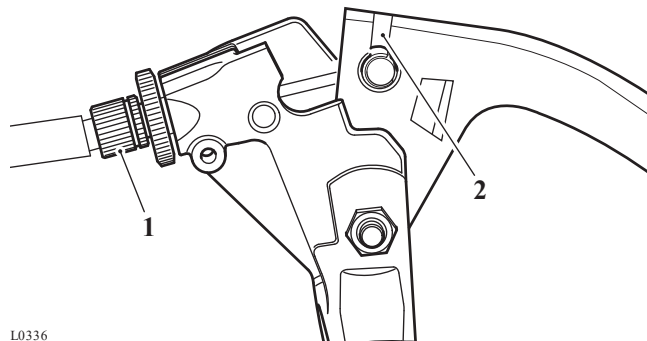
1. Clutch cable
2. Adjuster

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



- 1. Actuating arm
- 2. Inner cable nipple

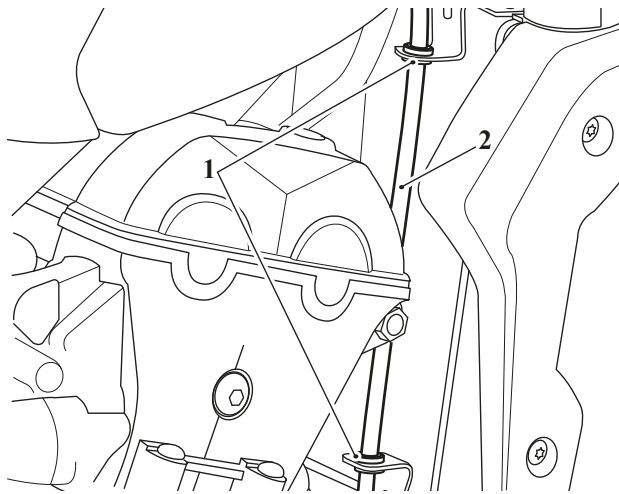
4. Align the cable adjuster and lever bracket slots.
5. Pull in the clutch lever and turn the inner cable, anticlockwise through the slots in the adjuster and lock nut, until the cable can be detached from the lever by pushing downwards.



L0336

- 1. Cable adjuster/lever bracket slots
- 2. Cable release point

6. Detach the two grommets from the radiator brackets and remove the clutch cable, noting the routing through the instruments bracket.



- 1. Grommets
- 2. Clutch cable

Clutch Cable - Inspection

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

Clutch Cable - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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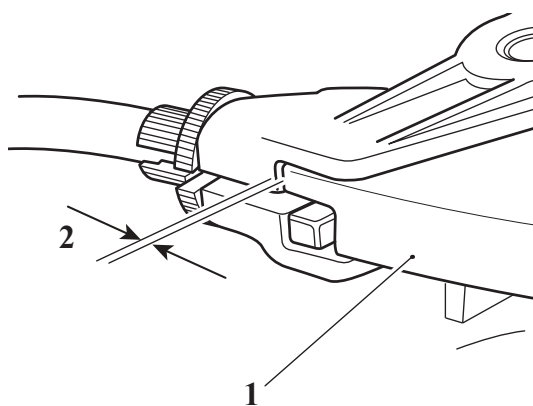
1. Make sure the two grommets and retaining clip are fitted to the clutch cable.
2. Feed the clutch cable through the radiator brackets and instruments bracket and position the clutch cable as noted during removal.
3. Attach the inner cable to the clutch lever and actuating arm using a reversal of the removal process.
4. Refit the outer cable to the adjuster bracket at the clutch end.
5. Attach the clutch cable retaining clip to the right hand headstock gusset.
6. Secure the two grommets to the radiator brackets.

NOTICE

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

Ensure the steering is at full right hand lock to adjust the clutch cable.

7. Turn the steering to full right hand lock.
8. Set the lever adjuster to a point where an equal adjustment is possible in both directions.
9. Set the adjuster at the clutch end to give a preliminary setting of 2 - 3 mm of free play as measured at the lever. Tighten the lock nut.
10. Operate the clutch lever several times and recheck the amount of free play present.
11. Set the final adjustment of the cable to give 2 - 3 mm of free play at the lever by turning the adjuster nut and lock nut at the lever end.



1. Clutch lever
2. Correct setting, 2 - 3 mm

Perform the following operations:

- [Battery - Installation](#)

- [Seat - Installation](#)

Clutch - Removal

⚠ WARNING

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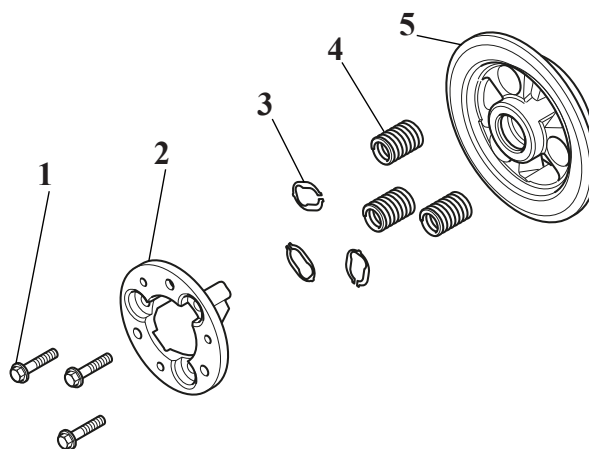
Perform the following operations:

- **Clutch Cover - Removal**

NOTICE

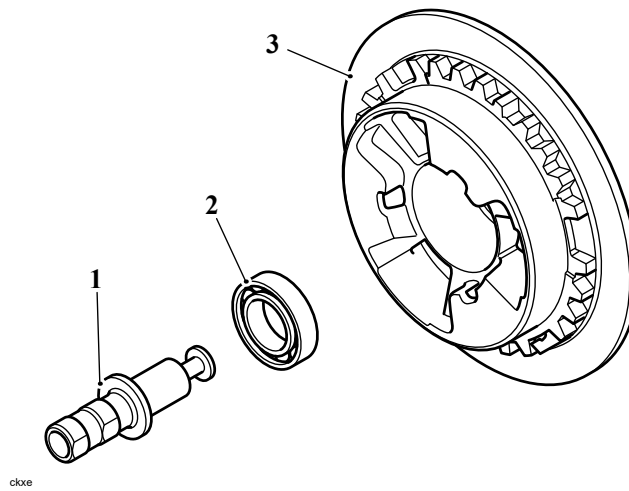
The spring seats will remain seated in the stopper plate during removal.

1. Release the three fixings evenly to ensure the stopper plate is released squarely. Remove the stopper plate, springs and pressure plate.



1. Fixings
2. Stopper plate
3. Spring seats
4. Springs
5. Pressure Plate

2. Remove the pull rod and bearing from the clutch pressure plate.



1. Pull rod
2. Bearing
3. Clutch pressure plate

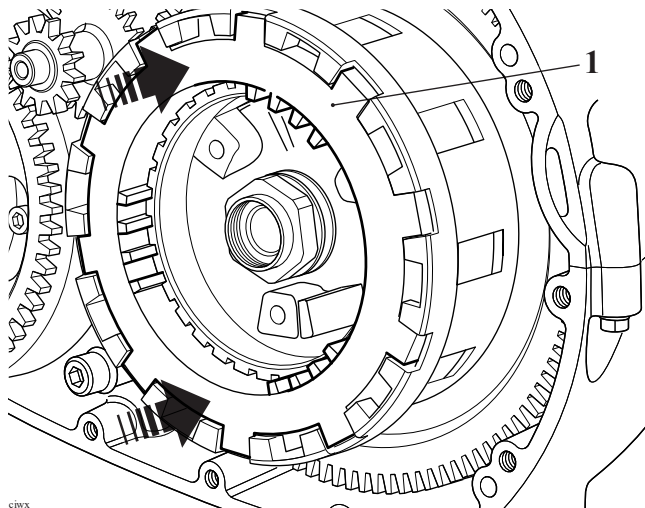
3. Remove the clutch plates, anti-judder seat washers and springs, noting the orientation of the each component as they are removed.

NOTICE

The innermost friction plate is different to the remainder and must not be fitted in any other position.

Refer to [Friction Plate Inspection](#) for details of clutch friction plate inspection.

4. Engage second gear and lock the inner and outer clutch drums together using service tool T3880307 as shown below.



1. T3880307 - Clutch Anti-rotation Jig

5. Release the clutch centre nut.

6. Remove the centre nut, Belleville washer, plain washer, clutch inner drum and thrust washer.

7. Discard both the Belleville washer and plain washer.

⚠ CAUTION



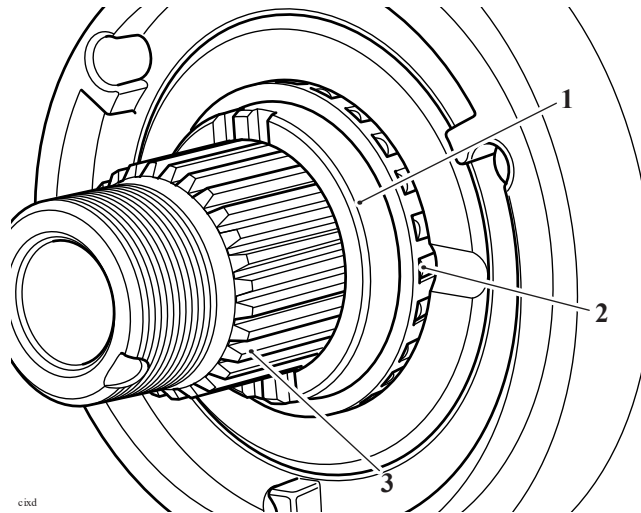
Do not remove the bearing sleeve from the shaft.

Removing the bearing sleeve will allow the oil pump drive chain to become dislodged.

If the oil pump drive chain becomes dislodged the oil pump will not operate causing severe engine damage.

8. Slide the bearing sleeve forward and backwards a maximum of 10 mm to allow the needle roller bearing to become dislodged.

9. Remove the needle roller bearing from the clutch outer drum.



- 1. Bearing sleeve
- 2. Needle roller bearing
- 3. Shaft

10. Slide the clutch outer drum away from the gearbox input shaft.

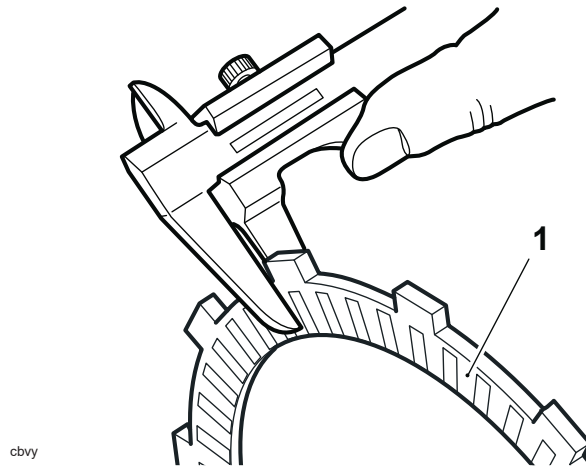
Friction Plate Inspection

Thickness

NOTICE

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

1. Measure the thickness of the friction plate.



1. Clutch friction plate

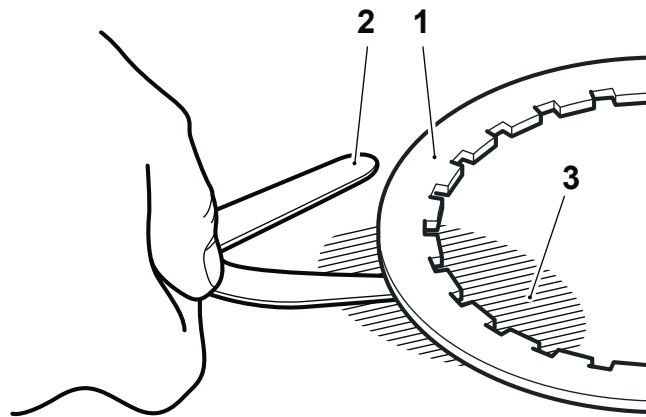
2. For the clutch friction plate thickness, refer to [Clutch and Primary Drive](#).

Steel Plate Inspection

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 service limit thickness between the steel plate and surface plate. If the feeler gauge can be passed beneath the steel plate at any point, renew the plates as a set.



cbvz

- | |
|---|
| <ol style="list-style-type: none">1. Steel plate2. Feeler gauge3. Surface plate |
|---|

2. For specifications refer to [Clutch and Primary Drive](#).

Clutch Pack Height

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

The clutch pack height is critical for a smooth operation of the gear change and needs to be measured prior to installation.

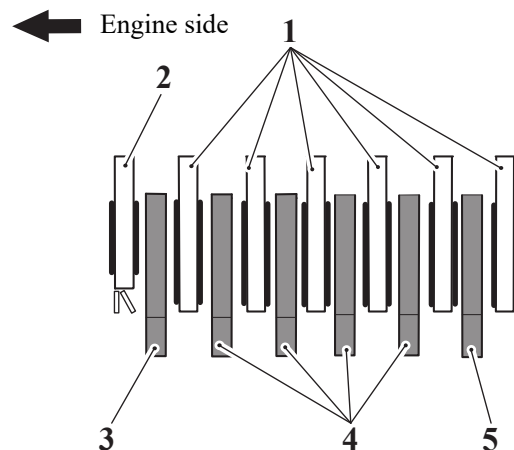
If used steel plates are being fitted, the clutch pack height measurement is not necessary, as the plates may not be worn to the service limit (and are therefore still serviceable), but could fall outside the clutch pack height tolerance when measured.

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 inner friction plate
- 1 x inner steel plate
- 6 x new friction plates
- 4 x steel plates, 2.0 mm thick
- 1 x outer steel plate, 2.3 mm thick.
- 1 x new outer friction plate

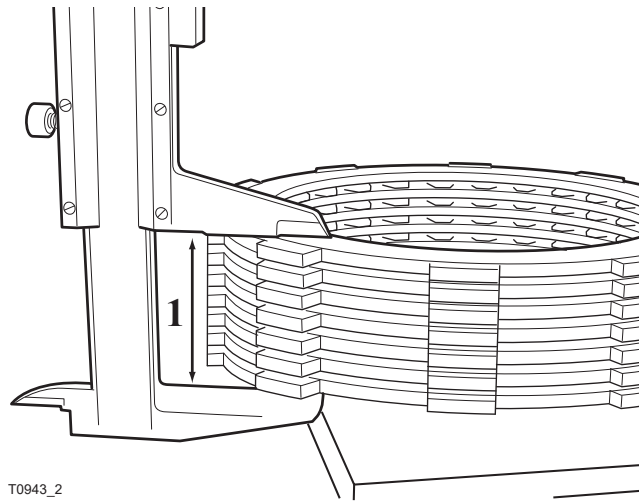
Friction plate and steel plate arrangement

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



- | |
|--|
| <ul style="list-style-type: none">1. Friction plates2. Inner friction plate3. Inner steel plate4. Steel plates, 2.0 mm thickness5. Outer steel plate, 2.3 mm thickness |
|--|

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



1. Clutch pack height

3. For the correct clutch pack height for this clutch assembly see [Clutch and Primary Drive](#).

Clutch - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

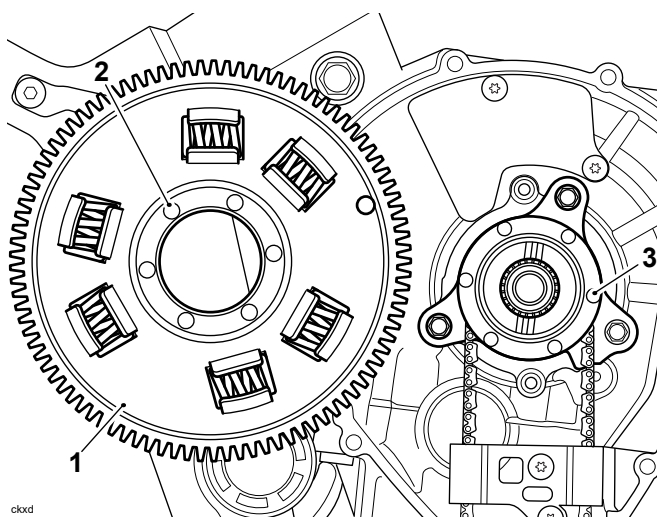
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

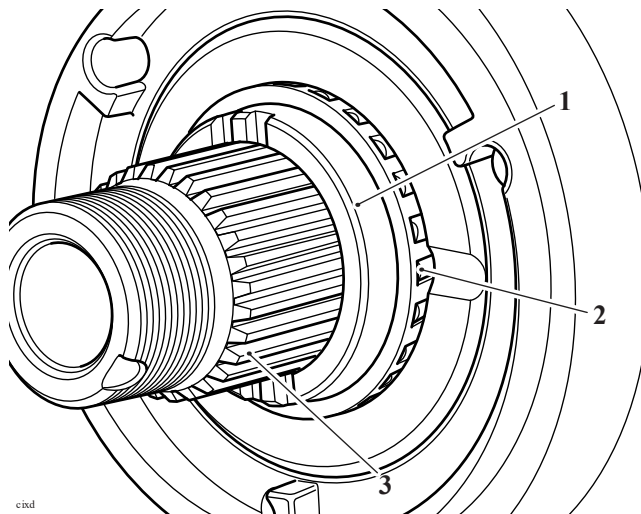
Make sure the oil pump drive chain is engaged with the oil pump drive gears. Running the engine without drive to the oil pump will stop oil supply to the engine. Running the engine without oil pressure will cause severe engine damage.

1. Visually check the oil pump drive chain is engaged with the drive gears.
2. Position the clutch outer drum assembly to the input shaft and align the oil pump sprocket drive pegs with the corresponding holes in the rear of the clutch outer drum.



1. Clutch outer drum (rear view)
2. Oil pump sprocket drive pegs
3. Clutch outer drum sprocket drive holes

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

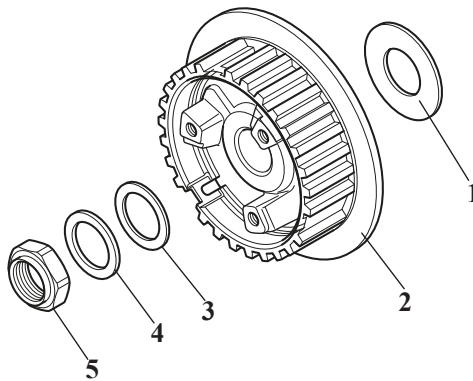


- 1. Bearing sleeve
- 2. Needle roller bearing
- 3. Shaft

NOTICE

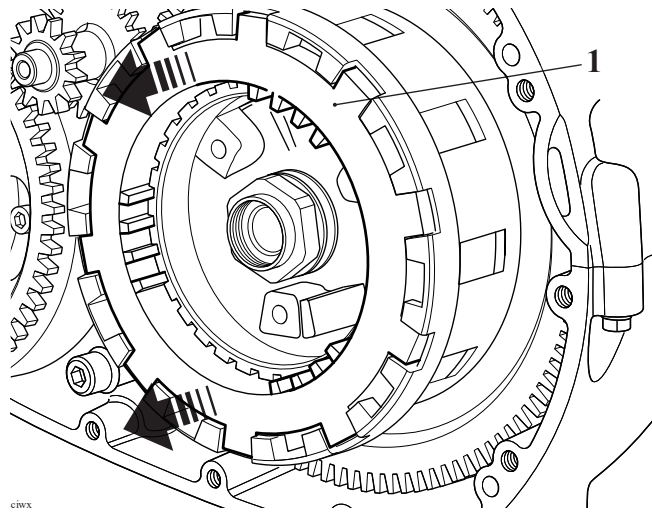
When the bearing and sleeve are correctly fitted, it will be a flush fit with the clutch drum face.

4. Fit the thrust washer to the shaft.
5. Fit the clutch inner drum.
6. Fit the flat washer, a new Belleville washer (OUT mark facing outwards), and a new centre nut.



- 1. Thrust washer
- 2. Clutch inner drum
- 3. Flat washer
- 4. Belleville Washer OUT Mark
- 5. Centre nut

7. Using service tool T3880307, lock the inner and outer drums together. Depress the rear brake pedal to prevent the engine rotating, and tighten the centre nut to 98 Nm.
8. Remove service tool T3880307.



1. T3880307 - Clutch Anti-rotation Jig

9. Disengage second gear and check for free rotation of the clutch inner drum.
10. Using a suitable pin punch, stake the nut to the shaft.

NOTICE

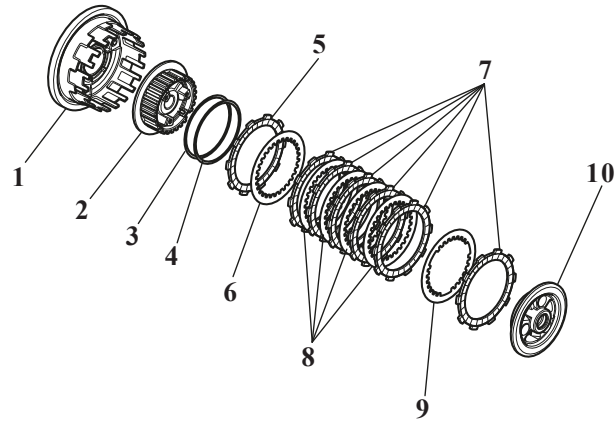
Always refer to the [Clutch Pack Height](#) prior to fitting new clutch plates to the motorcycle.

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

NOTICE

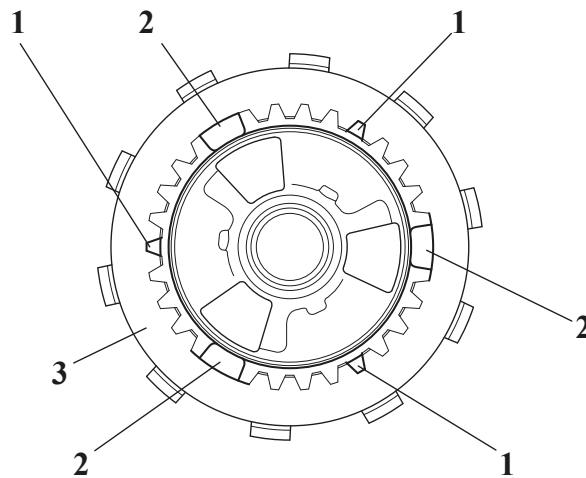
The inner friction plate is different to the other friction plates. It must be fitted in its noted position.

The inner and outer steel plates are different to the other plates. They must be fitted in their noted position.



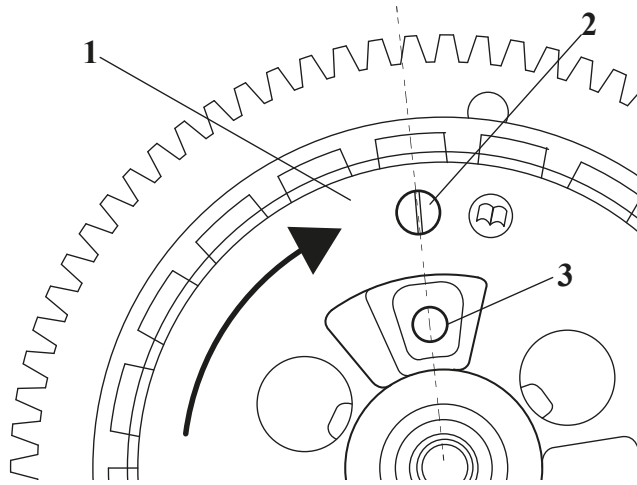
- | |
|----------------------------|
| 1. Clutch outer drum |
| 2. Clutch inner drum |
| 3. Anti-judder seat washer |
| 4. Anti-judder spring |
| 5. Friction plate (inner) |
| 6. Steel plate (inner) |
| 7. Friction plates |
| 8. Steel plates |
| 9. Steel plate (outer) |
| 10. Pressure plate |

12. Refit the clutch pull rod.
13. Ensure that the spring seats are fitted into the pressure plate as noted for removal.
14. Fit the pressure plate to the clutch centre, making sure the three raised teeth on the pressure plate align with the three missing teeth sections on the clutch centre, and the three raised teeth on the clutch centre align with the three missing teeth sections on the pressure plate.



- | |
|---------------------------|
| 1. Raised teeth |
| 2. Missing teeth sections |
| 3. Clutch pressure plate |

15. Rotate the clutch pressure plate in a clockwise direction until it comes into contact with the ramps on the clutch centre and the bolt holes align.



- 1. Clutch pressure plate
- 2. Alignment mark (1 of 3)
- 3. Bolt hole (1 of 3)

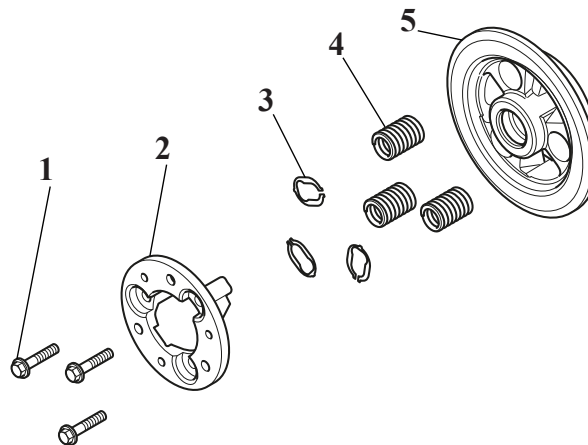
NOTICE

There are spring seats located in the stopper plate. Ensure the seats are in the stopper plate prior to fitting the springs.

CAUTION

Make sure the clutch stopper plate is tightened evenly. Failure to tighten the clutch stopper plate fixings as described may cause severe engine damage.

16. Fit the springs and stopper plate. Install the fixings and tighten finger tight until resistance is felt against the springs on each fixing.
17. Tighten the fixings to a maximum of three turns each in an alternating pattern. Continue until the stopper plate is fully down.
18. Tighten the fixings to 5 Nm.
19. Tighten the fixings to 10 Nm.



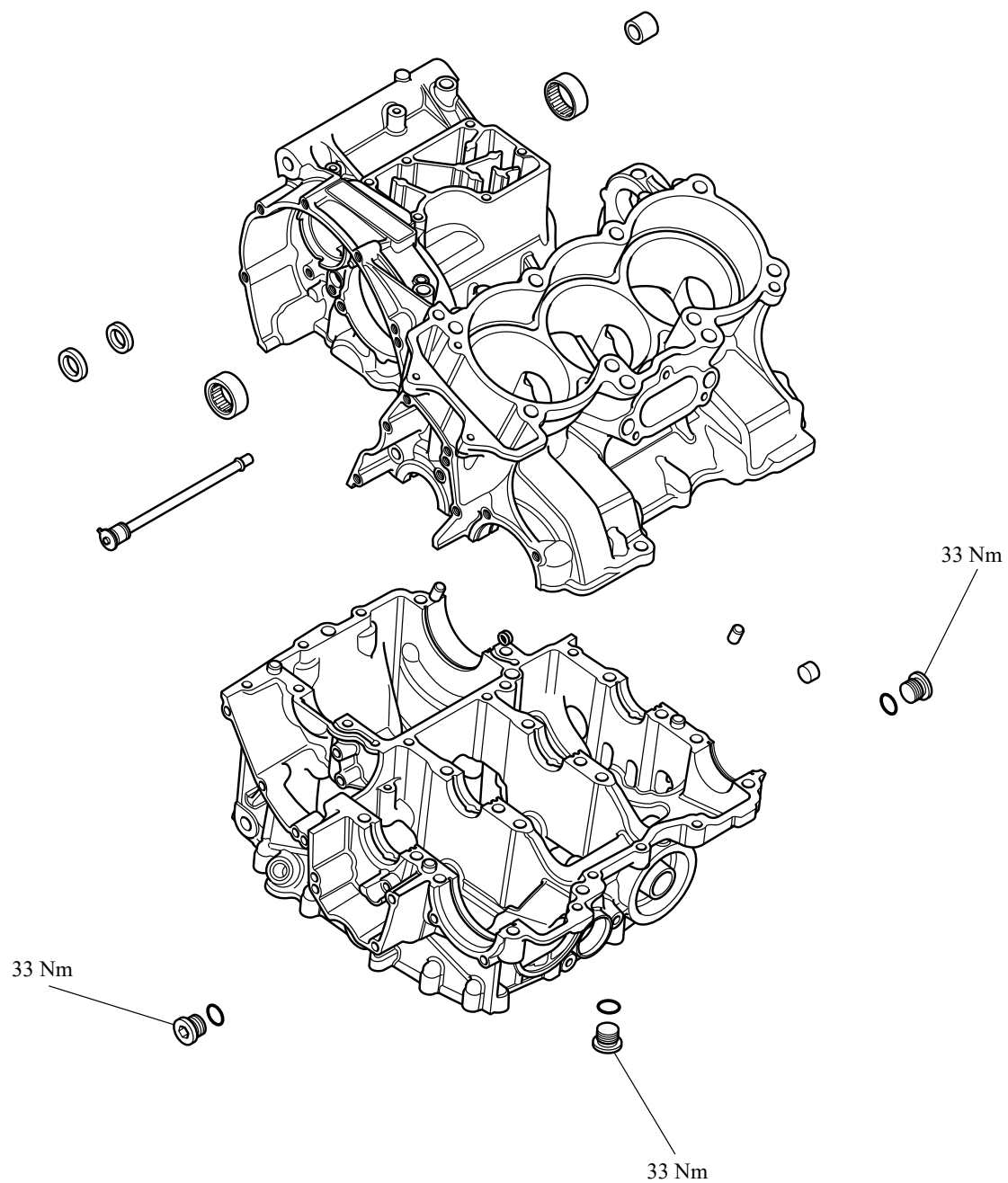
- 1. Fixings
- 2. Stopper plate
- 3. Spring seats
- 4. Springs
- 5. Pressure plate

Perform the following operations:

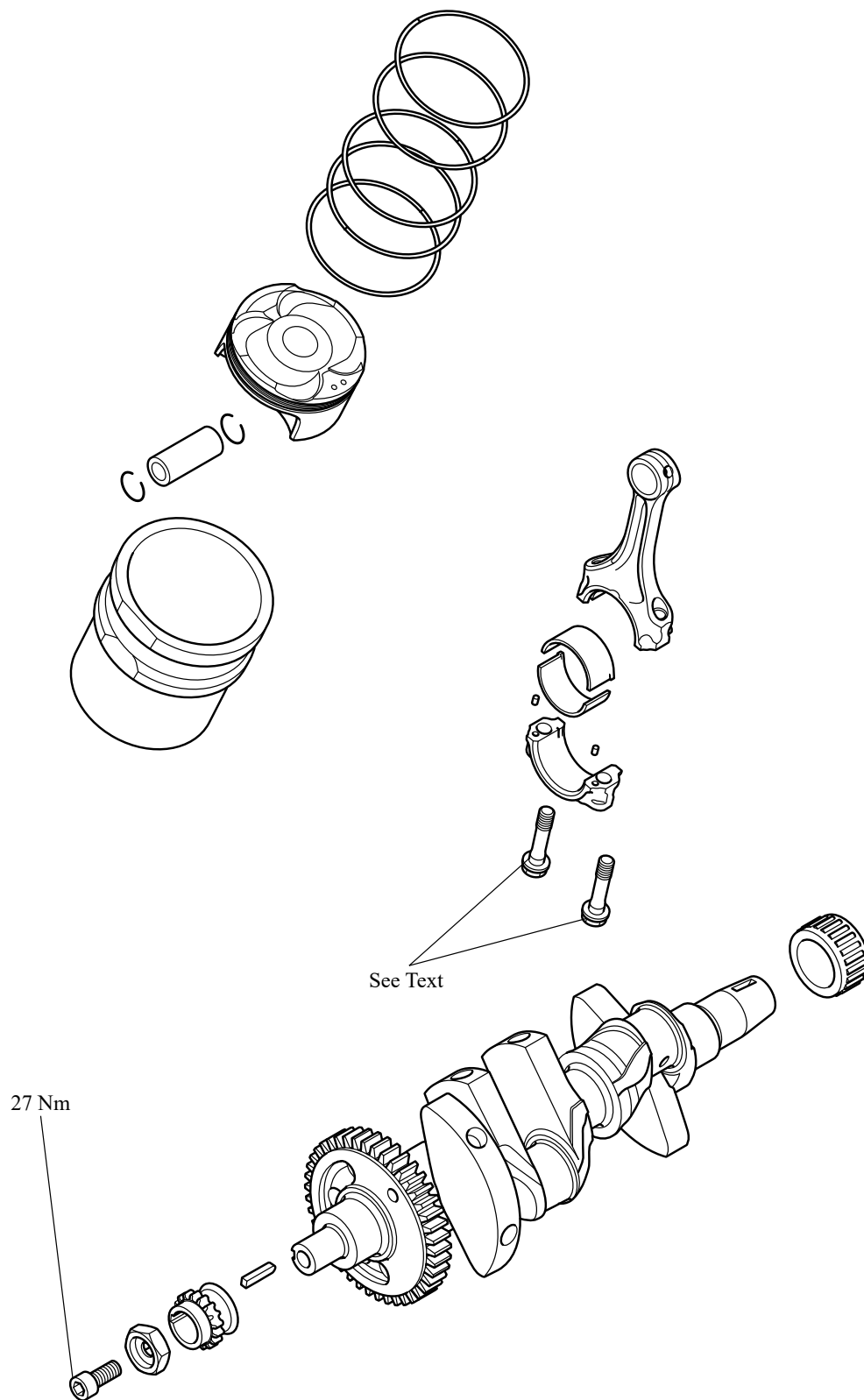
- **Clutch Cover - Installation**

Crankcase, Crankshaft, Connecting Rods and Pistons

Exploded View - Crankcase



Exploded View - Crankshaft, Connecting Rods and Pistons



Crankcases - Disassembly

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

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

Perform the following operations:

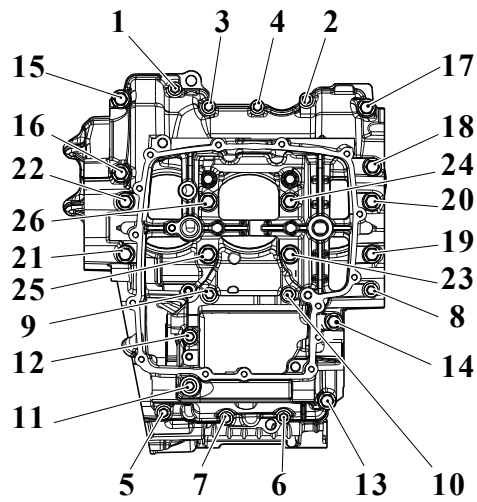
- [Engine - Removal](#)
- [Clutch - Removal](#)
- [Alternator Rotor - Removal](#)
- [Camshaft Cover - Removal](#)
- [Balancer Cover - Removal](#)
- [Camshaft Drive Chain Tensioner - Removal](#)
- [Sump - Removal](#)
- [Oil and Water Pump - Removal](#)

1. Invert the engine to give access to the lower crankcase bolts.

⚠ CAUTION

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

2. Release the lower crankcase bolts in the sequence shown in the diagram below. Note the position of the hardened washers under bolts 19 to 26.



Crankcase Bolt Release Sequence

3. 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.

NOTICE

The position of each individual bearing shell.

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

Perform the following operations:

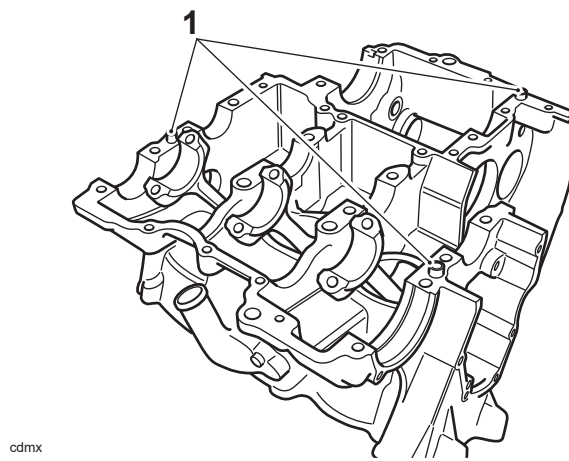
- **Input and Output Shaft Assemblies - Removal**
- **Crankshaft - Removal**
- **Balancer - Removal**

Crankcases - Assembly

Perform the following operations:

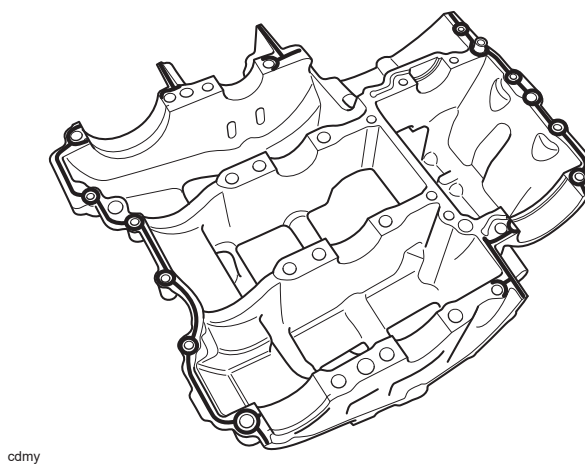
- **Input and Output Shaft Assemblies - Installation**

1. Use high flash-point solvent to clean the crankcase mating faces. Wipe the surfaces clean with a lint-free cloth.
2. Ensure that the transmission is in neutral.
3. Ensure that the three locating dowels are in position in the upper crankcase.



1. Locating dowels

4. Apply a thin bead of silicone sealant (at the factory, ThreeBond 1216E is used) to the lower crankcase mating faces.



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.

⚠ CAUTION

Ensure the three piston cooling jets are installed. If the piston cooling jets are omitted, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

5. Install and lubricate the crankshaft bearing shells with a 50/50 solution of engine oil and molybdenum disulphide grease (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#) before proceeding).
6. Lubricate the crankshaft journals with clean engine oil.
7. Fit the crankshaft (see [Crankshaft - Installation](#)).
8. If removed, refit the balancer (see [Balancer - Installation](#)).
9. Position the lower crankcase to the upper. An assistant may be required to support the crankcase during alignment.
10. Fit the bolts into the lower crankcase and hand tighten until the bolt heads are near contact with the crankcase. Note the position of the hardened washers under bolts 1 to 8.

NOTICE

The crankcase screws are tightened in stages.

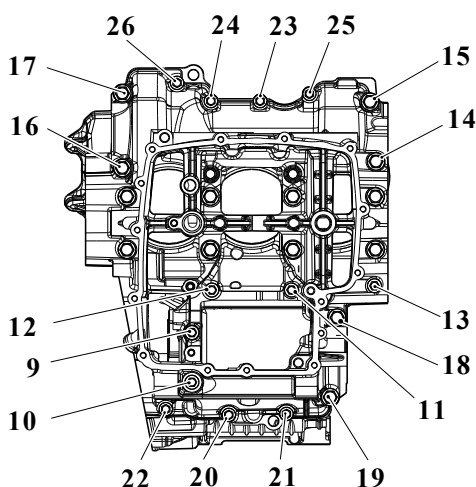
Two different sizes of crankcase bolts are used. All bolts must be tightened in the four stages as follows:

⚠ CAUTION

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

Stage 1

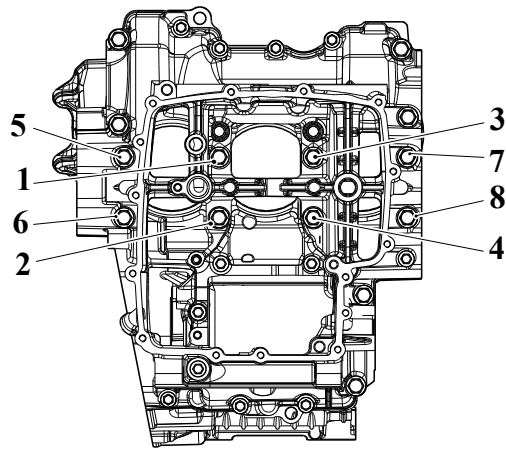
1. In the sequence shown below, tighten only the M8 size crankcase bolts (number 9 to 26) to 12 Nm.



Crankcase Bolt 9 to 26 Tightening Sequence

Stage 2

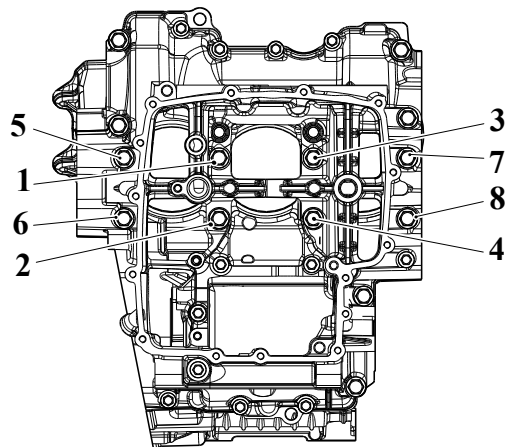
1. In the sequence shown below, tighten the new crankcase bolts 1 to 8 to 10 Nm.



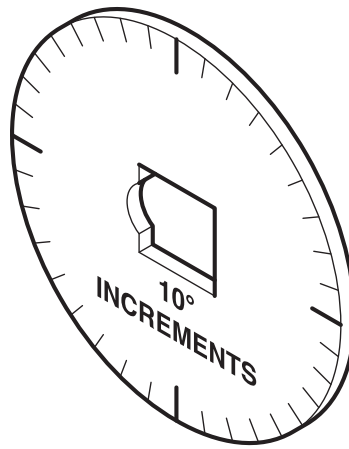
Crankcase Bolt 1 to 8 Tightening Sequence

Stage 3

1. In the sequence shown below, tighten the crankcase bolts 1 to 8 to 70° of bolt rotation using the service tool T3880105 :



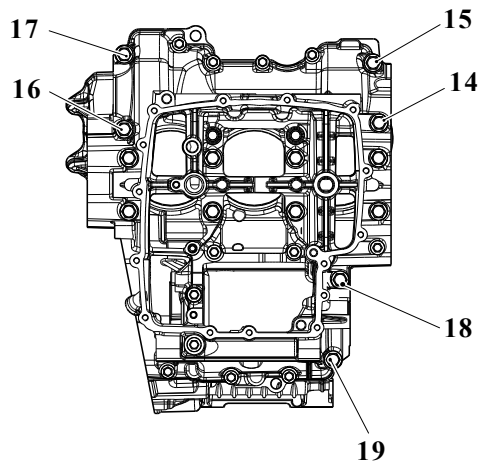
Crankcase Bolt 1 to 8 Tightening Sequence



T3880105 - Torque Angle Gauge

Stage 4

1. In the sequence shown below, tighten the crankcase bolts 14 to 19 to 32 Nm.



Crankcase Bolt 14 to 19 Tightening Sequence

Perform the following operations:

- Rotate the crankshaft clockwise. Check for tight spots and rectify as necessary.
- **Oil and Water Pump - Installation**
- **Sump - Installation**
- **Camshaft Drive Chain Tensioner - Installation**
- **Balancer Cover - Installation**
- **Camshaft Cover - Installation**
- **Clutch - Installation**
- **Alternator Rotor - Installation**
- **Engine - Installation**
- **Crankshaft Position Adaption (European Markets Only)**

Crankshaft - Removal

Perform the following operations:

- [Engine - Removal](#)
- [Camshaft Drive Chain - Removal](#)
- [Crankcases - Disassembly](#)
- [Input and Output Shaft Assemblies - Removal](#)
- [Connecting Rods - Removal](#)

1. Release and remove the crankshaft from the upper crankcase.

NOTICE

Identify the location of each bearing shell.

Remove all bearings and inspect for damage, wear, overheating (blue discolouration) and any other signs of deterioration. Replace the bearings as a set if necessary (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#)).

If the camshaft drive chain sprocket is removed from the crankshaft for any reason, always install a new fixing. Tighten to 27 Nm.

2. Remove the balancer (see [Balancer - Removal](#)).

Crankshaft - Installation

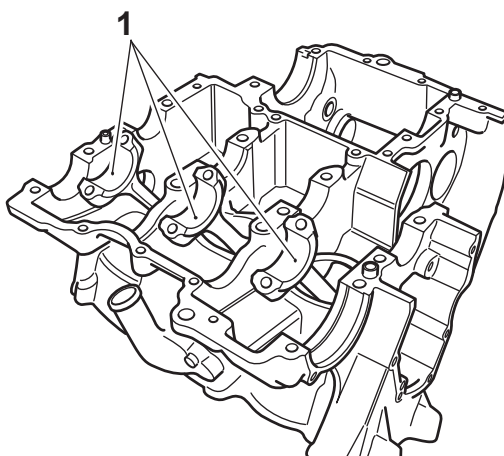
⚠ CAUTION

Always check the bearing journal clearance (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#) and [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#)), before final assembly of the crankshaft. Failure to correctly select crankshaft bearings will result in severe engine damage.

⚠ CAUTION

Ensure the three piston cooling jets are installed. If the piston cooling jets are omitted, oil pressure will be reduced. Running the engine with low oil pressure will cause severe engine damage.

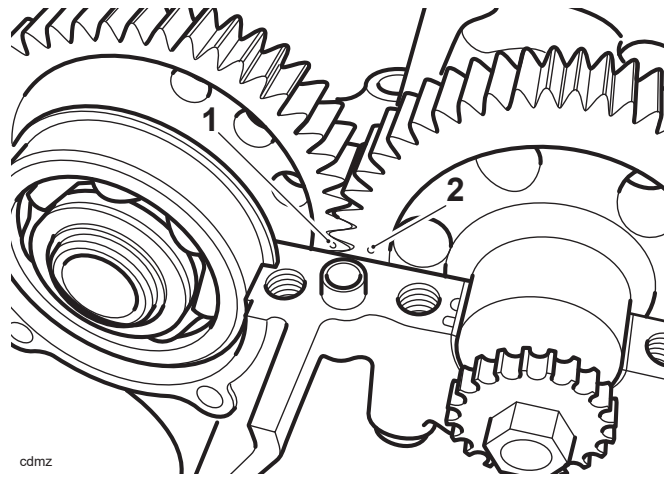
1. Select and fit new main and big end bearing shells using the selection processes (see [Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection](#)).



cdmx_1

1. Big end shells

2. Lubricate all bearings with a 50/50 solution of engine oil and molybdenum disulphide grease.
3. Ensure that the crankshaft is clean, and that the oil ways within the crankshaft are clean and free from blockages and debris.
4. Refit the balancer (see [Balancer - Installation](#)).
5. 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.



cdmz

- | |
|---|
| <ol style="list-style-type: none">1. Balancer backlash and drive gear markings2. Crankshaft markings |
|---|

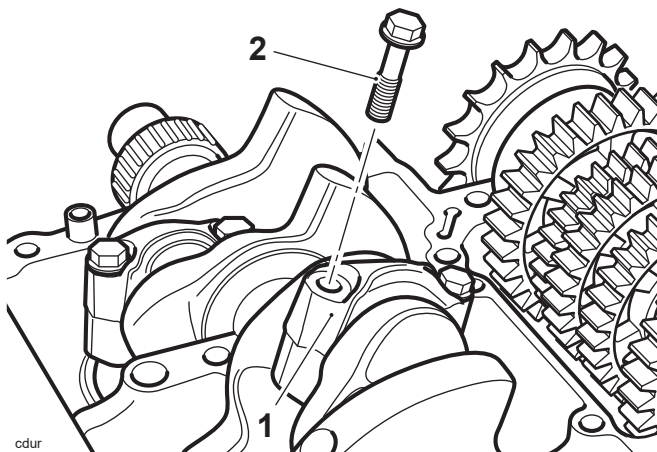
Perform the following operations:

- [Connecting Rods - Installation](#)
- [Input and Output Shaft Assemblies - Installation](#)
- [Crankcases - Assembly](#)
- [Alternator Rotor - Installation](#)
- [Camshaft Drive Chain - Installation](#)
- [Engine - Installation](#)
- [Crankshaft Position Adaption \(European Markets Only\)](#)

Connecting Rods - Removal

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

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



- | |
|---|
| <p>1. Big end cap</p> <p>2. Connecting rod bolt</p> |
|---|

NOTICE

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

3. Push the connecting rod up through the crankcase and collect the piston and connecting rod from the top.
4. Label the assembly to identify the cylinder from which it was removed.

⚠ CAUTION

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

5. Remove the liner using service tool T3880101 (see [Cylinder Liner - Removal](#)).
6. Detach the piston from the connecting rod (see [Pistons - Disassembly](#)).

Connecting Rods - Installation

NOTICE

Connecting rod bolts are treated with an anti-rust solution which must not be removed.

Clean the connecting rod with high flashpoint solvent.

Remove all bearings and inspect for damage, wear and any signs of deterioration and replace as necessary.

⚠ WARNING

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

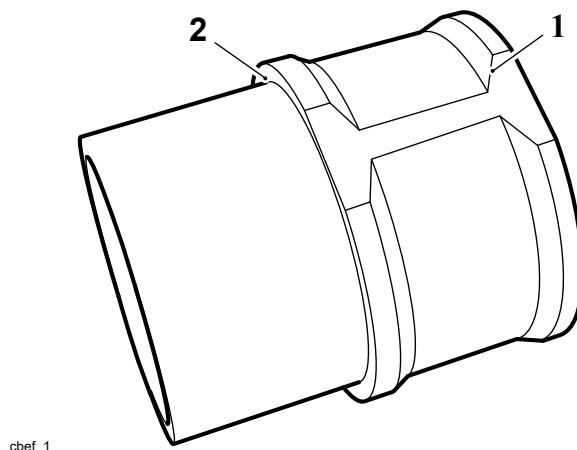
Reusing bolts can cause connecting rods and their caps to detach from the crankshaft causing severe engine damage, loss of motorcycle control and an accident.

NOTICE

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, and to the same cylinder, as prior to disassembly.

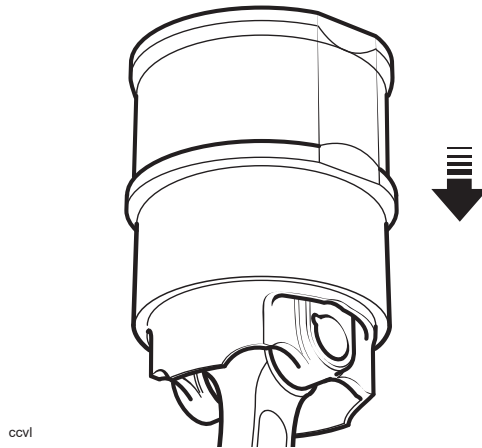
1. Fit the piston onto the connecting rod (see [Pistons - Assembly](#) Piston Assembly).
2. Apply silicone sealer to the liner-to-crankcase mating face (at the factory, ThreeBond 1216E is used).



cbe1_1

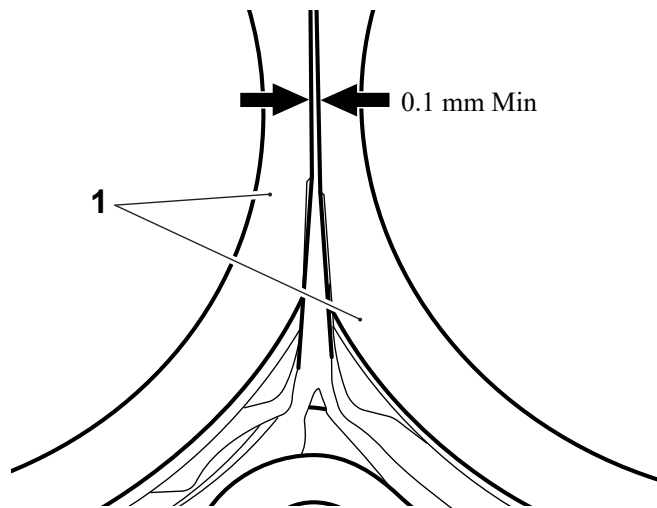
1. Liner
2. Sealer area

3. Fit the piston and connecting rod assembly into the liner from the bottom.



Arrowed: Liner-Piston Fitment

4. Fit the liner into the crankcase ensuring that the arrow on the piston faces forward.
5. The liners must be positioned such that they do not touch each other - it must be possible to pass a 0.1 mm feeler gauge between the centre liner and its adjacent liner on either side. If the liners touch at any point, rotate the liners until there is a minimum 0.1 mm clearance.

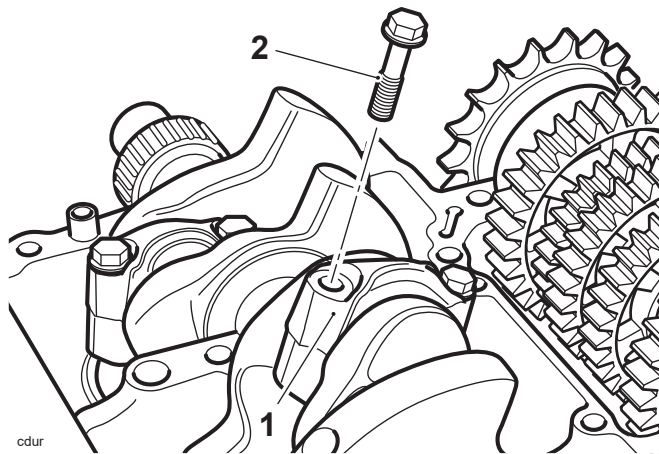


1. Liners

NOTICE

Ensure that the piston/liner/connecting rod assembly aligns correctly with the crankshaft journal during assembly into the crankcase.

6. Select the big end bearing shells (see [Connecting Rod Big End Journal Checking, Measuring and Bearing Selection](#)).
7. Fit the bearing shells to the connecting rod and big end cap and lubricate with a 50/50 solution of engine oil and molybdenum disulphide grease.
8. Align the connecting rod to the crankshaft and fit the big end cap.



1. Big end cap
2. Connecting rod bolt

⚠ CAUTION

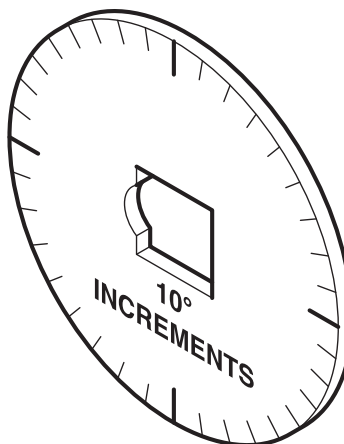
The torque characteristics of the connecting rod bolts are sensitive to the correct lubrication being applied. If the threads and under-head areas are not lubricated with molybdenum disulphide grease, the bolts may be stretched and may become loose when in service resulting in an expensive engine failure.

9. Lubricate the threads and under-head area of the new bolts with molybdenum disulphide grease. Tighten the bolts evenly and progressively in two stages as follows:

⚠ CAUTION

The torque characteristics of the connecting rod 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 may become loose when in service resulting in an expensive engine failure.

- Tighten to 14 Nm.
- Tighten through 210° of bolt rotation as measured using service tool T3880105.



T3880105 - Torque Angle Gauge

Connecting Rod Big End Journal Checking, Measuring and Bearing Selection

Connecting Rod Big End Bearing Selection/Crankshaft Journal Wear Check

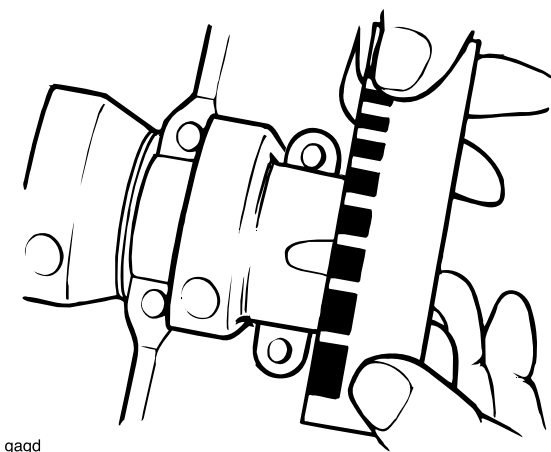
1. Measure the bearing and crankshaft journal clearance as follows.

NOTICE

The crankshaft journal clearances are measured using Plastigauge (Triumph part number 3880150-T0301).

Do not turn the connecting rod and crankshaft during the clearance measurement as this will damage the Plastigauge.

- Remove the big end cap from the journal to be checked.
- Wipe the exposed areas of the crankshaft journal, and the bearing face inside the cap.
- Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the bearing.
- Size a length of the Plastigauge to fit across the crankshaft journal. Fit the Plastigauge to the journal using the grease to hold the strip in place.
- Lubricate the threads and under-head of the bolt with molybdenum disulphide grease. Refit the bearing and cap and tighten the big end bolts (see [Connecting Rods - Installation](#)).
- Remove the big end cap from the journal being checked. Using the gauge provided with the Plastigauge kit, measure the width of the compressed Plastigauge.



Connecting Rod Big End Bearing/Crankshaft Journal Clearance

Standard	0.032-0.064 mm
Service limit	0.070 mm

NOTICE

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

Crankshaft Journal diameter

Standard	32.994-33.010 mm
Service limit	32.950 mm

NOTICE

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 re-ground and no oversize bearings are available.

Connecting Rod - Bearing Selection

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 information.

1. Select the correct big end bearing shell as follows:

- Measure each crankshaft journal diameter.
- Select the correct bearings by matching the information found with the chart below.

NOTICE

All dimensions in millimetres.

Big end bearing selection chart

Shell Colour	White	Red
Connecting Rod Big End Bore Dia.	36.009 36.000	36.009 36.000
Crankshaft Journal Dia.	33.010 33.003	33.002 33.994
Running Clearance Range	0.064 0.036	0.061 0.032
Running Clearance Nominal	0.049	

For instance:

Connecting Rod Big End Dia. 36.002

Crankshaft Journal Diameter 32.987

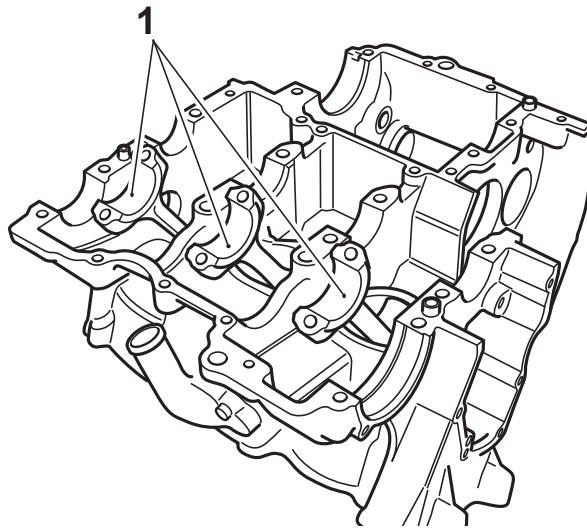
Required Bearing Red

NOTICE

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.

1. Install the new bearings in the connecting rod.



cdmx

1. Big end bearings

⚠ CAUTION



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

Crankshaft Main Bearing/Journal Checking, Measuring and Bearing Selection

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 information.

NOTICE

All dimensions in millimetres.

⚠ CAUTION

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

Crankshaft Main Bearing/Journal Wear

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

1. Measure the bearing to crankshaft journal clearance as follows:
2. Measure the bearing to crankshaft main journal clearance using Plastigauge (Triumph part number 3880150-T0301).

NOTICE

Do not turn the connecting rods and crankshaft during the clearance measurement as this will damage the Plastigauge.

3. Separate the crankcase halves (see [Crankcases - Disassembly](#)).
4. Wipe the exposed areas of the crankshaft journal, and the bearing faces inside the crankcase halves.
5. Apply a thin smear of grease to the journal and a small quantity of silicone release agent to the bearing.
6. Trim a length of the Plastigauge to fit across the crankshaft journal.
7. Fit the Plastigauge to the journal using the grease to hold the strip in place.

NOTICE

The original fixings may be reused for bearing selection. Do not use new fixings as they may only be used once, even if the single use is related to bearing selection.

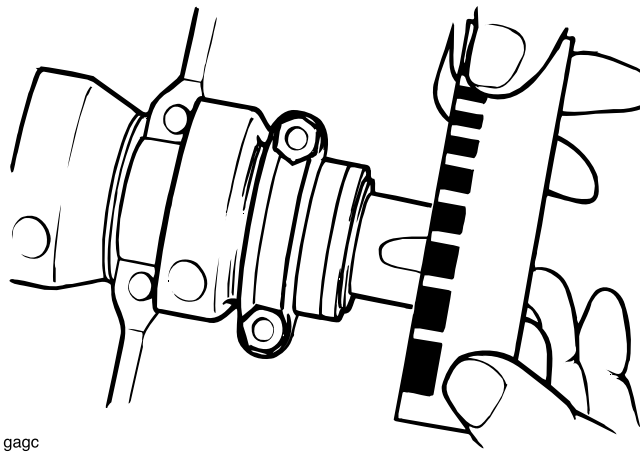
8. Lubricate the threads and the face of the fixings with molybdenum disulphide grease.

NOTICE

It is not necessary to apply silicone sealer to the crankcase mating faces during the bearing selection process.

Only apply silicone sealer during final assembly.

9. Refit the crankcase and tighten the original fixings (see [Crankcases - Assembly](#)).
10. Release the fixings and remove the crankcase.
11. Using the Plastigauge kit, measure the width of the compressed Plastigauge.



gagc

Checking Crankshaft Journal Clearance using Plastigauge

12. For specifications refer to [Crankshaft](#).

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

NOTICE

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 re-ground and no oversize bearings are available.

Main Bearing Selection

NOTICE

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

Select the 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, crankcase halves assembled and all fixings fully torqued).
3. Select and install the correct bearings by matching the information found in the [Main Bearing Selection Chart](#).

For example:

Crankcase Bore	35.990 mm
Crankshaft Journal Diameter	32.978 mm
Required Bearing	Blue

NOTICE

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 that gives the greater running clearance.

4. Install the new bearings.

Crankshaft End Float

Standard	0.15-0.30 mm
Service Limit	0.5 mm

NOTICE

^

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

Main Bearing Selection Chart

Crankcase Bore Diameter	Crankshaft Main Journal Diameter										
	32.972	32.973	32.974	32.975	32.976	32.977	32.978	32.979	32.980	32.981	32.982
35.980	Blue	Blue	Blue	Blue	Red	Red	Red	Red	Red	Red	Red
35.981	Blue	Blue	Blue	Blue	Blue	Red	Red	Red	Red	Red	Red
35.982	Blue	Blue	Blue	Blue	Blue	Blue	Red	Red	Red	Red	Red
35.983	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red	Red	Red	Red
35.984	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red	Red	Red
35.985	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red	Red
35.986	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red
35.987	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
35.988	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue
35.989	Green	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue
35.990	Green	Green	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue
35.991	Green	Green	Green	Green	Green	Green	Green	Blue	Blue	Blue	Blue
35.992	Green	Green	Green	Green	Green	Green	Green	Green	Blue	Blue	Blue
35.993	Green	Green	Green	Green	Green	Green	Green	Green	Green	Blue	Blue
35.994	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Blue
35.995	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
35.996	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
35.997	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
35.998	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

For instance:

Crankcase Bore	35.990
Crankshaft Journal Diameter	32.978
Required Bearing	Blue

 WARNING



Always confirm, using the Plastigauge method, that the running clearance is correct before final assembly. Severe engine damage could result from incorrect clearance resulting in loss of motorcycle control and an accident.

NOTICE



Repeat the measurements for all respective journals.

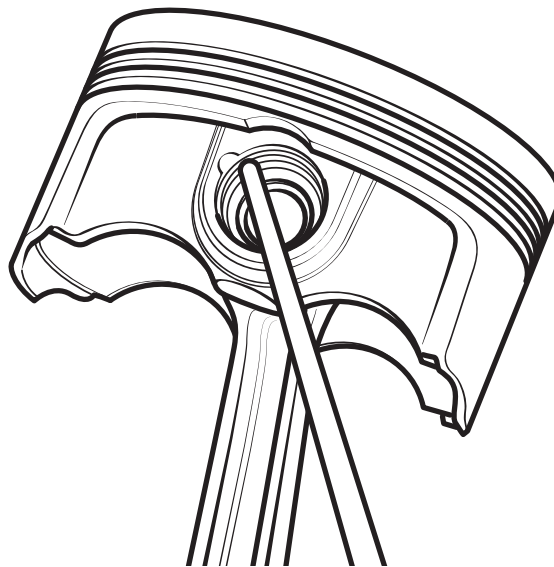
It is normal for the bearings selected to differ from one journal to another.

Pistons - Disassembly

NOTICE

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

1. Remove the liner, using the frame from service tool T3880315, and service tool T3880101 (see [Cylinder Liner - Removal](#)).
2. Remove and discard the gudgeon pin circlip from one side of the piston.



Removing the Gudgeon Pin Circlip

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

⚠ CAUTION

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

NOTICE

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

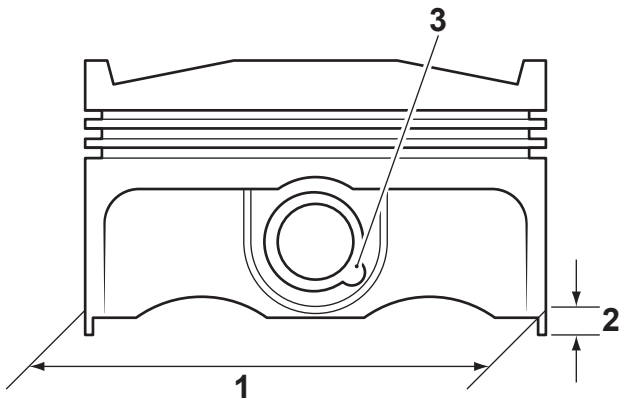
4. Piston rings must be removed from the piston using hand pressure only. Do not overextend the piston rings during removal.

NOTICE

If the piston rings are to be reused, note the orientation of the oil control rings prior to removal.

Piston Wear Check

1. Measure the piston outside diameter, 8 mm up from the bottom of the piston and at 90° to the direction of the gudgeon pin.



1. Piston outside diameter
2. Measurement point
3. Circlip removal groove

All Pistons	73.974-73.990 mm
Service limit	73.930 mm

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

Pistons - Assembly

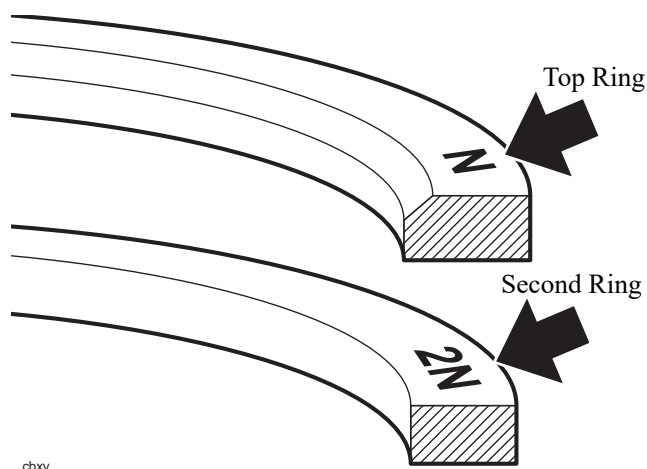
1. Clean the piston ring grooves and fit the piston rings to the piston.

NOTICE

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 N2, and is plain on the inside edge.

When new, the oil control rings can be fitted with either face upward. Used oil control rings must be refitted in the same orientation as noted prior to removal.



Piston Ring Identification

2. Fit the piston onto the connecting rod.

NOTICE

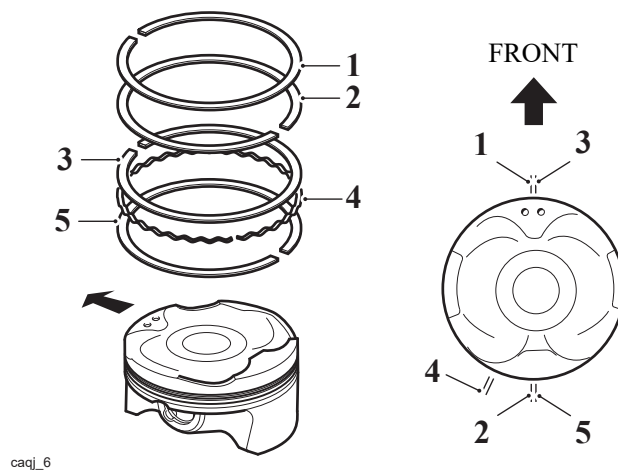
Connecting rods may be fitted either way around. However, ensure all three are fitted the same way.

3. Lubricate the piston, small end and gudgeon pin with a 50/50 solution of engine oil and molybdenum disulphide grease.
4. Align the small end in the connecting rod with the gudgeon pin hole in the piston 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, resulting in loss of motorcycle control and an accident.

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



1. Top ring
2. Second ring
3. First steel oil control ring
4. Oil control ring expander
5. Second steel oil control ring

NOTICE

The top ring gap should be positioned in the 12 o'clock position, and the second ring gap in the 6 o'clock position. The first steel oil control ring gap should be in the 12 o'clock position and the second steel oil control ring should be in the 6 o'clock position. The oil control ring expander should be in the 7 o'clock position.

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

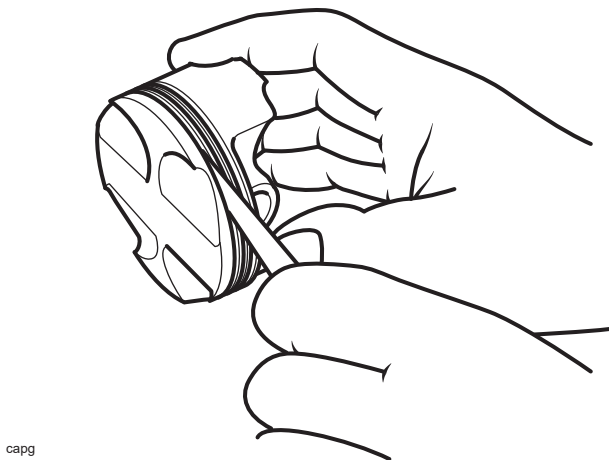
Piston Rings/Ring Grooves

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

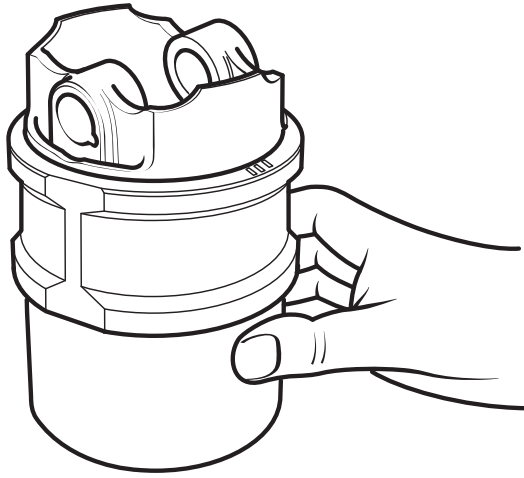
Top ring	0.02-0.06 mm
Service limit	0.075 mm
Second	0.02-0.06 mm
Service limit	0.075 mm

Piston Ring Gap

NOTICE

The piston ring gap, with the piston ring fitted in the liner, must be checked before final assembly.

- Place the piston ring inside the liner.
- 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 cylinder.



cduo_3

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	0.15-0.30 mm
Service limit	0.42 mm
Second	0.30-0.45 mm
Service limit	0.57 mm
Oil Control	0.20-0.70 mm
Service limit	0.84 mm

NOTICE



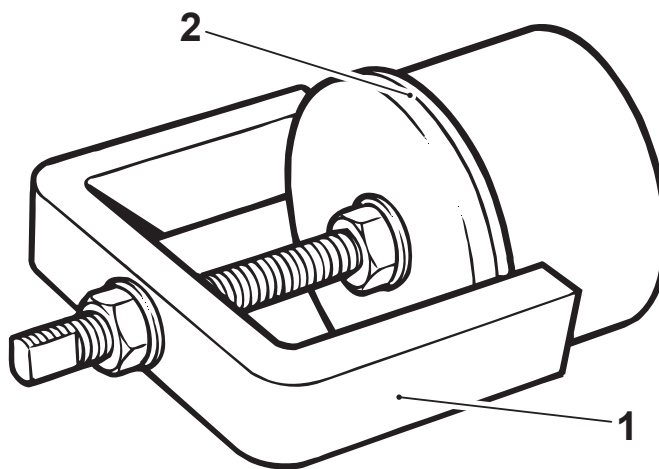
If the end-gap is too large, replace the piston rings with a new set.

If the gap remains too large with the new piston rings, both the pistons and barrels must be replaced.

If the gap is too small, check the cylinder bore for distortion, replacing as necessary. DO NOT FILE PISTON RINGS!

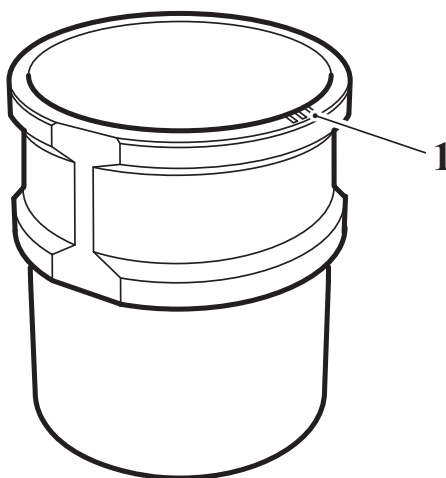
Cylinder Liner - Removal

1. Assemble the frame from service tool T3880315 to service tool T3880101 as shown below.



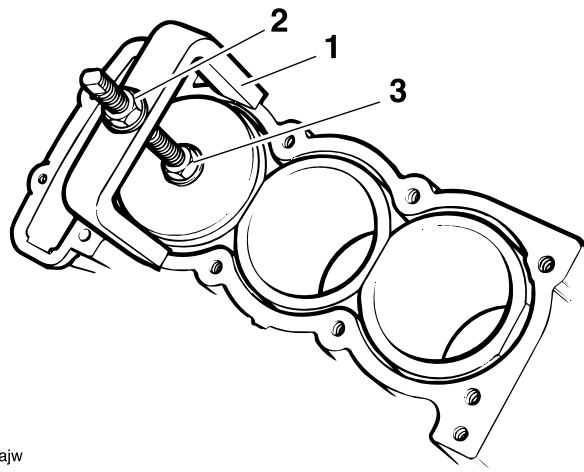
- 1. T3880315 - Extractor, Cylinder Liner
- 2. T3880101 - Extractor, Cylinder Liners

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



- 1. Paint mark

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



gajw

- | |
|--|
| <ol style="list-style-type: none">1. T3880315 - Extractor, Cylinder Liner and T3880101 - Extractor, Cylinder Liners2. Extraction nut3. Locking nut |
|--|

4. Check that the locking nut on service tool T3880101 is loose, then fully unscrew the extraction nut.
5. 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.
6. 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.
7. Turn the locking nut anticlockwise to release the liner.

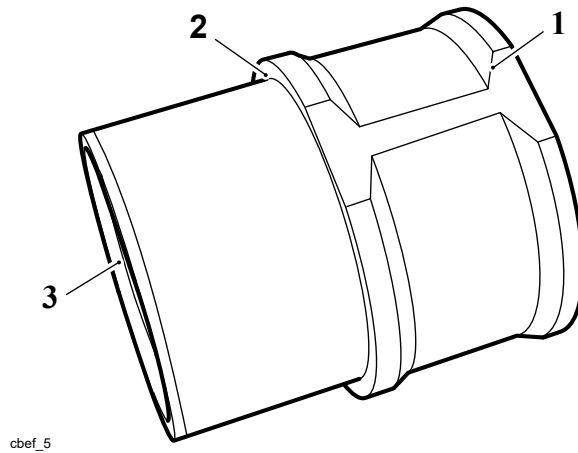
NOTICE

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.

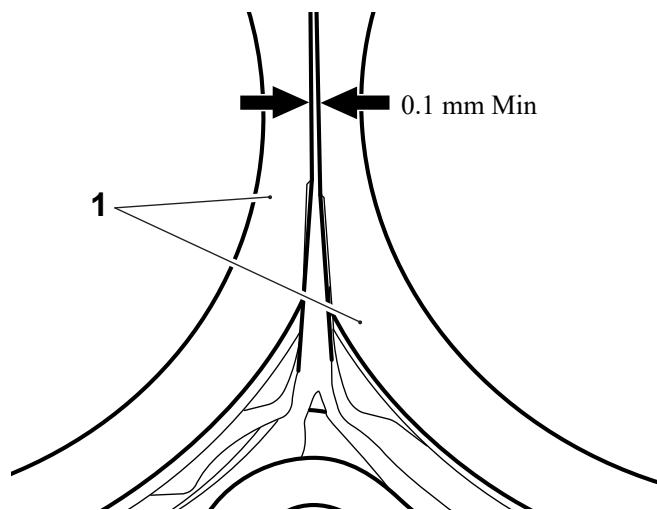
Cylinder Liner - Installation

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 (at the factory, ThreeBond 1216E is used).
4. Fit each liner over the piston using a gentle rocking motion to allow compression of the piston rings.



- | |
|--|
| <ol style="list-style-type: none">1. Liner2. Sealer area3. Chamfer |
|--|

5. The liners must be positioned such that they do not touch each other - it must be possible to pass a 0.1 mm feeler gauge between the centre liner and its adjacent liner on either side. If the liners touch at any point, rotate the liners until there is a minimum 0.1 mm clearance.



- | |
|---|
| <ol style="list-style-type: none">1. Liners |
|---|

NOTICE

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.

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

NOTICE

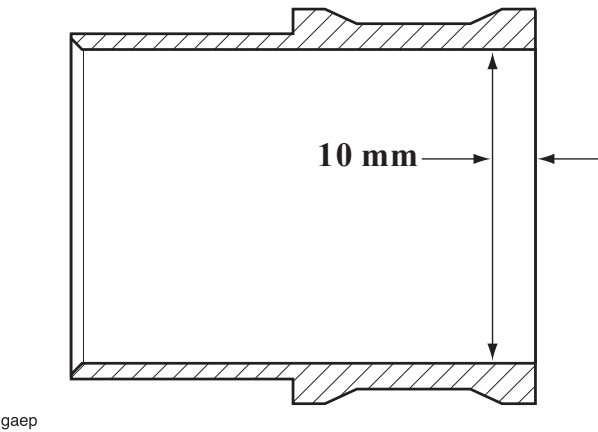
When the liners have been fitted, they should not be disturbed. If it is necessary to remove the liner after fitting, the sealer must be reapplied.

Cylinder Wear

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

Cylinder bore diameter

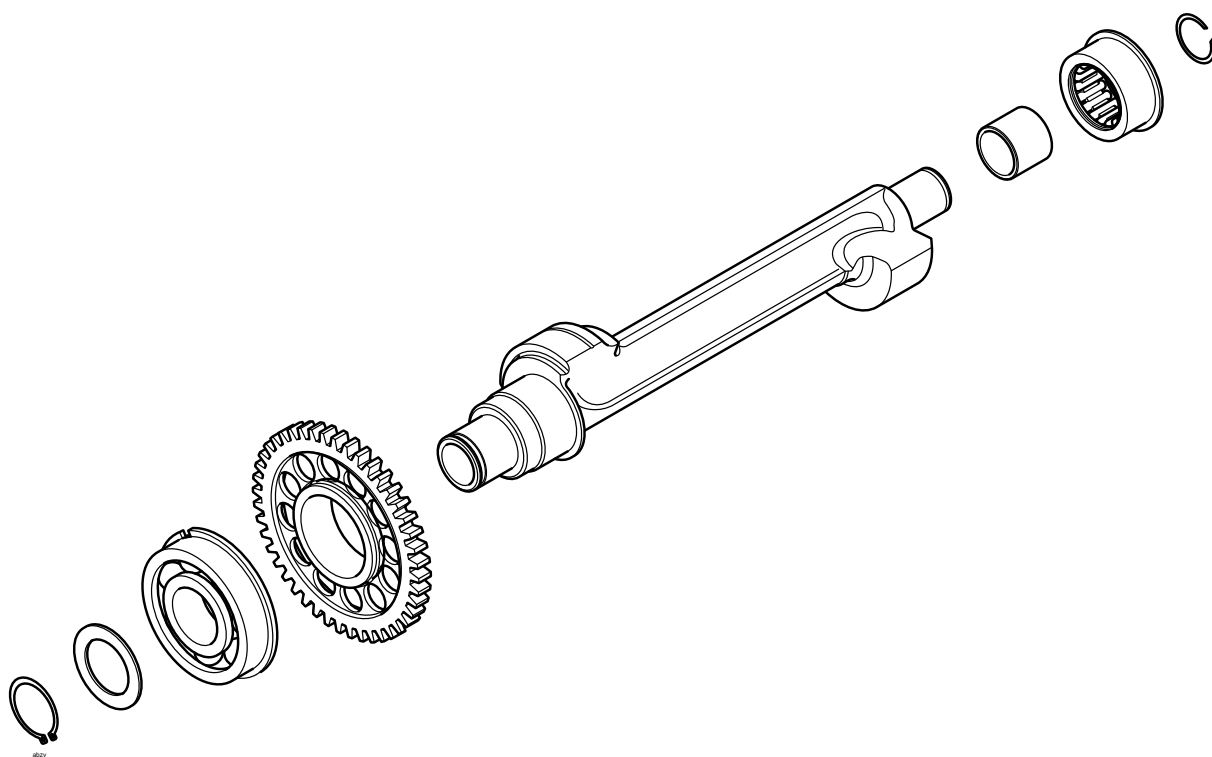
Standard	74.040-74.058 mm
Service limit	74.11 mm



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

- 1. Measure the inside diameter 10 mm from the top of the bore as shown above.
- 2. If the reading is outside the specified limits, replace the liner and piston as an assembly.

Exploded View - Balancer



Balancer

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

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

Balancer - Removal

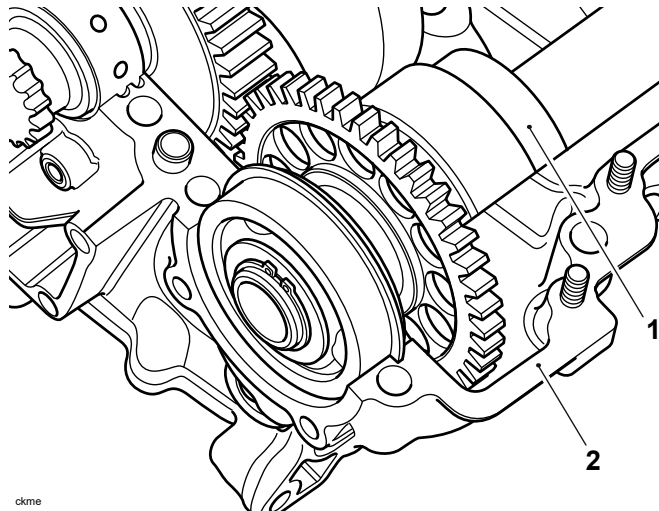
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

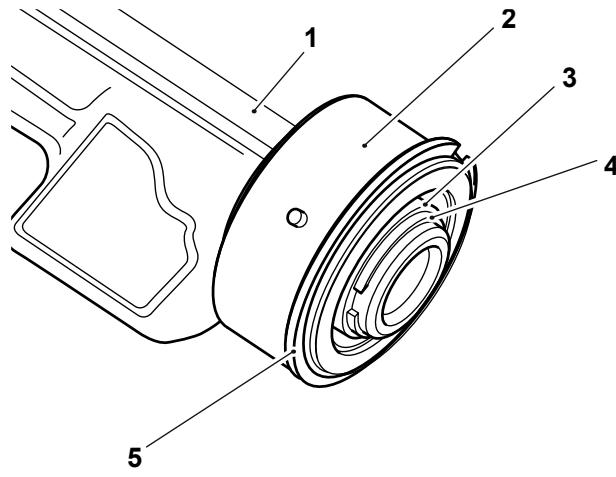
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Separate the crankcase halves (see [Crankcases - Disassembly](#)).
2. With the crankcase halves separated, lift out the balancer shaft complete with the shaft bearings/circlips.



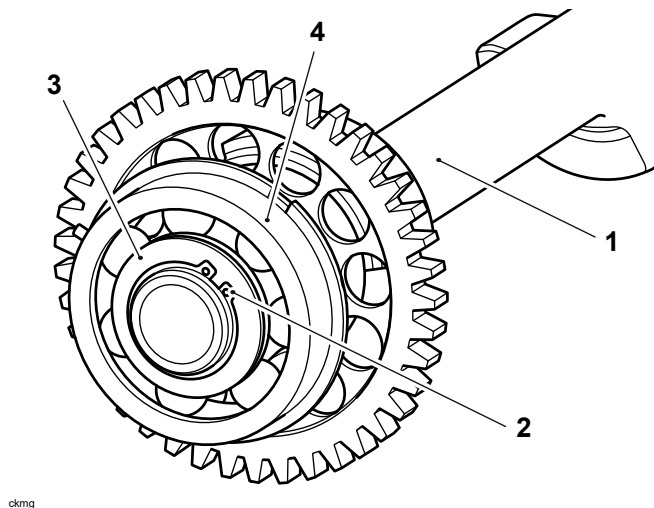
1. Balancer shaft
2. Crankcase

3. To remove the left hand bearing, slide the needle roller bearing and circlip from the shaft. Remove the circlip and bearing sleeve from the balancer shaft.



1. Balancer shaft
2. Needle roller bearing
3. Bearing sleeve
4. Circlip
5. Needle roller bearing circlip

4. To remove the right hand bearing, remove the circlip and washer, and, using a press and press bars remove the bearing race from the shaft, ensuring the inner bearing race is supported. Note the orientation of the bearing prior to removal. DO NOT remove the drive gear from the shaft.



1. Balancer shaft
2. Circlip
3. Washer
4. Bearing

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

Balancer - Inspection

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

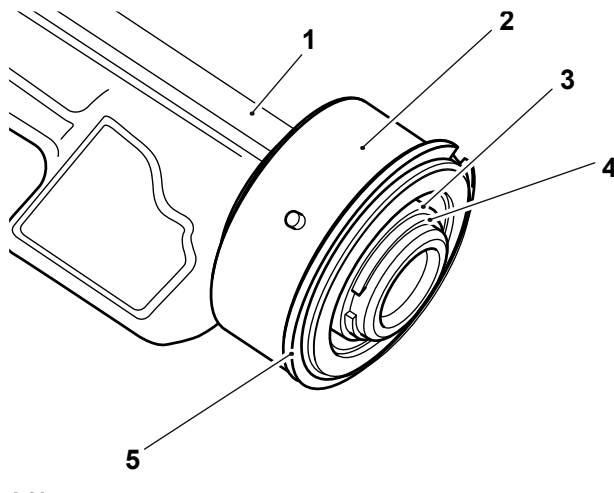
NOTICE



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

Balancer - Installation

1. Lubricate and fit the right hand bearing, washer and circlip to the shaft.
2. Fit the left hand bearing sleeve and circlip to the balancer shaft.



- 1. Balancer shaft
- 2. Needle roller bearing
- 3. Bearing sleeve
- 4. Circlip
- 5. Needle roller bearing circlip

NOTICE

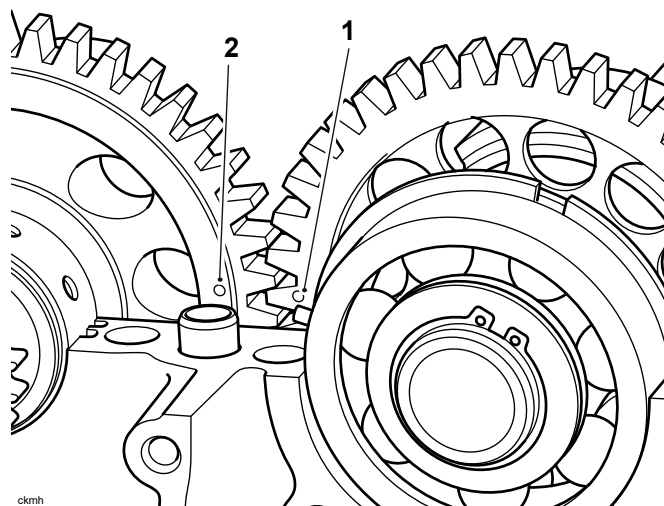
Before fitting the balancer shaft to the crankcase, lubricate the rollers of the needle roller bearing with new engine oil which meets specification API SH (or higher) and JASO MA.

3. Fit the needle roller bearing and circlip to the balancer shaft.

⚠ CAUTION

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

4. Locate the balancer to the crankcase aligning the balancer gears and crankshaft as shown in the illustration below, while ensuring that the bearing circlips locate correctly in their corresponding grooves in the crankcase.



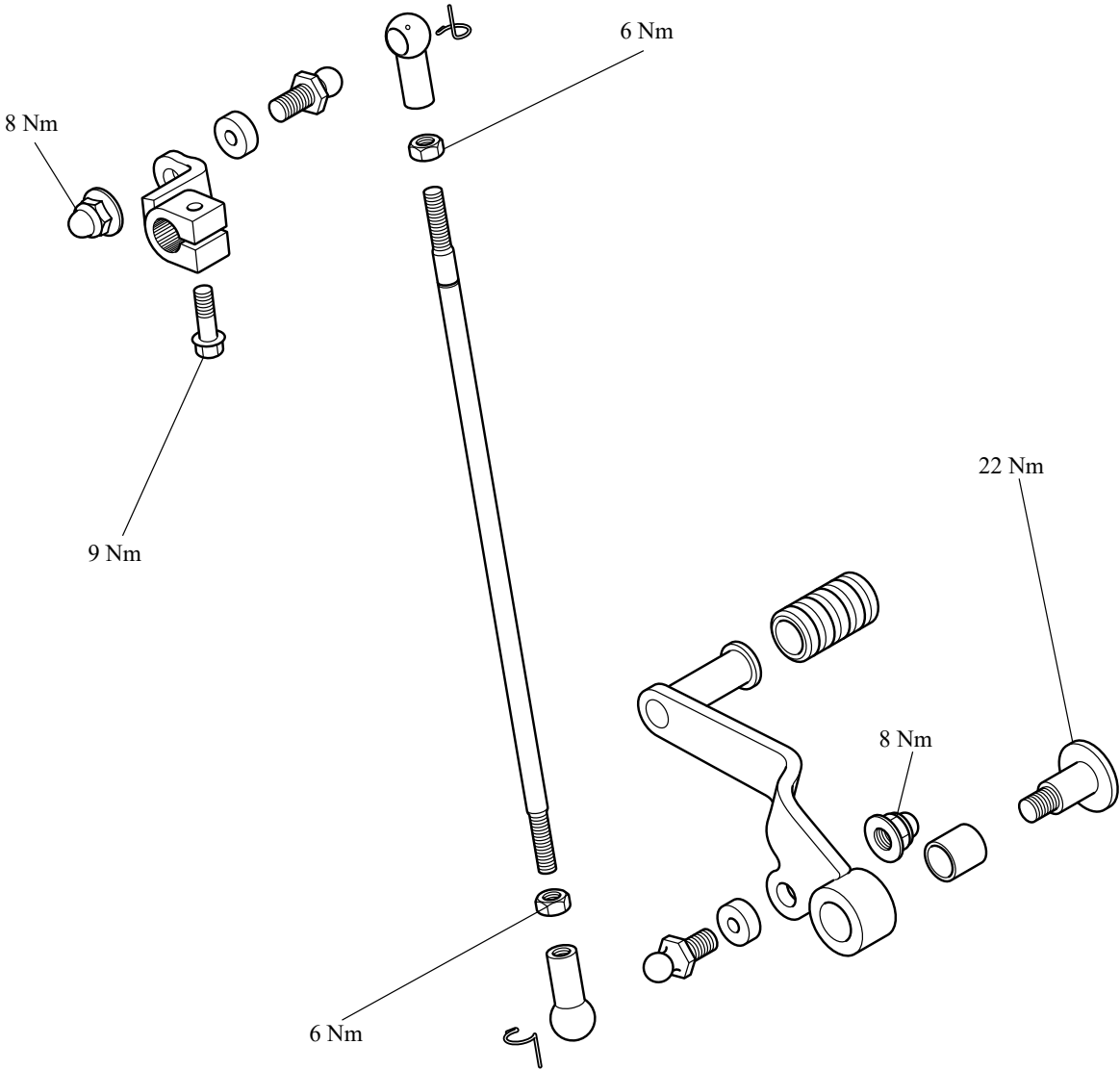
- 1. Balancer drive gear mark
- 2. Crankshaft marking

5. Check that the balancer and crankshaft are correctly aligned before continuing to assemble the crankcase halves (see [Crankcases - Assembly](#)).

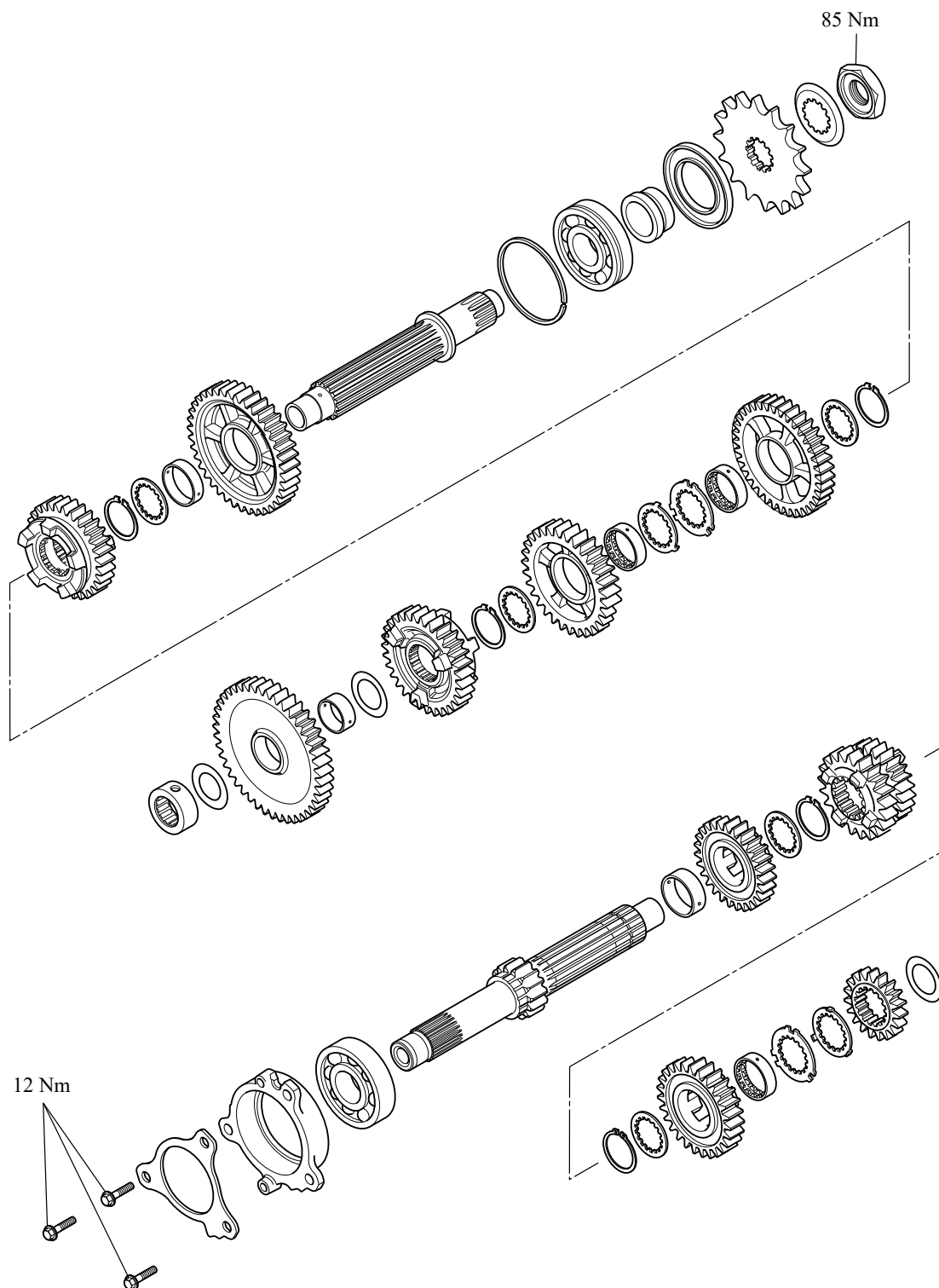
Exploded View – Gear Selectors and Drum



Exploded View - Gear Change Lever



Exploded View - Input and Output Shafts



Gear Change Linkage - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

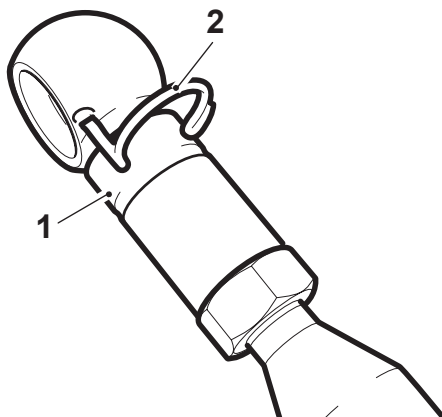
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

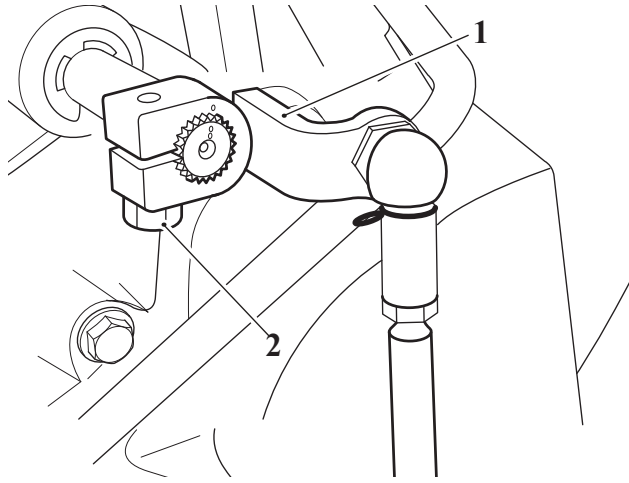
If the gear change linkage requires disassembly, continue from step one. If the gear change linkage requires removal only, continue from step three.

1. Remove the wire clips retaining the gear change linkage upper and lower ball joints.



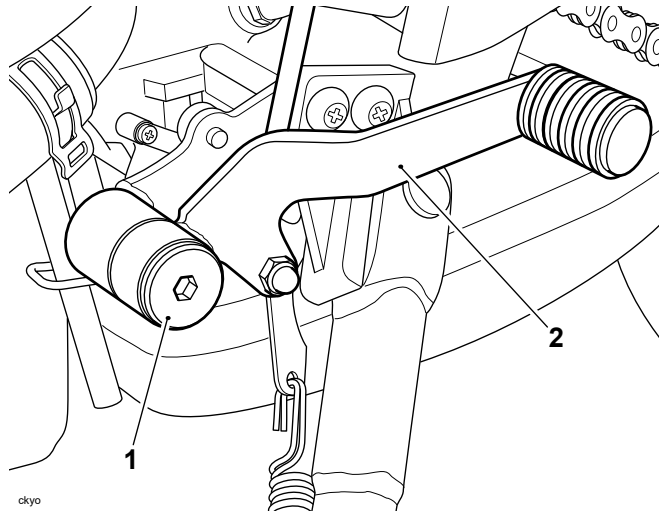
1. Ball joint
2. Wire clip

2. Remove the gear change linkage.
3. Remove the gear change clamp fixing.



- 1. Gear change clamp
- 2. Fixing

4. Remove and discard the gear change pivot bolt.

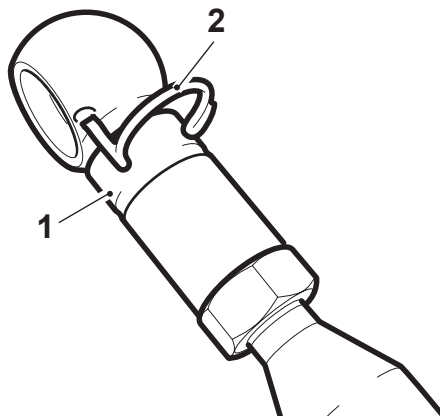


- 1. Gear change pivot bolt
- 2. Gear change pedal

5. Remove the gear change pedal and gear change clamp from the motorcycle, noting the position of the gear change clamp for installation.

Gear Change Linkage - Installation

- Make sure the gear change rod length is set correctly (see [Gear Change Rod Setting](#)).
1. Locate the gear change clamp to the gear selector shaft, as noted for removal. Tighten the fixing to 9 Nm.
 2. Install gear change pedal to the gear change bracket and tighten the new pivot bolt to 22 Nm.
 3. If required, attach the upper ball joint to the transmission linkage.
 4. If required, attach the lower ball joint to the gear change pedal.
 5. Refit the wire clips to retain the ball joints. Ensure the wire clips locate correctly in the ball joints before rotating the clips to lock in place.



- | |
|--|
| <ol style="list-style-type: none">1. Ball joint2. Wire clip |
|--|

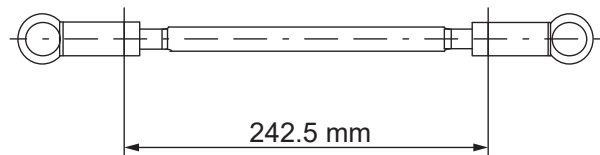
Gear Change Rod Setting

NOTICE

If accessory fit Triumph Shift Assist (TSA) is fitted, the length of the rod should not be altered.

If the gear change linkage needs to be removed, ensure the setting dimension and alignment are as described below when refitting.

- Make sure the alignment mark on the gear pedal crank lines up to the alignment mark on the gear change shaft
- Ensure the distance between the flats of the ball joints is 242.5 mm as shown below.



Gear change rod setting dimension

- The length of exposed thread at each end of the gear change rod should be equal.
- Tighten the gear change rod lock nuts to 6 Nm.
- Ensure the gear change mechanism is free to operate, without any excessive play.

Gear Change Shaft - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

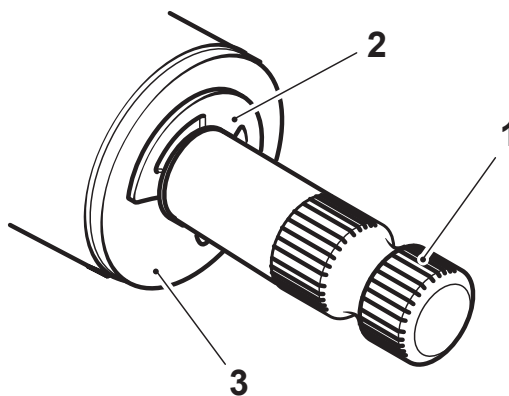
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Clutch - Removal](#)
- [Gear Change Linkage - Removal](#)

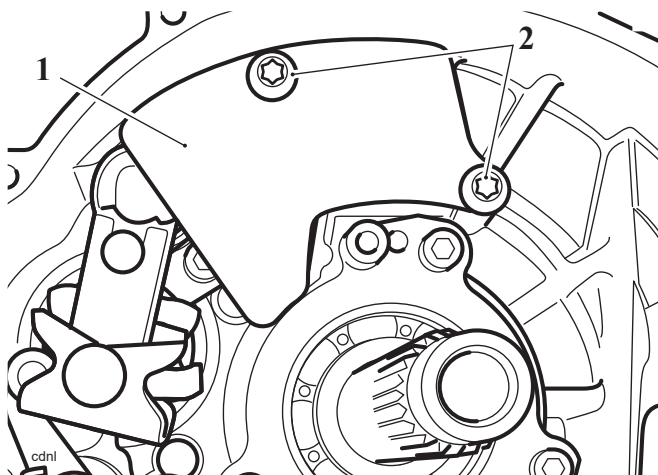
1. Remove the E-clip and washer from the gear pedal end of the gear change shaft.



kakh_2

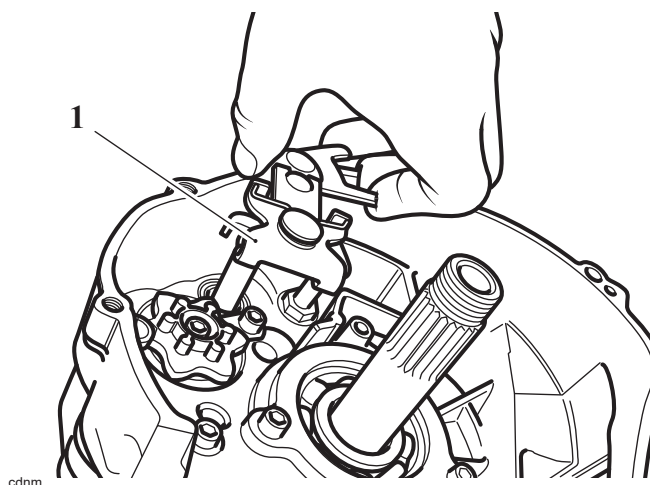
- | |
|--|
| 1. Gear change shaft
2. E-clip
3. Washer |
|--|

2. Release the two fixings and remove the baffle plate from the crankcase breather. Discard the fixings.



- 1. Crankcase breather baffle plate
- 2. Fixings

3. Withdraw the gear change shaft from the clutch end of the crankcase.

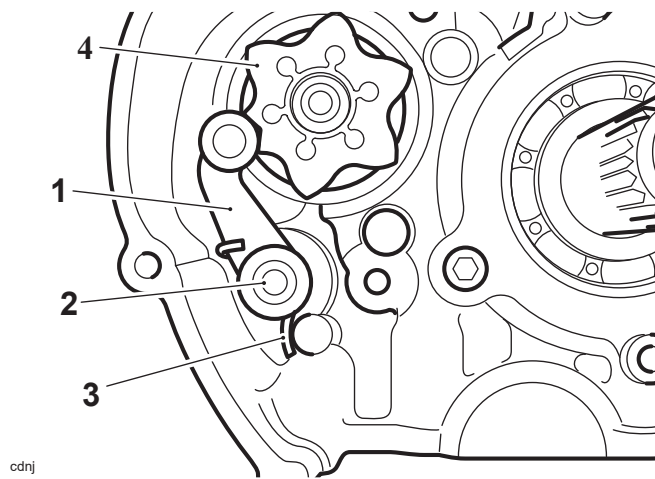


- 1. Gear change shaft

NOTICE

The detent arm is held in position under spring pressure. Prior to removal, note the orientation of the detent arm, fixing and spring, relative to the selector drum detent wheel. The same orientation must be retained on assembly.

- 4. Remove and discard the fixing securing the detent arm.
- 5. Withdraw the detent arm complete with its flanged sleeve, spring and washer.



- 1. Detent arm
- 2. Fixing
- 3. Spring
- 4. Detent wheel

Gear Change Shaft - Installation

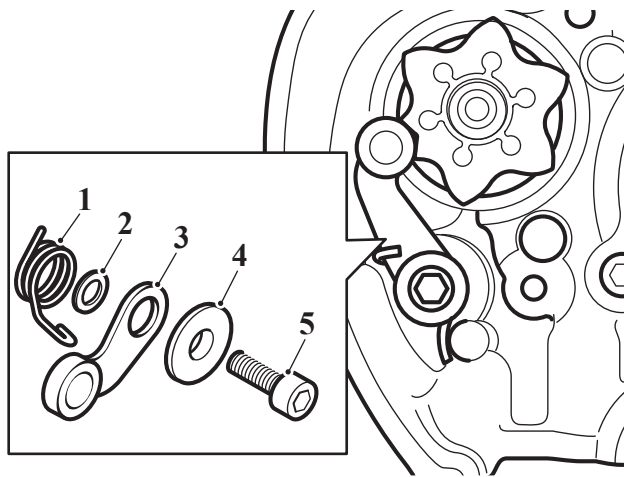
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

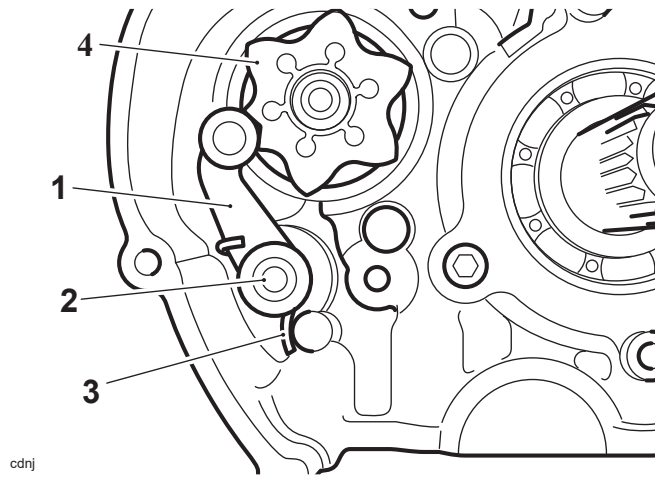
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Assemble the detent arm as noted during removal with a new fixing and place up to the crankcase.



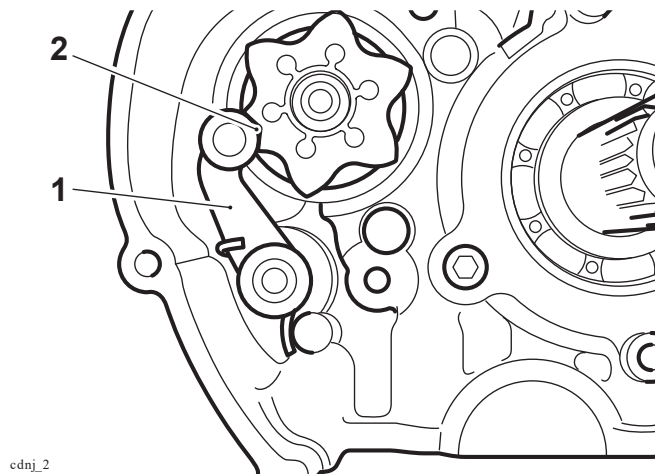
1. Spring
2. Washer
3. Detent arm
4. Flanged sleeve
5. Fixing

2. Hold the detent arm assembly in position and insert a new fixing. Start the thread and push the detent arm, using finger pressure only, to locate on the selector drum detent wheel.
3. Make sure the detent arm remains correctly located on the detent wheel and the spring is correctly seated in the recess in the crankcase. Make sure the shoulder of the flanged sleeve is located in the bore of the detent arm and tighten the fixing to 12 Nm.



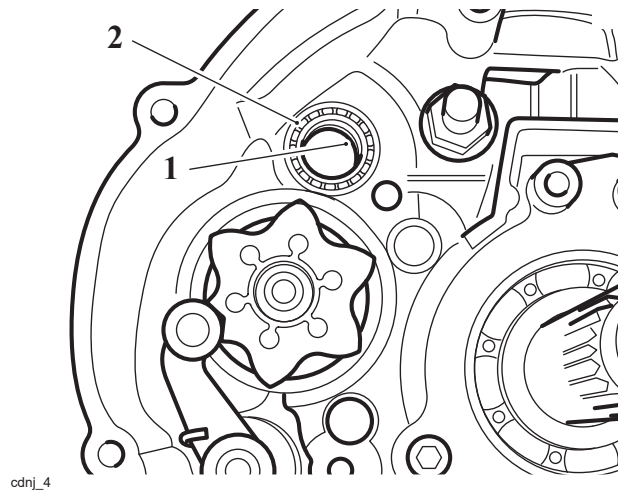
- 1. Detent arm
- 2. Fixing
- 3. Spring
- 4. Detent wheel

4. Rotate the selector drum to the neutral position. Make sure that the detent arm locates in the raised profile in the detent wheel (neutral position).



- 1. Detent arm
- 2. Neutral position

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



cdnj_4

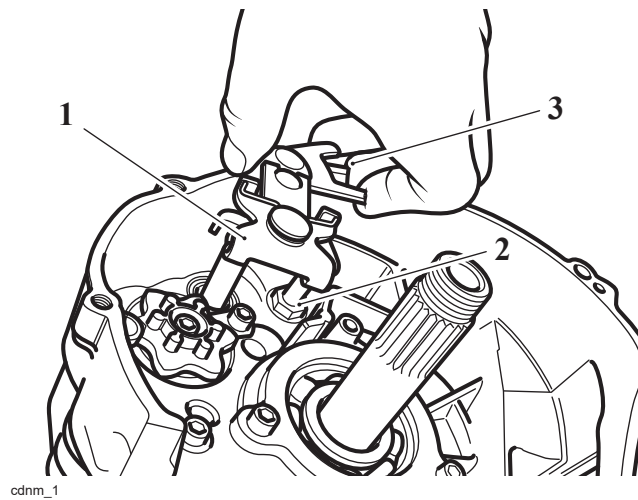
1. Gear change shaft seal
2. Gear change shaft bearing

6. Lubricate both sides of the forks and slider plates of the selector mechanism on the gear change shaft with new engine oil which meets specification API SH (or higher) and JASO MA.

⚠ CAUTION

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

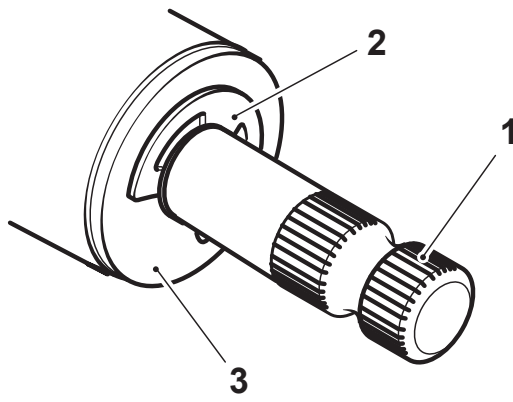
7. Insert the gear change shaft into the crankcase. Gently push the gear pedal end of the shaft through the bearing and lip seal at the clutch side of the crankcase, and the sealed bearing, located at the gear pedal side of the crankcase.



cdnm_1

1. Gear change shaft
2. Abutment bolt
3. Spring

8. Make sure the gear change shaft fingers locate in the detent wheel/arm and the spring fits either side of the abutment bolt.
9. Fit the washer and E-clip to the gear pedal end of the gear change shaft.



kakh_2

- | |
|--|
| <ul style="list-style-type: none">1. Gear change shaft2. E-clip3. Washer |
|--|

10. Refit the baffle plate with two new fixings and tighten to 9 Nm.

Perform the following operations:

- [Gear Change Linkage - Installation](#)
- [Clutch - Installation](#)

Selector Forks and Drum - Removal

⚠ WARNING

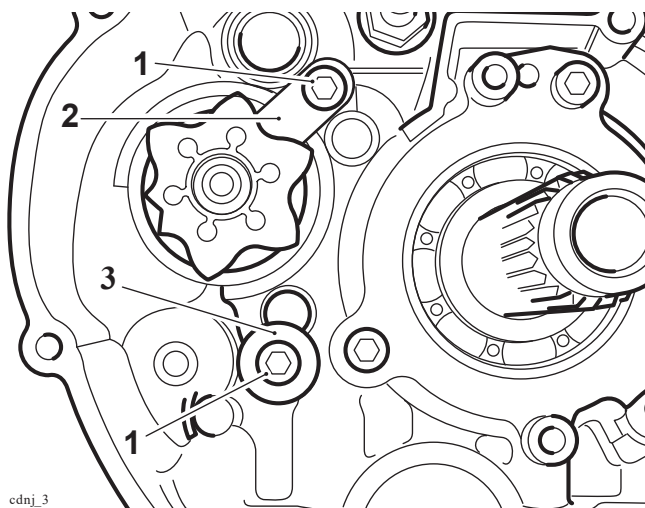
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Engine - Removal](#)
 - [Crankcases - Disassembly](#)
 - Remove the output shaft assembly (see [Input and Output Shaft Assemblies - Removal](#))
 - [Gear Change Shaft - Removal](#)
1. Remove and discard the two selector shaft fixings, noting the position of the washer and keeper plate. Note the position of the washer and keeper plate for installation.



- 1. Fixings
- 2. Selector drum and input selector shaft keeper plate
- 3. Output selector shaft retaining washer

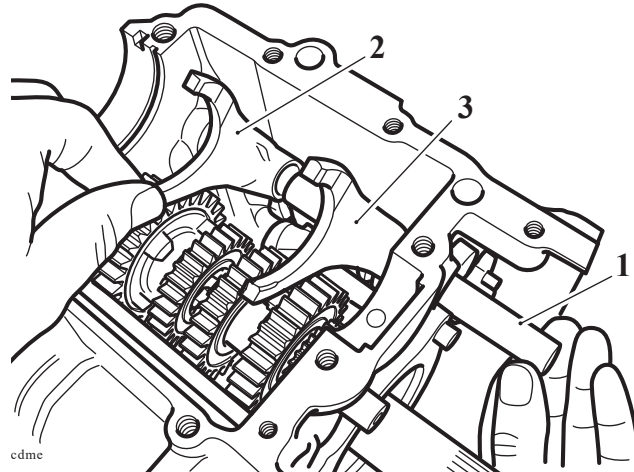
⚠ CAUTION

The two output shaft 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.

There are identification markings on one side of the fork. These markings must face the alternator side of the engine when installed.

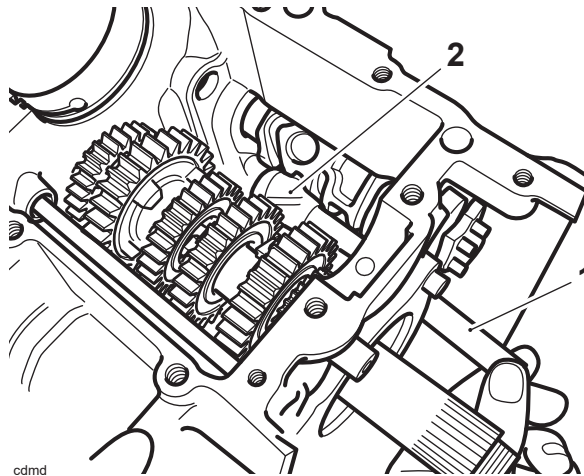
Note the orientation of the selector forks for installation.

2. Slide the output selector shaft from the crankcase in the direction of the clutch. Collect the two selector forks as they are released by the selector shaft.



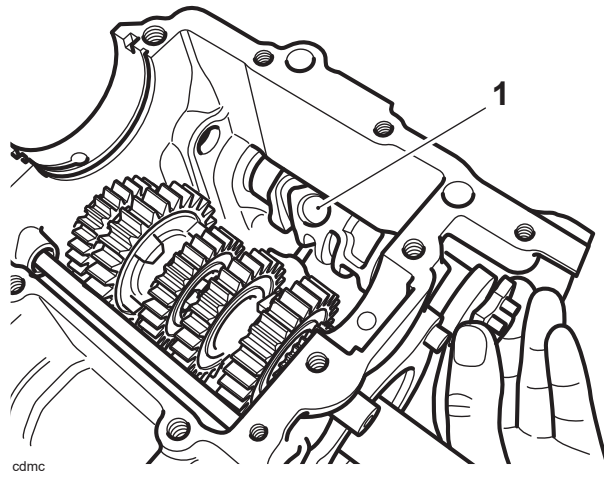
1. Output selector shaft
2. Sixth gear selector fork
3. Fifth gear selector fork

3. Noting the position of the selector fork, remove the input selector shaft, leaving the selector fork in the gearbox.



1. Input selector shaft
2. Selector fork

4. Withdraw the selector drum from within the crankcase.



1. Selector drum removal

5. Collect the input shaft selector fork from the crankcase.

Selector Forks and Drum - Inspection

Inspect all bearings for damage or wear. Renew as necessary.

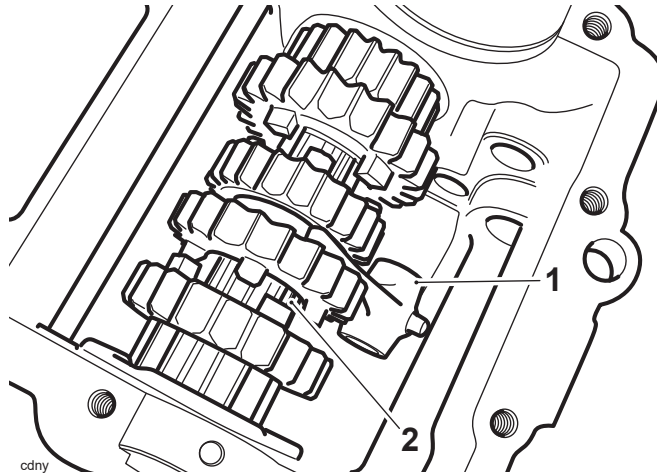
Inspect the selector forks and selector grooves for wear beyond the service limits. Renew the components as necessary.

- Refer to the specifications table (see [Transmission](#)).

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

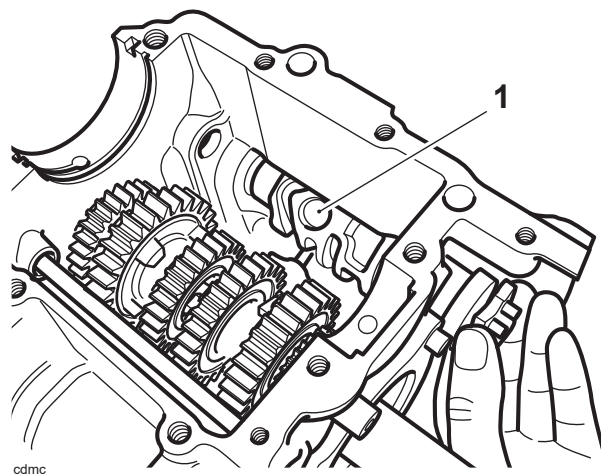
Selector Forks and Drum - Installation

1. Position the input shaft selector fork into the crankcase, locating the fork into the selector groove on the input shaft. Make sure the fork is fitted in the position noted during removal.



- | |
|------------------------------|
| 1. Input shaft selector fork |
| 2. Input shaft |

2. Using clean engine oil, lubricate the selector drum bearings. Lubricate the selector drum tracks with new engine oil which meets specification API SH (or higher) and JASO MA.
3. Position the selector drum into the crankcase.



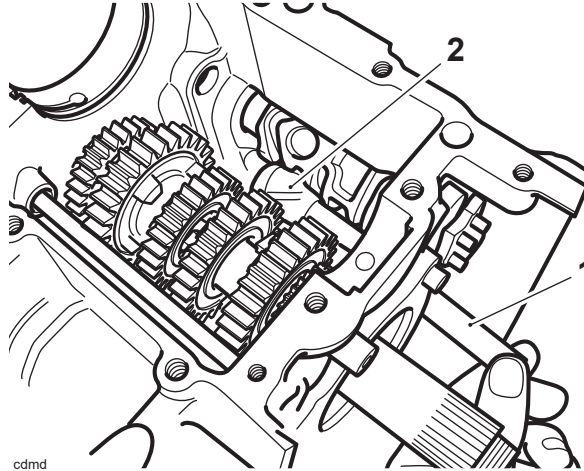
- | |
|------------------|
| 1. Selector drum |
|------------------|

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

⚠ CAUTION

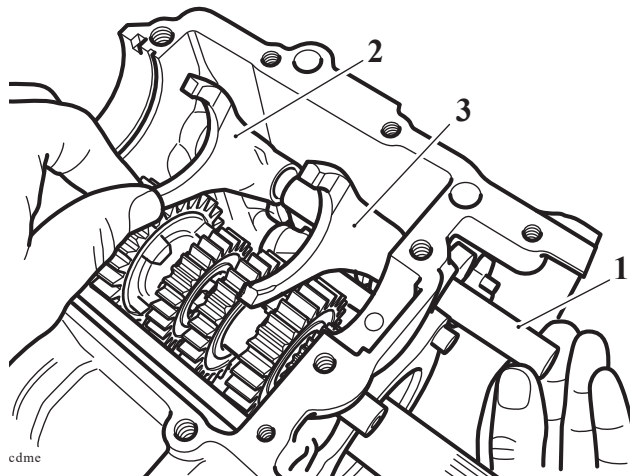
The selector forks can be fitted incorrectly. Ensure the position and orientation of the selector forks are the same as noted during removal. Incorrect fitting of the selector forks will cause gearbox damage.

5. Push the input selector shaft into the crankcase from the clutch end. As the shaft is inserted, locate the selector fork onto the shaft. Ensure the fork is fitted in the position noted during removal.



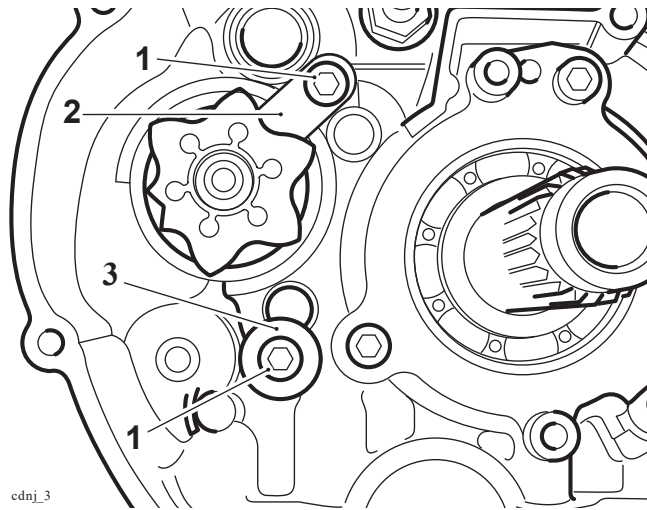
1. Input selector shaft
2. Selector fork

6. Push the output selector shaft into the crankcase from the clutch end. As the shaft is inserted, locate the selector forks. Ensure the selector forks are fitted in the positions and orientation as noted during removal.



1. Output selector shaft
2. Sixth gear selector fork
3. Fifth gear selector fork

7. Fit new fixings for the selector drum and input shaft keeper plates and output shaft retaining washer, making sure the washer and the keeper plate are fitted in the positions noted during removal. Tighten the fixings to 12 Nm.



1. Fixings
2. Selector drum and input selector shaft keeper plate
3. Output selector shaft retaining washer

Perform the following operations:

- [Gear Change Shaft - Installation](#)
- [Input and Output Shaft Assemblies - Installation](#)
- [Crankcases - Assembly](#)
- [Engine - Installation](#)

Input and Output Shaft Assemblies - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

The input and output shafts may be removed from the upper crankcase after first separating the lower crankcase from the upper.

The rear needle roller bearing on the input shaft remains in the crankcase on removal of the shaft.

Perform the following operations:

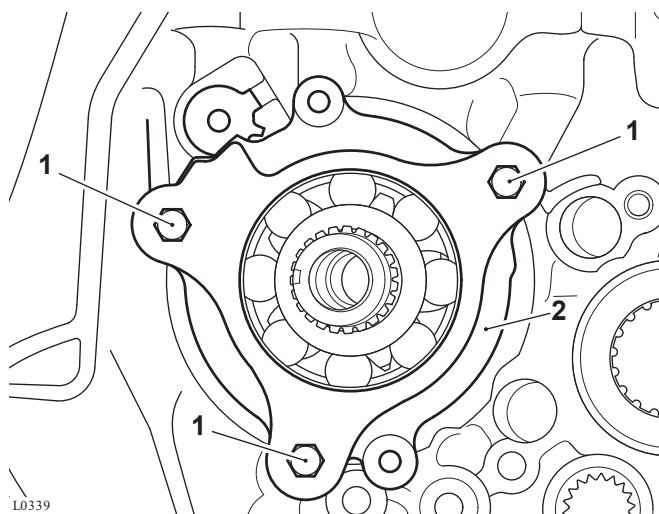
- [Engine - Removal](#)
- [Crankcases - Disassembly](#)

1. Lift the output shaft from the upper crankcase, noting the orientation of each bearing, their circlips and dowels.
2. Remove the selector shafts, forks and selector drum (see [Selector Forks and Drum - Removal](#)).

NOTICE

The input shaft bearing housing fixings may not be reused but should be retained for use during installation of the input shaft.

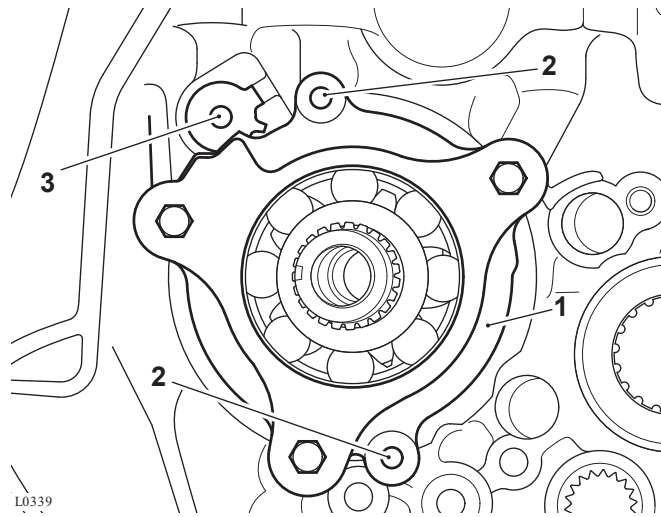
3. Release the three fixings securing the input shaft bearing housing to the upper crankcase.



1. Fixings
2. Bearing housing

Note the orientation of the bearing housing for installation.

4. Insert two M6 bolts into the two threaded holes at the periphery of the bearing housing. Evenly and progressively tighten both bolts to draw the bearing housing and input shaft from the crankcase.

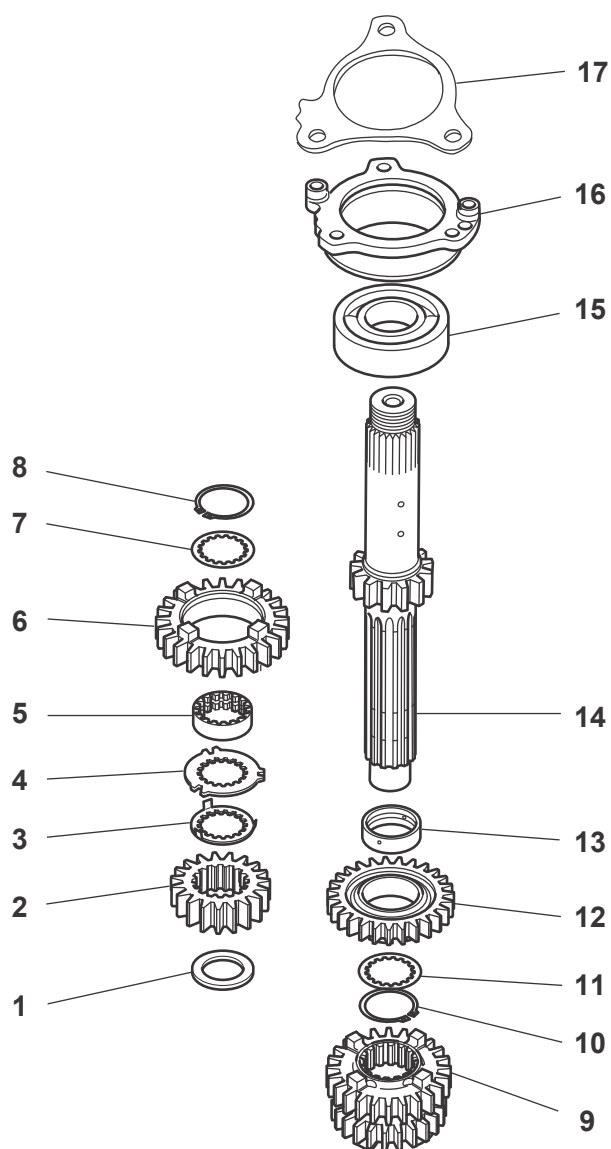


- 1. Bearing housing
- 2. M6 threaded holes
- 3. Transmission oil tube

5. If required, the transmission oil tube can now be removed. Remove and discard the three oil tube O-rings.

 / [Transmission](#) / [Exploded View - Input Shaft](#)

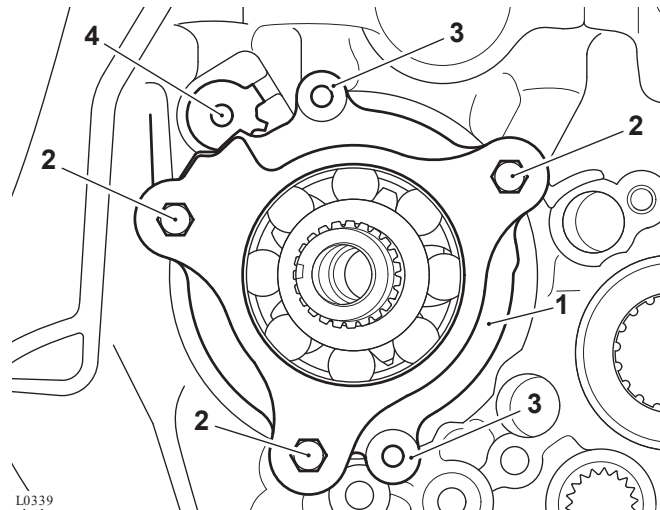
Exploded View - Input Shaft



1. Thrust washer
2. Second gear
3. Lock washer
4. Splined washer
5. Splined bush
6. Sixth gear
7. Splined thrust washer
8. Circlip
9. Third/fourth gear
10. Circlip
11. Splined thrust washer
12. Fifth gear
13. Plain bush
14. Input shaft
15. Bearing
16. Bearing housing
17. Bearing retainer

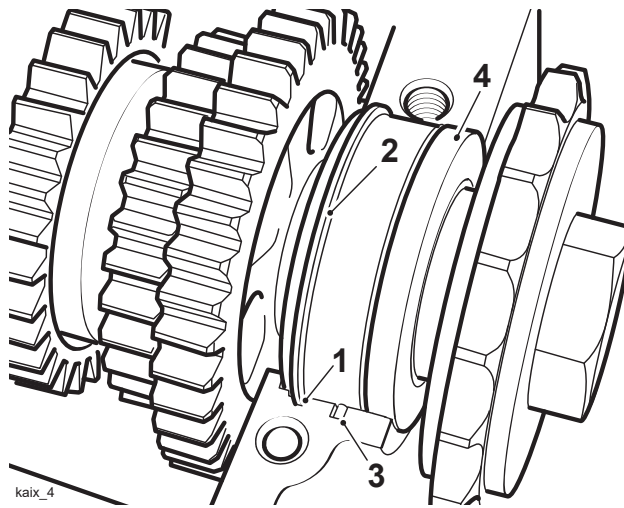
Input and Output Shaft Assemblies - Installation

1. If removed, check the transmission oil tube for blockages and contamination. Carefully fit new O-rings to the transmission oil tube and insert the tube into the crankcase, ensuring the tag on the tube locates in the slot in the crankcase.
2. Locate the input shaft to the upper crankcase, installing it through the aperture for the bearing housing.
3. Align the fixing holes to the threaded holes in their crankcase and fit the bearing housing into the aperture, by hand, as deeply as possible.
4. Using the old fixings, evenly and progressively tighten them to draw the bearing housing into the upper crankcase until fully home as noted for removal. Remove and discard the fixings.



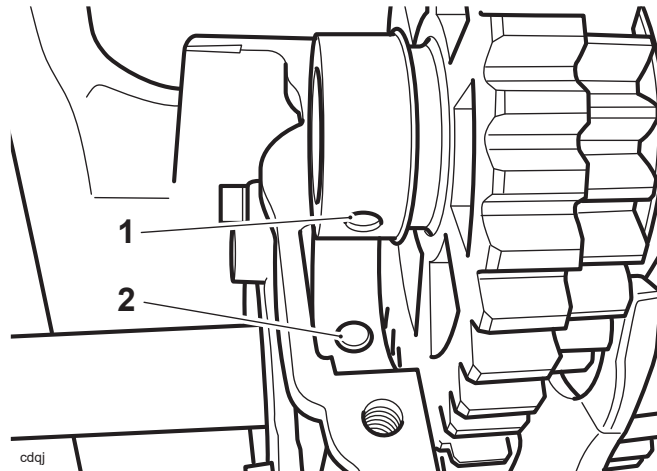
- | |
|--------------------------|
| 1. Bearing housing |
| 2. Fixings |
| 3. M6 threaded holes |
| 4. Transmission oil tube |

5. Install new fixings to the bearing housing and tighten to 12 Nm.
6. Refit the selectors and shafts (see [Selector Forks and Drum - Installation](#)).
7. Refit the output shaft to the crankcase ensuring the snap-ring locates in the corresponding groove in the crankcase, and the dowel locates in the slot in the upper crankcase.
8. Ensure the output shaft seal aligns with its recess in the crankcase.



1. Groove in crankcase
2. Snap ring
3. Dowel
4. Seal

9. Ensure the hole in the output shaft needle roller bearing outer race is positioned to locate onto the dowel provided in the upper crankcase.



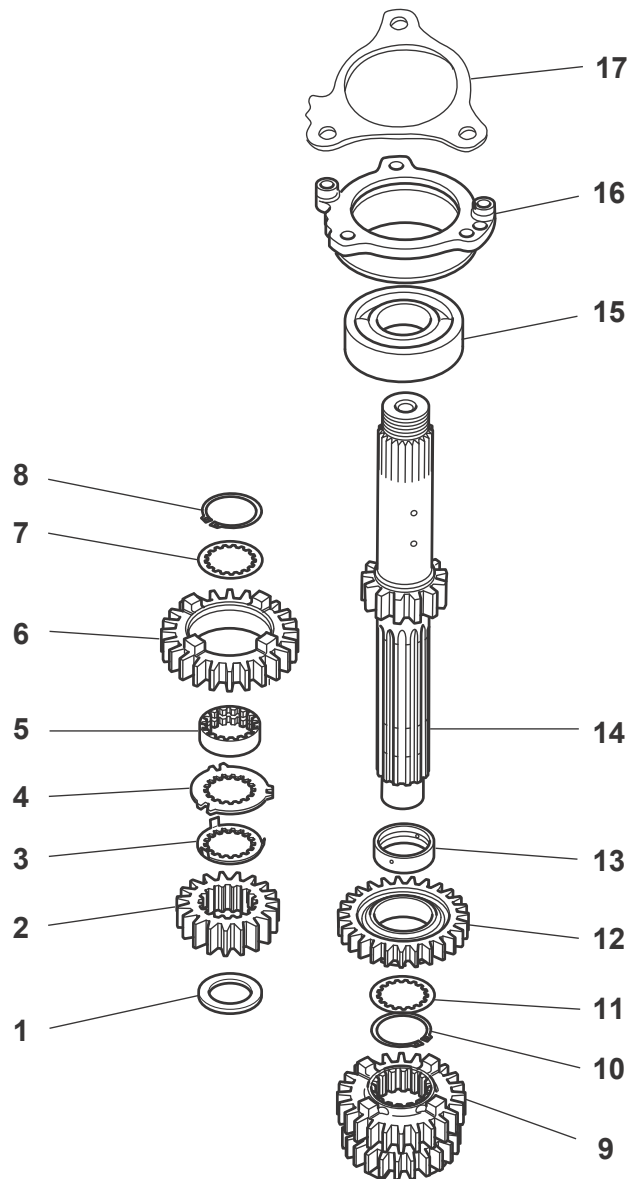
1. Roller bearing
2. Dowel

Perform the following operations:

- [Crankcases - Assembly](#)
- [Engine - Installation](#)

[🏠](#) / [Transmission](#) / Exploded View - Input Shaft

Exploded View - Input Shaft



1. Thrust washer
2. Second gear
3. Lock washer
4. Splined washer
5. Splined bush
6. Sixth gear
7. Splined thrust washer
8. Circlip
9. Third/fourth gear
10. Circlip
11. Splined thrust washer
12. Fifth gear
13. Plain bush
14. Input shaft
15. Bearing
16. Bearing housing

Input Shaft - Disassembly

NOTICE

The numbers in brackets in the following text refer to the exploded view on [Exploded View - Input Shaft](#).

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

1. Slide off the plain thrust washer (1).
2. Mark one side of second gear to denote its correct orientation. Remove second gear (2).
3. Remove the splined lock washers (3 and 4).
4. Mark one side of sixth gear to denote its correct orientation. Remove sixth gear (6), complete with the splined bush (5) which runs inside the gear.
5. Note their orientation and remove the splined thrust washer (7) from in front of the circlip between sixth and third/fourth gear.
6. Remove the circlip (8) from the shaft.
7. Mark one side of the combined third/fourth gear to denote its correct orientation. Remove the combined third/fourth gear (9).
8. Remove the circlip (10) from in front of fifth gear.
9. Remove the splined thrust washer (11) adjacent to fifth gear.
10. Mark one side of fifth gear to denote its correct orientation. Remove fifth gear (12), complete with the plain bush (13) which runs inside the gear.

NOTICE

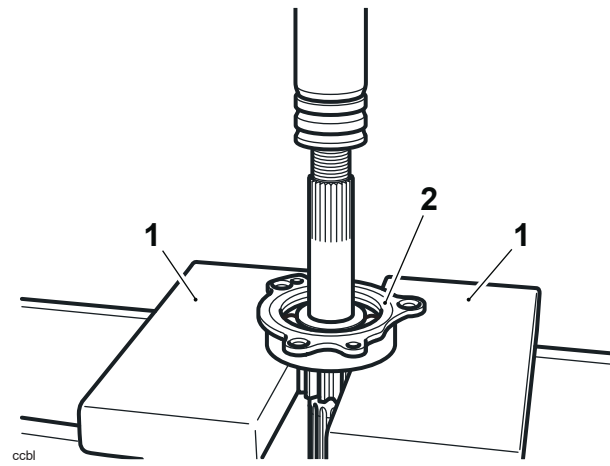
Unless the bearing at the clutch end of the input shaft is damaged or worn, it is not normally necessary to remove it from the shaft. The bearing is pressed onto the shaft and is also pressed into its housing. The bearing and housing are removed from the shaft together and are then separated.

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

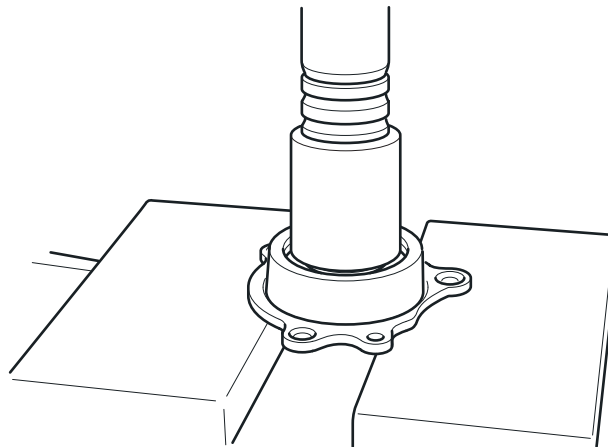
Never wear loose clothing, which could become trapped in the press and cause crushing injuries to the hand, arms or other parts of the anatomy.

11. Support the bearing and housing (15 and 16) on press bars, then press the shaft (14) through the bearing and housing as shown below.



- 1. Press bars
- 2. Bearing/housing

12. Support the outer circumference of the bearing housing on press bars, then press the bearing through the housing.



Pressing out the Bearing

Input Shaft - Inspection

1. Examine all gears, bearings and bushes and thrust washers for damage, distortion, chipped teeth and wear beyond the service limits.
Replace all defective components and always use new circlips to assemble the shaft.
2. Thoroughly clean the bearing housing and inspect for damage, scoring and cracks. Replace the housing if necessary.

Input Shaft - Assembly

NOTICE

The numbers in brackets in the following text refer to the exploded view on [Exploded View - Input Shaft](#).

Lubricate each gear, thrust washer and bush with clean engine oil during assembly.

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injuries to the hand, arms or other parts of the anatomy.

⚠ CAUTION

Bushes and gears with oil holes must always be **MISALIGNED** with the corresponding oil holes in the input shaft. Reduced oil pressure and gear lubrication may result from alignment of the oil holes, which would cause premature wear of engine and transmission components.

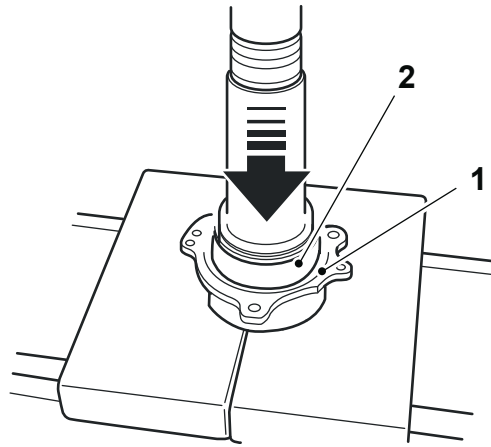
⚠ CAUTION

Removing the input shaft bearing from the shaft and its housing will damage the bearing and snap ring. Never reuse removed bearings or snap rings as use of damaged or weakened components could lead to engine and transmission damage. Also, check for damage to the housing itself.

⚠ CAUTION

Press only on the bearing outer race to prevent bearing damage.

1. Support the housing on press bars as shown below and press the bearing fully into the housing in the direction of the arrow.

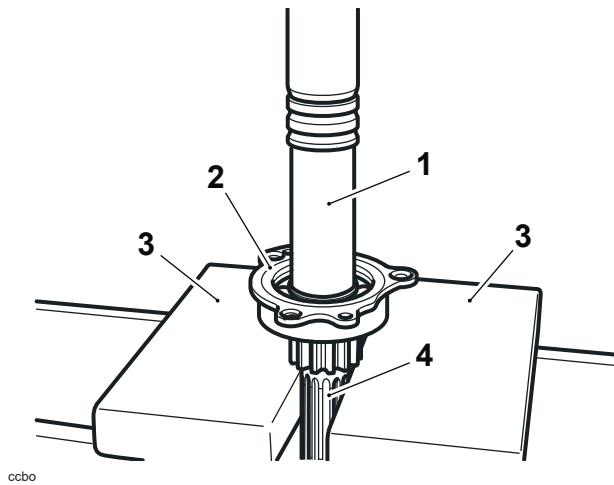


- 1. Bearing housing
- 2. Bearing

⚠ CAUTION

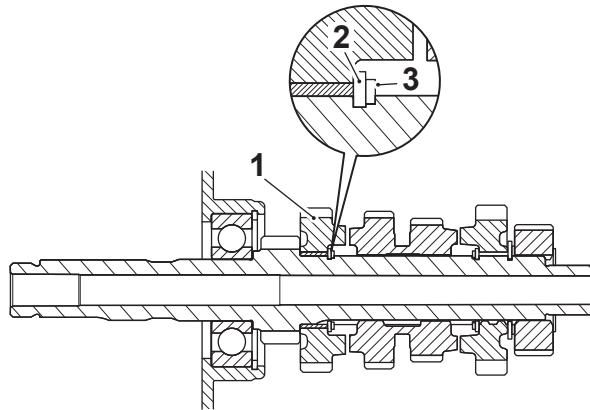
Press only on the bearing inner race to prevent bearing damage.

2. Locate the bearing and housing to the input shaft. Carefully support the shaft on the press bed, and using a suitable sleeve over the input shaft to ensure the bearing is pressed only on the inner race, press the bearing onto the shaft.



- 1. Sleeve
- 2. Bearing/housing
- 3. Press bars
- 4. Input shaft

3. Fit the plain bush (13) to the shaft.
4. Fit fifth gear (12) to the input shaft as noted during disassembly, with the dog teeth pointing away from the input shaft bearing.
5. Slide on the splined thrust washer (11).
6. Fit a new circlip (10) to the input shaft ensuring that the clip is located in the circlip groove as shown below.



cdmo

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

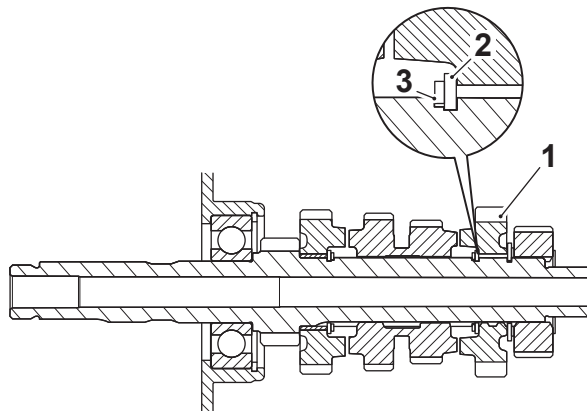
7. Fit the combined third/fourth gear (9) as noted during disassembly, with the larger gear facing toward fifth gear. Ensure that the oil hole in the input shaft DOES NOT align with the oil hole in the gear.

⚠ WARNING

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

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

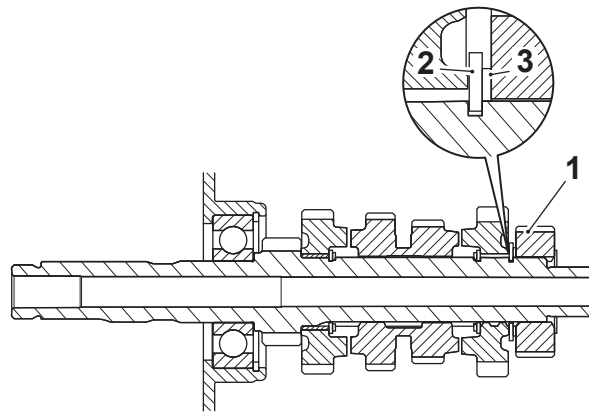
8. Fit a new circlip (8) to the input shaft ensuring that the circlip is located in the circlip groove as shown below.



cdmp

- 1. Sixth gear
- 2. Thrust washer
- 3. Circlip

9. Fit the splined thrust washer (7) to the input shaft and slide up the shaft until in contact with the circlip.
10. Fit the splined bush (5) from sixth gear. Ensure that the oil hole in the input shaft DOES NOT align with the oil hole on the shaft.
11. Fit sixth gear (6) as noted during disassembly, with the dog teeth facing third/fourth gear.
12. Fit the splined and lock washers (4 and 3), ensuring the tabs in the smaller washer (3) locate in the slots in the larger (4) washer.



cdmq

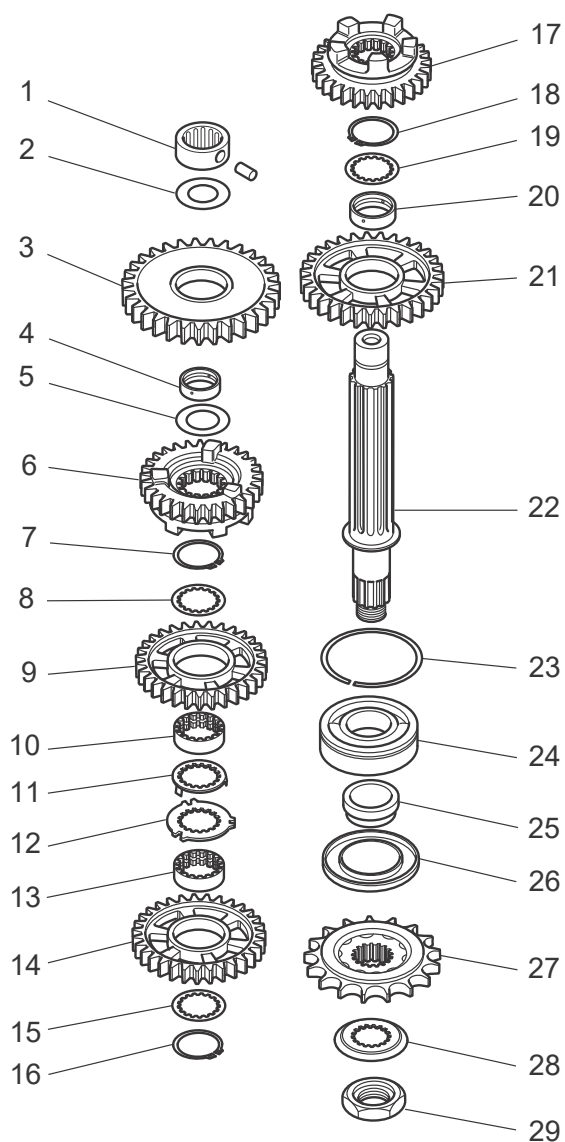
- 1. Second gear
- 2. Large splined lock washer
- 3. Small splined lock washer

13. Fit second gear (2) to the shaft as noted during disassembly.

14. Fit the plain thrust washer (1) adjacent to second gear.

[🏠](#) / [Transmission](#) / Exploded View - Output Shaft

Exploded View - Output Shaft



1. Bearing
2. Thrust washer
3. First gear
4. Plain bush
5. Thrust washer
6. Fifth gear
7. Circlip
8. Splined thrust washer
9. Fourth gear
10. Splined bush
11. Lock washer
12. Splined washer
13. Splined bush
14. Third gear
15. Splined washer
16. Circlip
17. Sixth gear
18. Circlip

19. Splined thrust washer
20. Plain bush
21. Second gear
22. Output shaft
23. Snap ring
24. Bearing
25. Sprocket spacer
26. Output shaft seal
27. Output sprocket
28. Tab washer
29. Output sprocket nut

Output Shaft - Disassembly

NOTICE

The numbers in brackets in the following text refer to the exploded view on [Exploded View - Output Shaft](#).

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

1. Remove the output shaft bearing (1) and plain thrust washer (2).
2. Mark one side of first gear to denote its correct orientation. Remove first gear (3) from the shaft, complete with the plain bush (4) which runs inside the gear.
3. Remove the plain thrust washer (5).
4. Mark one side of fifth gear to denote its correct orientation. Remove fifth gear (6) from the shaft.
5. Remove the circlip (7) and splined thrust washer (8) from in front of fourth gear.
6. Mark one side of fourth gear to denote its correct orientation. Remove fourth gear (9) complete with the splined bush which runs inside the gear (10).
7. Note their orientation and remove the splined lock washers (11 and 12).
8. Mark one side of third gear to denote its correct orientation. Remove third gear (14) off the shaft complete with the splined bush (13) which runs inside the gear.
9. Remove the splined thrust washer (15).
10. Remove the circlip (16) from in front of sixth gear.
11. Mark one side of sixth gear to denote its correct orientation. Remove sixth gear (17) from the shaft.
12. Remove the circlip (18) from in front of second gear.
13. Remove the splined thrust washer (19).
14. Mark one side of second gear to denote its correct orientation. Remove second gear (21) from the shaft, complete with the plain bush (20) which runs inside the gear.
15. Position the output shaft (22) in a vice with soft jaws fitted. Tighten the vice to prevent the shaft from turning and release the tab washer (28) from the output sprocket nut (29), then release the nut.
16. Remove the output sprocket nut (29), tab washer (28) and sprocket (27).
17. Collect the output shaft seal (26).
18. If it is found necessary to replace the large bearing (24) at the end of the shaft, use a press to remove both the bearing and output shaft sprocket spacer (25) together.

⚠ WARNING

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

Output Shaft - Inspection

1. Examine all gears, bearings, bushes and thrust washers for damage, distortion, chipped teeth and wear beyond the service limits.
Replace all suspect components and always use a new circlip to assemble the shaft.

Output Shaft - Assembly

NOTICE

The numbers in brackets in the following text refer to the exploded view on [Exploded View - Output Shaft](#).

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, a new output shaft seal and a new sprocket tab washer to assemble the shaft.

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injuries to the hand, arms or other parts of the anatomy.

⚠ CAUTION

Bushes and gears with oil holes must always be **MISALIGNED** with the corresponding oil holes in the output shaft. Reduced oil pressure and gear lubrication may result from alignment of the oil holes, which would cause premature wear of engine and transmission components.

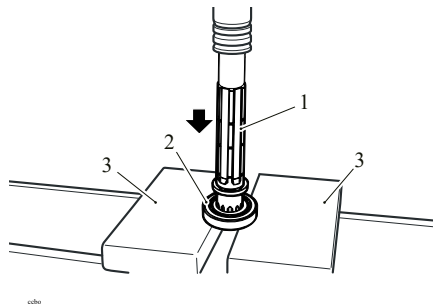
⚠ CAUTION

Removing the output shaft bearing from the shaft will damage the bearing and snap ring. Never reuse removed bearings or snap rings as use of damaged or weakened components could lead to engine and transmission damage.

⚠ CAUTION

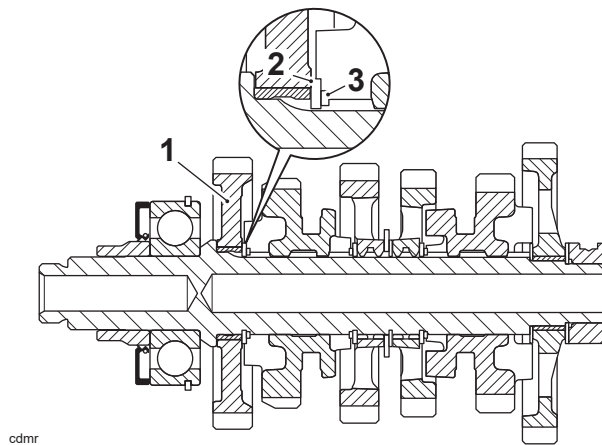
Press only on the bearing inner race to prevent bearing damage.

1. Working from the output sprocket end of the shaft, fit a new bearing (24) and a new sprocket spacer (25) to the shaft using a press and press bars. Fit the sleeve with the large chamfer facing outwards.



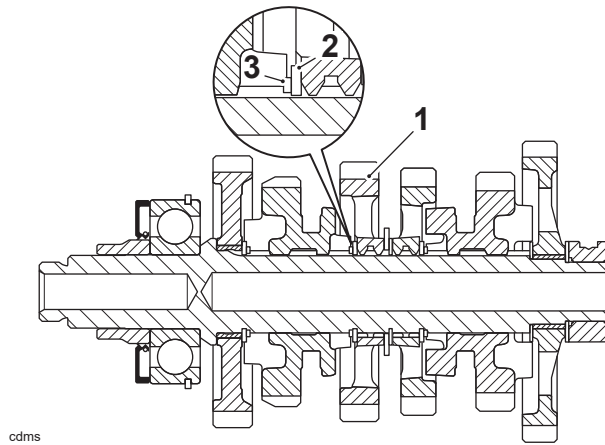
- 1. Output shaft
- 2. Bearing
- 3. Press bars

2. Lubricate and fit a new output shaft seal (26).
3. Transfer the shaft to the vice and secure between soft jaws. Fit the output sprocket (27), new tab washer (28) and nut (29). Tighten the nut to 85 Nm. Close the tab washer.
4. Withdraw the shaft from the vice and continue to assemble from the opposite end to the output sprocket.
5. Fit the plain bush (20) to the shaft.
6. Locate second gear (21) to the shaft as noted during disassembly, with the large step side facing towards the output sprocket end. Fit the splined thrust washer (19) and retain with a new circlip (18) as shown below.



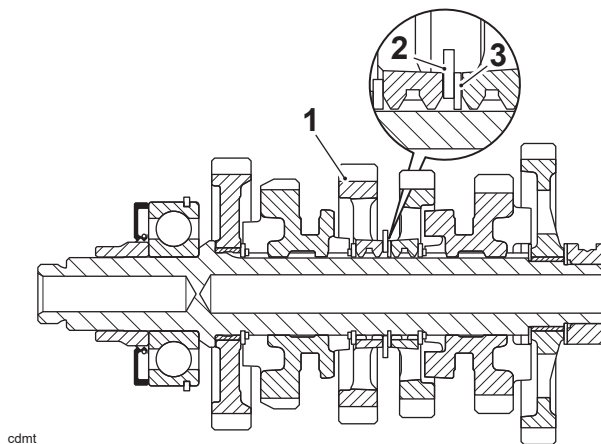
- 1. Second gear
- 2. Thrust washer
- 3. Circlip

7. Fit sixth gear (17) as noted during disassembly, with the selector fork groove facing away from the output sprocket end. Ensure that the oil holes in the gear DO NOT align with the corresponding oil hole in the output shaft.
8. Fit a new circlip (16) to retain sixth gear. Fit the splined thrust washer (15) to the rear of third gear as shown below.



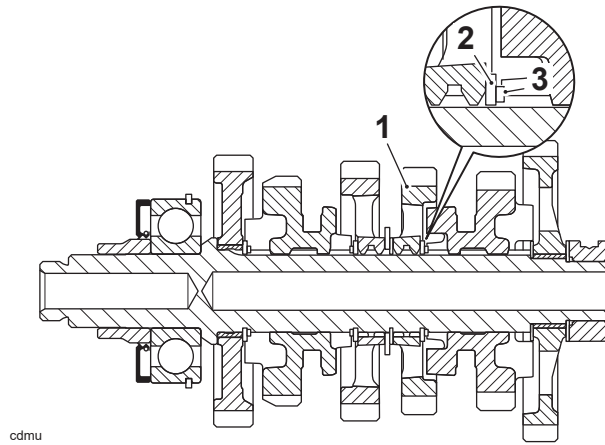
- 1. Third gear
- 2. Splined thrust washer
- 3. Circlip

9. Fit the splined bush (13) for third gear. Ensure that the oil holes in the gear DO NOT align with the corresponding oil hole in the output shaft. Fit third gear (14) to the shaft with the large step side facing away from the output sprocket.
10. Fit the splined lock washers (12 and 11), ensuring the tabs in the smaller washer (11) locate in the slots in the larger washer (12) as shown below.



- 1. Third gear
- 2. Large splined lock washer
- 3. Small splined lock washer

11. Fit the splined bush (10) from fourth gear. Ensure that the oil holes in the gear DO NOT align with the corresponding oil hole in the output shaft.
12. Fit fourth gear (9) as noted during disassembly, with the larger step side facing towards the output sprocket.
13. Fit the splined thrust washer (8) and retain with a new circlip (7) as shown below.



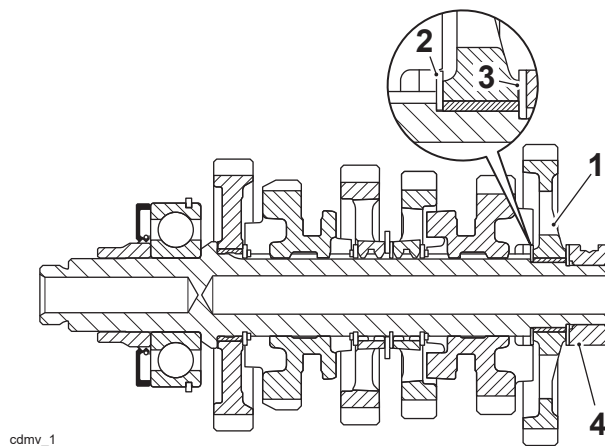
- 1. Fourth gear
- 2. Splined thrust washer
- 3. Circlip

14. Fit the fifth gear (6) to the shaft with the groove facing towards the output sprocket. Ensure that the oil holes in the gear DO NOT align with the corresponding oil hole in the output shaft.
15. Fit the first gear thrust washer (5) and plain bush (4).

NOTICE

When fitting first gear, ensure the solid side of the gear faces the clutch.

16. Fit first gear (3) to the shaft as marked during disassembly as shown below.



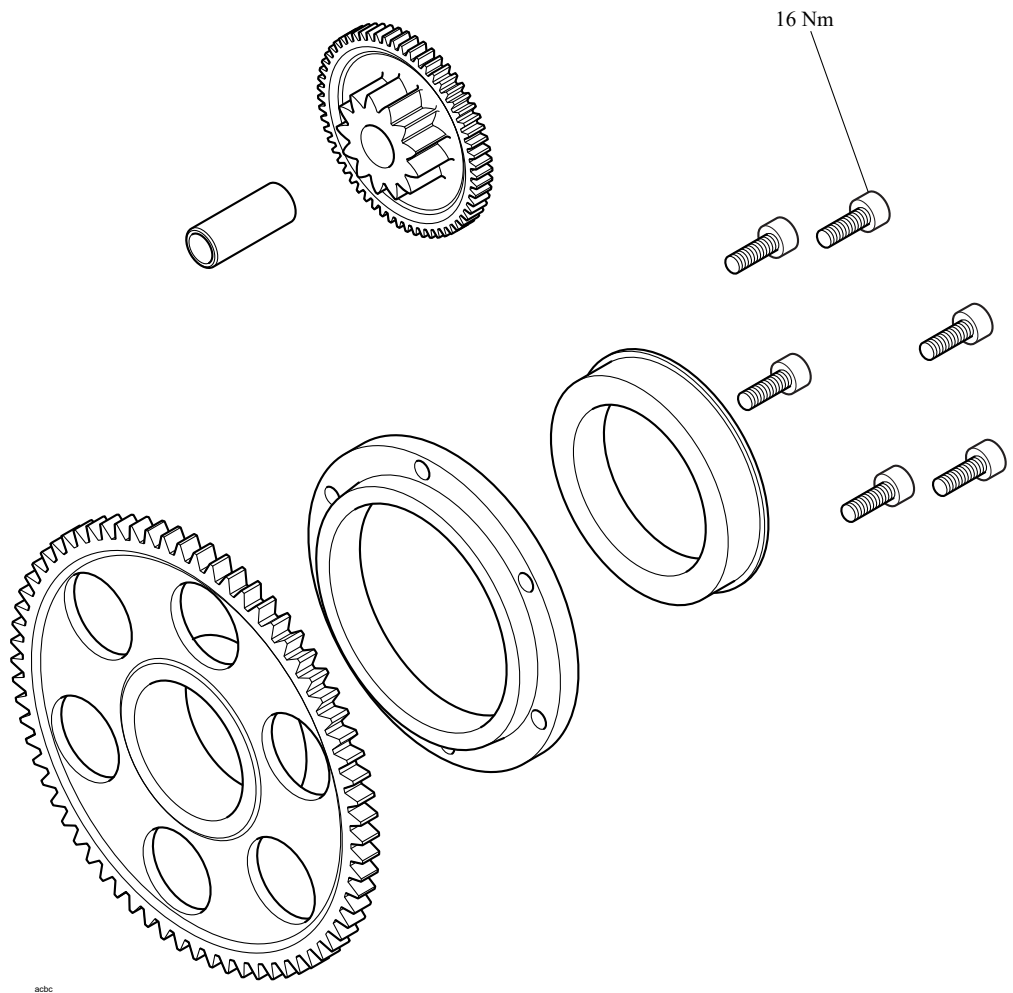
- 1. First gear
- 2. Thrust washer
- 3. Thrust washer
- 4. Needle roller bearing

17. Finally fit the thrust washer (2) and needle roller bearing (1) to the end of the shaft.

Starter Drive and Sprag Clutch

Exploded View - Sprag Clutch and Starter Gears

Exploded View - Sprag Clutch and Starter Gears



Starter Drive/Sprag Clutch - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

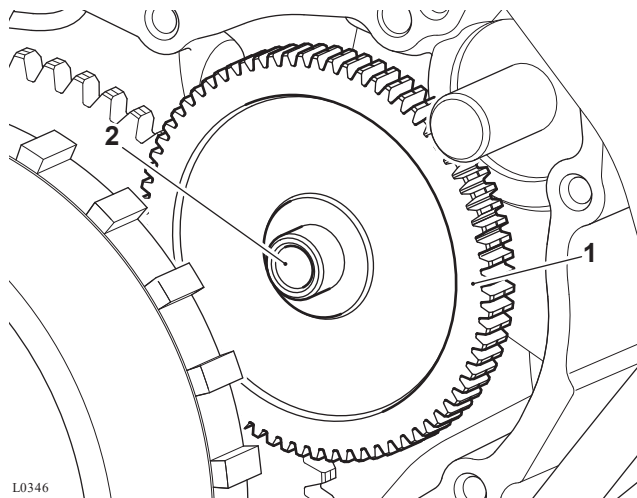
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

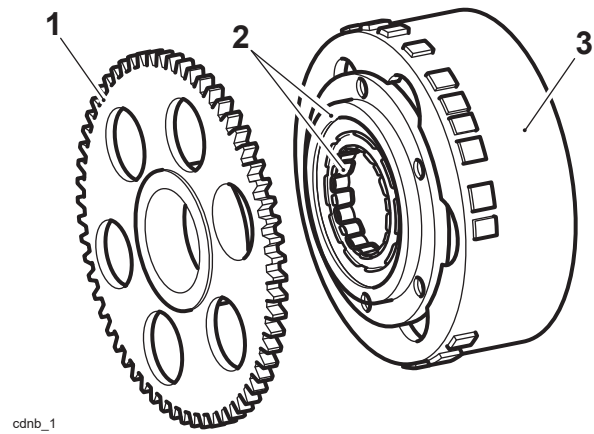
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Alternator Cover - Removal](#)

1. Withdraw the starter idler gear and shaft, noting the fitted position of the components.



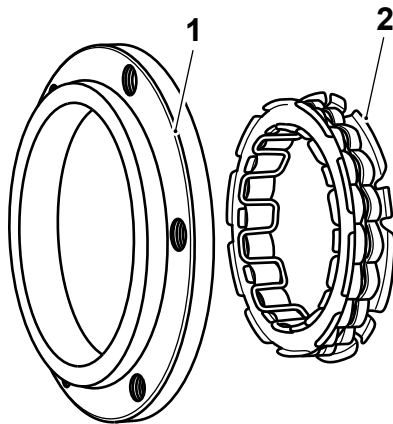
- 1. Idler gear
- 2. Idler shaft

2. Remove the alternator rotor (see [Alternator Rotor - Removal](#)).
3. Withdraw the starter drive gear from the sprag clutch.



1. Starter drive gear
2. Sprag clutch/housing
3. Alternator rotor

4. Remove and discard the fixings securing the sprag clutch housing to the alternator rotor. Withdraw the sprag clutch housing.
5. Remove the sprag clutch from the housing.



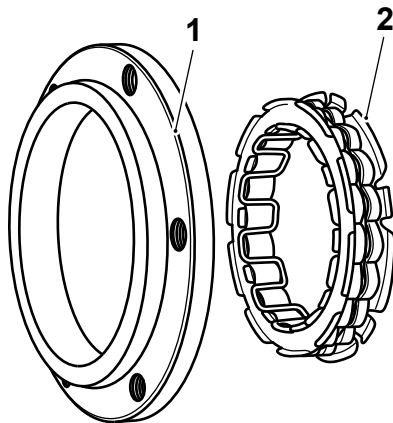
1. Sprag clutch housing
2. Sprag clutch assembly

Starter Drive/Sprag Clutch - Inspection

1. Check the sprag clutch bearings for overheating, wear and/or non-smooth operation. Replace the sprag clutch if overheating, wear and/or non-smooth operation is found.
2. Examine all gears for chipped teeth and for any other damage.
3. With the sprag clutch mounted in the housing, check the sprag clutch for smooth, free movement in one direction only (as indicated by the arrow marked on the sprag clutch body).

Starter Drive/Sprag Clutch - Installation

1. Locate the sprag clutch to the sprag clutch housing as shown below. Push firmly until the lip seats in the recess provided in the housing.

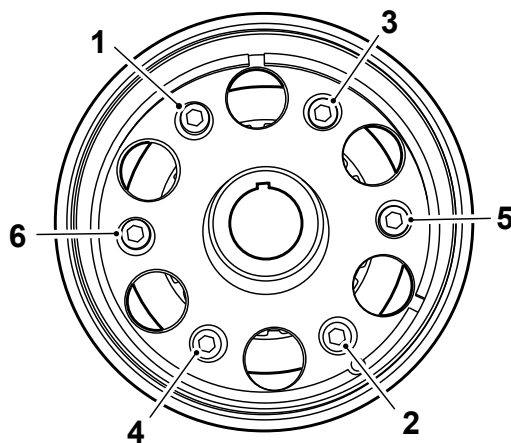


- 1. Sprag clutch housing
- 2. Sprag clutch assembly

2. Fit the housing to the alternator rotor.

3. Ensure that the housing is squarely seated and is not on the rotor. Install new fixings.

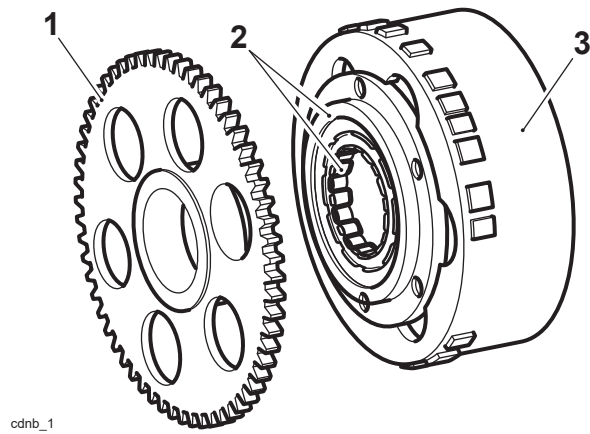
4. Tighten the cover bolts to in the sequence shown below to 16 Nm.



Tightening Sequence

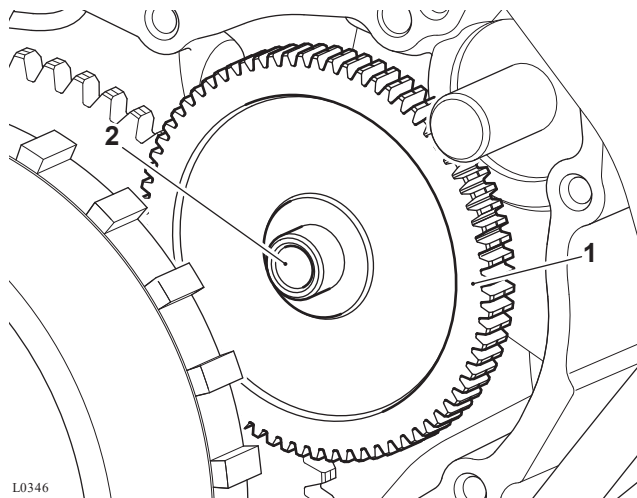
5. Once all six bolts have been tightened, go around again in sequence and recheck each bolt is correctly torqued, if any bolt moves, go around again. Repeatedly check the bolts in sequence until all are correctly torqued and do not move when checked, this will ensure the sprag clutch housing is correctly seated on the rotor.

6. Fit the starter drive gear to the sprag clutch.



- | |
|---|
| <ul style="list-style-type: none"> 1. Starter drive gear 2. Sprag clutch/housing 3. Alternator rotor |
|---|

7. Refit the alternator rotor (see [Alternator Rotor - Installation](#)).
8. Lubricate the idler gear shaft with new engine oil which meets specification API SH (or higher) and JASO MA.
9. Fit the starter idler gear and shaft to the crankcase.



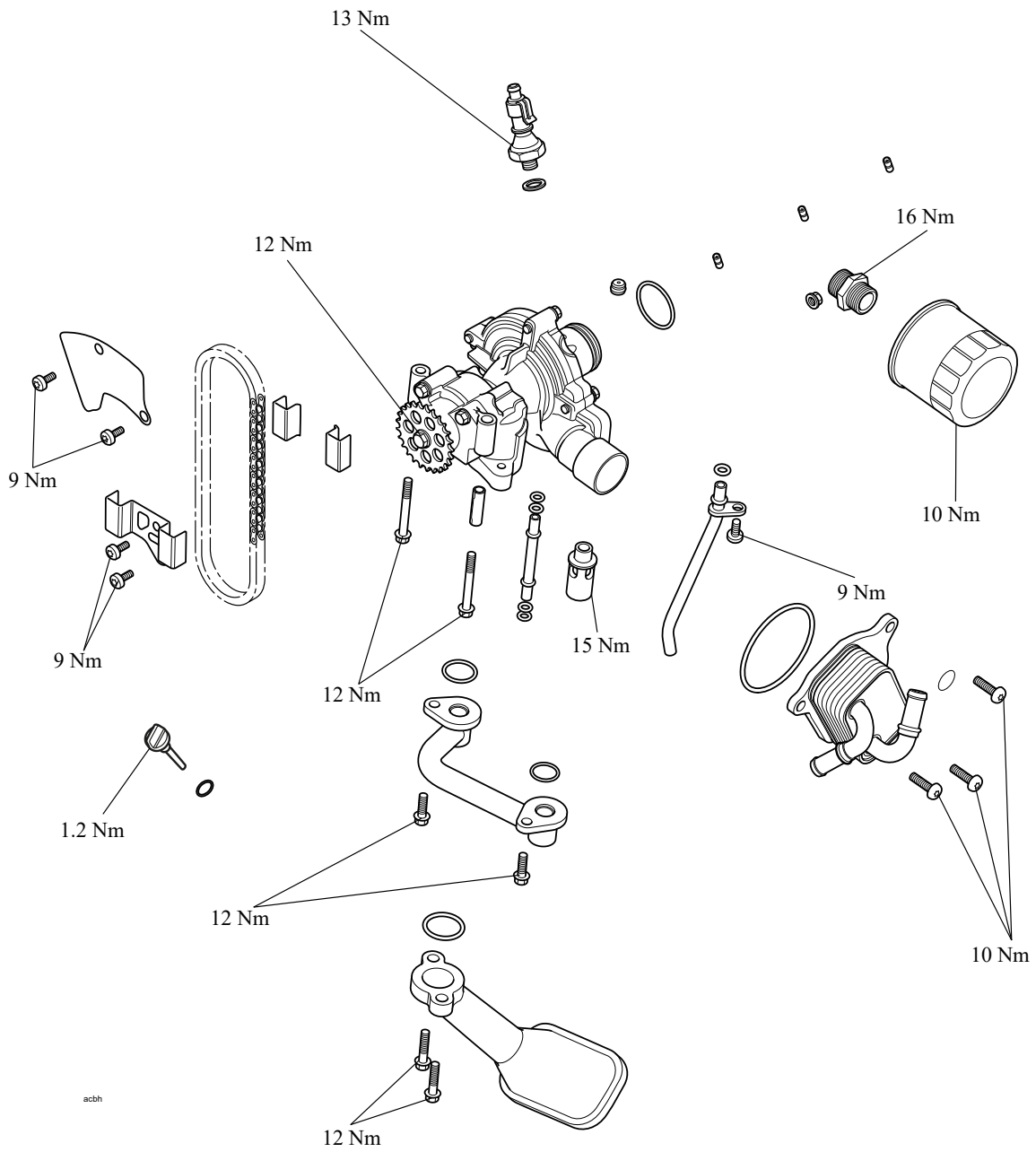
- | |
|---|
| <ul style="list-style-type: none"> 1. Idler gear 2. Idler shaft |
|---|

Perform the following operations:

- [Alternator Cover - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Lubrication

Exploded View - Oil Pump/Water Pump, Gears and Heat Exchanger



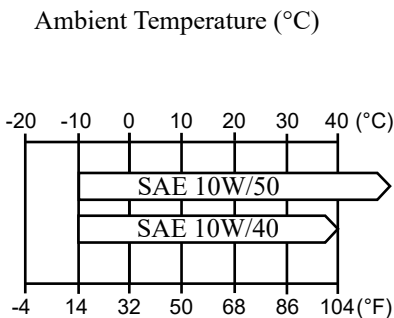
Engine Oil - Specification

Triumph's high performance fuel injected engines are designed to use 10W/40 or 10W/50 fully or semi synthetic motorcycle engine oil that meets specification API SH (or higher) and JASO MA.

Triumph Performance fully synthetic engine oil is recommended.

The oil viscosity may need to be changed to accommodate the ambient temperatures in your riding area.

Refer to the chart below for the correct oil viscosity (10W/40 or 10W/50) to be used in your riding area.



Ambient Temperature (°F)

Oil Viscosity Temperature Range

 **CAUTION**

Triumph's high performance fuel injected engines are designed to use 10W/40 or 10W/50 fully or semi synthetic motorcycle engine oil that 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.

Disposal of Used Engine Oil and Oil Filters

To protect the environment, do not pour oil on the ground, down sewers or drains, or into watercourses.

Do not place used oil filters in with general waste. If in doubt contact your local authority.

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 via the oil pressure relief valve. The relief valve is set to open at 5.1 bar (75 lb/in²) and when open, returns high pressure oil directly to the sump.

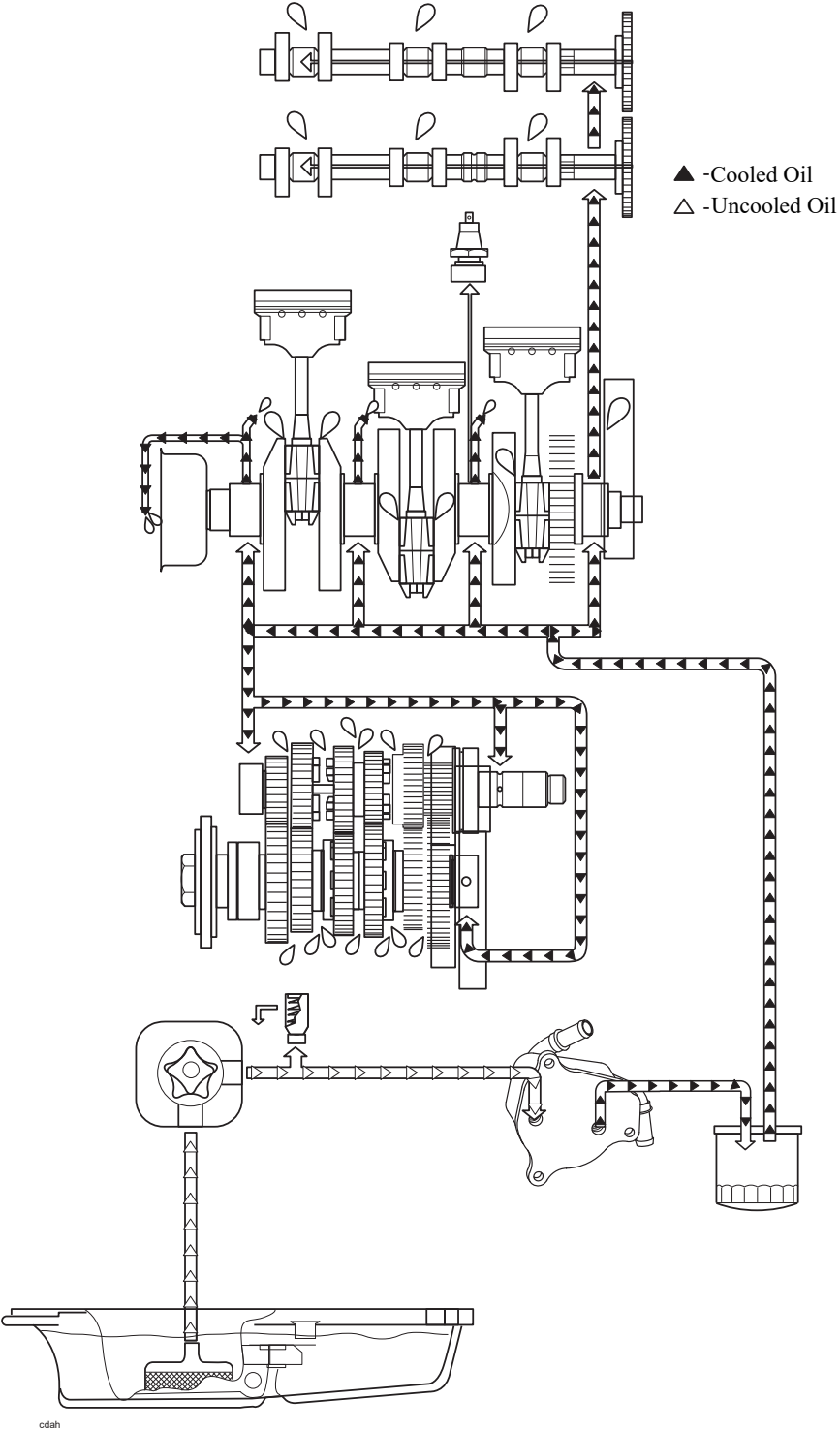
Pressurised oil is delivered to the outside rim of the oil filter, where it is filtered by passing through the filter membrane.

Filtered oil is then delivered to the oil-to-water heat exchanger (mounted on the front of the engine), where it is cooled.

The cooled oil is then fed into the lower crankcase gallery. From here it is distributed around the engine:

- Oil 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 also located in the upper crankcase gallery.
- Some oil is sent directly to the cylinder head via an internal gallery. 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 of the camshafts. 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 internal oil pipes and drillings that supply oil directly to the end of each shaft. Oil is circulated along the gearbox shafts to exit holes that feed directly to the bearings, gears and selectors.
- Oil is fed to the alternator to aid cooling of the alternator components. The oil is taken from the crankshaft oil feed and directed to the alternator via a drilling in the alternator bolt.

Engine Oil Circuit



Oil and Water Pump - Removal

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠️ WARNING

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

⚠️ WARNING

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

⚠️ WARNING

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.

⚠️ CAUTION

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

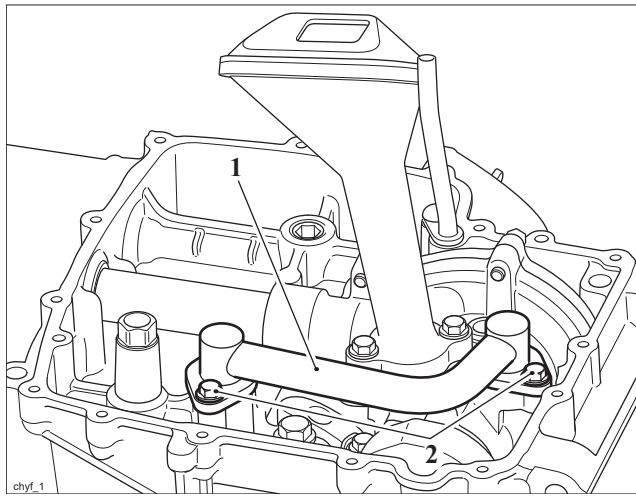
NOTICE

The oil pump and water pump are supplied as an assembly and cannot be separated. This procedure covers the removal of the oil and water pump assembly.

Perform the following operations:

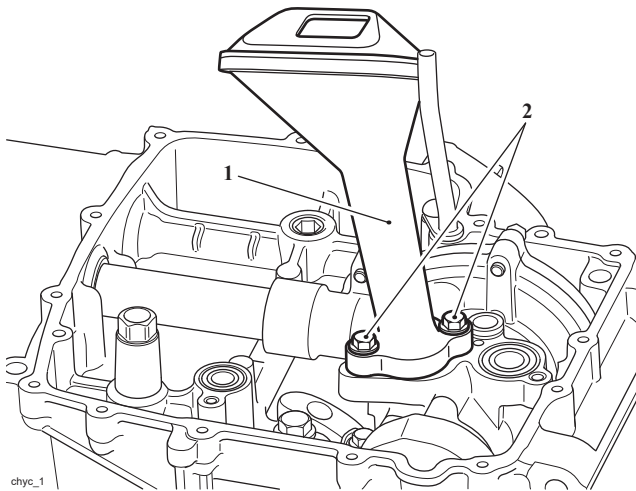
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Radiator - Removal](#)
- [Exhaust System - Removal](#)
- Drain the engine oil (see [Oil and Oil Filter Change](#))
- [Clutch - Removal](#)
- [Sump - Removal](#)

1. Release and discard the two fixings and remove the oil transfer pipe. Remove and discard the two O-ring seals.



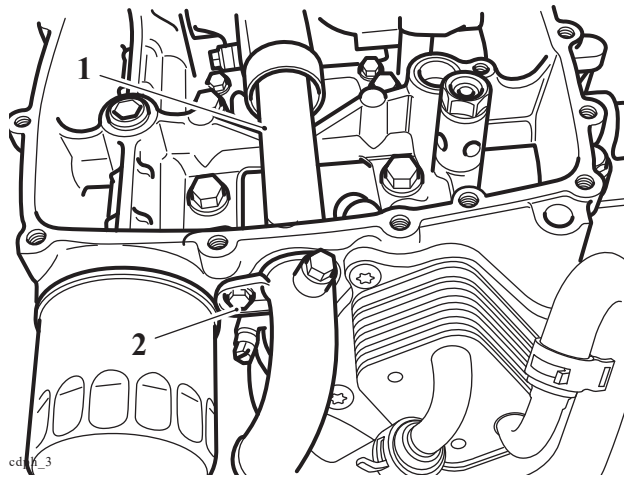
- 1. Oil transfer pipe
- 2. Fixings

2. Release and discard the two fixings and remove the oil pick-up. Remove and discard the O-ring seal.



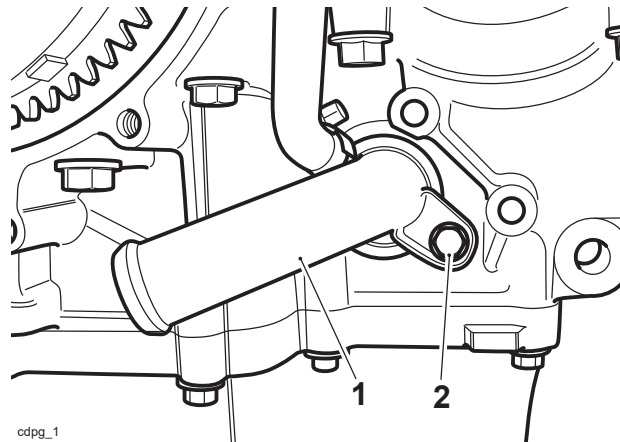
- 1. Oil pick-up
- 2. Fixings

3. Remove and discard the bolt securing the coolant outlet pipe to the crankcase and withdraw the pipe. Remove and discard the O-rings from the elbow.



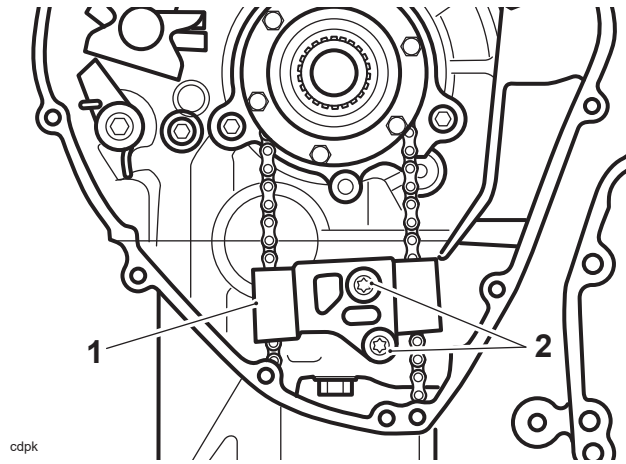
- 1. Coolant outlet pipe
- 2. Fixing

4. Remove and discard the bolt securing the coolant inlet elbow to the crankcase and withdraw the elbow. Remove and discard the O-ring from the elbow.



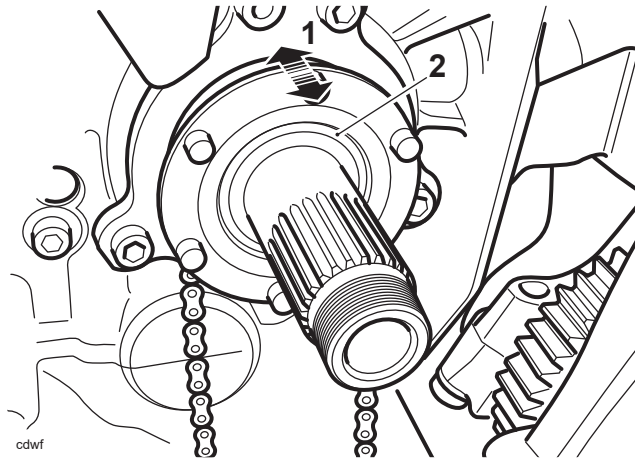
- 1. Coolant inlet pipe
- 2. Fixing

5. Release the fixings securing the drive chain guide to the crankcase and remove the guide.



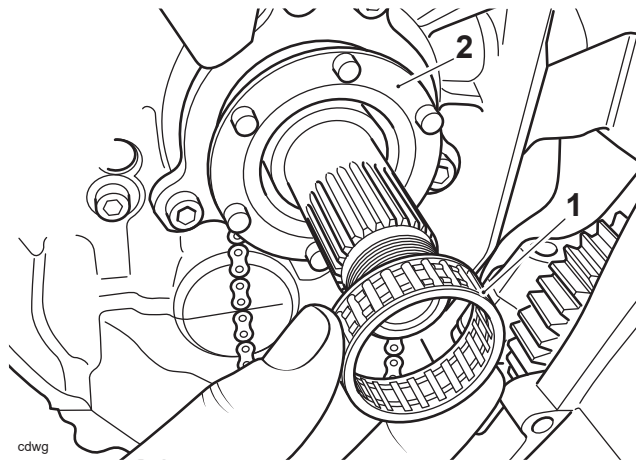
1. Oil pump drive chain guide (engine shown inverted)
2. Fixings

6. Slide the oil pump drive sprocket gently backwards and forwards to dislodge the inner needle roller bearing.



1. Oil pump drive sprocket (engine shown inverted)
2. Needle roller bearing

7. Carefully remove the bearing while supporting the oil pump drive sprocket.

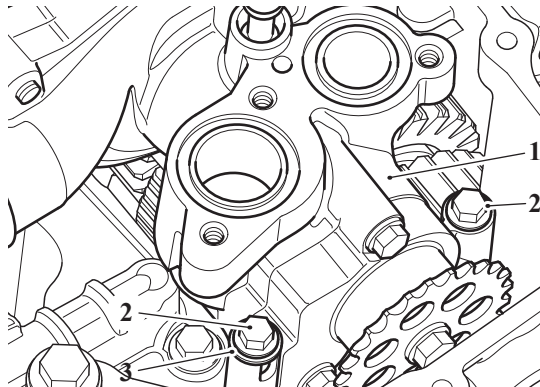


- 1. Needle roller bearing (engine shown inverted)
- 2. Oil pump drive sprocket

NOTICE

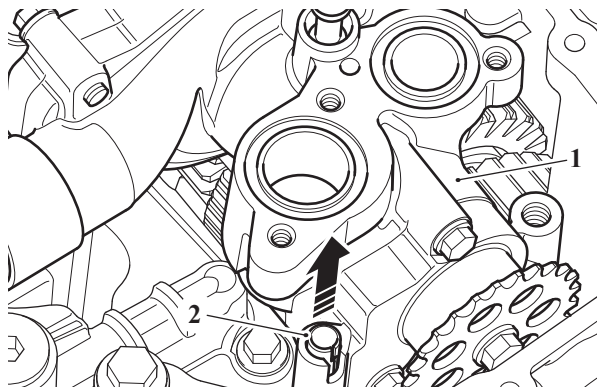
Note the position of the washer under the oil pump fixing for the oil pump dowel for installation.

8. Release the fixings securing the oil pump. Remove the fixings and collect the washer.



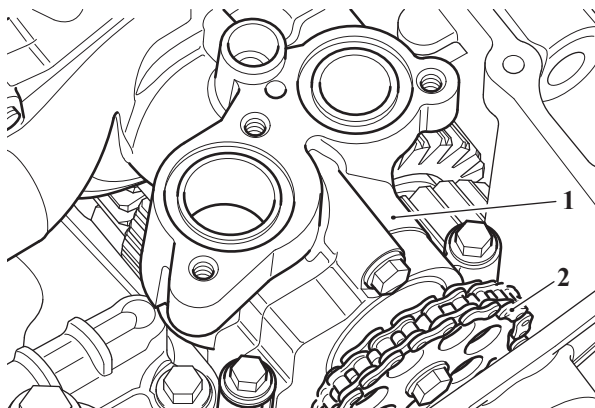
- 1. Oil pump
- 2. Fixings
- 3. Washer

9. 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

10. Detach the drive chain from the oil pump.



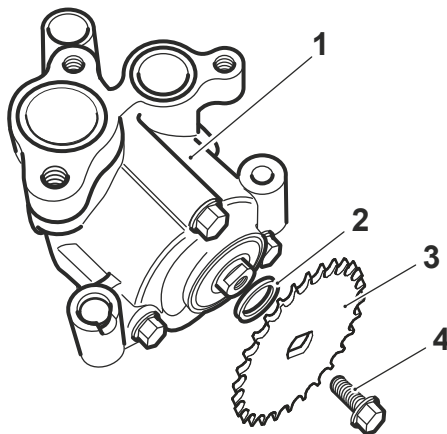
- 1. Oil pump
- 2. Drive chain

11. Carefully withdraw the oil pump from the crankcase.

12. Remove and discard the O-ring from the inlet sleeve on the water pump body.

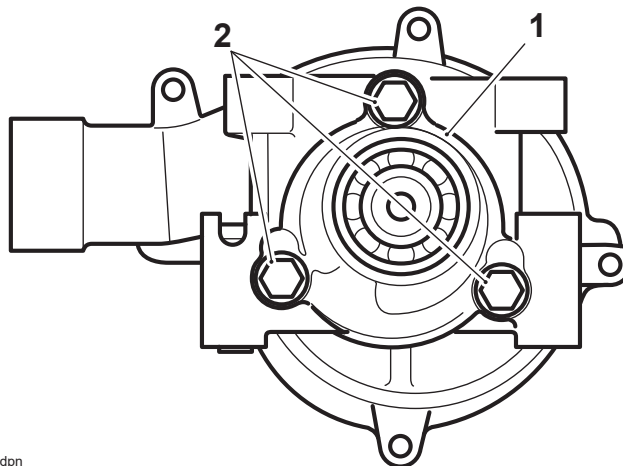
Oil Pump - Disassembly

1. Release the fixing and remove the drive sprocket and spacer washer.



- 1. Oil pump
- 2. Spacer washer
- 3. Drive sprocket
- 4. Fixing

2. Release the three fixings and withdraw the oil pump body.



cdpn

- 1. Oil pump body
- 2. Fixings

Oil Pump - Inspection

⚠ 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.

1. Measure the rotor tip clearance using feeler gauges.

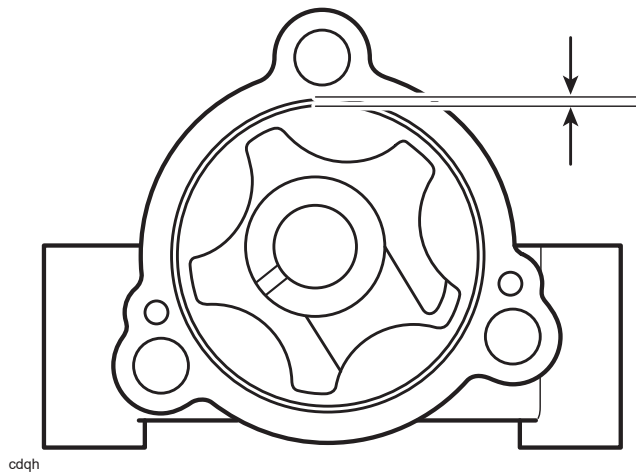
Rotor Tip Clearance	
Standard	0.15 mm
Service limit	0.20 mm

The diagram shows a cross-section of an oil pump rotor assembly. A feeler gauge is positioned between the rotor tip and the pump housing to measure the clearance. The rotor has four lobes, and the feeler gauge is inserted into the gap between one lobe and the housing. The measurement is indicated by a horizontal line with arrows at both ends.

cdqh

Rotor Tip Clearance

2. Measure the pump body clearance using feeler gauges.

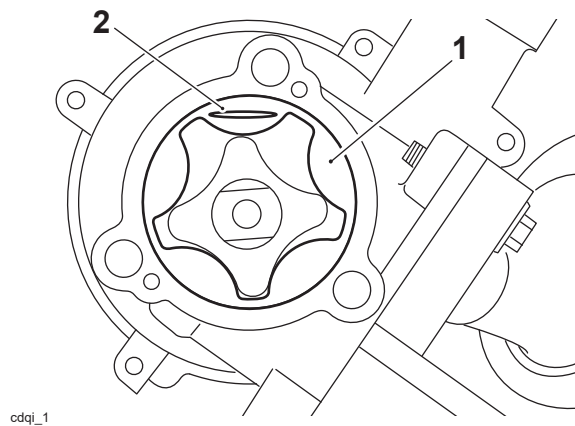


Pump Body Clearance

Pump Body Clearance	
Standard	0.15 - 0.22 mm
Service limit	0.35 mm

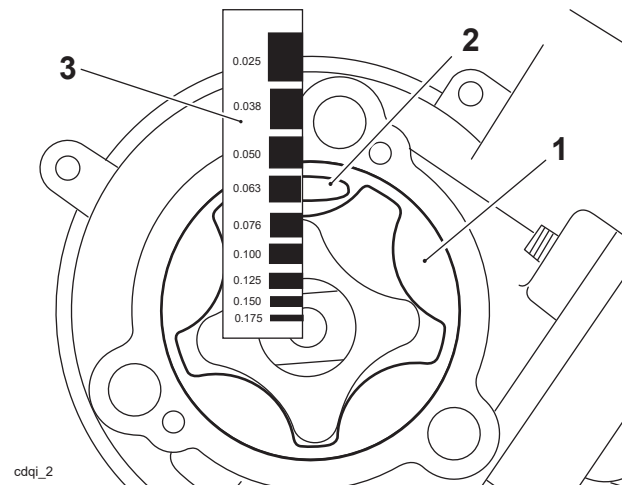
3. Measure the pump end clearance.

- Wipe the exposed areas of both the outer rotor and the oil pump cover.
- Apply a thin smear of grease to the outer rotor and a small quantity of silicone release agent to the oil pump cover.
- Size a length of Plastigauge to fit across one of the lugs on the outer rotor, as shown below. Fit the Plastigauge to the outer rotor using the grease to hold the strip in place.



1. Outer rotor
2. Plastigauge

- Without any twisting action, refit the oil pump cover and tighten the fixings to 12 Nm.
- Release the fixings and remove the oil pump cover.
- Using the gauge provided with the Plastigauge kit, measure the width of the now compressed Plastigauge.
- If the clearance is within the specified tolerance, clean off all traces of Plastigauge from the outer rotor and oil pump cover. Assemble the oil pump (see [Oil Pump - Assembly](#)).

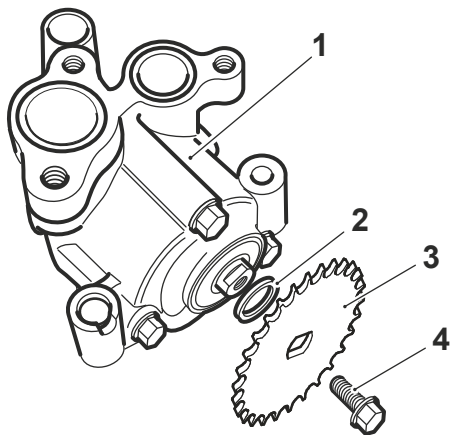


- | |
|--------------------------|
| 1. Outer rotor |
| 2. Plastigauge |
| 3. Gauge, in millimetres |

Pump End Clearance	
Standard	0.04 - 0.09 mm
Service limit	0.17 mm

Oil Pump - Assembly

1. If all clearances are within service limits, liberally apply clean engine oil to all internal components and refit the oil pump body to the oil pump rotor. Refit the fixings and tighten to 12 Nm.
2. If any clearance measured is outside the service limits, renew the complete pump.
3. Inspect the sprockets and chain for wear and/or damage. Replace the sprockets and chain if wear and/or damage is found.
4. Check the water pump shaft and shaft bearings for side and end float. Renew if necessary.
5. Check for corrosion and scale build-up around the impeller and in the pump body. Renew if necessary.
6. Check the oil pump location dowel for damage. Renew if necessary.
7. Refit the spacer washer and drive sprocket. Apply ThreeBond 1374 to the fixing and tighten to 12 Nm.



- | |
|--|
| <ol style="list-style-type: none">1. Oil pump2. Spacer washer3. Drive sprocket4. Fixing |
|--|

Oil and Water Pump - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

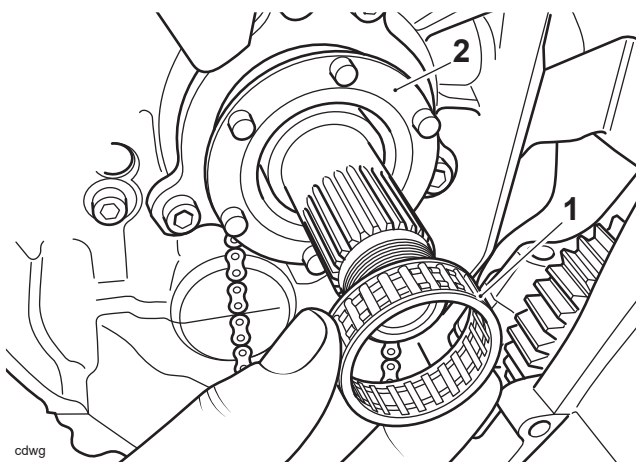
Before fitting the oil pump to the crankcase ensure the pump internal surfaces have been wetted with clean engine oil. The pump may fail to pick up oil from the sump if the surfaces have not been wetted. This will cause the engine to run without engine oil pressure and will lead to severe engine damage.

1. Install a new O-ring to the inlet sleeve on the water pump body.
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 insert the water pump inlet sleeve into the opening in the crankcase.
4. Fit the oil pump to the crankcase, ensuring the oil pump dowel correctly locates into the bolt hole in the crankcase.

⚠ CAUTION

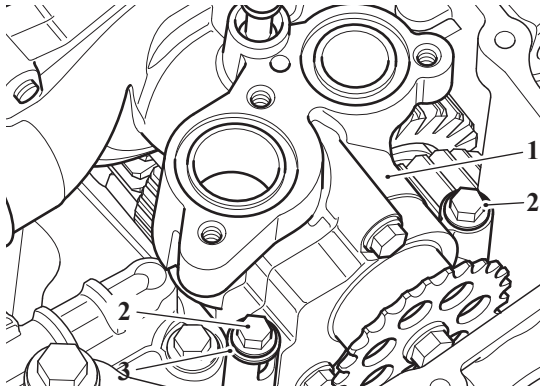
Do not use excessive force to insert the dowel into the crankcase. Severe dowel or crankcase damage may result from the use of excessive force.

5. Using a suitable pin punch, gently tap the dowel downwards into the crankcase until it seats.
6. Feed the drive chain over the transmission input shaft and fit to the sprocket.
7. Fit the drive chain to the sprocket on the oil pump.
8. Support the oil pump drive sprocket and carefully refit the needle roller bearing.



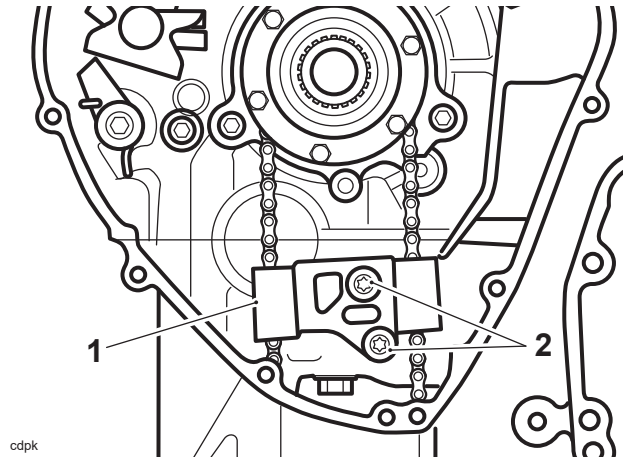
1. Needle roller bearing
2. Oil pump drive sprocket

9. Refit the washer and fixings as noted for removal. Tighten the fixings to 12 Nm.



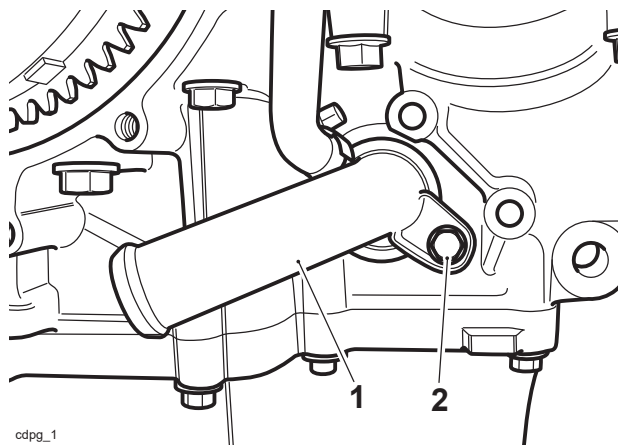
- 1. Oil pump
- 2. Fixings
- 3. Washer

10. Refit the oil pump drive chain guide. Install new fixings and tighten to 9 Nm.



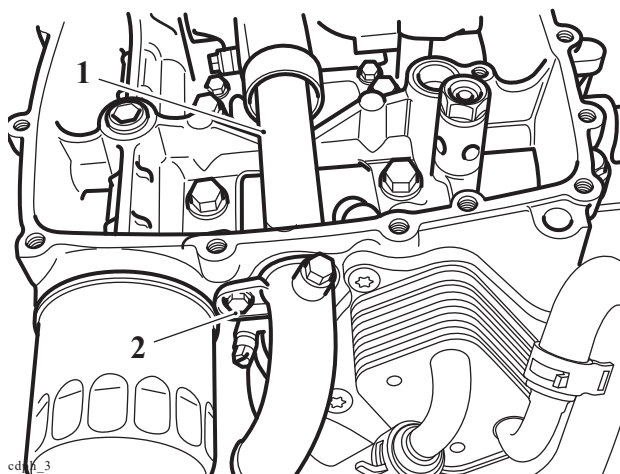
- 1. Oil pump drive chain guide
- 2. Fixings

11. Install a new O-ring to the coolant inlet elbow and position the elbow to the water pump inlet. Fit a new bolt and tighten to 12 Nm.



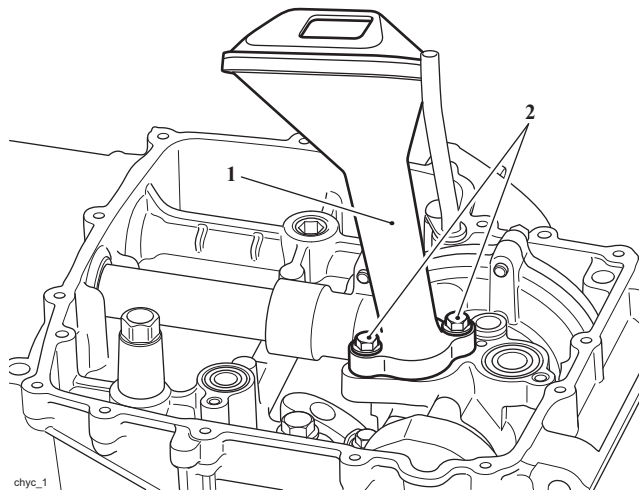
- 1. Coolant inlet elbow
- 2. Fixing

12. Install three new O-rings to the coolant outlet pipe and position the pipe through the crankcase. Locate the pipe to the water pump outlet. Install a new fixing and tighten to 12 Nm.



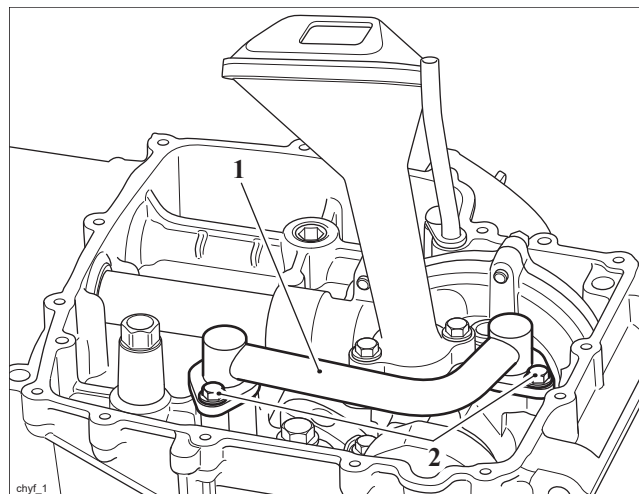
- 1. Coolant outlet pipe
- 2. Fixing

13. Install a new O-ring to the oil pick-up and refit the oil pick-up. Fit new bolts and tighten to 12 Nm.



1. Oil pick-up
2. Fixings

14. Install two new O-rings to the oil transfer pipe and refit the oil transfer pipe. Fit new bolts and tighten to 12 Nm.



1. Oil transfer pipe
2. Fixings

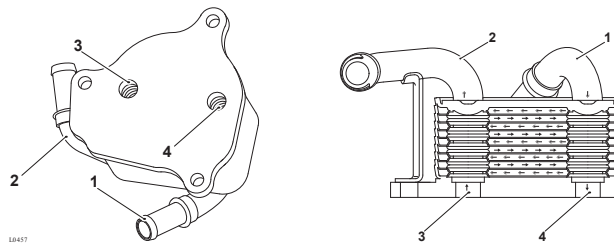
Perform the following operations:

- [Sump - Installation](#)
- [Clutch - Installation](#)
- Refill the engine oil (see [Oil and Oil Filter Change](#))
- [Exhaust System - Installation](#)
- [Radiator - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Heat Exchanger

The heat exchanger is used to transfer heat from the engine oil into the coolant.

Filtered oil is delivered to the heat exchanger via an opening (4) where it is circulated through the heat exchanger core. Coolant is pumped through spigot (1) into the heat exchanger core to cool the oil. The cooled oil then exits the heat exchanger (3) and flows to the main oil gallery. The coolant then flows out of the heat exchanger (2) and through the rest of the cooling system.



- 1. Coolant in
- 2. Coolant out
- 3. Oil out
- 4. Oil in

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.

Heat Exchanger - Removal

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠️ WARNING

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

⚠️ WARNING

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

⚠️ WARNING

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.

NOTICE

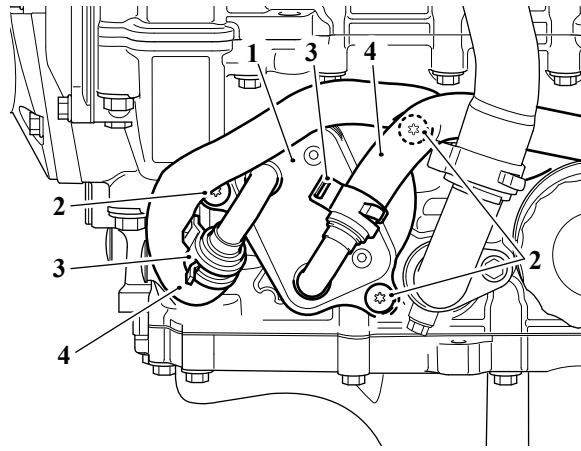
Prior to disassembly of the coolant hoses, note the orientation and position of the hose clips to help ensure that they are returned to the same positions and orientation on assembly.

- Position the motorcycle on level ground on the side stand.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Radiator - Removal](#)
- [Exhaust System - Removal](#)
- Drain the engine oil (see [Oil and Oil Filter Change](#)).

1. Noting their orientation, disconnect the coolant hoses from the heat exchanger using service tool T3880207 - Hose Clip Pliers.
2. Remove the three fixings from the heat exchanger and withdraw it from the crankcase.



- 1. Heat exchanger
- 2. Fixings
- 3. Hose clips
- 4. Coolant hoses

3. Remove and discard the O ring from the lower crankcase.

Heat Exchanger - Inspection

1. Check the heat exchanger body for corrosion and/or damage.

Heat Exchanger - Installation

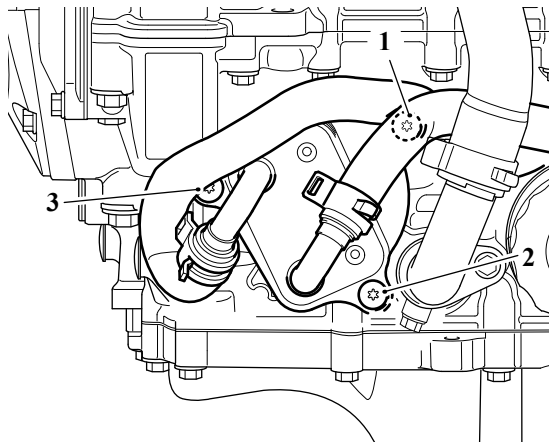
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

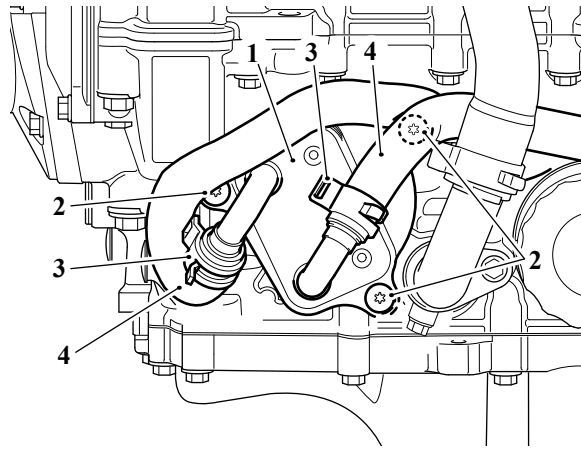
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new heat exchanger O-ring to the lower crankcase.
2. Fit the heat exchanger to the crankcase and tighten the bolts in the sequence shown to 10 Nm.
3. Retighten fixing 1 to 10 Nm.



Tightening Sequence

4. Fit the coolant hoses to the heat exchanger in the orientation noted during removal.
5. Using service tool T3880207 - Hose Clip Pliers, fit the coolant hose clips in the orientation noted during removal.



- | |
|---|
| <ul style="list-style-type: none">1. Heat exchanger2. Fixings3. Hose clips4. Coolant hoses |
|---|

Perform the following operations:

- [Exhaust System - Installation](#)
- [Radiator - Installation](#)
- [Oil and Oil Filter Change](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Low Oil Pressure Warning Light Switch - Removal

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

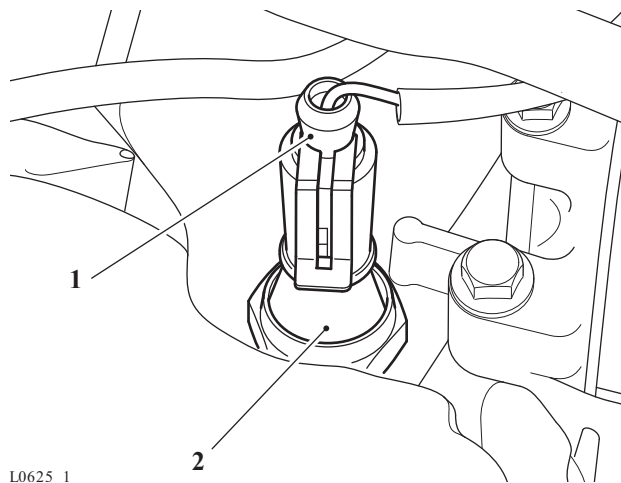
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The low oil pressure warning light switch is located in the upper crankcase, behind the cylinder head.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Throttle Body - Removal](#)
- [Inlet Manifold - Removal](#)

1. Disconnect the electrical connection to the switch.
2. Remove the switch and collect the copper washer.



L0625 1

1. Electrical connection
2. Low oil pressure warning light switch

Low Oil Pressure Warning Light Switch - Installation

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Incorporating a new copper washer, fit the switch and tighten to 13 Nm.
2. Refit the electrical connection.

Perform the following operations:

- [Inlet Manifold - Installation](#)
- [Throttle Body - Installation](#)
- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Engine Remove and Install

Engine - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

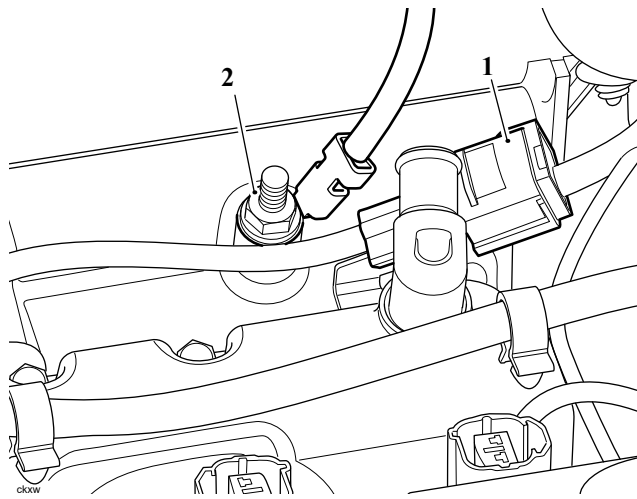
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Manifold Absolute Pressure \(MAP\) Sensor - Removal](#)
- [Airbox - Removal](#)
- [Purge Control Valve - Removal](#)
- [Throttle Body - Removal](#)
- [Gear Change Linkage - Removal](#)
- [Front Sprocket Cover - Removal](#)
- [Coolant Expansion Tank - Removal](#)
- [Radiator - Removal](#)
- [Exhaust System - Removal](#)
- [Side Stand - Removal](#)

1. If required, drain the engine oil (see [Oil and Oil Filter Change](#)).
2. Remove the two fixings and remove the gear change bracket and side stand switch from the frame.
3. Note the routing of the alternator regulator/rectifier harness for installation. Release the grey alternator regulator/rectifier electrical connection and route the harness back to the engine.
4. Disconnect the harness from the following components:
 - ignition coils
 - fuel rail (injectors)
 - coolant temperature sensor
 - secondary air injection valve.
5. Remove and discard the lock nut securing the engine ground lead to the crankcase. Remove the engine ground lead.
6. Disconnect the engine subharness from the main harness.



1. Engine subharness connector
2. Engine ground lead

7. Disconnect the gear position sensor from the main harness.
8. Set the drive chain adjustment to allow maximum free play in the chain (see [Drive Chain Free Movement - Adjustment](#)).
9. Place a support beneath the engine and ensure that the frame is still adequately and securely supported.

NOTICE

The frame is fitted with two frame adjuster sleeves, located on the right hand side of the frame in the upper and lower crankcase bolt positions.

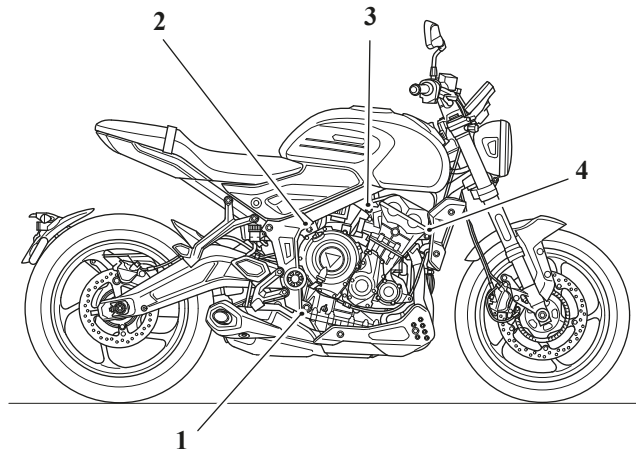
10. Remove the lower crankcase bolt, washer and lock nut. Discard the lock nut.
11. Remove the upper crankcase bolt, washer and lock nut. Discard the lock nut.
12. Using service tool T3880166, loosen the frame adjusters and unscrew them fully to allow clearance between the frame and engine.
13. Remove the right hand side rear cylinder head bolt and lock nut. Discard the lock nut.

CAUTION

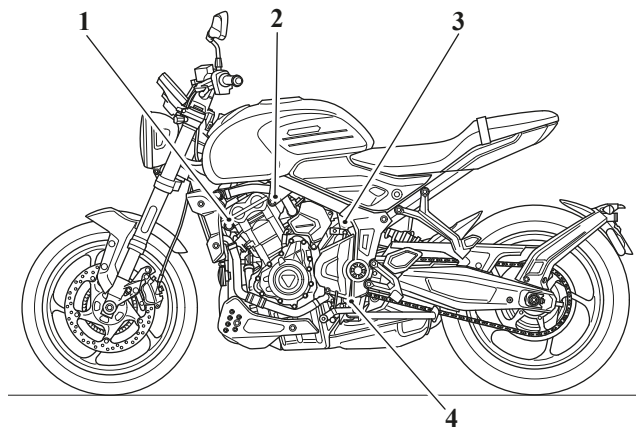
When removing/installing the frame to cylinder head left hand mounting bolt, power/air tools must not be used. Hand tools must only be used.

Damage to the cylinder head threads can occur if power/air tools are used.

14. Remove the left hand side rear cylinder head bolt.
15. Remove the right hand side front cylinder head bolt and lock nut. Discard the lock nut.
16. Remove the left hand side front cylinder head bolt and lock nut. Discard the lock nut.



1. Lower crankcase bolt (and frame adjuster)
2. Upper crankcase bolt (and frame adjuster)
3. Right hand side rear cylinder head bolt
4. Right hand side front cylinder head bolt



1. Left hand side front cylinder head bolt
2. Left hand side rear cylinder head bolt
3. Upper crankcase bolt
4. Lower crankcase bolt

⚠ CAUTION



To prevent damage to components, lower the engine very carefully.

17. Lower the engine sufficiently to allow the drive chain to be detached from the front sprocket.
18. Remove the engine.

Engine - Installation

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

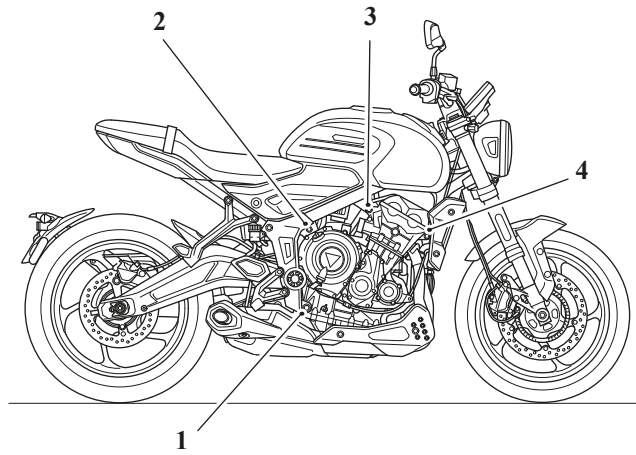
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the engine beneath the frame.
2. Make sure the alternator regulator/rectifier harness is routed as noted during removal.
3. Raise the engine, looping the drive chain over the output sprocket as it is raised.

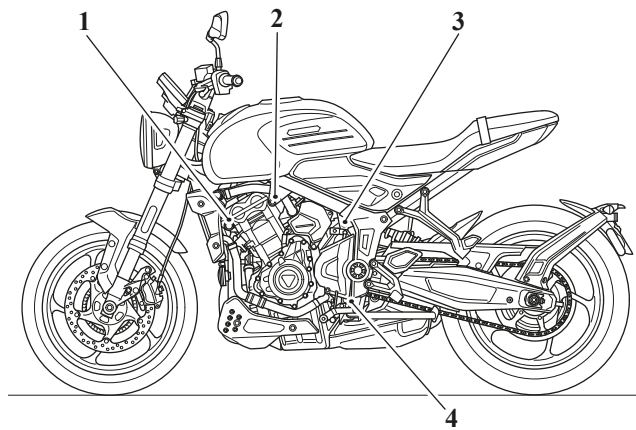
⚠️ CAUTION

Unless the following engine mounting bolt installation/tightening sequence is precisely followed, severe frame damage can occur.

4. Align the engine to the frame.
5. Loosely assemble the left hand side front cylinder head bolt and a new lock nut.
6. Loosely assemble the right hand side front cylinder head bolt and a new lock nut.
7. Thoroughly clean the threaded part of the left hand side rear cylinder head bolt and smear the first four threads with a proprietary copper based grease
8. Loosely assemble the left hand side rear cylinder head bolt.
9. Loosely assemble the right hand side rear cylinder head bolt and a new lock nut.
10. Using service tool T3880166 tighten the upper crankcase frame adjuster to 3 Nm.
11. Loosely assemble the upper crankcase bolt, washer and a new lock nut.
12. Using service tool T3880166 tighten the lower crankcase frame adjuster to 3 Nm.
13. Loosely assemble the lower crankcase bolt, washer and a new lock nut.
14. Whilst holding the lock nut, tighten the upper crankcase bolt to 48 Nm.
15. Whilst holding the lock nut, tighten the lower crankcase bolt to 48 Nm.
16. Whilst holding the lock nut, tighten the left hand side front cylinder head bolt to 48 Nm.
17. Tighten the left hand side rear cylinder head bolt to 48 Nm.
18. Whilst holding the lock nut, tighten the right hand side front cylinder head bolt to 48 Nm.
19. Whilst holding the lock nut, tighten the right hand side rear cylinder head bolt to 48 Nm.

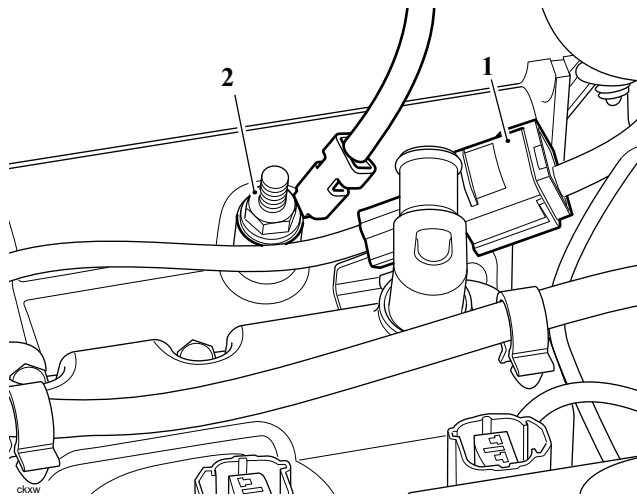


1. Lower crankcase bolt (and frame adjuster)
2. Upper crankcase bolt (and frame adjuster)
3. Right hand side rear cylinder head bolt
4. Right hand side front cylinder head bolt



1. Left hand side front cylinder head bolt
2. Left hand side rear cylinder head bolt
3. Upper crankcase bolt
4. Lower crankcase bolt

20. Reconnect the gear position sensor to the main harness.
21. Reconnect the engine subharness to the main harness.
22. Reconnect the engine ground lead to the crankcase with a new lock nut and tighten to 10 Nm.



- | |
|---|
| 1. Engine subharness connector
2. Engine ground lead |
|---|

23. Reconnect the following components to the main harness:

- ignition coils
- fuel rail (injectors)
- coolant temperature sensor
- secondary air injection valve.

24. Reconnect the grey alternator regulator/rectifier electrical connection.

25. Refit the gear change bracket and side stand switch to the frame with two fixings and tighten to 24 Nm.

26. Set the drive chain adjustment (see [Drive Chain Free Movement - Adjustment](#)).

27. If drained, refill the engine oil (see [Oil and Oil Filter Change](#)).

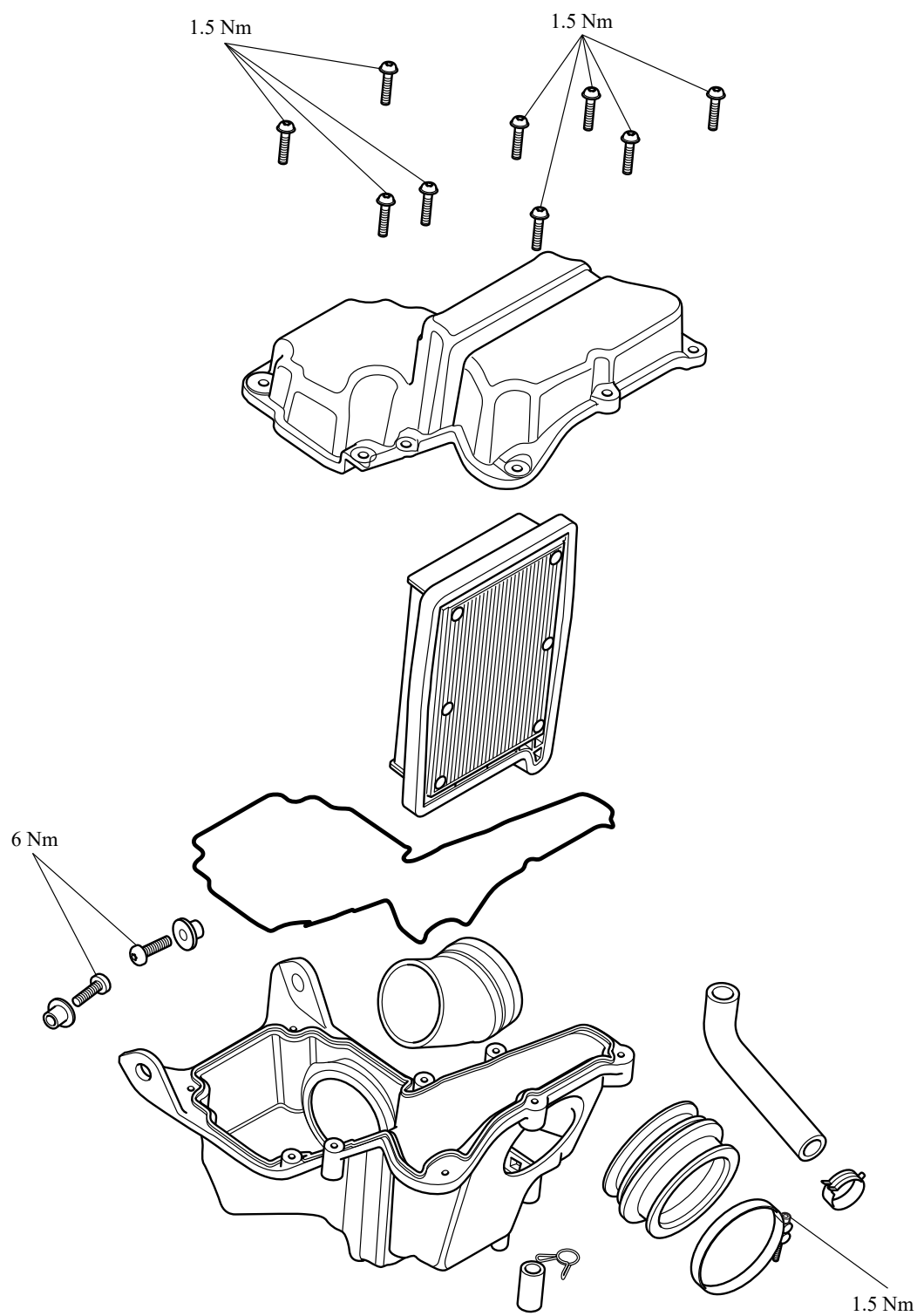
Perform the following operations:

- [Side Stand - Installation](#)
- [Exhaust System - Installation](#)
- [Radiator - Installation](#)
- [Coolant Expansion Tank - Installation](#)
- [Front Sprocket Cover - Installation](#)
- [Gear Change Linkage - Installation](#)
- [Throttle Body - Installation](#)
- [Purge Control Valve - Installation](#)
- [Airbox - Installation](#)
- [Manifold Absolute Pressure \(MAP\) Sensor - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

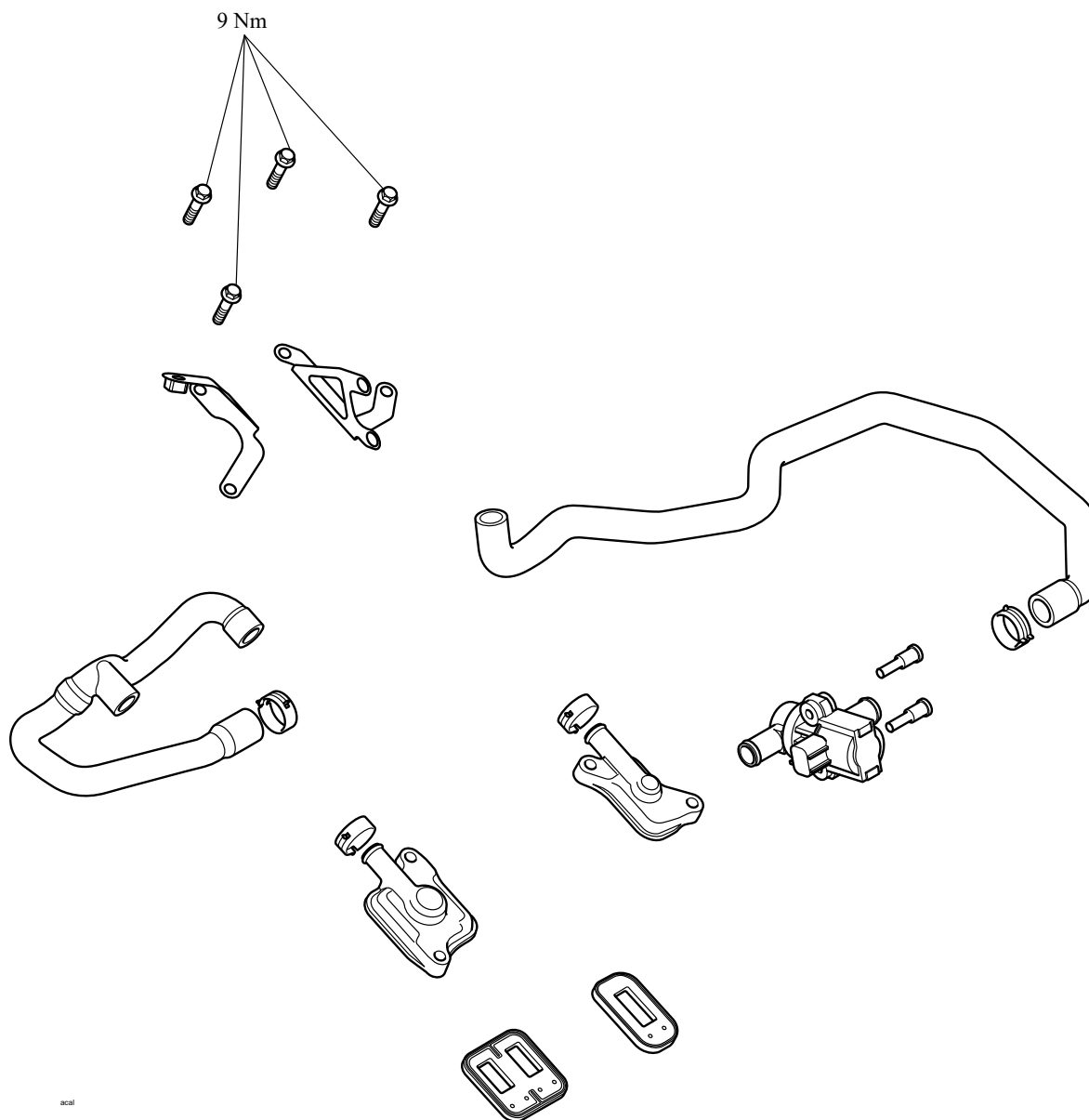
Fuel and Exhaust System and Engine Management

Exploded Views

Exploded View - Airbox

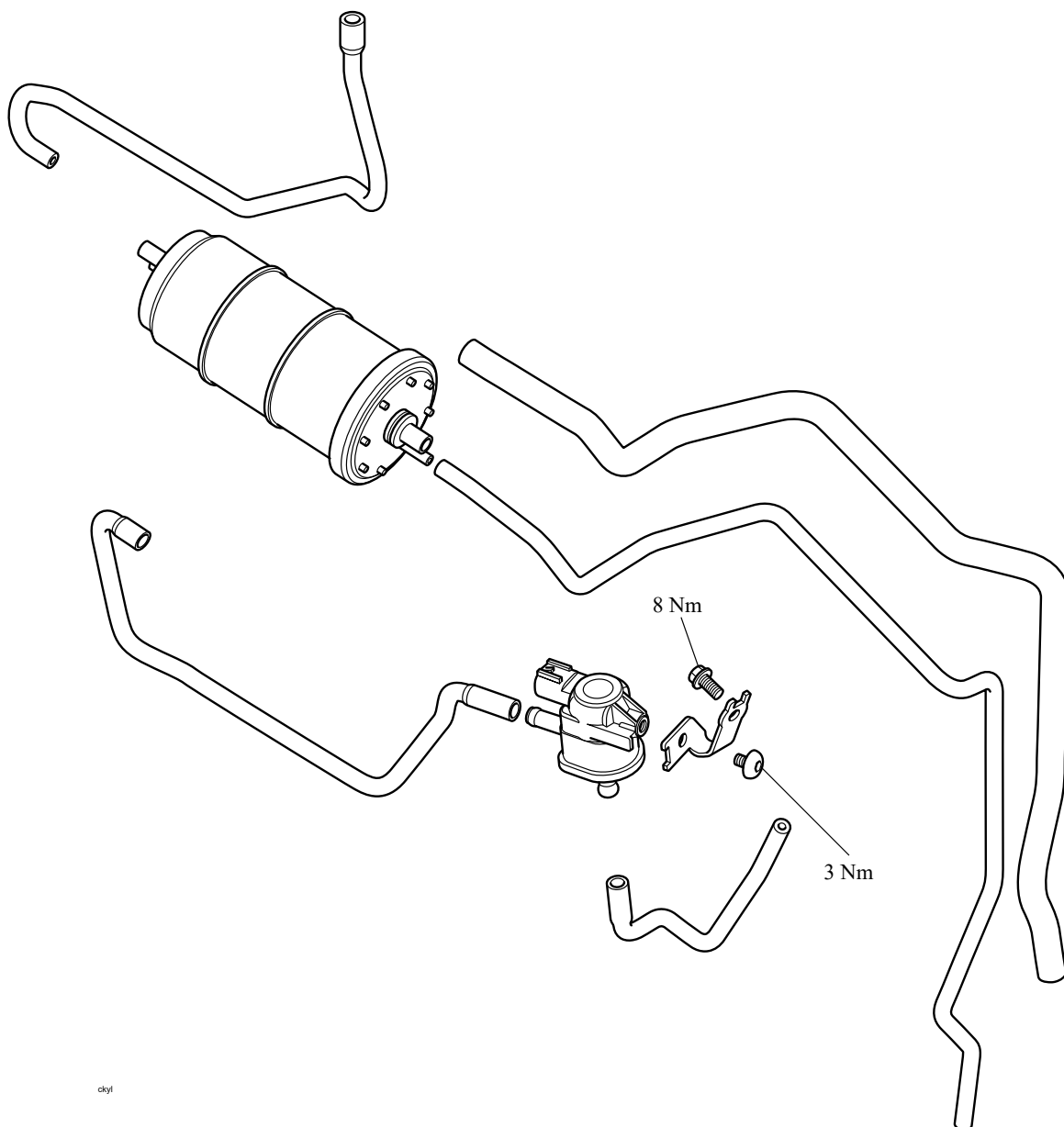


Exploded View - Secondary Air Injection

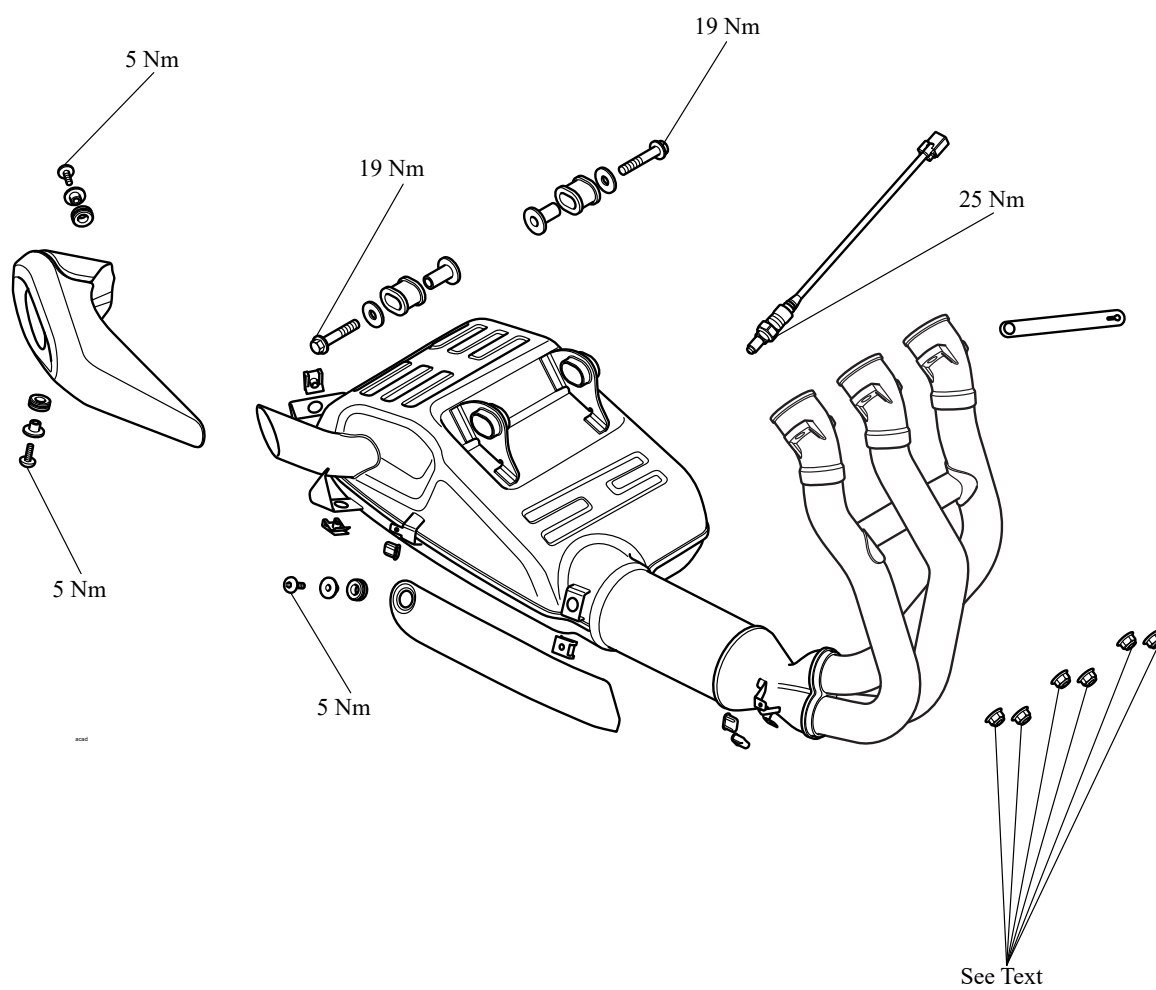


Exploded View - Engine Management

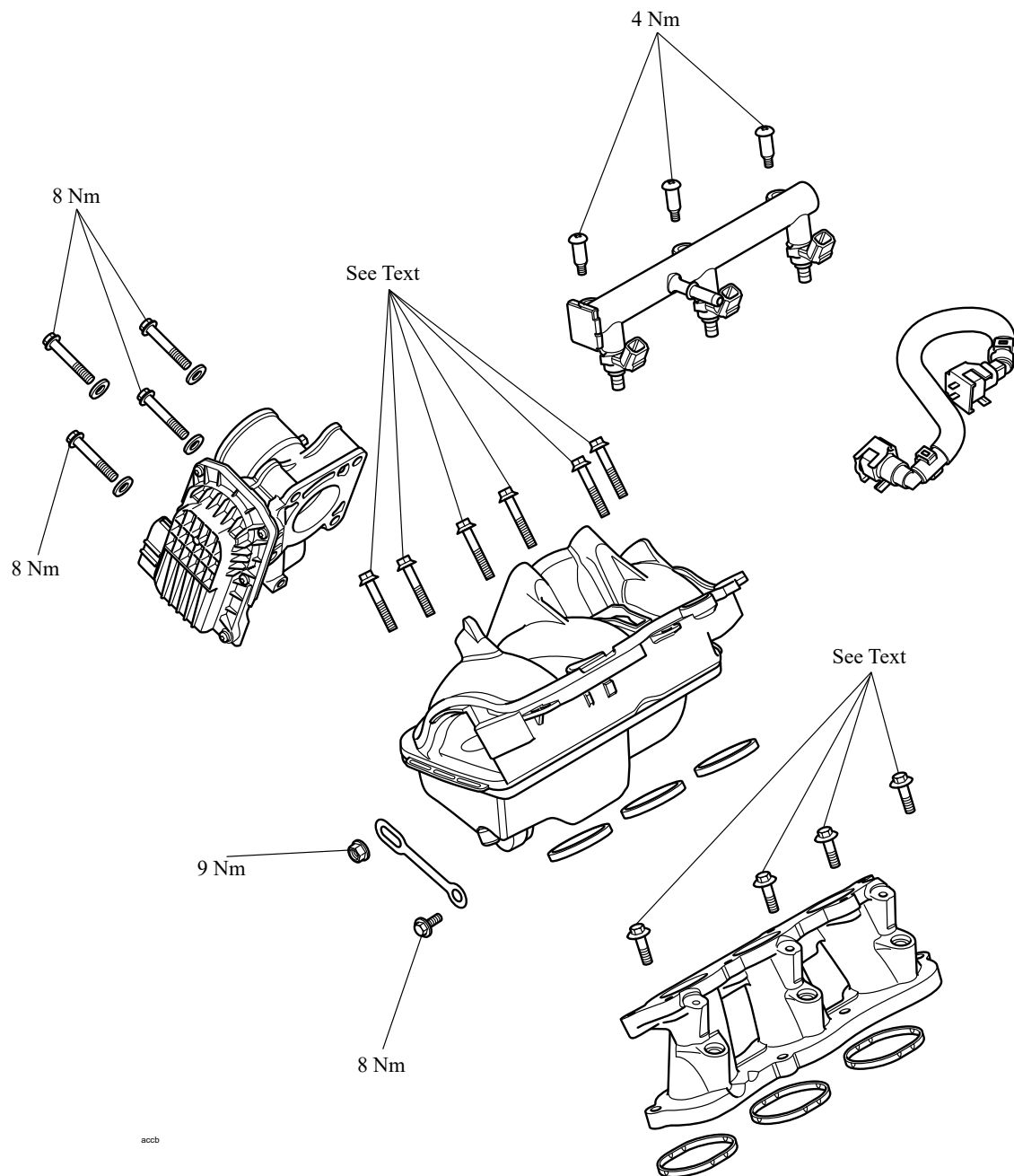
Exploded View - Evaporative System



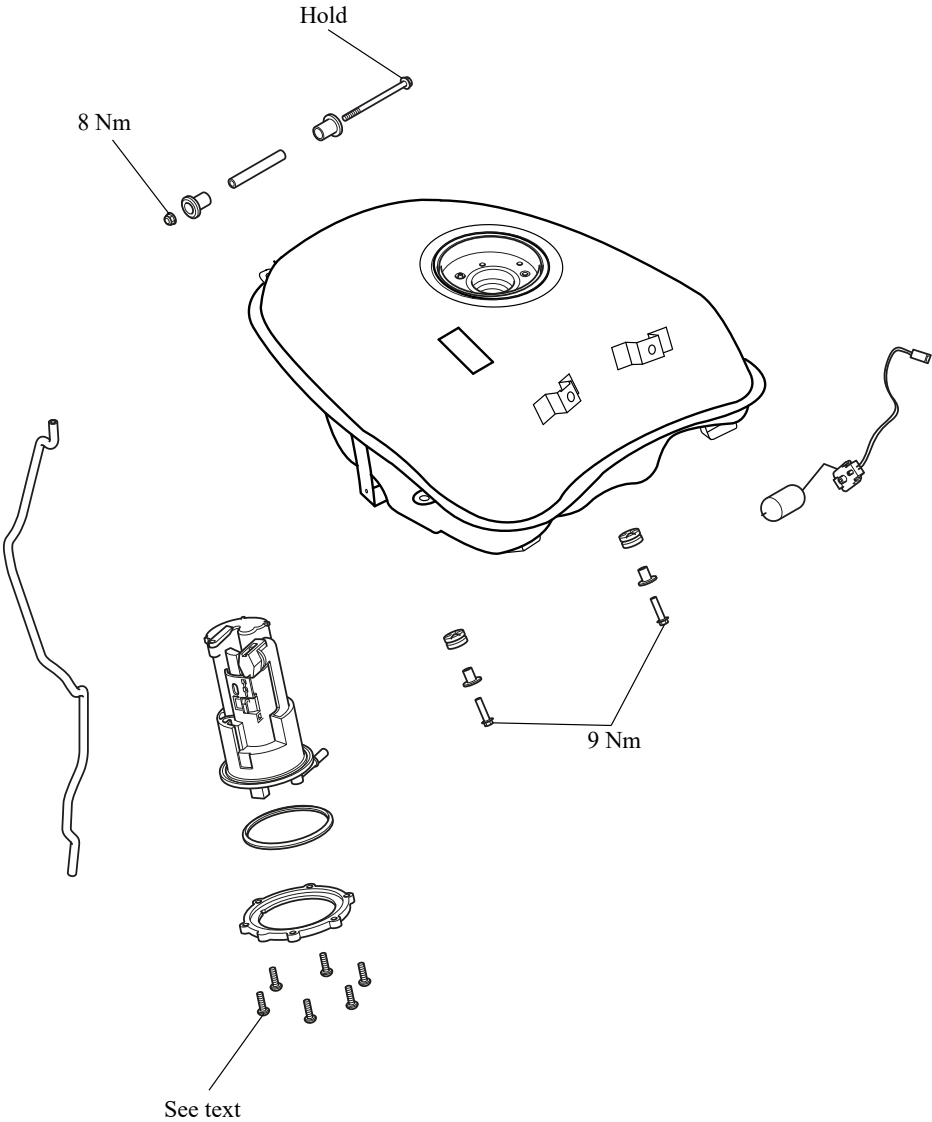
Exploded View - Exhaust System



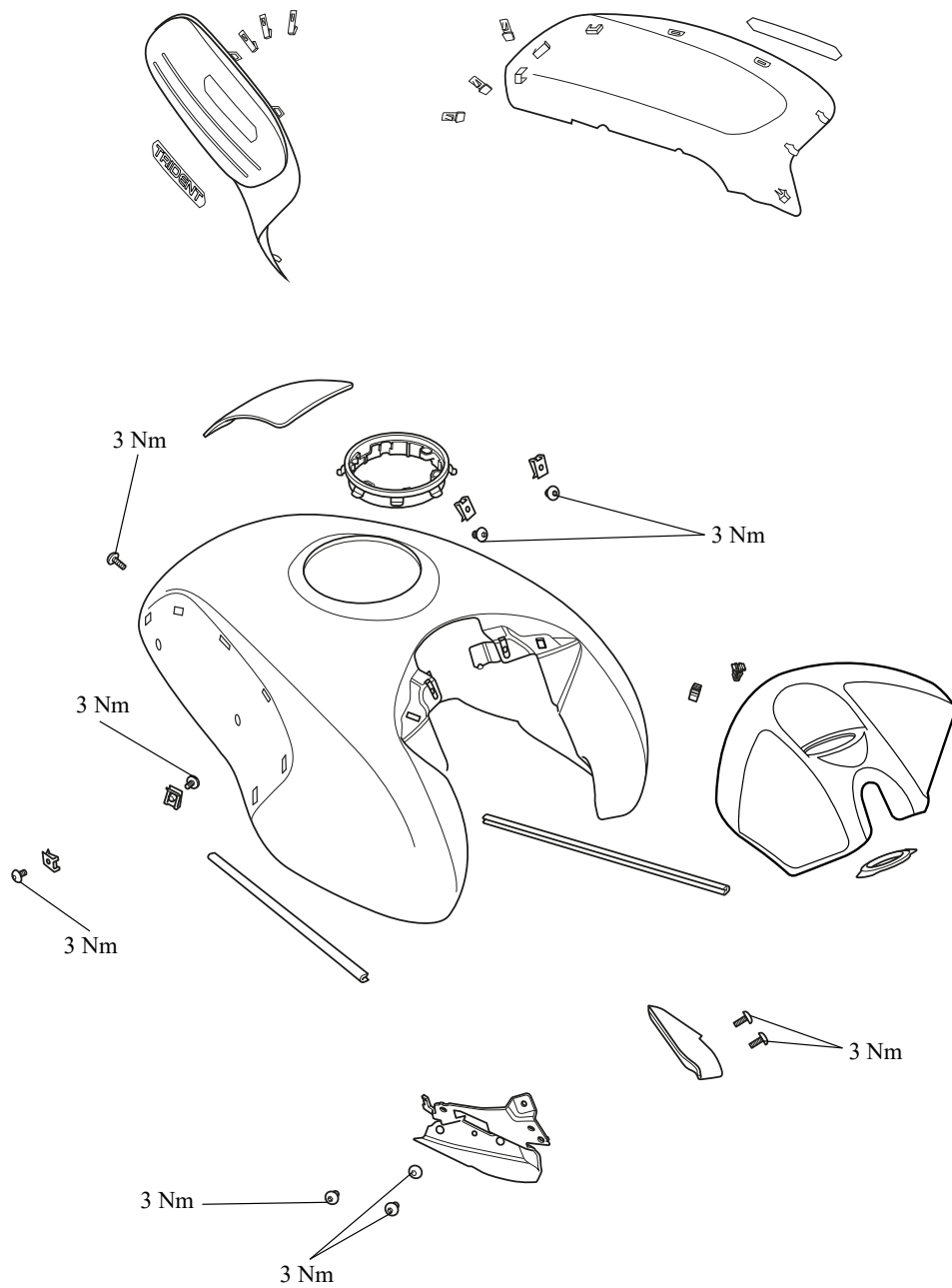
Exploded View - Fuel Rail, Throttles and Injectors



Exploded View - Fuel Tank



Exploded View - Fuel Tank Bodywork



Fuel Diagnostics

Pin Point Tests

Select the relevant diagnostics chapter.

- Engine: [Diagnostic Trouble Codes - Index - Engine](#)
- Immobiliser/TPMS: [Diagnostic - Trouble Codes - Index - Immobiliser/TPMS](#)
- ABS: [Diagnostic Trouble Codes - Index - ABS](#)
- Instruments: [Diagnostic - Trouble Codes - Index - Instruments](#)
- CAN errors (five digit fault code): [Diagnostics - Trouble Codes - Index - CAN Errors](#)

Removal and Installation - Fuel and Air Components

Fuel Tank - Removal

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

WARNING

Never drain fuel from the tank using non-approved, non-professional standard fuel handling equipment. A fire causing destruction of property and injury to persons may result from use of non-approved fuel handling equipment.

WARNING

For models fitted with an accessory quick release tank bag only:

The fuel must be drained from the fuel tank before removal.

The fuel filler cap will be loose after removing the accessory tank bag quick release ring.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

NOTICE

For models fitted with an accessory quick release tank bag only:

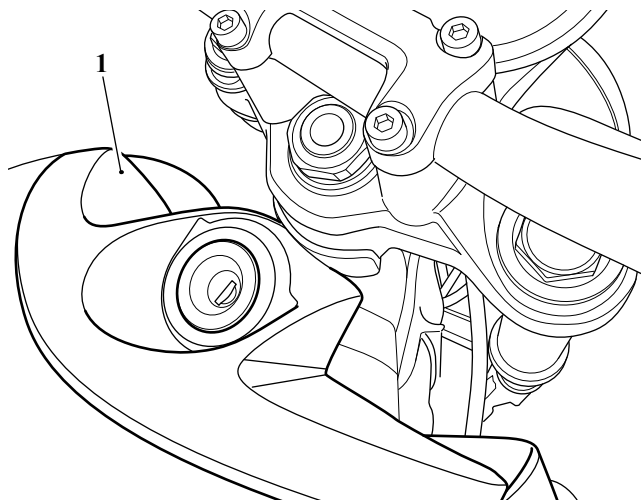
The quick release ring must be removed before removing the fuel tank. Please refer to the relevant accessory fitting instruction for details.

Using proprietary professional automotive workshop equipment approved for fuel handling, drain the fuel from the fuel tank.

Perform the following operations:

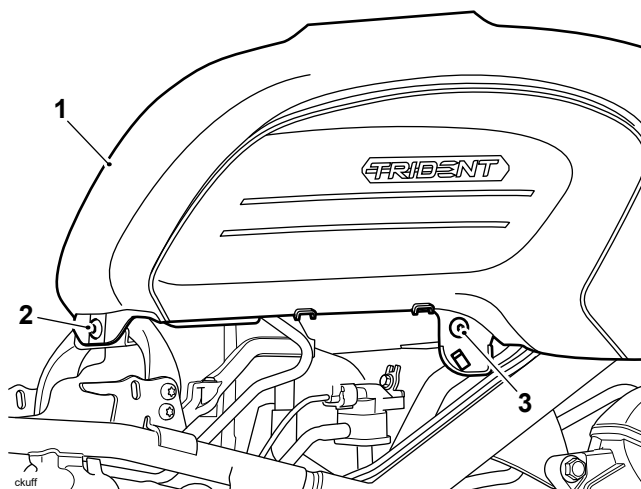
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Side Panels - Removal](#)

1. Unclip and remove the ignition barrel shroud from the fuel tank.



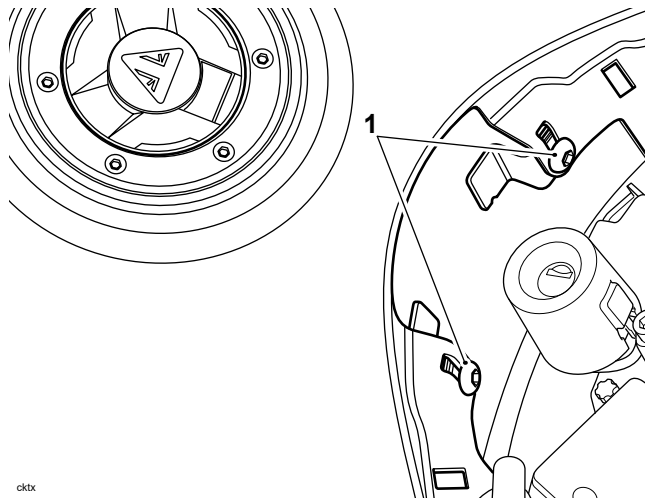
1. Ignition barrel shroud

2. Remove the rear and side fixings from the fuel tank bodywork.



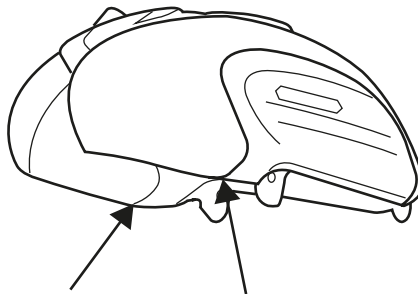
1. Fuel tank bodywork
2. Rear fixing
3. Side fixing (right hand side shown)

3. Remove the front fixings from the fuel tank bodywork.



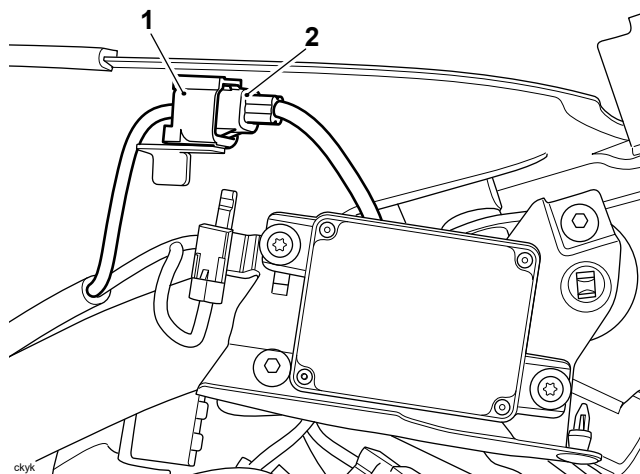
1. Front fixings

4. Flex the fuel tank bodywork sides out in the areas shown below and lift clear of the fuel tank.



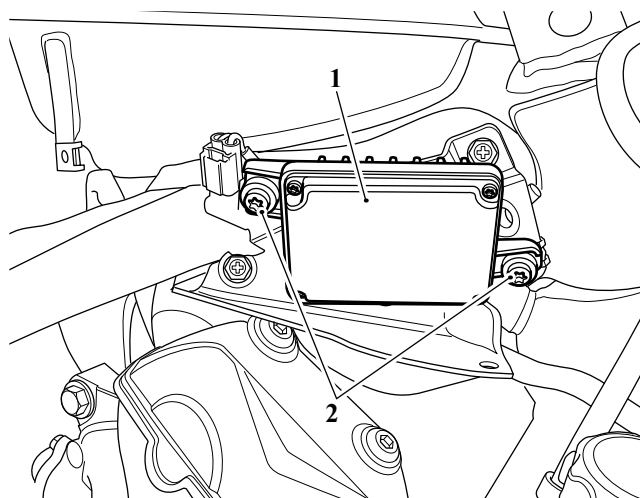
Fuel tank flex positions

5. Unclip the twist grip position sensor harness connector from the fuel tank bracket.



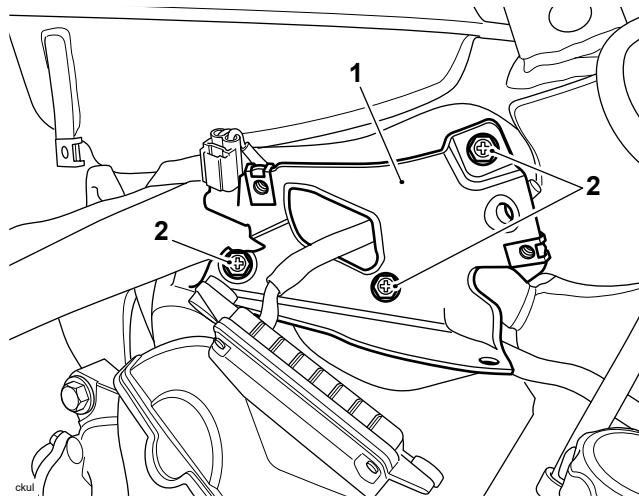
1. Twist grip position sensor main harness connector
2. Twist grip position sensor connector

6. Release and discard the two fixings and remove the immobiliser module from its bracket.



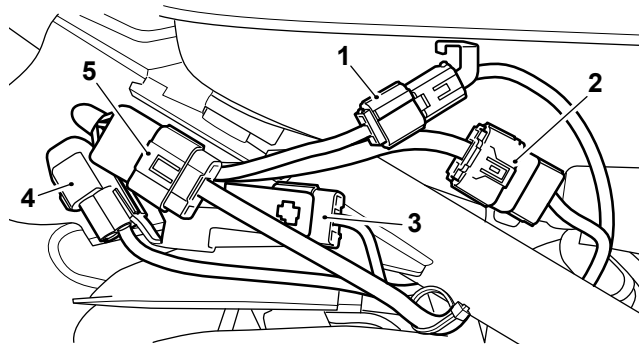
1. Immobiliser module
2. Fixings

7. Release the three fixings and remove the immobiliser bracket from the frame. Allow to rest to one side.



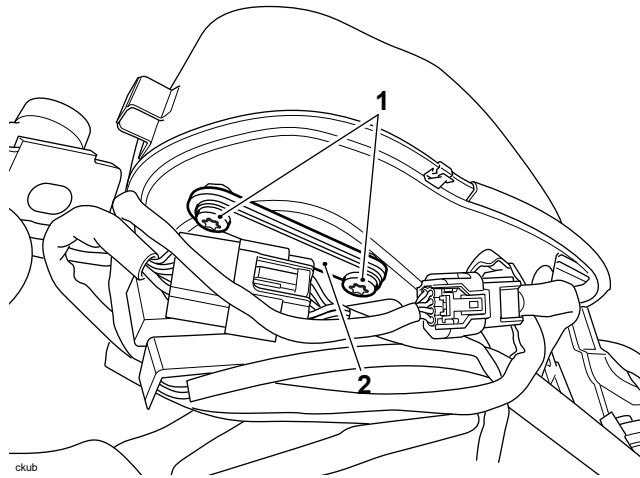
- 1. Immobiliser bracket
- 2. Fixings

- 8. Unclip the left hand switch housing connector A (2) and the right hand switch housing connector (1) from the fuel tank.
- 9. Disconnect the ignition switch electrical connector.



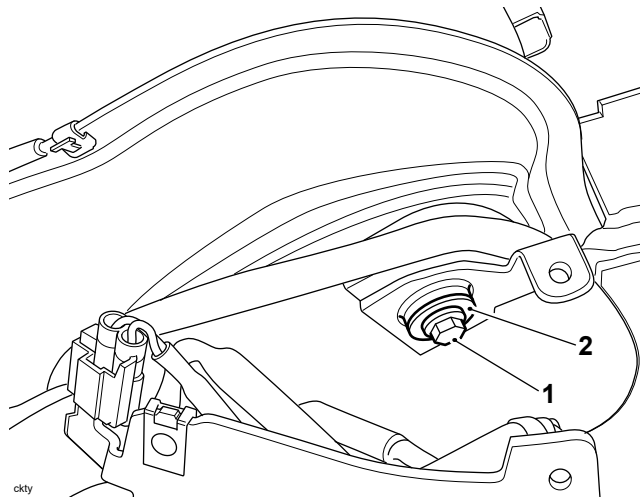
- 1. Right hand switch housing connector
- 2. Left hand switch housing connector A
- 3. Left hand switch housing connector B
- 4. Fuse box 2
- 5. Ignition switch connector

- 10. Release the two fixings and remove the harness bracket from the frame and allow to rest to one side.



- 1. Fixings
- 2. Harness bracket

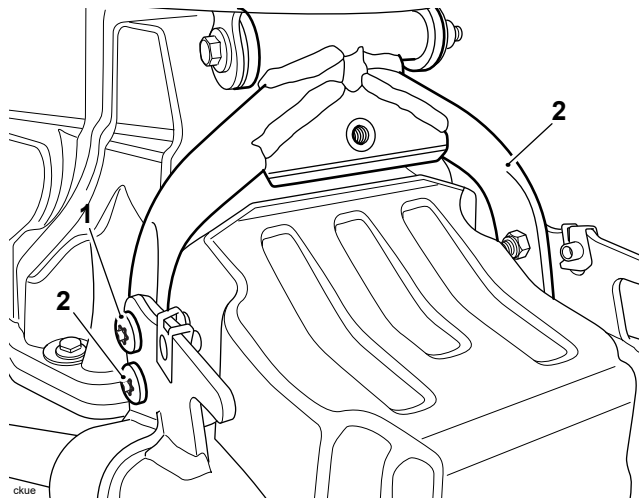
11. Remove the two front fixings and flanged sleeves from the fuel tank.



- 1. Fixing (right hand side shown)
- 2. Flanged sleeve

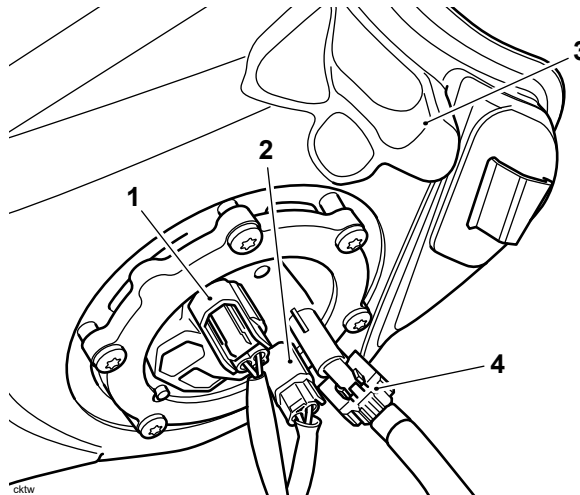
12. Remove the lower fuel tank bracket fixings.

13. Loosen, but do not remove, the upper fuel tank bracket fixings.



1. Upper bracket fixing (left hand side shown)
2. Lower bracket fixing (left hand side shown)
3. Fuel tank rear bracket

14. Tilt the fuel tank and bracket assembly rearwards to allow access to the fuel tank electrical connectors and hoses.



1. Fuel level sensor electrical connector
2. Fuel pump electrical connector
3. Fuel tank
4. Fuel hose

15. Disconnect the fuel pump and fuel level sensor electrical connectors.

⚠ WARNING

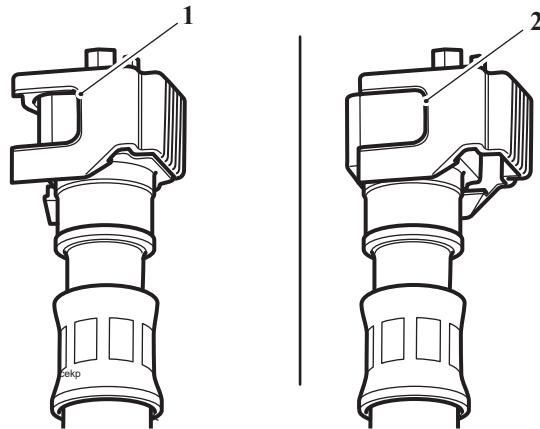
If the fuel rail is dismantled without first reducing pressure, fuel may escape causing clothing and components to be coated with fuel. This would represent a serious fire hazard which could lead to burn injuries and damage to property.

NOTICE

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.

16. Reconnect the ignition switch electrical connector.
17. Have an assistant reconnect the battery, positive (red) lead first, and crank the engine to reduce pressure in the fuel rail.
18. Disconnect the battery, negative (black) lead first.
19. Disconnect the ignition switch electrical connector.
20. Ease the latch away from the connector until the release buttons are exposed.



- | |
|---|
| <ol style="list-style-type: none">1. Locked position2. Unlocked position |
|---|

21. Disconnect the fuel hose by squeezing the sides of the connector and pulling the hose free from its spigot on the fuel pump plate.

NOTICE

Before disconnection, note the position of the two breather hoses so that they can be returned to the same locations when refitting the tank.

22. Disconnect the two breather hoses from near the rear of the fuel tank and note their position for installation.
23. Remove the upper bracket fixings and remove the fuel tank and bracket assembly from the motorcycle.
24. If required, remove the pivot fixings and remove the bracket from the fuel tank. Discard the lock nut.

NOTICE

If fitting a new fuel tank, the barrel lock must be removed from the original fuel cap and fitted to the new one (see [Fuel Cap Lock - Removal, Fuel Cap Lock - Installation](#)).

Fuel Tank - Installation

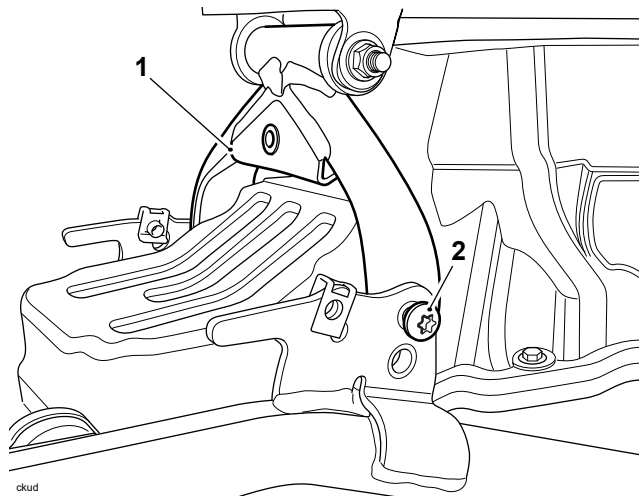
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If required, assemble the fuel tank bracket to the fuel tank and secure with a bolt and new lock nut. Tighten the lock nut to 8 Nm.
2. Align the fuel tank and bracket assembly to the frame and loosely fit the two upper bracket fixings.



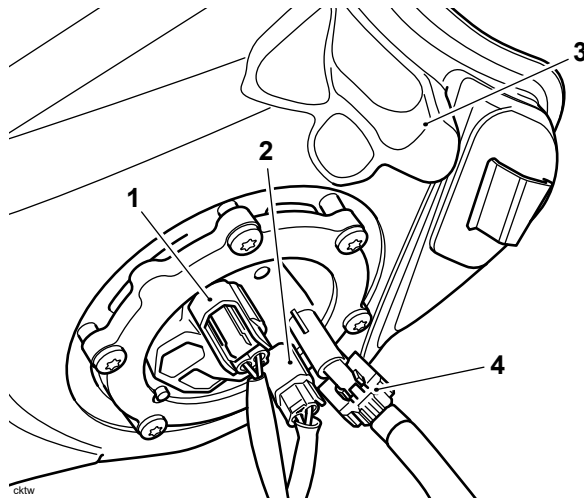
1. Fuel tank bracket
2. Bracket upper fixing (right hand side shown)

3. Tilt the fuel tank rearwards and refit the breather hoses as noted during removal.
4. Refit the fuel pump and fuel level sensor electrical connectors.

NOTICE

The fuel hose has different coloured connectors on each end, to aid orientation. The grey end must be fitted to the fuel tank, the orange end must be fitted to the fuel rails.

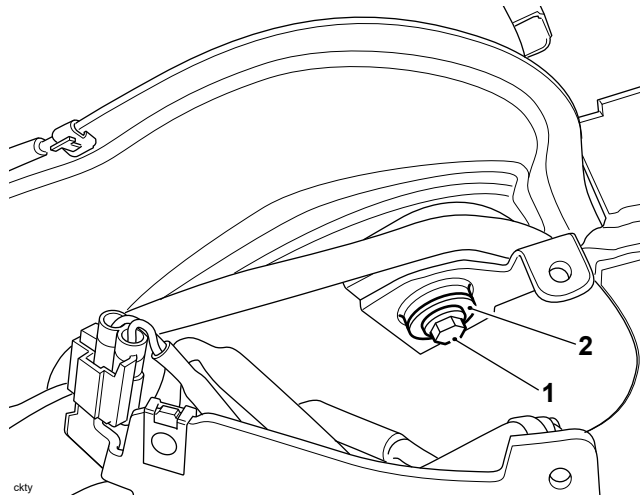
5. Reconnect the fuel feed hose by gently pushing inwards until the hose engages with a click.
6. Slide the double check latch down (towards the spigot) until the release buttons are covered. If the latch will not slide into position, then the fuel hose is not fully home on its spigot and must therefore be refitted correctly.



1. Fuel level sensor electrical connector
2. Fuel pump electrical connector
3. Fuel tank
4. Fuel hose

7. Lower the fuel tank and align the two front fixing holes.

8. Install the two front fixings and flanged sleeves. Tighten to 9 Nm.



1. Fixing (right hand side shown)
2. Flanged sleeve

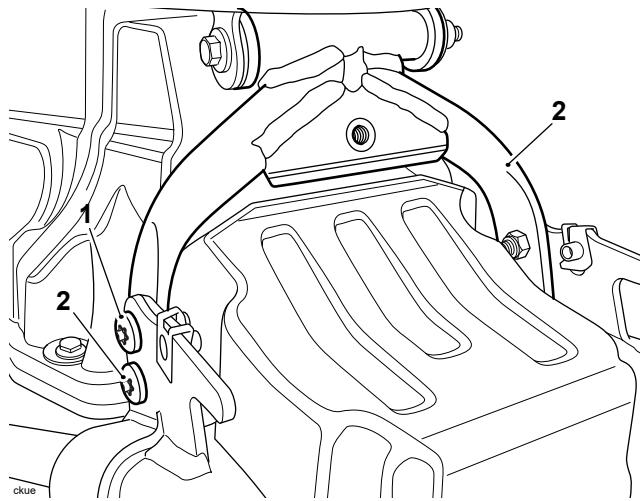
9. Loosely fit the two lower bracket fixings.

10. Tighten the right hand side upper bracket fixing to 12 Nm.

11. Tighten the right hand side lower bracket fixing to 12 Nm.

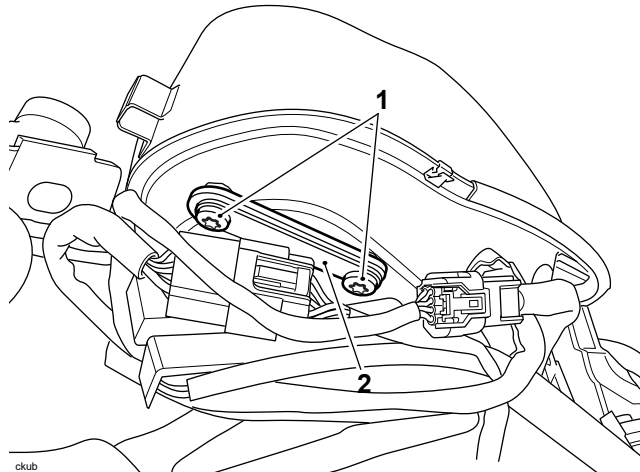
12. Tighten the left hand side upper bracket fixing to 12 Nm.

13. Tighten the left hand side lower bracket fixing to 12 Nm.



- 1. Upper bracket fixing (left hand side shown)
- 2. Lower bracket fixing (left hand side shown)
- 3. Fuel tank rear bracket

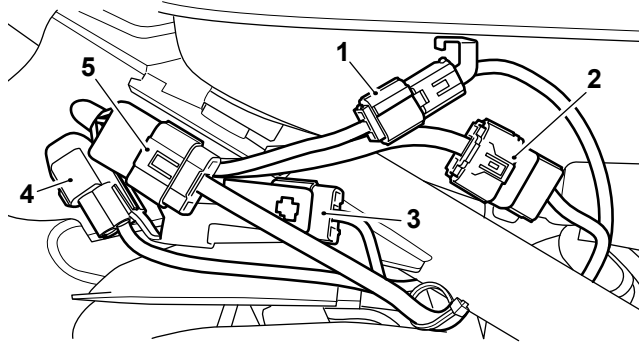
14. Refit the harness bracket to the frame with two fixings and tighten to 5 Nm.



- 1. Fixings
- 2. Harness bracket

15. Reclip the left hand switch housing connector A (2) and the right hand switch housing connector (1) to the fuel tank.

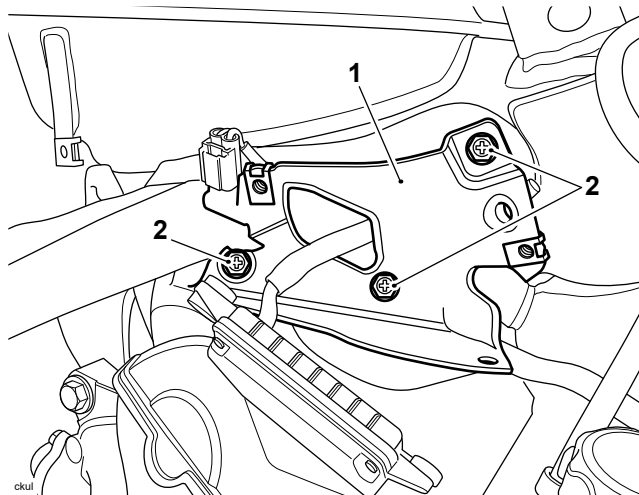
16. Reconnect the ignition switch electrical connector.



ckuc

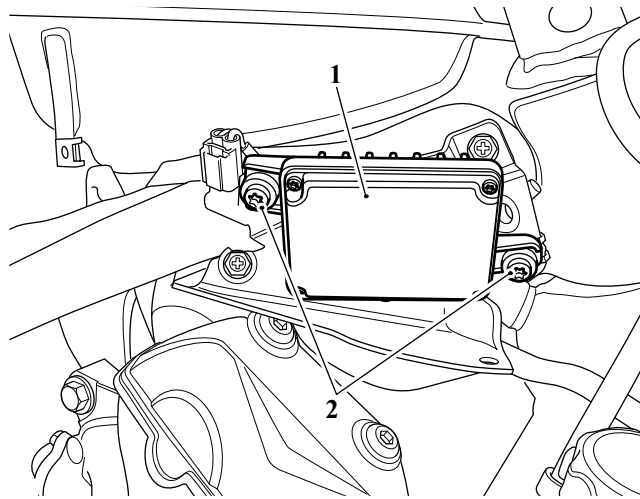
1. Right hand switch housing connector
2. Left hand switch housing connector A
3. Left hand switch housing connector B
4. Fuse box 2
5. Ignition switch connector

17. Refit the immobiliser bracket to the frame with three fixings and tighten to 3 Nm.



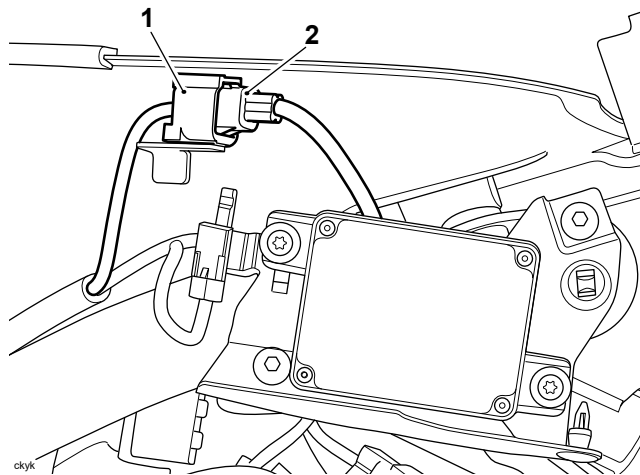
1. Immobiliser bracket
2. Fixings

18. Refit the immobiliser module with two new fixings and tighten to 1.5 Nm.



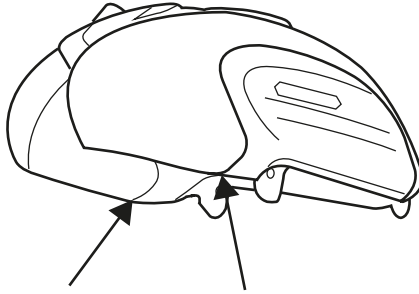
- 1. Immobiliser module
- 2. Fixings

19. Reattach the twist grip position sensor harness connector to the fuel tank bracket.



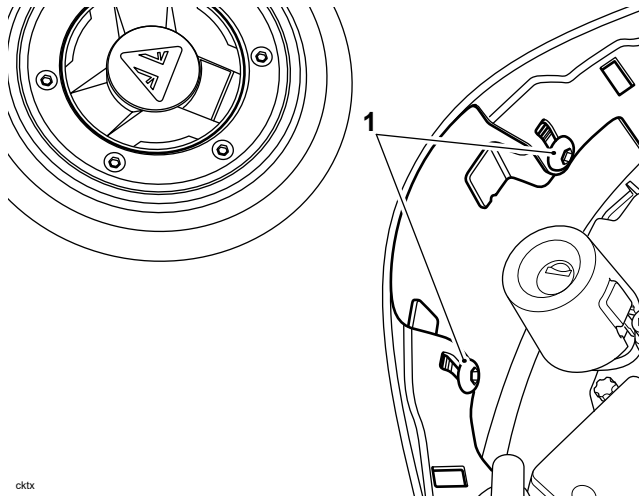
- 1. Twist grip position sensor main harness connector
- 2. Twist grip position sensor connector

20. Flex the fuel tank bodywork sides out slightly at the positions shown below and refit the fuel tank bodywork to the fuel tank.



Fuel tank flex positions

21. Install the two front fixings and tighten to 3 Nm.

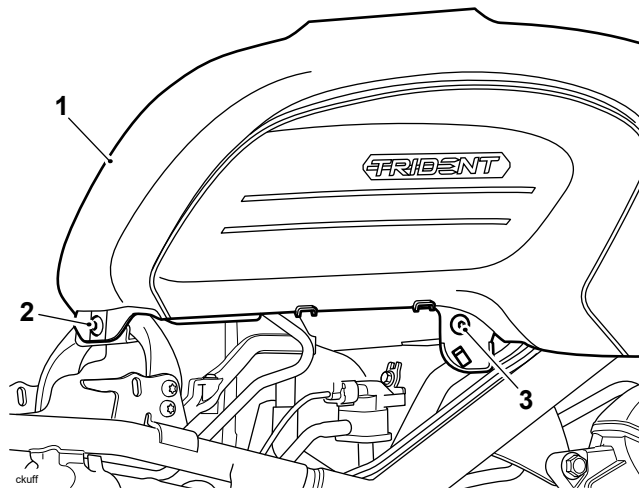


cktx

1. Front fixings

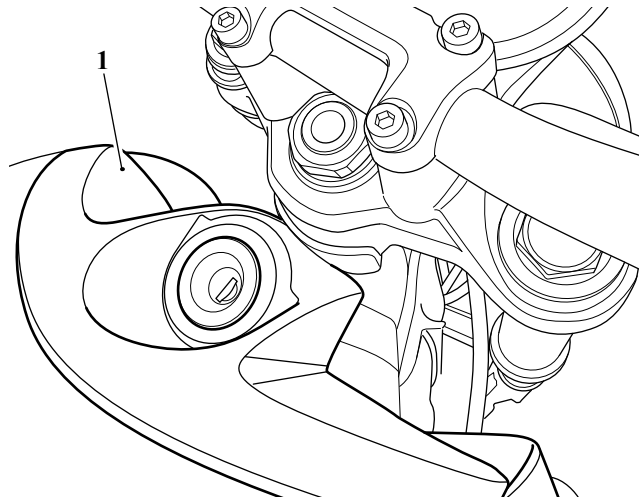
22. Refit the two bodywork side fixings and tighten to 3 Nm.

23. Refit the fuel tank bodywork rear fixing and tighten to 3 Nm.



1. Fuel tank bodywork
2. Rear fixing
3. Side fixing (right hand side shown)

24. Make sure the clips and rubber grommet are fitted and install the ignition barrel shroud to the front of the fuel tank.



1. Ignition barrel shroud

25. Using proprietary professional automotive workshop equipment approved for fuel handling, refill the fuel tank with the fuel previously removed.

Perform the following operations:

- [Side Panels - Installation](#)
- [Battery - Installation](#)
- Start the engine and check carefully for fuel leaks. Rectify as necessary.
- [Seat - Installation](#)

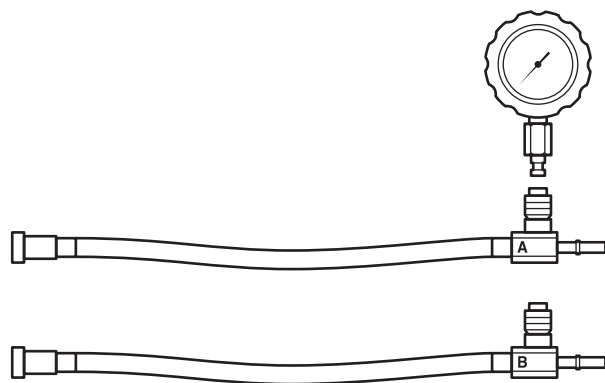
Fuel Pressure Checking

⚠ WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

Fuel pressure is checked using service tool T3880001.



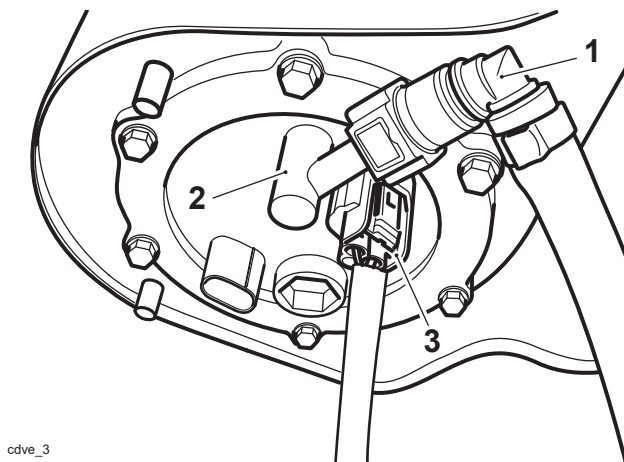
T3880001 - Fuel Pressure Gauge

1. Remove the fuel tank (see [Fuel Tank - Removal](#)) and place on a suitable support, close to the motorcycle.
2. Using the service tool T3880123, carefully connect the fuel pump connection on the main harness to the fuel tank.
3. Select the fuel pressure gauge adapter marked B from service tool T3880001.

⚠ WARNING

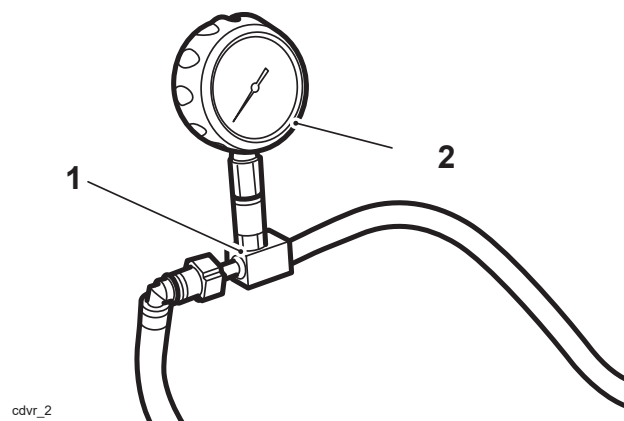
Always use the correct fuel pressure gauge adapter. Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

4. Connect the adapter hose to the fuel pump plate outlet as shown in the illustration below.



- 1. Adaptor hose B
- 2. Fuel pump plate outlet
- 3. T3880123 - Extension Cable

5. Connect the fuel hose to the adaptor hose.
6. Connect the fuel pressure gauge to the adaptor hose as shown below by pushing the gauge spigot into the adapter until a click can be heard.



- 1. Adaptor hose
- 2. Fuel pressure gauge

NOTICE

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.

7. Ensure the gauge is visible to the side of the motorcycle.
8. Temporarily reconnect the battery, positive (red) lead first and tighten the terminals to 4.5 Nm.
9. Start the engine and observe the fuel pressure reading on the gauge.

NOTICE

The fuel pressure should be 3.5 bar nominally.

10. When fuel pressure checking is complete, disconnect the battery, negative (black) lead first.

11. Disconnect the fuel pressure gauge adapter and wiring extension.
Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Fuel Cap Lock - 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

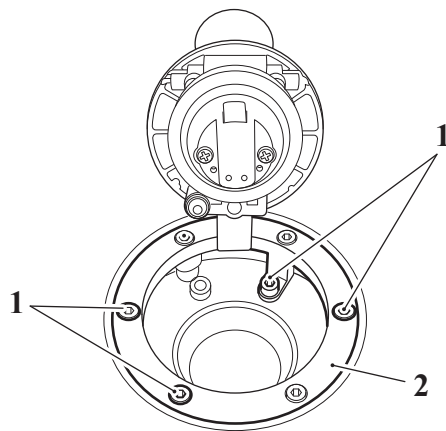
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

A new filler cap is supplied without the barrel lock. Therefore, the barrel in the original filler cap will need to be removed and fitted to the filler cap.

1. Remove the fuel tank (see [Fuel Tank - Removal](#)).
2. Drain the fuel tank into a suitable fuel proof container.
3. Open the fuel cap on the original fuel tank.
4. Remove the screws shown in the illustration below, then remove the fuel filler cap.



cfls_2

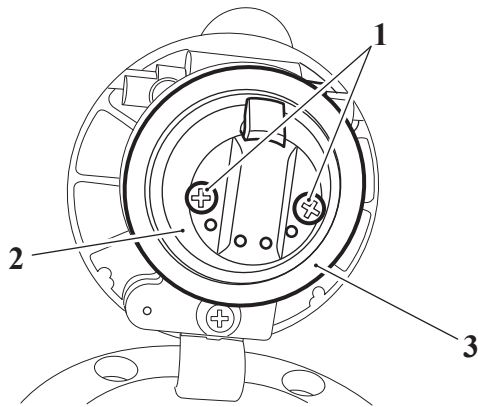
1. Screws
2. Filler cap

NOTICE

When removing the lock housing and sealing ring, the four sealing ring springs will become loose.

Note the position and orientation of the lock housing, sealing ring and springs for installation.

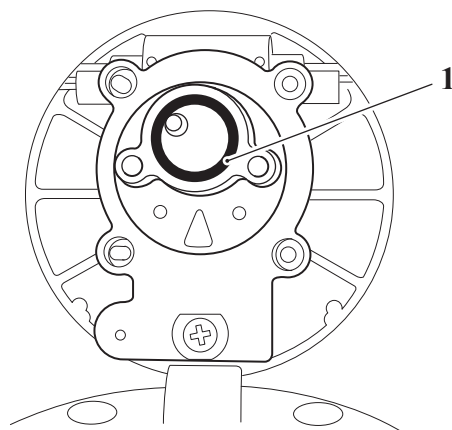
5. Remove the screws, then carefully remove the lock housing and sealing ring from the fuel cap and collect the four springs.



cfik_2

- | |
|---|
| 1. Screws
2. Lock housing
3. Sealing ring |
|---|

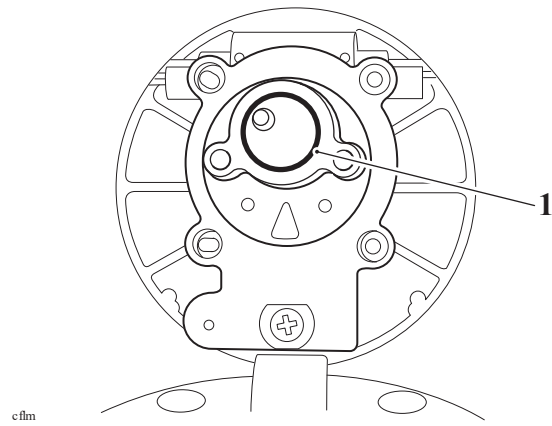
6. Remove the O-ring from the fuel cap.



cfli

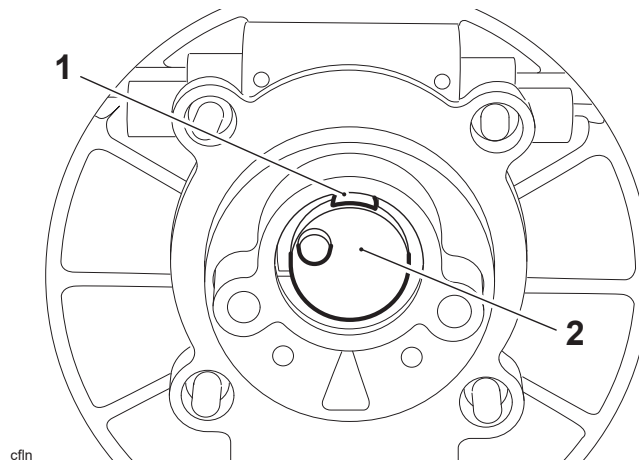
- | |
|-----------|
| 1. O-ring |
|-----------|

7. Remove the two washers (one washer is behind the other).



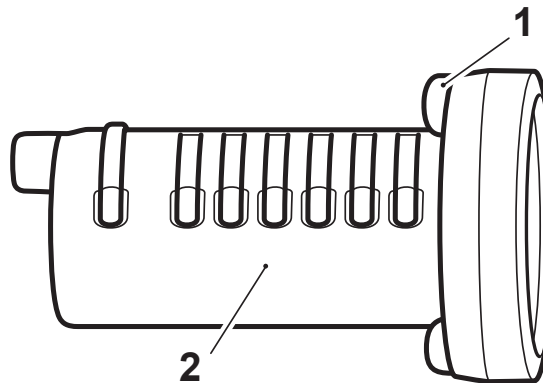
1. Washers

8. Using a suitable flat blade screwdriver, release the locking device for the barrel lock and push the barrel out of the fuel cap.



1. Locking device
2. Barrel lock

9. If still attached, remove the barrel lock seal.



cfl

1. Seal
2. Barrel lock

Fuel Cap Lock - Installation

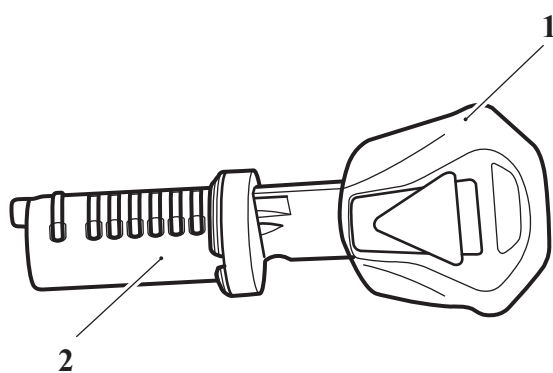
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

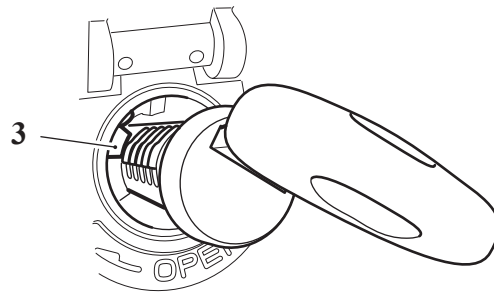
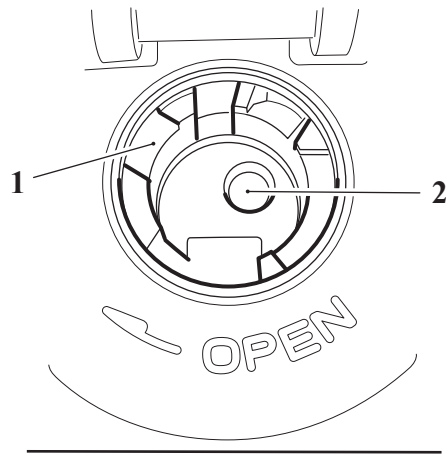
1. Insert the key into the barrel lock.



clip

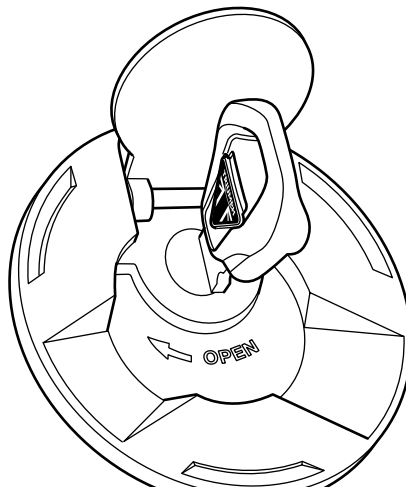
1. Key
2. Barrel lock

2. Align the locking device on the barrel to the small slot in the upper left hand side of the housing, as indicated in the illustration below.



- 1. Slot
- 2. Housing
- 3. Locking device

3. Push the barrel lock half way into the fuel cap.
4. Turn the lock clockwise until the key is vertical in the fuel cap.



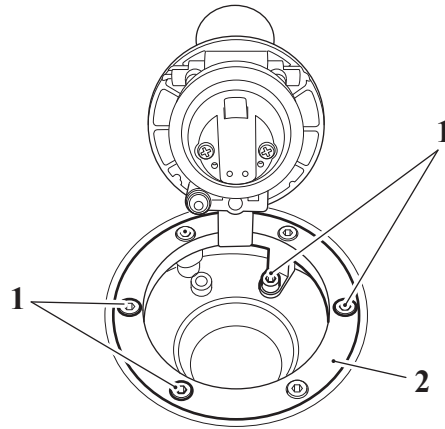
NOTICE



An audible click can be heard when the lock is pushed fully into the fuel cap.

5. Push the barrel fully into the fuel cap.

6. Fit the two washers to the fuel cap.
7. Fit the O-ring to the fuel cap.
8. Fit the lock housing, sealing ring and springs as noted during removal and secure with the screws.
9. Test the lock for normal operation.
10. Fit the filler cap to the fuel tank and secure with the screws shown in the illustration below. Tighten the screws to 4 Nm.



cfis_2

- | |
|---|
| <ol style="list-style-type: none">1. Screws2. Filler cap |
|---|

11. Fit the fuel tank (see [Fuel Tank - Installation](#)).
12. Refill the fuel tank with the fuel drained earlier.

Fuel Pump Assembly - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

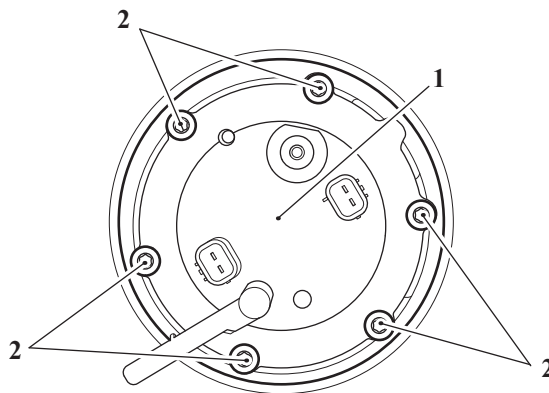
NOTICE

The fuel pump and fuel filter is a sealed for life unit and must be replaced as a complete assembly.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- Using proprietary professional automotive workshop equipment approved for fuel handling, drain the fuel from the fuel tank.
- [Fuel Tank - Removal](#)

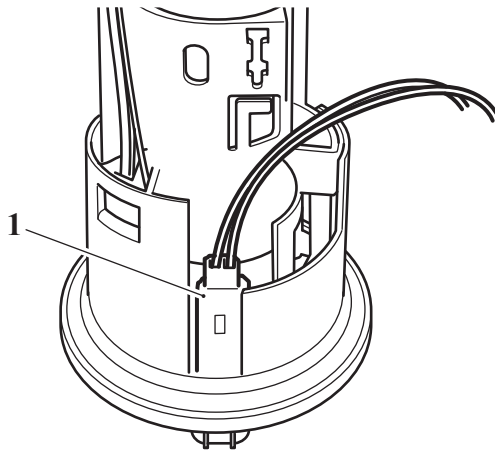
1. Invert the fuel tank and place on a protective surface to prevent paint damage.
2. Remove the fixings securing the fuel pump mounting plate to the fuel tank.



chxo_5

1. Mounting plate
2. Fixings

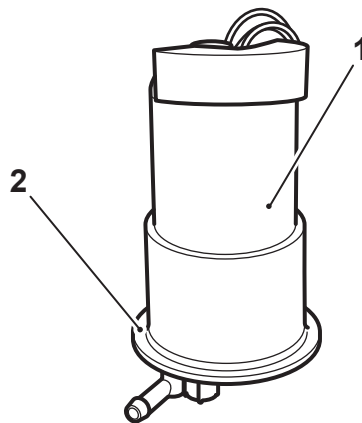
3. Lift the fuel pump assembly and manoeuvre it from the fuel tank aperture.
4. Disconnect the fuel level sensor electrical connector and remove the fuel pump and filter assembly.



cegz

1. Fuel level sensor electrical connector

5. Noting its orientation, remove and discard the sealing ring from the fuel pump assembly.

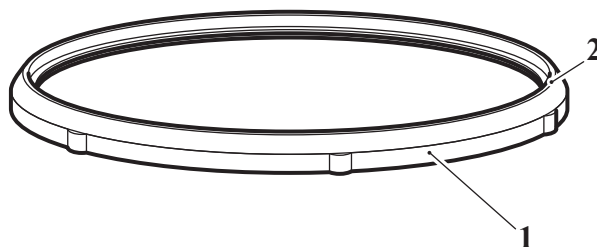


ccxh_1

1. Fuel pump assembly
2. Sealing ring location

Fuel Pump Assembly - Installation

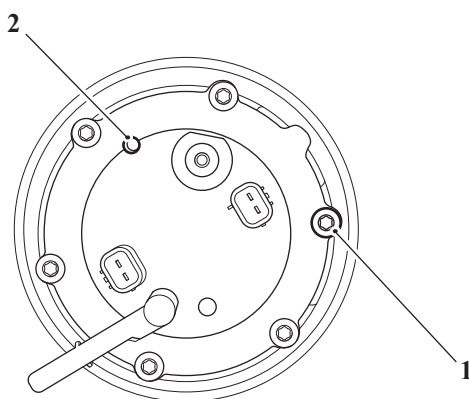
1. Install a new sealing ring into the fuel pump assembly, with the seal lip facing uppermost, and ensure that it is correctly seated.



cdva

- | |
|--------------------------------|
| 1. Sealing ring
2. Seal lip |
|--------------------------------|

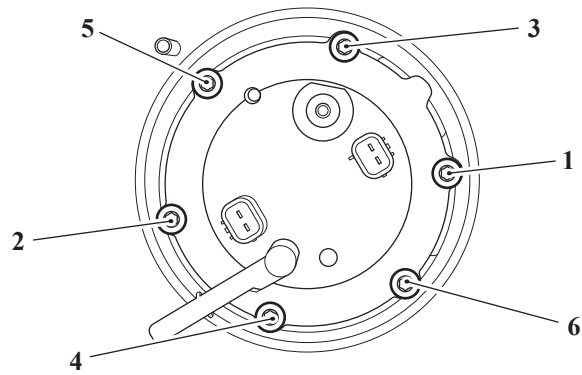
2. Taking care to ensure the sealing ring is not damaged or dislodged, manoeuvre the fuel pump assembly into the fuel tank aperture.
3. Reconnect the fuel level sensor electrical connector and locate the fuel pump and filter assembly.
4. Ensure the locating peg on the fuel pump assembly is located in the cut out on the mounting plate and the offset hole is positioned as shown below.



chxo_4

- | |
|--|
| 1. Offset hole position
2. Locating peg |
|--|

5. In the sequence shown below, tighten the mounting plate fixings to 9 Nm.



chxo_3

Pump Mounting Plate Torque Sequence

Perform the following operations:

- **Fuel Tank - Installation**
- Using proprietary professional automotive workshop equipment approved for fuel handling, refill the fuel tank with the fuel drained earlier.
- **Battery - Installation**
- **Seat - Installation**

Fuel Level Sensor - 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.

NOTICE

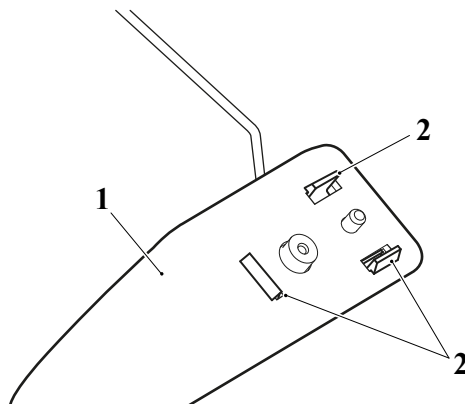
The fuel level sensor is located inside the fuel tank on the right hand side.

Access to the fuel level sensor is through the aperture for the fuel pump.

Perform the following operations:

- **Fuel Pump Assembly - Removal**

1. Press the three locking tabs inwards to remove fuel level sensor from the bracket.



- | |
|---|
| <p>1. Bracket (inside fuel tank)</p> <p>2. Locking tabs</p> |
|---|

2. Carefully manoeuvre the fuel level sensor out of the fuel tank.

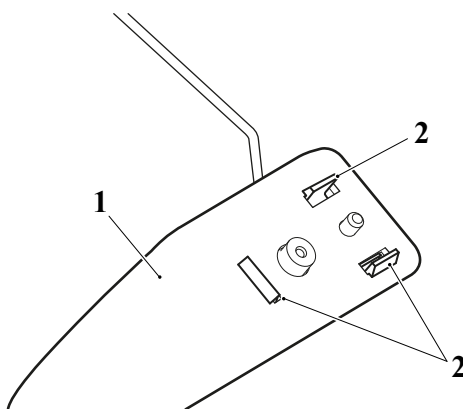
Fuel Level Sensor - Installation

⚠ WARNING

Observe the warning advice given in the General Information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property could result from spilled fuel or fuel not handled or stored correctly.

1. Align the three locking tabs into the holes in the bracket and push to secure.
2. Make sure the fuel level sensor is held securely.



1. Bracket (inside fuel tank)
2. Locking tabs

Perform the following operations:

- [Fuel Pump Assembly - Installation](#)

Airbox - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

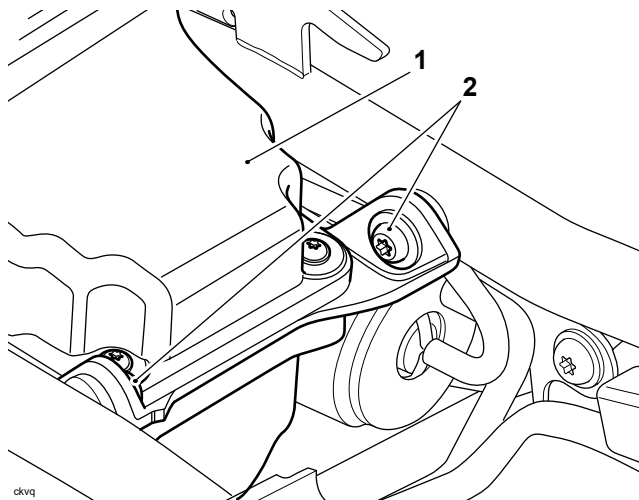
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

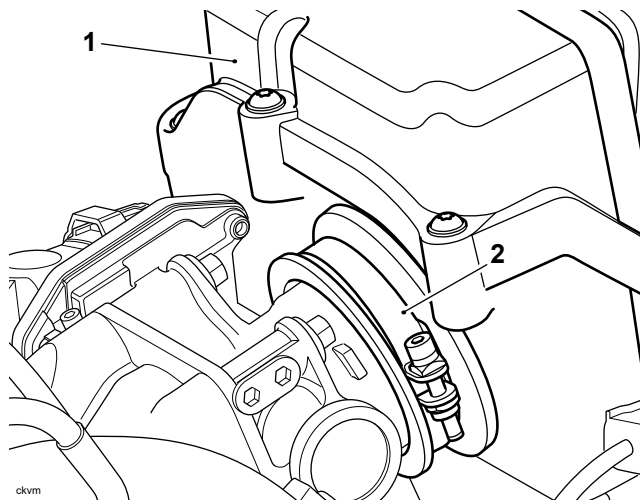
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

1. Remove the two rear fixings and flanged sleeves.



- 1. Airbox
- 2. Fixings

2. Loosen the clamp at the front of the airbox.



- 1. Airbox
- 2. Clamp

3. Move the airbox rearwards and upwards and remove the breather hose and secondary air injection hose from the front of the airbox.
4. Remove the airbox. Note the position of the rubber seal and clamp for installation.

Airbox - Installation

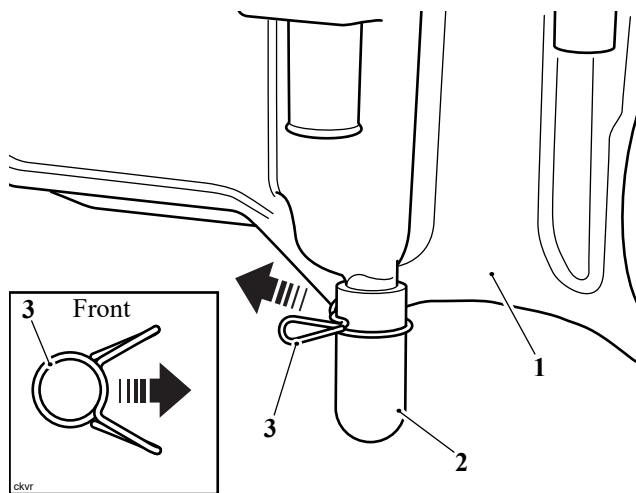
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

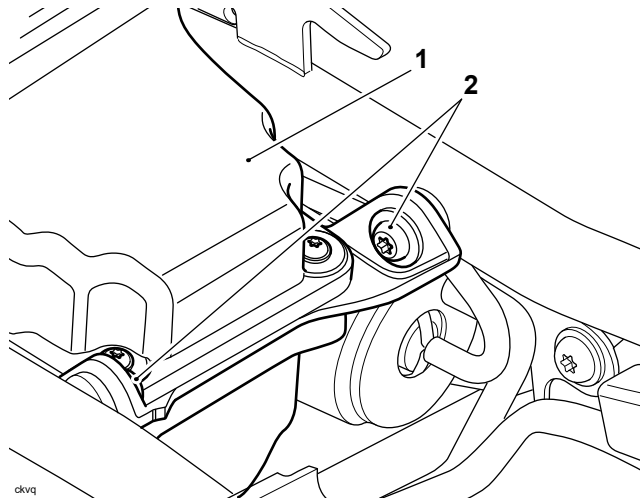
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Make sure the blank is fitted to the underside of the airbox and the clip is positioned towards the centreline.



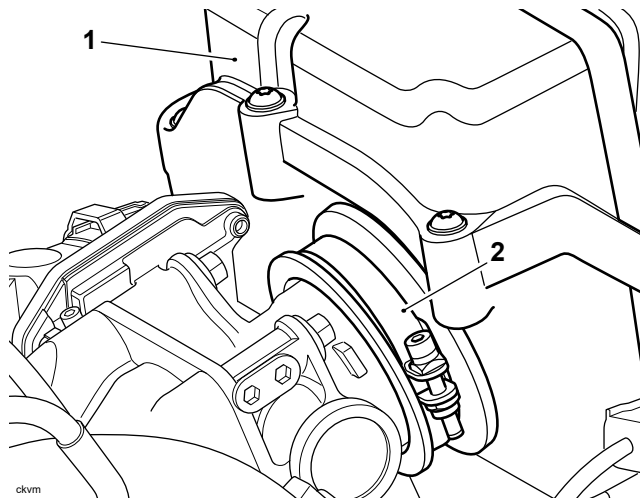
1. Airbox
2. Blank
3. Clip

2. Make sure the rubber seal and clamp are fitted to the airbox as noted during removal.
3. Position the airbox to the motorcycle and refit the secondary air injection hose and breather hose to the airbox.
4. Push the airbox forwards on to the throttle body and align the two rear fixing holes.
5. Install the two rear fixings and flanged sleeves and tighten to 6 Nm.



1. Airbox
2. Fixings

6. Tighten the airbox clamp to 1.5 Nm.



1. Airbox
2. Clamp

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Air Filter - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

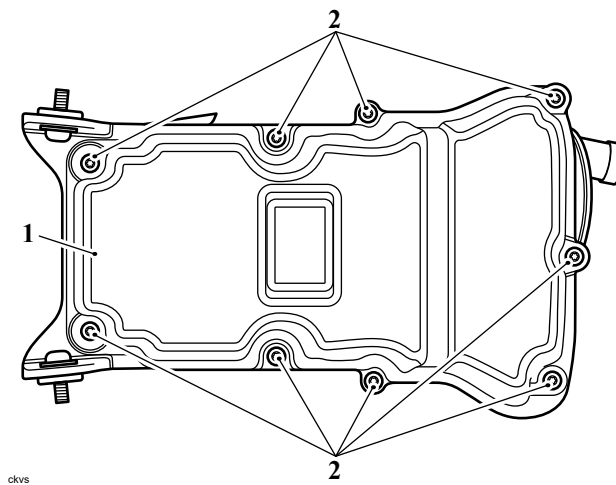
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

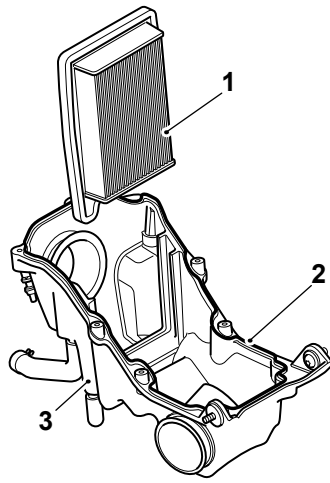
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

1. Remove the nine fixings and separate the airbox upper from the airbox.



- 1. Airbox upper
- 2. Fixings

2. Remove the air filter from the airbox.



ckm

- 1. Air filter
- 2. Seal
- 3. Airbox

Air Filter - Installation

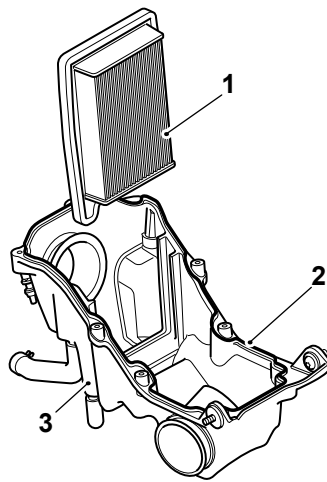
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

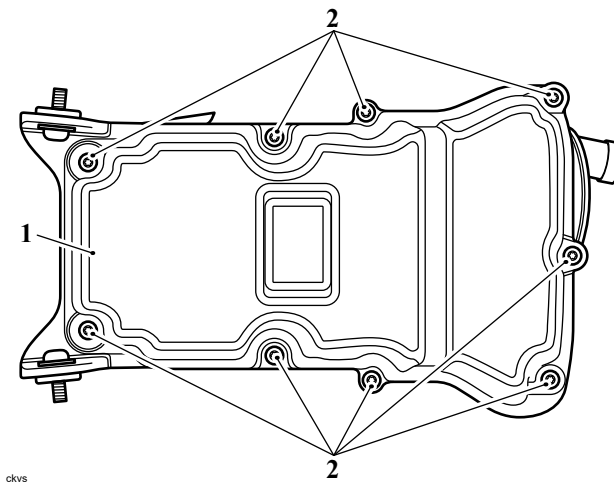
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Install the air filter into the airbox.
2. Check the condition of the seal and, if necessary, replace.



1. Air filter
2. Seal
3. Airbox

3. Fit the airbox upper to the airbox and secure with nine fixings. Tighten to 1.5 Nm.



1. Airbox upper
2. Fixings

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Throttle Body - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

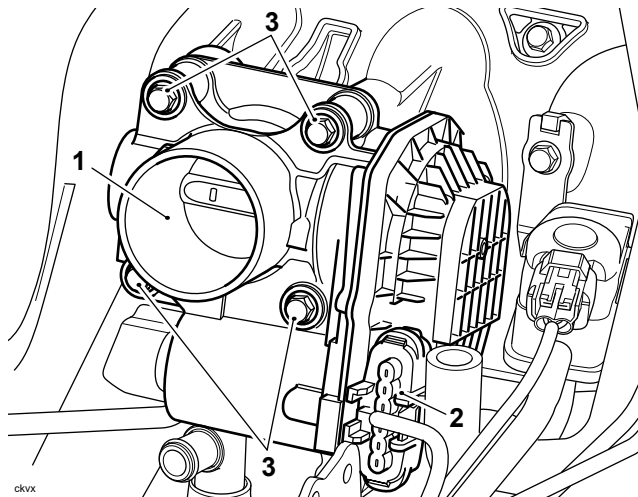
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)

1. Disconnect the throttle actuator motor multiplug.



1. Throttle body
2. Throttle actuator motor multiplug
3. Fixings

2. Remove the four fixings and washers securing the throttle body to the inlet manifold and remove the throttle body.

3. Remove and discard the inlet manifold seal.

Throttle Body - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

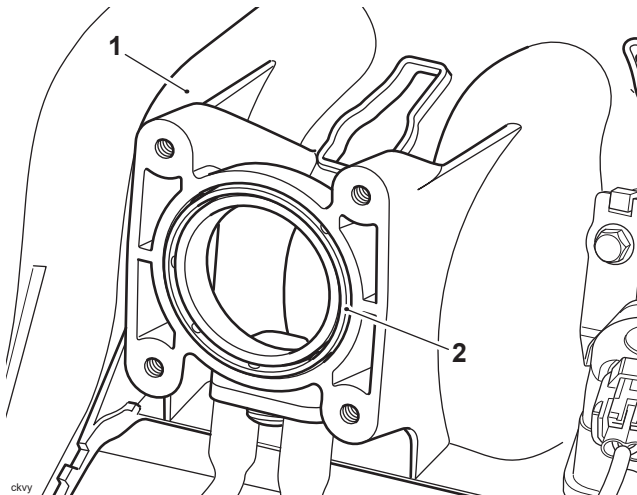
⚠ CAUTION

Never use lubricants when fitting throttle bodies onto transition pieces, evaporative hoses (EVAP) or manifold absolute pressure hoses (MAP) on to spigots.

When dried, the lubricant may block spigots and/or restrictors.

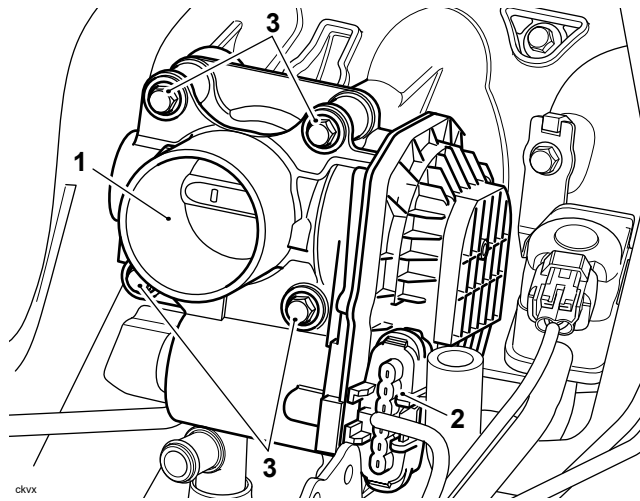
A blocked spigot and/or restrictor will cause the engine to operate inefficiently, and a DTC (diagnostic trouble code) to be recorded.

1. Ensure the mating surfaces of the throttle body and inlet manifold are clean.
2. Fit a new seal to the inlet manifold.



1. Inlet manifold
2. Seal

3. Install the throttle body to the inlet manifold and secure with four fixings and washers. tighten to 8 Nm.
4. Connect the multiplug to the throttle actuator motor.



1. Throttle body
2. Throttle actuator motor multiplug
3. Fixings

Perform the following operations:

- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Inlet Manifold - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

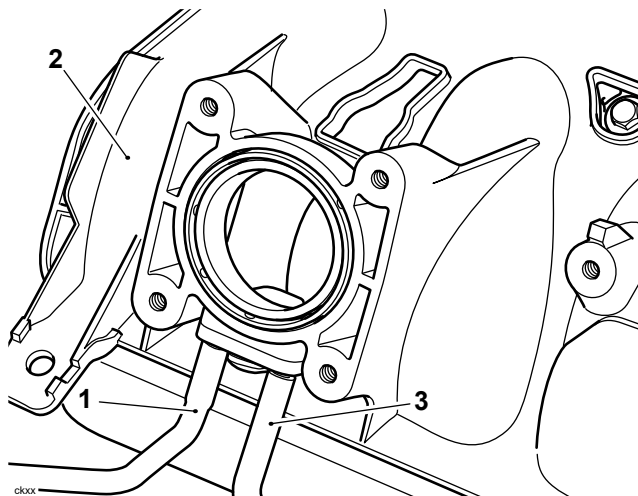
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

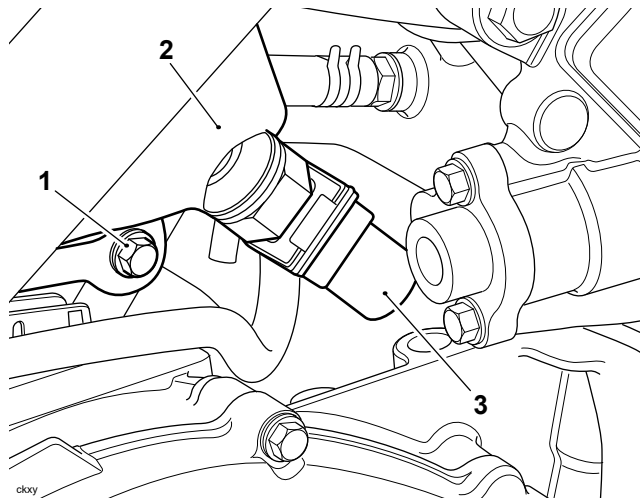
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Throttle Body - Removal](#)
- [Purge Control Valve - Removal](#)

1. Unclip the harness from the inlet manifold moulding, noting the routing of the harness and the position of the clips for installation.
2. Remove the MAP sensor hose and purge valve hose from the inlet manifold moulding.



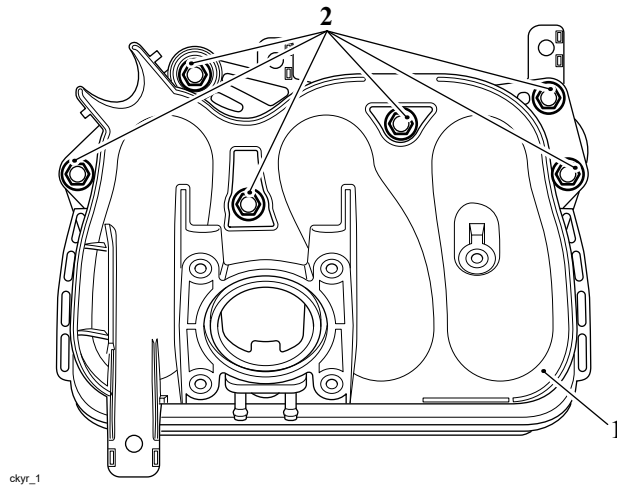
1. MAP sensor hose
2. Inlet manifold moulding
3. Purge valve hose

3. Remove the three fixings and remove the fuel rail assembly from the inlet manifold.
4. Disconnect the intake air temperature sensor from the engine sub harness.
5. Remove the intake air temperature sensor from the inlet manifold moulding.
6. Remove the tie bar fixing from the inlet manifold moulding.



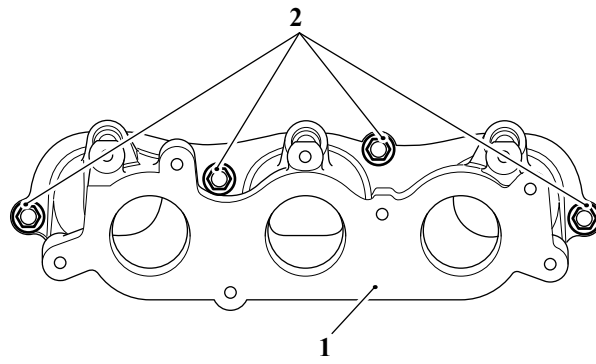
- 1. Tie bar fixing
- 2. Inlet manifold moulding
- 3. Intake air temperature sensor

7. Remove the six fixings and remove the inlet manifold moulding. Discard the three seals.



- 1. Inlet manifold moulding
- 2. Fixings

8. Remove the four fixings and remove the inlet manifold casting from the cylinder head. Discard the three seals.



ckya_1

- 1. Inlet manifold casting
- 2. Fixings

Inlet Manifold - Installation

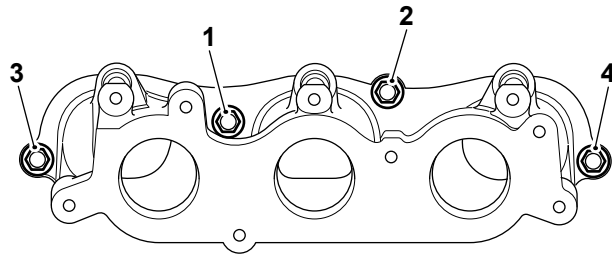
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

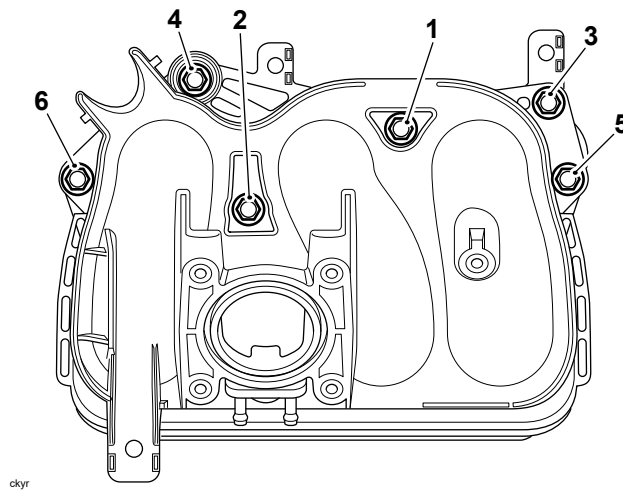
1. Install new seals to the inlet manifold casting and fit the casting to the cylinder head. Refit the fixings and tighten to 8 Nm in the sequence shown below. Tighten the fixings a second time in the same sequence to 8 Nm.



dkyq

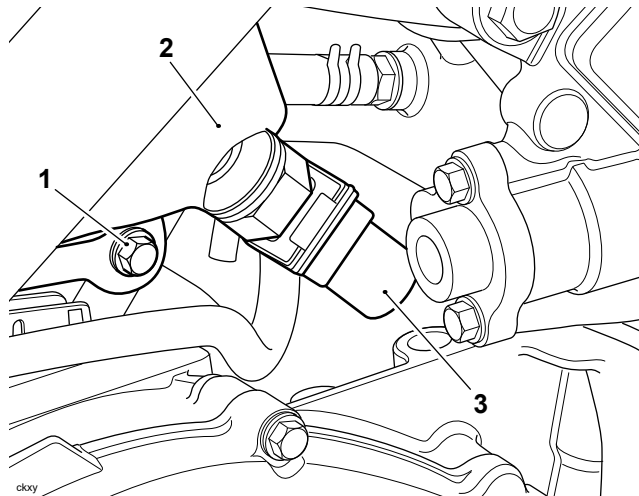
Inlet manifold casting tightening sequence

2. Make sure the mating faces of the inlet manifold casting and inlet manifold moulding are clean and free from debris.
3. Install new seals to the inlet manifold moulding and refit the moulding to the inlet manifold casting. Tighten the fixings 8 Nm in the sequence shown below.



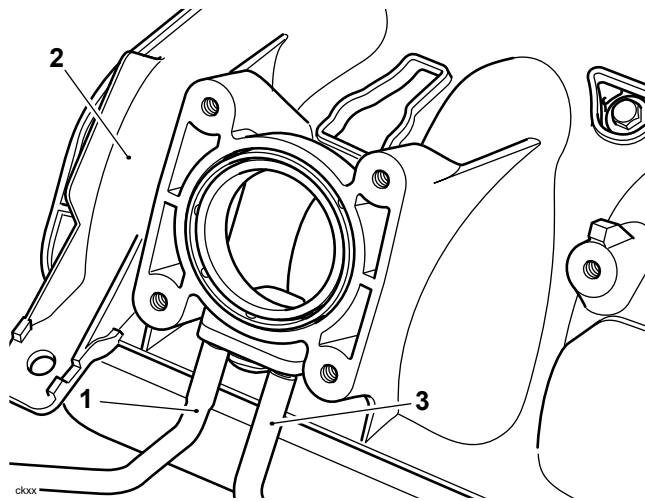
Inlet manifold moulding tightening sequence

4. Retighten fixings 1 and 2 to 8 Nm.
5. Install the tie bar fixing and tighten to 8 Nm.
6. Check the condition of the intake air temperature sensor rubber washer and replace if necessary.
7. Make sure the threads of the intake air temperature sensor are clean and apply Threebond 1360.
8. Install the intake air temperature sensor to the inlet manifold moulding and tighten to 1 Nm.
9. Reconnect the intake air temperature sensor to the engine subharness.



1. Tie bar fixing
2. Inlet manifold moulding
3. Intake air temperature sensor

10. Refit the fuel rail assembly to the inlet manifold casting and tighten the fixings to 4 Nm.
11. If the restrictor in the MAP hose has been removed, refit the restrictor (see [Manifold Absolute Pressure \(MAP\) Hose Restrictor](#)).
12. Reconnect the MAP sensor hose and purge valve hose to the inlet manifold moulding.



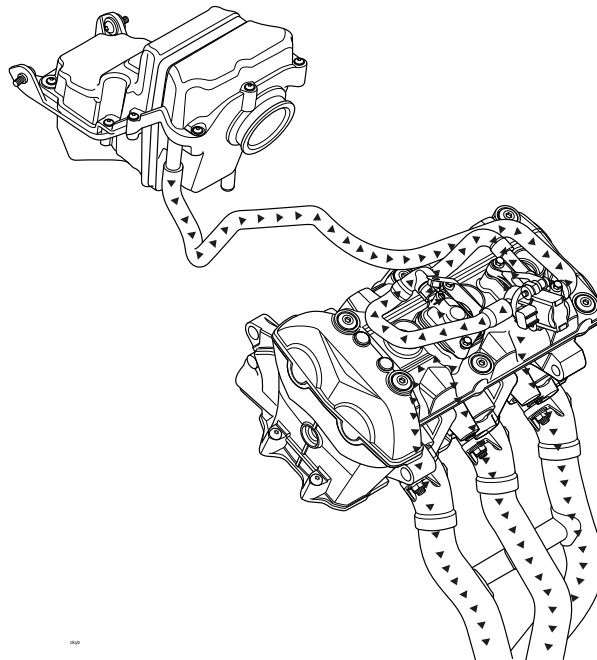
- | |
|---|
| <ul style="list-style-type: none">1. MAP sensor hose2. Inlet manifold moulding3. Purge valve hose |
|---|

13. Reclip the harness to the inlet manifold moulding as noted during removal.

Perform the following operations:

- **Purge Control Valve - Installation**
- **Throttle Body - Installation**
- **Airbox - Installation**
- **Fuel Tank - Installation**
- **Battery - Installation**
- **Seat - Installation**

Secondary Air Injection



System Purpose and Operation

The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber.

At certain specific engine speeds (determined by the factory programming of the engine management system), the secondary air injection control valve is opened by the ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the control valve, through the open reed valves, into the exhaust port. This air promotes secondary combustion of the exhaust gases in the ports and the header system.

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

Secondary Air Injection Solenoid Valve - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

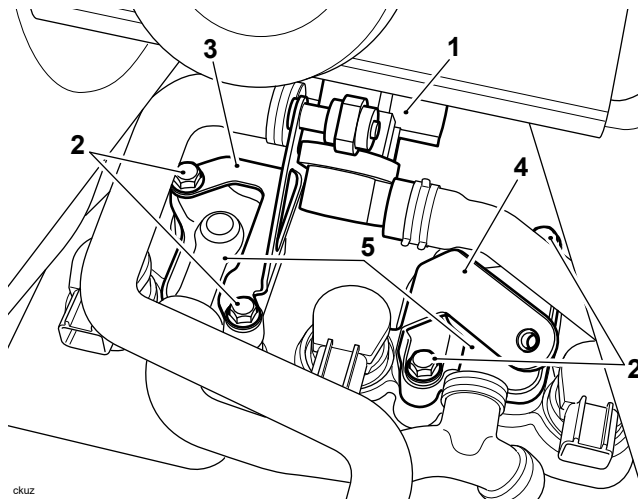
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [ABS Modulator - Removal](#)

1. Release the hoses attached to the valve.
2. Disconnect the solenoid valve multiplug.



Harness shown removed for clarity

1. Solenoid valve
2. Reed valve cover fixings
3. Solenoid valve bracket
4. ABS modulator bracket
5. Reed valve covers

3. Gently pull the valve to detach it from the bracket.

Secondary Air Injection Solenoid Valve - Installation

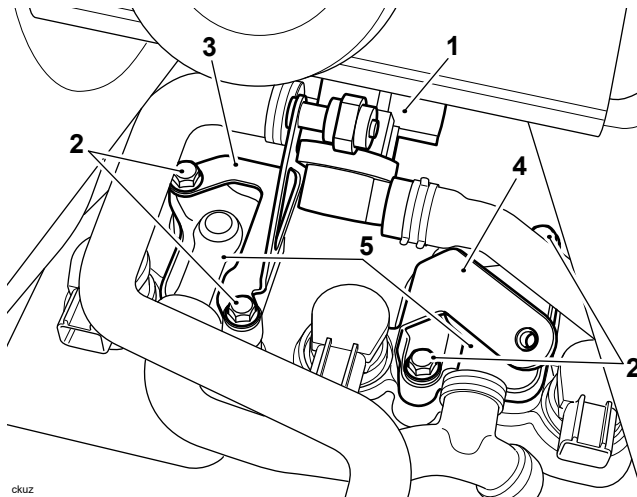
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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1. Locate the solenoid valve to the bracket.
2. Reconnect the multiplug.
3. Refit the hoses to the valve.



Harness shown removed for clarity

1. Solenoid valve
2. Reed valve fixings
3. Solenoid valve bracket
4. ABS modulator bracket
5. Reed valves

Perform the following operations:

- [ABS Modulator - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Secondary Air Injection Reed Valves - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

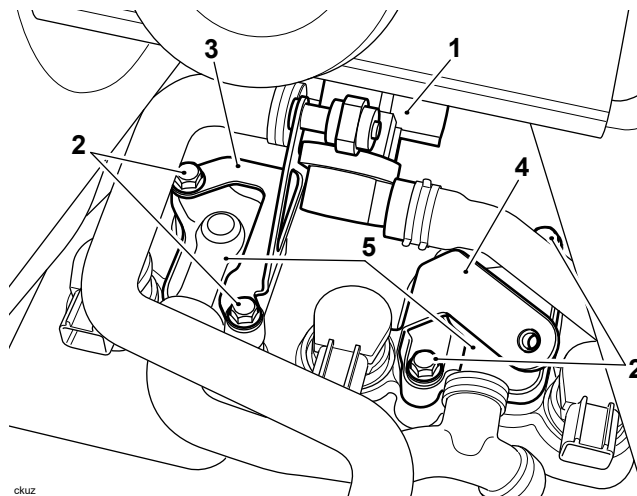
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [ABS Modulator - Removal](#)
- [Secondary Air Injection Solenoid Valve - Removal](#)

1. Release the spring clips and detach the secondary air injection feed hoses from the reed valves on the camshaft cover.

NOTICE

Note that the mounting bracket for the secondary air injection solenoid valve is secured by the fixings for the left hand reed valve cover. The ABS mounting bracket is secured by the fixings for the right hand reed valve cover.

2. Release the bolts securing the valve covers to the camshaft cover.

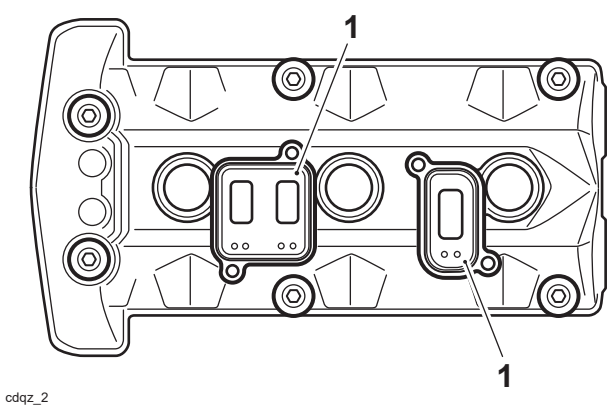


Harness shown removed for clarity

- 1. Solenoid valve
- 2. Reed valve cover fixings
- 3. Solenoid valve bracket
- 4. ABS modulator bracket
- 5. Reed valve covers

3. Ease the valve covers from the valves.

4. Detach the valves from the camshaft cover.

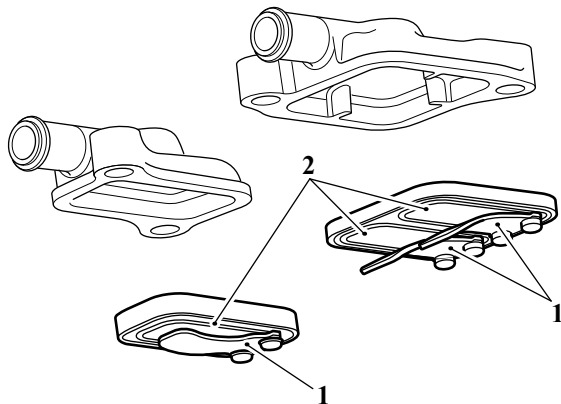


cdqz_2

1. Reed valves

Secondary Air Injection Reed Valves - Inspection

1. Check for cracks, bending or other damage to the reed valves. Replace as necessary.
2. Check for cracks or other damage to the reed valve limiting plates. Replace as necessary.
3. Clean any carbon build up on the reed valve assemblies, reed valve cover and the camshaft cover.
4. Check for damage to the seal areas on the reed valve assemblies. Replace as necessary.
5. Make sure the reed valve limiting plates are fitted as shown in the illustration below.



clcu

- | |
|--|
| <ol style="list-style-type: none">1. Reed valve limiting plates2. Reed valves |
|--|

Secondary Air Injection Reed Valves - Installation

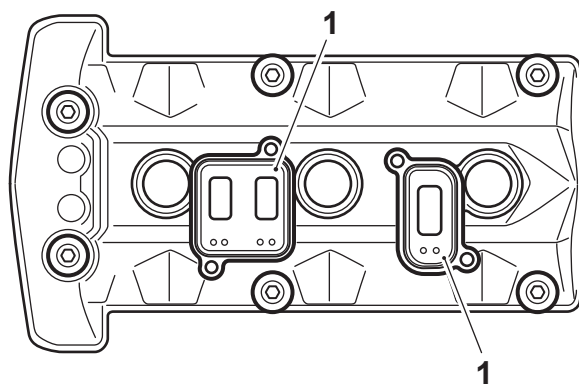
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

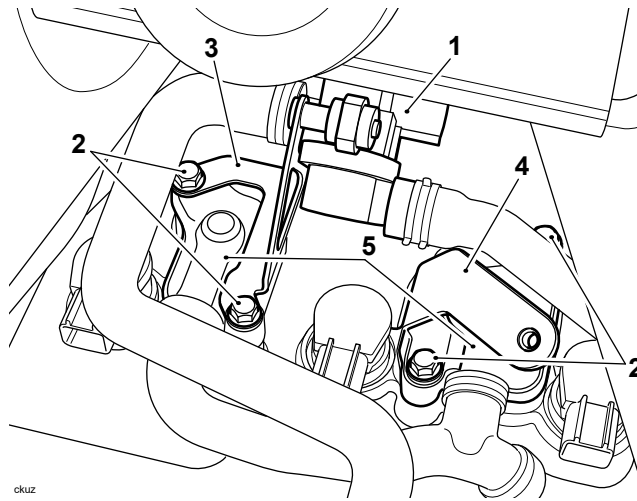
1. Fit the reed valves to the camshaft cover.



cdqz_2

1. Reed valves

2. Refit the valve covers, and the brackets for the secondary air injection solenoid and ABS modulator, as noted for removal. Tighten the fixings to 9 Nm.



Harness shown removed for clarity

1. Solenoid valve
2. Reed valve cover fixings
3. Solenoid valve bracket
4. ABS modulator bracket
5. Reed valve covers

3. Refit the secondary air injection feed hoses to the reed valves.

Perform the following operations:

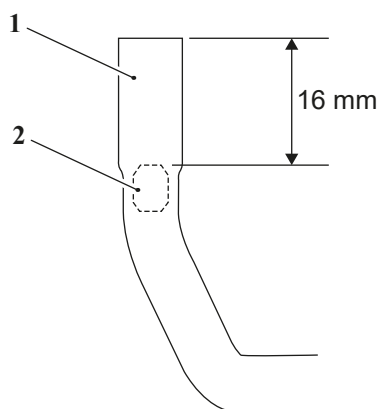
- [Secondary Air Injection Solenoid Valve - Installation](#)
- [ABS Modulator - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Manifold Absolute Pressure (MAP) Hose Restrictor

NOTICE

Do not use P80 lubricant on the restrictor or MAP hose.

The MAP hose restrictor is fitted to the flared end (inlet manifold end) of the MAP hose to the depth shown.



- 1. MAP hose
- 2. Restrictor

Removal and Installation - Engine Management Components

Engine Electronic Control Module (ECM) - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

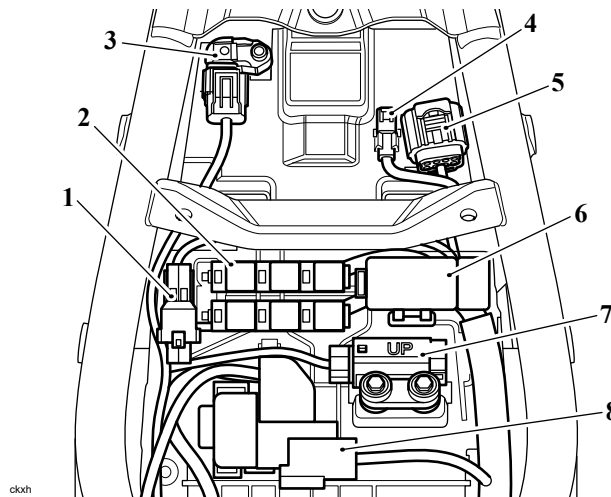
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Seat - Removal**
- **Battery - Removal**

1. Note the position and routing of the harness.
2. Release the diagnostic connector from its locating tang.
3. Remove the starter solenoid from the engine ECM tray and rest to one side.
4. Release the fixing and remove the ambient air pressure sensor and rest to one side.
5. Tilt the alarm electrical connector towards the rear and slide rearwards to release from the battery tray.
6. Unclip the rear light connector from the battery tray.
7. Disconnect the fall detection switch electrical connector.
8. Remove the two relay blocks and rest to one side, noting the position of each block for installation. The rear block has blue tape to identify.
9. Remove the fuse box from the engine ECM tray.



1. Accessory USB connector
2. Relays
3. Ambient air pressure sensor
4. Rear light connector
5. Alarm connector
6. Fuse box
7. Fall detection switch
8. Starter solenoid

10. Move the harness and seat lock cables clear of the engine ECM tray, noting their position for installation.
11. Unclip the accessory USB connector from the engine ECM tray.

12. Release the two fixings and raise the engine ECM tray from the battery tray. Unclip the ECM tray from the rear and remove from the battery tray.
13. Disconnect the three engine ECM harness connectors and remove the engine ECM.

Engine Electronic Control Module (ECM) Installation

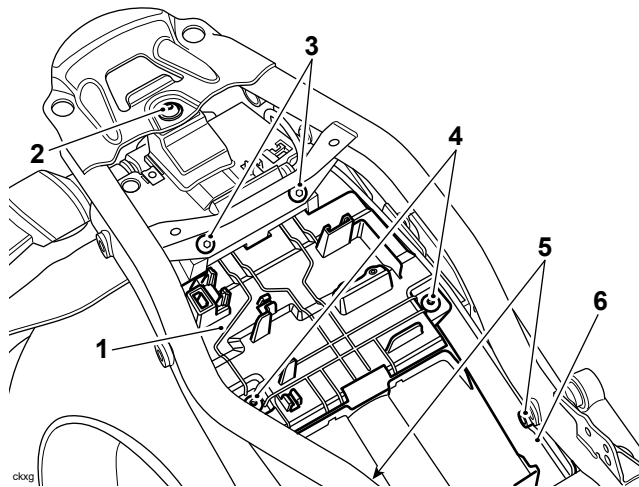
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

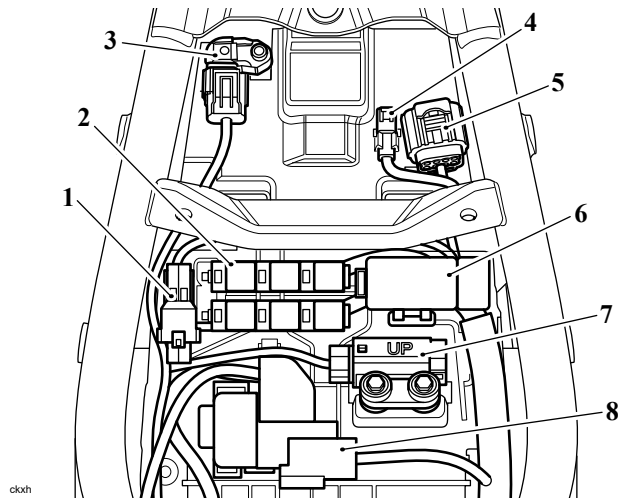
1. Install the engine ECM and reconnect the three electrical connectors.
2. Refit the engine ECM tray with two fixings and tighten to 5 Nm.



Harness not shown for clarity

1. Engine ECM tray
2. Rear fixing
3. Centre fixings
4. Engine ECM tray fixings
5. Side fixings
6. Battery tray

3. Reroute the harness and seat lock cable over the engine ECM tray as noted during removal.
4. Reclip the accessory USB connector to the engine ECM tray.
5. Refit the fuse box to the engine ECM tray.
6. Refit the relay blocks to the engine ECM tray in the positions as noted during removal.
7. Reconnect the fall detection switch electrical connector.
8. Refit the starter solenoid to the battery tray.
9. Reclip the alarm and rear light connectors to the battery tray.
10. Refit the ambient air pressure sensor to the battery tray and tighten the fixing to 3 Nm.



1. Accessory USB connector
2. Relays
3. Ambient air pressure sensor
4. Rear light connector
5. Alarm connector
6. Fuse box
7. Fall detection switch
8. Starter solenoid

11. Refit the diagnostic connector to its locating tang.

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Immobiliser/TPMS Control Module - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

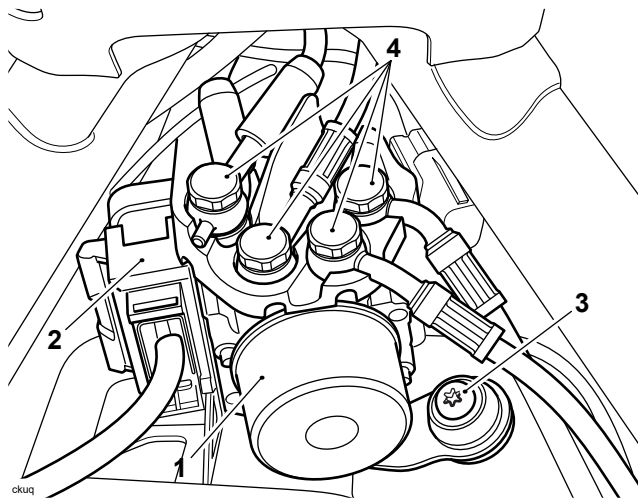
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

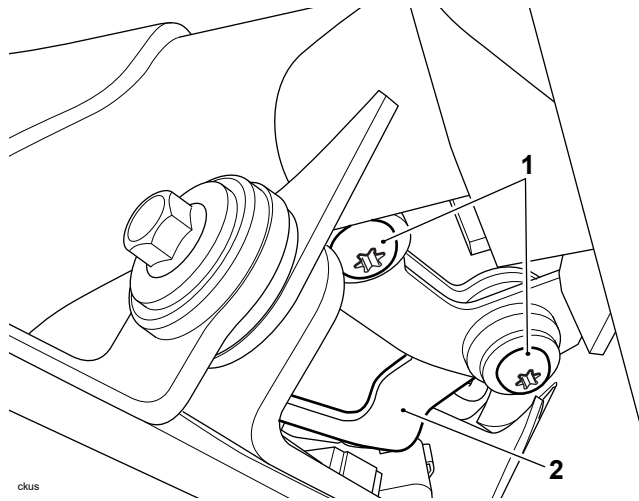
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

1. Remove and discard the rear fixing from the ABS modulator bracket.



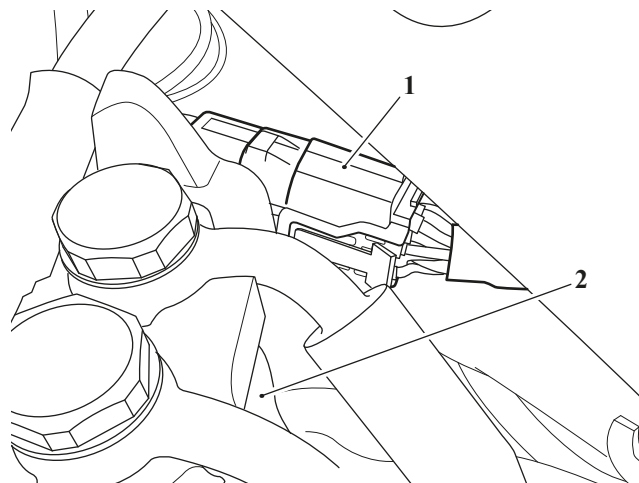
1. ABS modulator
2. ABS modulator multiplug
3. ABS modulator rear fixing
4. Brake line unions

2. Remove and discard the two fixings and remove the ABS modulator and bracket assembly from the frame.



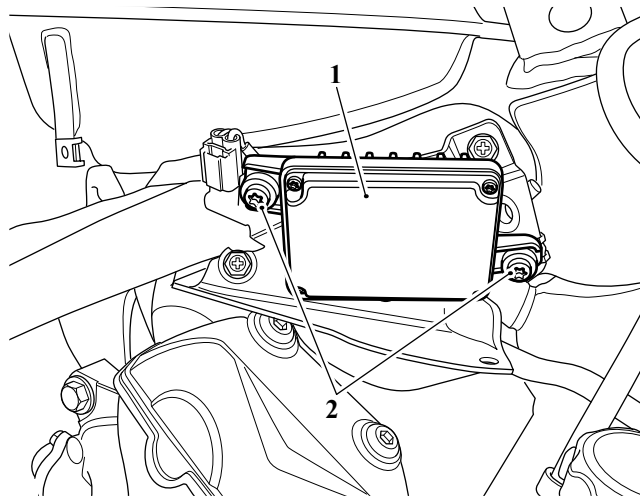
- | |
|---|
| <p>1. Fixings</p> <p>2. ABS modulator bracket</p> |
|---|

3. Manoeuvre the ABS modulator to the left hand side to gain access to the immobiliser electrical connector.
4. Unclip the immobiliser electrical connector from the ABS modulator bracket.
5. Disconnect the immobiliser from the main harness. Feed the harness through the frame, noting the routing for installation.



- | |
|--|
| <p>1. Immobiliser electrical connector</p> <p>2. ABS modulator</p> |
|--|

6. Remove the two fixings and remove the immobiliser/TPMS module.



- 1. Immobiliser
- 2. Fixings

Immobiliser/TPMS Control Module - Installation

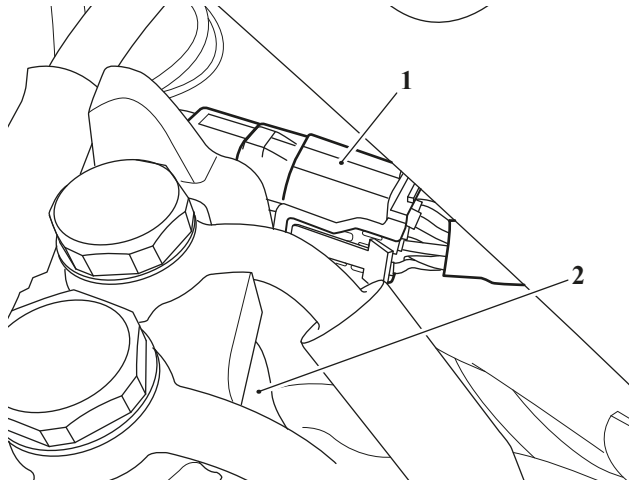
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

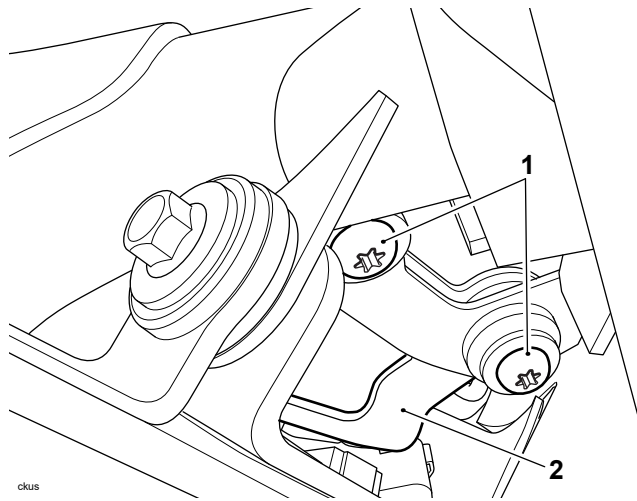
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Route the immobiliser harness through the frame as noted during removal.
2. Secure the immobiliser with two fixings and tighten to 1.5 Nm.
3. Reconnect the immobiliser to the main harness.



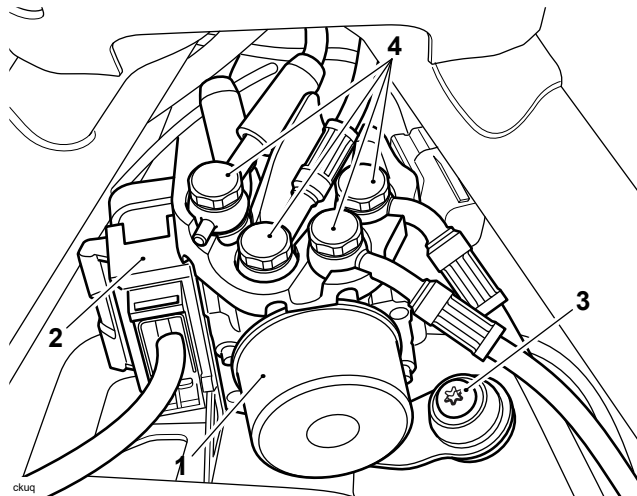
1. Immobiliser electrical connector
2. ABS modulator

4. Make sure the two rubber grommets are fitted to the frame and one is fitted to the ABS modulator bracket.
5. Align the ABS modulator and bracket to the frame and secure with two flanged sleeves and two new fixings. Tighten the fixings to 9 Nm.



1. Fixings
2. ABS modulator bracket

6. Install a flanged sleeve and new fixing and tighten to 9 Nm.



1. ABS modulator
2. ABS modulator multiplug
3. ABS modulator rear fixing
4. Brake line unions

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Twist Grip - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

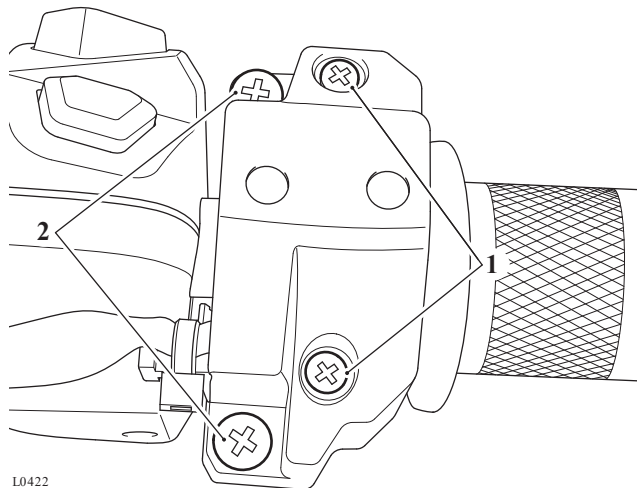
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Handlebar End Weights - Removal](#) (if applicable)

NOTICE

The anti-tamper fixings on the twist grip housing must not be loosened or removed.

If the anti-tamper screws have been loosened or removed any warranty claims for the twist grip housing will not be honoured.

1. Release the fixings and remove the clamp for the twist grip housing from the handlebar.



1. Anti-tamper fixings
2. Fixings

NOTICE

Note the position and orientation of the twist grip to its housing for installation.

2. Slide the twist grip assembly off the handlebar.

Twist Grip - Installation

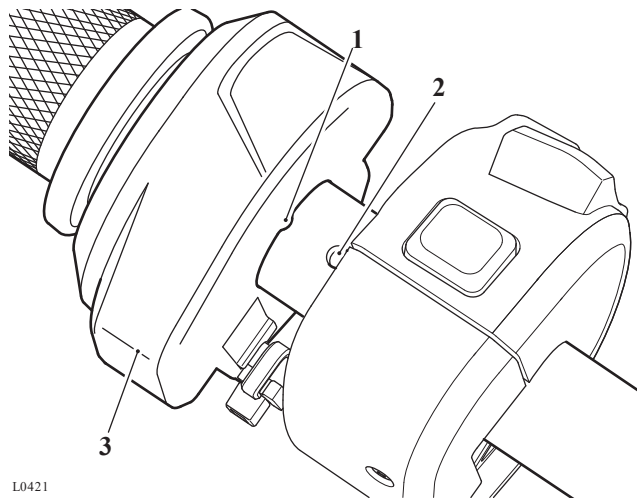
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Slide the twist grip onto the handlebar and align it to the twist grip position sensor as noted for removal.
2. Fit the twist grip clamp. Ensure the locating lug fits into its hole on the handlebar.



1. Locating lug
2. Hole
3. Twist grip clamp

3. Fit and fixings and tighten, upper one first, to 2.5 Nm.
Perform the following operations:

- [Handlebar End Weights - Installation](#) (if applicable)
- [Battery - Installation](#)
- [Seat - Installation](#)

Twist Grip Position Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

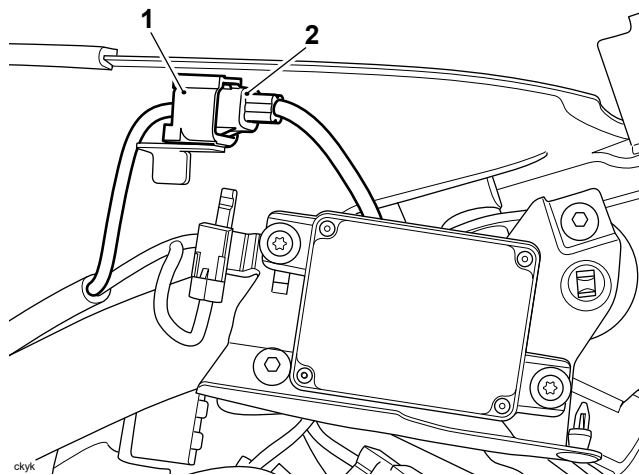
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- Remove the fuel tank bodywork (see [Fuel Tank - Removal](#))
- [Twist Grip - Removal](#)

1. Detach the twist grip position sensor connection from the right hand side of the fuel tank.
2. Disconnect the twist grip position sensor from the main harness.



1. Twist grip position sensor main harness connector
2. Twist grip position sensor connector

NOTICE

Note the routing of the twist grip harness for installation.

3. Remove the rubber band that secures the right hand switch cube harness, right hand side front direction indicator harness and twist grip position sensor harness. Note its position for installation.
4. Route the twist grip harness out of the frame to the twist grip.

NOTICE

Note the orientation of the twist grip position sensor for installation.

5. Slide the twist grip position sensor off the handlebar.

Twist Grip Position Sensor - Installation

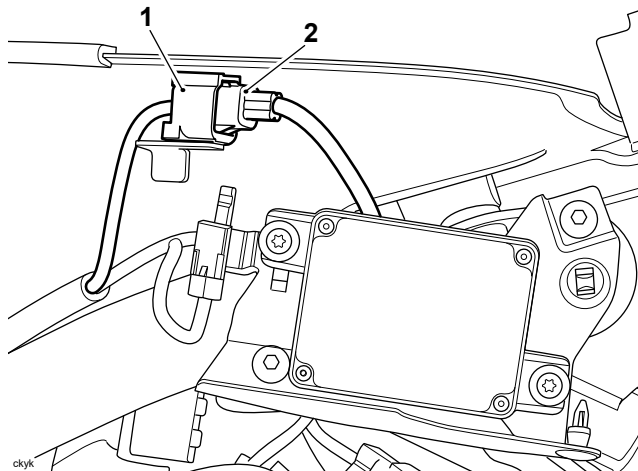
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Slide the twist grip position sensor onto the handlebar in the orientation noted for removal.
2. Route the twist grip harness to the main harness as noted for removal.
3. Connect the harness to the main harness then attach the connector to its bracket on the fuel tank.



1. Twist grip position sensor main harness connector
2. Twist grip position sensor connector

4. Refit the rubber band around the right hand switch cube harness, right hand side front direction indicator harness and twist grip position sensor harness as noted during removal.

Perform the following operations:

- [Twist Grip - Installation](#)
- Refit the fuel tank bodywork (see [Fuel Tank - Installation](#))
- [Battery - Installation](#)
- [Seat - Installation](#)

Intake Air Temperature Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

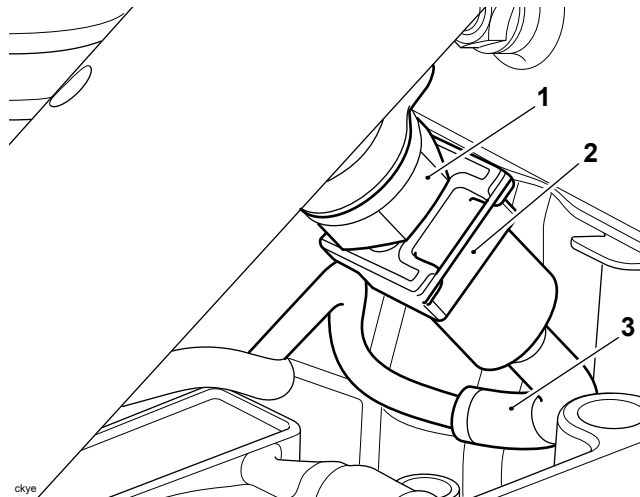
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

NOTICE

The intake air temperature sensor harness is identified by red tape.

1. Press the wire locking device fully in and disconnect the harness from the intake air temperature sensor.
2. Remove the intake air temperature sensor from the inlet manifold moulding.



1. Intake air temperature sensor
2. Electrical connector
3. Red tape identifier

Intake Air Temperature Sensor - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

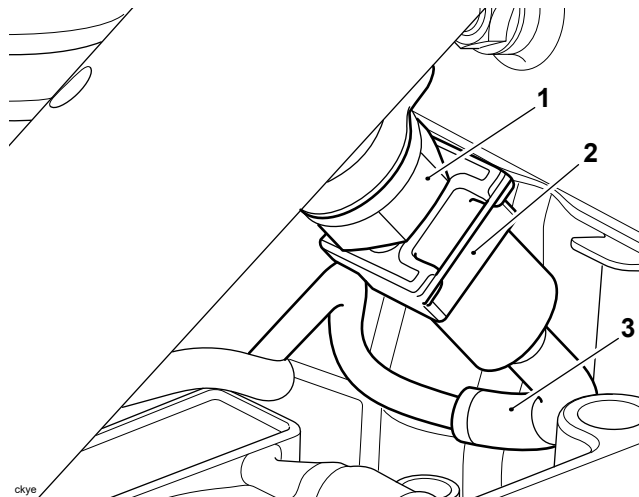
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

The intake air temperature sensor harness is identified by red tape.

1. Check the condition of the rubber washer and replace if necessary.
2. Make sure the threads of the sensor are clean and apply Threebond 1360.
3. Install the intake air temperature sensor to the inlet manifold moulding and tighten to 1 Nm.
4. Refit the harness to the intake air temperature sensor.



1. Intake air temperature sensor
2. Electrical connector
3. Red tape identifier

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Coolant Temperature Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

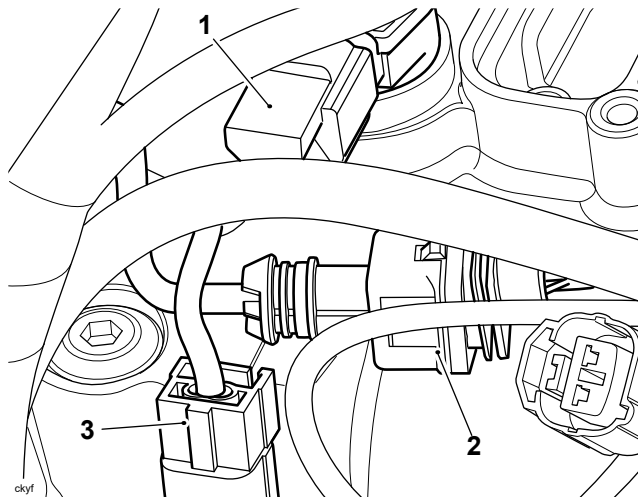
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Drain the cooling system (see [Coolant Replacement - Drainage](#)).

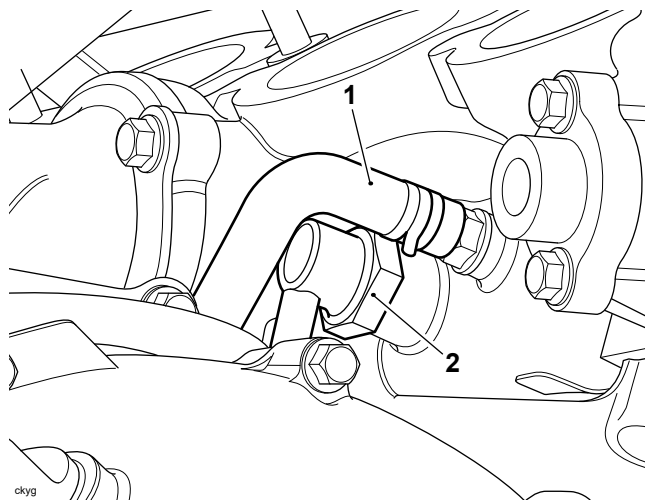
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Throttle Body - Removal](#)
- [Inlet Manifold - Removal](#)

1. Disconnect the coolant temperature sensor from the main harness, noting its routing in between ignition coil 1 and injector 1 harness connector.



1. Ignition coil 1
2. Coolant temperature harness connector
3. Injector 1 harness connector

2. Disconnect the bypass hose from the cylinder head spigot.
3. Remove the rubber cover and using a suitable 20 mm slotted socket, remove the coolant temperature sensor from the cylinder head, noting the routing of the harness for installation.



- 1. Bypass hose
- 2. Coolant temperature sensor

Coolant Temperature Sensor - Installation

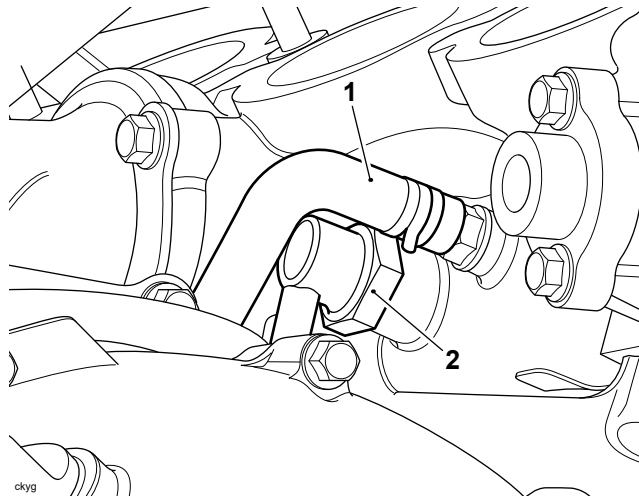
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

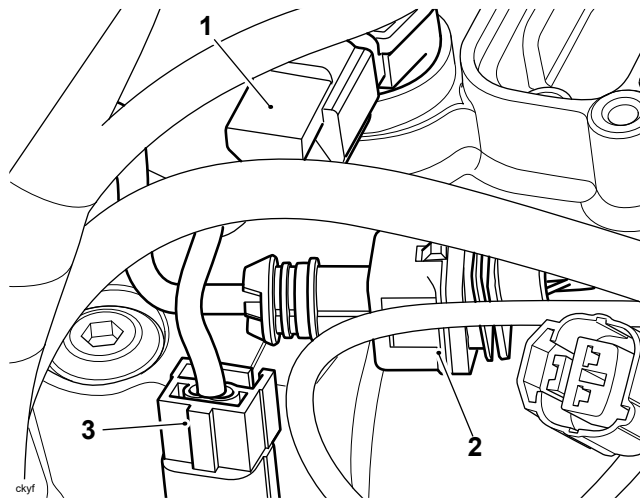
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the coolant temperature sensor into the cylinder head and tighten to 18 Nm and route the harness as noted during removal. Refit the rubber cover.
2. Refit the bypass hose to the cylinder head spigot.



1. Bypass hose
2. Coolant temperature sensor

3. Reconnect the coolant temperature sensor to the main harness, routing the harness as noted during removal.



1. Ignition coil 1
2. Coolant temperature harness connector
3. Injector 1 harness connector

Perform the following operations:

- [Coolant Replacement - Filling](#)
- [Inlet Manifold - Installation](#)
- [Throttle Body - Installation](#)
- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Manifold Absolute Pressure (MAP) Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

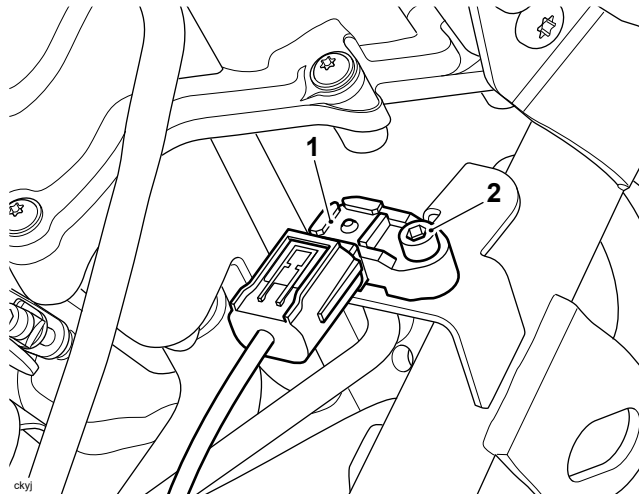
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

1. Release the fixing and detach the MAP sensor from the bracket.
2. Disconnect the map sensor multiplug and the MAP sensor hose. Remove the MAP sensor.



1. MAP sensor
2. Fixing

Manifold Absolute Pressure (MAP) Sensor - Installation

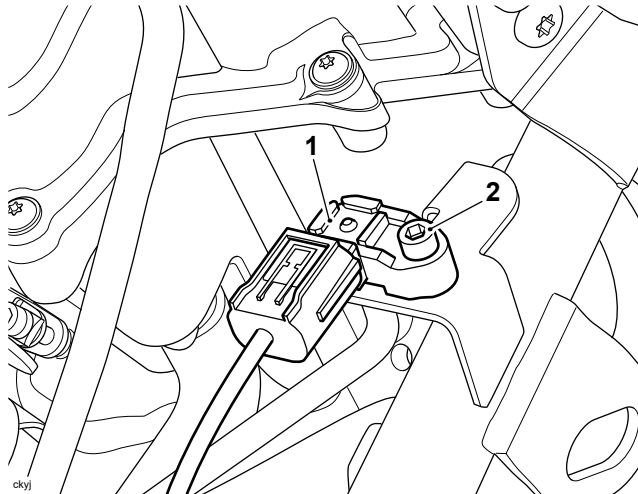
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Reconnect the MAP sensor multiplug.
2. Refit the MAP sensor hose to the MAP sensor.
3. Fit the sensor to the bracket, tightening the fixing to 5 Nm.



1. MAP sensor
2. Fixing

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Ambient Air Pressure Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

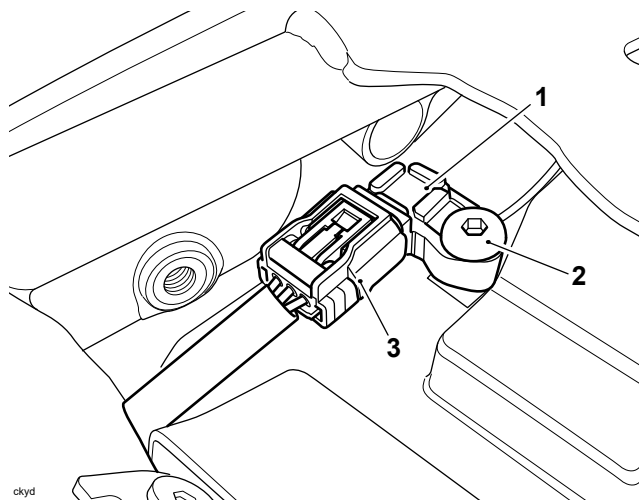
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. Release the fixing securing the ambient air pressure sensor to the battery tray.
2. Disconnect the electrical connector and remove the sensor.



1. Ambient air pressure sensor
2. Fixing
3. Electrical connector

Ambient Air Pressure Sensor - Installation

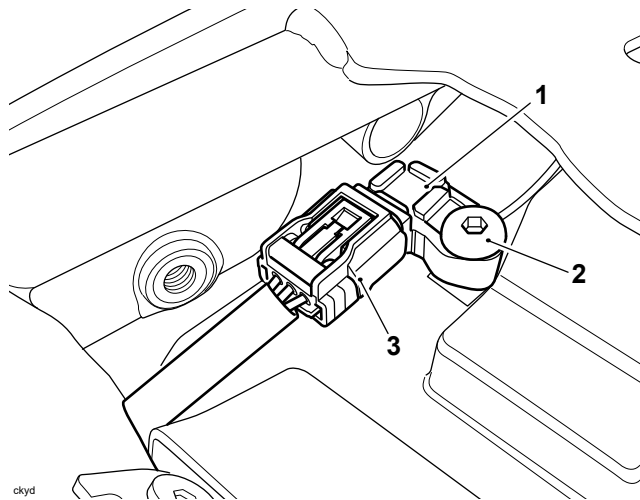
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Reconnect the electrical connector to the ambient air pressure sensor.
2. Fit the sensor to the battery tray and tighten its fixing to 3 Nm.



1. Ambient air pressure sensor
2. Fixing
3. Electrical connector

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Fall Detection Switch - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

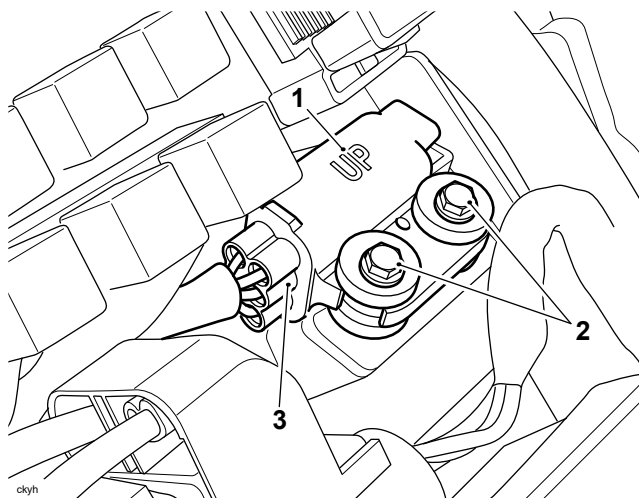
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. Remove and discard the fixings securing the fall detection switch to the engine ECM tray.
2. Disconnect the electrical connector and remove the fall detection switch.



1. Fall detection switch
2. Fixings
3. Electrical connector

Fall Detection Switch - Installation

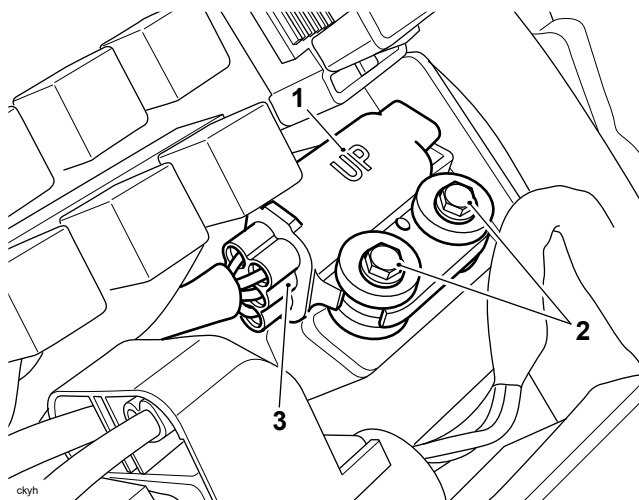
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Connect the electrical connector to the fall detection switch.
2. Fit the fall detection switch to the engine ECM tray and tighten the new fixings to 3 Nm.



1. Fall detection switch
2. Fixings
3. Electrical connector

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Gear Position Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

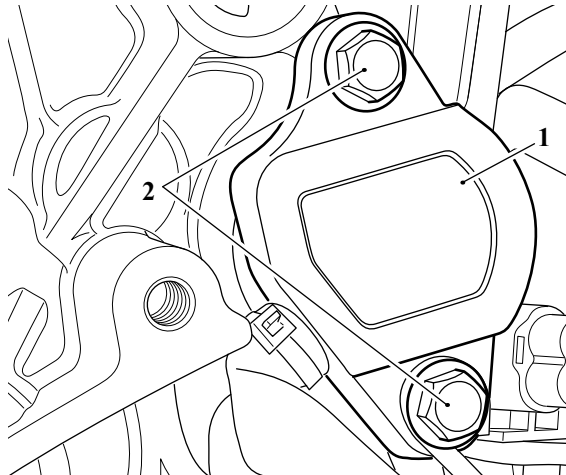
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Front Sprocket Cover - Removal](#)

NOTICE

The gear position sensor electrical connection is situated in between the crankcase and the alternator regulator/rectifier.

1. Disconnect the gear position sensor from the main harness.
2. Remove the fixings and remove the gear position sensor.



1. Gear position sensor
2. Fixings

Gear Position Sensor - Installation

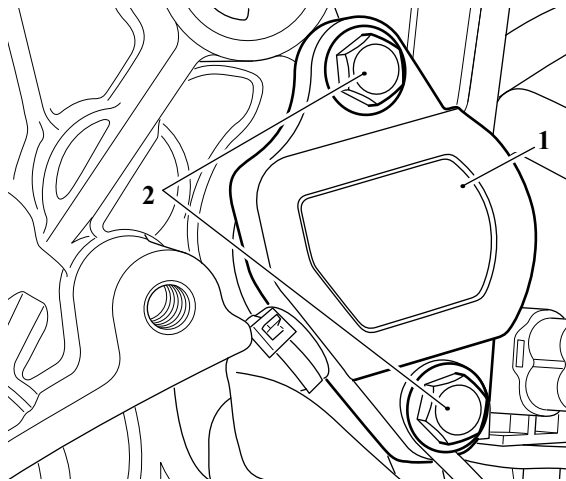
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Refit the gear position sensor and tighten the fixings to 5 Nm.



1. Gear position sensor
2. Fixings

NOTICE

The gear position sensor electrical connection is situated in between the crankcase and the alternator regulator/rectifier.

2. Reconnect the gear position sensor to the main harness.

Perform the following operations:

- [Front Sprocket Cover - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Crankshaft Position Sensor

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The alternator stator and crankshaft position sensor are supplied as an assembly and cannot be separated.

Perform the following operations:

- [Alternator Stator - Removal](#)
- [Alternator Stator - Installation](#)

Removal and Installation - Exhaust System Components

Exhaust System - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

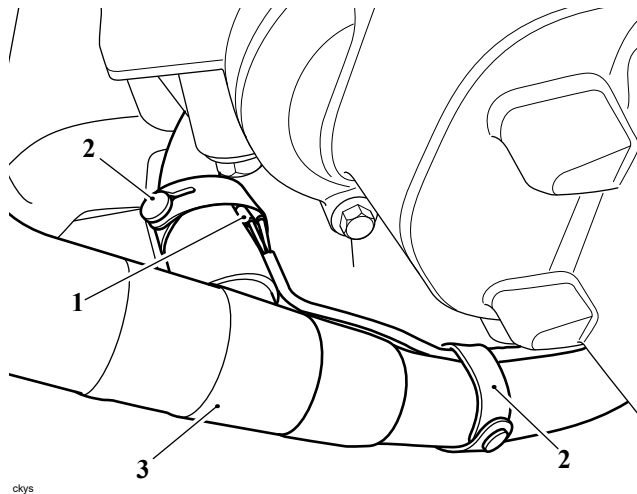
⚠ WARNING

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

Perform the following operations:

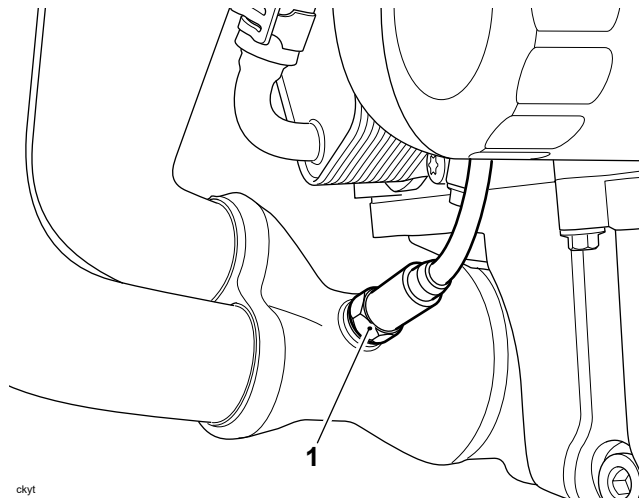
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Radiator - Removal](#)

1. Disconnect the oxygen sensor from the main harness and remove the rubber bands. Note the routing of the harness and position of the rubber bands for installation.



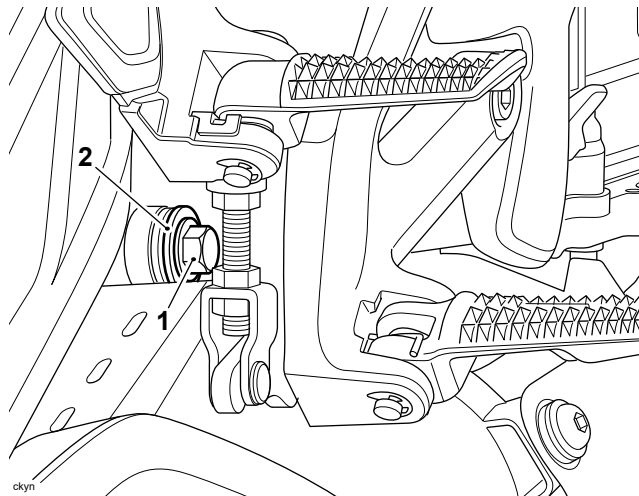
1. Oxygen sensor electrical connector
2. Rubber band
3. Coolant tee piece

2. If required, remove the oxygen sensor from the exhaust.



1. Oxygen sensor

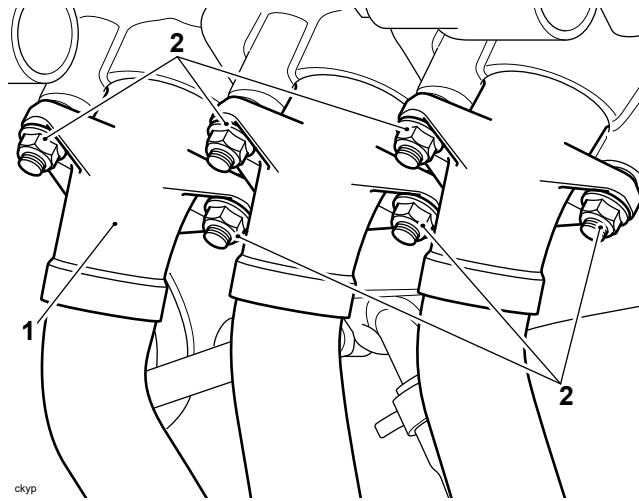
3. Support the exhaust and remove the two rear fixings and washers.



Right hand side shown, left hand side similar

- 1. Fixing
- 2. Washer

4. Remove and discard the six header lock nuts.



- 1. Exhaust header
- 2. Lock nuts

5. Lower the rear of the exhaust and then remove the exhaust from the cylinder head. Collect the flanged sleeves from the rear mounts.

Exhaust System - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

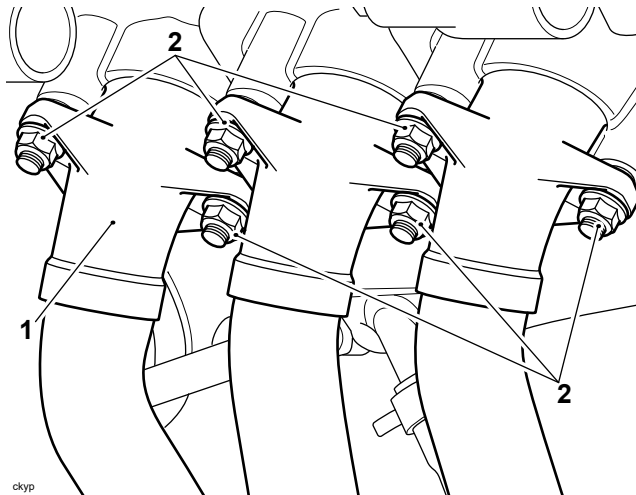
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

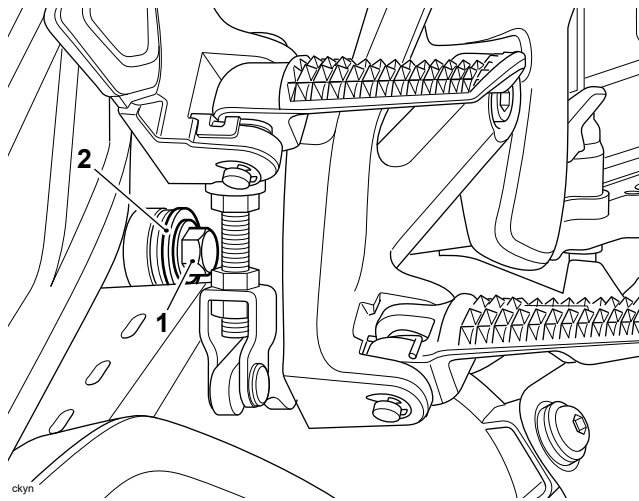
Do not install the exhaust system or run the engine without the exhaust heat shields fitted. Components protected by the exhaust heat shields may suffer severe damage or a fire if the motorcycle is operated without the heat shields being fitted.

1. Align the exhaust with the cylinder head and loosely fit six lock nuts.



1. Exhaust header
2. Lock nuts

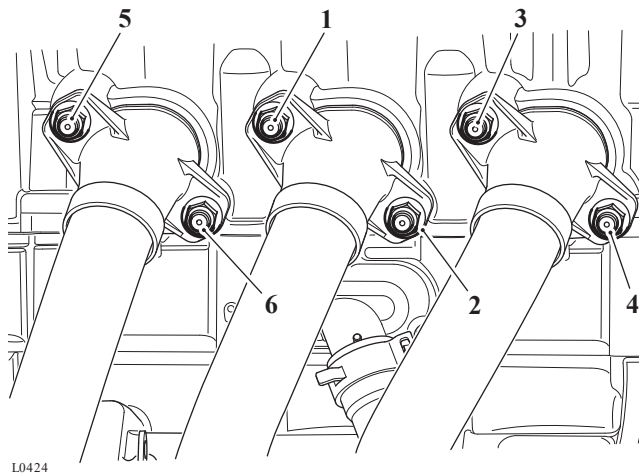
2. Make sure the flanged sleeves and grommets are fitted to the two rear exhaust mounts.
3. Fit the exhaust to the two rear mounts and secure with two fixings and two washers.



Right hand side shown, left hand side similar

1. Fixing
2. Washer

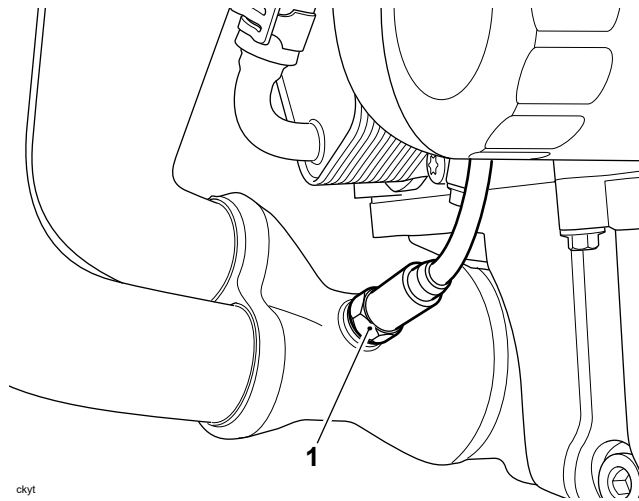
4. Tighten the cylinder head lock nuts to 15 Nm in the sequence shown below.



Exhaust Header Tightening Sequence

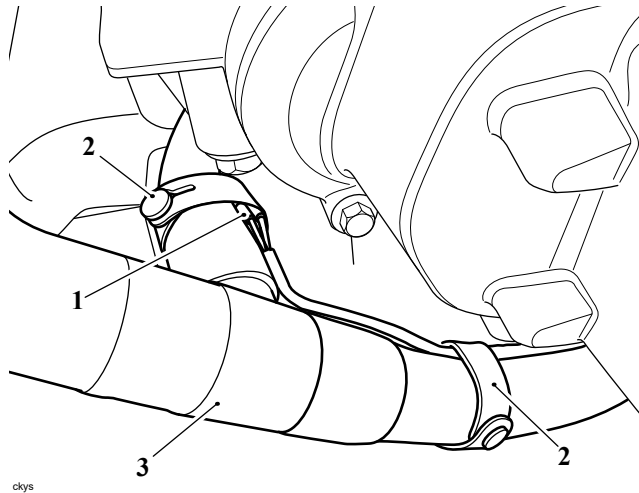
5. Tighten the two rear mount fixings to 19 Nm.

6. If required, refit the oxygen sensor to the exhaust and tighten to 25 Nm.



1. Oxygen sensor

7. Reroute the oxygen sensor harness as noted during removal and reconnect to the main harness.
8. Secure the oxygen harness to the coolant hose with two rubber bands.



1. Oxygen sensor electrical connector
2. Rubber band
3. Coolant tee piece

Perform the following operations:

- [Radiator - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Evaporative System Components

Evaporative Emissions Control System

Certain Markets Only

Some models in certain markets are fitted with a system to control the evaporation of fuel vapour to the atmosphere.

A carbon filled 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.

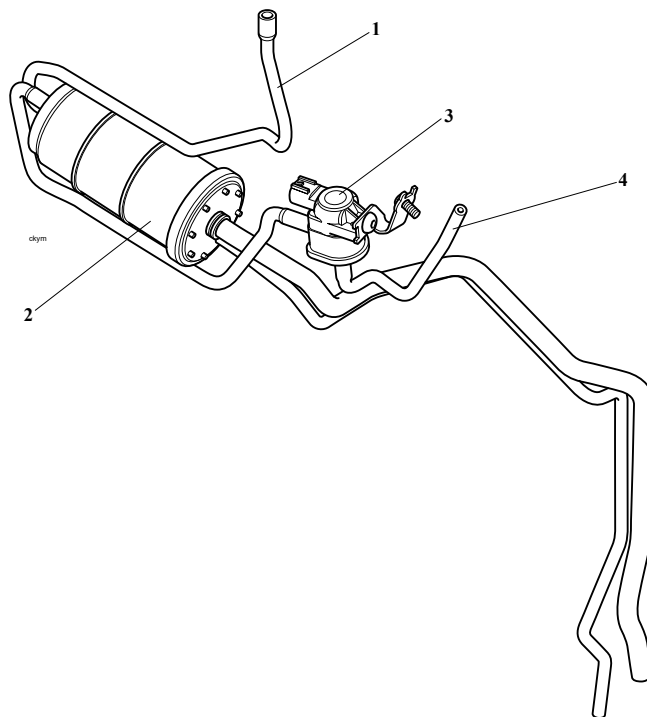
Component Locations

Carbon Filled Canister - under the airbox.

Purge Control Valve - attached to the bracket mounted on the inlet manifold (electronically controlled by the engine ECM).

Carbon Filled Canister - attached to the rear of the fuel tank.

Purge Control Valve - attached to the bracket mounted on the left hand side fuel tank bracket (electronically controlled by the engine ECM).

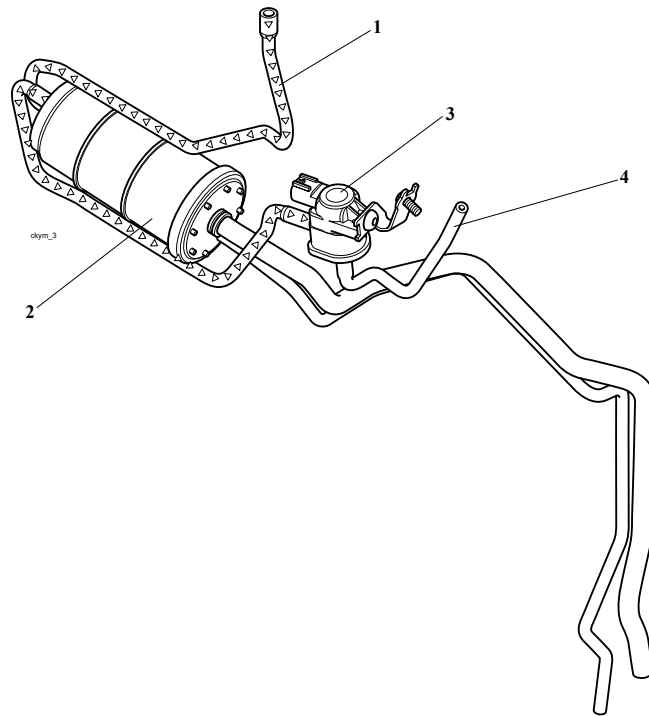


1. Breather hose
2. Carbon filled canister
3. Purge valve
4. Purge hose to inlet manifold

Evaporative Emissions Control System - Engine Off

When the engine is stationary, any pressure increase in the fuel tank due to a rise in ambient temperature will cause the fuel vapour to pass down the breather hose (1) to a carbon filled canister (2) which stores the vapour.

Once in the canister, vapour cannot enter the engine because the purge valve (3) is closed.



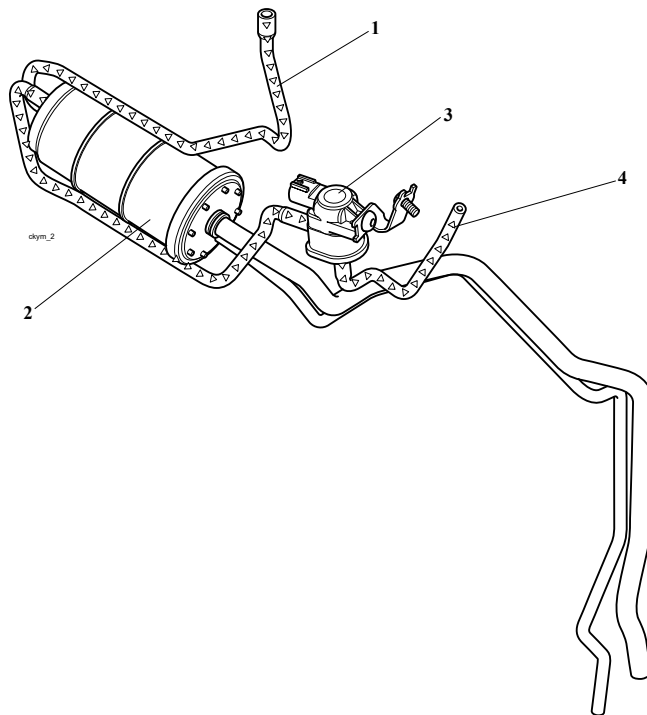
1. Breather hose
2. Carbon filled canister
3. Purge valve (closed)
4. Purge hose to inlet manifold

Evaporative Emissions Control System - Engine Running

When the engine is running, a vacuum is applied to the purge hose (4) from the inlet manifold.

At certain times, the ECM opens the purge valve. The vacuum applied to the purge hose (4) now begins to draw stored vapour from the carbon filled area of the canister and returns it to the inlet manifold for burning in the engine.

In order to control the speed at which the vapour is purged from the canister, the engine management system shuttles the purge control valve between the open and closed positions.



- 1. Breather hose
- 2. Carbon filled canister
- 3. Purge valve (open under engine ECM control)
- 4. Purge hose to inlet manifold

Evaporative Canister - 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

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

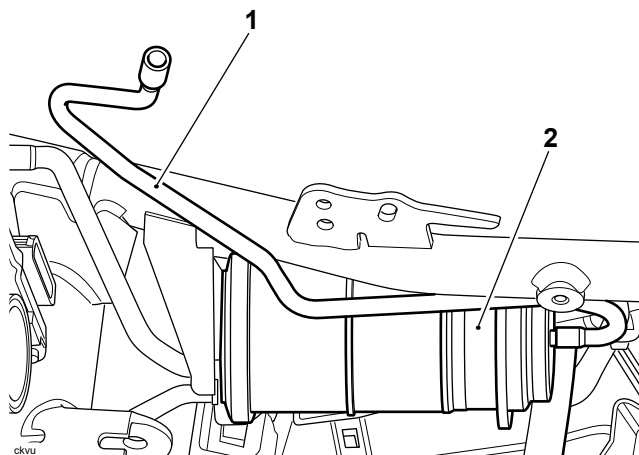
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)

NOTICE

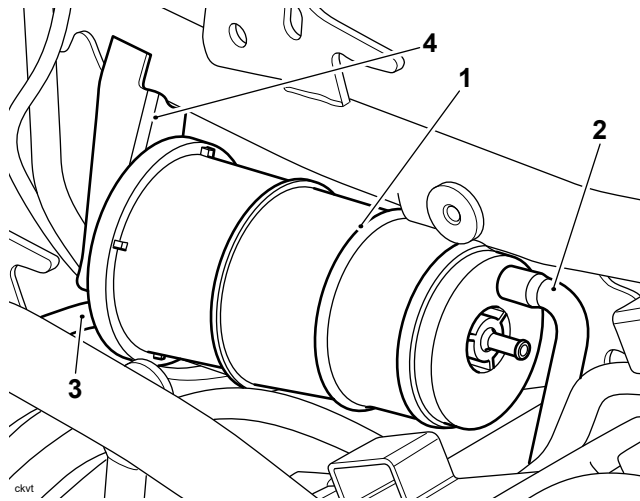
Note the position, orientation and routing of all hoses connected to the evaporative cannister for installation.

1. Remove the fuel tank hose from the evaporative canister.



1. Fuel tank hose
2. Evaporative canister

2. Remove and discard the cable tie securing the evaporative canister to the frame.
3. Disconnect the purge valve hose and drain hose from the evaporative cannister.



- 1. Evaporative canister
- 2. Purge valve hose
- 3. Drain hose
- 4. Evaporative canister bracket

- 4. Remove the evaporative canister from the grommet in the bracket.
- 5. If required, remove the drain hose noting the routing for installation.

Evaporative Canister - Installation

⚠ 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.

⚠ CAUTION

Never use lubricants when fitting throttle bodies onto transition pieces, evaporative hoses (EVAP) or manifold absolute pressure hoses (MAP) on to spigots.

When dried, the lubricant may block spigots and/or restrictors.

A blocked spigot and/or restrictor will cause the engine to operate inefficiently, and a DTC (diagnostic trouble code) to be recorded.

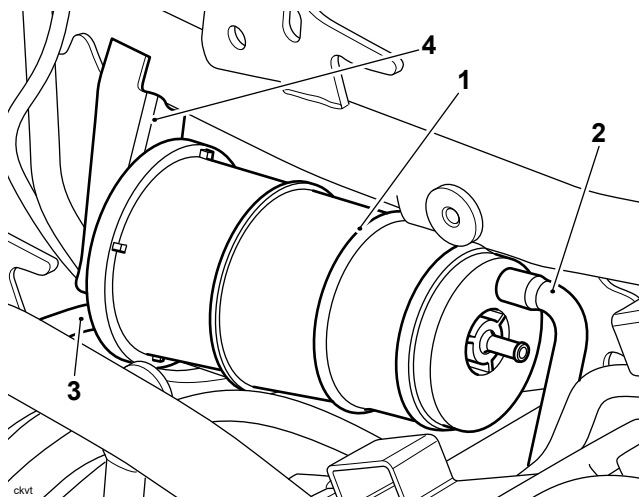
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

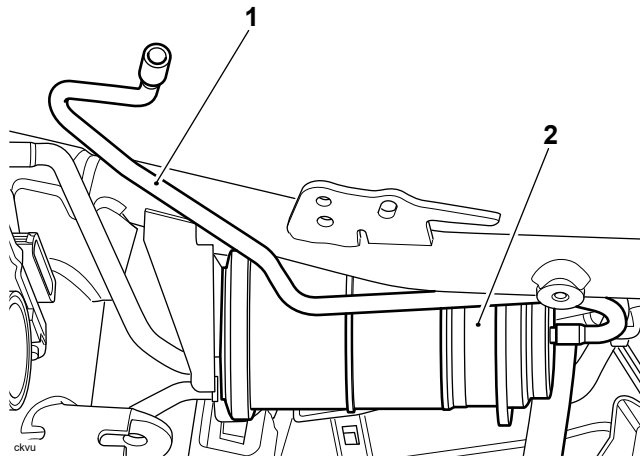
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If required, route the drain hose as noted during removal.
2. Make sure the purge valve hose is routed as noted during removal.
3. Refit the evaporative canister to the bracket, aligning the spigot to the grommet. Secure the canister to the frame with a new cable tie.
4. Refit the purge valve hose and drain hose to the evaporative canister.



1. Evaporative canister
2. Purge valve hose
3. Drain hose
4. Evaporative canister bracket

5. Refit the fuel tank hose to the evaporative canister. Make sure the hose routes underneath the airbox fixing boss.



1. Fuel tank hose
2. Evaporative canister

Perform the following operations:

- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Purge Control Valve - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

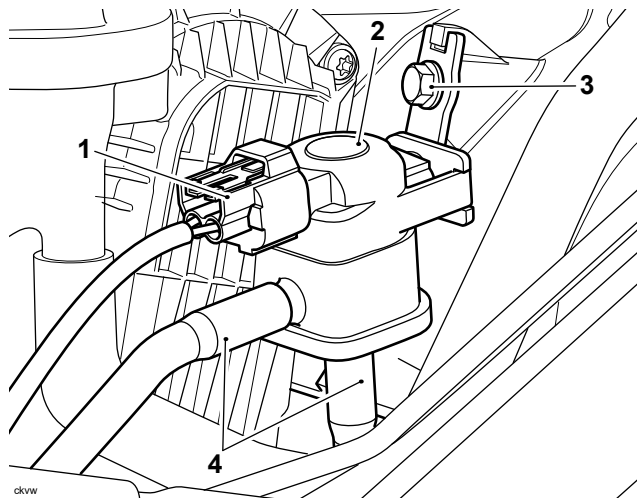
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Side Panels - Removal](#)

NOTICE

Note the routing of the purge control valve fly lead for installation.

Note the position of the purge control valve hoses for installation.

1. Disconnect the electrical connector from the purge control valve.
2. Disconnect the evaporative canister hose and inlet manifold hose from the purge control valve.
3. Remove the bracket fixing and remove the purge control valve and bracket from the inlet manifold.



1. Purge control valve electrical connector
2. Purge control valve
3. Bracket fixing
4. Hoses

4. If required, remove the fixing and separate the bracket from the purge valve.

Purge Control Valve - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

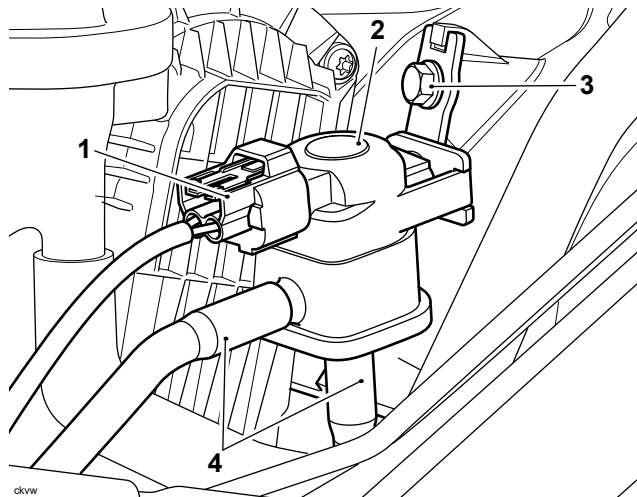
⚠ CAUTION

Never use lubricants when fitting throttle bodies onto transition pieces, evaporative hoses (EVAP) or manifold absolute pressure hoses (MAP) on to spigots.

When dried, the lubricant may block spigots and/or restrictors.

A blocked spigot and/or restrictor will cause the engine to operate inefficiently, and a DTC (diagnostic trouble code) to be recorded.

1. If required, position the purge control valve to its mounting bracket ensuring that the locating tab locates correctly into the bracket.
Secure with the fixing and tighten to 3 Nm.
2. Position the purge control valve and mounting bracket to the inlet manifold. Secure with the fixing and tighten to 8 Nm.
3. Connect the hoses as noted during removal.
4. Connect the purge control valve electrical connector as noted during removal.

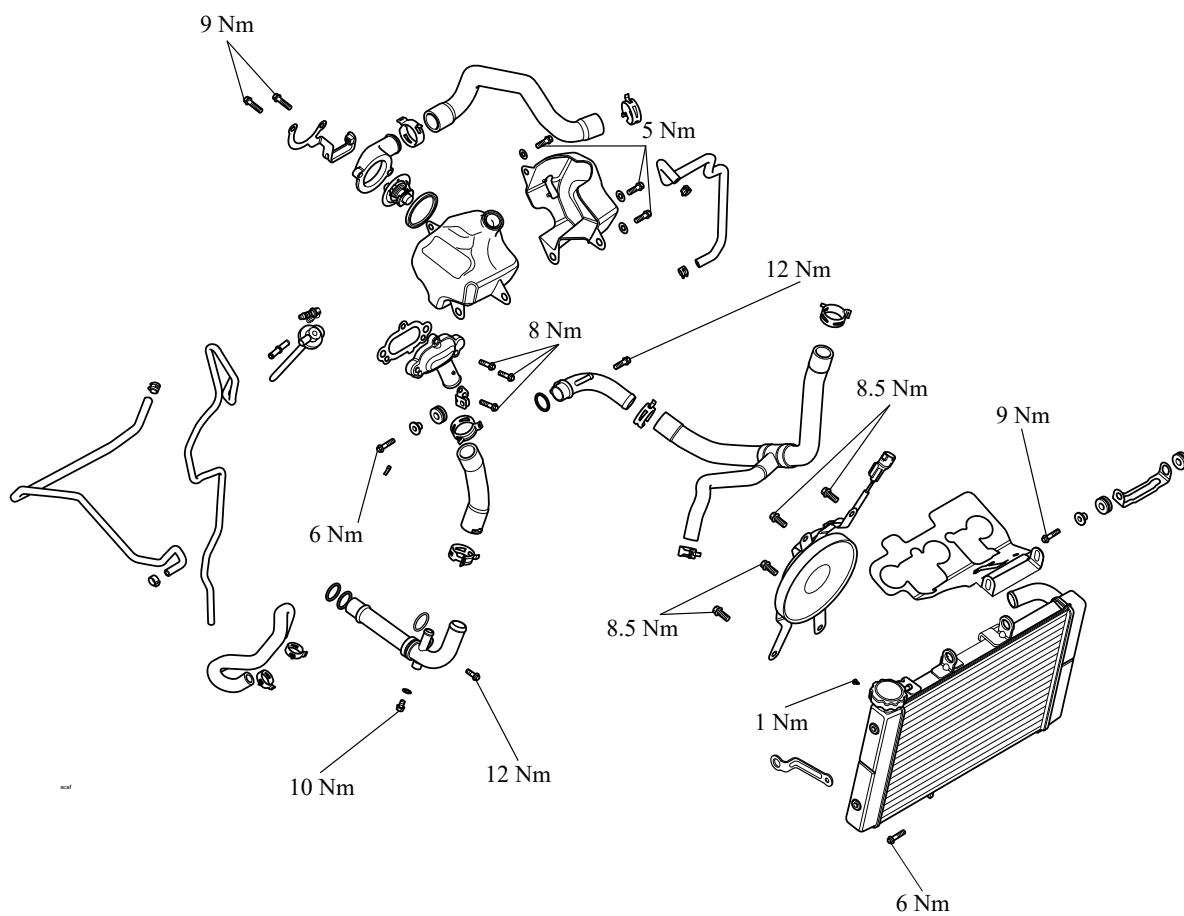


1. Purge control valve electrical connector
2. Purge control valve
3. Bracket fixing
4. Hoses

Perform the following operations:

- [Side Panels - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Exploded View - Cooling System



Radiator Hoses

Check the radiator hoses for cracks or deterioration, and hose clamps for tightness in accordance with scheduled maintenance requirements.

Coolant Replacement - Drainage

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

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.

Use service tool T3880207 for removal and installation of the coolant hose constant tension hose clips.

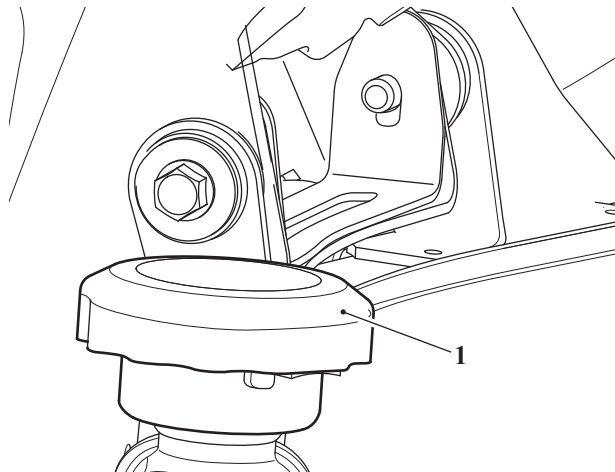
Perform the following operations:

- Position the motorcycle on level ground and place on a paddock stand.
- **Radiator Cowl - Removal**

⚠ WARNING

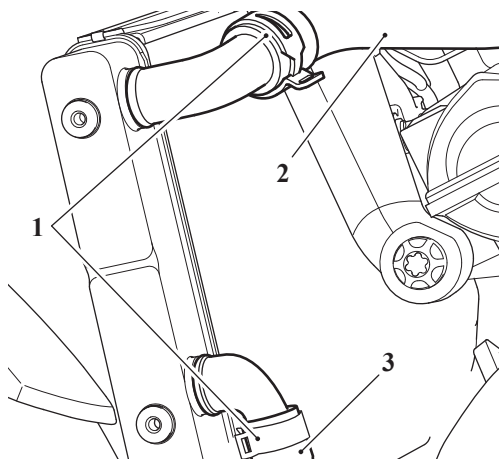
Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Release the fixing and remove the coolant pressure cap.



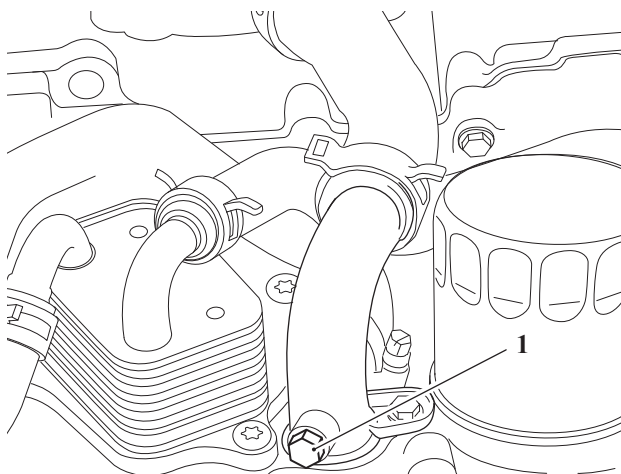
1. Coolant pressure cap

2. Position a container to collect the displaced coolant.
3. Loosen the hose clip then release the bottom hose from the radiator and allow the coolant to drain.



- 1. Hose clips
- 2. Top hose
- 3. Bottom hose

4. Remove the drain bolt from the coolant outlet tube, located next to the heat exchanger and allow the coolant to drain.



- 1. Drain bolt

Coolant Replacement - Filling

1. Incorporating a new sealing washer, refit the drain bolt to the coolant outlet tube and tighten to 10 Nm.
2. Reconnect the bottom hose. Ensure the hose clip is positioned as noted for removal.

NOTICE

During filling, squeezing the bottom hose with both hands will help to pump coolant around the system and remove trapped air.

3. Slowly add coolant mixture to the system, through the filler opening in the radiator, until the system is full.
4. If the system has filled correctly and fully, there should be coolant visible through the radiator filler opening.
5. If necessary, top up the system through the filler and refit the coolant pressure cap to the radiator filler neck. Tighten the fixing to 1 Nm.
6. 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. Repeat as necessary.
7. Reconnect the battery, positive (red) lead first and tighten the battery terminals to 4.5 Nm.
8. 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.
9. Stop the engine. Check and top up the coolant level as necessary.
10. 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.
11. Start the motorcycle. Briefly raise the engine speed several times to allow any air to be expelled from the system.
12. Allow the engine to run until the cooling fan operates.
13. 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.

14. Check and top up the coolant level as necessary.
 15. Check the expansion tank level and top up if necessary.
- Perform the following operations:

- [Coolant Level Inspection](#)
- [Radiator Cowl - Installation](#)

Coolant Pressure Cap and Coolant System Testing

Inspection and Testing

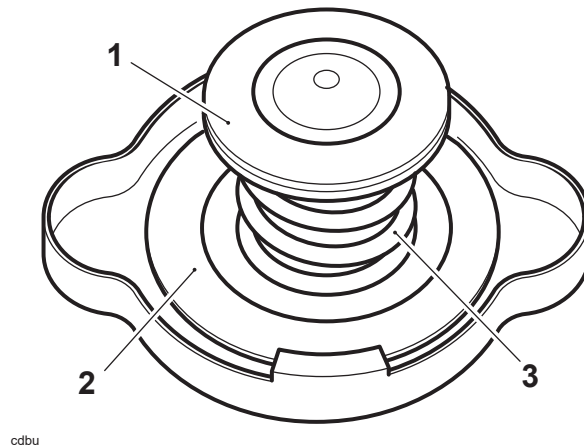
⚠ WARNING

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.

⚠ WARNING

Before starting work, ensure the 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. 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.



1. Lower seal
2. Upper seal
3. Spring

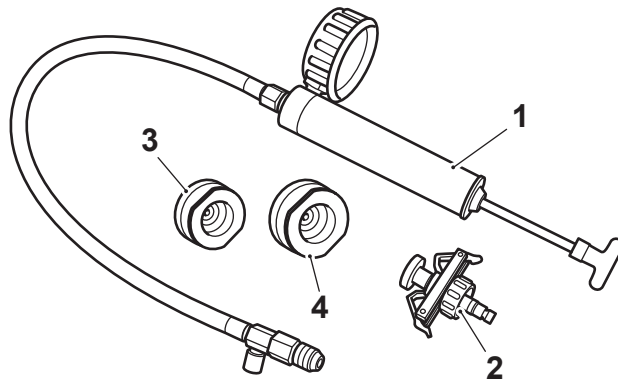
NOTICE

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 service tool T3880147. If the cap opens at a lower pressure or fails to open at 1.1 bar, replace the cap.

NOTICE

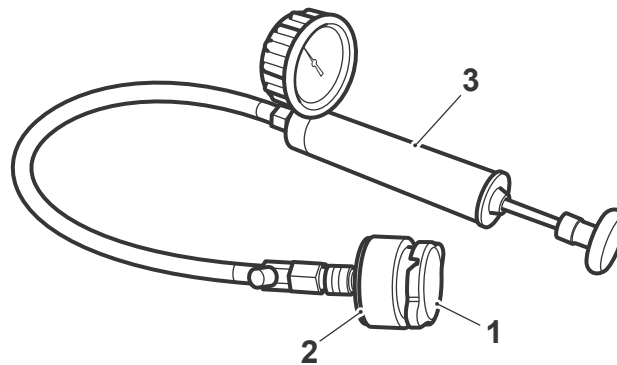
It is recommended to carry out coolant pressure cap and cooling system pressure tests consecutively.



cgwp

1. Hand held pump
2. Bayonet type connector
3. Pressure cap test adaptor 44 mm - Adaptor B
4. Pressure cap test adaptor 46 mm - Adaptor A
5. Pressure cap test adaptor 44 mm - Adaptor C (Not Pictured)

1. Select pressure cap test adaptor C - T3880453 and securely fasten to the pressure cap.
2. Carefully connect the hand pump to the adaptor ensuring an air tight seal is maintained.



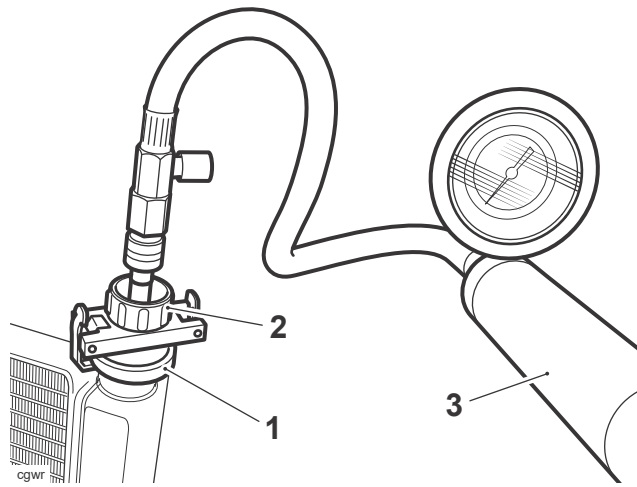
cgwq_5

1. Pressure cap
2. Test adaptor
3. Hand held pump

3. Pressure test the coolant cap to the blow off pressure. If the coolant cap opens at a lower pressure, fails to open at the correct pressure or the seal leaks, replace the cap.

Coolant System Pressure Test

1. Select the bayonet type adaptor and securely fasten to the radiator.
2. Carefully connect the hand pump to the bayonet connector ensuring an air tight seal is maintained.



- 1. Radiator filler
- 2. Bayonet type connector
- 3. Hand held pump

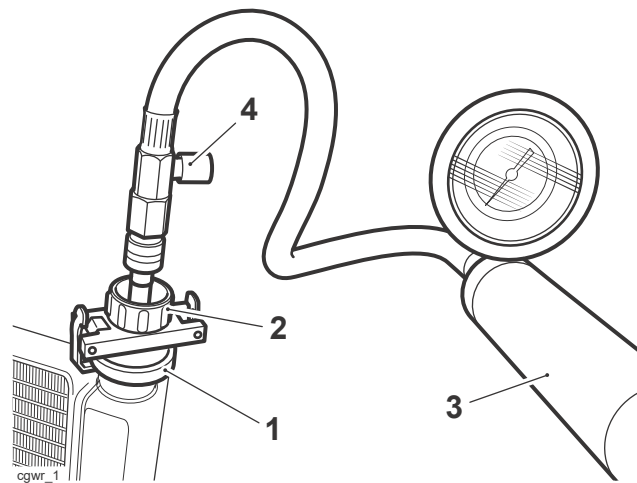
3. Pressurise the cooling system to the operating pressure, using the hand pump taking care not to exceed the maximum cap pressure.
4. Hold the pressure for a minimum of 10 minutes, whilst visually inspecting the external components of the coolant system for leaks.
5. Remove the engine oil filler cap/dipstick and check for contamination of the engine oil caused by coolant escaping into the engine sump.

NOTICE

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 pressure cap.
8. Fill the coolant to the maximum mark (see [Coolant Replacement - Filling](#)).

Radiator - Removal

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

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.

For models fitted with the constant tension hose clips, use service tool T3880207 for their removal and installation.

⚠️ 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.

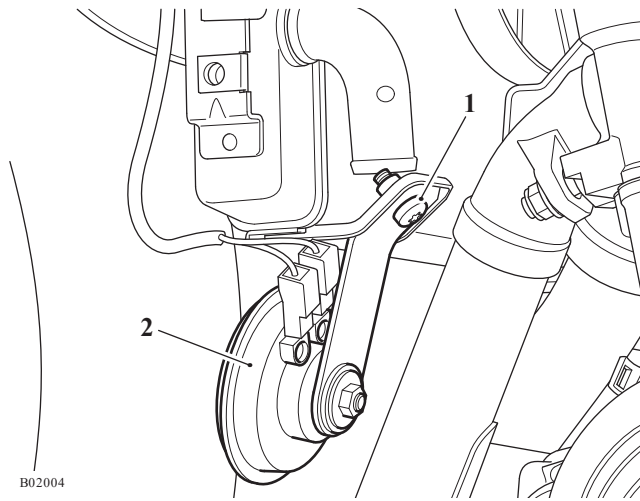
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Radiator Cowl - Removal](#)
- [Clutch Cable - Removal](#)
- [Coolant Replacement - Drainage](#)

NOTICE

Note the routing of the harness for the horn for installation.

1. Disconnect the horn's two electrical connectors and detach the harness from the cooling fan cowl, noting the position of the clips and routing of the harness.
2. Release the fixing and remove the horn.

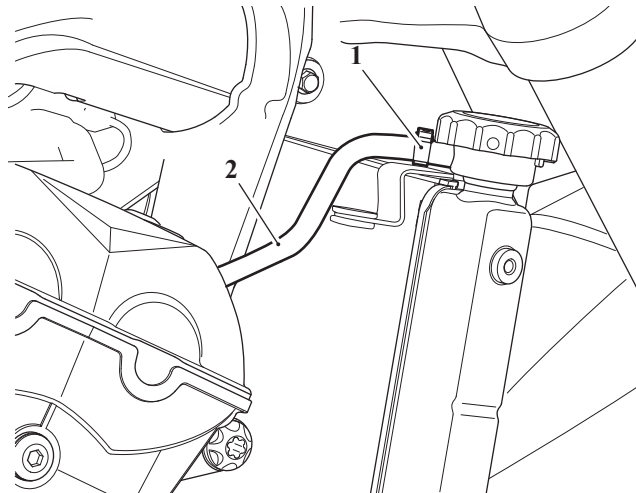


1. Fixing
2. Horn

NOTICE

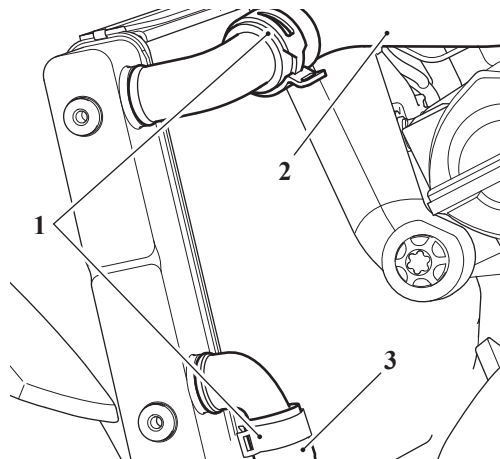
Note the routing of the harness for the cooling fan for installation.

3. Follow the routing of the harness for the cooling fan and disconnect it from the main harness.
4. Release the hose clip and disconnect the bypass hose from the radiator. Discard the clip.



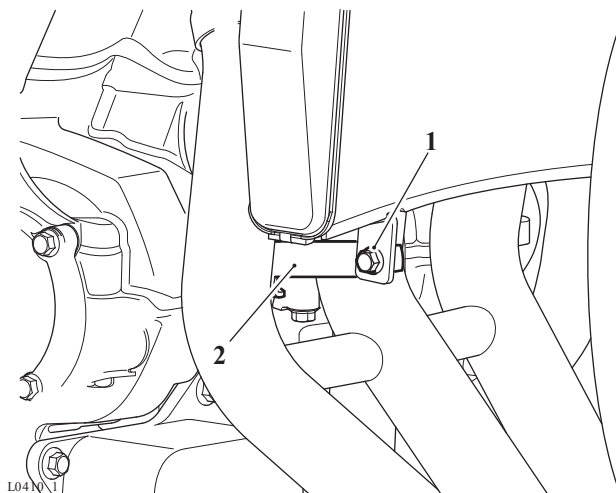
1. Hose clip
2. Bypass hose

5. Loosen the hose clips then detach the top and bottom hoses from the radiator.



- 1. Hose clips
- 2. Top hose
- 3. Bottom hose

6. Release the radiator lower mounting.



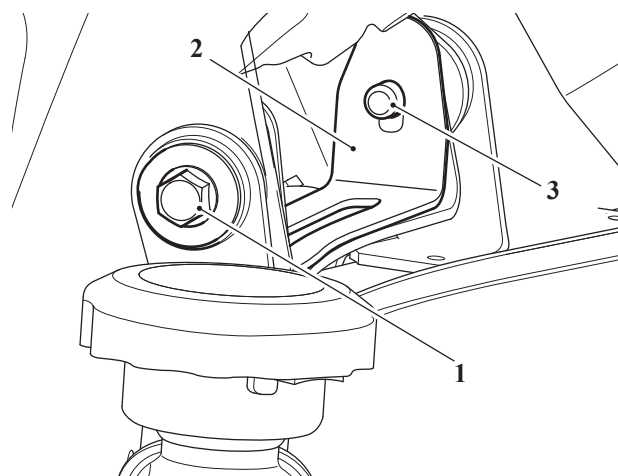
- 1. Fixing
- 2. Radiator lower mounting

NOTICE



Note the position of the rubber air deflector and its retaining plate in relation to the radiator's upper mounting bolt for installation.

7. Release the fixing securing the radiator to the frame. Slide the radiator towards the right hand side of the motorcycle to release the radiator from the bracket pin. Collect the retaining plate for the air deflector.



- 1. Fixing
- 2. Retaining plate
- 3. Bracket pin

8. Remove the radiator.

Radiator and Cooling Fan Inspection

Radiator

⚠ CAUTION

Using high pressure water, such as from a pressure-washer, can damage the radiator fins and impair the radiator's efficiency.

Do not obstruct or deflect airflow through the radiator by installing unauthorised accessories in front of the radiator or behind the cooling fan. Interference with the radiator airflow can lead to overheating and consequent engine damage.

1. Check the radiator for stone damage.
2. Check the radiator core for damage to fins or obstructions to air flow.
3. Clean off any obstructions with a stream of low-pressure water.

⚠ CAUTION

To avoid overheating and consequent engine damage, replace the radiator if the cores are blocked or if the fins are badly deformed or broken.

4. Rectify any damage.

Cooling Fan

⚠ WARNING

The cooling fan is switched on and off by the Engine Control Module in response to a signal received from the coolant temperature sensor. To prevent injury, never place loose clothing, fingers or hands near the cooling fan, until the engine is stopped. Loose clothing, fingers or the hands could become trapped during cooling fan operation and cause crushing injury to the fingers, hands or other parts of the anatomy.

The motorcycle is fitted with a thermostatically controlled electric fan situated behind the radiator. When the fan operates with the motorcycle stationary or at slow speed, cool air is drawn through the radiator from the front of the motorcycle.

1. Check that the cooling fan spins freely and without tight spots.
2. Check the cooling fan blades for signs of heat distortion.
3. Rectify as necessary.

Radiator - Installation

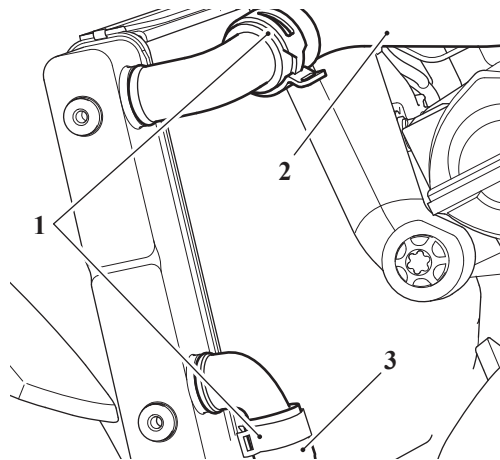
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

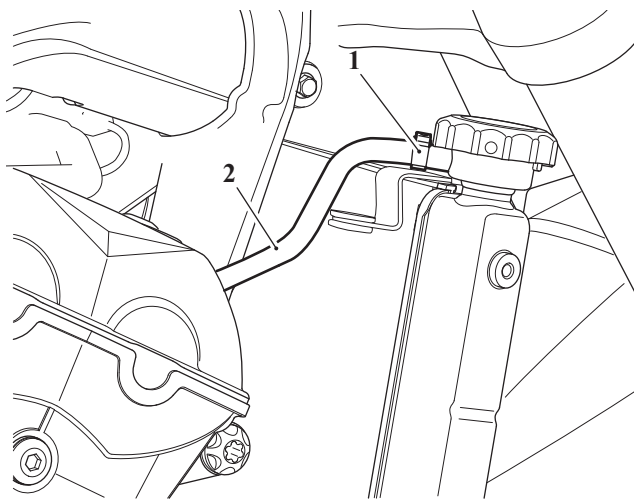
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Align the radiator to the frame and lower mounting.
2. Position the rubber air deflector and its retaining plate to the upper mountings as noted for removal.
3. Fit the upper mounting fixing and tighten to 9 Nm.
4. Fit and tighten the lower mounting fixing to 6 Nm.
5. Reconnect the top and bottom hoses. Ensure the hose clips are positioned as noted for removal and secure with the hose clips.



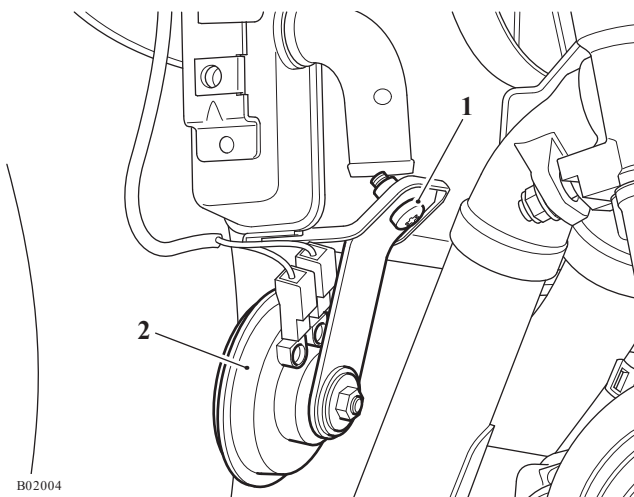
1. Hose clips
2. Top hose
3. Bottom hose

6. Connect the bypass hose to the radiator and secure with a new hose clip.



1. Hose clip
2. Bypass hose

7. Route the harness for the cooling fan as noted for removal (ensure connectors are pushed through the air deflector) and connect to the main harness.
8. Fit the horn to the radiator and tighten its fixing to 9 Nm.



1. Fixing
2. Horn

9. Route the harness as noted during removal and connect the horn's two electrical connectors.
- Perform the following operations:

- [Coolant Replacement - Filling](#)
- [Clutch Cable - Installation](#)
- [Radiator Cowl - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Water Pump

NOTICE



The oil pump and water pump are supplied as an assembly and cannot be separated. For additional information, refer to Oil Pump (see [Oil and Water Pump - Removal](#) and [Oil and Water Pump - Installation](#)).

Thermostat - Removal

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

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.

Use service tool T3880207 for their removal and installation.

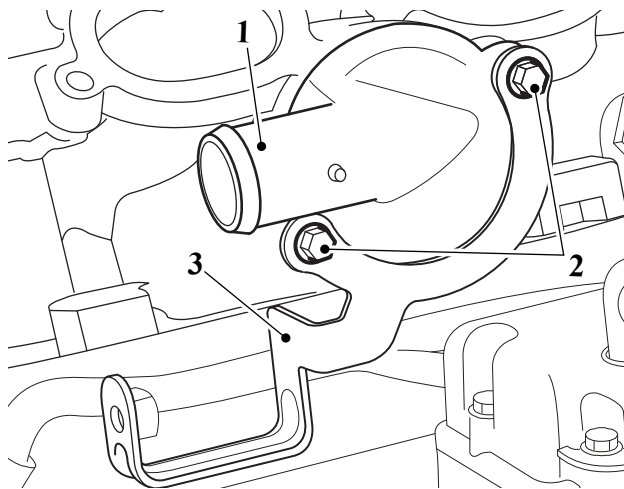
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Throttle Body - Removal](#)
- [Inlet Manifold - Removal](#)
- [Coolant Expansion Tank - Removal](#)

WARNING

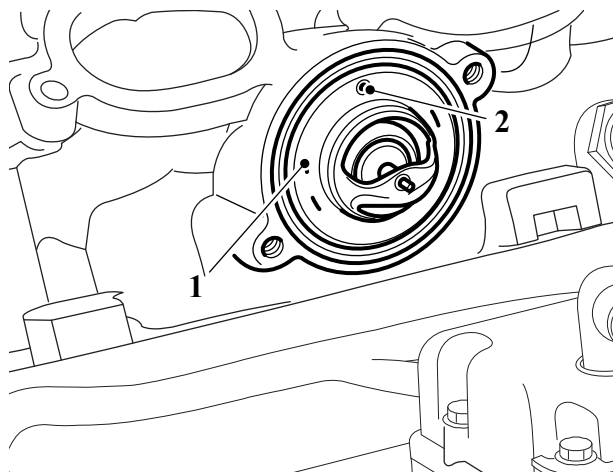
Do not remove the coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the radiator is hot and also under pressure. Contact with the pressurised coolant will cause scalds and skin damage.

1. Detach the top hose from the thermostat housing, noting the position of the clip for installation.
2. Release the fixings securing the thermostat housing to the cylinder head.
3. Remove the thermostat housing and the bracket. Discard the O-ring.



- 1. Thermostat housing
- 2. Fixings
- 3. Coolant expansion tank bracket

4. Remove the thermostat from the cylinder head.



- 1. Thermostat
- 2. Bleed valve

Thermostat - Inspection

1. Inspect the thermostat at room temperature. If the thermostat is open, it must be replaced.
2. To check the thermostat is opening at the correct temperature, suspend the thermostat in a suitable container of water and raise the temperature of the water until the thermostat opens.
3. Measure the water temperature with an accurate thermometer.
 - Refer to the coolant specifications section for the correct thermostat opening temperature.
4. If the temperature at which thermostat opening takes place is incorrect, replace the thermostat.

Thermostat - Installation

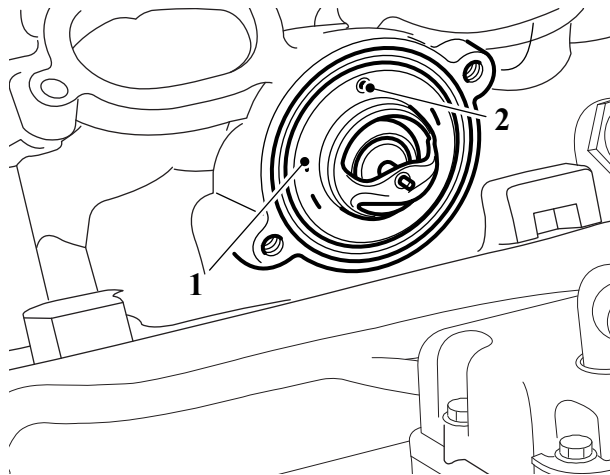
⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

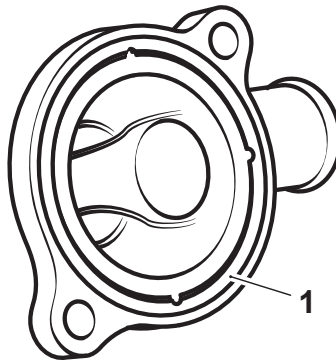
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the thermostat into the cylinder head. Ensure the bleed valve is uppermost as shown below.



1. Thermostat
2. Bleed valve

2. Fit a new O-ring to the thermostat housing groove.

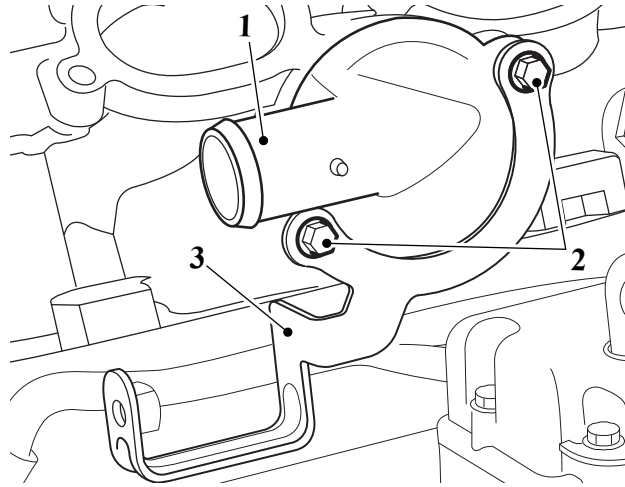


cash

1. O-ring groove

3. Refit the thermostat housing and bracket to the cylinder head,

4. Tighten the fixings to 9 Nm.



- | |
|--|
| <ul style="list-style-type: none">1. Thermostat housing2. Fixings3. Coolant expansion tank bracket |
|--|

5. Reconnect the top hose. Ensure the hose clip is positioned as noted for removal.
Perform the following operations:

- [Coolant Expansion Tank - Installation](#)
- [Inlet Manifold - Installation](#)
- [Throttle Body - Installation](#)
- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Coolant Expansion Tank - Removal

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

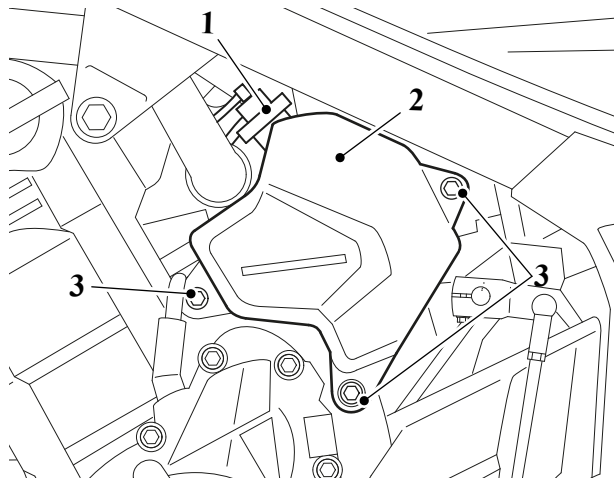
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠️ WARNING

Do not remove the expansion tank or coolant pressure cap when the engine is hot. When the engine is hot, the coolant inside the cooling system will be hot and may also be under pressure. Contact with hot coolant will cause scalds and skin damage.

1. Remove the coolant expansion tank cap from the coolant expansion tank.
2. Release the fixings and remove the coolant expansion tank cover and coolant expansion tank.



1. Coolant expansion tank cap
2. Coolant expansion tank
3. Fixings

Coolant Expansion Tank - Installation

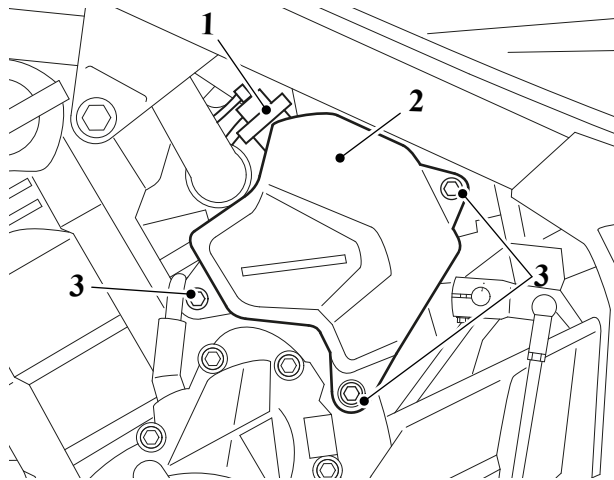
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the coolant expansion tank to the frame and brackets.
2. Refit the cover and secure the tank and cover with three fixings and washers. Tighten to 5 Nm.

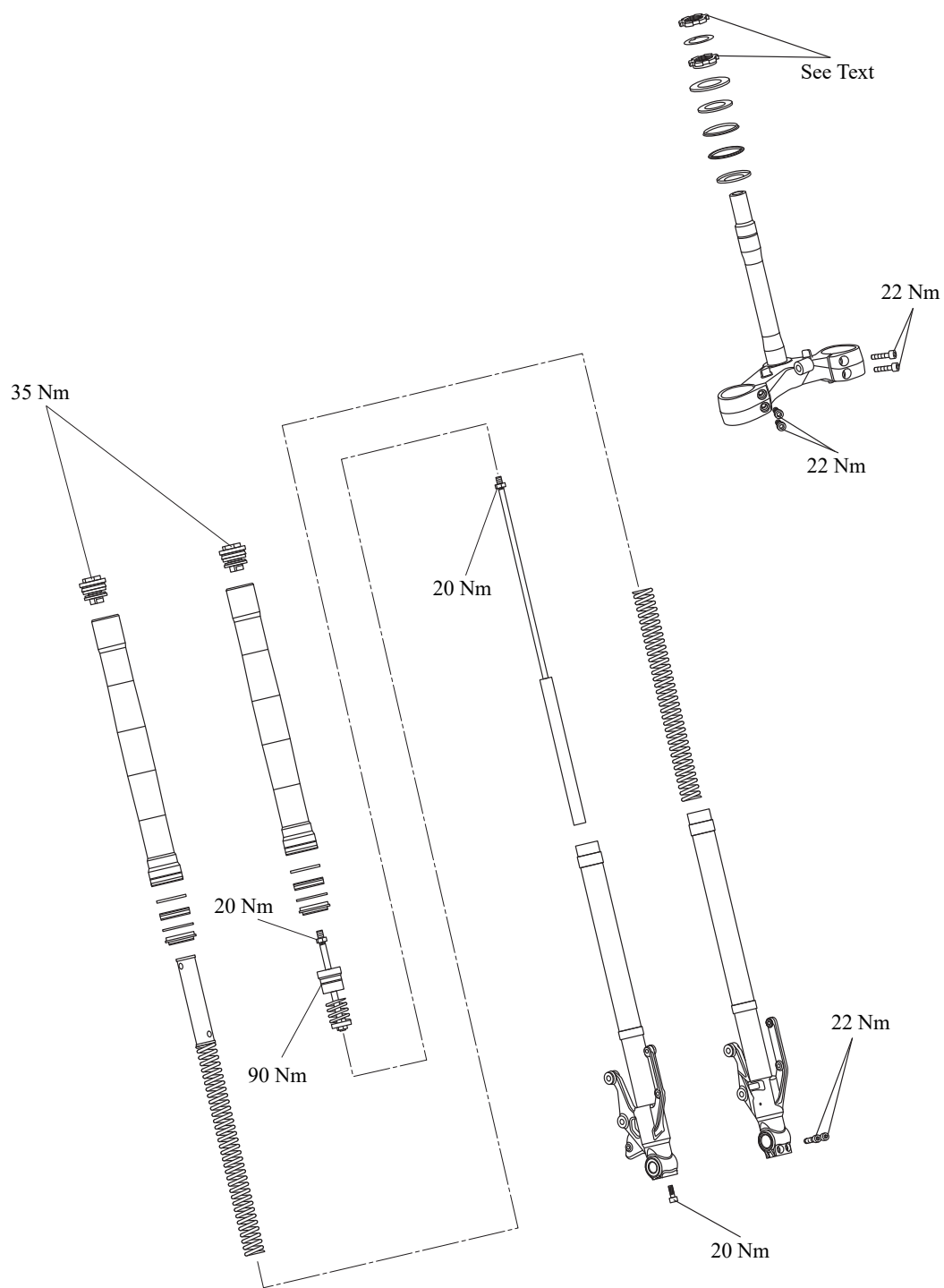


1. Coolant expansion tank cap
2. Coolant expansion tank
3. Fixings

3. Check and adjust the coolant level as necessary (see [Coolant Level Inspection](#) and [Coolant Level Adjustment](#)).
4. Refit the coolant expansion tank cap.

Front Suspension and Steering

Exploded View - Front Forks, Bottom Yoke and Steering Head Bearings



Exploded View - Handlebars



26 Nm

Fork Inspection

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.

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.

Front Fork Oil Seal - Clean

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

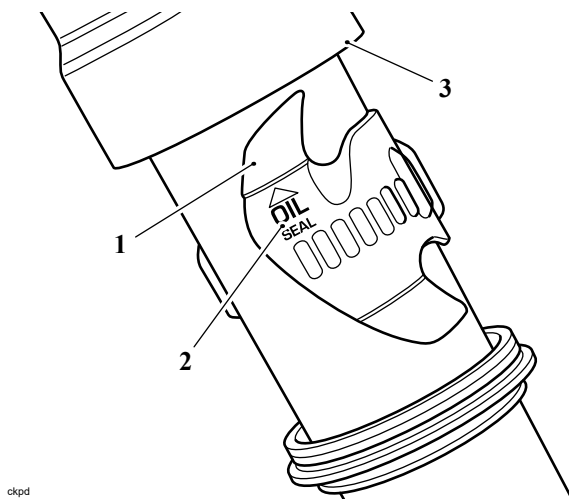
1. Clean the area around the dust seal then carefully detach the dust seal from the fork outer tube.
2. Wipe away any visible dirt or water from the oil seal.

NOTICE

T3880215 - Fork Seal Cleaner, 35-45 mm forks has two cleaning hooks. The one with the OIL SEAL text is for the oil seal, the other cleaning hook is for the dust seal.

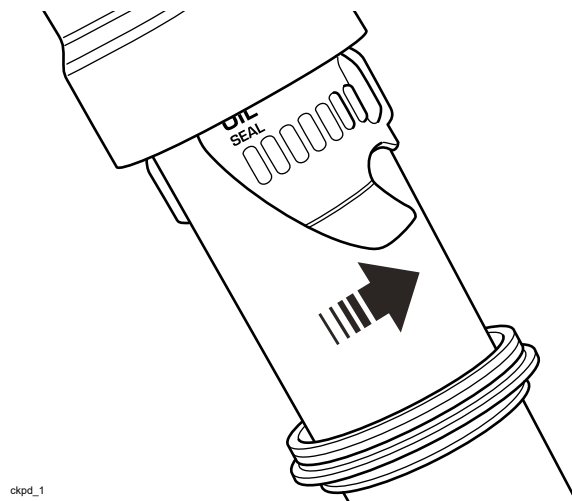
When cleaning the oil seal with service tool T3880215 it is possible that a small amount of fork oil may seep out.

3. Clean service tool T3880215
4. Fit service tool T3880215 to the fork inner tube. Make sure that the cleaning hook, with the text OIL SEAL below it, is pointing towards the oil seal.



1. Cleaning hook
2. OIL SEAL text
3. Oil seal location

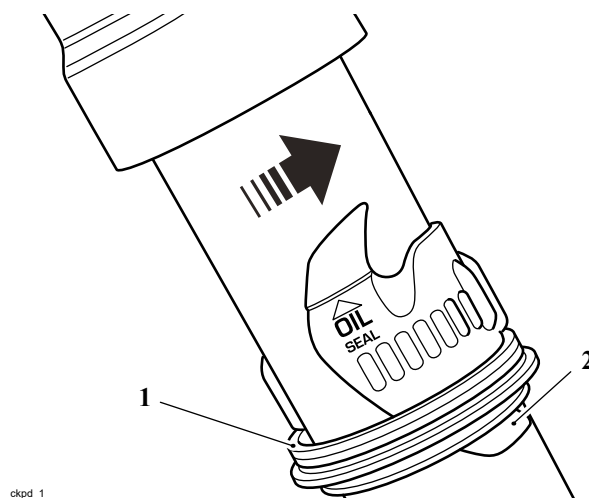
5. Slide the cleaning hook carefully under the seal lip. Rotate service tool T3880215 360° in the direction shown then remove the cleaning hook from the oil seal.



ckpd_1

Direction of Rotation

6. Slide service tool T3880215 down to use the other cleaning hook to clean the dust seal. Rotate service tool T3880215 360° in the direction shown then remove the cleaning hook from the dust seal.



ckpd_1

Direction of Rotation

1. Dust seal
2. Cleaning hook

7. With hand pressure only, press the dust seal into position in the outer tube.

Front Fork - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
 - [Battery - Removal](#)
 - Raise and support the front of the motorcycle.
1. Detach and support the front brake calipers (see [Front Brake Caliper - Removal](#)).
 2. Detach the front ABS wheel speed sensor (and its harness if necessary) from the right hand fork leg (see [Front ABS Wheel Speed Sensor - Removal](#)).

⚠ WARNING

Never allow the brake calipers to hang on the brake hoses as this may damage the hoses. A damaged brake hose can cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

3. Remove the front direction indicators (see [Front Direction Indicators - Removal](#)).
4. Remove the front wheel (see [Front Wheel - Removal](#)).
5. Remove the front mudguard (see [Front Mudguard - Removal](#)).

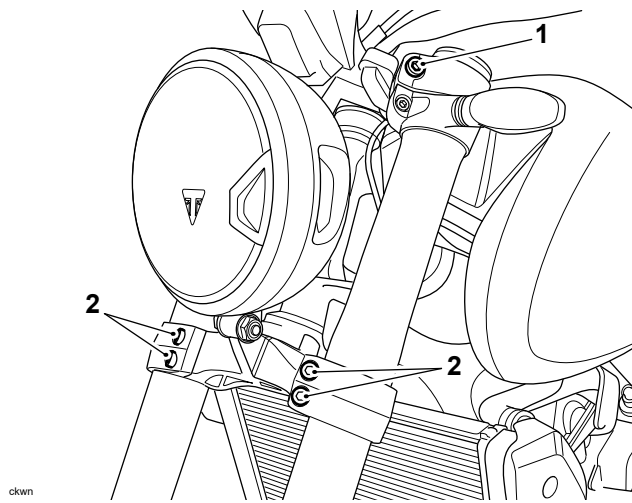
⚠ CAUTION

Before loosening, cover the fork top cap with a suitable masking tape to protect its anodized finish from becoming damaged by the tool.

NOTICE

If the forks are to be dismantled, loosen the fork top caps.

6. Loosen the upper yoke pinch bolts.
7. Loosen the lower yoke pinch bolts.



- 1. Upper yoke pinch bolt (left hand side shown)
- 2. Lower yoke pinch bolts

⚠ CAUTION



Care must be taken when removing the forks, to ensure that the outer surfaces do not become scratched.

8. Using a downward, twisting action, withdraw the forks from the yokes. Retrieve the direction indicator brackets.

Front Fork - Installation

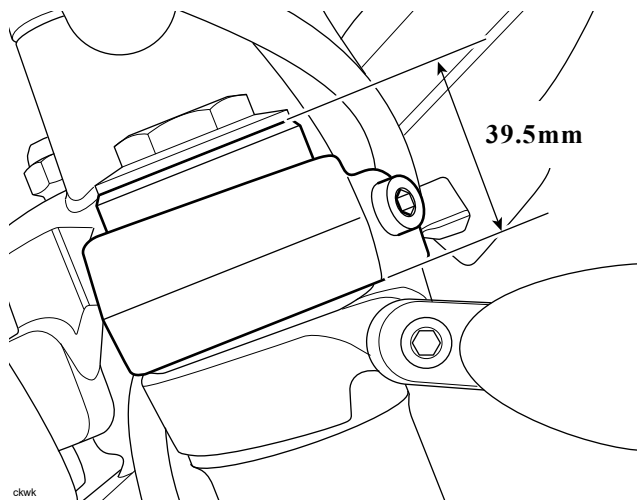
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Install the forks into the yokes, refitting the direction indicator brackets in between the two yokes, and make sure the manufacturer's labels are facing outwards on each fork leg.
2. Position the forks within the yokes so that the lip of the outer tube, not the top cap, is 39.50 mm +/- 0.5 mm above the flat/machined surface on the underside of the upper yoke.



Fork pull through measurement

3. Tighten the lower yoke pinch bolts as follows:
 - tighten the upper bolt to 22 Nm
 - tighten the lower bolt to 22 Nm
 - re-tighten the upper bolt to 22 Nm.
4. Tighten the upper yoke pinch bolts, upper fixings first, to 26 Nm.

⚠ CAUTION

Before tightening, cover the fork top cap with a suitable masking tape to protect its anodized finish from becoming damaged by the tool.

5. If the forks have been dismantled, tighten the fork top caps to 35 Nm.
Perform the following operations:

- [Front Mudguard - Installation](#)
- [Front Wheel - Installation](#)
- [Front Brake Caliper - Installation](#)
- [Front Direction Indicators - Installation](#)

- [Battery - Installation](#)
- [Seat - Installation](#)
- Lower the motorcycle to the ground and park it on the side stand.

Fork Oil Change - Oil Draining

1. Remove the fork (see [Front Fork - Removal](#)).

NOTICE

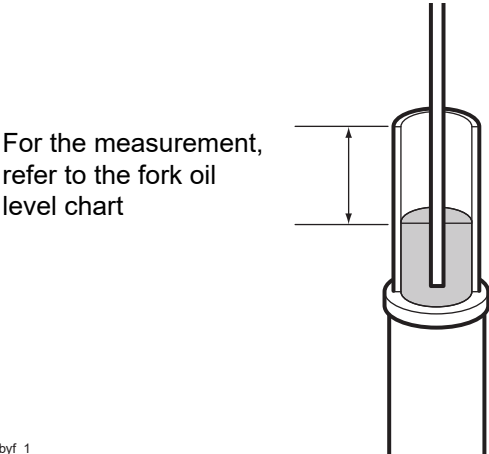


The left hand and right hand fork leg assemblies differ internally.

2. Disassemble the following items from the fork leg:
 - For the left hand fork leg, remove the top cap and joint rod assembly and remove the spring (see [Left Hand Front Fork - Disassembly](#)).
 - For the right hand fork leg, remove the top cap, spring spacer, washer and spring (see [Right Hand Front Fork - Disassembly](#)).
3. Holding the inner and outer tubes together, invert the fork and pour out the fork oil into a suitable container. Pump the fork assembly to remove all the oil.

Fork Oil Change - Oil Refilling

The oil level is measured from the upper surface of the fork outer tube, with the fork fully compressed with the spring removed.



Fork Oil Level (fork fully compressed)

Fork Oil Level Chart

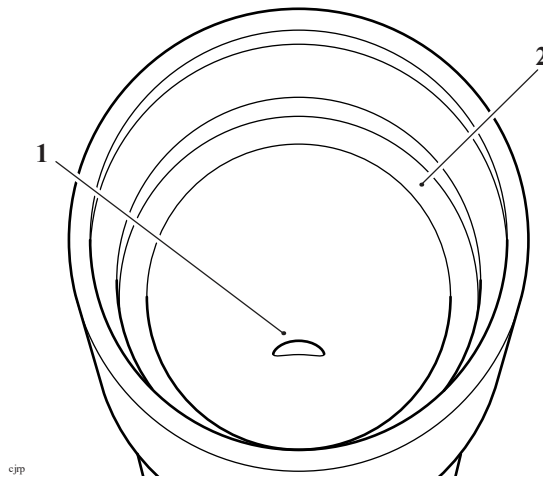
⚠️ WARNING

The method for oil refilling and oil level setting is the same for both fork legs, however, the left hand and right hand fork assemblies differ internally and require different oil levels to be set.

Any variation from the figures quoted in the fork oil level chart could result in an unsafe riding condition leading to loss of motorcycle control and an accident.

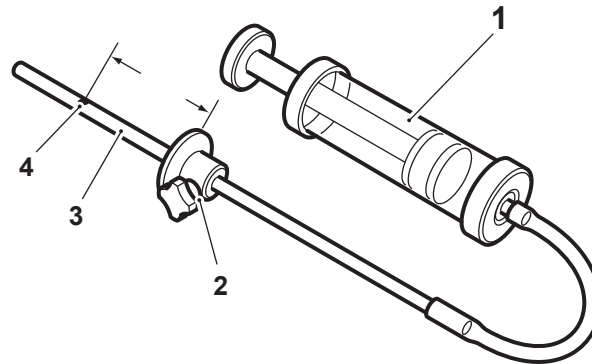
Fork Leg	Oil Level*	Oil Volume	Oil Grade
Left Hand	125 mm	560 cc	Showa SS47G
Right Hand	115 mm	475 cc	
*Fork fully compressed with the spring removed.			

1. Fill the fork with the specified fork oil until the oil level passes the side holes in the fork inner tube.



1. Hole (one of two shown)
2. Fork inner tube

2. Pump the fork outer tube 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 level to stabilise.
3. Refer to the oil level chart and set the scale on service tool T3880160 to the specified level.



cbyg_1

1. T3880160 - Fork Oil Filler/Evacuator
2. Adjuster plate
3. Scale area
4. Hole (zero position)

NOTICE

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 outer 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.

NOTICE



The left hand and right hand fork assemblies differ internally.

7. Assemble the following items to the fork leg:

- For the left hand fork leg, install the spring and the top cap and joint rod assembly (see [Left Hand Front Fork - Assembly](#)).
- For the right hand fork leg, install the spring, washer, spring spacer and top cap (see [Right Hand Front Fork - Assembly](#)).

Left Hand Front Fork - Disassembly

- Remove the fork assembly (see [Front Fork - Removal](#)).

⚠ CAUTION

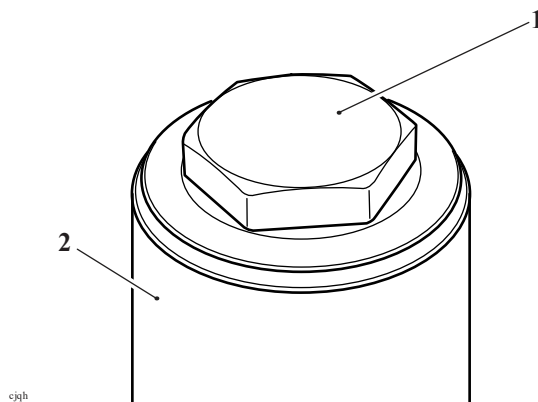
When securing the fork in service tool T3880171, take care not to over tighten the clamp as this will cause the fork tube to distort beyond repair.

1. Using a soft jawed vice, clamp the service tool T3880171 such that the fork can be mounted vertically.
2. With the top cap facing upwards, very gently clamp the fork inner tube into service tool T3880171.

⚠ CAUTION

Before loosening, cover the top cap with a suitable masking tape to protect its anodized finish from tool damage.

3. Carefully unscrew the top cap from the fork outer tube.

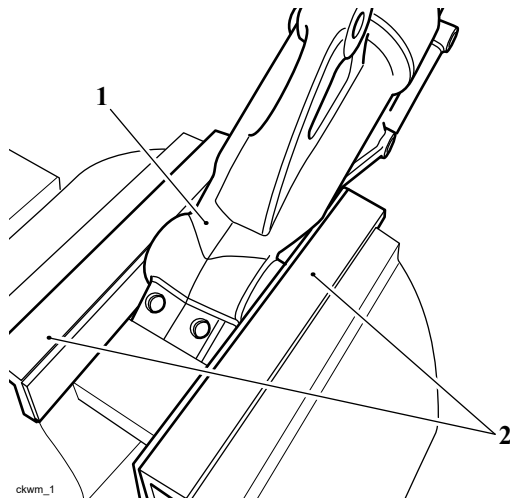


1. Top cap
2. Fork outer tube

⚠ WARNING

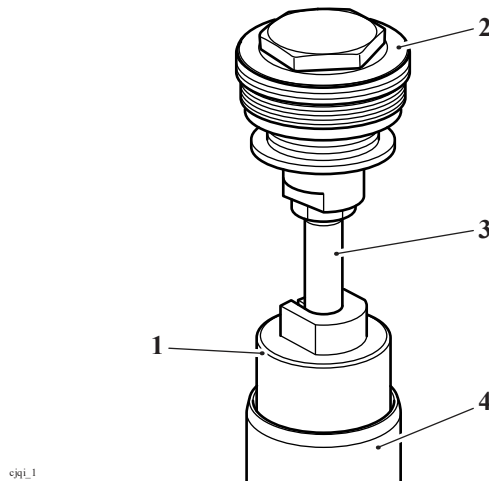
The fork top cap and joint rod assembly is under pressure from the fork spring. As the last few threads of the assembly are unscrewed, keep the assembly pushed firmly into the tube to prevent it being forcibly expelled as the threads release. To prevent injury, always wear eye, face and hand protection when removing the top cap and joint rod assembly.

4. Remove the fork assembly from service tool T3880171 and transfer to a soft jawed vice.



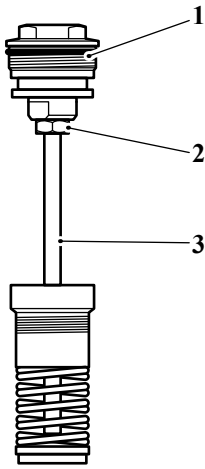
- 1. Front fork assembly
- 2. Soft jaws

5. Hold the fork inner tube fully into the fork outer tube. Using service tool T3880367 unscrew and remove the fork top cap and joint rod assembly from the fork inner tube.



- 1. T3880367 - Wrench, Damper Cylinder, 33mm
- 2. Top cap
- 3. Joint rod
- 4. Fork outer tube

6. If removal of the top cap is required, loosen the locknut and unscrew the top cap from the joint rod. If necessary remove the O-ring joint seal from the top cap assembly.



ckwt

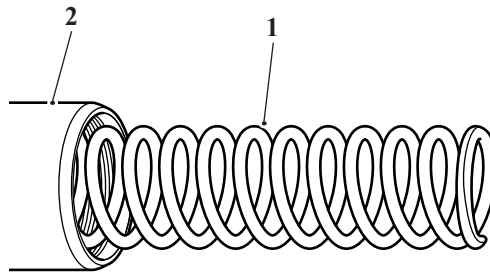
1. Fork top cap
2. Lock nut
3. Joint rod

NOTICE



The spring has a smaller coil diameter at its upper end. Note the orientation of the spring before removal.

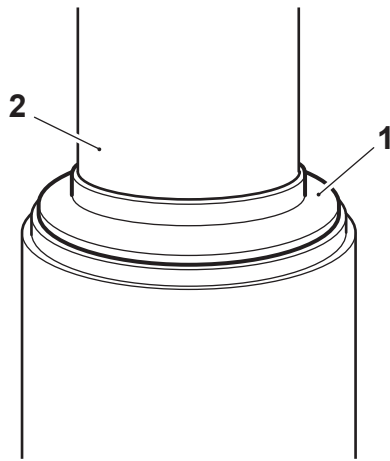
7. Remove the spring.



cjrk_1

1. Spring
2. Fork outer tube

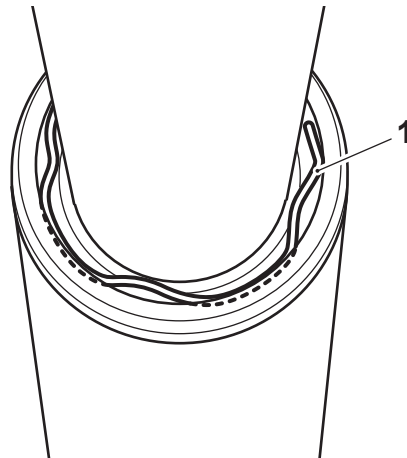
8. Invert the fork and pour out the fork oil into a suitable container. Pump the fork assembly to remove all oil.
9. With the fork still inverted, very gently clamp the fork outer tube into service tool T3880171.
10. Ease the dust seal out of the outer tube.



ceto_2

- 1. Dust seal
- 2. Inner tube

11. Carefully ease the circlip out from the top of the outer tube.



oetn

- 1. Circlip

12. Compress the fork then pull the inner tube sharply out of the outer tube. Repeat this procedure until the upper bush and seal are forced out of position and the inner and outer tube can be separated.

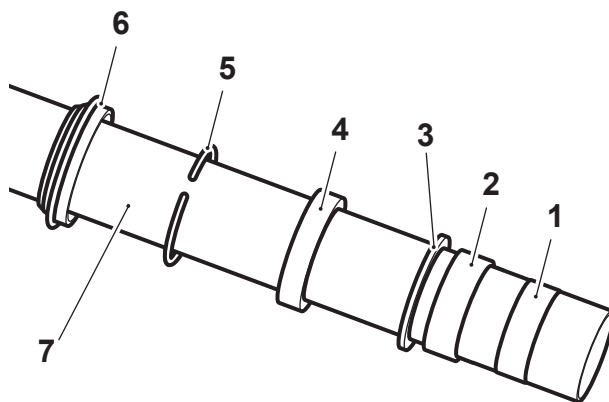
13. Carefully slide the upper bush off the fork inner tube. Discard the upper bush.

NOTICE



Note the orientation of the oil seal and dust seal for installation.

14. Slide the lower bush, washer, oil seal, circlip and dust seal off the fork inner tube. Discard the lower bush, oil seal, circlip and dust seal.



ccup_5

- 1. Upper bush
- 2. Lower bush
- 3. Washer
- 4. Oil seal
- 5. Circlip
- 6. Dust seal
- 7. Fork inner tube

Right Hand Front Fork - Disassembly

- Remove the fork assembly (see [Front Fork - Removal](#)).

⚠ CAUTION

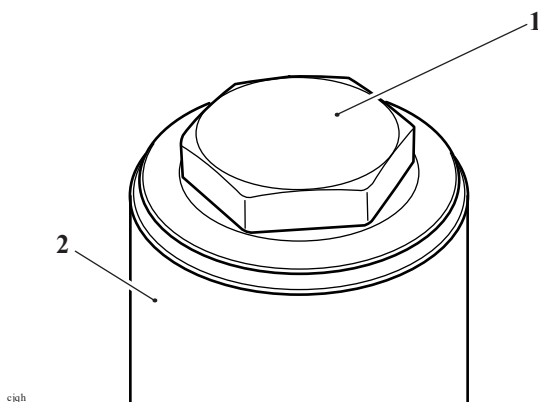
When securing the fork in service tool T3880171, take care not to over tighten the clamp as this will cause the fork tube to distort beyond repair.

1. Using a soft jawed vice, clamp the service tool T3880171 such that the fork can be mounted vertically.
2. With the top cap facing upwards, very gently clamp the fork inner tube into service tool T3880171.

⚠ CAUTION

Before loosening, cover the top cap with a suitable masking tape to protect its anodized finish from tool damage.

3. Carefully unscrew the top cap from the fork outer tube.



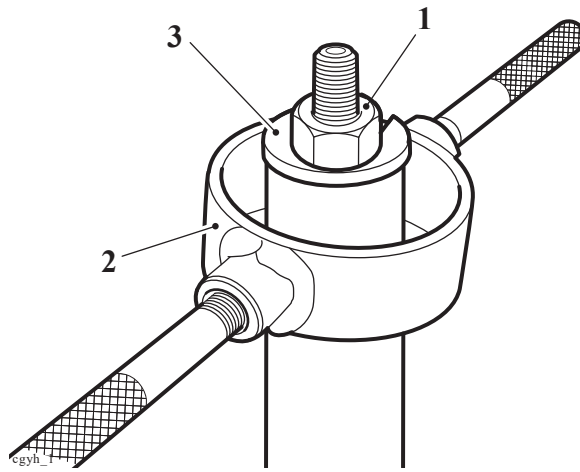
1. Top cap
2. Fork outer tube

4. Loosen the lock nut, unscrew and remove the top cap. If necessary, remove the O-ring seal from the top cap assembly.
5. Invert the fork and pour out the fork oil into a suitable container. Pump the fork assembly to remove all oil.
6. Return the fork to the clamping tool.

⚠ 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.

7. Fit service tool T3880067 over the spring spacer. Position the two adjustable arms to the spring spacer. Screw in the arms until they positively engage in the spring spacer holes.
8. Using service tool T3880067, manually compress the fork spring and remove the split collar from below the damper lock nut.



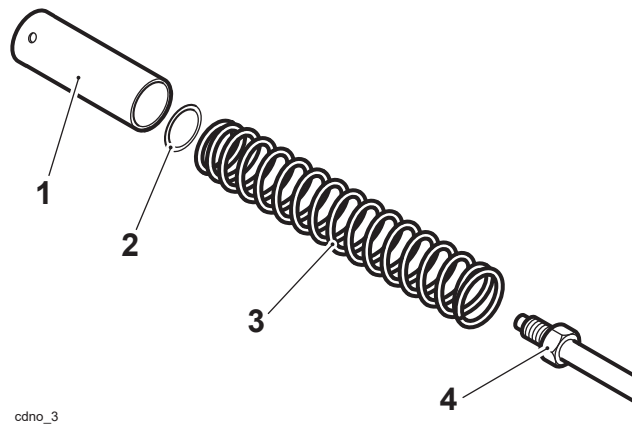
- 1. Damper lock nut
- 2. T3880067 - Fork Spring Compressor
- 3. Split collar

9. Remove service tool T3880067 from the spring spacer.

NOTICE

The spring has a smaller coil diameter at its upper end. Note the orientation of the spring before removal.

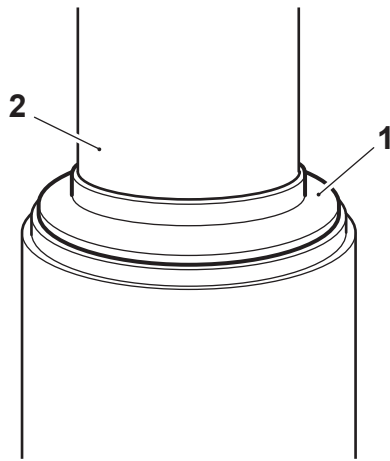
10. Remove the spring spacer, washer and spring.



- 1. Spring spacer
- 2. Washer
- 3. Spring
- 4. Damper rod

11. Invert the fork and very gently clamp the fork outer tube into service tool T3880171.

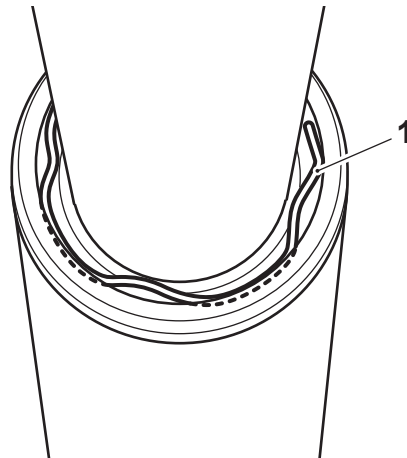
12. Ease the dust seal out of the outer tube.



ceto_2

- 1. Dust seal
- 2. Inner tube

13. Carefully ease the circlip out from the top of the outer tube.



oetn

- 1. Circlip

14. Compress the fork then pull the inner tube sharply out of the outer tube. Repeat this procedure until the upper bush and seal are forced out of position and the inner and outer tube can be separated.

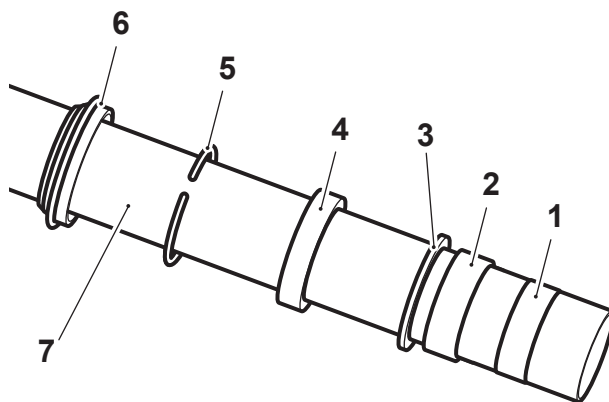
15. Carefully slide the upper bush off the fork inner tube. Discard the upper bush.

NOTICE



Note the orientation of the oil seal and dust seal for installation.

16. Slide the lower bush, washer, oil seal, circlip and dust seal off the fork inner tube. Discard the lower bush, oil seal, circlip and dust seal.

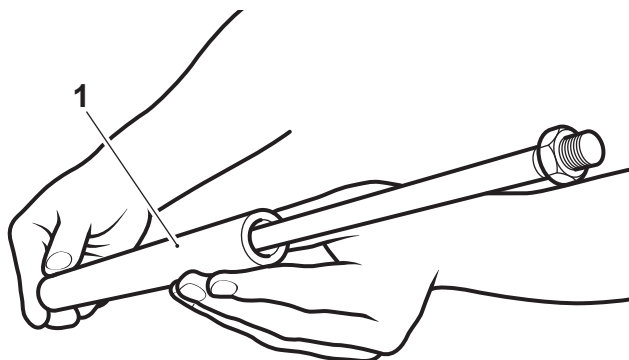


ccup_5

1. Upper bush
2. Lower bush
3. Washer
4. Oil seal
5. Circlip
6. Dust seal
7. Fork inner tube

17. If removal of the damping cylinder is required, unscrew the damping cylinder bolt from the bottom of the fork. Discard the sealing washer.

18. Slide the damping cylinder out of the fork inner tube. Collect the centering collar from the lower end of the damping cylinder.



ccuy

1. Damping cylinder

Front Fork - Inspection

1. Thoroughly clean and examine all components for damage, wear, scoring, corrosion etc., paying particular attention to the bushes and damper rod piston ring. Renew as necessary.
2. Always renew the oil seal, dust seal and the damper rod bolt sealing washer every time the fork is dismantled.

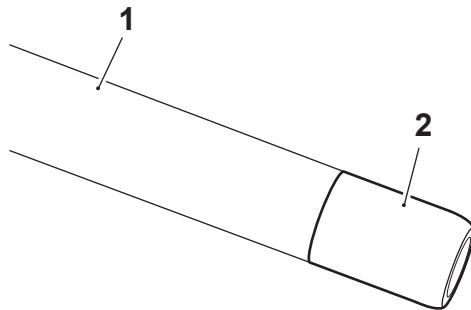
Left Hand Front Fork - Assembly

⚠ WARNING

The front forks comprise of many precision machined parts. Total cleanliness must be observed at all times and assembly must take place in a dirt/dust-free environment.

Dirt ingress may cause damage to the fork parts, leading to incorrect operation, instability, loss of motorcycle control and an accident.

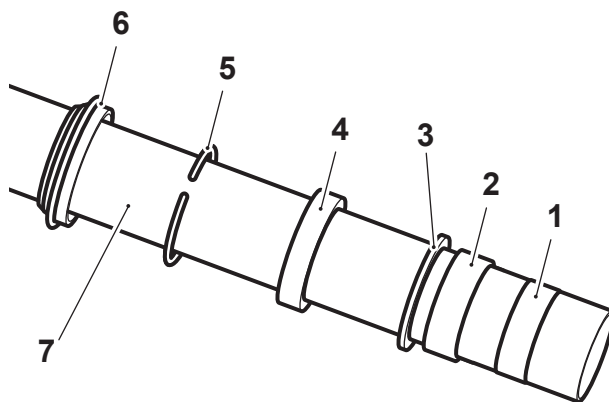
1. Lubricate the oil seal, upper and lower bushes for the inner tube with clean fork oil.
2. Install service tool T3880642 to the fork inner tube. Ensure the tool is not damaged and that it covers the bush groove fully.



ccup_4

- | |
|--|
| <ol style="list-style-type: none">1. Fork inner tube2. T3880642 - Fork Seal Guide/Protector |
|--|

3. Slide a new dust seal on to the fork inner tube as noted for removal.
4. Slide the circlip and a new oil seal on to the fork inner tube as noted for removal.
5. Slide the washer and a new lower bush onto the inner tube.
6. Remove service tool T3880642 from the fork inner tube.
7. Fit a new upper bush to the fork inner tube.

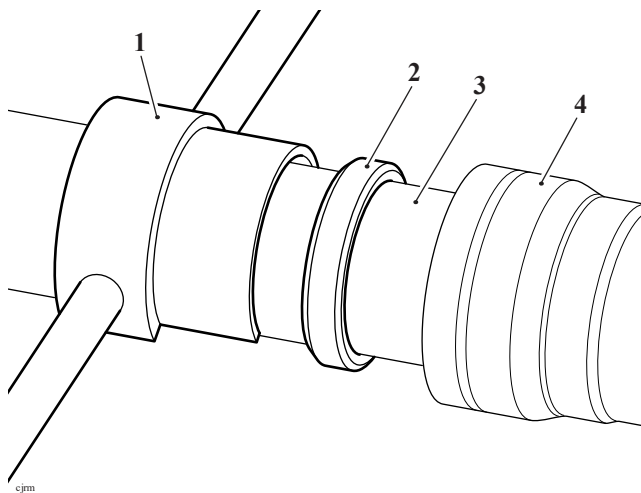


ccup_5

1. Upper bush
2. Lower bush
3. Washer
4. Oil seal
5. Circlip
6. Dust seal
7. Fork inner tube

8. Insert the fork inner tube assembly into the fork outer tube.

9. Using the narrow end of service tool T3880003, guide the lower bush, washer and oil seal into place.



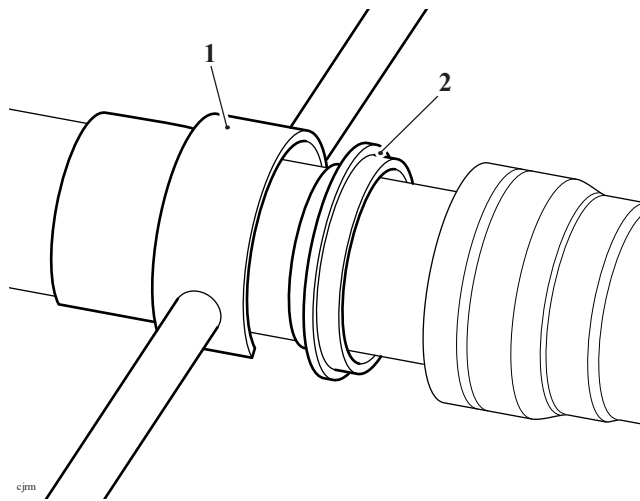
cjgm

1. T3880003 - Front Fork Seal Installer
2. Oil seal
3. Fork inner tube
4. Fork outer tube

10. Secure the oil seal in position with the circlip, ensuring it is correctly located in its groove.

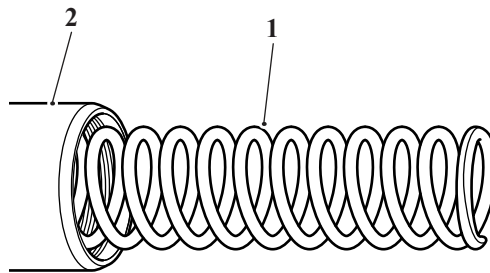
11. Position the dust seal to the outer tube.

12. Invert service tool T3880003 and, using hand pressure only, push the dust seal squarely into the outer tube.



- 1. T3880003 - Front Fork Seal Installer
- 2. Dust seal

13. Return the fork to an upright position, with the lower end of the fork inner tube secure in service tool T3880171.
14. Refill the fork with new oil (see [Fork Oil Change - Oil Refilling](#)).
15. Fit the spring into the fork inner tube as noted during removal.



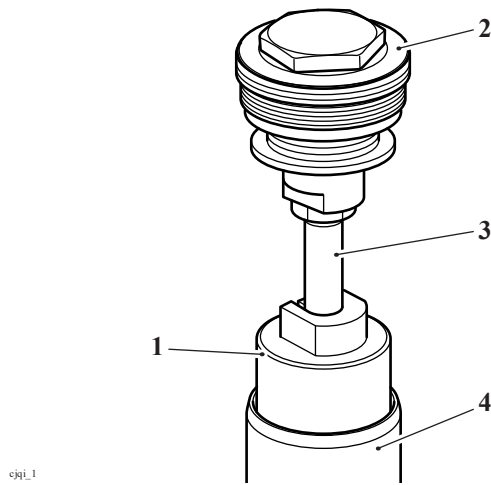
- 1. Spring
- 2. Fork outer tube

16. If removed, fit a new O-ring to the top cap.
17. If removed, screw the top cap fully onto the joint rod.
18. Hold the top cap while tightening the lock nut to 20 Nm.

NOTICE

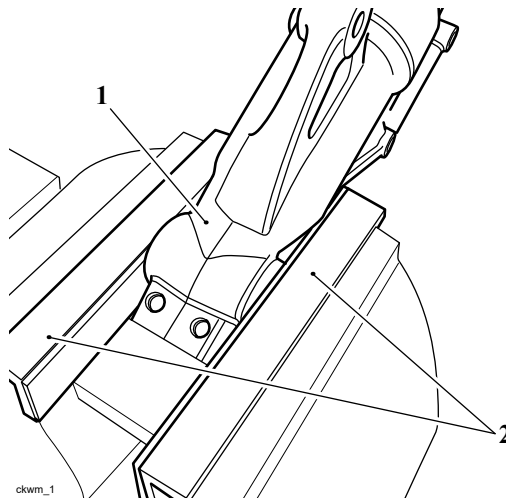
When fitting the fork top cap and joint rod assembly, care must be taken not to damage the top ring of the joint rod assembly.

19. With the fork fully compressed use service tool T3880367 to fit the fork joint rod assembly to the inner tube.



- 1. T3880367 - Wrench, Damper Cylinder, 33mm
- 2. Top cap
- 3. Joint rod
- 4. Fork outer tube

20. Remove the fork from service tool T3880171 and transfer to a soft jawed vice.



- 1. Front fork assembly
- 2. Soft jaws

21. With the lower end of the fork inner tube secure in the vice, tighten the joint rod assembly to 90 Nm using a torque wrench fitted with a suitable crow foot spanner adapter (see [Use of Crow Foot Spanner Adapters with Torque Wrenches](#)).

22. Lubricate the O-ring on the top cap with a smear of clean fork oil then screw the top cap fully into the fork outer tube.

CAUTION

Before tightening, cover the top cap with a suitable masking tape to protect its anodized finish from tool damage.

23. Tighten the top cap to 35 Nm.

NOTICE

It is much easier to tighten the top cap when the fork has been refitted.

- Refit the fork assembly (see [Front Fork - Installation](#)).

Right Hand Front Fork - Assembly

⚠ WARNING

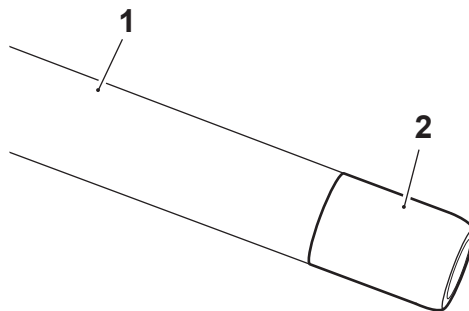
The front forks comprise of many precision machined parts. Total cleanliness must be observed at all times and assembly must take place in a dirt/dust-free environment.

Dirt ingress may cause damage to the fork parts, leading to incorrect operation, instability, loss of motorcycle control and an accident.

NOTICE

If the damping cylinder has not been removed, omit steps 1 to 3.

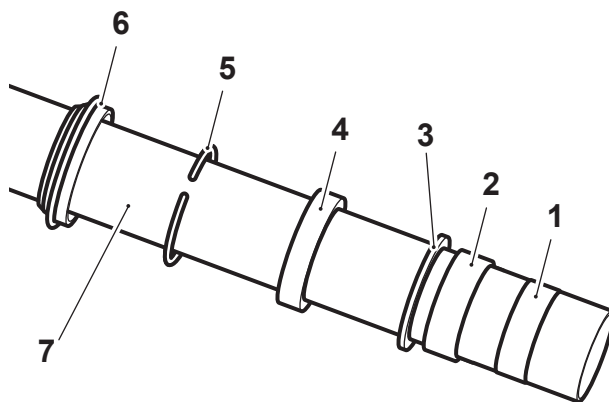
1. Fit the centering collar to the lower end of the damping cylinder.
2. Fit the damping cylinder to the fork inner tube.
3. Clean the threads of the damping cylinder bolt and fit a new sealing washer. Prevent the cylinder from turning while tightening the damping cylinder securing bolt to 20 Nm.
4. Lubricate the oil seal, upper and lower bushes for the inner tube with clean fork oil.
5. Install service tool T3880642 to the fork inner tube. Ensure the tool is not damaged and that it covers the bush groove fully.



ccup_4

- | |
|--|
| <ol style="list-style-type: none">1. Fork inner tube2. T3880642 - Fork Seal Guide/Protector |
|--|

6. Slide a new dust seal on to the fork inner tube as noted for removal.
7. Slide the circlip and a new oil seal on to the fork inner tube as noted for removal.
8. Slide the washer and a new lower bush onto the inner tube.
9. Remove service tool T3880642 from the fork inner tube.
10. Fit a new upper bush to the fork inner tube.

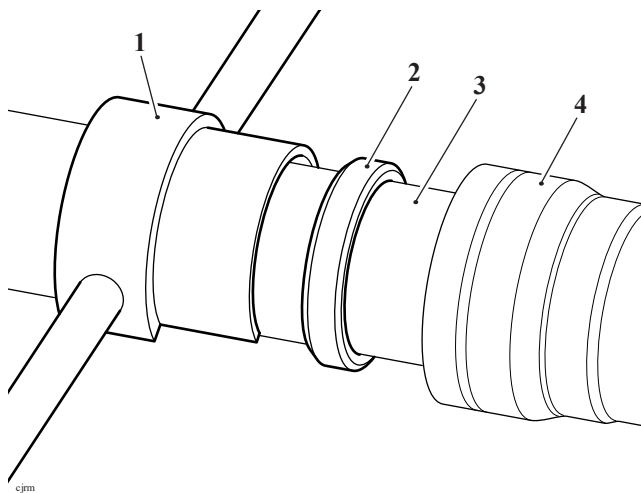


ccup_5

- 1. Upper bush
- 2. Lower bush
- 3. Washer
- 4. Oil seal
- 5. Circlip
- 6. Dust seal
- 7. Fork inner tube

11. Insert the fork inner tube assembly into the fork outer tube.

12. Using the narrow end of service tool T3880003, guide the lower bush, washer and oil seal into place.



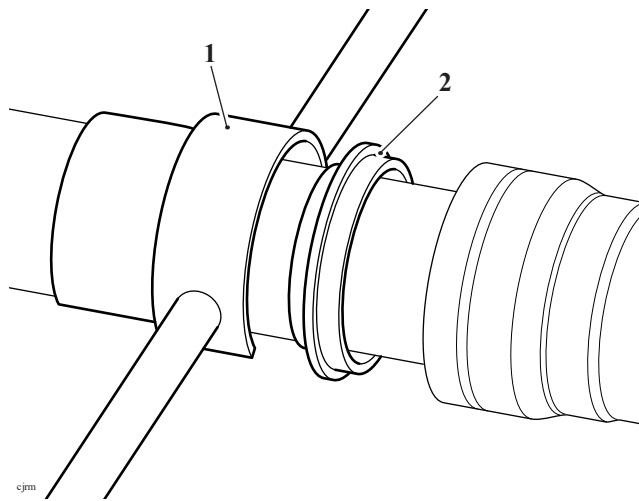
cjgm

- 1. T3880003 - Front Fork Seal Installer
- 2. Oil seal
- 3. Fork inner tube
- 4. Fork outer tube

13. Secure the oil seal in position with the circlip, ensuring it is correctly located in its groove.

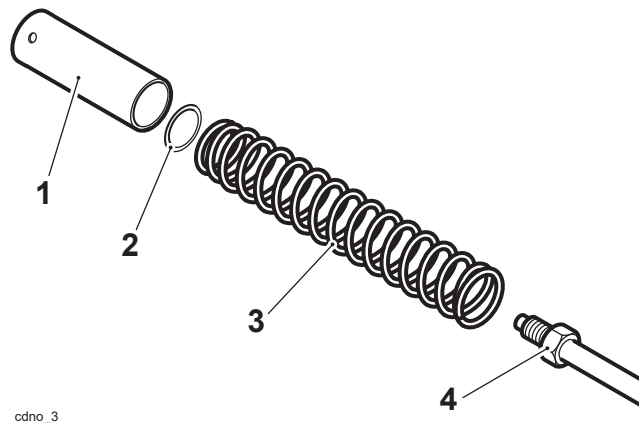
14. Position the dust seal to the outer tube.

15. Invert service tool T3880003 and, using hand pressure only, push the dust seal squarely into the outer tube.



- 1. T3880003 - Front Fork Seal Installer
- 2. Dust seal

16. Return the fork to an upright position, with the lower end of the fork inner tube secure in service tool T3880171.
17. Refill the fork with new oil (see [Fork Oil Change - Oil Refilling](#)).
18. Position the fork assembly as for compression of the fork spring during disassembly.
19. Make sure that the damper rod lock nut is screwed fully onto the threads of the damper rod.
20. Fit the spring, washer and spring spacer into the fork inner tube as noted during removal.



- 1. Spring spacer
- 2. washer
- 3. Spring
- 4. Damper rod lock nut

21. Attach service tool T3880085 to the threads of the damper rod and pull the damper upwards.

⚠ WARNING

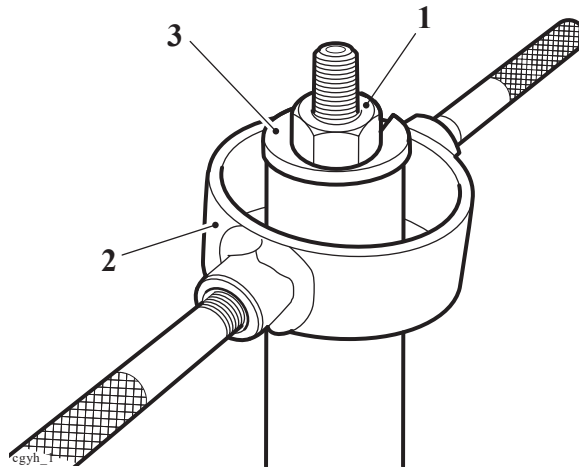
While compressing the fork spring always wear protective equipment for the face and eyes and never stand directly above or look directly down on the fork. If the spring compressor should dislodge or detach, the resulting release of spring tension could cause parts to fly off resulting in injury to the user.

22. Fit service tool T3880067 over the spring spacer. Position the two adjustable arms to the spring spacer. Screw in the arms until they positively engage in the spring spacer holes.

NOTICE

An assistant may be required to install the split collar and top cap.

23. Using service tool T3880067, manually compress the fork spring and with the aid of an assistant, fit the split collar below the damper lock nut.



- 1. Damper lock nut
- 2. T3880067 - Fork Spring Compressor
- 3. Split collar

24. Remove service tool T3880085 from the damper rod.
25. Fit a new O-ring to the top cap.
26. Screw the top cap fully onto the damper rod.
27. Compress the fork spring using service tool T3880067 and with the aid of an assistant, hold the top cap while tightening the damper rod lock nut to 20 Nm.
28. Remove service tool T3880067 from the spring spacer.
29. Lubricate the O-ring on the top cap with a smear of clean fork oil then screw the top cap fully into the outer tube.

CAUTION

Before tightening, cover the top cap with a suitable masking tape to protect its anodized finish from tool damage.

30. Tighten the top cap to 35 Nm.

NOTICE

It is much easier to tighten the top cap when the fork has been refitted.

31. Refit the fork assembly (see [Front Fork - Installation](#)).

Handlebars - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

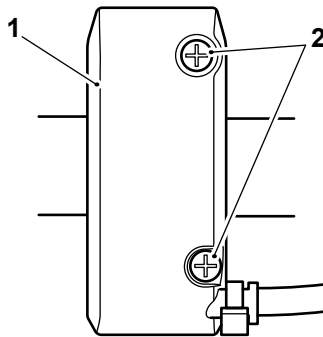
⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork or frame. Spilled brake fluid will damage paintwork.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Mirrors - Removal](#)
- [Front Brake Master Cylinder - Removal](#)
- [Handlebar End Weights - Removal](#) (if applicable)
- [Twist Grip - Removal](#)

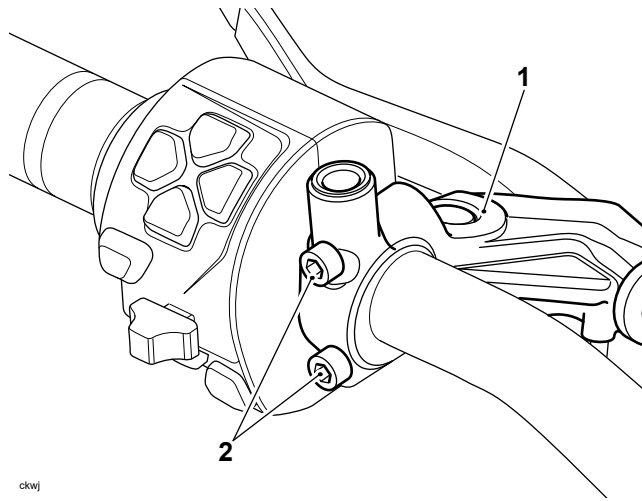
1. Release the fixings securing the right hand switch housing to the handlebar.



ckwr

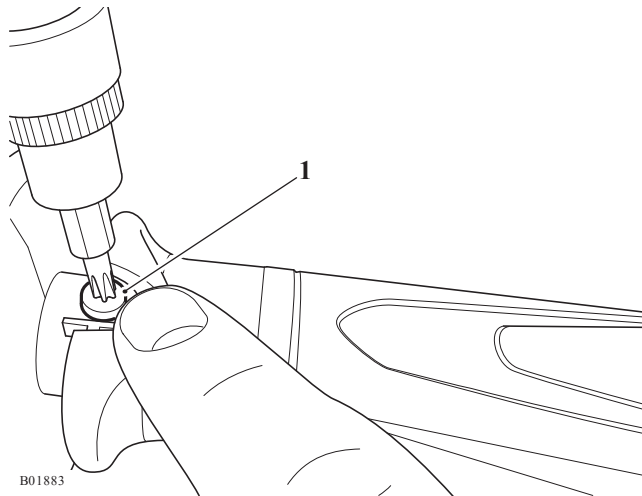
- | |
|---|
| <p>1. Fixings</p> <p>2. Right hand switch housing</p> |
|---|

2. Release the fixings and remove the clamp from the clutch lever assembly. Without disconnecting the clutch cable, lay the lever aside.



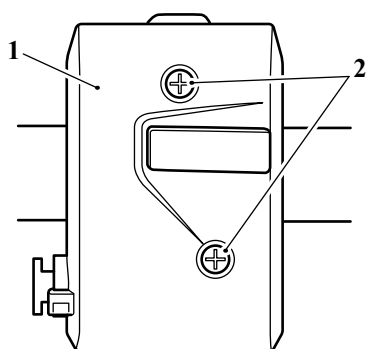
- 1. Clutch lever
- 2. Fixings

3. Release the two fixings and remove the left hand grip from the handlebar. Collect the two washers.



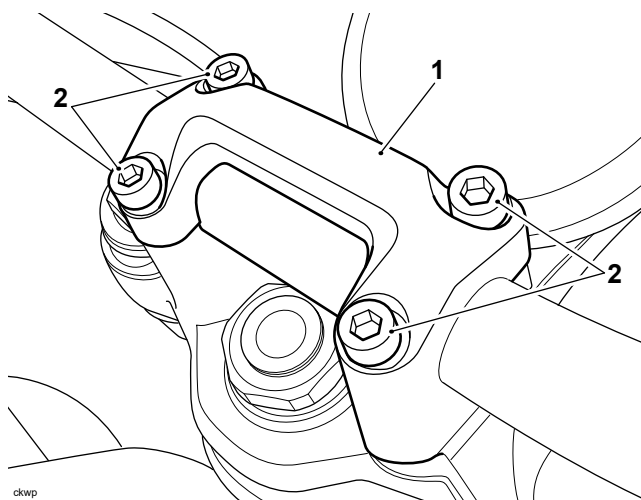
- 1. Fixing (one of two shown)

4. Release the fixings securing the left hand switch housing to the handlebar.



1. Left hand switch housing
2. Fixings

5. Support the handlebars and remove the handlebar clamp bolts.



1. Handlebar clamp
2. Fixings

6. Remove the clamp and the handlebars.

Handlebars - Installation

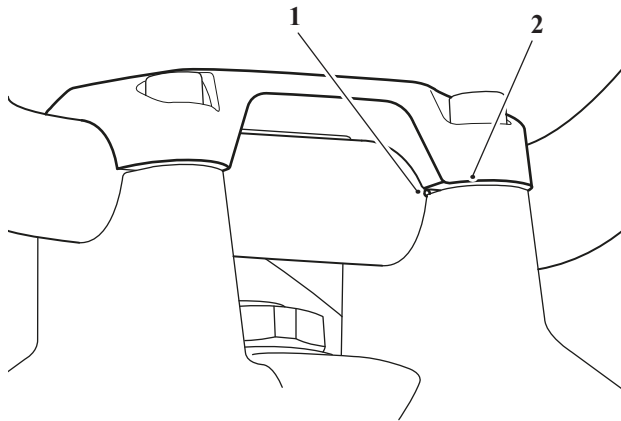
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

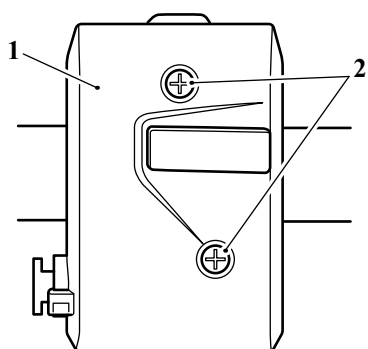
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the handlebars on to the upper yoke, fit the clamp and the fixings. Do not fully tighten at this stage.
2. Rotate the handlebars so that the alignment mark on the handlebar aligns with the handlebar clamp split line.



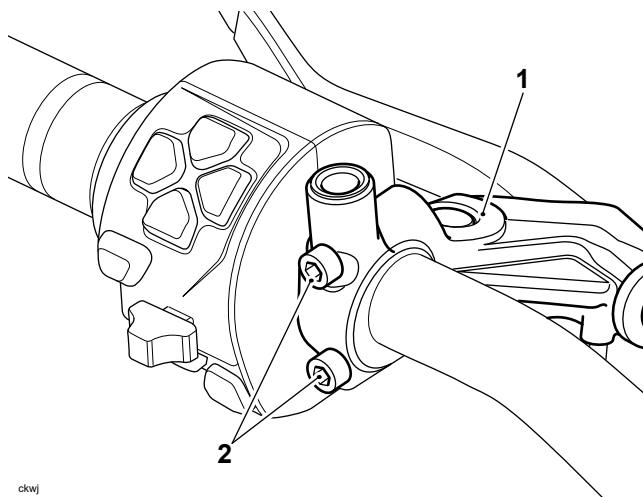
1. Alignment mark
2. Split line

3. Tighten the handlebar clamp fixings, front ones first, to 26 Nm.
4. Align the left hand switch housing to the handlebar, ensure the locating lug aligns with the hole in the handlebar. Fit the two screws and tighten to 2.5 Nm.



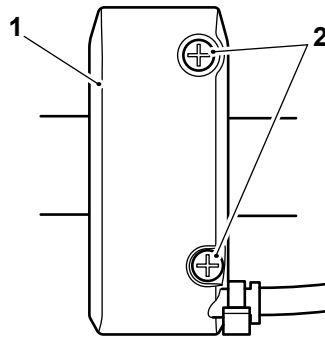
- | |
|---|
| 1. Left hand switch housing
2. Fixings |
|---|

5. Refit the left hand grip with two fixings and washers, and tighten to 3 Nm.
6. Locate the clutch lever assembly to the handlebar and fit the clamp.
7. Align the clutch lever split line with the alignment mark on the handlebar. Tighten the clamp fixings, upper one first, to 9 Nm.



- | |
|-------------------------------|
| 1. Clutch lever
2. Fixings |
|-------------------------------|

8. Align the right hand switch housing to the handlebar, ensure the locating lug aligns with the hole in the handlebar. Fit the two fixings and tighten to 2.5 Nm.



ckwr

- | |
|---|
| <ol style="list-style-type: none">1. Fixings2. Right hand switch housing |
|---|

Perform the following operations:

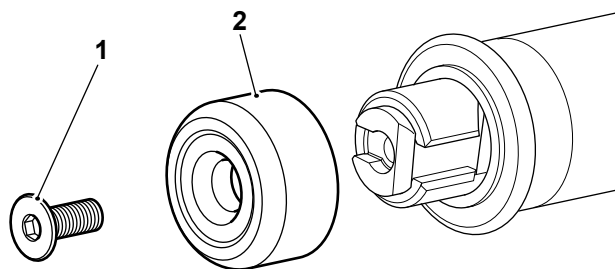
- [Twist Grip - Installation](#)
- [Handlebar End Weights - Installation](#) (if applicable)
- [Front Brake Master Cylinder - Installation](#)
- [Mirrors - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Handlebar End Weights - Removal

NOTICE

Handlebar end weights are not fitted to models that have accessory handguards installed.

1. Release and discard the fixings and remove the handlebar end weights.



ckwo

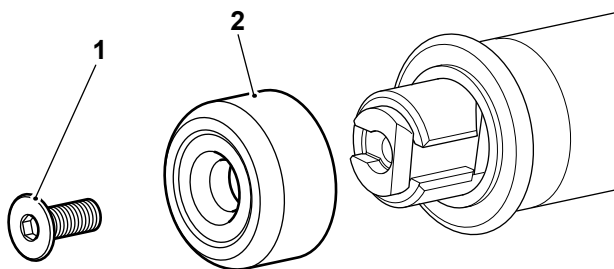
1. Fixing
2. End weight

Handlebar End Weights - Installation

NOTICE

Handlebar end weights are not fitted to models that have accessory handguards installed.

1. Install the handlebar end weights with new fixings and tighten to 3 Nm.



ckwo

1. Fixing
2. End weight

Upper Yoke - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

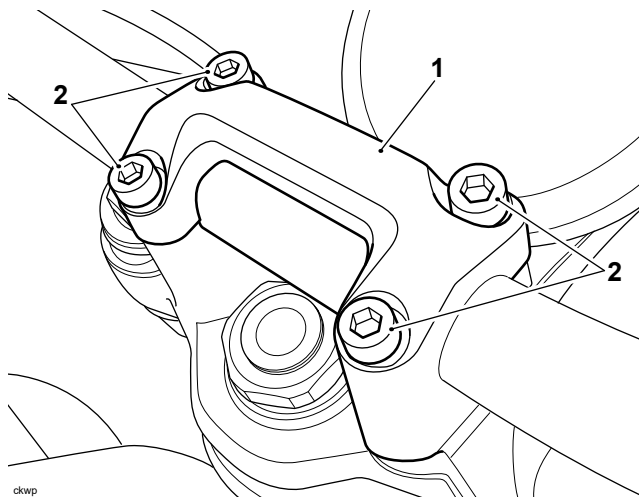
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Instruments - Removal](#)
- [Clutch Cable - Removal](#)

NOTICE

Note the routing of the harnesses through the upper yoke wire guides for installation.

1. Release the fixings securing the handlebar clamp to the upper yoke, detach the clamps and release the handlebar.



1. Handlebar clamp
2. Fixings

2. As an assembly, raise the handle bars until clear of the upper yoke. Rest the assembly forward of the steering stem such that access to the upper yoke centre nut is unrestricted. Ensure the master cylinder remains in an upright position.
3. Loosen the upper yoke pinch bolts.

⚠ WARNING

If the lower yoke fixings are also loosened, the forks will no longer support the weight of the motorcycle.

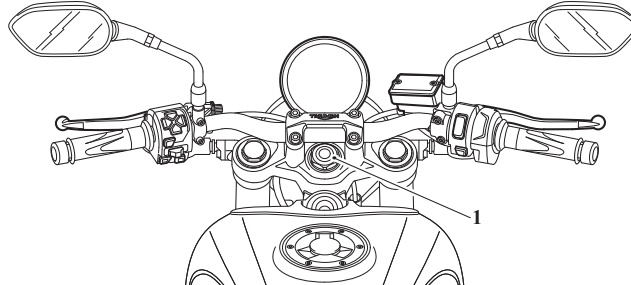
Do not loosen the lower yoke fixings as, in this condition, the motorcycle could topple over causing damage and/or risk of injury.

⚠ CAUTION



Care must be taken when removing the upper yoke centre nut, to ensure that the centre nut and upper yoke do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

4. Remove the upper yoke centre nut.



1. Upper yoke centre nut

5. Ease the upper yoke from the forks and remove from the motorcycle.
6. If required, release the four fixings and remove the instruments bracket from the upper yoke.

Upper Yoke - Installation

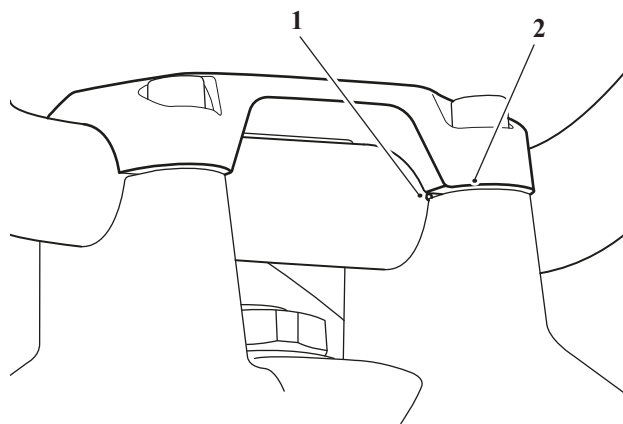
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If required, refit the instruments bracket to the upper yoke with four fixings and tighten to 3 Nm.
2. Refit the upper yoke and tighten the upper yoke centre nut to 90 Nm.
3. Tighten the upper yoke pinch bolts, upper fixings first, to 26 Nm.
4. Locate the handlebar assembly in the upper yoke. Fit the handlebar clamp and bolts.
5. Align the handlebar alignment mark with the front split line of the left hand side.
6. Tighten the front clamp bolts to 26 Nm, then the rears.



1. Alignment mark
2. Split line (left hand side)

7. Reroute the harnesses through the upper yoke wire guides as noted during removal.
Perform the following operations:

- [Clutch Cable - Installation](#)
- [Instruments - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Lower Yoke and Headstock Bearings - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

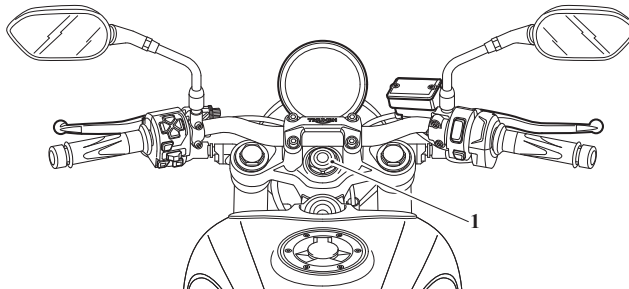
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Headlights - Removal](#)
- [Front Fork - Removal](#)

⚠ CAUTION

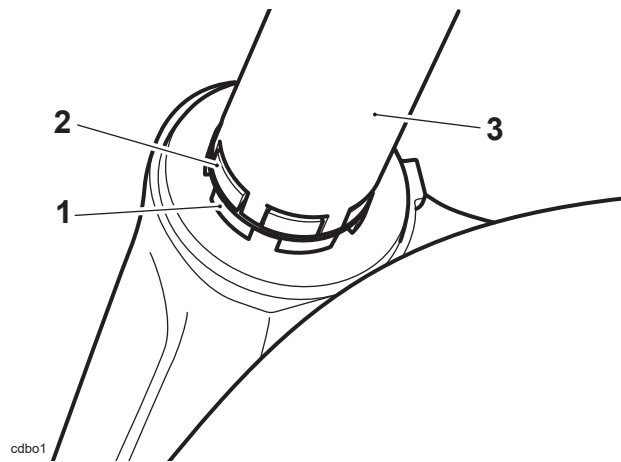
Care must be taken when removing the headstock top nut, to ensure that the top nut and headstock do not become scratched. Protect the surfaces with a suitable cloth or tape to prevent scratching.

1. Remove the upper yoke centre nut.



1. Upper yoke centre nut

2. As an assembly, raise the upper yoke and handle bars until clear of the steering stem. Rest the assembly forward of the steering stem such that access to the adjustment nuts is unrestricted. Ensure the master cylinder remains in an upright position.
3. Using service tool T3880023, remove the lock nut and tab washer. Discard the tab washer.



- 1. Adjuster nut
- 2. Lock nut
- 3. T3880023 - 50 mm Socket

- 4. Using service tool T3880750, remove the adjuster nut.
- 5. Remove the lower yoke from below the frame headstock.

⚠ WARNING

Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

- 6. Using a suitable drift, evenly and progressively drive the bearing races from the frame headstock.
- 7. Remove the inner race and dust seal from the lower yoke using a press or puller.

Lower Yoke and Headstock Bearings - Installation

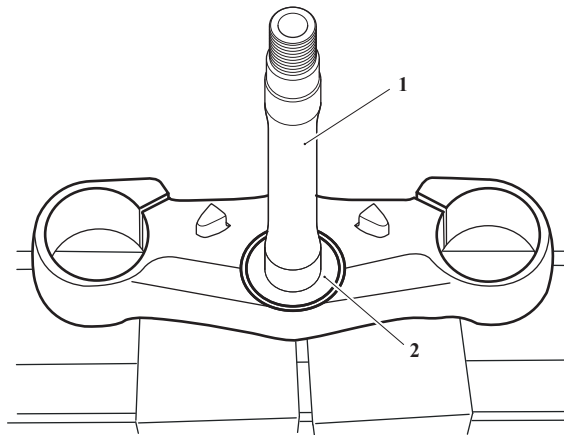
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit a new dust seal to the steering stem on the lower yoke.

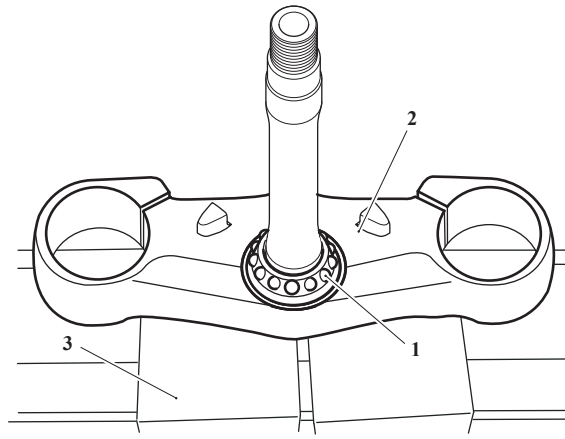


1. Steering stem
2. Dust seal

⚠ CAUTION

Protect the threads of the lower yoke when using a press or puller as damaged threads may mean replacing the yoke completely.

2. Press a new lower bearing inner race onto the steering stem of the lower yoke.



- | |
|--|
| <p>1. Bearing</p> <p>2. Lower yoke</p> <p>3. Press bed</p> |
|--|

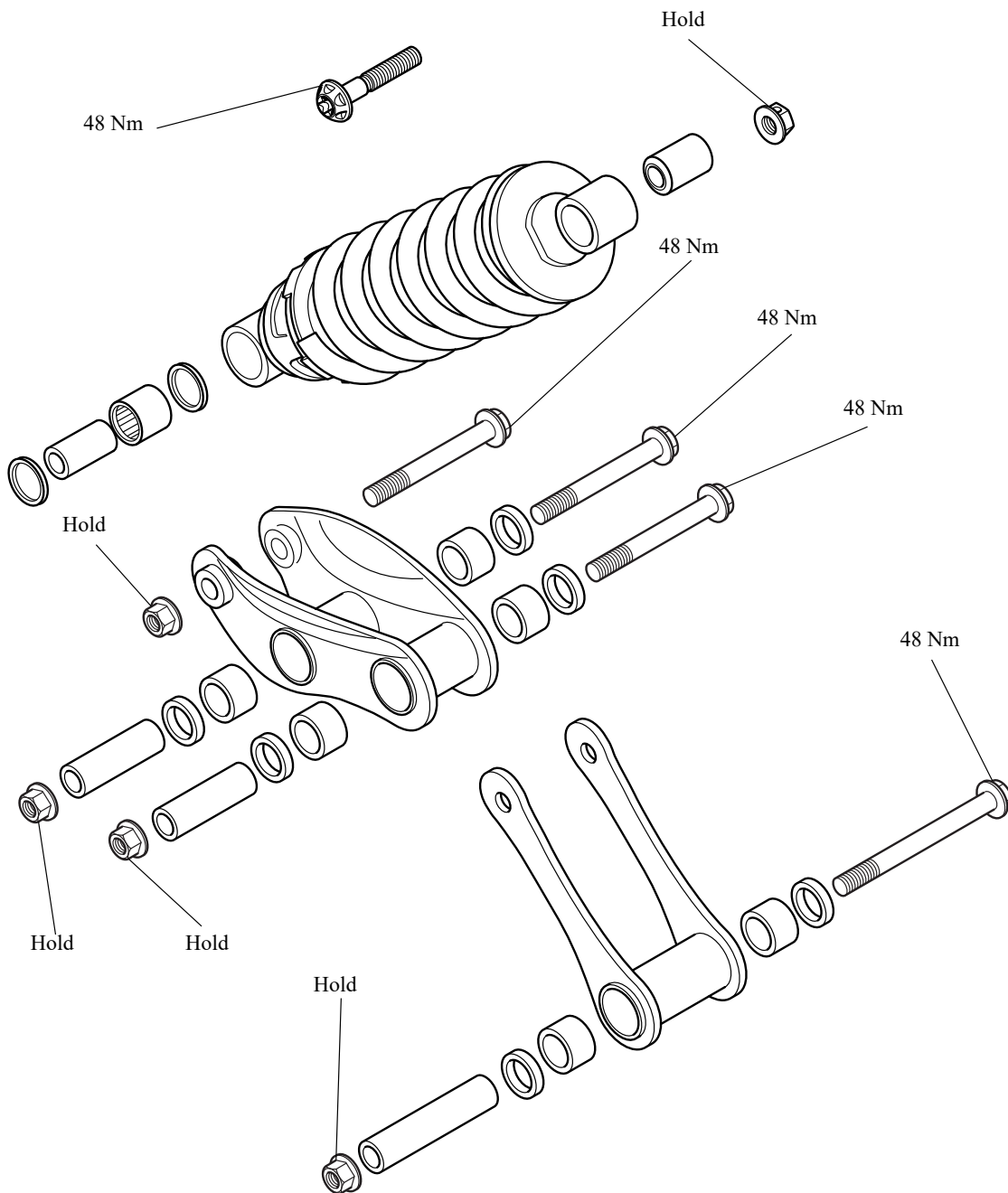
3. Evenly and progressively drive a new complete upper bearing into the frame headstock.
4. Lubricate the lower bearing using a heavy duty, lithium based, NLGI 2 specification grease such as Castrol Spheerol™ LCX 222.
5. Drive a new lower outer bearing into the frame headstock.
6. Lubricate the upper bearing using a heavy duty, lithium based, NLGI 2 specification grease such as Castrol Spheerol™ LCX 222.
7. Insert the lower yoke to the frame, fit the upper bearing and race, and retain with the adjuster nut.
8. Ensure that the threads on the steering stem are free from grease and adjust the headstock bearings (see [Steering Head Bearing - Adjustment](#)).
9. Locate the upper yoke to the steering stem. Install but do not fully tighten the upper yoke centre nut at this stage.
10. Fit the forks (see [Front Fork - Installation](#)).
11. Tighten the upper yoke centre nut to 90 Nm.
12. Check that no free play exists in the headstock bearings. Adjust as necessary (see [Steering Head Bearing - Check](#) and [Steering Head Bearing - Adjustment](#)).

Perform the following operations:

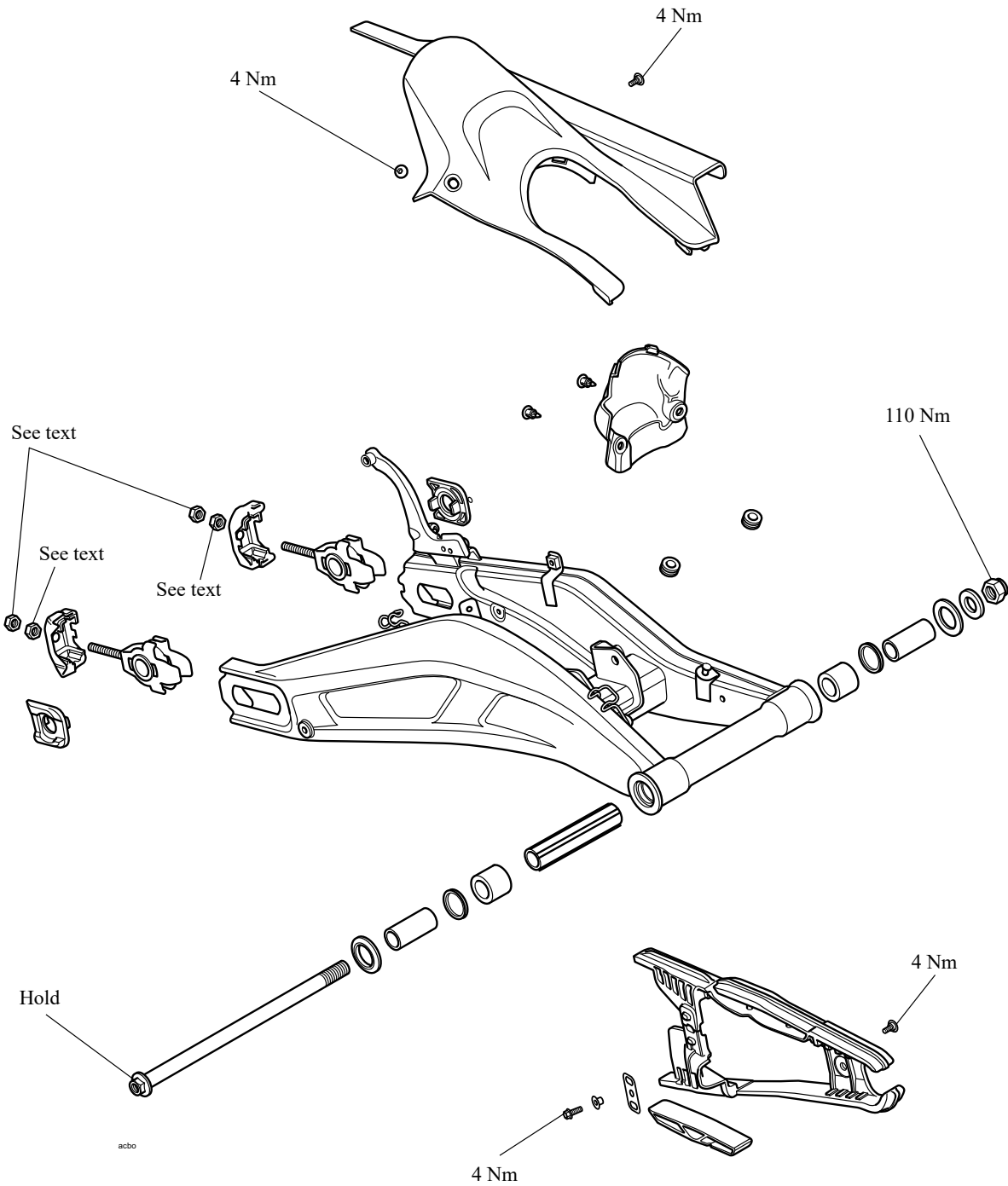
- [Headlights - Installation](#)
- [Instruments - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Rear Suspension and Swinging Arm

Exploded View - Rear Suspension Unit



Exploded View - Swinging Arm



Rear Suspension Unit

⚠️ WARNING

Contents under pressure. Never attempt to open this rear suspension unit. Never attempt to service this rear suspension unit. Never incinerate, puncture, or disassemble this rear suspension unit. Opening this rear suspension unit may result in severe injuries or even death.

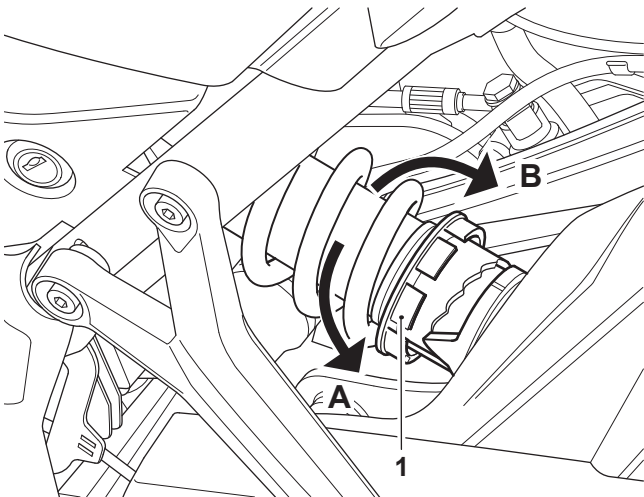


The rear suspension units are sealed units and do not have any internally user serviceable parts.

Rear Suspension Spring Preload Adjustment

The spring preload adjuster is located at the bottom of the rear suspension unit.

Rear adjuster settings are counted from one, with position one being with the adjuster turned fully clockwise. Position one gives the minimum amount of spring preload. There are seven adjuster positions in total. Position seven gives the maximum amount of spring preload.



1. Spring preload adjuster ring

A. Anticlockwise direction

B. Clockwise direction

To change the rear suspension spring preload setting:

- Locate the C spanner supplied in the tool kit.
- Insert the C spanner into the slots of the spring preload adjuster ring.
- Turn the spring preload adjuster ring anticlockwise (shown as direction A in the diagram) towards the left hand side of the motorcycle to increase spring preload.
- Turn the spring preload adjuster ring clockwise (shown as direction B in the diagram) towards the right hand side of the motorcycle to decrease spring preload.

Rear Suspension Settings

The motorcycle is delivered from the factory with all the suspension settings set at the Solo Riding setting as shown in the suspension settings table. The Solo Riding suspension settings provide a comfortable ride and good handling characteristics for general, solo riding.

The details shown in the suspension settings table are only a guide. Setting requirements may vary for rider and passenger weight and personal preferences.

Spring Preload Settings

Loading Condition	Spring Preload ¹
Solo Riding	1

Loading Condition	Spring Preload ¹
Solo Riding with Accessories/Loading (not exceeding limits)	1
Rider and Passenger	7
Rider and Passenger with Accessories/Loading (not exceeding limits)	7
¹ Position 1 is minimum (fully clockwise) and position 7 is maximum (fully anticlockwise).	

Rear Suspension Unit - Removal

⚠ WARNING

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

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

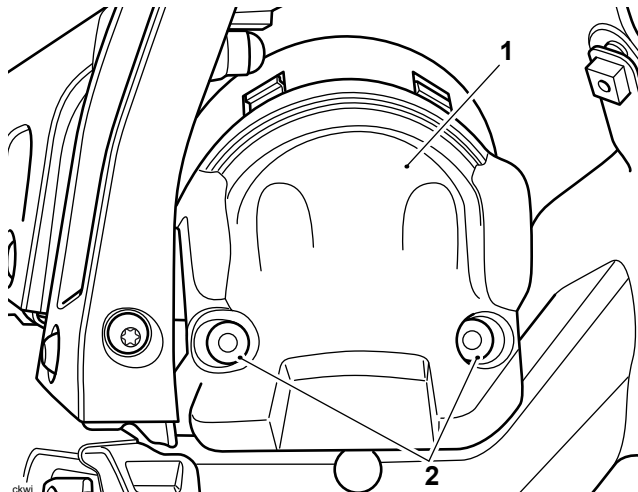
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

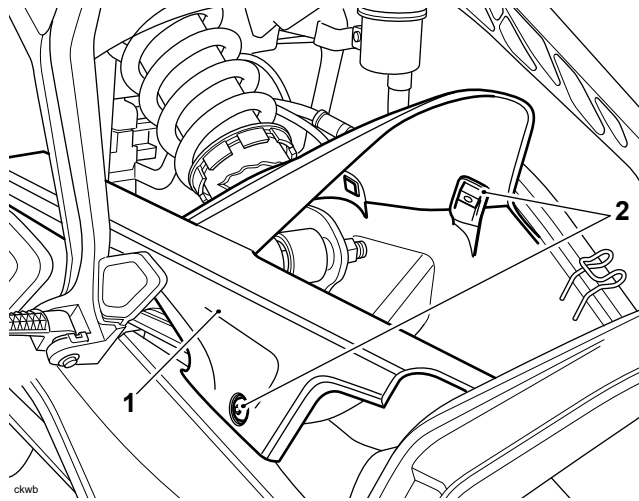
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Side Panels - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Rear Wheel - Removal](#)

1. Remove the two push release plastic rivets securing the rear suspension unit guard to the rear hugger. Remove the rear suspension unit guard.



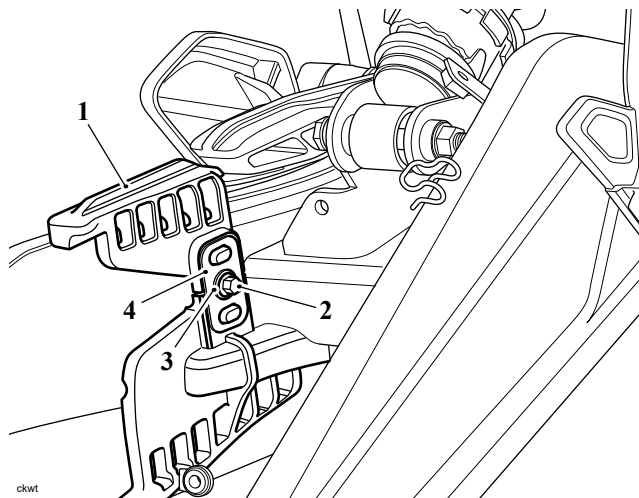
1. Rear suspension unit guard
2. Plastic rivets

2. Remove the two fixings and remove the rear hugger and chain guard.



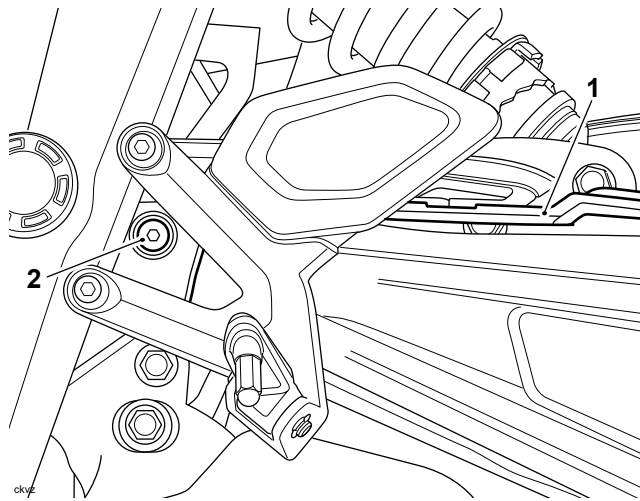
1. Rear hugger and chain guard
2. Fixings

3. Remove the fixing, flanged sleeve and plate from the drive chain rubbing strip.



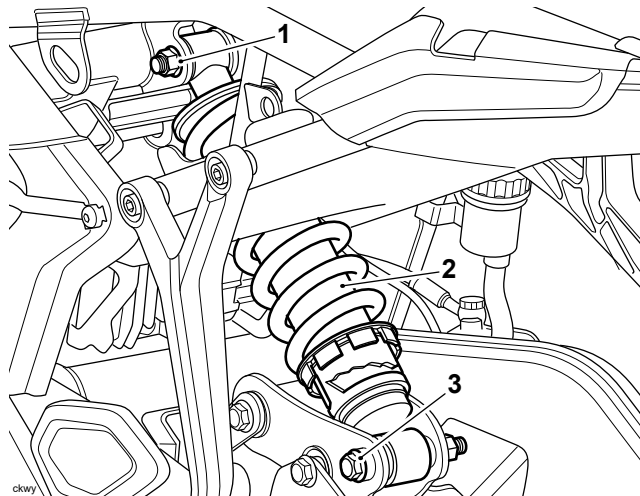
1. Drive chain rubbing strip
2. Fixing
3. Flanged sleeve
4. Plate

4. Remove the front fixing and remove the drive chain rubbing strip from the swinging arm.



- 1. Drive chain rubbing strip
- 2. Fixing

- 5. Position a suitable block to support the swinging arm.
- 6. Remove the upper rear suspension unit fixing and discard the lock nut.
- 7. Remove the lower fixing, discard the lock nut and remove the rear suspension unit.



- 1. Upper fixing
- 2. Rear suspension unit
- 3. Lower fixing

Rear Suspension Unit Lower Mounting Bearing Replacement

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

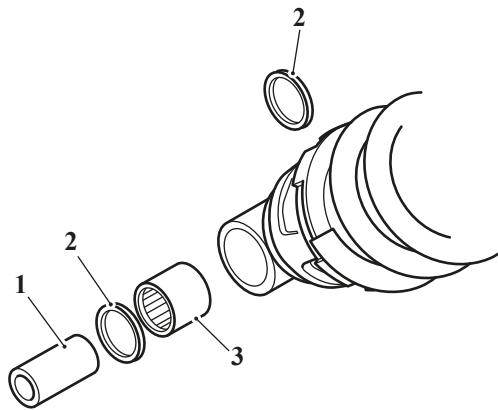
Perform the following operations:

- **Rear Suspension Unit - Removal**

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.



Trident model shown, Tiger Sport model similar

- 1. Bearing sleeve
- 2. Seals
- 3. Needle roller bearing

Removal

1. Remove the bearing sleeve and seals. Discard the seals.
2. Using a suitable press, remove the needle roller bearing.

Installation

NOTICE



The bearing is a 'dry fit' bearing and grease or other forms of lubrication should not be used during installation. However, a thin smear of multi-purpose NLGI 2 specification grease should be added to the bearing sleeve and seals.

When Inserting bearings always press against the marked or shielded side and always fit new bearing seals.

Ensure that the bearing bore is clean and free of debris before installing new bearings.

1. Install the new bearing using a suitable press.
 2. Fit new bearing seals and carefully insert the bearing sleeve.
- Perform the following operations:

- **Rear Suspension Unit - Installation**

Rear Suspension Unit Upper Mounting Bush Replacement

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

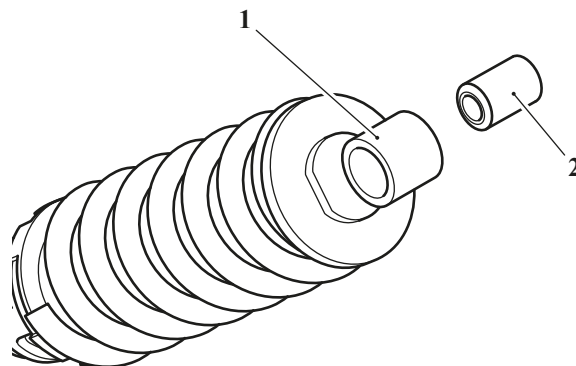
Perform the following operations:

- **Rear Suspension Unit - Removal**

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.



- 1. Rear suspension unit upper mounting
- 2. Bush

Removal

1. Using a suitable press, remove the upper mounting bush.

Installation

⚠ CAUTION

When installing the upper mounting bush, ensure bush is pressed in by its outer sleeve.

Pressing the bush in by its inner sleeves will cause irreparable damage to the bush.

NOTICE



Ensure that the upper mounting bore is clean and free of debris before installing a new bush.

1. Install the new bush using a suitable press.

Perform the following operations:

- [Rear Suspension Unit - Installation](#)

Rear Suspension Unit - Installation

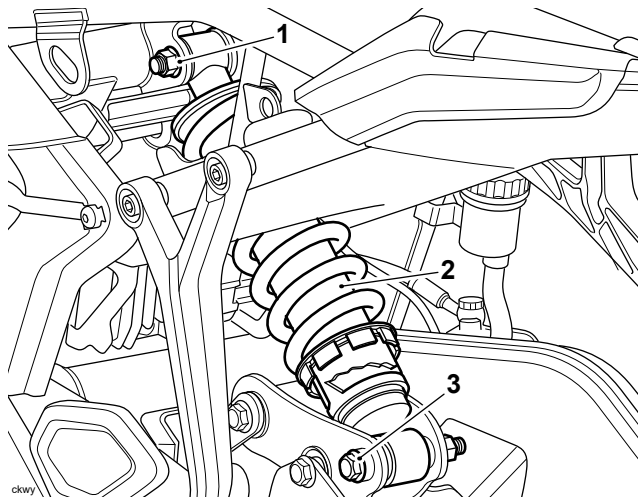
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

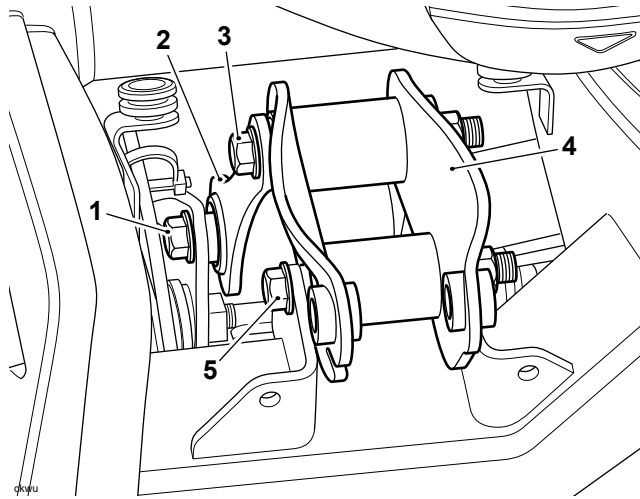
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Refit the rear suspension unit to the motorcycle and refit the fixings with new lock nuts.



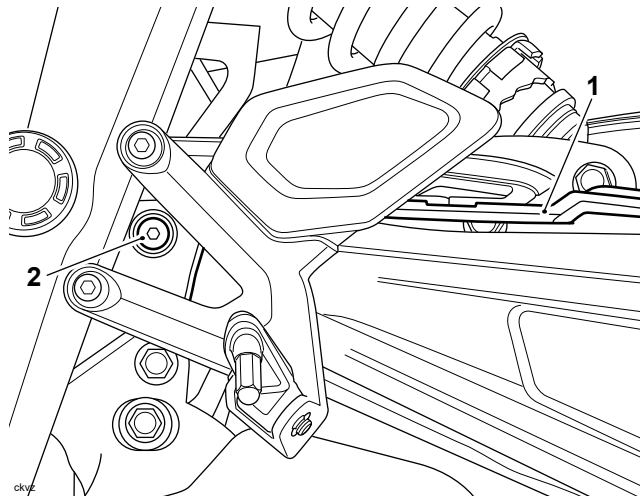
1. Upper fixing
2. Rear suspension unit
3. Lower fixing

2. Raise the swinging arm as high as the slack in the linkage units will allow. This will ensure the rear suspension unit and rear suspension linkages are sat in their correct seating position. Support with a suitable block.
3. If required, tighten the drag link and rocker centre fixing to 48 Nm whilst holding the lock nut.
4. Tighten the rocker pivot fixing to 48 Nm whilst holding the lock nut.
5. Tighten drag link lower fixing to 48 Nm whilst holding the lock nut.



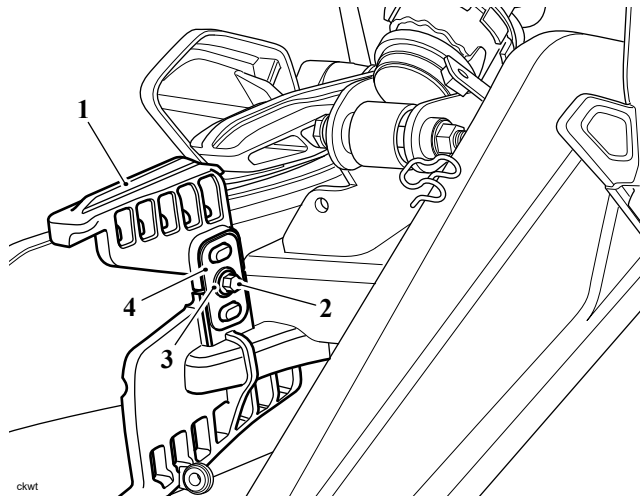
1. Drag link lower fixing
2. Drag link
3. Drag link and rocker centre fixing
4. Rocker
5. Rocker pivot fixing

6. Tighten the rear suspension unit lower fixing to 48 Nm whilst holding the lock nut.
7. Tighten the rear suspension unit upper fixing to 48 Nm whilst holding the lock nut.
8. If removed, refit the left hand control plate and tighten the fixings to 24 Nm.
9. Check the condition of the drive chain rubbing strip and replace if necessary.
10. Install the drive chain rubbing strip to the swinging arm and install the front fixing.



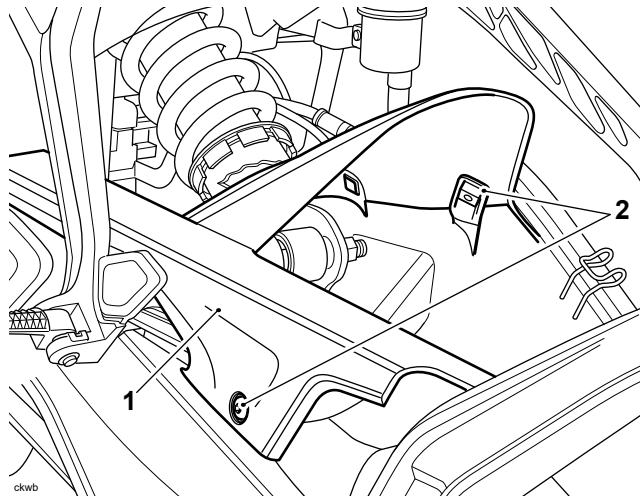
1. Drive chain rubbing strip
2. Fixing

11. Install the plate, flanged sleeve and fixing to the drive chain rubbing strip. Tighten the front and rear fixings to 4 Nm.



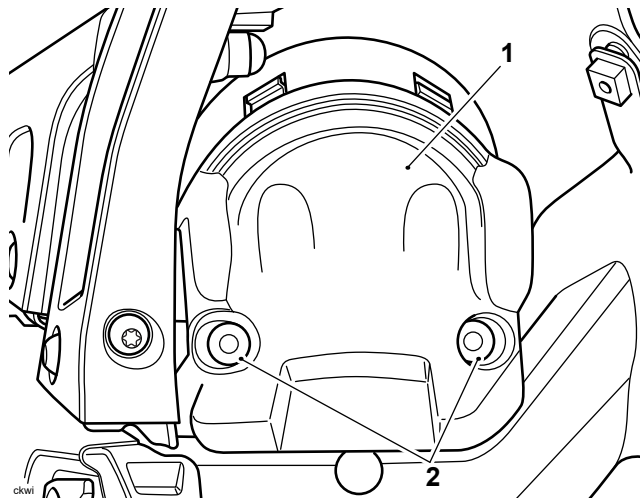
- 1. Drive chain rubbing strip
- 2. Fixing
- 3. Flanged sleeve
- 4. Plate

12. Refit the rear hugger and chain guard with two fixings and tighten to 4 Nm.



- 1. Rear hugger and chain guard
- 2. Fixings

13. Refit the rear suspension unit guard to the rear hugger and secure with the two plastic rivets.



1. Rear suspension unit guard
2. Plastic rivets

Perform the following operations:

- [Rear Wheel - Installation](#)
- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Side Panels - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Drag Link and Rocker - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

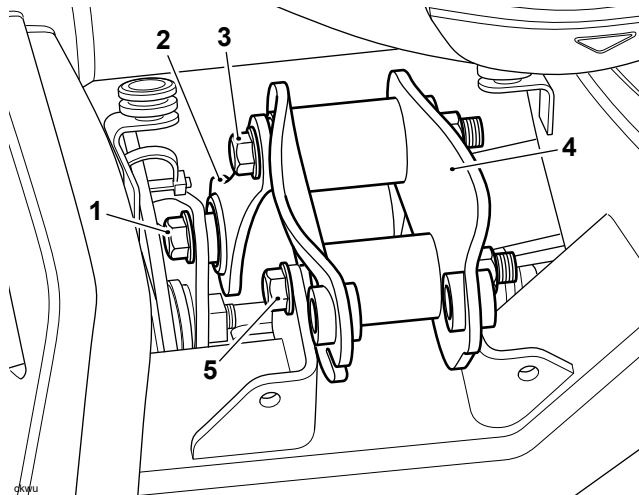
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Rear Suspension Unit - Removal**

1. Remove the two fixings and remove the left hand control plate.
2. Remove the lower drag link fixing and discard the lock nut.
3. Remove the rocker pivot fixing and discard the lock nut.
4. Remove the drag link and rocker assembly.
5. If required, remove the drag and rocker centre fixing and discard the lock nut. Separate the drag link and rocker.



1. Drag link lower fixing
2. Drag link
3. Drag link and rocker centre fixing
4. Rocker
5. Rocker pivot fixing

Drag Link Bearing Replacement

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

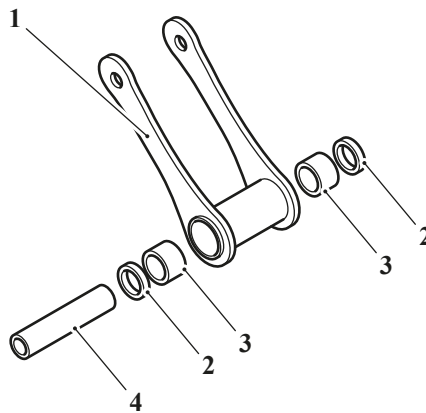
Perform the following operations:

- [Rear Suspension Unit - Removal](#)
- [Drag Link and Rocker - Removal](#)

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.



- 1. Drag link
- 2. Seals
- 3. Needle roller bearings
- 4. Bearing sleeve

Removal

1. Remove the drag link bearing sleeve and seals. Discard the seals.
2. Using a suitable press, remove the needle roller bearings.

Installation

NOTICE



The drag link bearings are 'dry fit' bearings and grease or other forms of lubrication should not be used during installation. However, a thin smear of multi-purpose NLGI 2 specification grease should be added to the bearing sleeve and seals.

Service tool T3880368 - Bearing Installer is required to install the new bearings to the correct depth.

Insert bearings with the marked or shielded side facing outwards and always fit new bearing seals.

Ensure that the bearing bore is clean and free of debris before installing new bearings.

1. Install the new bearings (marked side facing outwards) to the correct depth using service tool T3880368 and a suitable press.
2. Fit new bearing seals and carefully insert the bearing sleeves.

Perform the following operations:

- [Drag Link and Rocker - Installation](#)
- [Rear Suspension Unit - Installation](#)

Rocker Bearing Replacement

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

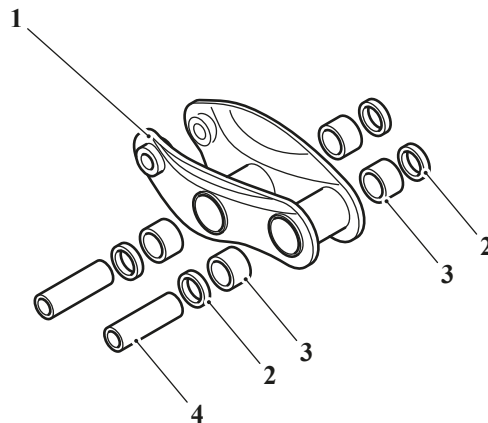
Perform the following operations:

- [Rear Suspension Unit - Removal](#)
- [Drag Link and Rocker - Removal](#)

⚠ WARNING

When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.



1. Drop link
2. Seals
3. Needle roller bearings
4. Bearing sleeve (drag link mounting)

Removal

1. Remove the drop link bearing sleeves and seals. Discard the seals.
2. Using a suitable press, remove the needle roller bearings.

Installation

NOTICE



The drop link bearings are 'dry fit' bearings and grease or other forms of lubrication should not be used during installation. However, a thin smear of multi-purpose NLGI 2 specification grease should be added to the bearing sleeve and seals.

Service tool T3880368 - Bearing Installer is required to install the new bearings to the correct depth.

Insert bearings with the marked or shielded side facing outwards and always fit new bearing seals.

Ensure that the bearing bore is clean and free of debris before installing new bearings.

1. Install the new bearings (marked side facing outwards) to the correct depth using service tool T3880368 and a suitable press.
2. Fit new bearing seals and carefully insert the bearing sleeves.

Perform the following operations:

- [Drag Link and Rocker - Installation](#)
- [Rear Suspension Unit - Installation](#)

Drag Link and Rocker - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

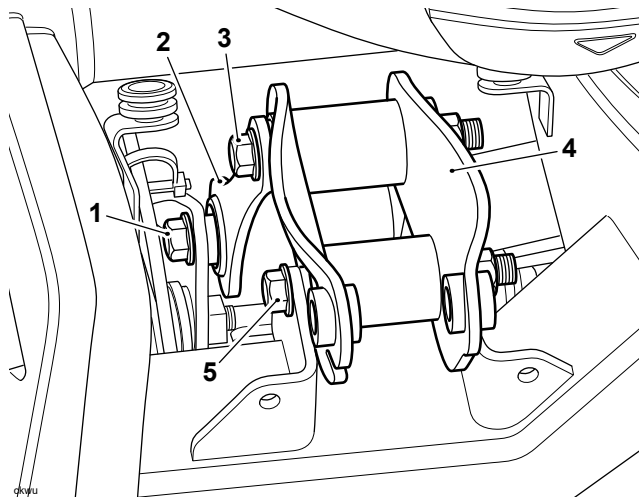
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

The fixings for the drag link and rocker are tightened during installation of the rear suspension unit. See [Rear Suspension Unit - Installation](#).

1. If required, refit the drag link and rocker centre fixing with a new lock nut. Do not tighten at this stage.
2. Refit the drag link and rocker assembly to the swinging arm and secure with the rocker pivot fixing and a new lock nut. Do not tighten at this stage.
3. Refit the drag link lower fixing with a new lock nut. Do not tighten at this stage.



1. Drag link lower fixing
2. Drag link
3. Drag link and rocker centre fixing
4. Rocker
5. Rocker pivot fixing

Perform the following operations:

- [Rear Suspension Unit - Installation](#)

Swinging Arm - Removal

⚠️ WARNING

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

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

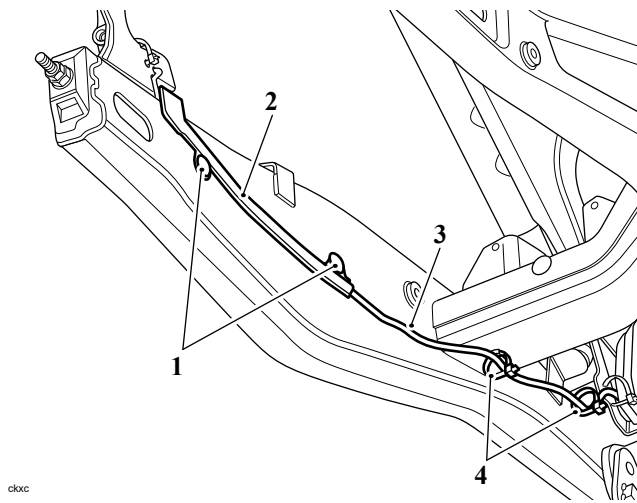
Raise the rear of the motorcycle and support under the frame and engine.

Support the swinging arm to allow for removal of the rear wheel and rear suspension unit.

Perform the following operations:

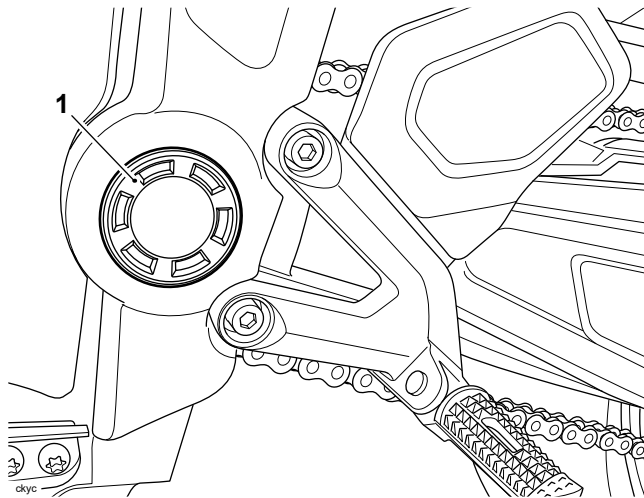
- [Exhaust System - Removal](#)
- [Rear Mudguard - Removal](#)
- [Rear Wheel - Removal](#)
- [Rear Suspension Unit - Removal](#)
- [Drag Link and Rocker - Removal](#)

1. Remove the harness conduit from the swinging arm and remove the cable ties. Note the routing of the harness for installation and position the harness to one side.



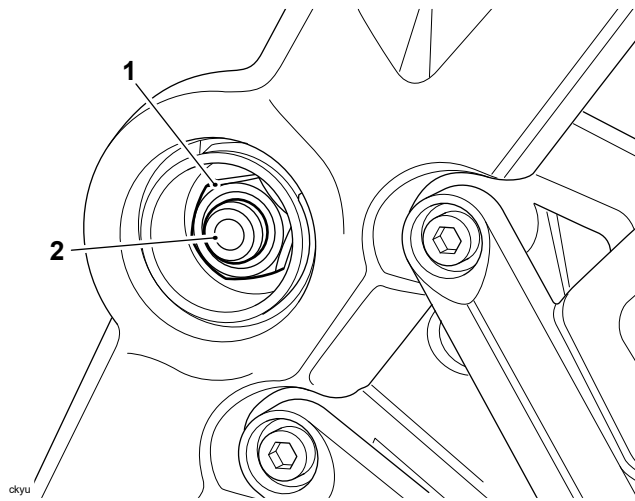
1. Fir tree clips
2. Harness conduit
3. Harness
4. Cable ties

2. Remove the swinging arm pivot covers from the frame.



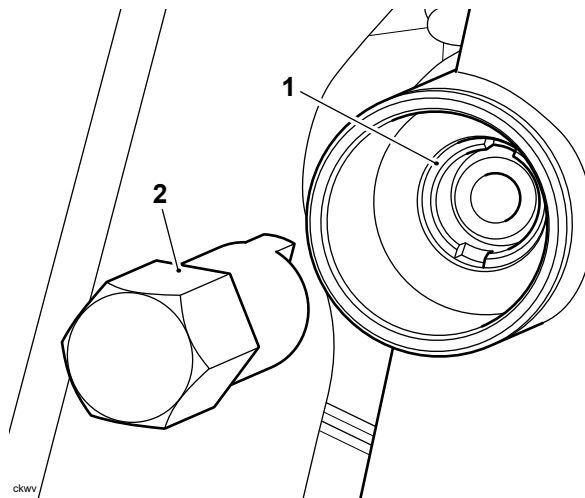
1. Swinging arm pivot cover (left hand side shown)

3. Remove the nut and washer from the swinging arm spindle.



- 1. Nut
- 2. Swinging arm spindle

4. Partially withdraw the swinging arm spindle from the right hand side, to allow access to the frame adjuster sleeve located on the left hand side of the frame.
5. Engage service tool T3880104 in the slots of the frame adjuster sleeve and rotate anticlockwise to loosen the sleeve fully.



- 1. Frame adjuster sleeve
- 2. T3880104 - Swinging Arm Adjuster Wrench

⚠ CAUTION

Care must be taken when removing the swinging arm, not to damage any brake hoses or electrical harnesses that are routed in close proximity to the swinging arm.

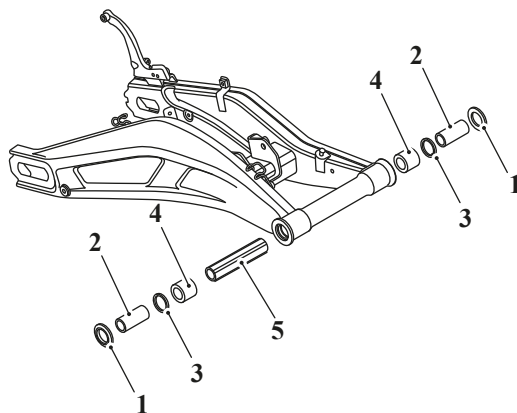
6. Support the swinging arm and remove the swinging arm spindle from the right hand side of the motorcycle.
7. Remove the swinging arm clear of the motorcycle and drive chain.

Swinging Arm - Inspection

1. Check all swinging arm bearings for damage, pitting, and cracks. Replace as necessary.
2. Check the swinging arm for damage. Replace as necessary.
3. Check all bearing seals for damage, splits etc. Replace as necessary.
4. Check the drive chain rubbing strip for wear and damage. Replace as necessary.

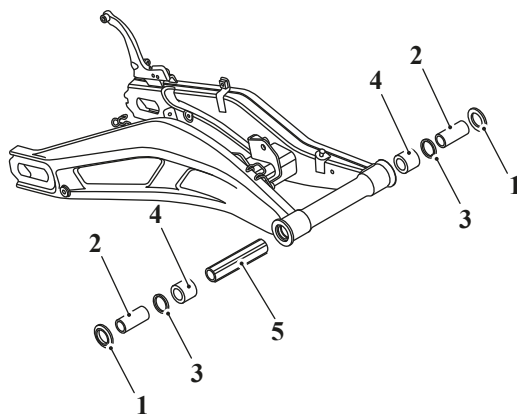
Swinging Arm - Disassembly

1. Remove the bush, bearing sleeve and seal from the left hand side.
2. Remove the bush, bearing sleeve and seal from the right hand side.
3. Remove the right hand side needle roller bearing by drifting through from the left.
4. Remove the spacer tube.
5. Remove the left hand side needle roller bearing by drifting through from the right.



- | |
|---|
| <ol style="list-style-type: none">1. Bush2. Sleeve3. Seal4. Needle roller bearing5. Spacer tube |
|---|

Swinging Arm - Assembly



- | |
|---|
| <ol style="list-style-type: none">1. Bush2. Sleeve3. Seal4. Needle roller bearing5. Spacer tube |
|---|

1. Install the spacer tube, needle roller bearings (marked faces outwards), seals, sleeves and bushes into the swinging arm in the order shown above. Use new seals throughout.

Swinging Arm - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

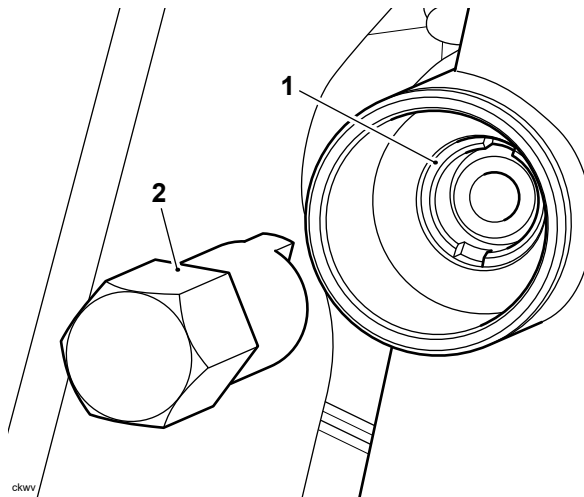
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

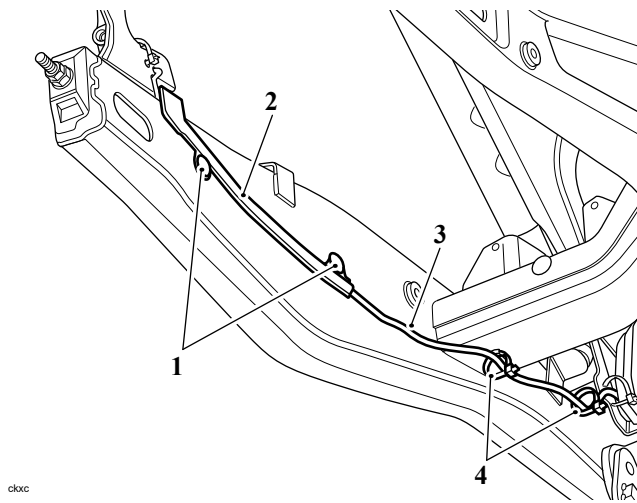
Care must be taken when positioning the swinging arm, not to damage any brake hoses or electrical harnesses that are routed in close proximity to the swinging arm.

1. Position the swinging arm to the frame ensuring the drive chain is in position on the rubbing strip.
2. Refit the swinging arm spindle from the right hand side such that it will support the swinging arm, but not pass all the way through the frame adjuster sleeve. This will allow service tool T3880104 to engage in the slot in the frame adjuster sleeve.
3. Using service tool T3880104, tighten the frame adjuster sleeve to 6 Nm.



1. Frame adjuster
2. T3880104 - Swinging Arm Adjuster Wrench

4. Fully insert the swinging arm spindle.
5. Fit the washer and a new lock nut and tighten to 110 Nm.
6. Refit the swinging arm pivot covers.
7. Route the harness to the swinging arm as noted during removal.
8. Refit the conduit with the two fir tree clips and fit two new cable ties.



1. Fir tree clips
2. Harness conduit
3. Harness
4. Cable ties

Perform the following operations:

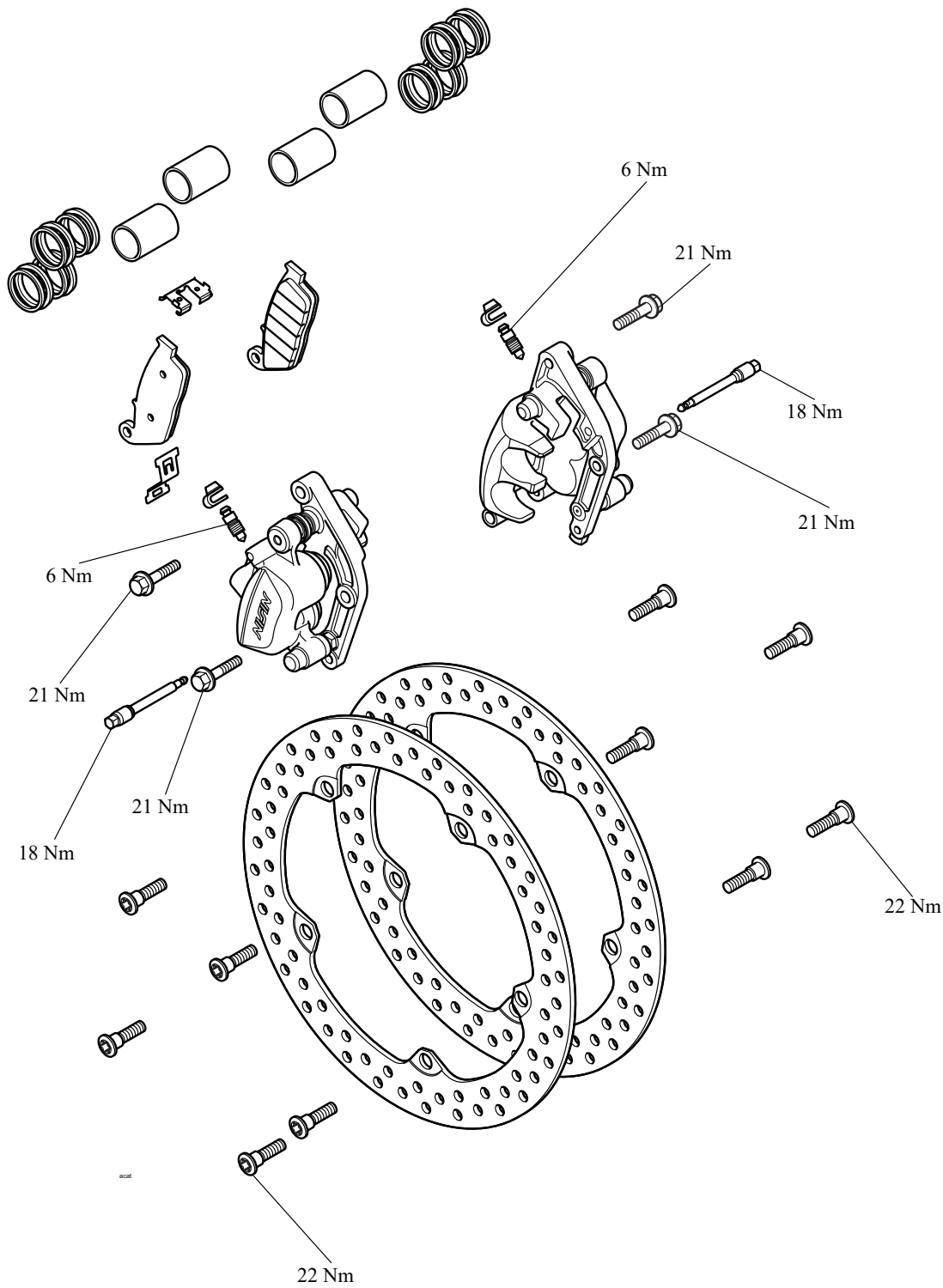
- [Drag Link and Rocker - Installation](#)
- [Rear Suspension Unit - Installation](#)
- [Exhaust System - Installation](#)
- [Rear Mudguard - Installation](#)
- [Rear Wheel - Installation](#)

 / Brakes

Brakes

Exploded Views

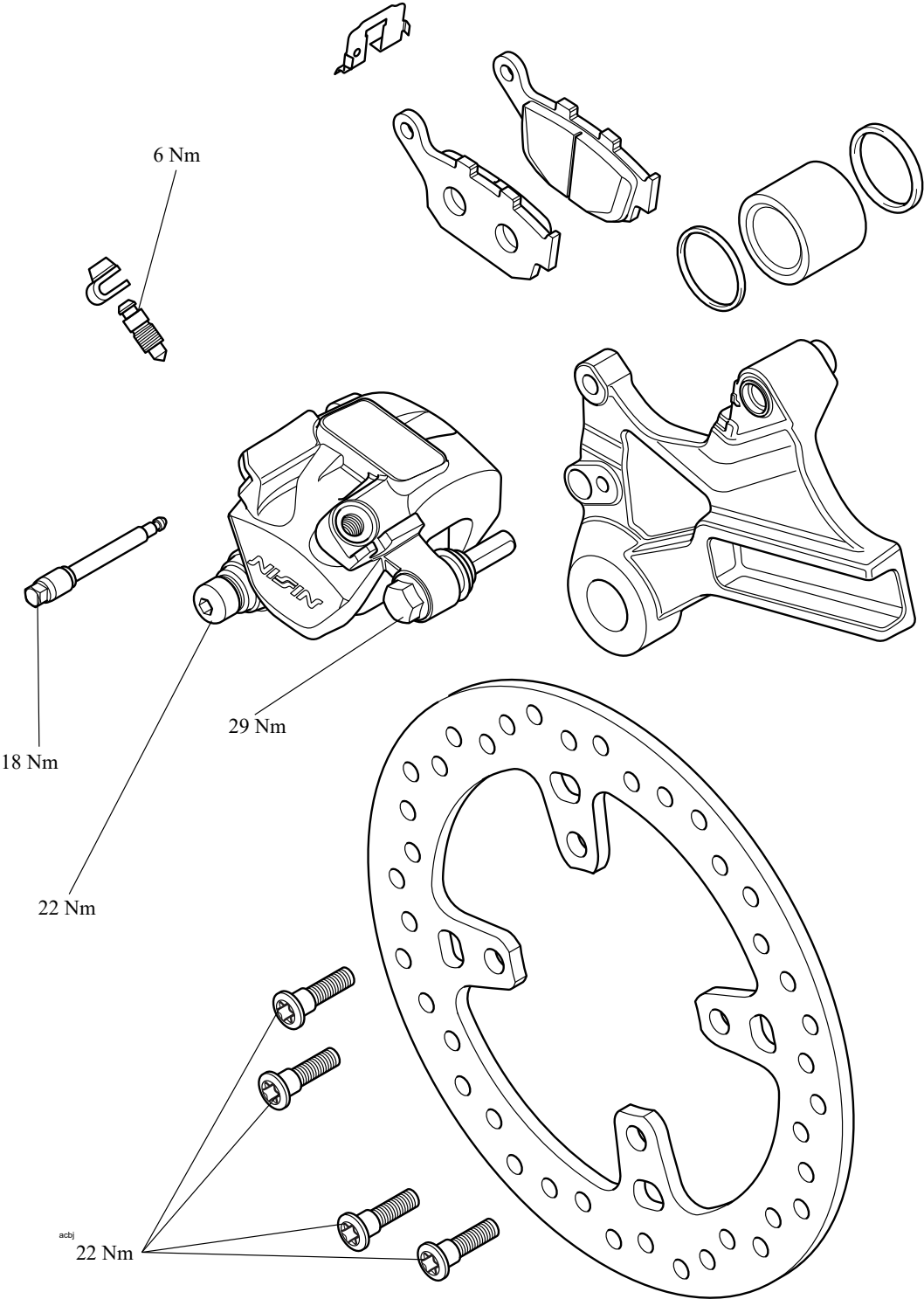
Exploded View - Front Brake Calipers and Discs



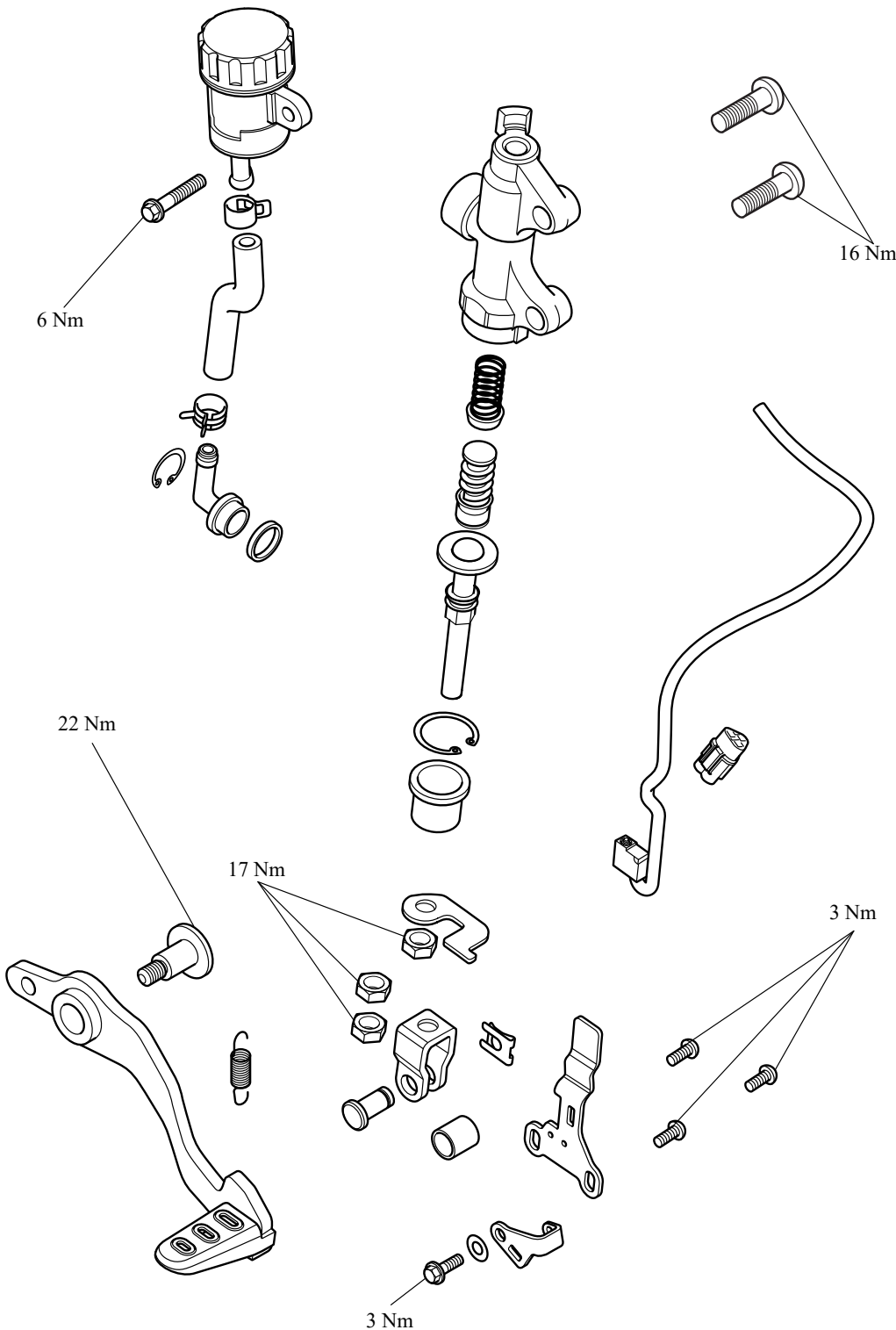
Exploded View - Front Brake Master Cylinder



Exploded View - Rear Brake Caliper



Exploded View - Rear Brake Master Cylinder



Exploded View - ABS System

Braking System Maintenance and Safety

Braking System Maintenance Safety Precautions

⚠️ WARNING

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

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

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

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

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

Check regularly for brake hose damage.

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

⚠️ WARNING

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

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

It is dangerous to operate the motorcycle under such conditions and you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

⚠️ WARNING

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

Failure to change the brake fluid at the interval specified in the Scheduled Maintenance chart may reduce braking efficiency resulting in loss of motorcycle control and an accident.

⚠️ WARNING

Never use mineral-based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral-based grease will damage the hydraulic seals in the calipers and master cylinders. Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

⚠ WARNING



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

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

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

⚠ WARNING



A magnetised brake disc and/or a magnetised ABS pulser ring may cause problems with the ABS sensor which will illuminate the ABS warning light and disable the ABS.

To prevent these parts becoming magnetised, we strongly recommend that magnets, and items that contain magnets, must not be stored near or placed on brake discs or ABS pulser rings.

This includes parts fitted to motorcycles, parts removed during motorcycle service and new parts in dealer stores.

Examples of items that may contain magnets, are listed below:

- Alternator rotor
- Magnetic fuel tank bags
- Audio speakers
- Magnetic dial test indicator stand
- Magnetic parts tray.

If the ABS is not functioning, the brake system will continue to function as a non-ABS braking system. Do not continue to ride for longer than is necessary with the indicator light illuminated. Ride with extreme caution when performing diagnostic troubleshooting on a non-functioning ABS system. In this situation braking too hard will cause the wheels to lock resulting in loss of motorcycle control and an accident.

Changing Brake Fluid

Brake fluid must be changed every two calendar years, irrespective of the mileage the motorcycle has covered in that time.

Bleeding the Front Brakes

Brake Fluid Replacement - Routine Maintenance

Braking performance reduces as brake fluid ages, Repeated stops cause brake fluid to heat and cool rapidly reducing braking performance.

Brake fluid absorbs moisture over a period of time and becomes contaminated as it ages.

Therefore brake fluid should be replaced at specified intervals as instructed in the routine maintenance schedule, see [Brake Fluid - Renew](#).

Brake Bleeding

When removing or replacing brake components and the brake line is opened air will enter as fluid escapes.

If the brake bleed procedure is not carried out air can become trapped in the brake fluid.

A consequence of air being trapped in the brake system is that the brake can feel soft/spongy and the performance of the brakes will be reduced.

⚠ WARNING

Brake fluid is hygroscopic which means it will absorb moisture from the air.

Only use new DOT 4 brake fluid from a sealed container, do not mix different brands of brake fluid and never use brake fluid from an unsealed container or from one that has been previously opened.

Any absorbed moisture will greatly reduce the boiling point of the brake fluid.

Moisture in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ WARNING

Do not allow dirt or debris to enter the braking system when adding brake fluid to the brake fluid reservoir.

Always maintain absolute cleanliness as this will adversely affect the brake fluid's properties.

Contaminated brake fluid may cause a reduction in brake performance leading to loss of motorcycle control and an accident.

⚠ WARNING

During bleeding, do not allow the brake 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.

Trapped air in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ WARNING

Check for fluid leakage around brake fittings, seals and joints.

Leaks around fittings and joints may allow air to enter the brake system.

Air entering the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ CAUTION

Do not attempt to maintain brake fluid pressure by securing the brake lever to the handlebar or the brake pedal using a band or strap.

Banding or strapping the brake lever or pedal may deform the piston seals in the caliper.

Lever or pedal travel that is increased or reduced may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork.

Close the brake reservoir and wash any spilled brake fluid immediately with warm soapy water.

Spilled brake fluid, if left, will damage painted and plastic surfaces.

⚠ CAUTION

Pressure applied to the brake lever or caliper pistons during the bleeding process must be applied and removed smoothly and slowly.

It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to follow these instructions can allow air to be drawn in to the system through the bleed screw threads.

NOTICE

An additional technician is required to monitor the fluid level and operate the brake lever or pedal when bleeding the brakes.

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

The following table indicates the procedure to follow when carrying out repairs or replacement of the following brake components.

Brake Bleed Procedure Table

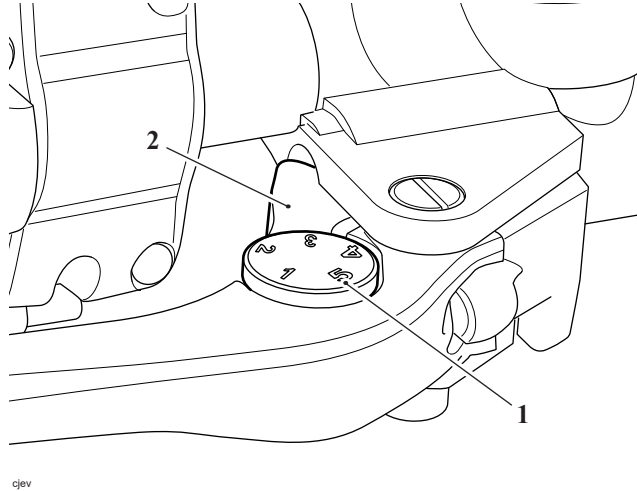
When replacing/fitting the	Bleed the brakes as follows:							
ABS Modulator	Front Brake Lever Setting	Brake Fluid Cap Removal	Back bleed master cylinder	Brake master cylinder bleed ¹	Bleed brake caliper(s)	Final bleed procedure	Brake caliper conditioning	Front Brake Lever Setting
Master Cylinder	Front Brake Lever Setting	Brake Fluid Cap Removal	Back bleed master cylinder	Brake master cylinder bleed ¹	Final bleed procedure	Brake caliper conditioning	Front Brake Lever Setting	Brake Fluid Cap Installation
Brake Caliper(s)	Front Brake Lever Setting	Brake Fluid Cap Removal	Bleed brake caliper(s)	Final bleed procedure	Brake caliper conditioning	Front Brake Lever Setting	Brake Fluid Cap Installation	-
Brake Hose/line(s)	Front Brake Lever Setting	Brake Fluid Cap Removal	Brake master cylinder bleed ¹	Bleed brake caliper(s)	Final bleed procedure	Brake caliper conditioning	Front Brake Lever Setting	Brake Fluid Cap Installation

¹ For models with a front brake master cylinder bleed screw only.

NOTICE

Note the rider's preferred span and ratio settings of the brake lever adjusters in order that they can be returned to the same position when the bleeding operation is complete.

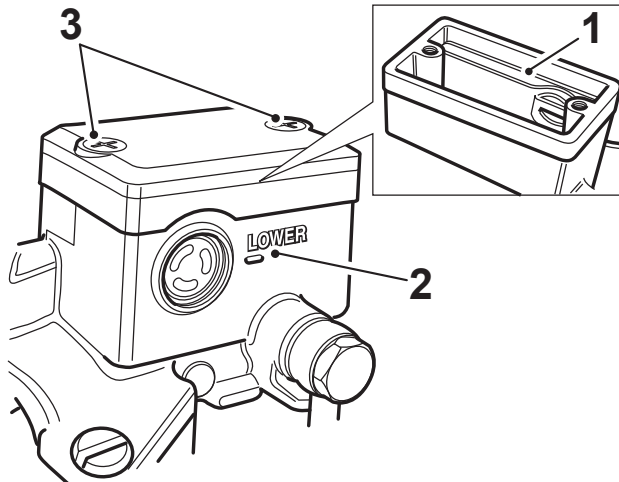
1. Note the rider's setting of the brake lever adjuster.
2. Set the brake lever adjuster to position No. 1.
3. Once the bleeding operation is complete, reset the brake lever adjuster to the rider's preferred setting as noted prior to setting the maximum adjustment.



1. Adjuster wheel
2. Arrow mark

Front Brake Fluid Cap Removal

1. Turn the handlebars to bring the fluid reservoir to a level position.

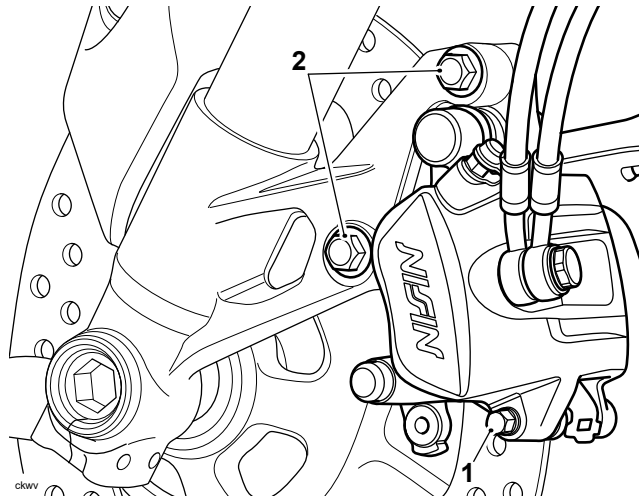


1. Front reservoir upper level
2. Front reservoir lower level
3. Screws

2. Remove the screws from the brake reservoir cover.
3. Carefully remove the reservoir cover taking care not to spill any fluid.
4. Check the condition of the sealing diaphragm for the reservoir. Replace if necessary.

Master Cylinder Back Bleed

1. Remove the caliper mounting fixings and slide the brake caliper off the brake disc.



1. Brake pad retaining pin
2. Brake caliper fixings

2. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the front brake lever slowly until the plate is held by the brake pads. Do not allow the pistons to fall out.
3. Being careful not to damage the brake pad material, use the metal plate against the brake pads to push the caliper pistons in evenly and apply pressure to the system.

⚠ WARNING

During bleeding, do not allow the brake fluid level to fall below the lower level mark in the reservoir.

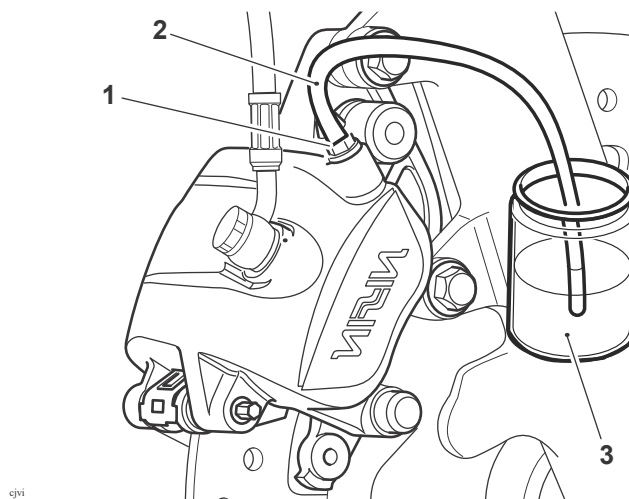
If the fluid level is allowed to fall below this mark, air may enter the system and the sequence of bleeding must be repeated.

Trapped air in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

4. Repeat steps 2 and 3 until no more air appears in the reservoir.
5. Refit the front brake caliper (see [Front Brake Caliper - Installation](#)).

Front Brake Caliper Bleed

1. Remove the rubber cap from the bleed nipple on the right hand caliper.
2. Attach a transparent tube to the bleed nipple.



- 1. Bleed nipple
- 2. Bleed tube
- 3. Container

3. Place the other end of the tube in a suitable receptacle containing new brake fluid.

NOTICE

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

4. Slowly apply and slowly release pressure to the brake lever five times, maintaining pressure on the final application.
5. Briefly open and close the caliper bleed screw slightly as per the note.
6. Repeat steps 4 and 5.
7. Slowly apply and slowly release pressure to the brake lever another five times, maintaining pressure on the final application.
8. Open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake lever.
9. Leave the bleed screw slightly open and slowly release the brake lever.
10. Slowly apply and slowly release pressure to the brake lever another five times, closing the bleed screw on the final application.
11. Repeat steps 4 to 11 until no more air appears in the bleed tube.
12. Tighten the bleed screw to the 6 Nm.
13. Fill the reservoir to the upper level with new DOT 4 fluid.
14. Repeat front brake caliper bleed for the left hand caliper.
15. Remove the transparent bleed tube.

Final Bleed Procedure

1. Repeat the bleed procedure as detailed in **Front Brake Caliper Bleed**.
2. If brake lever travel is unacceptably high, repeat the front brake bleed procedure.
3. If the brake lever travel is acceptable, refit the front brake reservoir cover and tighten the screws to 1.5 Nm.

WARNING

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

4. Check that the brakes operate correctly. 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.

⚠ WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

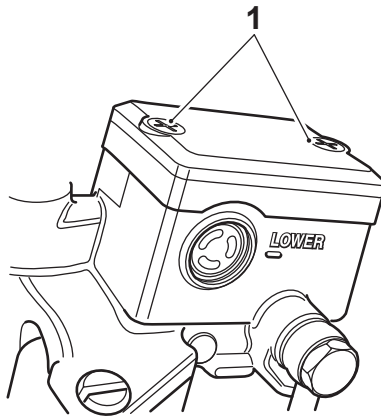
Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

1. On the right hand side caliper, using a suitable tool, push the caliper pistons 1-2 mm into the caliper body by forcing the brake pads apart.
2. Operate the brake lever to pump the pistons back out until the brake pads come into contact with the brake disc.
3. Repeat steps 1 to 2 on the same caliper until the pistons have been pushed in and out three times.
4. Repeat steps 1 to 3 on the left hand side caliper.
5. Slowly apply front brake lever to the handlebar and maintain that pressure for approximately five seconds. Slowly release the lever, and leave for 30 seconds. Repeat three times.

Brake Fluid Cap - Installation

1. Fit the diaphragm seal into the reservoir cap and make sure that the holes for the fixings in the cap and the diaphragm seal are correctly aligned.
2. Install the fixings into the cap and diaphragm seal assembly.
3. Hold the assembly together and position the cap, diaphragm seal and fixings onto the reservoir.



1. Fixings

4. Tighten the fixings to 1.5 Nm.

Bleeding the Rear Brakes

Brake Fluid Replacement - Routine Maintenance

Braking performance reduces as brake fluid ages, Repeated stops cause brake fluid to heat and cool rapidly reducing braking performance.

Brake fluid absorbs moisture over a period of time and becomes contaminated as it ages.

Therefore brake fluid should be replaced at specified intervals as instructed in the routine maintenance schedule, see [Brake Fluid - Renew](#).

Brake Bleeding

When removing or replacing brake components and the brake line is opened air will enter as fluid escapes.

If the brake bleed procedure is not carried out air can become trapped in the brake fluid.

A consequence of air being trapped in the brake system is that the brake can feel soft/spongy and the performance of the brakes will be reduced.

NOTICE

Always renew the brake fluid at the interval specified in the routine maintenance schedule.

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

Brake fluid is hygroscopic which means it will absorb moisture from the air.

Only use new DOT 4 brake fluid from a sealed container, do not mix different brands of brake fluid and never use brake fluid from an unsealed container or from one that has been previously opened.

Any absorbed moisture will greatly reduce the boiling point of the brake fluid.

Moisture in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ WARNING

Do not allow dirt or debris to enter the braking system when adding brake fluid to the brake fluid reservoir

Always maintain absolute cleanliness as this will adversely affect the brake fluid's properties.

Contaminated brake fluid may cause a reduction in brake performance leading to loss of motorcycle control and an accident.

⚠ WARNING

During bleeding, do not allow the brake 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.

Trapped air in the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ WARNING

Check for fluid leakage around brake fittings, seals and joints.

Leaks around fittings and joints may allow air to enter the brake system.

Air entering the braking system may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ CAUTION

Do not attempt to maintain brake fluid pressure by securing the brake lever to the handlebar or the brake pedal using a band or strap.

Banding or strapping the brake lever or pedal may deform the piston seals in the caliper.

Lever or pedal travel that is increased or reduced may cause a reduction in braking efficiency leading to loss of motorcycle control and an accident.

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork.

Close the brake reservoir and wash any spilled brake fluid immediately with warm soapy water.

Spilled brake fluid, if left, will damage painted and plastic surfaces.

⚠ CAUTION

Pressure applied to the brake lever or caliper pistons during the bleeding process must be applied and removed smoothly and slowly.

It must take a minimum of five seconds between lever positions (from fully released to stop).

Failure to follow these instructions can allow air to be drawn in to the system through the bleed screw threads.

NOTICE

An additional technician is required to monitor the fluid level and operate the brake lever or pedal when bleeding the brakes.

The bleed screws should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake lever or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

The following table indicates the procedure to follow when carrying out repairs or replacement of the following brake components.

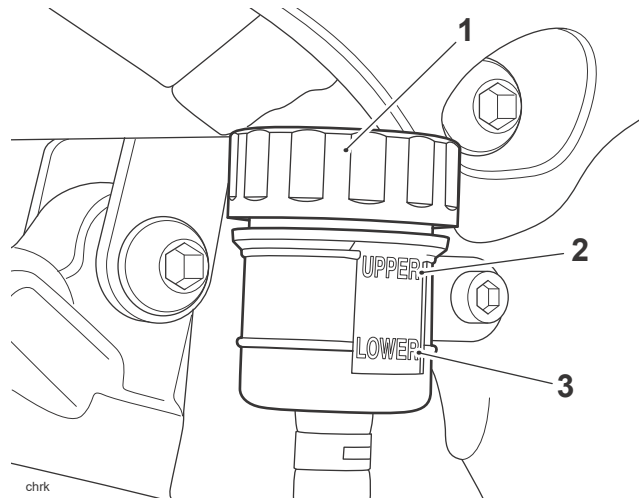
Rear Brake Bleed Procedure Table

When replacing/fitting the	Bleed the brakes as follows:					
ABS Modulator	Brake Fluid Cap Removal	Back bleed master cylinder	Bleed brake caliper	Final bleed procedure	Brake caliper conditioning	Brake Fluid Cap Installation
Master Cylinder	Brake Fluid Cap Removal	Back bleed master cylinder	Final bleed procedure	Brake caliper conditioning	Brake Fluid Cap Installation	-
Brake Caliper	Brake Fluid Cap Removal	Bleed brake caliper	Final bleed procedure	Brake caliper conditioning	Brake Fluid Cap Installation	-
Brake Hose/Line(s)	Brake Fluid Cap Removal	Back bleed master	Bleed brake caliper	Final bleed procedure	Brake caliper conditioning	Brake Fluid Cap

		cylinder				Installation
--	--	----------	--	--	--	--------------

Brake Fluid Cap Removal

1. Unscrew and remove the rear brake reservoir cover taking care not to spill any fluid.
2. Carefully remove the diaphragm seal.
3. Check the condition of the diaphragm seal. Replace if necessary.



1. Rear reservoir
2. Rear reservoir upper level
3. Rear reservoir lower level

Rear Brake Master Cylinder Back Bleed

Perform the following operations:

- **Rear Wheel - Removal**

CAUTION

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose above the height of the rear brake master cylinder.

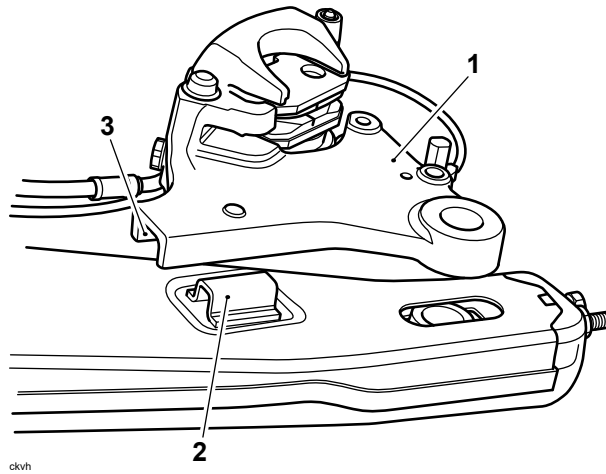
Allowing the brake hose to fall below the rear brake master cylinder height will allow an excessive amount of air to enter into the brake system.

Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

NOTICE

Note the position of the rear brake caliper for installation.

1. Remove the brake caliper and carrier assembly.



1. Caliper carrier, wheel shown removed for clarity
2. Swinging arm slot
3. Caliper carrier groove

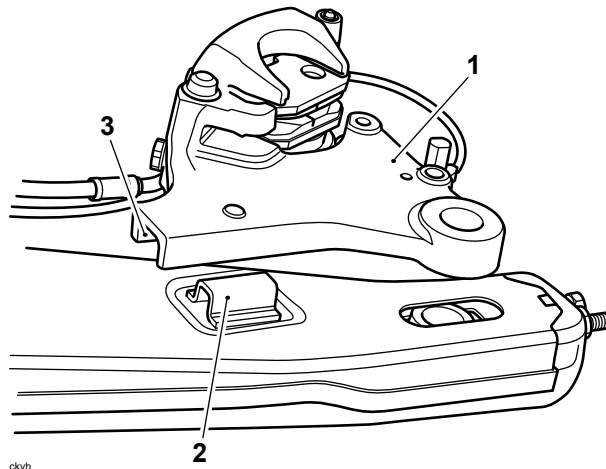
⚠ WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

2. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the rear brake pedal slowly until the plate is held by the brake pads. Do not allow the pistons to fall out.
3. Depress the brake pedal to its stop. This will ensure the reservoir port is closed and brake fluid flows to the fluid reservoir.
4. Being careful not to damage the brake pad material, use the metal plate against the brake pads to push the caliper pistons in evenly.
5. Push the pistons into the caliper to apply pressure to the system.
6. Position the rear brake caliper and carrier to the swinging arm as noted prior to removal. Align the groove in the carrier with the boss on the swinging arm.



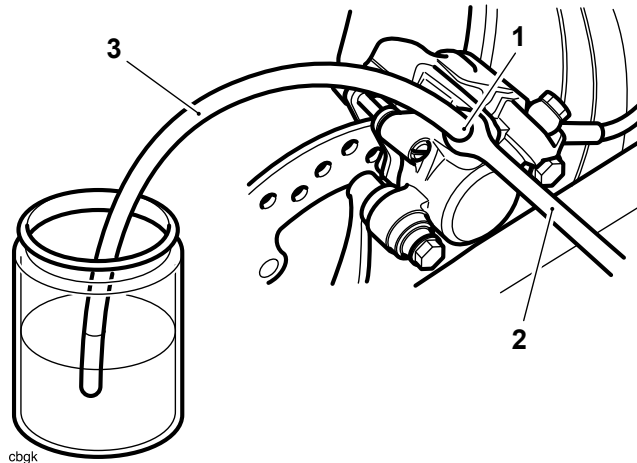
1. Caliper carrier, wheel shown removed for clarity
2. Swinging arm slot
3. Caliper carrier groove

Perform the following operations:

• **Rear Wheel - Installation**

Rear Brake Caliper Bleed

1. Remove the rubber cap from the caliper bleed screw.
2. Attach a transparent tube to the bleed screw.
3. Place the other end of the tube in a suitable container containing new brake fluid.



- | |
|---|
| <ol style="list-style-type: none"> 1. Bleed screw 2. Spanner 3. Bleed tube |
|---|

NOTICE

The bleed screw should only be opened by a small angle, just enough to allow system pressure to drop. When pulling the brake pedal or pushing the caliper pistons in, some resistance should be felt indicating that the screw is not opened too much.

4. Slowly apply and slowly release pressure to the brake pedal five times, maintaining pressure on the final application.
5. Open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake pedal.
6. Close the bleed screw.
7. Slowly apply and slowly release pressure to the brake pedal five times, maintaining pressure on the final application.
8. Open the bleed screw slightly to allow fluid to flow out but to still feel resistance in the brake pedal.
9. Leave the bleed screw slightly open and slowly release the brake pedal.
10. Slowly apply and slowly release pressure to the brake pedal five times.
11. Close the bleed screw.
12. Repeat steps 4 to 11 until no more air appears in the bleed tube/container.
13. With the brake pedal still applied tighten the bleed screw to 6 Nm.
14. Fill the reservoir to the upper level with new DOT 4 fluid.
15. Remove the transparent bleed tube.

Rear Brake Final Bleed Procedure

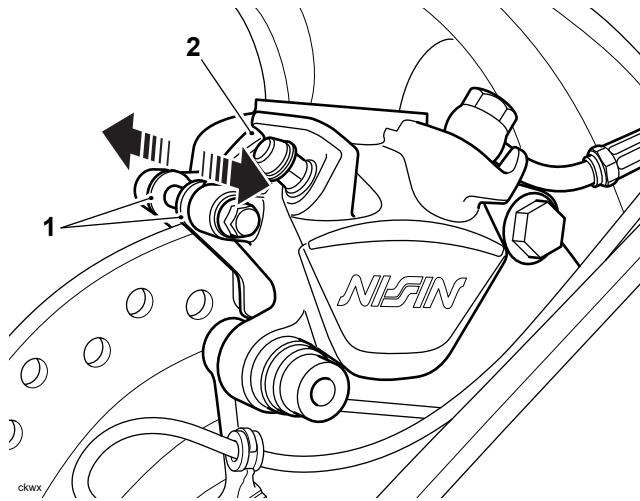
1. Repeat the bleed procedure as detailed in **Rear Caliper Bleed**.
2. If brake pedal travel is unacceptably high, bleed the rear brake as detailed in **Rear Master Cylinder Back Bleed**.
3. If brake pedal travel is acceptable, refit the rear brake reservoir cover.

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.

Brake Caliper Conditioning

1. Using a suitable tool, push the rear brake caliper pistons 1-2 mm into the caliper body by forcing the brake pads apart.



1. Brake pad
2. Brake caliper

2. Operate the brake pedal to pump the pistons back out until the brake pads come into contact with the brake disc.
3. Repeat steps 1 and 2 on the caliper until the pistons have been pushed in and out three times.
4. Slowly apply the rear brake pedal to the stop and maintain that pressure for approximately five seconds. Slowly release the pedal, and leave for 30 seconds. Repeat three times.

Brake Fluid Cap Installation

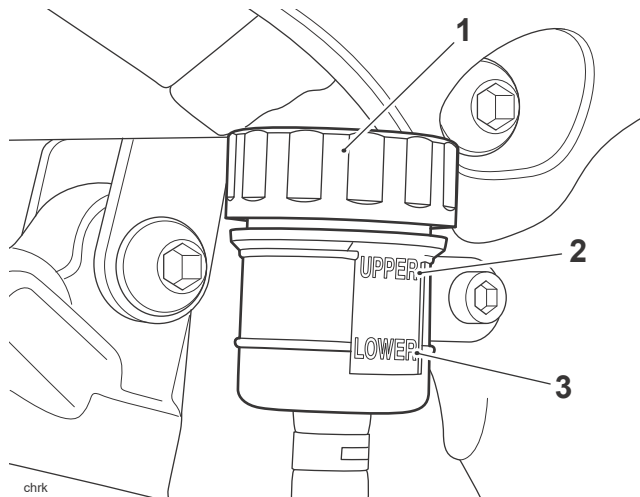
⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork.

Close the brake reservoir and wash any spilled brake fluid immediately with warm soapy water.

Spilled brake fluid, if left, will damage painted and plastic surfaces.

1. Check the condition of the brake fluid cap sealing diaphragm. Replace the diaphragm as necessary.
2. Refit the rear brake reservoir cap.



1. Rear reservoir
2. Rear reservoir upper level
3. Rear reservoir lower level

Brake Pads Wear

Front and rear brake pad wear is automatically compensated for and has no effect on brake lever or pedal action.

Front Brake Discs - Wear

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

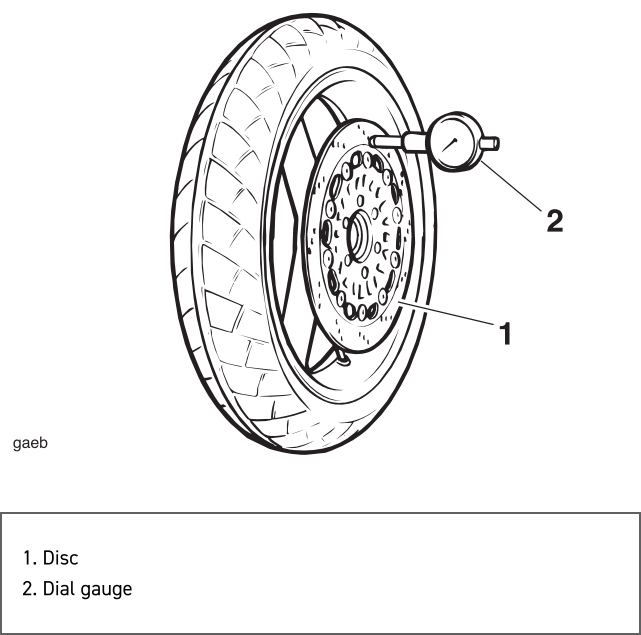
Wear

1. Replace any brake disc if it is worn beyond the service limit or exceeds the disc run-out limit.

Front Brake Disc Thickness	
Standard	4.5 mm
Service Limit	4.0 mm

Front Brake Disc Run-out	
Service Limit:	0.25 mm

Measure disc run out using an accurate dial gauge mounted on a surface plate.



Rear Brake Disc - Wear

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

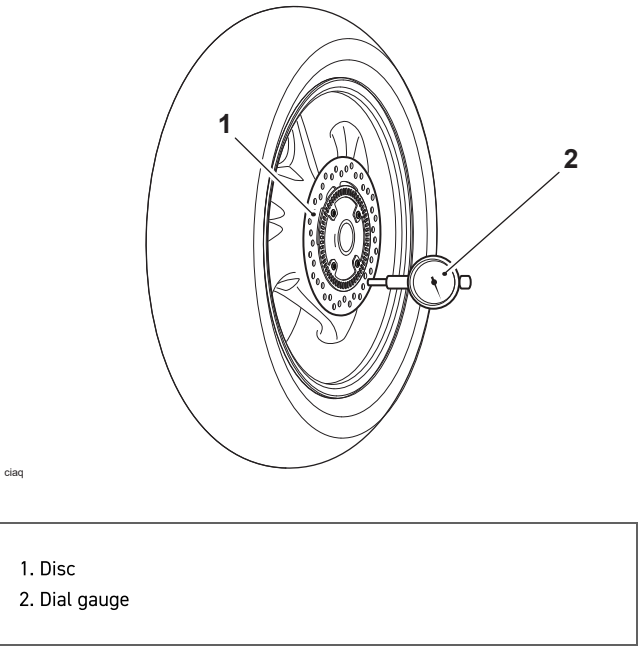
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Replace any brake disc worn beyond the service limit or that exceeds the disc run-out limit.

Rear Brake Disc Thickness	
Standard	5.5 mm
Service Limit	5.0 mm

Rear Brake Disc Run-out	
Service Limit	0.25 mm

Measure brake disc run-out using an accurate dial gauge mounted on a surface plate.



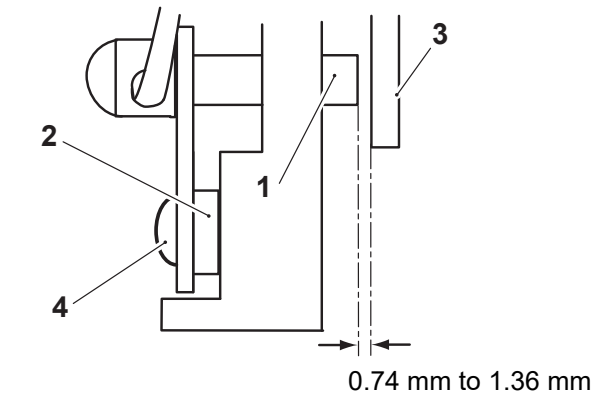
Breaking-in New Brake Pads and Discs

After replacement brake discs and/or pads have been fitted to the motorcycle, we recommend a period of careful breaking-in that will optimise the performance and longevity of the discs and pads. The recommended distance for breaking in new pads and discs is 200 miles (300 km).

After fitting new brake discs and/or pads avoid extreme braking, ride with caution and allow for greater braking distances during the breaking-in period.

Front ABS Sensor Air Gap Measurement

1. Using feeler gauges, measure the air gap between the wheel speed sensor and the pulser ring.



cdhj_1

- | |
|---|
| <ol style="list-style-type: none">1. ABS sensor (front sensor shown)2. Shim3. Pulser ring4. 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 to achieve an air gap between 0.74 mm and 1.36 mm.
4. Shims are available in the following sizes:
 - shims - 0.5 mm, 1.0 mm, 1.5 mm and 2.0 mm.
5. If necessary, remove the wheel speed sensor, fit the correct thickness shim and refit the wheel speed sensor and tighten the fixing to 9 Nm.
6. Repeat the air gap measurement. Readjust as necessary.

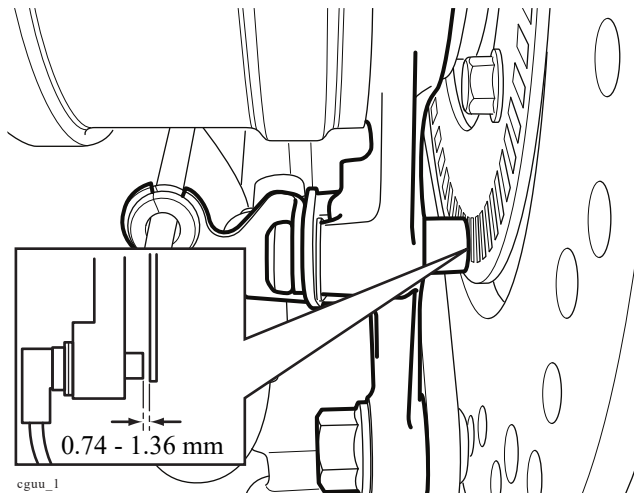
Rear ABS Sensor Air Gap Measurement

Air Gap Measurement

⚠ CAUTION

Never lever directly against the disc, caliper or the pad lining material. Always use a levering tool made from a soft material which will not cause damage to the load bearing surfaces.

1. Using feeler gauges, measure the air gap between the wheel speed sensor and the pulser ring.



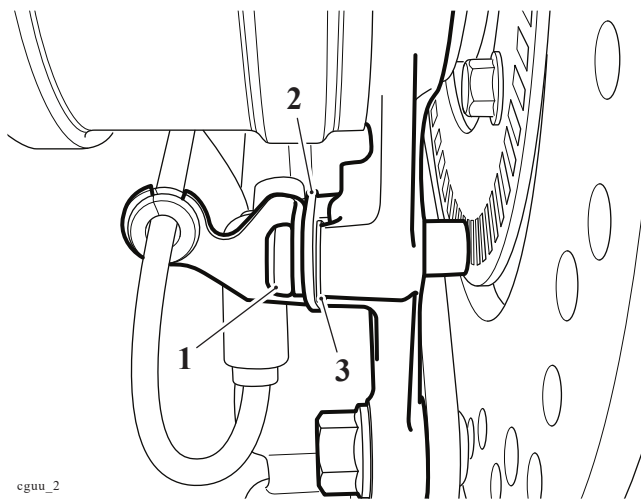
ABS Wheel Speed Sensor Air Gap Measurement

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 to achieve an air gap between 0.74 mm to 1.36 mm.

NOTICE

Shims are available in the following sizes, 0.5 mm, 1.0 mm, 1.5 mm, and 2.0 mm.

4. If necessary, remove the wheel speed sensor, fit the correct thickness shim and refit the wheel speed sensor and tighten the fixing to 9 Nm.



- 1. Fixing
- 2. ABS sensor
- 3. Shim

5. Repeat the air gap measurement. Re-adjust as necessary.

ABS Diagnostics

Pin Point Tests

Select the relevant diagnostics chapter.

- Engine: [Diagnostic Trouble Codes - Index - Engine](#)
- Immobiliser/TPMS: [Diagnostic - Trouble Codes - Index - Immobiliser/TPMS](#)
- ABS: [Diagnostic Trouble Codes - Index - ABS](#)
- Instruments: [Diagnostic - Trouble Codes - Index - Instruments](#)
- CAN errors (five digit fault code): [Diagnostics - Trouble Codes - Index - CAN Errors](#)

Removal and Installation - Front Brake Components

Front Brake Pads - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

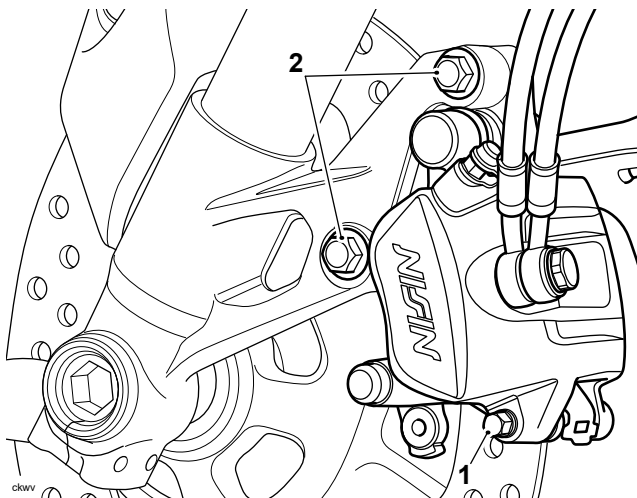
⚠ WARNING

Do not allow a brake component to hang unsupported on the brake hose or line.

Brake hoses or lines that are not supported may become damaged or bent.

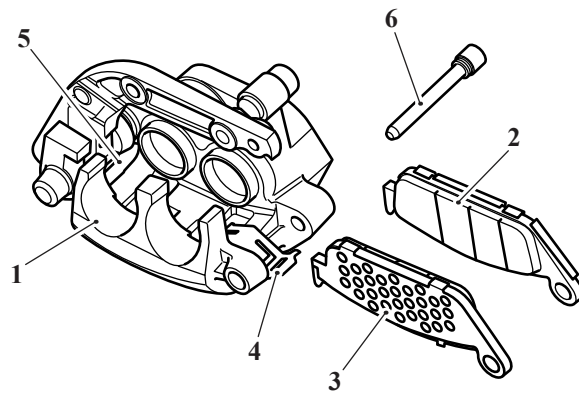
Bent or damaged brake hoses or lines lead to reduced braking efficiency causing loss of motorcycle control and an accident.

1. Loosen the brake pad retaining pin.
2. Remove the caliper mounting fixings and slide the brake caliper off the brake disc.



1. Brake pad retaining pin
2. Brake caliper fixings

3. Remove the brake pad retaining pin and remove the brake pads from the caliper. Take care not to lose the brake pad retainer from the mounting bracket or the anti-rattle spring from the brake caliper.



cjrb

1. Brake caliper
2. Outer brake pad
3. Inner brake pad
4. Anti-rattle spring
5. Brake pad retainer
6. Brake pad retaining pin

NOTICE



Complete the installation of the brake pads to one caliper (see [Front Brake Pads - Installation](#)) before removing the pads from the other caliper.

Front Brake Pads - Inspection

- Check the brake pad anti-rattle spring, brake pad retainer and retaining pin. Renew any component which shows signs of damage or corrosion.
- Inspect the brake pads for wear (see [Front Brake Wear inspection](#)).

Front Brake Pads - Installation

⚠ WARNING

Always have replacement brake pads supplied and fitted by your Triumph dealer.

The ABS calibration is optimised for use with the friction material provided on brake pads supplied by Triumph.

The use of proprietary brands of brake pads is not recommended as differing friction material specifications will affect the performance of the ABS, potentially causing loss of motorcycle control and an accident.

⚠ WARNING

Brake pads for this model supplied by Triumph are specifically designed for use with the brake calipers fitted to your motorcycle.

The use of proprietary brands of brake pads is not recommended as these may have a reduced carrier plate thickness when compared with the Triumph genuine parts.

Brake pads with an incorrect carrier plate thickness can potentially become dislodged from the caliper body as they wear, leading to brake failure, loss of motorcycle control and 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 loss of motorcycle control and 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.

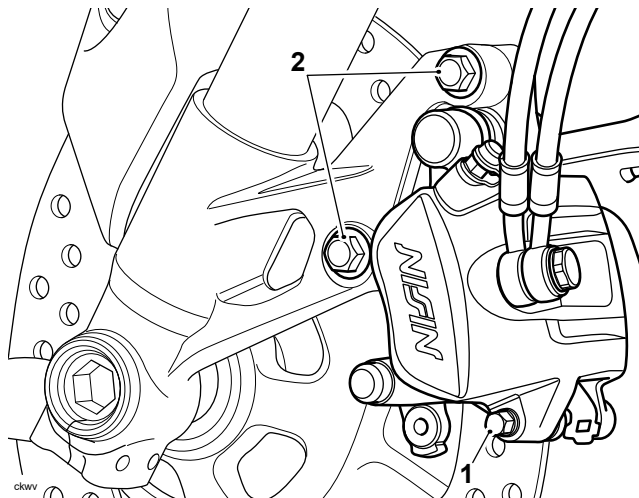
1. If new brake pads are being installed, push the pistons fully back into the caliper body. Keep an eye on the fluid level in the reservoir whilst retracting the pistons to prevent fluid spillage.
2. Ensure the brake pad retainer is correctly fitted to the mounting bracket and the anti-rattle spring is securely clipped onto the caliper body.

⚠ WARNING

Do not apply more than a minimum coating of grease to the pad retaining pin. Excess grease may contaminate the brake pads, hydraulic seals and brake discs causing reduced braking efficiency leading to loss of motorcycle control and an accident.

3. Lubricate the brake pad retaining pin with a thin smear of proprietary high temperature copper based grease.
4. Fit the brake pads to the brake caliper with their friction material surfaces facing each other. Locate the brake pad upper ends in the mounting bracket retainer then align them with the caliper body and insert the retaining pin.
5. Slide the brake caliper onto the brake disc, ensuring the brake pads pass either side of the brake disc, fit the fixings and tighten to 21 Nm.

6. Tighten the brake pad retaining pin to 18 Nm.



- 1. Brake pad retaining pin
- 2. Brake caliper fixings

7. Pump the brake lever to correctly position the caliper pistons.

⚠ WARNING

Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident. Observe the brake fluid handling warnings given in the general information section (see [Brakes](#)).

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

8. Check the front brake fluid level and top up as required with new DOT 4 fluid.

9. Check for correct brake operation. Rectify as necessary.

⚠ WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Caliper - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

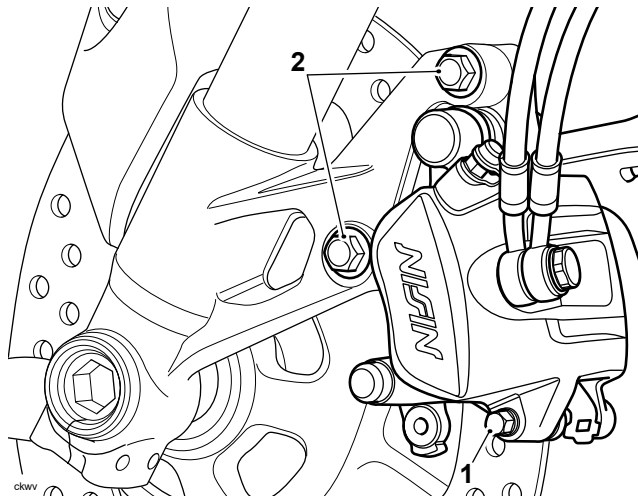
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Disconnect the brake hose at the front caliper and place the free end of the hose in a suitable container to collect the brake fluid. Discard the two sealing washers.

NOTICE

If removing the brake pads, loosen the brake pad retaining pin.

2. Remove the caliper mounting fixings and slide the brake caliper off the brake disc.



1. Brake pad retaining pin
2. Brake caliper fixings

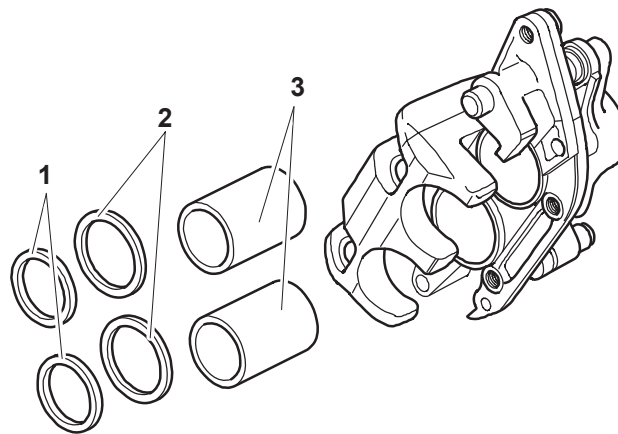
3. If required, remove the brake pads (see [Front Brake Pads - Removal](#)).

Front Brake Caliper - Disassembly

⚠ WARNING

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

1. Separate the caliper and mounting bracket.
2. Cover the brake caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake lever, eject both pistons from the caliper at the same time.



1. Dust seals
2. Piston seals
3. Pistons

⚠ 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. Extract the dust seals and piston seals, taking care not to damage the brake caliper bores.
4. Check the pistons, caliper and mounting bracket for signs of damage, paying particular attention to the caliper bores and pistons. If damage is present, renew the worn component or the complete caliper assembly.

Front Brake Caliper - Inspection

WARNING

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

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

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Front Brake Caliper - Assembly

1. If all components are serviceable, obtain a piston seal kit and reassemble the caliper as follows:

⚠ WARNING

Always renew caliper seals after removal of the pistons. An effective hydraulic seal can only be made if new seals are fitted.

A dangerous riding condition leading to loss of motorcycle control and 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.

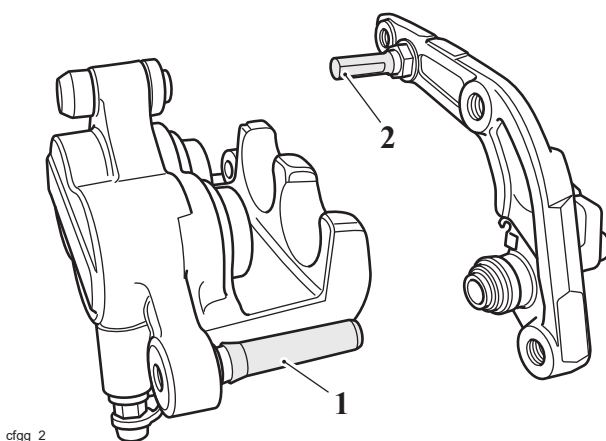
A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

2. Ensure all components are clean, then fit the new seals to their grooves in the caliper bores.
3. Lubricate the fluid seals, caliper bore and the outside of the pistons with clean DOT 4 brake fluid.
4. Ease the pistons squarely back into the bores, taking care not to displace the seals.

⚠ WARNING

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

5. Lubricate the mounting bracket pins with a suitable silicone based brake grease then reassemble the bracket and caliper. Ensure the pin gaiters are correctly located on both the bracket and caliper.



1. Caliper sliding pin
2. Caliper bracket sliding pin

Front Brake Caliper - Installation

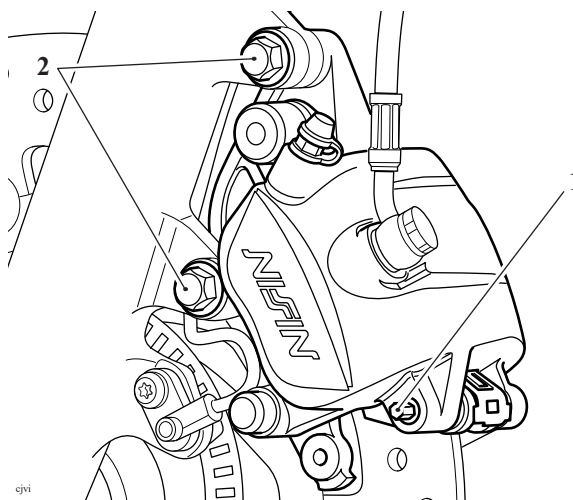
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If removed, fit the brake pads (see [Front Brake Pads - Installation](#)).
2. Slide the brake caliper onto the brake disc, ensuring the brake pads pass either side of the brake disc, fit the fixings and tighten to 21 Nm.
3. If removed, tighten the brake pad retaining pin to 18 Nm.



1. Brake pad retaining pin
2. Brake caliper fixings

4. Connect the brake hose to the caliper incorporating new sealing washers on each side of the brake hose union.
5. Tighten the brake hose union to 25 Nm.

⚠ WARNING

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

- Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
- Bleed the front brakes (see [Bleeding the Front Brakes](#)).

- Check the brakes for correct operation. Rectify any faults as necessary.

 WARNING



It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Disc - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

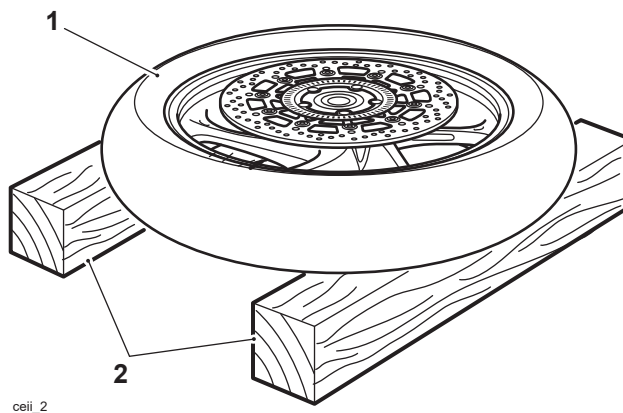
Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable.

A dangerous riding condition leading to an accident could result if this warning is ignored.

NOTICE

The fixings securing the right hand brake disc to the wheel also secure the ABS pulser ring. Note the orientation of the brake discs and the ABS pulser ring for installation.

1. Remove the front wheel (see [Front Wheel - Removal](#)).
2. Support the wheel on blocks as illustrated to avoid damage to the wheel centre.



1. Wheel
2. Support blocks

3. Remove and discard the five fixings and remove the brake disc.
4. Repeat for the other disc.
5. Collect the ABS pulser ring from the right hand brake disc.

Front Brake Disc - Installation

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the right hand brake disc and ABS pulser ring to the wheel as noted during removal.
2. Fit new fixings and tighten to 22 Nm.
3. Fit the other disc in the same way.
4. Refit the front wheel (see [Front Wheel - Installation](#)).
5. Check, and if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see [Front ABS Sensor Air Gap Measurement](#)).
6. Check for correct brake operation. Rectify as necessary.

WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front Brake Master Cylinder - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

⚠ CAUTION

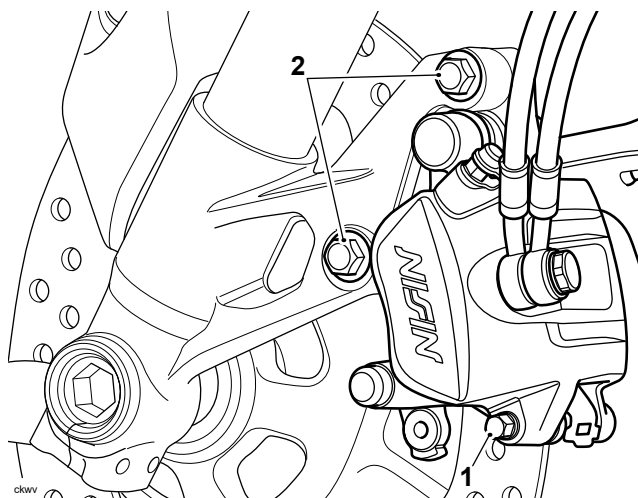
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Note the setting of the brake lever adjuster to make sure it is returned to the same position when the overhaul operation is complete.

NOTICE

One of the brake calipers will require removing and the pistons pushed out to back bleed the master cylinder as part of the brake bleeding procedure, see [Bleeding the Front Brakes](#).

2. Remove the caliper mounting bolts and slide the caliper off the brake disc.



1. Caliper mounting bolts
2. Brake pad retaining pin

3. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the front brake lever slowly until the plate is held by the brake pads. Do not allow the pistons to fall out.

⚠ CAUTION

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose above the handlebars.

Allowing the brake hose to fall below the handlebar height will allow an excessive amount of air to enter into the brake system.

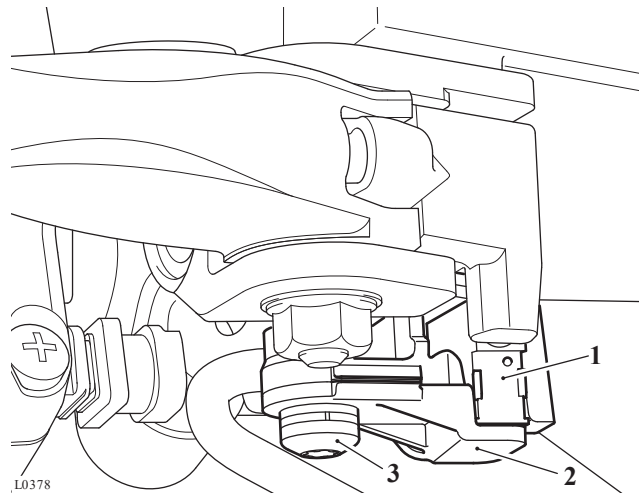
Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

4. Noting its orientation for installation, disconnect the brake hose, discard the washers and allow the brake fluid to drain from the master cylinder outlet into a suitable container.

NOTICE

Note the position of the brake light switch and bracket for installation.

5. Release the fixing and remove the brake light switch and bracket.

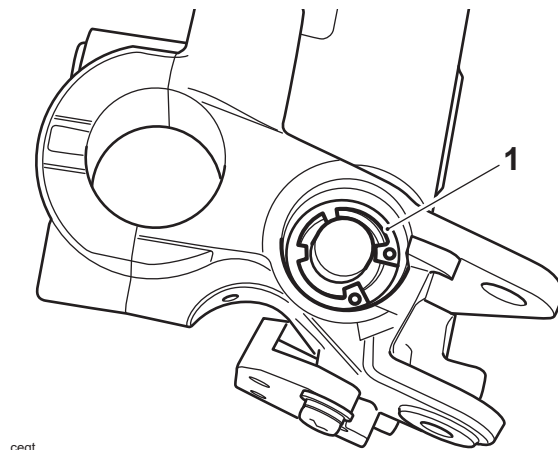


1. Brake light switch
2. Bracket
3. Fixing

6. Remove the pivot lock nut and bolt securing the brake lever to the master cylinder, and remove the lever.
7. Release the clamp screws from the handlebar to remove the master cylinder.

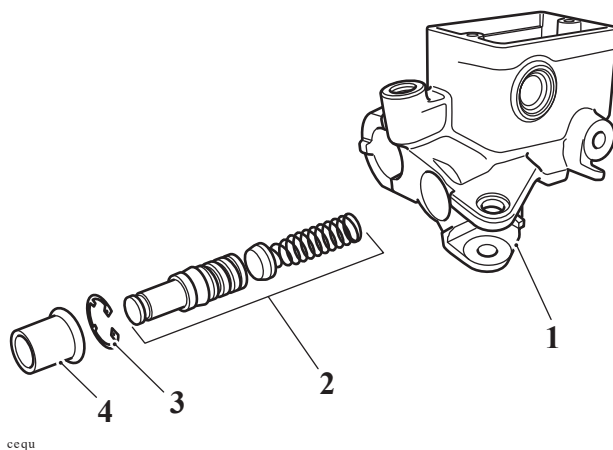
Front Brake Master Cylinder - Disassembly

1. Detach the rubber boot from the lever end of the cylinder.
2. Remove the circlip from beneath the boot.



1. Circlip

3. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.



1. Master cylinder
2. Spring and piston assembly
3. Circlip
4. Rubber boot

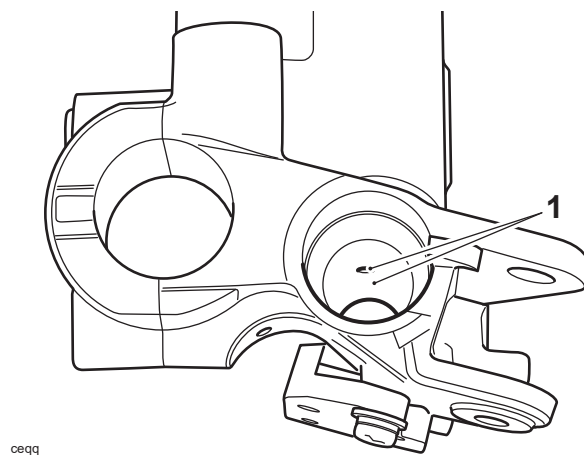
Front Brake Master Cylinder - Inspection

1. Check the following for wear, damage, cracks or deterioration:

- 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

Front Brake Master Cylinder - Assembly

⚠️ WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

⚠️ WARNING

Before installation, all internal brake components should be cleaned and lubricated with clean new DOT 4 brake 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 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 loss of motorcycle control and an accident could result from incorrect assembly of the master cylinder.

2. Fit the new piston set into the master cylinder and retain with a new circlip.
3. Refit the master cylinder boot.

Front Brake Master Cylinder - Installation

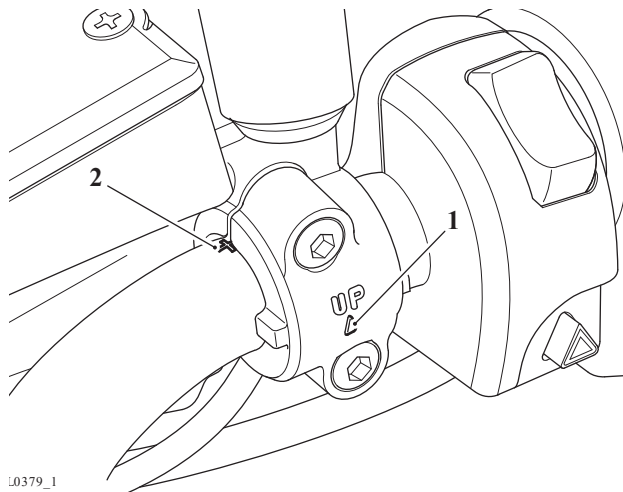
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

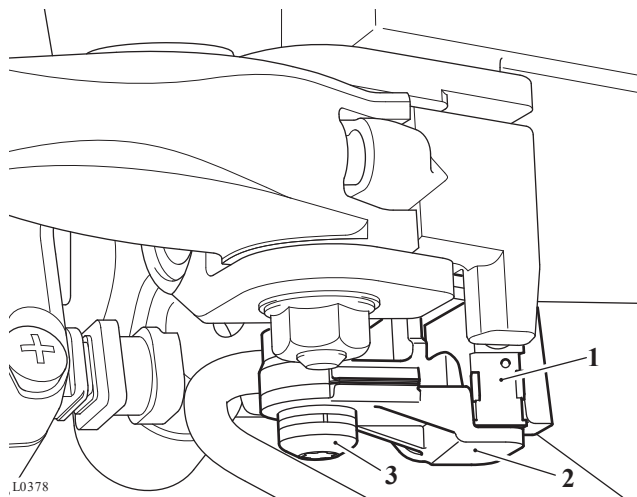
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the master cylinder to the handlebars and position the clamp with the UP arrow pointing upwards.
2. Align the master cylinder/clamp split line with the alignment mark on the handlebar.



1. UP arrow
2. Alignment mark

3. Tighten the clamp bolts, upper first and then the lower to 12 Nm.
4. Fill the brake fluid reservoir to the maximum mark.
5. Allow the brake fluid to flow through the master cylinder until fluid just starts to flow at the front brake hose union, collect any escaping fluid.
6. Connect the brake hose to the master cylinder incorporating new sealing washers. Tighten the union bolt to 25 Nm.
7. Refit the brake light switch and bracket to the master cylinder as noted during removal. Tighten the fixing to 2 Nm.



1. Brake light switch
2. Bracket
3. Fixing

8. Position the brake lever ensuring that the pivot boss is correctly aligned to the pushrod. Fit and tighten the pivot bolt to 1 Nm, and the lock nut 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.

9. Fill and bleed the front brakes (see [Bleeding the Front Brakes](#)).

⚠ 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.

10. Reset the brake lever adjuster to the original setting.

11. Examine the system for correct operation and fluid leaks. Rectify as necessary.

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)
- Check for correct brake operation. Rectify as necessary.

⚠ WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Removal and Installation - Rear Brakes Components

Rear Brake Pads - Removal

⚠ WARNING

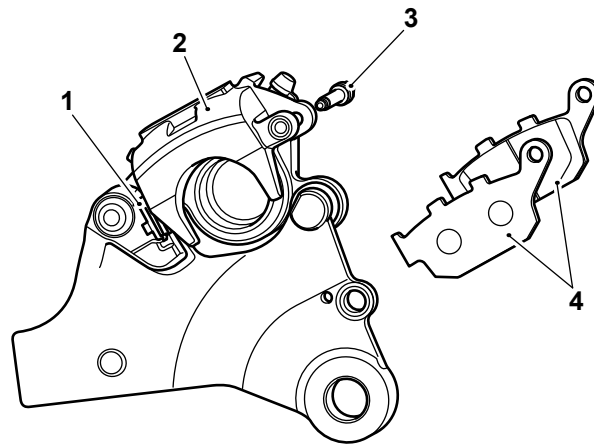
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

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.



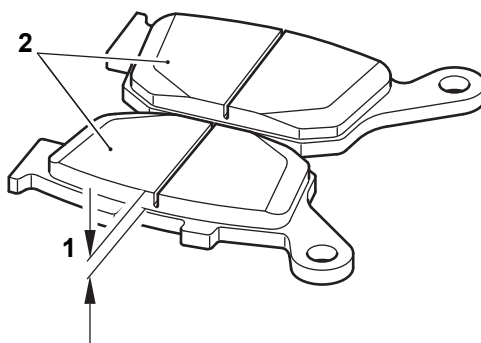
ckww

- 1. Anti-rattle spring
- 2. Rear brake caliper
- 3. Brake pad retaining pin
- 4. Brake pads

1. Remove the rear wheel (see [Rear Wheel - Removal](#)).
2. Remove the brake pad retaining pin and remove the brake pads. Note the position of the anti-rattle spring
3. For inspection and replacing the anti-rattle spring, remove the caliper (see [Rear Brake Caliper - Removal](#)).

Rear Brake Pads - Inspection

1. Check the friction material of each brake pad for signs of contamination and measure its thickness. If the friction material of either pad is contaminated or has worn beyond the service limit, renew both pads as a set.



L0225

- | |
|---|
| <ol style="list-style-type: none">1. Friction material thickness (service limit 1.5 mm)2. Brake pads |
|---|

2. Check the retaining pin. Renew any component which shows signs of damage or corrosion.
3. Check the caliper body slides easily on the mounting bracket pins and check there is no sign of leakage from the piston seal. Rectify any problems before installing the brake pads.

Rear Brake Pads - Installation

⚠ WARNING

Always have replacement brake pads supplied and fitted by your Triumph dealer.

The ABS calibration is optimised for use with the friction material provided on brake pads supplied by Triumph.

The use of proprietary brands of brake pads is not recommended as differing friction material specifications will affect the performance of the ABS, potentially causing loss of motorcycle control and an accident.

⚠ WARNING

Brake pads for this model supplied by Triumph are specifically designed for use with the brake calipers fitted to your motorcycle.

The use of proprietary brands of brake pads is not recommended as these may have a reduced carrier plate thickness when compared with the Triumph genuine parts.

Brake pads with an incorrect carrier plate thickness can potentially become dislodged from the caliper body as they wear, leading to brake failure, loss of motorcycle control and 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 loss of motorcycle control and an accident.

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Make sure the anti-rattle spring is located as noted during removal.
2. If fitting new pads, use hand pressure to compress the caliper piston fully into its bore. Keep an eye on the fluid level in the reservoir whilst retracting the pistons to prevent fluid spillage.
3. 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.

4. Lubricate the pad retaining pin using a minimum amount of proprietary high temperature brake grease.
5. Install the brake pad retaining pin and tighten to 18 Nm.
6. Refit the rear wheel (see [Rear Wheel - Installation](#)).
7. Pump the brake pedal to correctly position the caliper pistons.
8. 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.

9. Check for correct brake operation. Rectify as necessary.

⚠ WARNING



It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Caliper - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

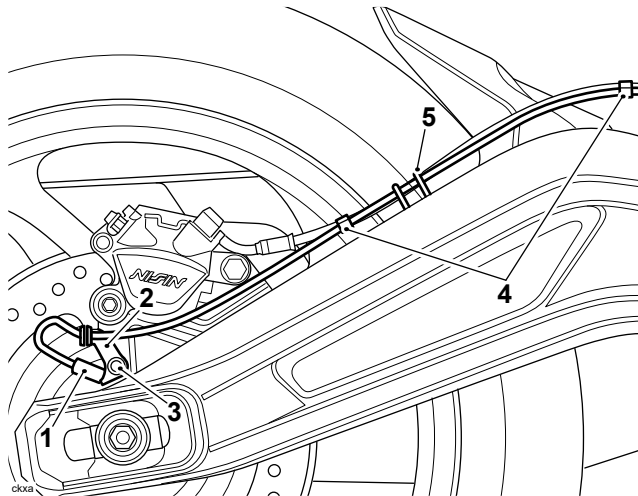
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. Remove the fixing and remove the rear wheel speed sensor and bracket and position to one side, noting the routing for installation.



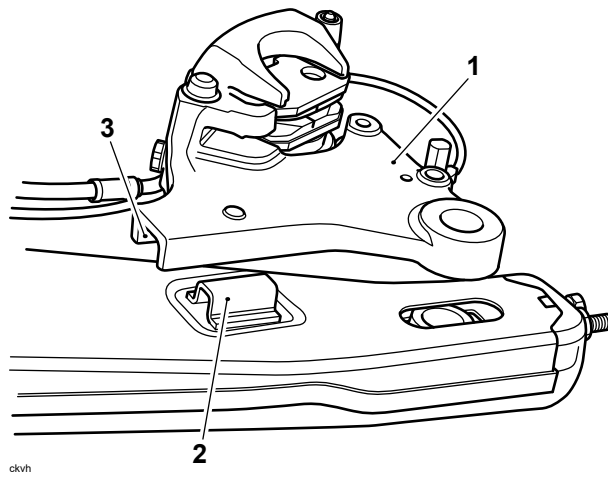
1. Rear wheel speed sensor
2. Bracket
3. Fixing
4. Clips
5. Wire guide

2. 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.

NOTICE

Note the position of the rear brake caliper for installation.

3. Remove the rear wheel (see [Rear Wheel - Removal](#)).
4. Remove the brake pads (see [Rear Brake Pads - Removal](#)).
5. Remove the brake caliper and carrier assembly.



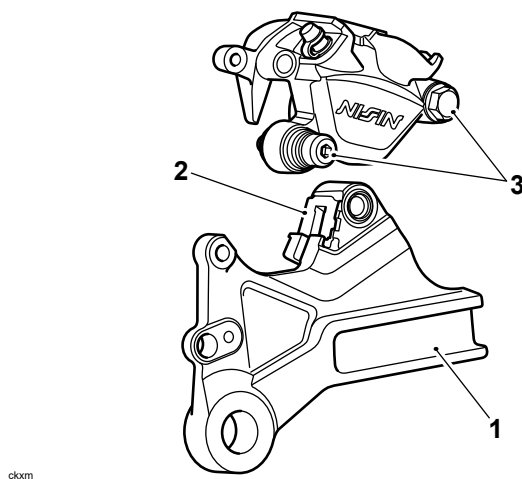
- 1. Caliper carrier
- 2. Swinging arm slot
- 3. Caliper carrier groove

Rear Brake Caliper - Disassembly

The following items can be replaced on the rear brake caliper:

- Anti-rattle spring
- Piston, piston seal and dust seal
- Bleed screw
- Bleed screw boot.

1. Release the two bolts and remove the caliper from the carrier.



- 1. Caliper carrier
- 2. Anti-rattle spring
- 3. Bolts

2. Remove the anti-rattle spring.

3. 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, eject the piston from the caliper.

⚠ WARNING

Ensure the seal grooves in the caliper bore 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. Extract the dust seal and piston seal, taking care not to damage the caliper bore.

Rear Brake Caliper - Inspection

WARNING



Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

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

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.
2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

Rear Brake Caliper - Assembly

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

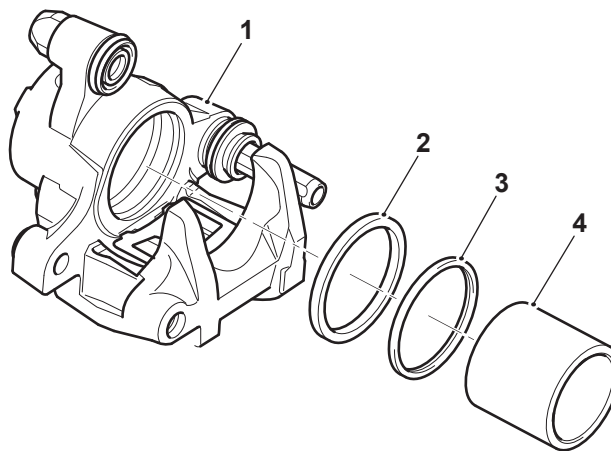
Ensure that the caliper bores do not become scratched during piston removal and assembly. Ensure that the pistons remain square to their bores during fitment otherwise damage to the caliper could result. Loss of motorcycle control and an accident could result if this warning is ignored.

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 seals to the caliper. Apply brake fluid to the outside of the caliper piston and fluid seal.



B00805

1. Caliper
2. Piston seal
3. Dust seal
4. Piston

⚠ WARNING



Ensure that the piston does not tip during assembly as this could damage the caliper.

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

2. Carefully push the piston into the caliper by hand.
 3. If removed, install the anti-rattle spring into the caliper carrier.
 4. Assemble the caliper onto the carrier. Tighten the rear bolt to 22 Nm and the front bolt to 29 Nm.
- Perform the following operations:

- [Rear Brake Caliper - Installation](#)
- [Rear Brake Pads - Installation](#)

Rear Brake Caliper - Installation

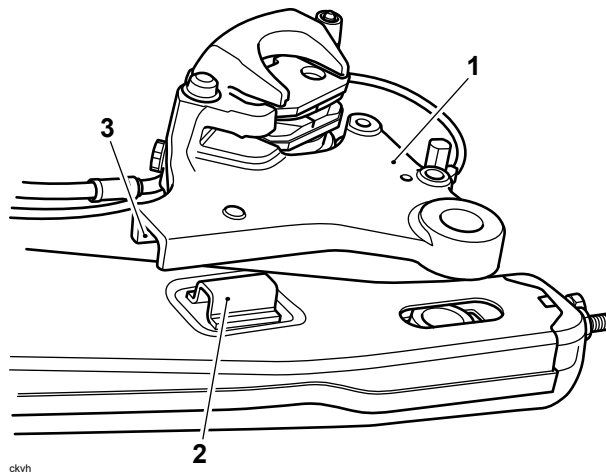
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

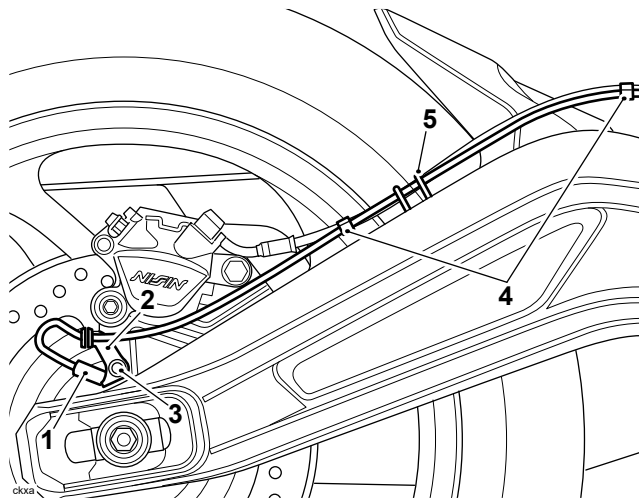
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the caliper and carrier assembly to the swinging arm as noted for removal. Align the boss on the carrier with the slot on the swinging arm.



1. Caliper carrier
2. Swinging arm slot
3. Caliper carrier groove

2. Fit the rear wheel (see [Rear Wheel - Installation](#)).
3. Fit the brake pads (see [Rear Brake Pads - Installation](#)).
4. Connect the brake hose to the caliper incorporating new washers on each side of the union bolt.
5. Tighten the union bolt to 25 Nm.
6. Position the wheel speed sensor and bracket to the caliper carrier with its shim between the sensor and caliper carrier. Tighten the fixing to 9 Nm.



1. Rear wheel speed sensor
2. Bracket
3. Fixing
4. Clips
5. Wire guide

⚠ 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.

7. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
8. Bleed the rear brake (see [Bleeding the Rear Brakes](#)).
9. The air gap between the wheel speed sensor and the pulser ring must be between 0.74 mm and 1.36 mm. Check, and if necessary, adjust the air gap (see [Rear ABS Sensor Air Gap Measurement](#)).
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 attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Disc - Removal

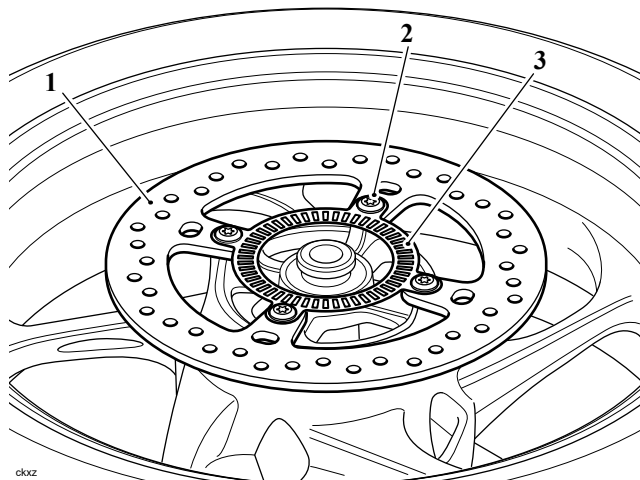
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Remove the rear wheel (see [Rear Wheel - Removal](#)).
2. Support the wheel on blocks to avoid damage to the wheel centre.
3. Remove and discard the four screws and remove the ABS pulser ring and brake disc.



1. Brake disc
2. Fixing
3. ABS pulser ring

NOTICE

The fixings securing the rear brake disc to the wheel also secure the ABS pulser ring. Note the orientation of the brake disc and the ABS pulser ring for installation.

Rear Brake Disc - Inspection

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.
A correctly supported motorcycle will help prevent it from falling.
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Brake Disc Wear

Replace any brake disc worn beyond the service limit or that exceeds the disc run-out limit.

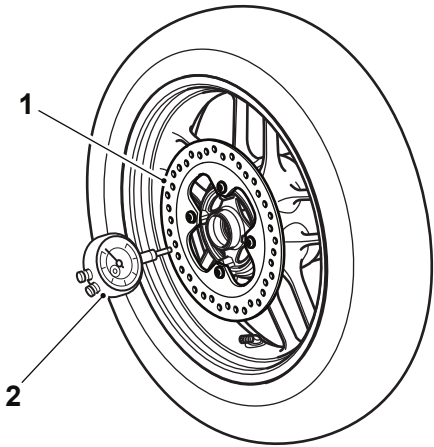
Rear Brake Disc Thickness

Standard:	5.5 mm
Service Limit:	5.0 mm

Rear Brake Disc Run-out

Service Limit:	0.25 mm
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Measure disc run-out using an accurate dial gauge mounted on a surface plate.



1. Disc
2. Dial gauge

Rear Brake Disc - Installation

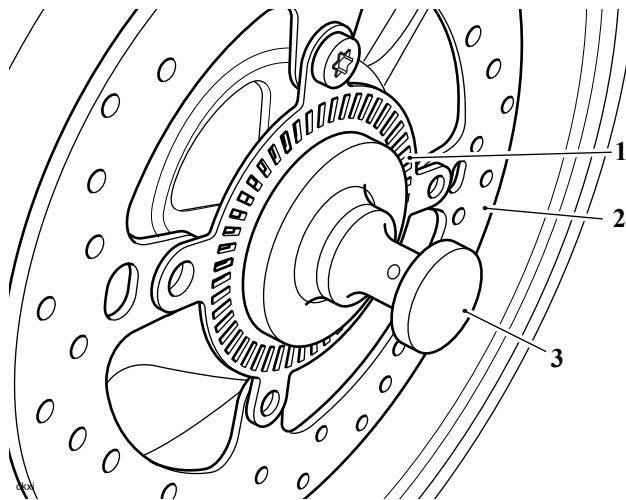
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the brake disc and ABS pulser ring to the rear wheel as noted during removal.
2. Use service tool T3880172 to align the pulser ring and brake disc.



1. Pulser ring
2. Brake disc
3. T3880172 - Pulser Ring Alignment Tool

3. Install new fixings and tighten to 22 Nm.
4. Remove the service tool T3880172.
5. Refit the rear wheel (see [Rear Wheel - Installation](#)).
6. Check, and if necessary, adjust the air gap between the wheel speed sensor and the ABS pulser ring (see [Rear ABS Sensor Air Gap Measurement](#)).
7. Check for correct brake operation. Rectify as necessary.

⚠ WARNING

It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Rear Brake Master Cylinder - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- Remove the right hand side panel (see [Side Panels - Removal](#)).

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

NOTICE

The brake caliper will require removing and the pistons pushed out to back bleed the master cylinder as part of the brake bleeding procedure, see [Bleeding the Rear Brakes](#).

Perform the following operations:

- [Rear Wheel - Removal](#)

⚠ WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

1. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the rear brake pedal slowly until the plate is held by the brake pads. Do not allow the pistons to fall out.

⚠ CAUTION

When disconnecting the brake hose from the master cylinder it is necessary to keep the open end of the hose above the height of the rear brake master cylinder.

Allowing the brake hose to fall below the rear brake master cylinder height will allow an excessive amount of air to enter into the brake system.

Trapped air may cause the brake lever to feel spongy and contribute to reduced braking efficiency.

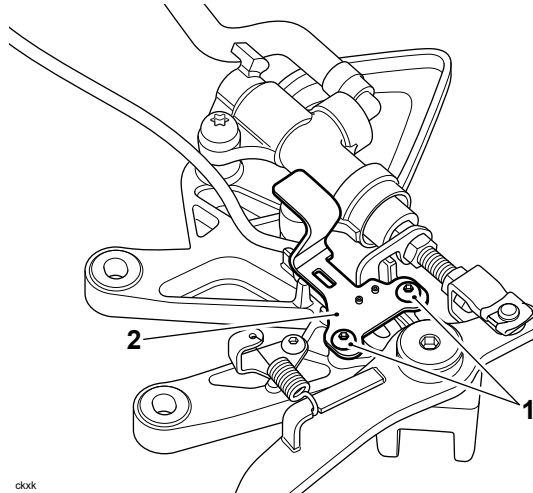
2. Noting its orientation for installation, disconnect the brake hose from the master cylinder, discard the washers and allow the brake fluid to drain from the master cylinder outlet into a suitable container.
3. Remove and discard the rear master cylinder reservoir fixing and support the reservoir.

4. Remove the two fixings and remove the right hand control plate and rear brake master cylinder assembly.

NOTICE

Note the routing of the rear brake switch harness for installation.

5. Disconnect the rear brake switch from the main harness.
6. Remove the two fixings and remove the rear brake switch and bracket from the control plate, noting the routing for installation. Position the brake switch and bracket to one side.

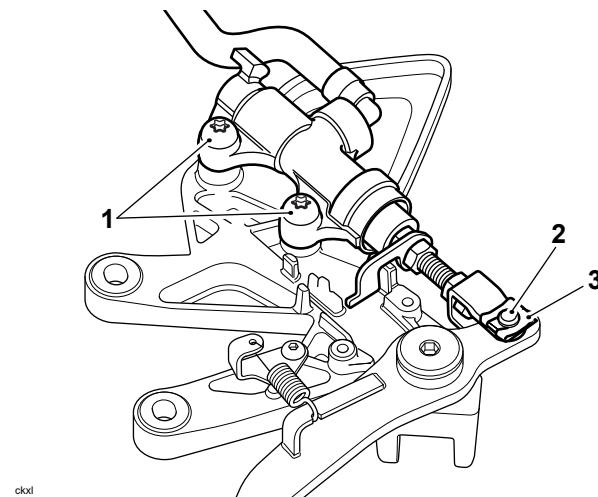


1. Fixings
2. Rear brake switch bracket

NOTICE

Note the position and orientation of the clevis pin and clip for installation.

7. Remove the clip and clevis pin at the lower end of the brake push rod.
8. Remove the two fixings and remove the master cylinder from the control plate.

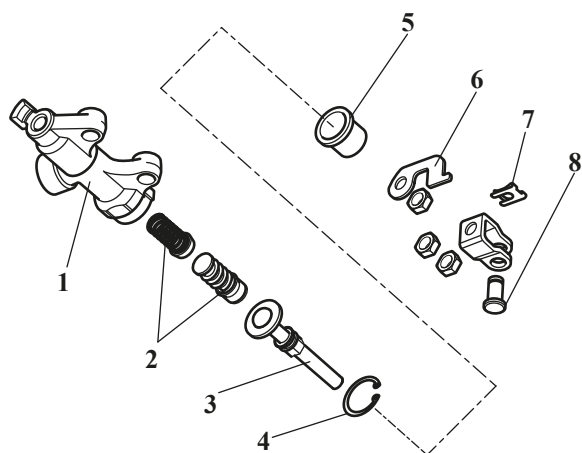


1. Fixings
2. Clevis pin
3. Clip

9. Disconnect the reservoir hose from the master cylinder if required and collect any brake fluid.

Rear Master Cylinder - Disassembly

1. Remove the dust boot from the cylinder and pushrod.
2. Remove the circlip retaining the pushrod to the cylinder.
3. Remove the pushrod and piston set from the master cylinder bore noting the relative position of the seals and piston components.



- | |
|---|
| <ol style="list-style-type: none">1. Rear brake master cylinder2. Piston set3. Push rod4. Circlip5. Dust boot6. Brake switch plate7. Clip8. Clevis pin |
|---|

Rear Master Cylinder - Inspection

1. Visually inspect the master cylinder bore for wear, scratches or corrosion. Replace as necessary.
2. Check the piston and cylinder bore for damage, wear or deterioration. Replace as necessary. Always renew the piston seals if the cylinder has been dismantled.
3. Examine the pushrod for bends and damage. Replace as necessary.

Rear Master Cylinder - Assembly

⚠ WARNING

Never use mineral-based grease (such as lithium or copper based grease) in any area where contact with the braking system hydraulic seals and dust seals is possible. Mineral-based grease will damage the hydraulic seals and dust seals in the calipers and master cylinders.

Damage caused by contact with mineral-based grease may reduce braking efficiency resulting in loss of motorcycle control and an accident.

⚠ WARNING

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

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

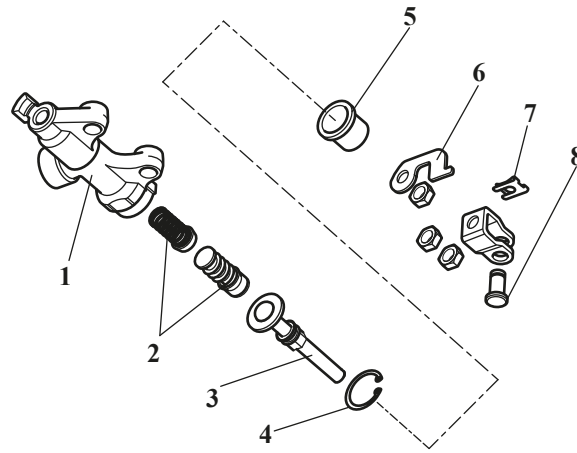
A dangerous riding condition leading to loss of motorcycle control and an accident could result if this warning is ignored.

1. Clean the master cylinder bore, piston and seals, with new brake fluid.
2. Ensure all ports are clear of obstruction.

⚠ WARNING

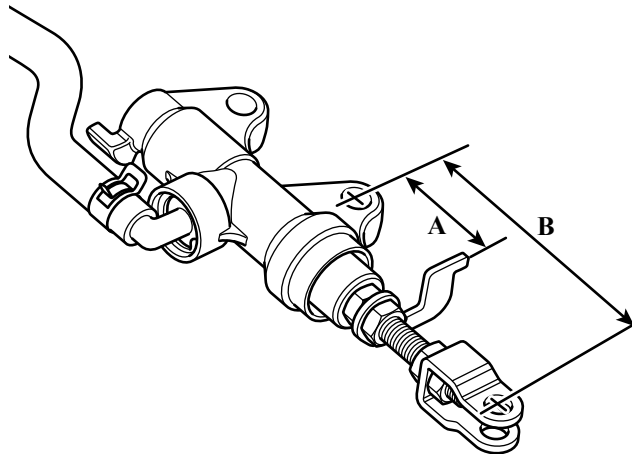
Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

3. Install the spring and piston set together.
4. Apply a small amount of brake grease to the push rod.
5. Install the push rod in the master cylinder and retain with a new circlip.
6. Refit the dust boot.



1. Rear brake master cylinder
2. Piston set
3. Push rod
4. Circlip
5. Dust boot
6. Brake switch plate
7. Clip
8. Clevis pin

7. If the push rod and brake switch plates have been disassembled, set the brake switch plate (A) to 39 mm and the push rod free length (B) to 91 mm, as shown below.



clxj

Push rod and brake switch plate setting dimensions

8. Tighten the lock nuts to 17 Nm.

Rear Brake Master Cylinder - Installation

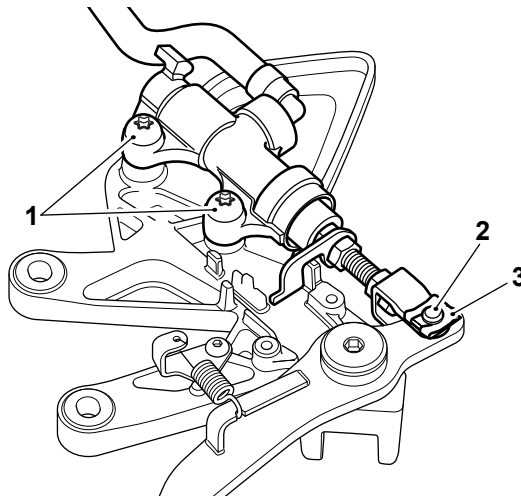
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

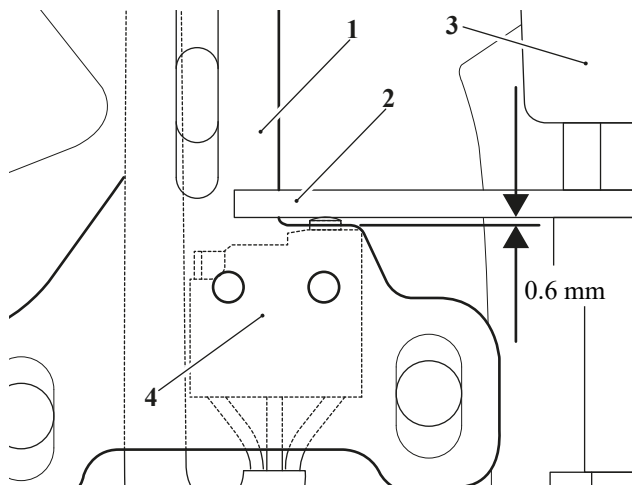
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If required, refit the reservoir hose to the rear brake master cylinder.
2. Align the rear brake pedal to the master cylinder push rod and secure with the clevis pin and clip as noted during removal.
3. Secure the rear master cylinder to the control plate and tighten the fixings to 16 Nm.



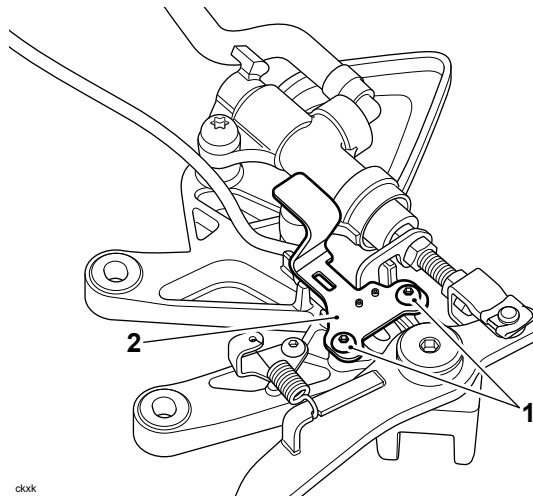
1. Fixings
2. Clevis pin
3. Clip

4. Refit the rear brake switch and bracket assembly to the control plate and loosely install the fixings. Make sure the routing of the harness is as noted during removal. Position the rear brake switch until it engages with the brake switch plate. The gap between the brake switch bracket and the brake switch plate should be 0.6 mm.



- 1. Brake switch bracket
- 2. Brake switch plate
- 3. Rear master cylinder
- 4. Brake switch

5. Tighten the fixings to 3 Nm.



- 1. Fixings
- 2. Rear brake switch bracket

6. Fit the right hand control plate to the frame and tighten its fixings to 24 Nm.
7. Reconnect the rear brake switch to the main harness.
8. Refit the brake fluid reservoir with a new fixing and tighten to 6 Nm.
9. Fill the brake fluid reservoir to the maximum mark.
10. Allow the brake fluid to flow through the master cylinder until fluid just starts to flow at the rear brake hose union, collect any escaping fluid.
11. Incorporating new washers, fit the brake hose to the master cylinder. Ensuring correct orientation of the brake hose, tighten the union bolt to 25 Nm.

⚠ WARNING

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

12. Fill and bleed the rear brake system (see [Bleeding the Rear Brakes](#)).

13. Install the right hand side panel (see [Side Panels - Installation](#))

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)
- Check the brakes for correct operation. Rectify any faults as necessary.

 WARNING



It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Removal and Installation - ABS Components

ABS Modulator - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Rear Wheel - Removal](#)

⚠ CAUTION

To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

⚠ 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.

NOTICE

Note the position of the rear brake caliper for installation.

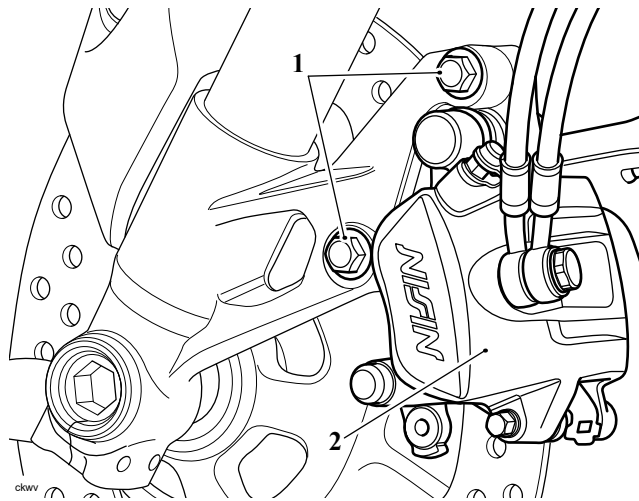
⚠ WARNING

Make sure no damage is made to the brake pad material when moving the brake pads.

Allowing the brake pads to come into contact with each other or sharp objects may cause the material to crack or break.

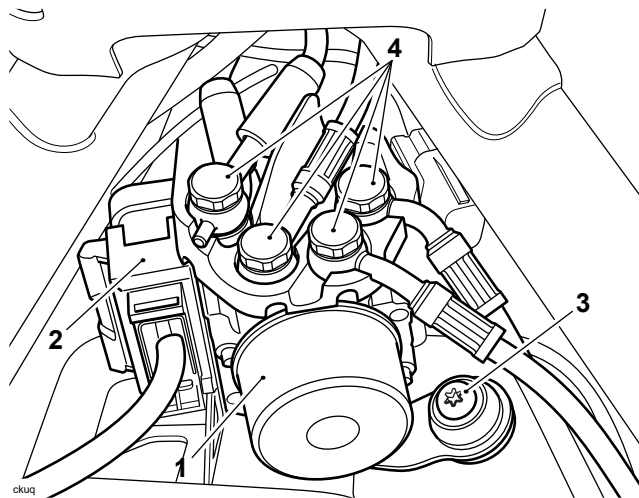
Damage to the brake pads may result in reduced braking efficiency leading to loss of motorcycle control and an accident.

1. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the rear brake pedal slowly until the plate is held by the brake pads. Do not allow the pistons to fall out.
2. Remove the front caliper mounting fixings and slide the brake caliper off the brake disc.



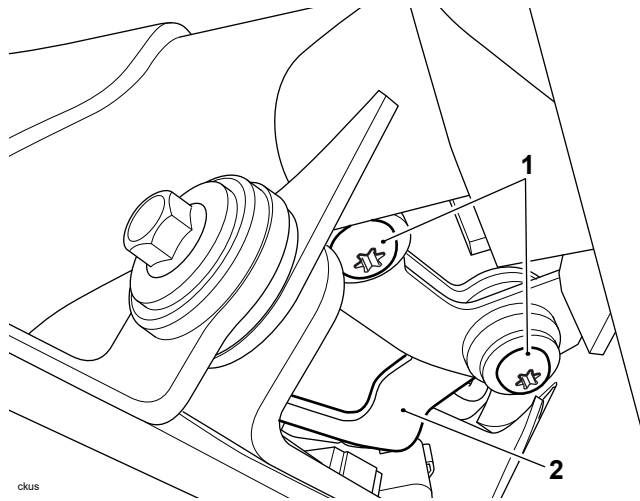
- 1. Fixings
- 2. Caliper

3. Using a suitable flat metal plate approximately 2 mm thick and 30 to 50 mm wide (for example a gasket scraper) between the brake pads, pump the front brake lever slowly until the plate is held by the brake pads. Do not allow the pistons to fall out.
4. Disconnect the ABS modulator multiplug.
5. Remove the union bolts and carefully disconnect the four brake lines from the ABS modulator, collecting any brake fluid. Discard the sealing washers.
6. Remove and discard the rear fixing from the ABS modulator bracket.



- 1. ABS modulator
- 2. ABS modulator multiplug
- 3. ABS modulator rear fixing
- 4. Brake line unions

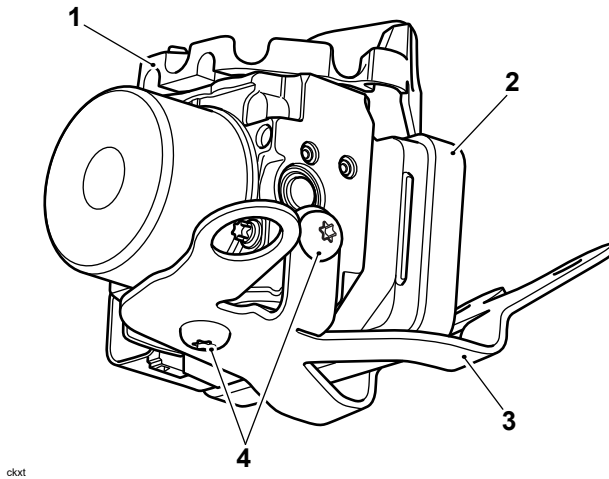
7. Remove and discard the two fixings and remove the ABS modulator and bracket assembly from the frame.



1. Fixings
2. ABS modulator bracket

8. If required, remove the anti-rotation moulding from the ABS modulator.

9. If required, remove and discard the fixings and remove the ABS modulator from the bracket.



1. Anti-rotation moulding
2. ABS modulator
3. Bracket
4. Fixings

ABS Modulator - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

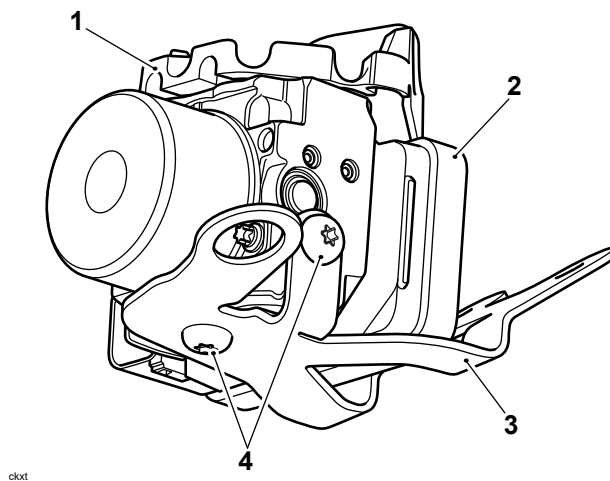
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

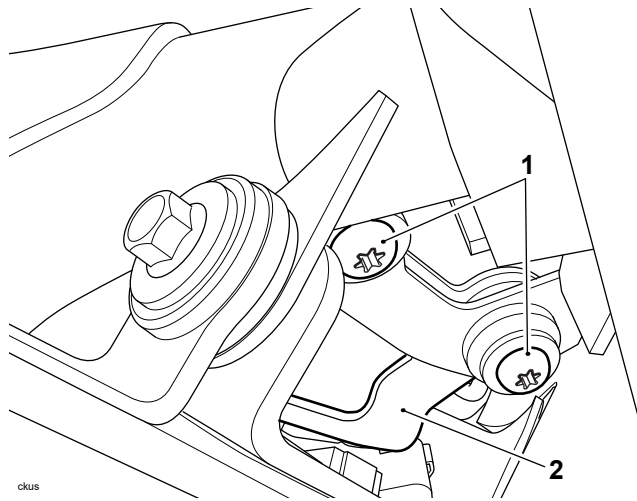
To prevent paint damage, do not spill brake fluid onto any area of the bodywork. Spilled brake fluid will damage paintwork.

1. If required, fit the anti-rotation moulding to the ABS modulator.
2. If required, position the ABS modulator onto its bracket. Fit new fixings and tighten to 9 Nm.



1. Anti-rotation moulding
2. ABS modulator
3. Bracket
4. Fixings

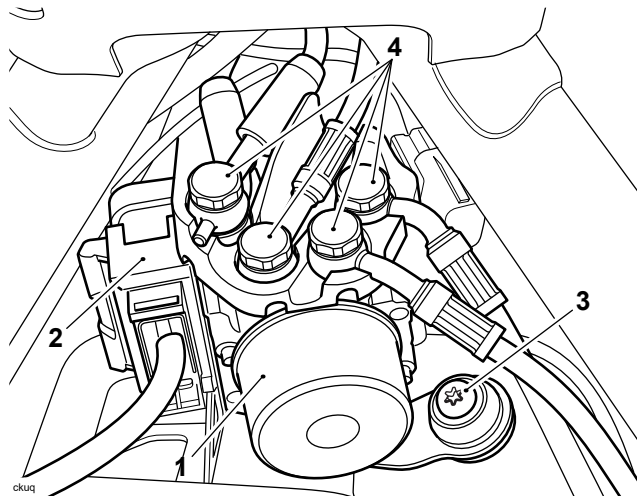
3. Make sure the two rubber grommets are fitted to the frame and one is fitted to the ABS modulator bracket.
4. Align the ABS modulator and bracket to the frame and secure with two flanged sleeves and two new fixings. Tighten the fixings to 9 Nm.



1. Fixings
2. ABS modulator bracket

5. Install a flanged sleeve and new fixing and tighten to 9 Nm.

6. Incorporating new washers to either side of the unions, fit the brake lines to the ABS modulator as noted for removal. Tighten the brake line unions to 25 Nm.



1. ABS modulator
2. ABS modulator multiplug
3. ABS modulator rear fixing
4. Brake line unions

⚠ WARNING

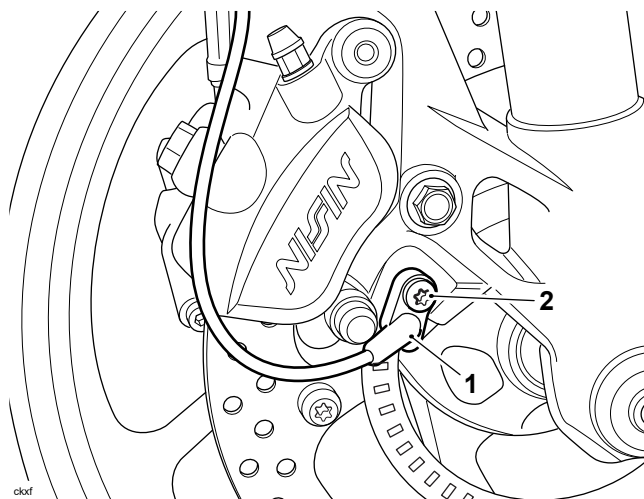
Use only DOT 4 specification brake fluid as listed in the General Information section of this manual. The use of brake fluids other than those DOT 4 fluids listed in the General Information section may reduce the efficiency of the braking system leading to an accident.

Observe the brake fluid handling warnings given earlier in this section of the manual.

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)
- [Bleeding the Front Brakes](#)

- **Bleeding the Rear Brakes**



1. Front ABS wheel speed sensor
2. Fixing

Rear ABS Wheel Speed Sensor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

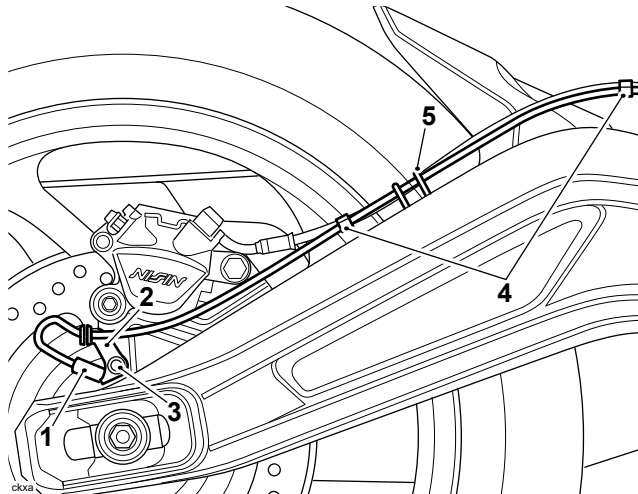
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- Remove the right hand side panel (see [Side Panels - Removal](#)).

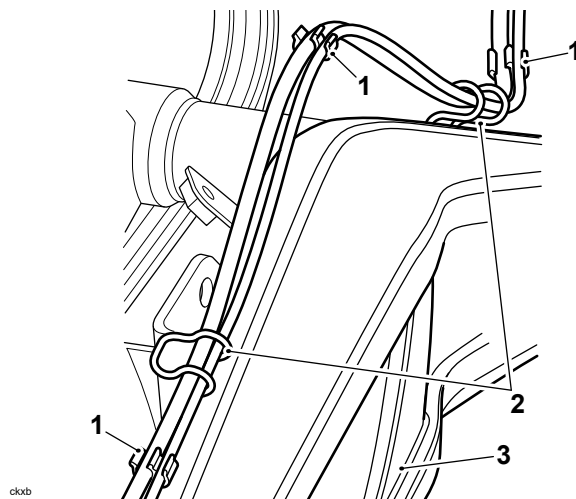
NOTICE

Note the routing of the harness and its retaining clips for installation.

1. Remove the fixing and remove the rear wheel speed sensor and bracket and position to one side, noting the routing for installation.
Collect the shim from in between the sensor and the caliper carrier.
2. Release the harness from the three clips and two wire guides.



1. Rear wheel speed sensor
2. Bracket
3. Fixing
4. Clips
5. Wire guide



- 1. Clips
- 2. Wire guides
- 3. Swinging arm

3. Detach the rear ABS wheel speed sensor multiplug from its bracket on the battery tray and disconnect from the main harness.

Front ABS Wheel Speed Sensor - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

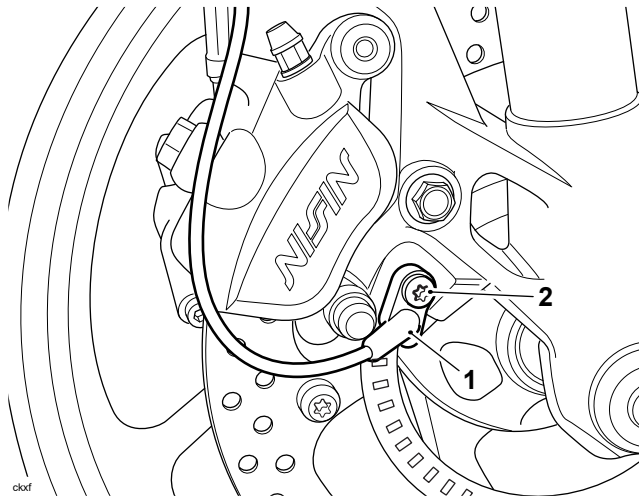
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

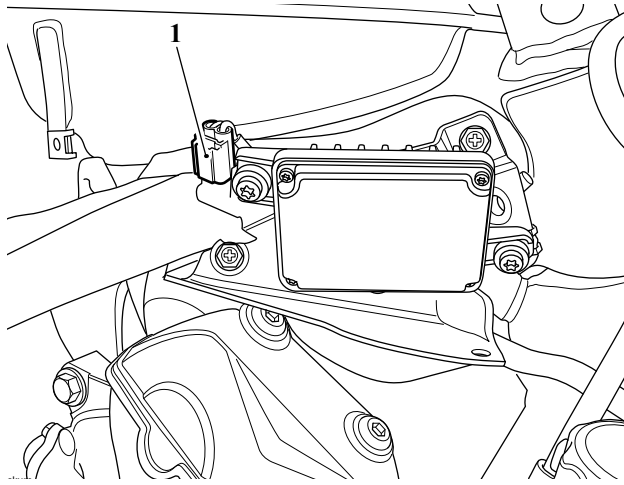
Check the condition of the shim before use. Do not use a shim which is bent or damaged.

1. Position the wheel speed sensor to the fork leg with its shim between the sensor and fork leg. Tighten the fixing to 9 Nm.



1. Front ABS wheel speed sensor
2. Fixing

2. Route the sensor harness along the front brake hose as noted for removal. Secure with the three clips.
3. Route the sensor harness through the wire guide behind the lower yoke and through the frame as noted during removal.
4. Connect the wheel speed sensor multiplug and secure the harness to the clip behind the bracket. Any slack in the harness must be positioned behind the headstock area.



1. Front wheel speed sensor multiplug

5. Install the fuel tank bodywork (see [Fuel Tank - Installation](#))

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)
- [Front ABS Sensor Air Gap Measurement](#)

Rear ABS Wheel Speed Sensor - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

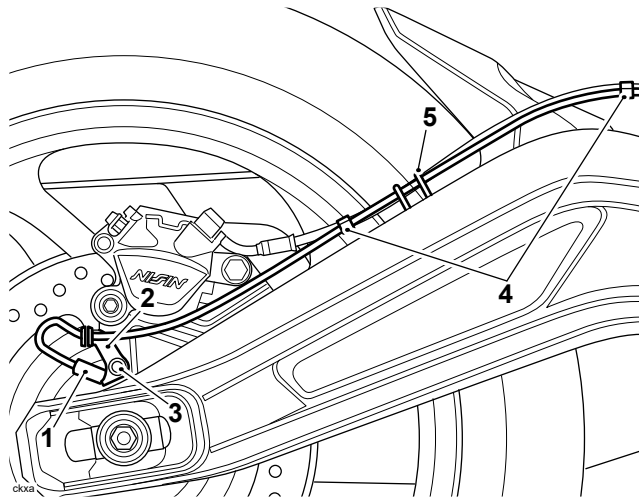
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

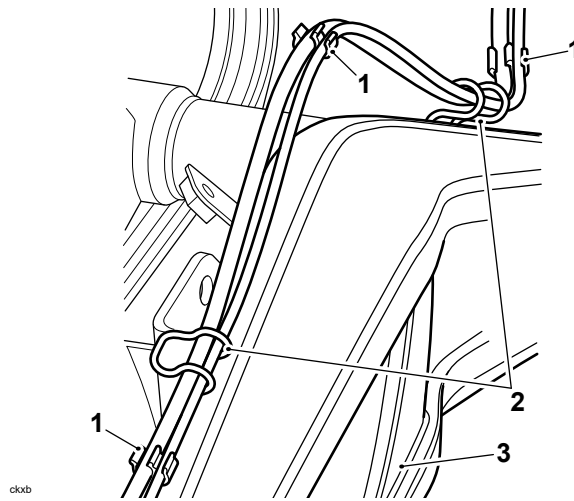
NOTICE

Check the condition of the shim before use. Do not use a shim which is bent or damaged.

1. Refit the rear wheel speed sensor, shim and bracket with the fixing, routing the harness through the two wire guides and three clips as noted during removal. Tighten the fixing to 9 Nm.



1. Rear wheel speed sensor
2. Bracket
3. Fixing
4. Clips
5. Wire guide



1. Clips
2. Wire guides
3. Swinging arm

2. Connect the wheel speed sensor multiplug and secure to its bracket on the battery tray.

3. Refit the right hand side panel (see [Side Panels - Installation](#))

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)
- [Rear ABS Sensor Air Gap Measurement](#)

Front ABS Pulser Ring - Installation

WARNING



Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The procedure for installing the front ABS pulser ring is described in front brake disc installation (see [Front Brake Disc - Installation](#)).

WARNING



It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

Front ABS Pulser Ring - Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Front ABS Pulser Ring - Removal

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

The fixings securing the ABS pulser ring to the wheel also secure the right hand brake disc. Note the orientation of the brake disc and the ABS pulser ring for installation.

The procedure for removing the front ABS pulser ring is described in front brake disc removal (see [Front Brake Disc - Removal](#)).

Rear ABS Pulser Ring - Removal

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The procedure for removing the rear ABS pulser ring is described in rear brake disc removal (see [Rear Brake Disc - Removal](#)).

Rear ABS Pulser Ring - Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Rear ABS Pulser Ring - Installation

WARNING



Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

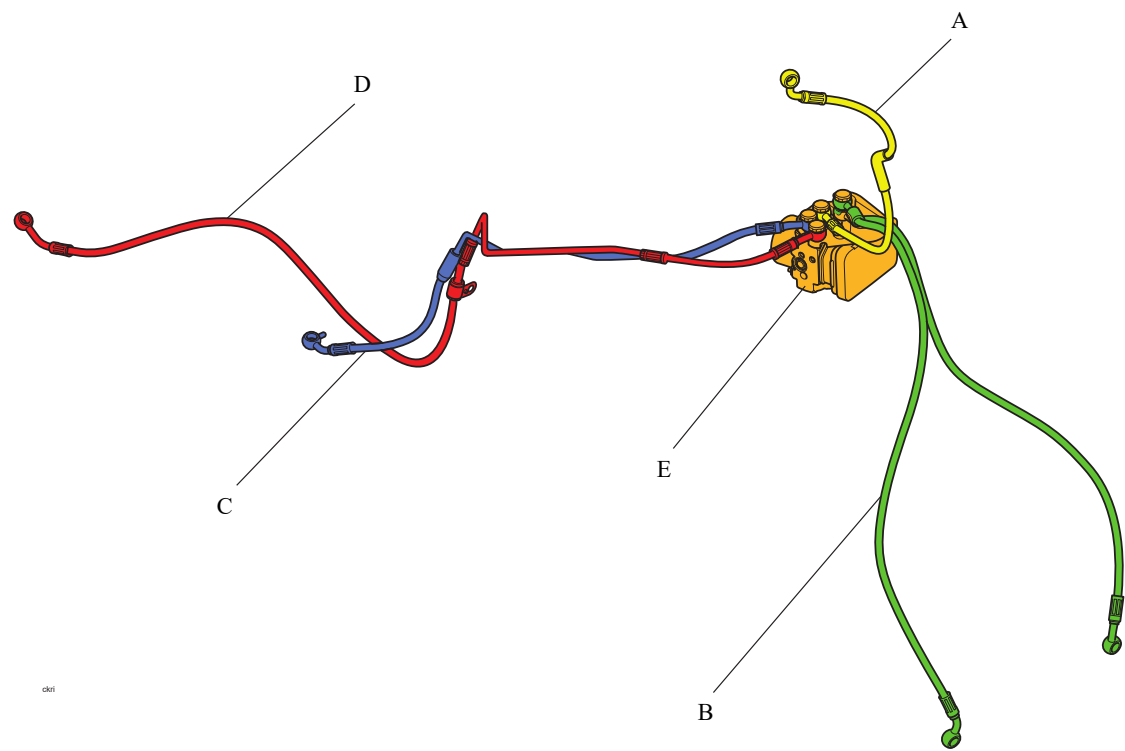
The procedure for installing the rear ABS pulser ring is described in rear brake disc installation (see [Rear Brake Disc - Installation](#)).

WARNING



It is dangerous to operate the motorcycle with defective brakes; you must have your authorised Triumph dealer take remedial action before you attempt to ride the motorcycle again. Failure to take remedial action may reduce braking efficiency leading to loss of motorcycle control and an accident.

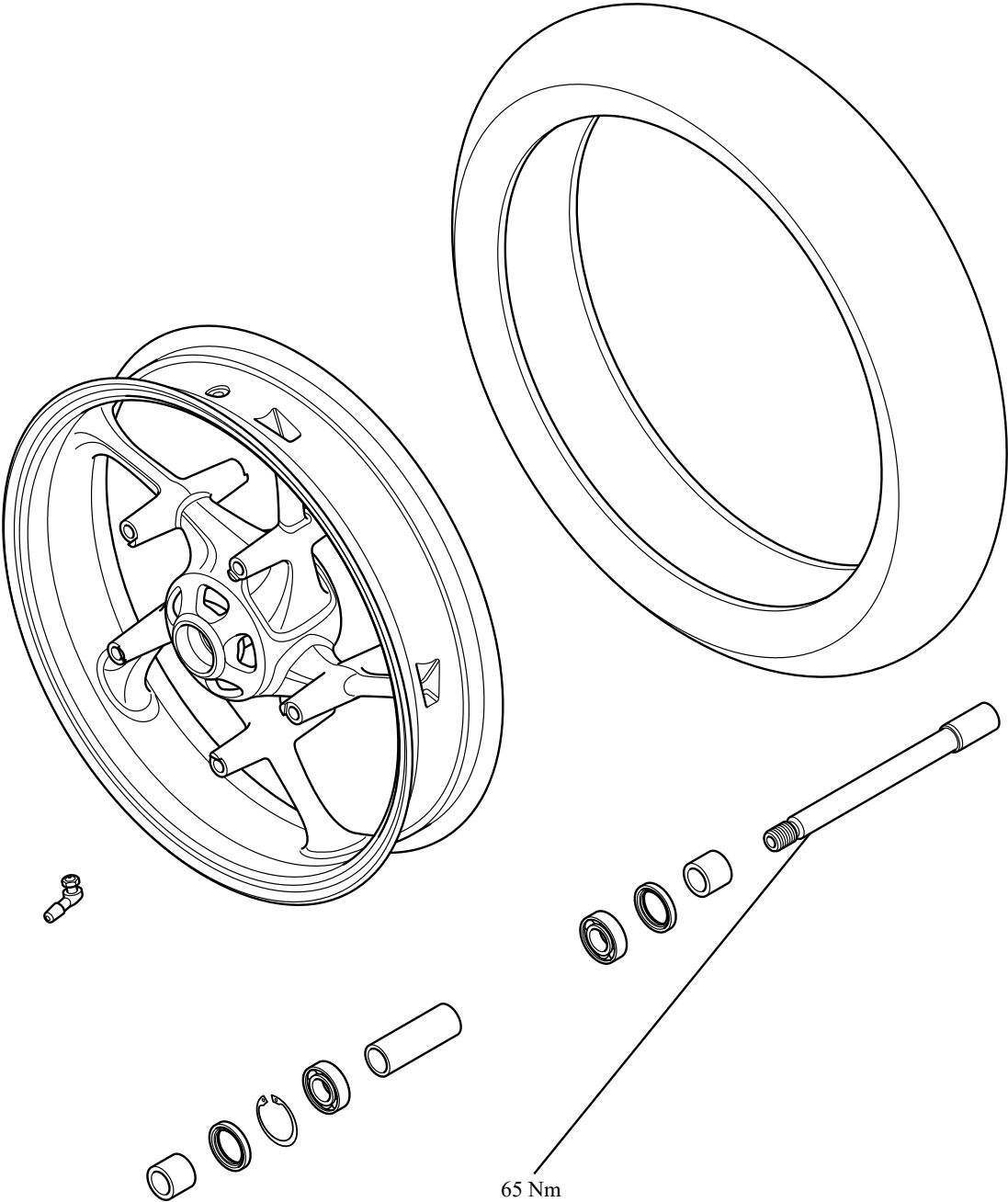
ABS Hydraulic Circuit Layout



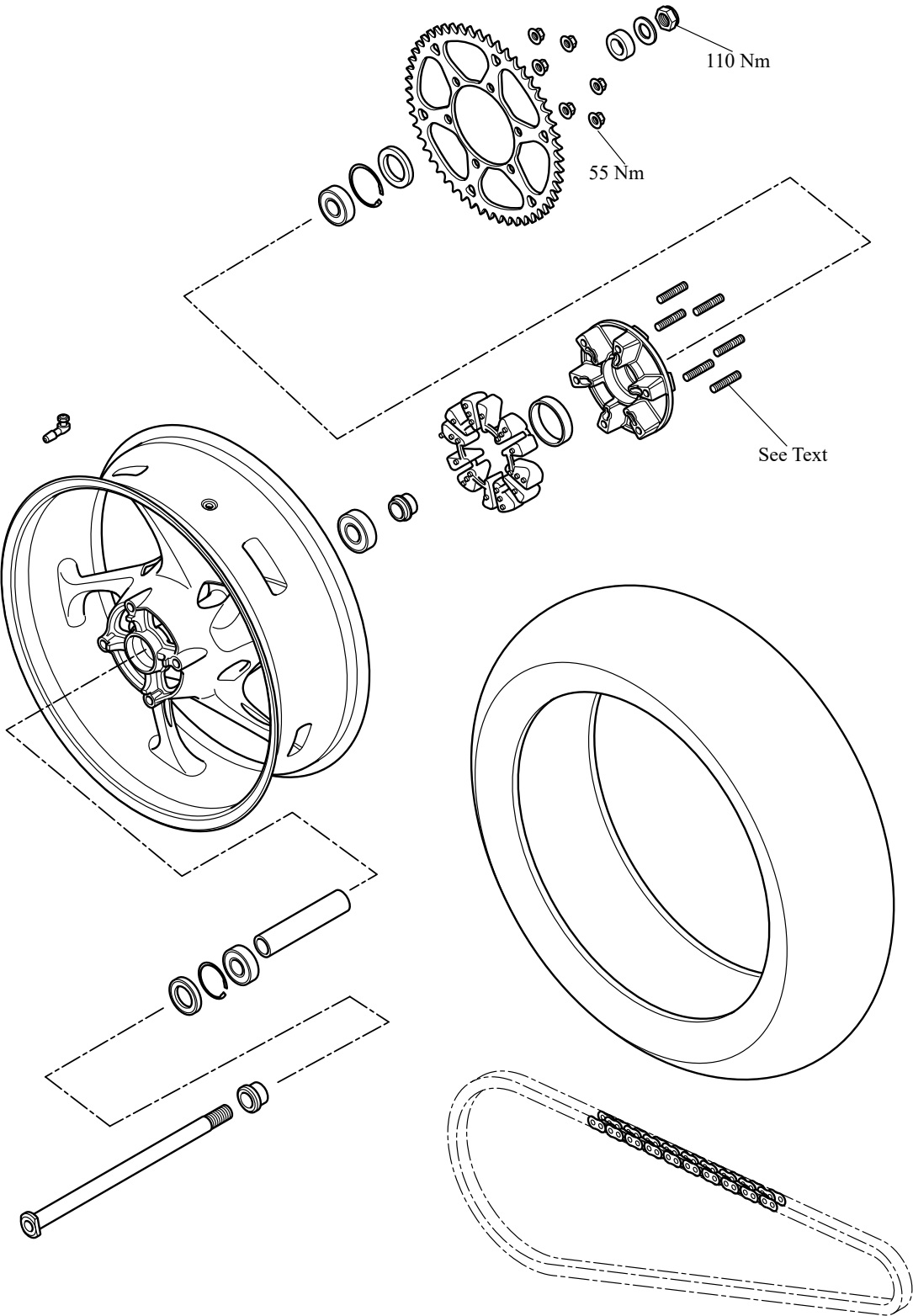
	A. Front Brake Circuit from Master Cylinder to ABS Modulator
	B. Front Brake Circuit from ABS Modulator to Front Calipers
	C. Rear Brake Circuit from Master Cylinder to ABS Modulator
	D. Rear Brake Circuit from ABS Modulator to Rear Caliper
	E. ABS Modulator

Wheels and Tyres

Exploded View - Front Wheel



Exploded View - Rear Wheel



Tyres

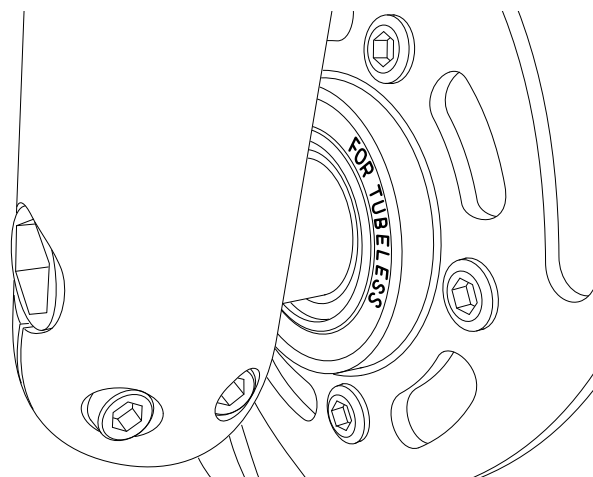
This model is fitted with tubeless tyres, valves and wheel rims. Use only tyres marked 'TUBELESS' and tubeless valves on rims marked 'SUITABLE FOR TUBELESS TYRES'.

⚠ WARNING

Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing rapid tyre deflation that may result in a loss of vehicle control and an accident. Never install an inner tube inside a tubeless tyre. This will cause friction inside the tyre and the resulting heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.



Typical Tyre Marking -Tubeless Tyre



Typical Wheel Marking -Tubeless Tyre

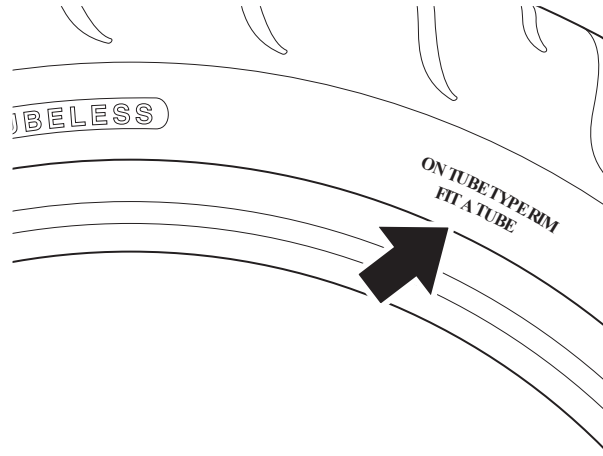
⚠ WARNING



Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE TYPE'.

Some brands of approved tyres marked 'TUBELESS' may be suitable for use with an inner tube. Where this is the case, the tyre wall will be marked with text permitting the fitment of an inner tube (see illustration below).

Use of an inner tube with a tyre marked 'TUBELESS', and NOT marked as suitable for use with an inner tube, or use of an inner tube on an alloy wheel marked 'SUITABLE FOR TUBELESS TYRES' will cause deflation of the tyre resulting in loss of motorcycle control and an accident.



Typical Tyre Marking - Tubeless Tyre Suitable For Use With An Inner Tube

Tyre Inflation Pressures

WARNING



Incorrect tyre inflation will cause abnormal tread wear and instability problems that may lead to loss of control and an accident.

Under inflation may result in the tyre slipping on, or coming off the rim. Overinflation will cause instability and accelerated tread wear.

Both conditions are dangerous as they may cause loss of control leading to an accident.

WARNING



Tyre pressures which have been reduced for off-road riding will impair on-road stability.

Always make sure that the tyre pressures are set as described in the Specification section for on-road use.

Operation of the motorcycle with incorrect tyre pressures may cause loss of motorcycle control and an accident.

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. See the Specification section for details of the correct inflation pressures.

Tyre Wear/Wheel Inspection

⚠ WARNING

Operation with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control and an accident.

When tubeless tyres, used without a tube, become punctured, leakage is often very slow. Always inspect tyres very closely for punctures. Check the tyres for cuts, embedded nails or other sharp objects. Operation with punctured or damaged tyres will adversely affect motorcycle stability and handling which may lead to loss of control or an accident.

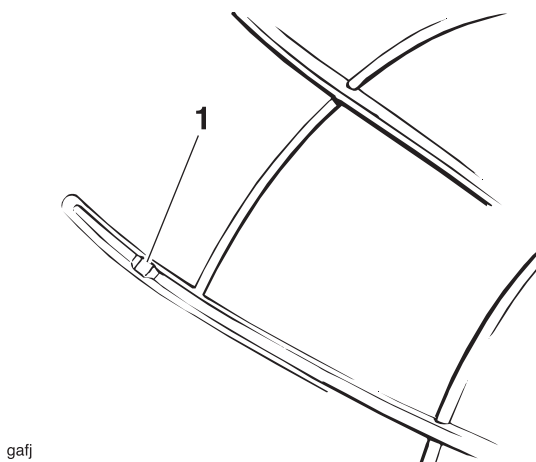
Check the rims for dents or deformation. Operation with damaged or defective wheels or tyres is dangerous and loss of motorcycle control or an accident could result.

Always consult your authorised Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

Tyre Wear

As the tyre tread wears down, the tyre becomes more susceptible to puncture and failure. It is estimated that 90% of all tyre failures occur during the last 10% of tread life (90% worn). It is false economy and unsafe to use tyres until they are worn to their minimum.

All tyres are fitted with tread wear indicators. When the tyre becomes worn down as far as the top of a tread wear indicator, the tyre is worn beyond its service life and must be replaced.



1. Tread wear indicator

Attention must also be paid to the legal limits for tread wear, which differ from country to country. Tyres that have worn to the legal limit in the country or region in which the motorcycle is operated must be replaced, even if tread wear has not yet reached the level of the tread wear indicators.

In accordance with the scheduled maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum allowable tread depth.

Mud and Snow/Dual Purpose Tyres (if fitted)

The use of mud and snow/dual purpose tyres may result in reduced motorcycle stability. If the stability or handling characteristics of the motorcycle (with the mud and snow/dual purpose tyres fitted) begins to change adversely, then check the tyre tread depth. It is recommended that mud and snow/dual purpose tyres are replaced earlier than normal tyres and before they are worn near to the minimum allowable tread depth, see <https://www.triumphmotorcycles.co.uk/owners/your-triumph#tyres>.

Wheel Inspection

Inspect wheels for cracks, splits and kerb damage. Always replace wheels that are suspected of having become damaged.

Minimum Recommended Tread Depth

 **WARNING**



Riding with excessively worn tyres is hazardous and will adversely affect traction, stability and handling which may lead to loss of control and an accident.

When tubeless tyres, used without a tube, become punctured, leakage is often very slow. Always inspect tyres very closely for punctures. Check the tyres for cuts, embedded nails or other sharp objects. Riding with punctured or damaged tyres will adversely affect motorcycle stability and handling which may lead to loss of control or an accident.

Check the rims for dents or deformation. Riding with damaged or defective wheels or tyres is dangerous and may lead to loss of control and an accident.

Always consult your authorised Triumph dealer for tyre replacement, or for a safety inspection of the tyres.

In accordance with the periodic maintenance chart, measure the depth of the tread with a depth gauge, and replace any tyre that has worn to, or beyond the minimum allowable tread depth specified in the table below:

Under 80 mph (130 km/h)	2 mm (0.08 in)
Over 80 mph (130 km/h)	Front 2 mm (0.08 in) Rear 3 mm (0.12 in)

Important Tyre Information

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the internet at www.triumph.co.uk.

WARNING

The ABS computer operates by comparing the relative speed of the front and rear wheels. Use of non-recommended tyres can affect wheel speed and cause the ABS function not to operate, potentially leading to loss of motorcycle control and an accident in conditions where the ABS would normally function.

WARNING

Always check tyre pressures before riding when the tyres are cold. Operation with incorrectly inflated tyres may affect handling leading to loss of control and an accident.

WARNING

Operation with excessively worn or damaged tyres will adversely affect handling and control leading to loss of control or an accident.

WARNING

Inner tubes must only be used on motorcycles fitted with spoked wheels and with tyres marked 'TUBE-TYPE' unless marked otherwise.

Use of an inner tube with a tyre marked 'TUBELESS' without appropriate marking and/or on an alloy wheel can lead to loss of motorcycle control and an accident.

All Triumph motorcycles are carefully and extensively tested in a range of riding conditions to ensure that the most effective tyre combinations are approved for use on each model. It is essential that approved tyre combinations are used when purchasing replacement tyres as the use of non-approved tyres or approved tyres in non-approved combinations may lead to motorcycle instability. A list of approved tyres specific to this model is available from your authorised Triumph dealer, or on the internet at www.triumph.co.uk.

WARNING

If a tyre or inner tube sustains a puncture, the tyre and inner tube must be replaced together. Failure to replace a punctured tyre and inner tube together, or operation with a repaired tyre or inner tube can lead to instability, loss of motorcycle control or an accident.

If tyre or inner tube damage is suspected, such as after striking the kerb, ask your authorised Triumph dealer to inspect the tyre both internally and externally and to also inspect the inner tube. Remember, tyre damage may not always be visible from the outside. Operation of the motorcycle with damaged tyres could lead to loss of motorcycle control and an accident.

When replacing a 'TUBE-TYPE' tyre on a spoked wheel, always inspect the rim tape (rim protection band) to ensure that it is correctly protecting the tube from the spoke threads. A damaged rim tape may lead to rapid tyre deflation causing loss of control and an accident.

⚠ WARNING



Do not install tube-type tyres on tubeless rims. The bead will not seat and the tyres could slip on the rims, causing tyre deflation that may result in a loss of motorcycle control and an accident.

Do not install an inner tube inside a tubeless tyre unless it is clearly marked on the side wall that you can do so. This may cause instability and excessive heat build-up may cause the tube to burst resulting in rapid tyre deflation, loss of vehicle control and an accident.

⚠ WARNING



The use of tyres other than those listed at your authorised Triumph dealer, or on the internet, at www.triumph.co.uk, may adversely affect handling leading to loss of motorcycle control or an accident. Use the recommended tyre options only in the combinations listed at your authorised Triumph dealer, or on the internet at www.triumph.co.uk. Do not mix tyres from different manufacturers or tyres from the same manufacturer but from another option.

⚠ WARNING



Accurate wheel balance is important for safe, stable handling of the motorcycle. Do not remove or change any wheel balance weights. Incorrect wheel balance may cause instability leading to loss of motorcycle control and an accident.

When wheel balancing is required, such as after tyre replacement, see your authorised Triumph dealer.

Only use self-adhesive weights. Clip-on weights will damage the wheel and tyre potentially resulting in tyre deflation, loss of motorcycle control and an accident.

⚠ WARNING



When replacement tyres are required, consult your authorised Triumph dealer who will arrange for the tyres to be fitted according to the tyre manufacturer's instructions.

When tyres are replaced, allow time for the tyre to seat itself to the rim (approximately 24 hours). During this seating period, ride cautiously as an incorrectly seated tyre could cause loss of motorcycle control or an accident. Initially, the new tyre will not produce the same handling characteristics as the worn tyre and the rider must allow adequate riding distance (approximately 100 miles/160 km) to become accustomed to the new handling characteristics.

After both 24 hours and 100 miles (160 km), the tyre pressures should be checked and adjusted and the tyre examined for correct seating and rectified as necessary.

Use of a motorcycle when not accustomed to its handling characteristics, with incorrect tyre pressures or an incorrectly seated tyre is dangerous and may lead to loss of motorcycle control and an accident.

Front Wheel - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Remove the front wheel speed sensor (see [Front ABS Wheel Speed Sensor - Removal](#)).
2. Detach and support the front brake calipers (see [Front Brake Caliper - Removal](#)).

NOTICE

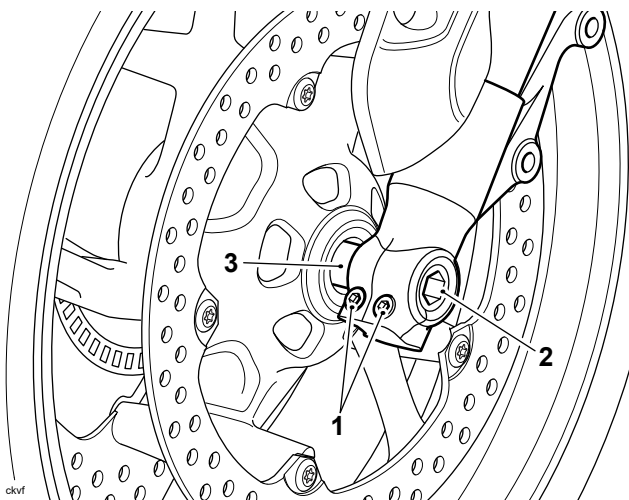
It is not necessary to disconnect the brake hoses.

⚠ WARNING

Do not allow the calipers to hang on the brake hoses as this may damage the hoses.

Damaged hoses could cause brake failure leading to loss of control and an accident.

3. Raise and support the front of the motorcycle.
4. Loosen both pinch bolts at the lower end of the left hand fork.
5. Release and remove the wheel spindle.
6. Remove the wheel and the wheel spacers.



1. Fork pinch bolts
2. Wheel spindle
3. Wheel spacers (left hand shown)

7. Place the wheel on wooden blocks.

⚠ WARNING



Do not allow the wheel to rest on either brake disc as this may damage the disc and could lead to an accident.

⚠ CAUTION



To prevent wheel and bearing damage, observe absolute cleanliness and ensure there is no dirt ingress to the wheel bearings while the wheel is removed.

8. Thoroughly clean all components and inspect for wear or damage.

Front Wheel - Inspection

1. Check the wheel bearings spin smoothly with no signs of play. If not, renew the bearings (see [Front Wheel Bearings - Removal](#)).

Front Wheel - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

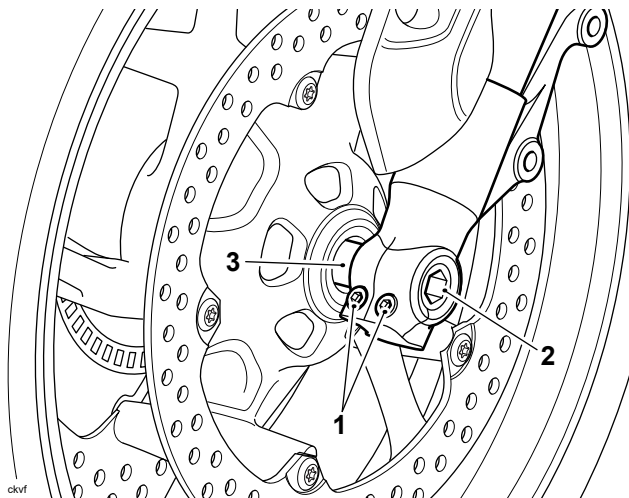
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Lightly smear the wheel spacers with grease and locate in the hubs.
2. Position the wheel between the forks ensuring the spacers remain in position on both sides.
3. Refit the wheel spindle from the left hand side and tighten to 65 Nm.
4. Lower the motorcycle to the ground and position the front wheel up against a fixed surface. Bounce the front suspension numerous times to allow the left hand fork to float to its natural position on the wheel spindle.

NOTICE

Do not lean on the motorcycle or compress the front suspension prior to tightening the fork pinch bolts.

5. Tighten the fork pinch bolts to 22 Nm.



1. Fork pinch bolts
2. Wheel spindle
3. Wheel spacers (left hand shown)

6. Thoroughly clean and degrease the brake discs.
7. Refit the front brake calipers (see [Front Brake Caliper - Installation](#)).
8. Refit the front wheel speed sensor (see [Front ABS Wheel Speed Sensor - Installation](#)).

Rear Wheel - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

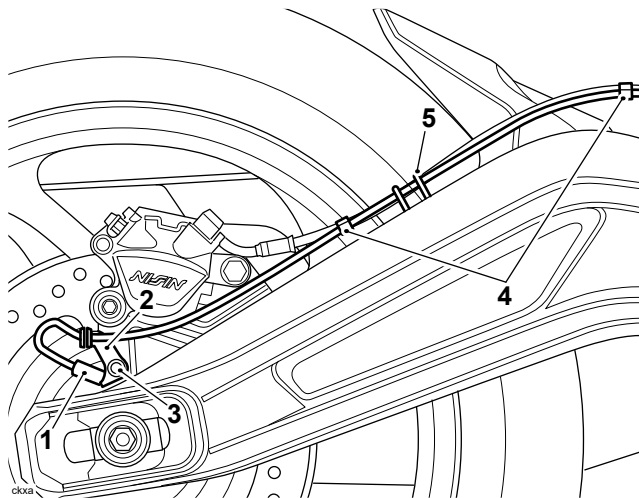
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

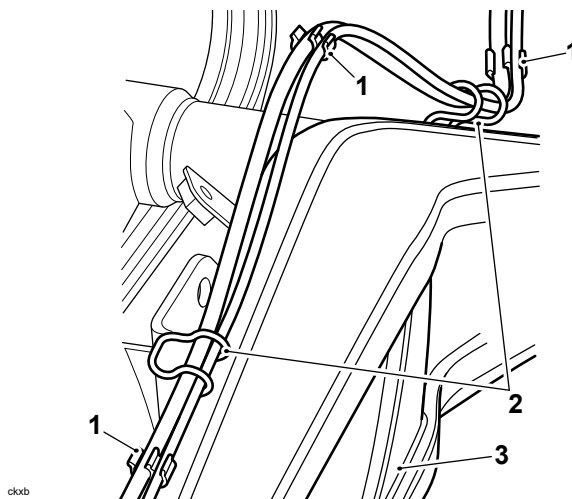
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Mudguard - Removal](#)

1. Remove the fixing and remove the rear wheel speed sensor and bracket and position to one side, noting the routing for installation.



1. Rear wheel speed sensor
2. Bracket
3. Fixing
4. Clips
5. Wire guide



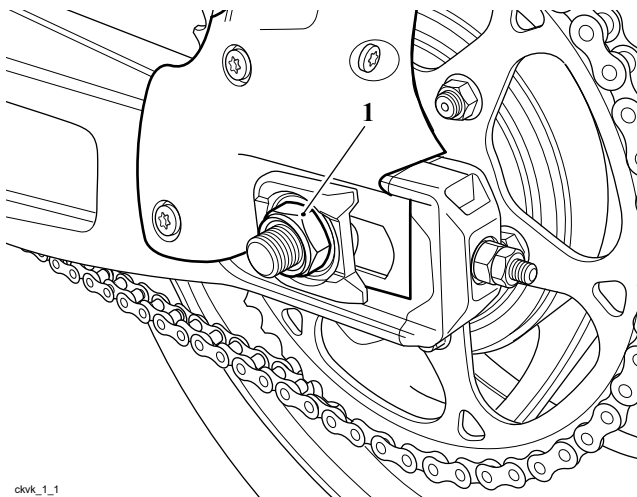
- 1. Clips
- 2. Wire guides
- 3. Swinging arm

2. 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.

3. Remove the nut from the rear wheel spindle.



- 1. Rear wheel spindle nut

4. Support the wheel and withdraw the wheel spindle.

⚠ WARNING

Do not allow the caliper to hang on the brake hose as this may damage the hose.

Damaged hoses could cause brake failure leading to loss of control and an accident.

5. Noting its position, release the brake caliper and carrier from the slot on the swinging arm and roll the wheel forward until the chain can be detached from the rear sprocket.

6. Tie the rear brake caliper aside.

7. Withdraw the wheel and collect the flanged spacer from the right hand side and the plain spacer from the left hand side.
8. Place the wheel on wooden blocks with the drive sprocket uppermost.
9. If required, remove the final drive (see [Final Drive - Removal](#)).
10. Reposition the wheel on wooden blocks with the rear brake disc uppermost.
11. If required, remove the rear brake disc (see [Rear Brake Disc - Removal](#)).

Rear Wheel - Inspection

1. Check the wheel bearings spin smoothly with no signs of play. If not, renew the bearings (see [Rear Wheel Bearing - Removal](#)).

Rear Wheel - Installation

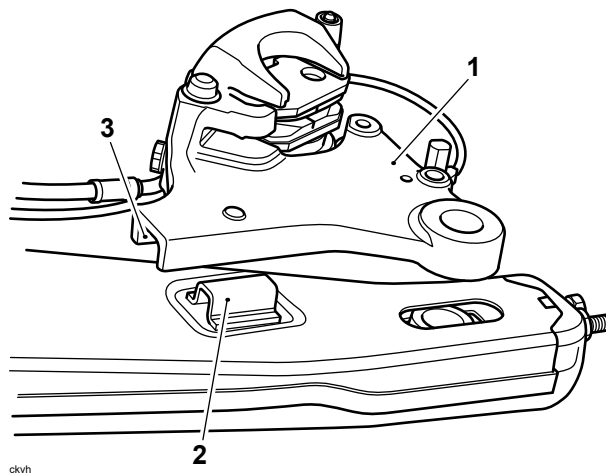
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

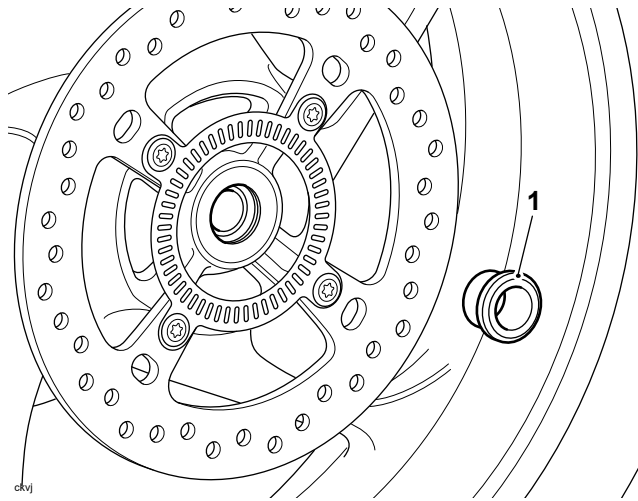
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Thoroughly clean and degrease the brake disc.
2. If removed, refit the brake disc (see [Rear Brake Disc - Installation](#)).
3. Refit the final drive assembly (see [Final Drive - Installation](#)).
4. Position the wheel within the swinging arm and refit the chain to the final drive sprocket.
5. Position the rear brake caliper and carrier to the swinging arm as noted prior to removal. Align the groove in the carrier with the boss on the swinging arm.



1. Caliper carrier, wheel shown removed for clarity
2. Swinging arm slot
3. Caliper carrier groove

6. Refit the wheel spacers, flanged spacer to the right hand side (flange facing outwards) and plain spacer to the left.



1. Wheel spacer (right hand shown)

7. Lift the rear wheel into position, aligning the wheel, caliper carrier and swinging arm.

⚠ WARNING

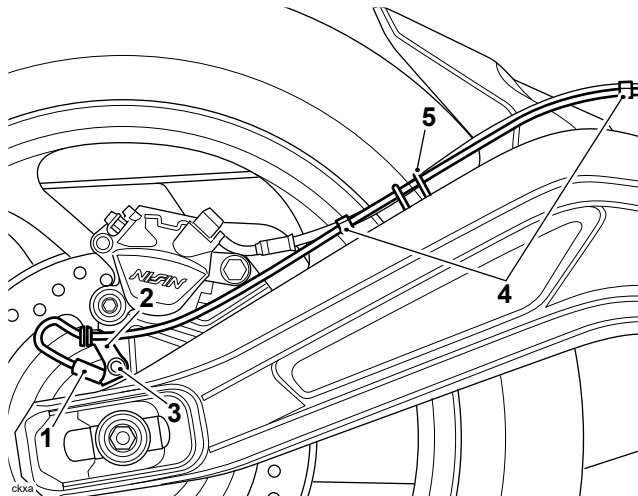
Check that the spacers are still correctly positioned. Incorrectly fitted wheel spacers will cause a dangerous riding condition leading to loss of motorcycle control and an accident.

NOTICE

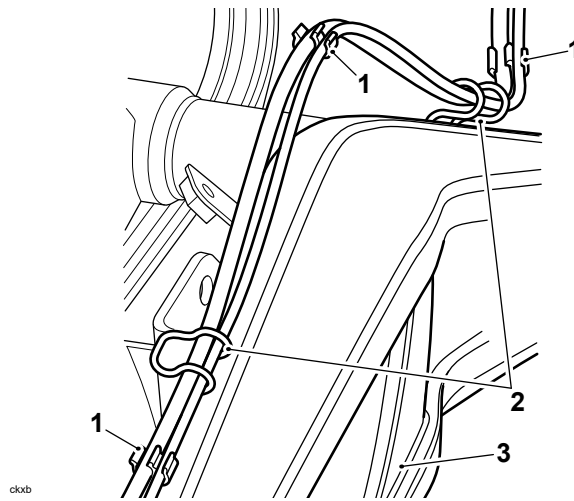
The fitting and tightening of the wheel spindle nut is included in the Rear Mudguard - Installation section.

8. Fit the wheel spindle with the threaded end facing to the left.

9. Refit the rear wheel speed sensor and bracket with the fixing, routing the harness as noted during removal. Tighten the fixing to 9 Nm.



- 1. Rear wheel speed sensor
- 2. Bracket
- 3. Fixing
- 4. Clips
- 5. Wire guide



1. Clips
2. Wire guides
3. Swinging arm

Perform the following operations:

- [Rear Mudguard - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Front Wheel Bearings - Removal

Perform the following operations:

- **Front Wheel - Removal**

⚠ CAUTION

Do not allow the wheel to rest on the brake discs, as this may damage the discs. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake discs are raised above the ground.

1. Place the wheel on wooden blocks to prevent damage to the brake discs.
2. Remove and discard the seals and the bearing circlip.

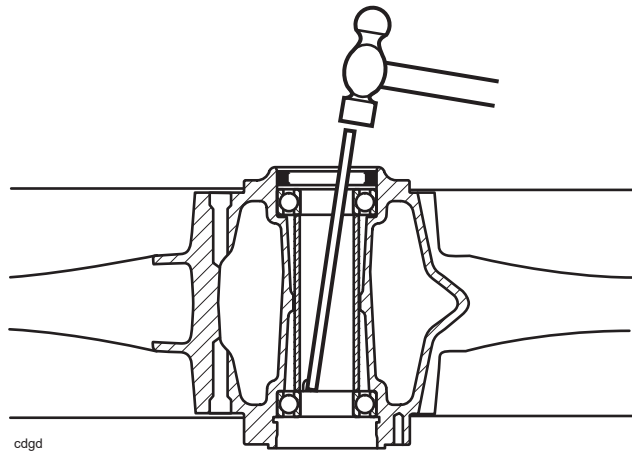
⚠ WARNING

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.

3. Using a suitable pin punch, through the centre of the wheel, drift out the wheel bearings. Collect the centre sleeve.



Wheel Bearing Removal

Rear Wheel Bearing - Removal

Perform the following operations:

- **Rear Wheel - Removal**

⚠ CAUTION

Do not allow the wheel to rest on the brake disc, as this may damage the disc. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake disc is raised above the ground.

1. Place the wheel on wooden blocks to prevent damage to the brake disc.
2. Remove and discard the seals and the bearing circlip.

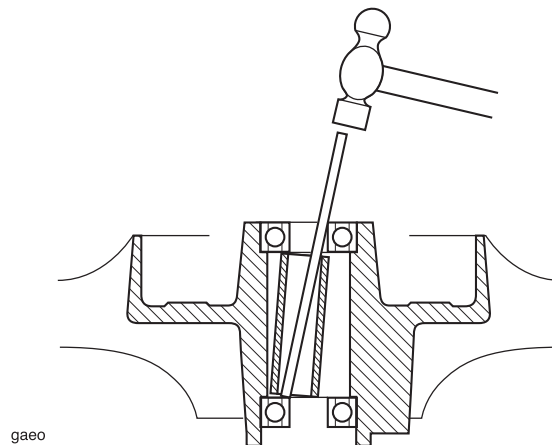
⚠ WARNING

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.

3. Using a suitable pin punch, through the centre of the wheel, drift out the wheel bearings. Collect the centre sleeve.



Rear Wheel Bearing Removal

Wheel Bearings - Inspection

1. Check the wheel bearings spin smoothly with no signs of play. If not, renew the bearings.

Front Wheel Bearing - Installation

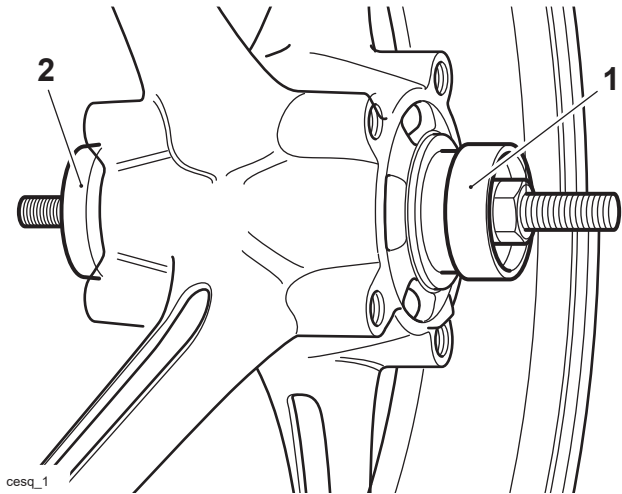
NOTICE

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	service tool T3880053 Small face to bearing	service tool T3880065 Large face to wheel
Right bearing	service tool T3880053 Small face to bearing	service tool T3880065 Large face to wheel

1. Fit the wheel bearings and centre sleeve using the method described above.



1. T3880053 - Wheel Bearing Extraction Kit

2. T3880065 - Bearing Installer

2. Fit a new circlip.
3. Lubricate and fit new seals to the front wheel. Lubricate the seal's knife-edge with grease to NLGI 2 specification.
- Perform the following operations:

- [Front Wheel - Installation](#)

Rear Wheel Bearing - Installation

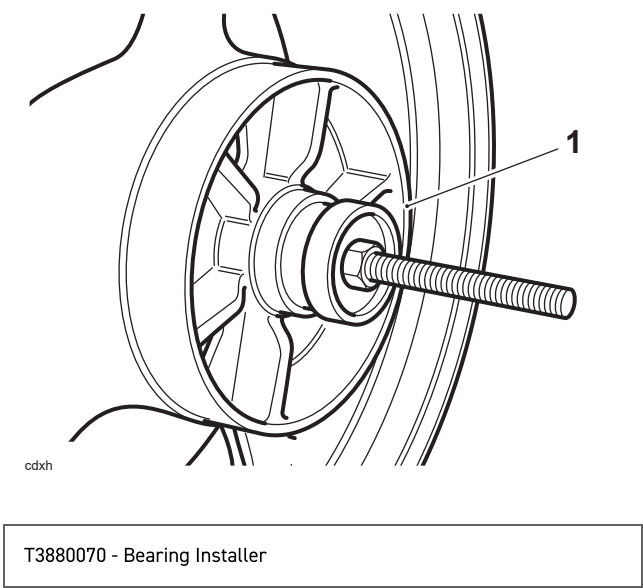
NOTICE

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	service tool T3880070 Small face to bearing	service tool T3880065 Large face to wheel
Right bearing	service tool T3880070 Small face to bearing	service tool T3880065 Large face to wheel

1. Fit the wheel bearings and centre sleeve using the method described above.

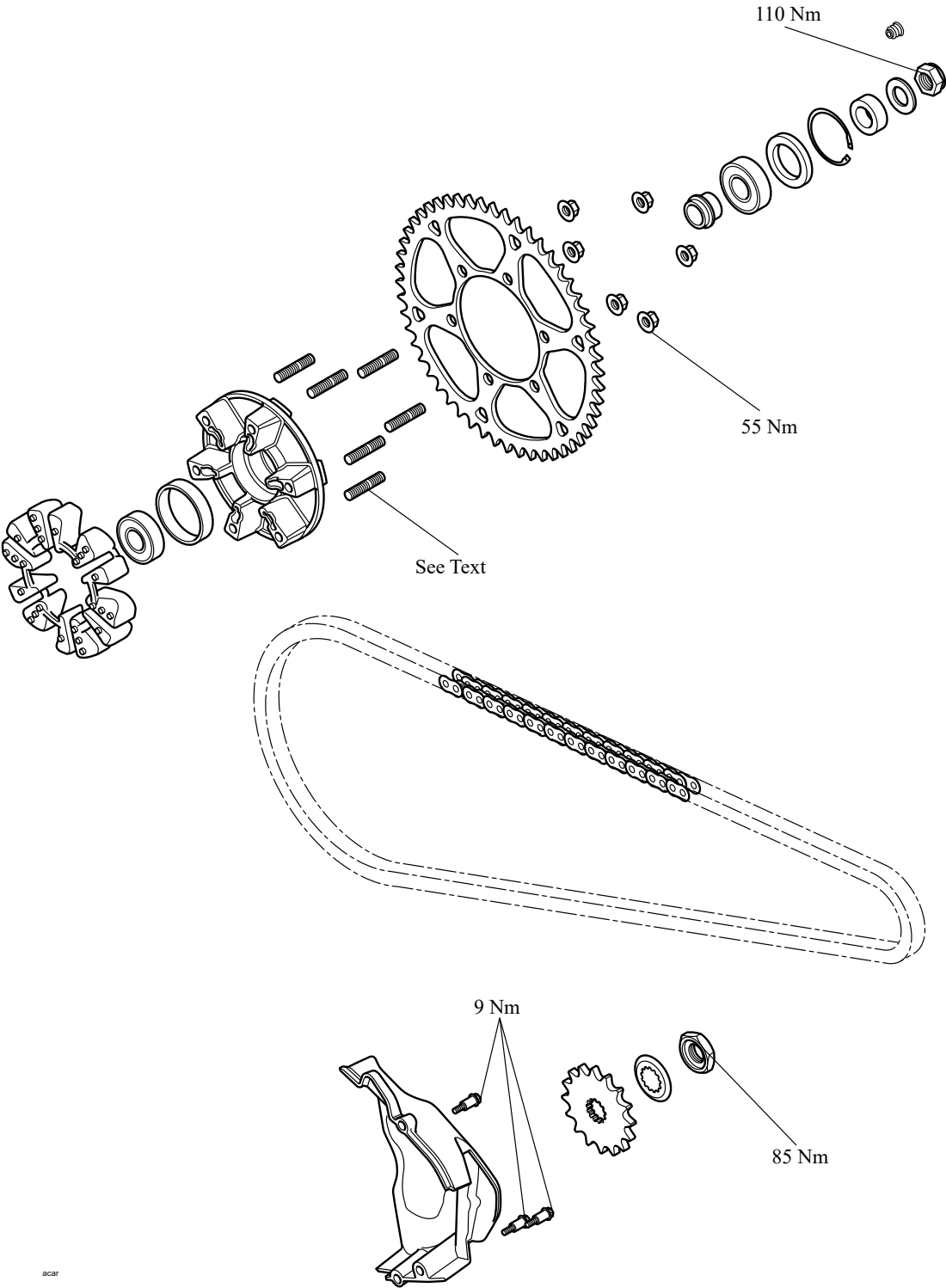


- 2. Fit a new circlip.
 - 3. Lubricate and fit new seals to the rear wheel. Lubricate the seal's knife-edge with grease to NLGI 2 specification.
- Perform the following operations:

- [Rear Wheel - Installation](#)

Final Drive

Exploded View - Final Drive



Final Drive Chain

For safety and to prevent excessive wear, the drive chain must be checked, adjusted and lubricated in accordance with scheduled maintenance requirements. Checking, adjustment and lubrication must be carried out more frequently for extreme conditions such as salty or heavily gritted roads.

If the drive chain is badly worn or incorrectly adjusted (either too loose or too tight) the drive chain could jump off the sprockets or break.

WARNING



A drive chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing an accident. Never neglect chain maintenance.

NOTICE



Lubrication of the drive chain should ideally be carried out with the motorcycle set up so that the rear wheel is free to rotate.

The drive chain must be adjusted with the motorcycle in an upright position, resting on its wheels, and with no additional weight on it.

Drive Chain Replacement

Rivet link type

Removal of the swinging arm is not required for drive chain replacement, the drive chain can be split for removal from the motorcycle. The following instructions for the replacement of rivet link type drive chains requires the use of service tool T3880027.

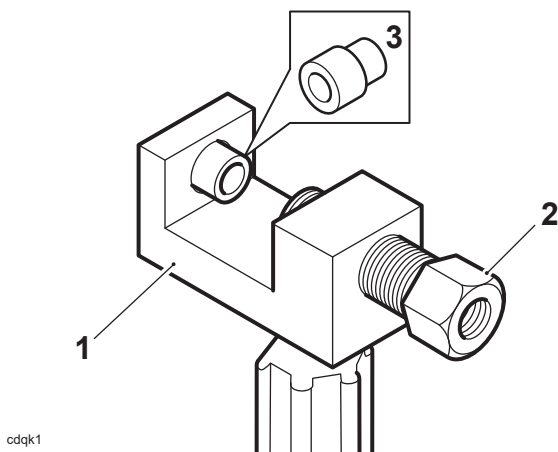
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

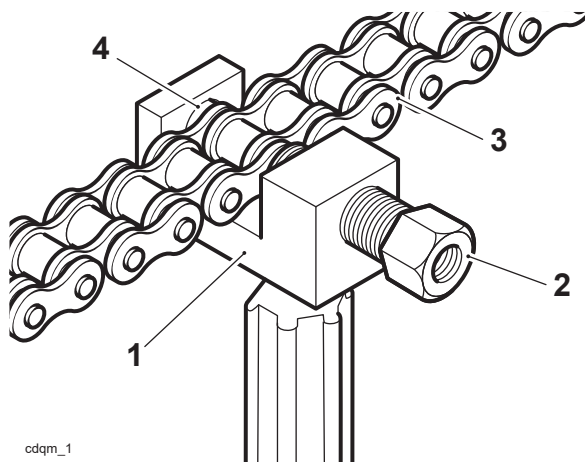
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Support the motorcycle on a stand so the rear wheel is clear of the ground.
2. Insert the hollow chain cutting tail piece into the tool body so its larger diameter end is facing towards the large pressure screw as shown.



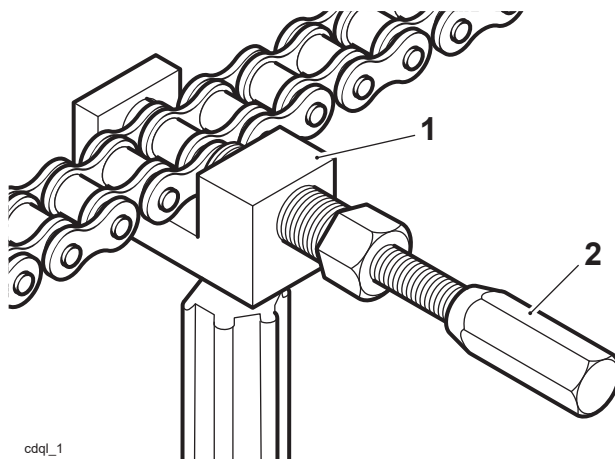
1. T3880027 - Chain Link Tool Kit
2. Large pressure screw
3. Chain cutting tail piece

3. Position the chain to the tool ensuring that the chain link pin which is to be removed is aligned with the holes in the chain cutting tail piece and the large pressure screw. Tighten the large pressure screw by hand to grip the chain.



- 1. T3880027 - Chain Link Tool Kit
- 2. Large pressure screw
- 3. Chain
- 4. Chain cutting tail piece

4. Insert the small pressure screw into the larger pressure screw as shown below, until the cutting pin on the small pressure screw contacts the link pin. Ensure that the cutting pin is centralised on the link pin to be removed.



- 1. T3880027 - Chain Link Tool Kit
- 2. Small pressure screw

- 5. Retain the tool body then tighten the small pressure screw until the link pin is pressed out from the chain.
- 6. Repeat steps 3 to 5 on the remaining chain link pin.
- 7. Remove the tool and separate the two ends of the chain.
- 8. Remove the chain cutting tail piece from the body.

⚠ CAUTION

The replacement chain is supplied in a split condition, complete with a link kit to join the two ends.

⚠ CAUTION

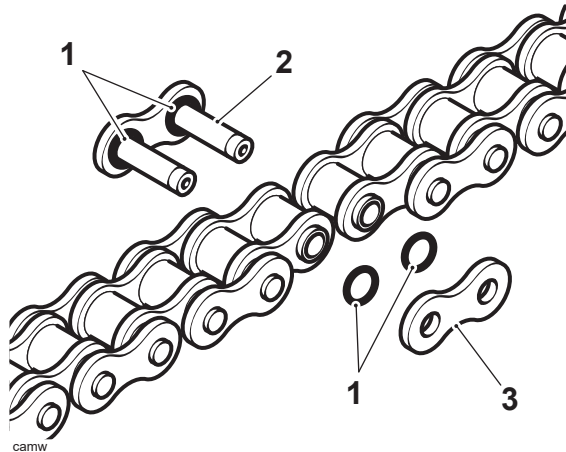
The component parts of the new link kit are coated with a special grease which must not be removed. Removal of this special grease will severely reduce the service life of the chain.

9. Use the old drive chain to pull the new chain into position as follows: Temporarily attach the end of the new chain to a free end of the old chain using the old connector link. Carefully pull the other end of the old chain to pull the new chain around the sprockets.

⚠ CAUTION

Do not use the new connector link as the special grease on it may be removed.

10. Using the new link supplied with the chain kit, join the two ends of the chain. Ensure that the O-rings are positioned as shown below and the link plate is fitted with its markings facing outwards.



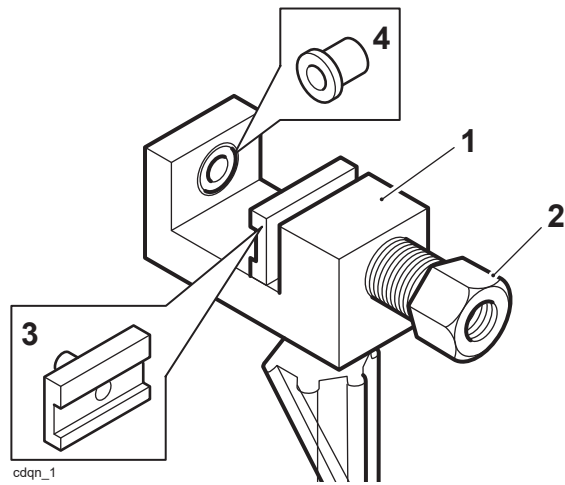
- 1. O-rings
- 2. Link
- 3. Link plate

11. Insert the riveting tail piece into the tool body so its larger diameter end is facing towards the large pressure screw as shown.

⚠ CAUTION

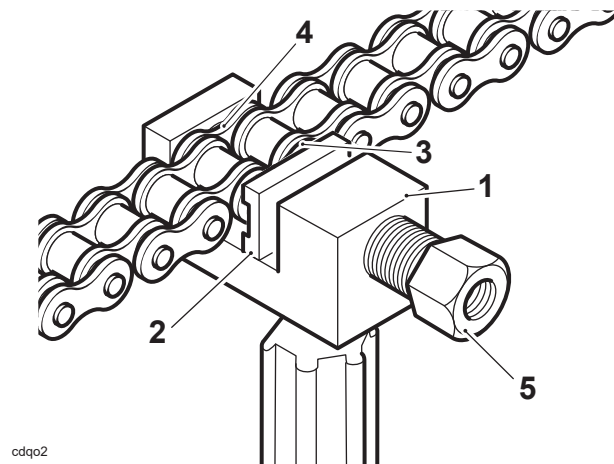
The service tool T3880027 includes two link plate holders, one is for riveted link plates (marked PH5060R), the other is for link plates retained by a spring clip (marked PH4060C). The holder for riveted link plates has a shallow groove to allow for chain link clearance, the holder for clipped link plates has a deep groove to allow for chain link clearance.

12. Insert the link plate holder (marked PH5060R) into the large pressure screw.



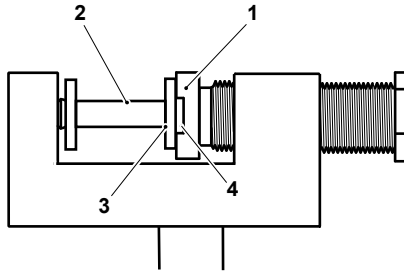
- 1. Tool body
- 2. Large pressure screw
- 3. Link plate holder (marked PH5060R)
- 4. Riveting tail piece

13. Position the tool to the chain. Ensure the link plate holder is correctly located in the large pressure screw.



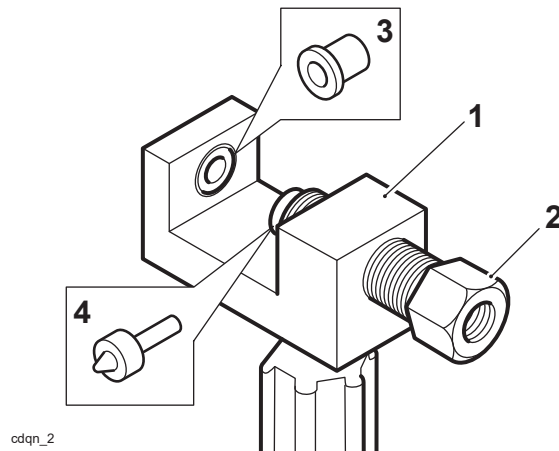
- 1. Tool body
- 2. Link plate holder (marked PH5060R)
- 3. Link plate
- 4. Link
- 5. Large pressure screw

14. Locate the split link pins such that the pins will enter the groove in the link plate holder when the link plate is pressed on to the link.



1. Link plate holder
2. Link plate
3. Chain link
4. Link plate holder groove

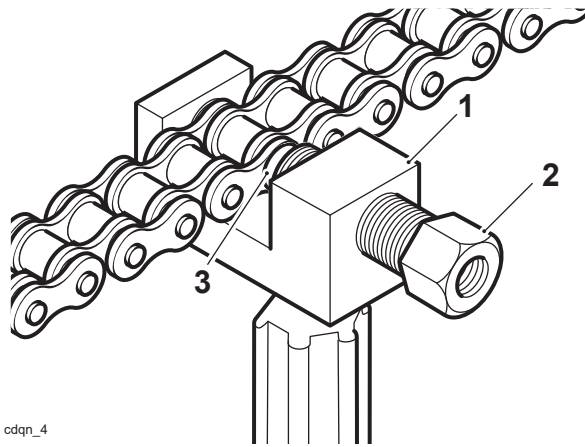
15. Retain the tool body and tighten the large pressure screw until the link plate is pressed fully onto the link.
16. Back off the pressure screw, slide the tool assembly to one side and check that the split link is correctly assembled.
17. Remove the link plate holder from the tool. Do not remove the riveting tail piece from the tool
18. Insert the flare pin into the large pressure screw.



cdqgn_2

1. Tool body
2. Large pressure screw
3. Riveting tail piece
4. Flair pin

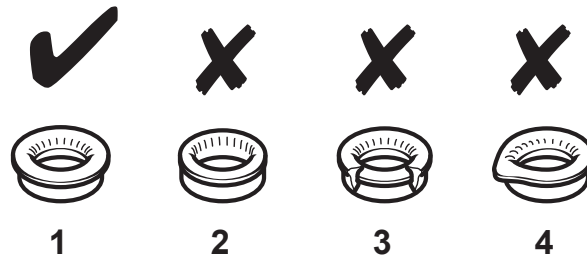
19. Locate one of the split link pins into the riveting tail piece and screw the large pressure screw in until the flare pin contacts the split link end. Ensure the split link pin is centrally located on the flare pin.
20. Retain the tool body and tighten the large pressure screw until the split link end is riveted-over.



cdqpn_4

- 1. Tool body
- 2. Large pressure screw
- 3. Flare pin

21. Back off the large pressure screw and rivet the remaining split link pin as described above.
22. Remove the tool from the chain and check that both the split link pins are correctly riveted as shown below.



cana

- 1. Correct riveting
- 2. Insufficient riveting
- 3. Excessive riveting
- 4. Riveting off-centre

⚠ WARNING



If either split link pin is not correctly riveted, the split link must be removed and replaced with a new link. Never operate the motorcycle with an incorrectly riveted split link as the link could fail resulting in an unsafe riding condition leading to loss of control and an accident.

Front Sprocket - Removal

⚠ WARNING

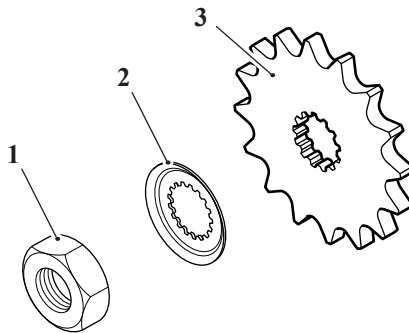
Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- Position the motorcycle on the side stand.
- **Front Sprocket Cover - Removal**
 1. Bend back the front sprocket lock washer.
 2. Have an assistant sit on the motorcycle, select sixth gear and apply the front and rear brakes hard.
 3. Loosen the front sprocket nut.



- 1. Nut
- 2. Lock washer
- 3. Front sprocket

4. Remove the front sprocket nut and discard the lock washer.
5. Set the drive chain adjustment to allow maximum free play in the drive chain.

NOTICE

Note the orientation of the front sprocket for installation.

6. Disengage the front sprocket from the drive chain and slide it off the output shaft.

Front Sprocket - Installation

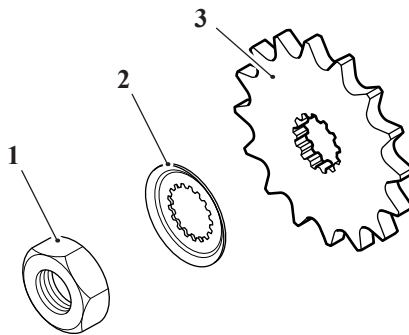
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the front sprocket, as noted during removal, and engage it with the drive chain.
2. Fit a new lock washer engaging it with the output shaft splines, and fit the sprocket nut hand tight.



1. Nut
2. Lock washer
3. Front sprocket

3. Have an assistant sit on the motorcycle, select sixth gear and apply the front and rear brakes hard.
 4. Tighten the front sprocket nut to 85 Nm.
 5. Secure the front sprocket nut in position by bending the lock washer down to contact one of the nut flats.
- Perform the following operations:

- [Drive Chain Free Movement - Adjustment](#)
- [Front Sprocket Cover - Installation](#)

Final Drive - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

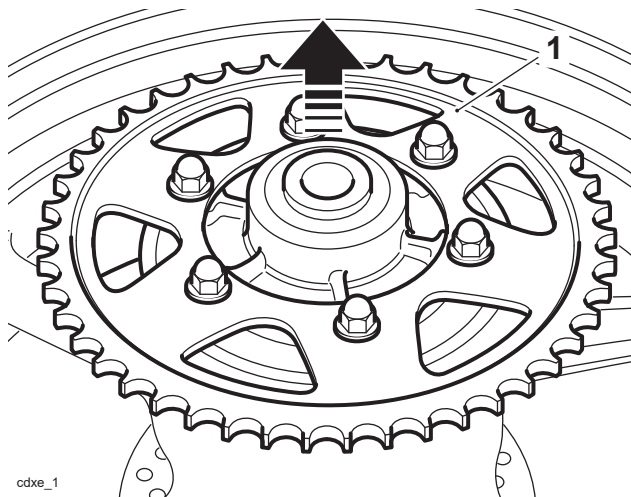
Perform the following operations:

- **Rear Wheel - Removal**

⚠ CAUTION

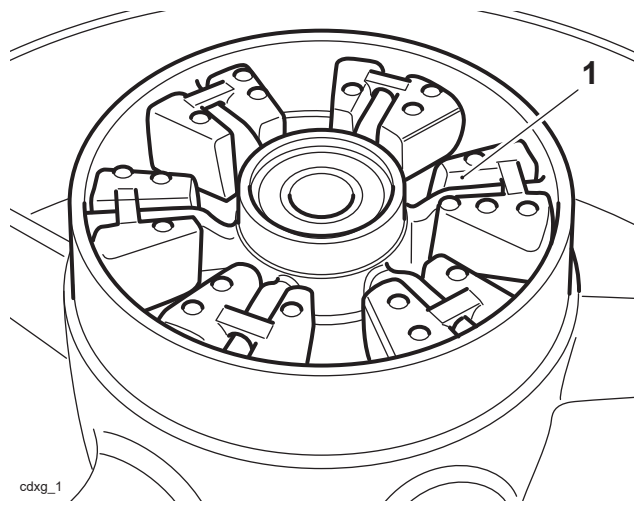
Do not allow the wheel to rest on the brake disc, as this may damage the disc. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake disc is raised above the ground.

1. Place the wheel on wooden blocks with the drive sprocket uppermost.
2. Gently lever the drive flange from the wheel hub.



1. Drive flange

3. Remove the cush drive rubbers.



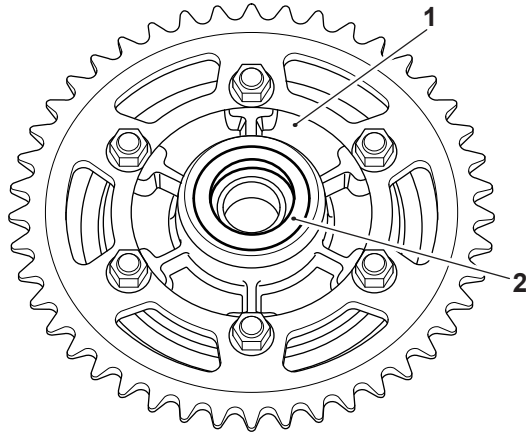
1. Cush drive

Rear Sprocket Carrier Bearings - Disassembly

Perform the following operations:

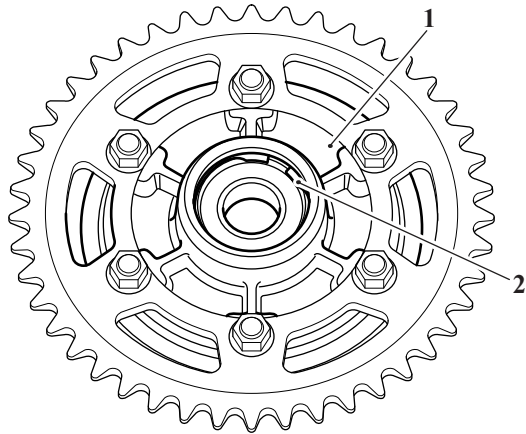
- **Final Drive - Removal**

1. Remove and discard the seal.



- | |
|--------------------------------|
| 1. Sprocket carrier
2. Seal |
|--------------------------------|

2. Remove and discard the bearing circlip.



- | |
|-----------------------------------|
| 1. Sprocket carrier
2. Circlip |
|-----------------------------------|

⚠ WARNING

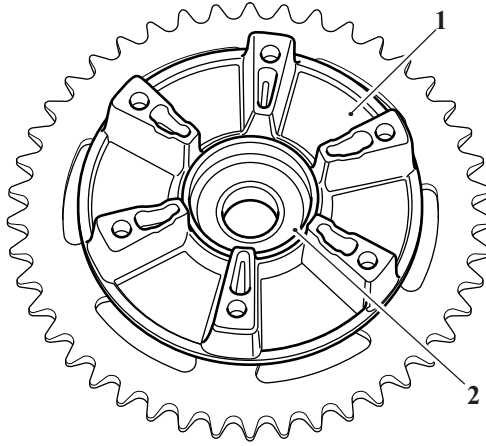
Always wear eye, hand and face protection when using a hammer and drift. Use of a hammer and drift can cause bearings to fragment. Pieces of fragmented bearing could cause eye and soft tissue injuries if suitable protective apparel is not worn.

⚠ CAUTION



To prevent sprocket carrier 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 drive flange.

3. Turn the sprocket carrier over, and use a pin punch to drift out the ball bearing.



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- 1. Sprocket carrier
- 2. Ball bearing

Rear Sprocket Carrier and Cush Drive - Inspection

1. Check the cush drive rubbers for deterioration and cracks.
2. Inspect the sprocket teeth for wear, damage and chips.
3. Check the wheel and drive flange for wear, cracks and damage.

Rear Sprocket Carrier Bearings - Assembly

WARNING



When using a press, always wear overalls, eye, face and hand protection. Objects such as bearings frequently break-up under load and the debris caused during break-up may cause damage and injury to unprotected parts of the body.

Never wear loose clothing, which could become trapped in the press and cause crushing injury to the hand, arms or other parts of the anatomy.

1. Position the ball bearing, marked side facing outwards, to the drive flange.
2. Using a suitable press, fully insert the ball bearing into the sprocket carrier.
3. Fit a new circlip.
4. Install a new seal, marked side facing outwards, to the sprocket carrier.
5. Lubricate the seal's knife-edge with grease to NLGI 2 specification.
6. Install the cush drive rubbers to the wheel hub.
7. Fit the spacer to the wheel hub as noted for removal.
8. Refit the sprocket carrier to the wheel.

Final Drive - Installation

1. Install the cush drive rubbers to the wheel.
2. Refit the drive flange to the wheel.
3. Refit the rear wheel (see [Rear Wheel - Installation](#)).

Rear Sprocket - Removal

⚠ CAUTION

Do not allow the wheel to rest on the brake disc, as this may damage the disc. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake disc is raised above the ground.

Perform the following operations:

- **Rear Wheel - Removal**

1. Place the wheel on wooden blocks with the drive chain sprocket uppermost.

NOTICE

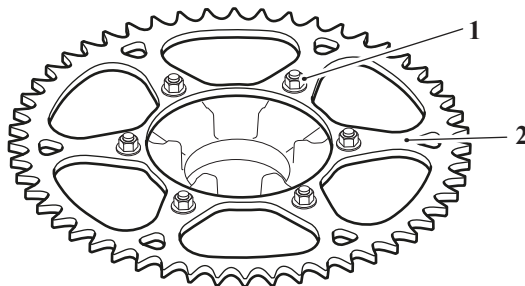
If the studs for the rear sprocket become loose or removed, they must be replaced.

2. Evenly and progressively, remove and discard the rear sprocket lock nuts.

NOTICE

Note the orientation of the rear sprocket for installation.

3. Remove the rear sprocket.



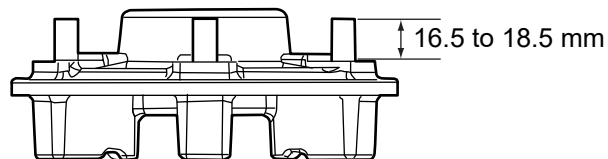
- 1. Lock nut
- 2. Sprocket

Rear Sprocket - Installation

⚠ CAUTION

Do not allow the wheel to rest on the brake disc, as this may damage the disc. Support the wheel on wooden blocks, equally spaced around the rim, such that the brake disc is raised above the ground.

1. If necessary, replace any rear sprocket studs that have been loosened or removed as follows:
 - Remove and discard any of the studs that have become loose.
 - Fit new studs and tighten until the dimensions below have been achieved.
 - Check the height of the studs when fitted to the sprocket carrier. The top of the stud must be between 16.5 to 18.5 mm above the sprocket carrier face.



1. Height of stud (16.5 to 18.5 mm)

2. Fit the rear sprocket to the sprocket carrier as noted for removal.
 3. Fit new lock nuts, evenly and progressively tighten to 55 Nm.
- Perform the following operations:

- [Rear Wheel - Installation](#)

Drive Chain Rubbing Strip - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

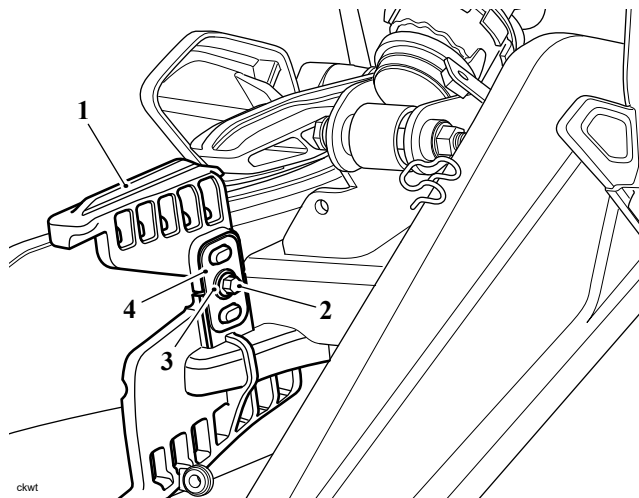
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

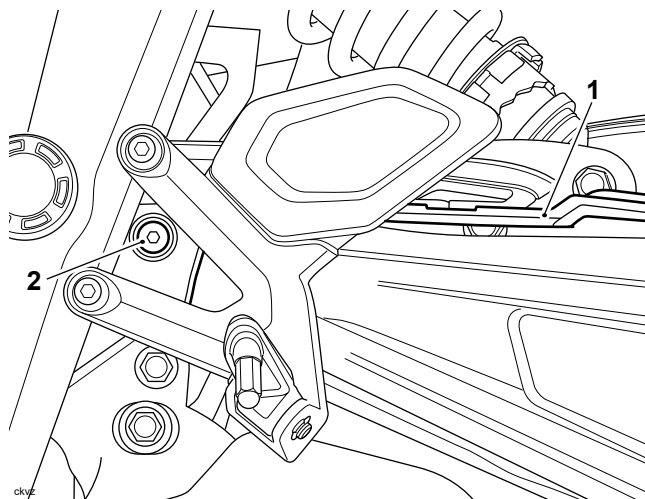
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Wheel - Removal](#)

1. Remove the fixing, flanged sleeve and plate from the drive chain rubbing strip.



- 1. Drive chain rubbing strip
- 2. Fixing
- 3. Flanged sleeve
- 4. Plate

2. Remove the front fixing and remove the drive chain rubbing strip from the swinging arm.



1. Drive chain rubbing strip
2. Fixing

Drive Chain Rubbing Strip - Installation

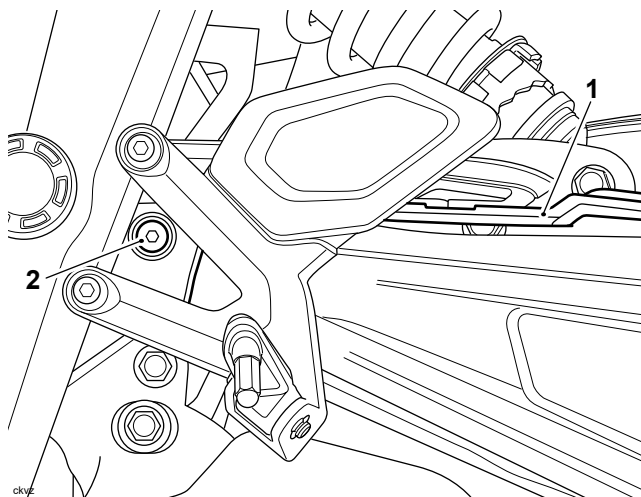
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

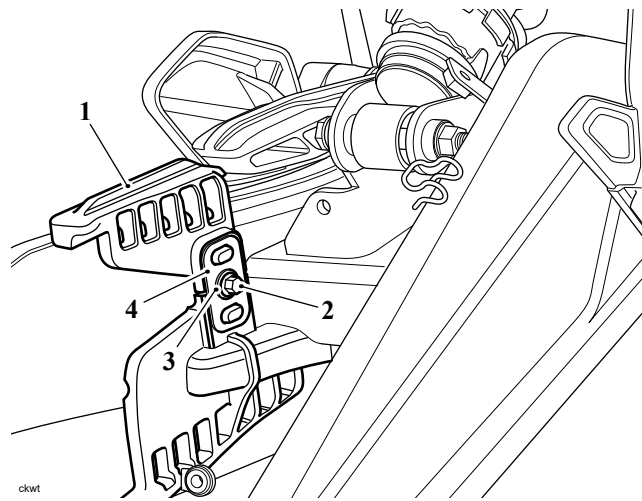
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Install the drive chain rubbing strip to the swinging arm and install the front fixing.



1. Drive chain rubbing strip
2. Fixing

2. Install the plate, flanged sleeve and fixing to the drive chain rubbing strip. Tighten the front and rear fixings to 4 Nm.



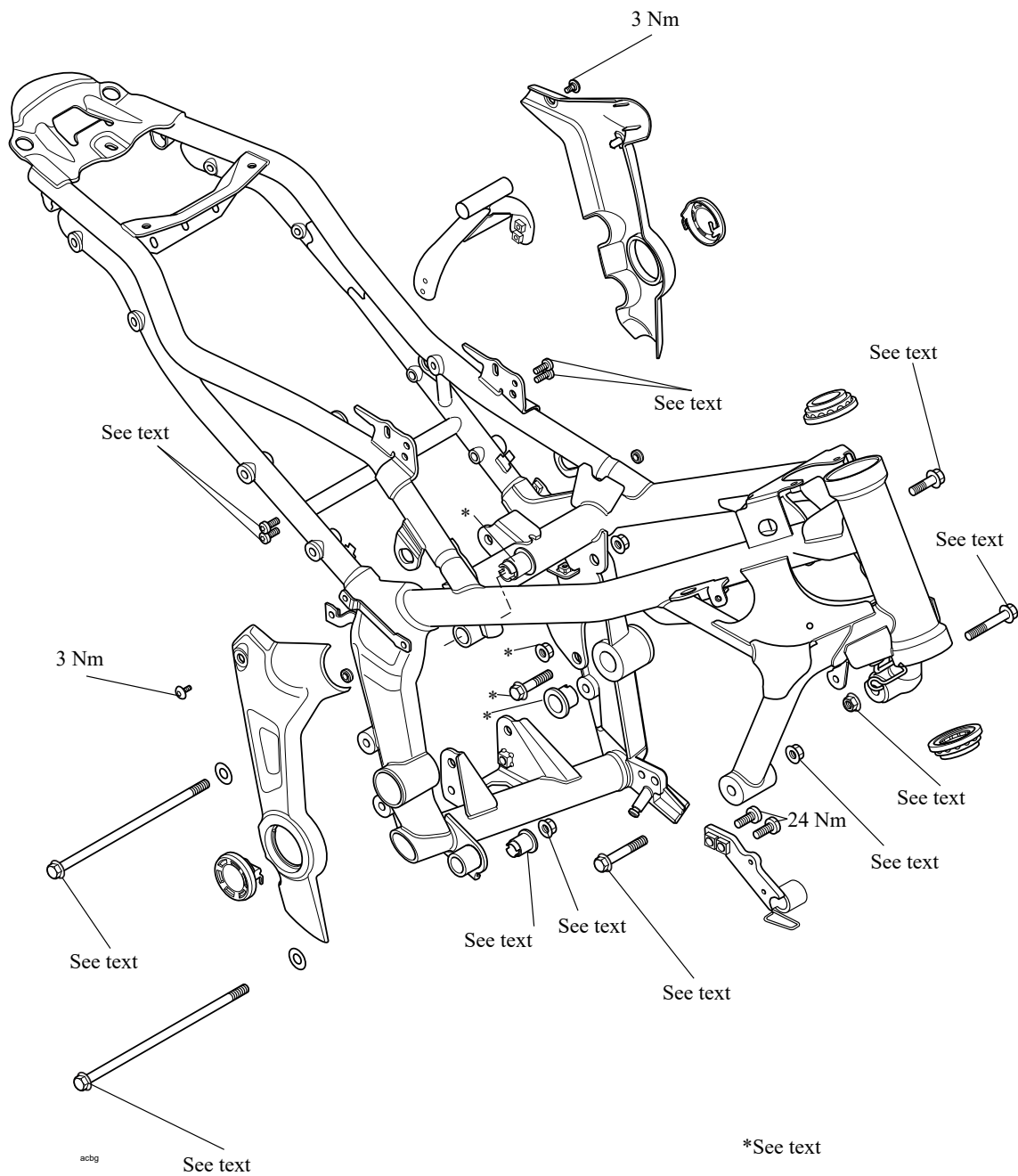
1. Drive chain rubbing strip
2. Fixing
3. Flanged sleeve
4. Plate

Perform the following operations:

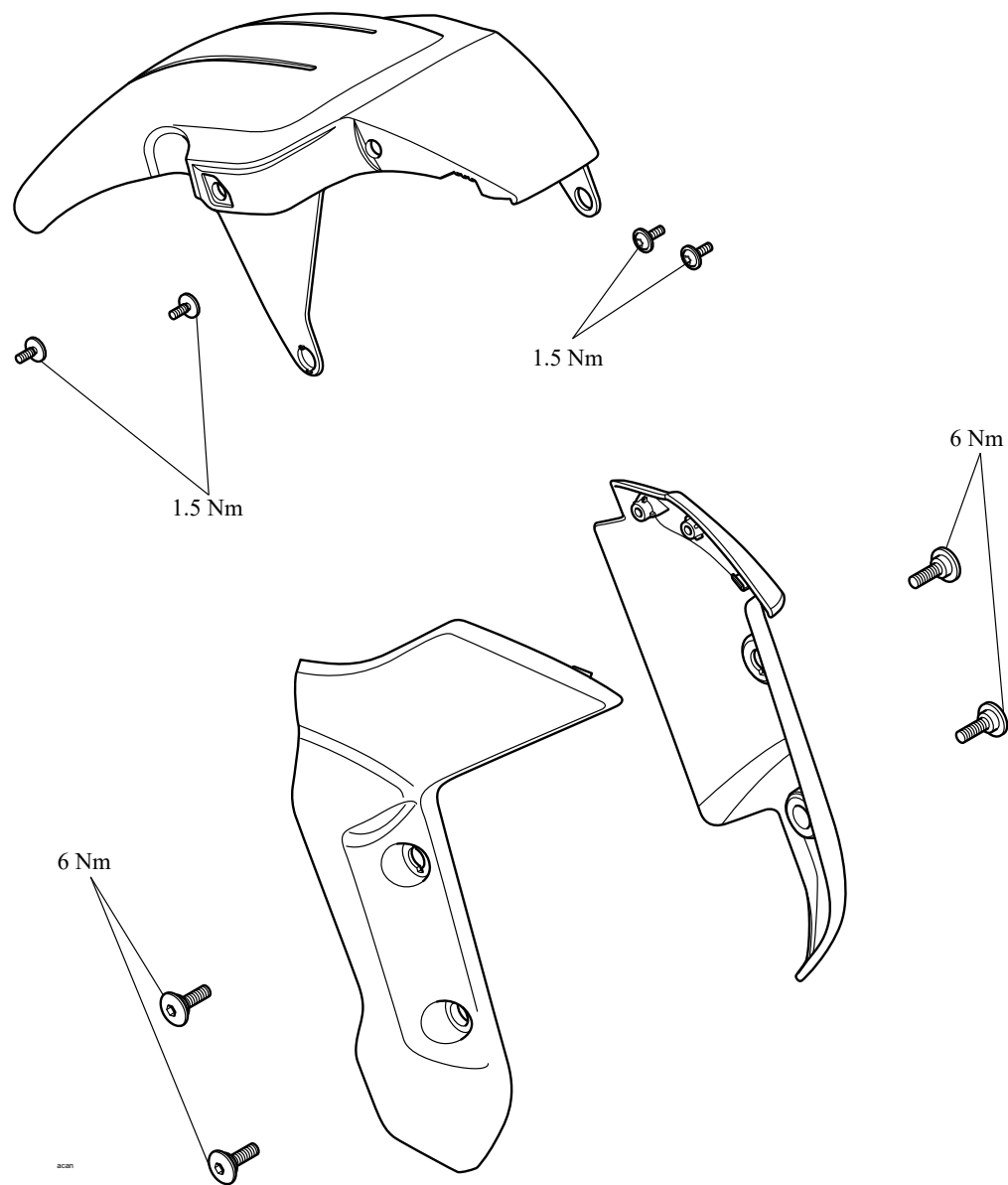
- [Rear Wheel - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Frame and Bodywork

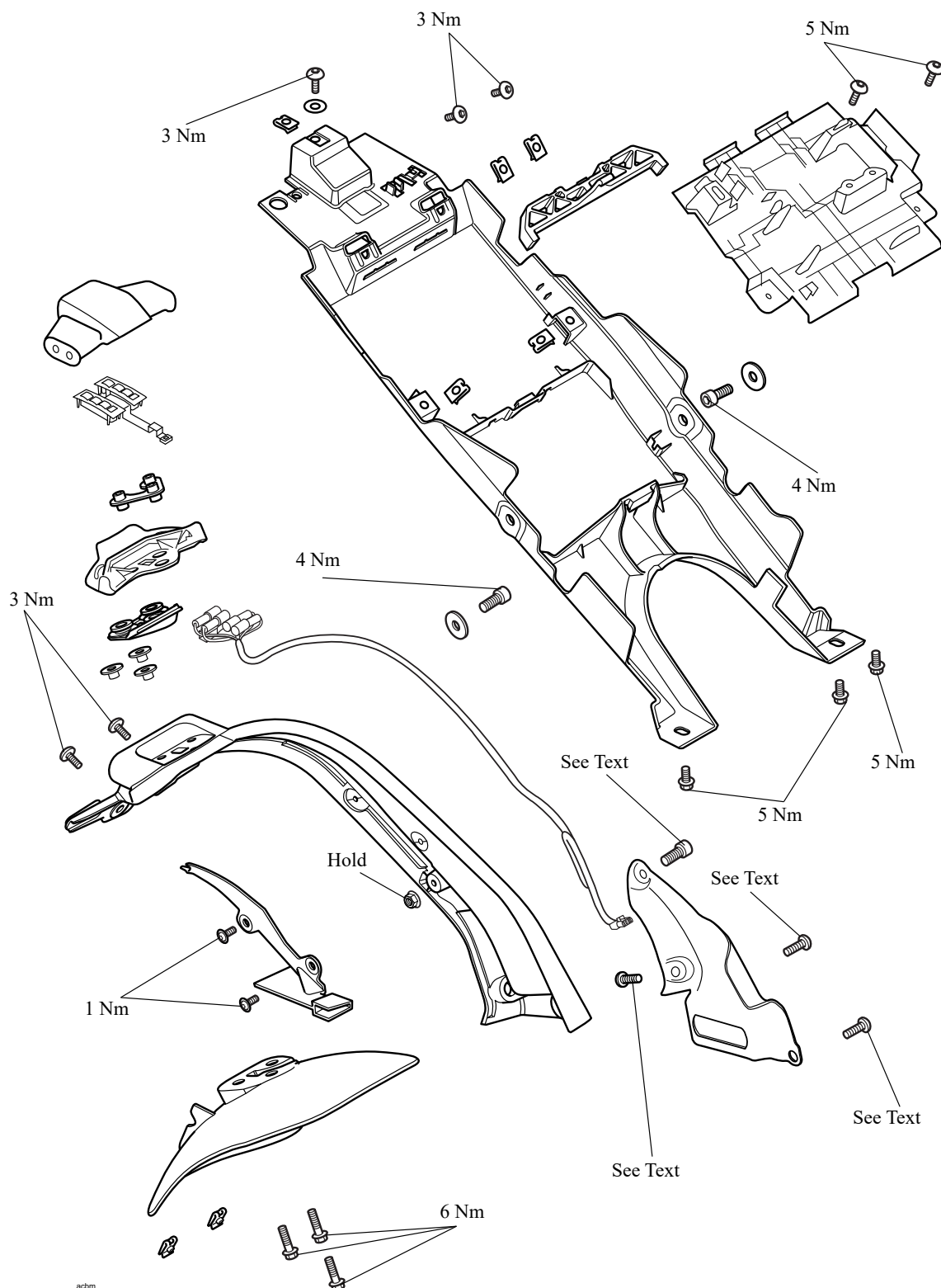
Exploded View - Frame and Fixings



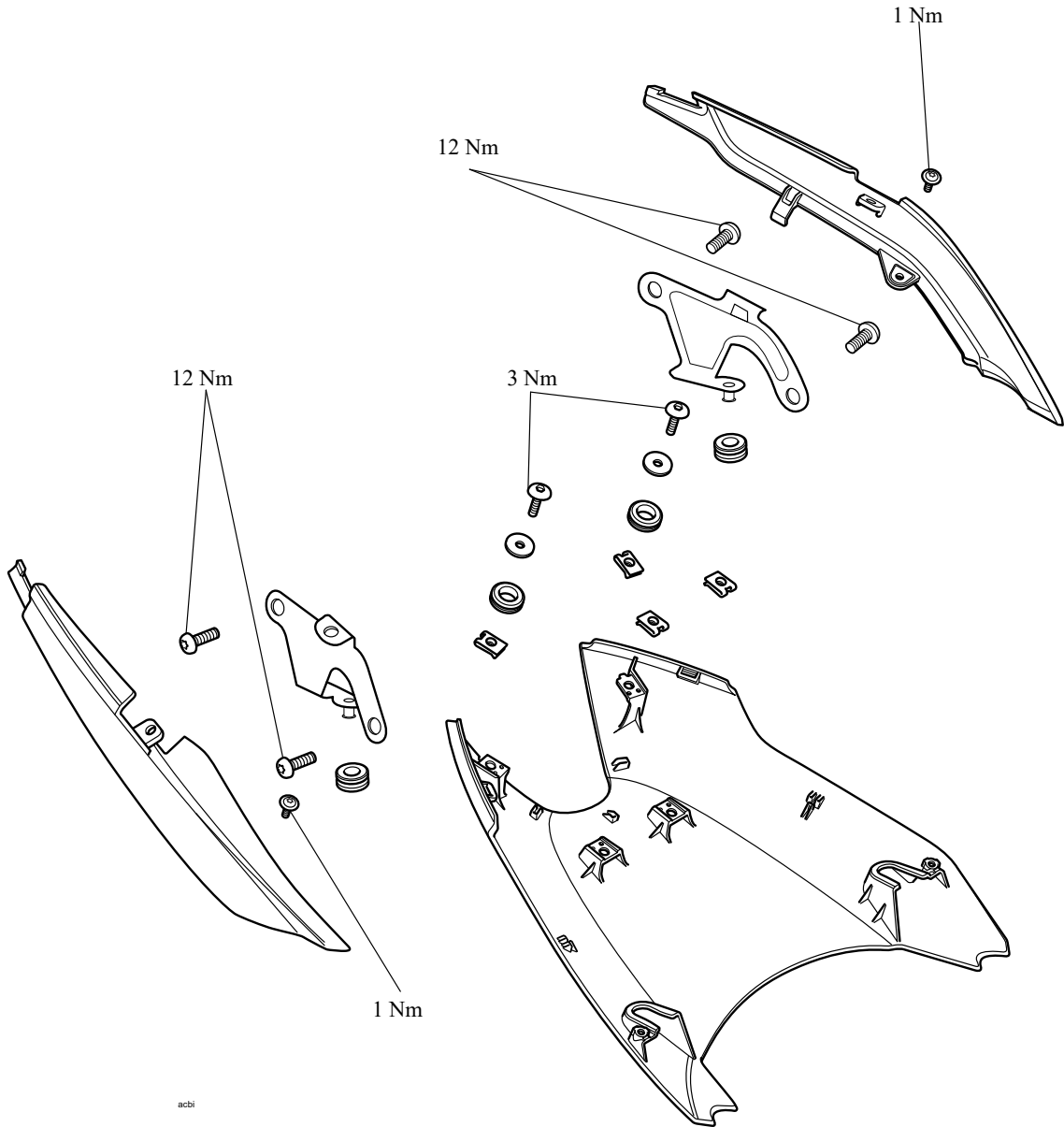
Exploded View - Front Mudguard



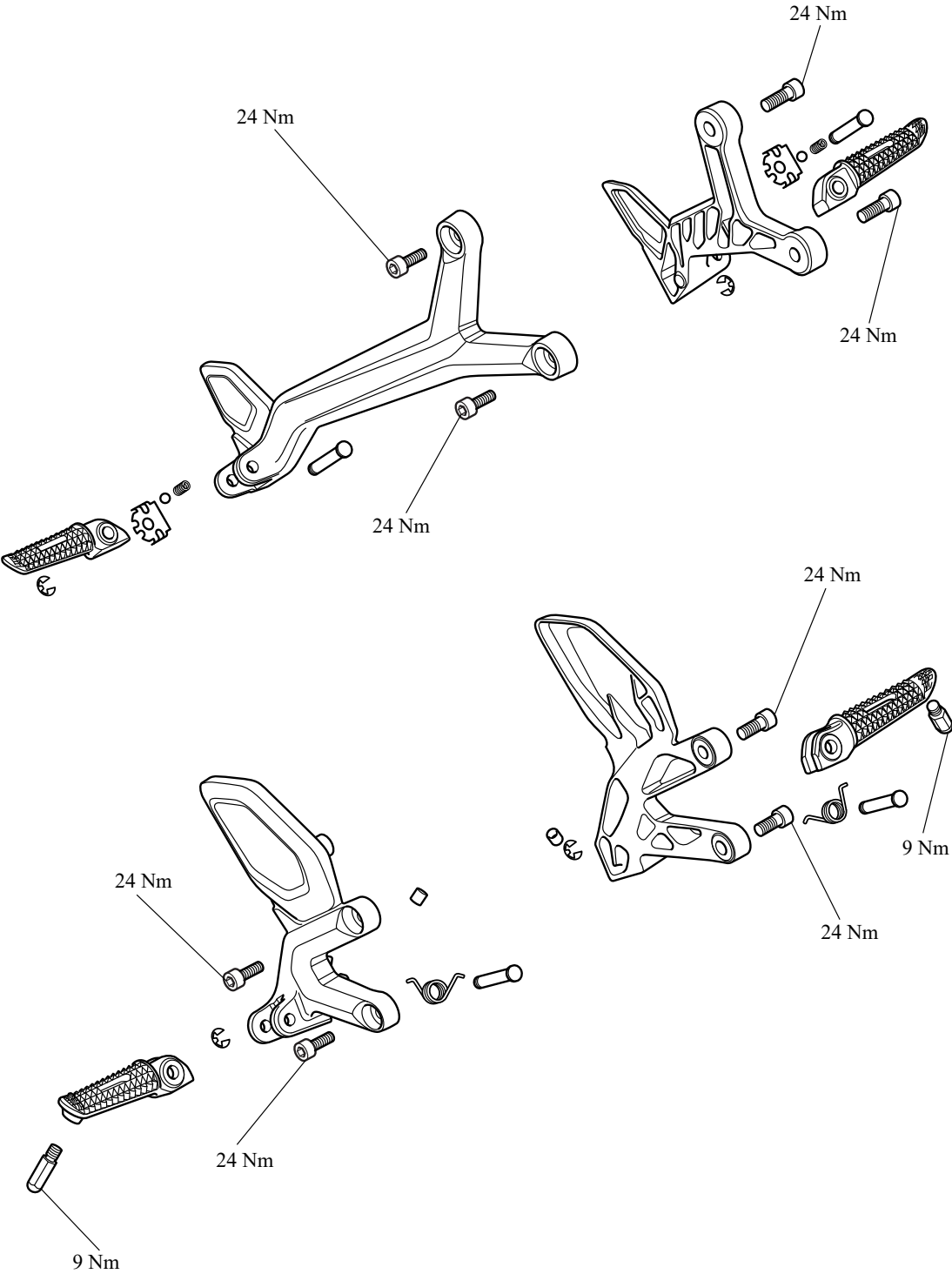
Exploded View - Rear Mudguard



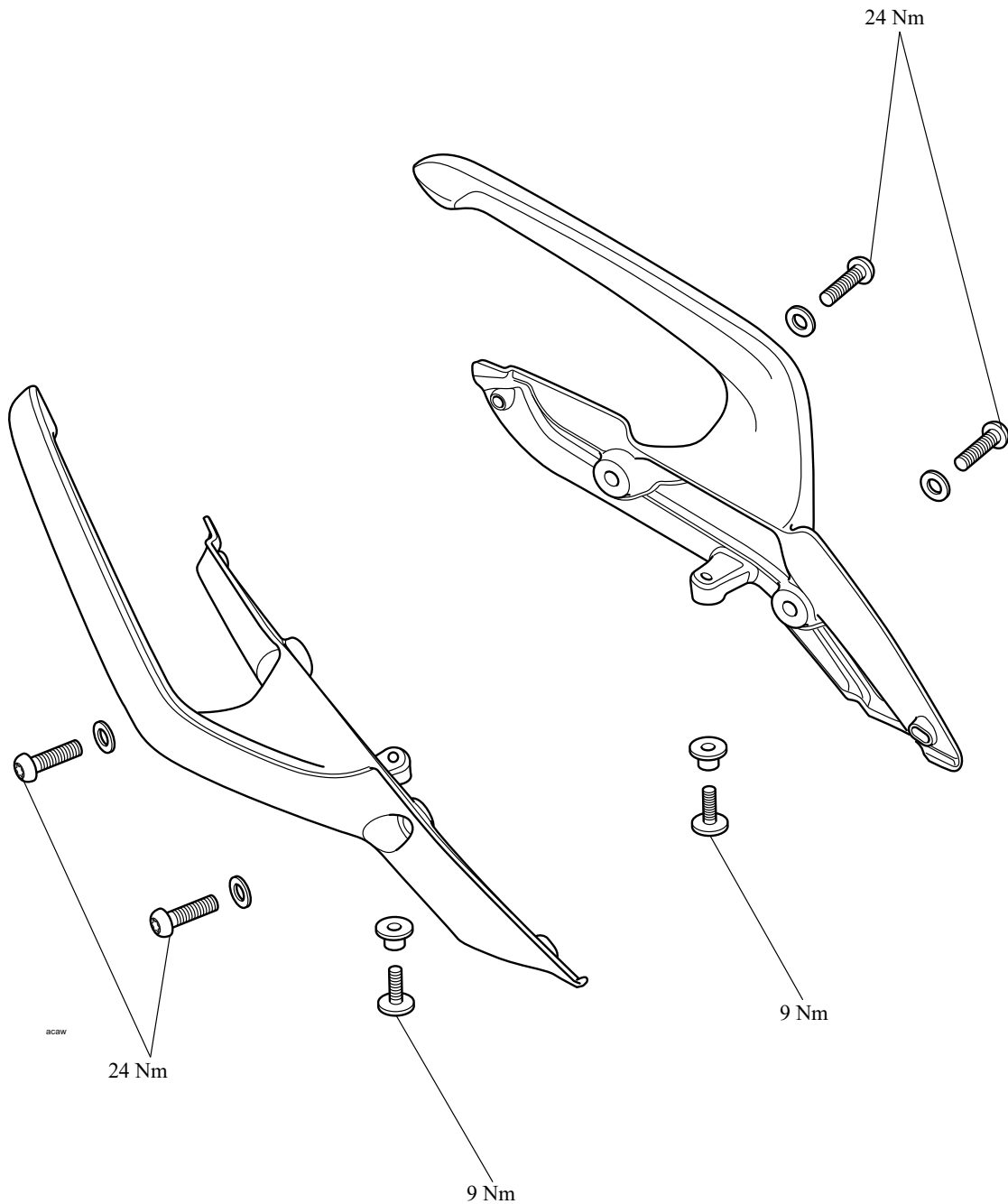
Exploded View - Rear Bodywork



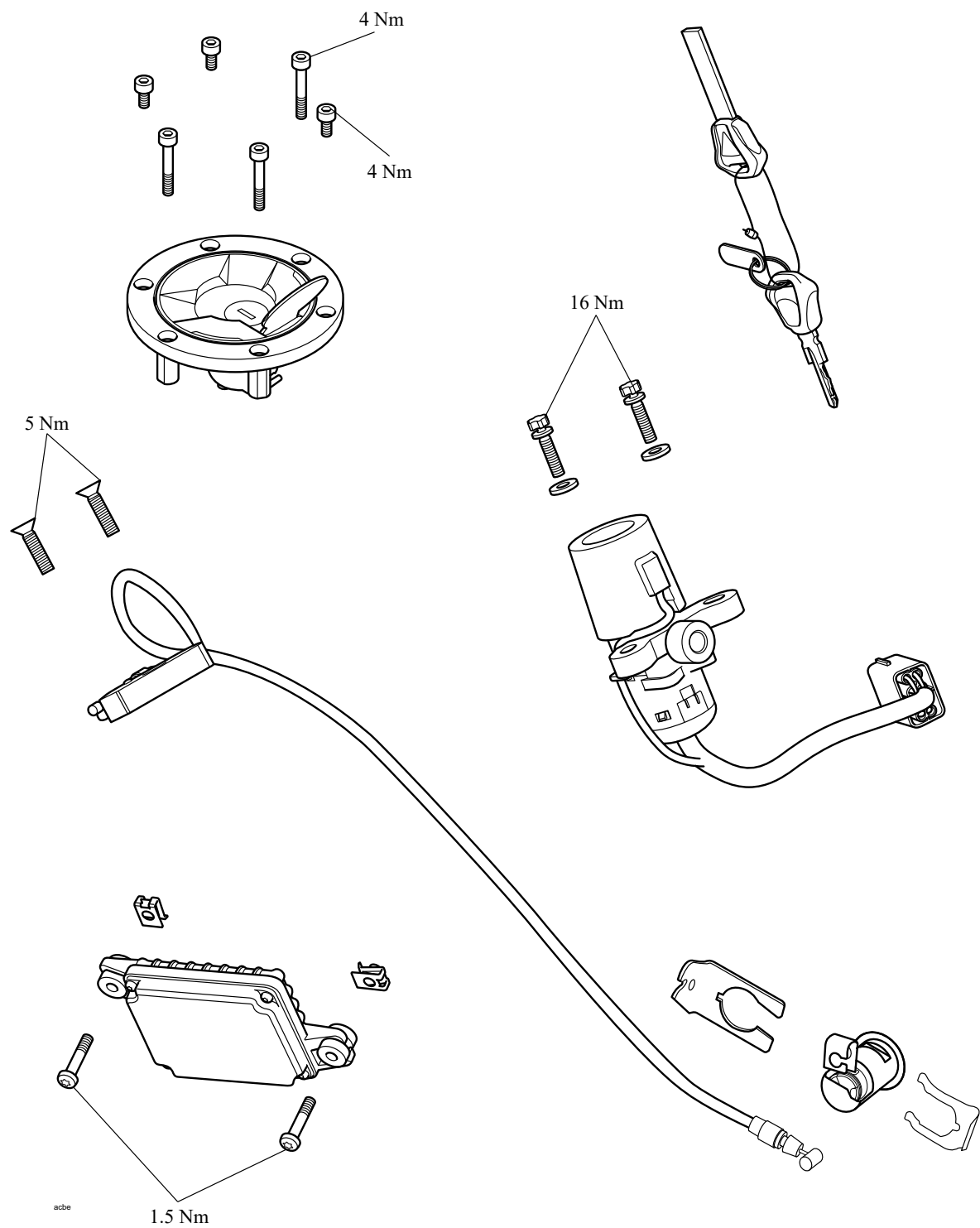
Exploded View - Footrests



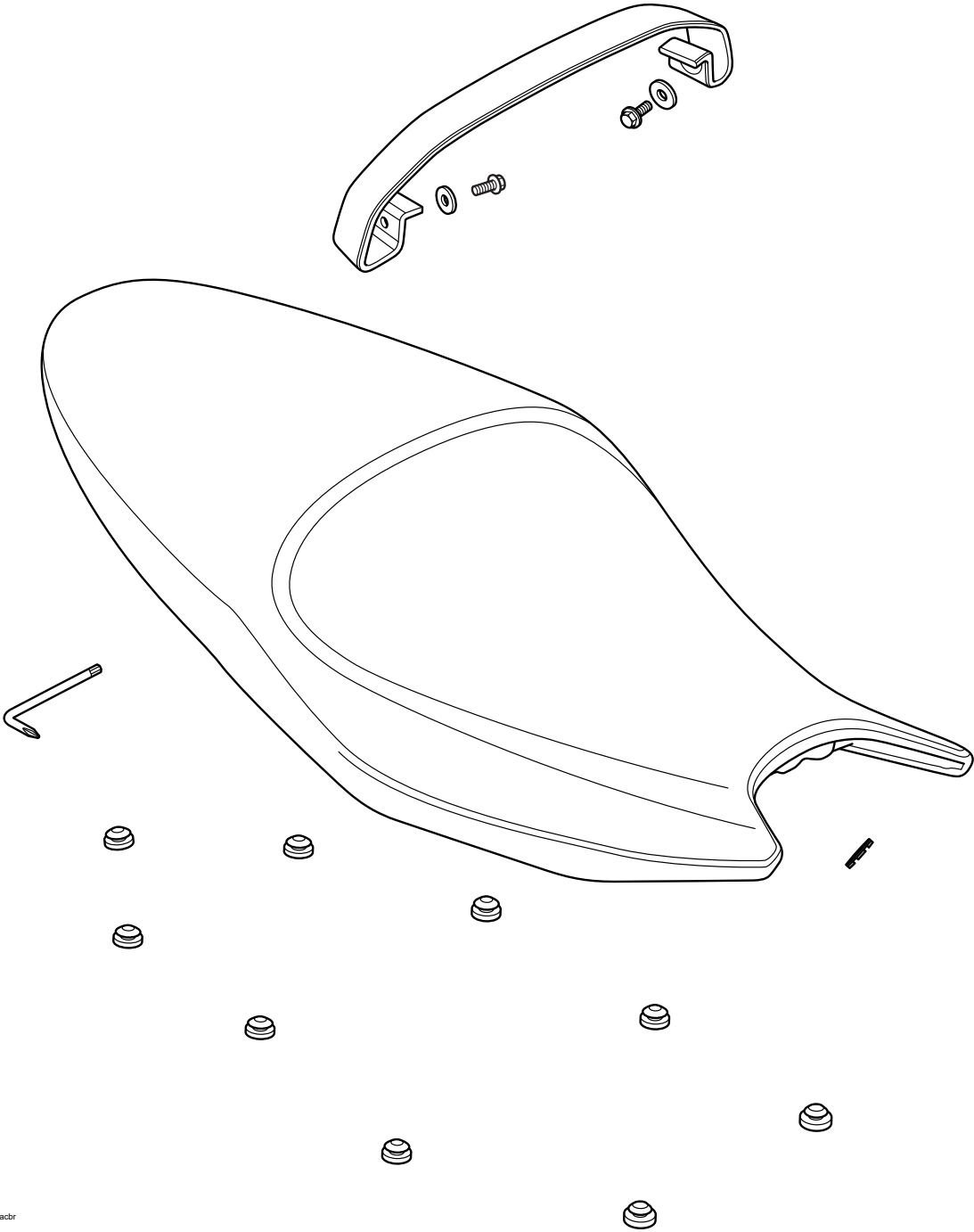
Exploded View - Grab Handles - Applicable Markets Only



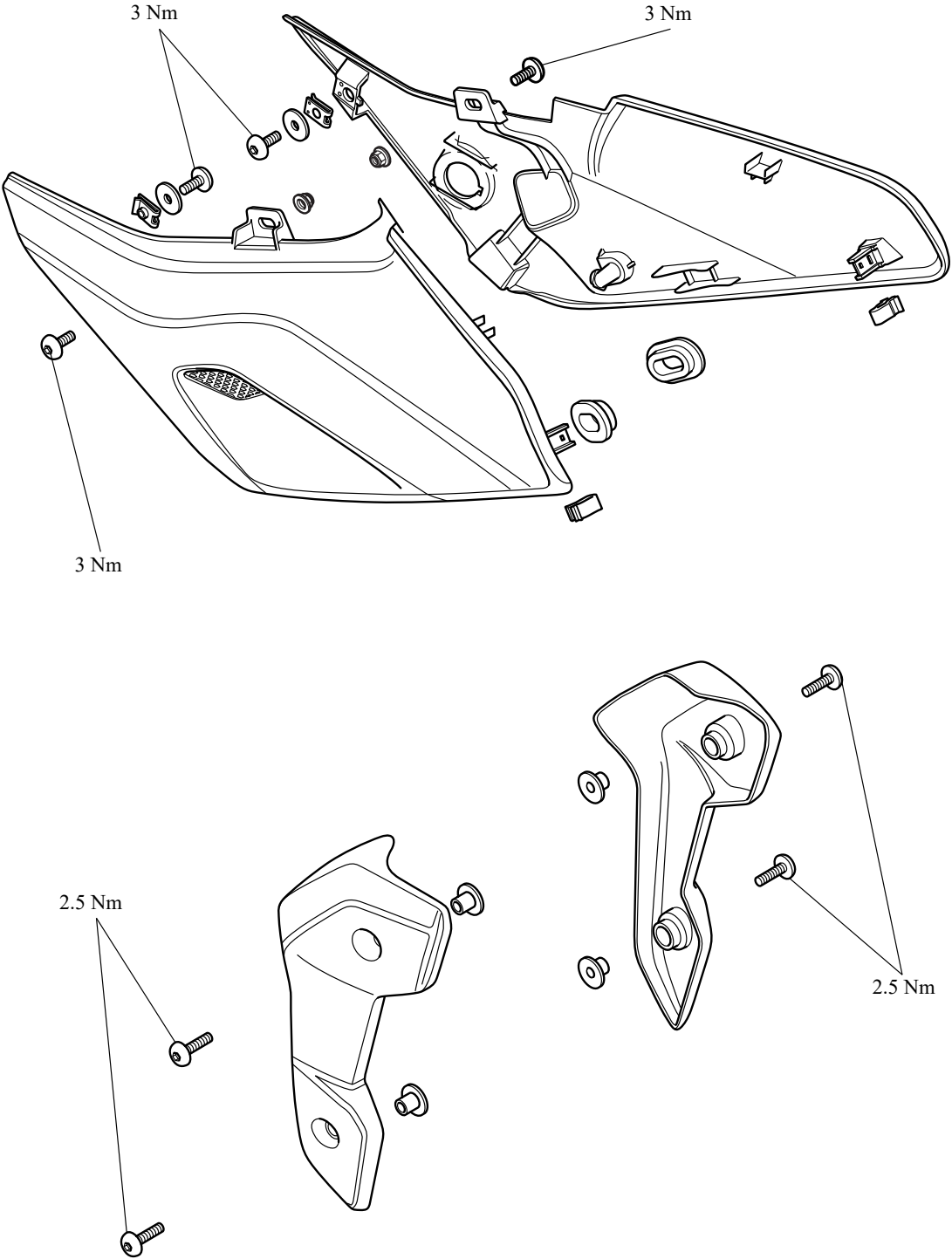
Exploded View - Ignition Switch and Lock Set



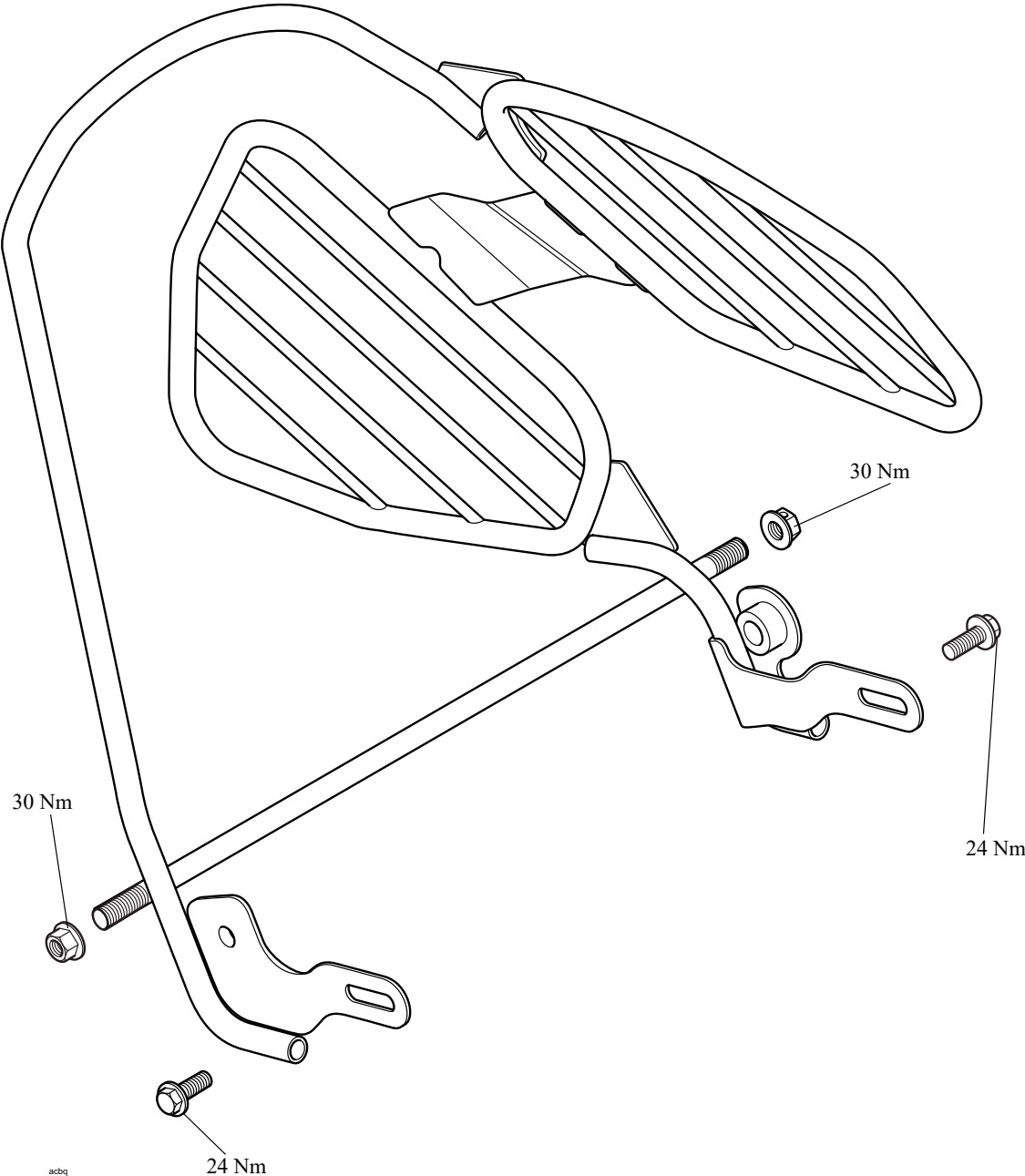
Exploded View - Seat



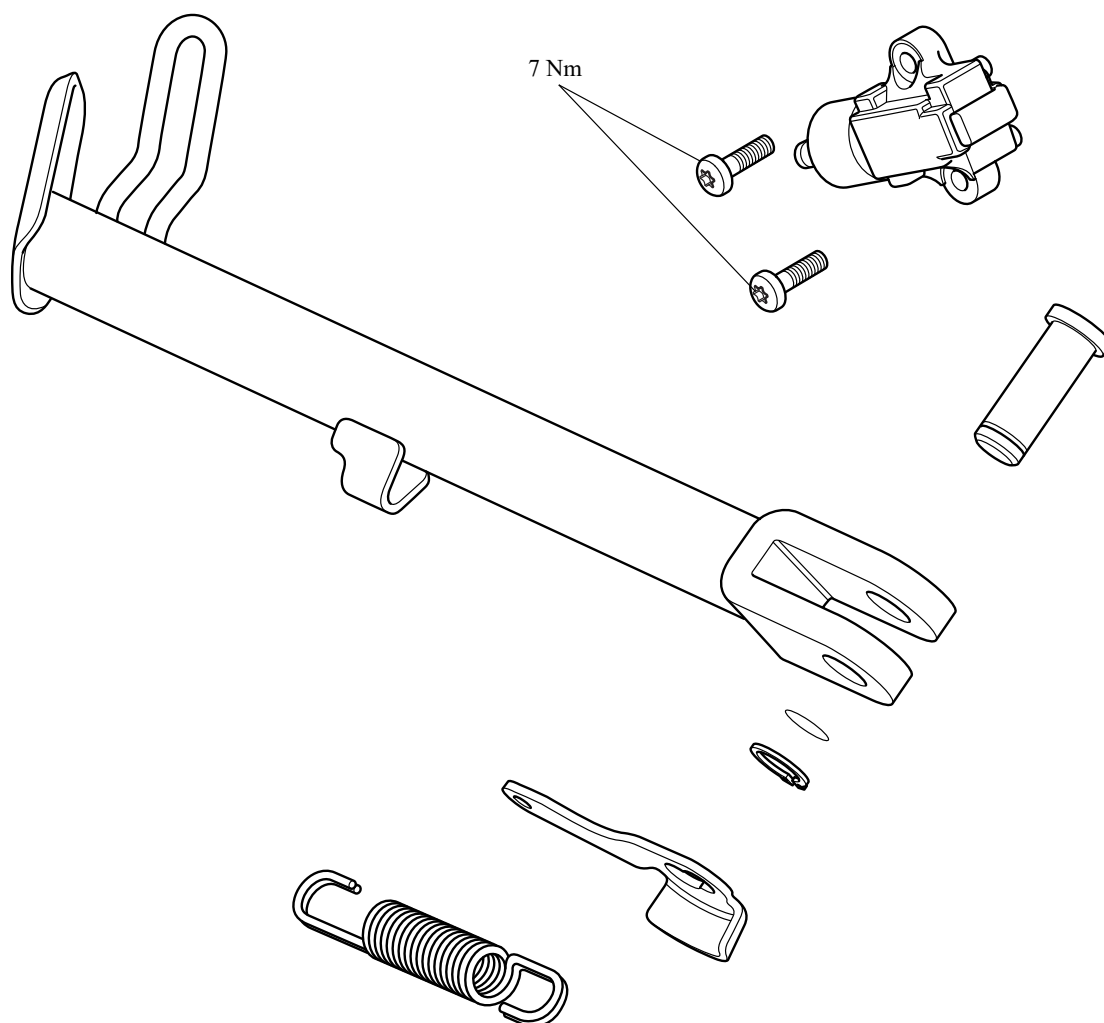
Exploded View - Side Panels



Exploded View - Saree Guard - Applicable Markets Only



Exploded View - Side Stand



General Frame Inspection

Inspect the frame, bodywork and footrests for accident and other damage, cracks, splits and general dilapidation. Check all fixings for security. If any faults are found, rectify as necessary. If any faults with the frame are found, the frame must be replaced; repairs to the frame are not permitted.

WARNING



The frame must not be modified in any way. Any modification to the frame, such as welding or drilling, may weaken the structure causing an unsafe riding condition leading to loss of motorcycle control and an accident.

WARNING



If the motorcycle is involved in an accident or collision it must be taken to an authorised Triumph dealer for inspection and repair before it is ridden again.

Models With a Side Stand Fitted

Check the operation of the side stand to make sure it is securely held in the retracted position by the spring. Rectify any faults.

WARNING



If the return spring is faulty, the side stand could extend whilst the motorcycle is being ridden. This will cause an unsafe riding condition, which could lead to loss of motorcycle control and an accident.

Models With a Centre Stand Fitted

Check the operation of the centre stand to make sure it is securely held in the retracted position by the spring. Rectify any faults.

WARNING



If the return spring is faulty, the centre stand will not be held in the retracted position whilst the motorcycle is being ridden. This will cause an unsafe riding condition, which could lead to loss of motorcycle control and an accident.

Seat - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

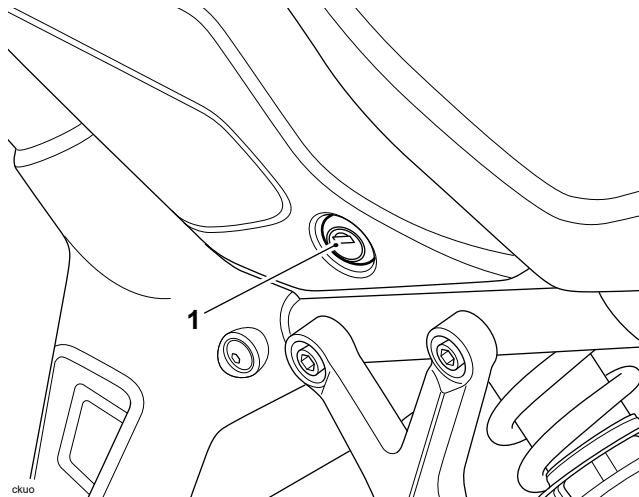
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ CAUTION

To prevent damage to the seats or seat covers, care must be taken not to drop the seats. Do not lean the seats against the motorcycle or any surface which may damage the seats or seat covers. Instead, place the seats, with the seat cover facing upwards, on a clean, flat surface which is covered with a soft cloth.

Do not place any item on the seats which may cause damage or staining to the seat covers.

1. Insert the ignition key into the seat lock and turn it anticlockwise. This will release the seat from its lock and allow it to be slid rearwards for complete removal from the motorcycle.



1. Seat lock

Seat - Installation

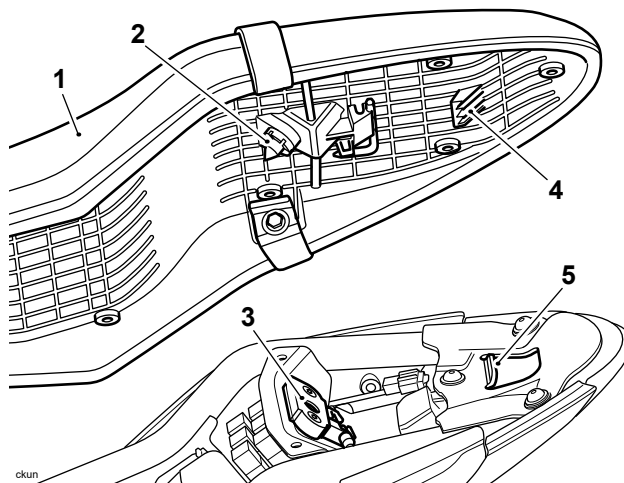
⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Align the two locating holes at the front of the seat with the locating tangs on the fuel tank brackets.
2. Engage the seat tongue with the seat tongue locating position on the motorcycle.



1. Seat
2. Seat lock peg
3. Seat lock
4. Seat tongue
5. Seat tongue locating position

3. Align the seat lock peg to the lock and press down, engaging the seat lock. An audible click can be heard when the seat is fully engaged in its lock.

⚠️ 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.

4. Grasp the seat and pull firmly upwards to ensure that it is securely retained.

Mirrors - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

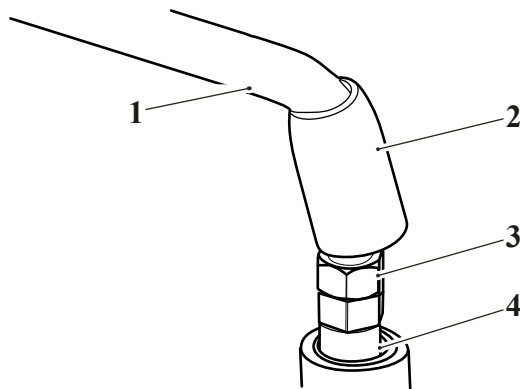
Follow the same procedure for both left and right hand sides.

NOTICE

The right mirror arm and lock nut has a left hand thread.

The left mirror arm and lock nut has a right hand thread.

1. Slide the rubber cover from the lock nut.
2. Make a note of the lock nut position on the thread of the mirror arm.
3. Loosen the lock nut and separate the mirror arm from the mirror boss.



1. Mirror arm
2. Rubber cover
3. Lock nut
4. Mirror boss

Mirrors - Installation

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠ WARNING

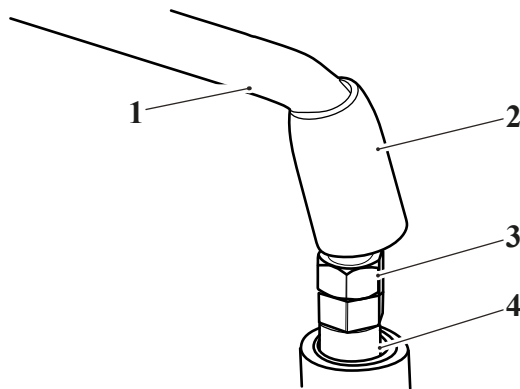
If the mirror fixing is too loose, the mirror may blow back at speed. This will result in a loss of vision to the rear of the motorcycle. It is dangerous to ride a motorcycle without sufficient rearward vision.

NOTICE

The right mirror arm and lock nut has a left hand thread.

The left mirror arm and lock nut has a right hand thread.

1. Position the locknut as noted during removal onto the thread of the mirror arm.
2. Fit the mirror boss to the handlebar clamp and tighten to 17 Nm.



1. Mirror arm
2. Rubber cover
3. Lock nut
4. Mirror boss

3. Fit the mirror arm into the mirror boss. Tighten by hand until the lock nut makes contact with the mirror boss, do not tighten fully at this stage.
4. Loosen the mirror arm one full turn.
5. Position the mirror arm to give rear visibility in the riding position and tighten the lock nut by hand.

 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.

6. Counter-hold the mirror boss and tighten the mirror lock nut to 17 Nm.
7. Slide the rubber cover over the lock nut.

Front Mudguard - Removal

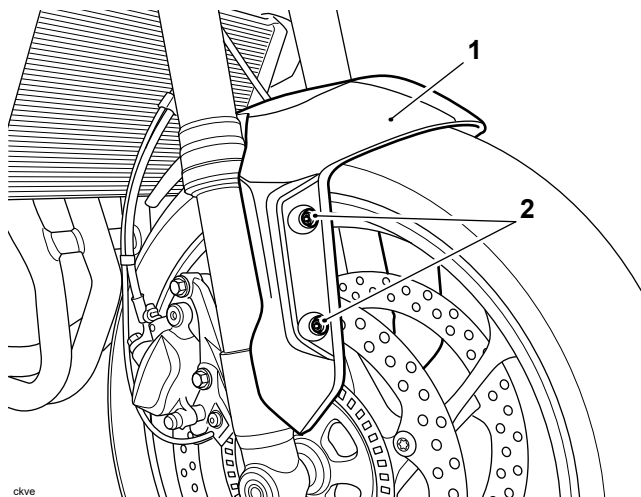
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

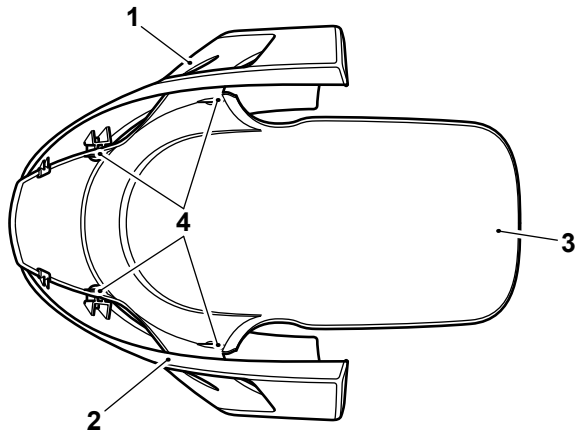
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Remove the four fixings securing the front mudguard assembly to the front forks and remove the mudguard assembly.



1. Front mudguard assembly
2. Fixings (right hand side shown)

2. If required, remove the four screws to separate the centre moulding from the side mouldings.



ckvd

1. Left hand side moulding
2. Right hand side moulding
3. Centre moulding
4. Screws

Front Mudguard - Installation

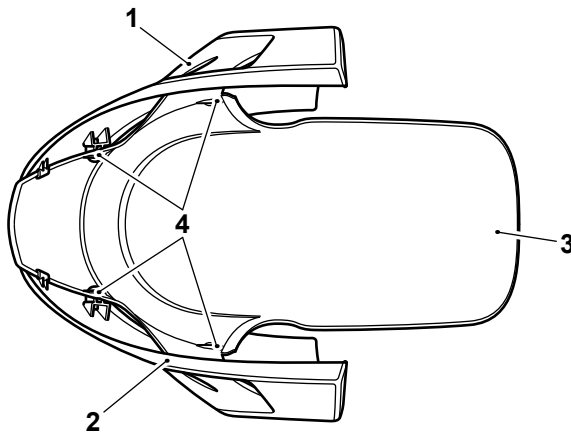
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

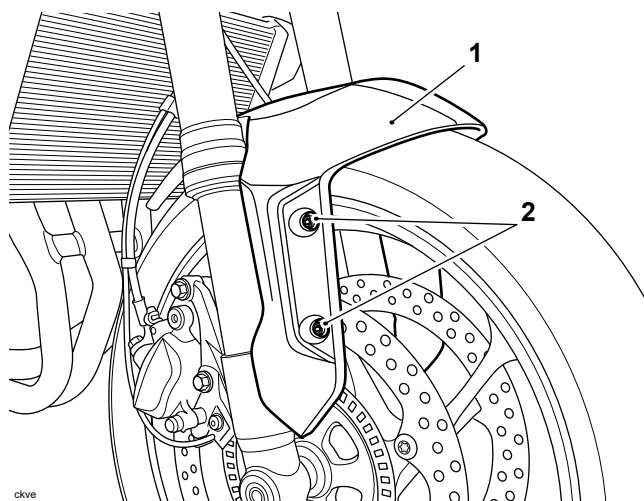
1. If required, position the side mouldings to the centre moulding and secure with four screws. Tighten to 1.5 Nm.



ckvd

1. Left hand side moulding
2. Right hand side moulding
3. Centre moulding
4. Screws

2. Position the front mudguard assembly to the front forks and install the four fixings. Tighten to 6 Nm.



- 1. Front mudguard assembly
- 2. Fixings (right hand side shown)

Rear Mudguard - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

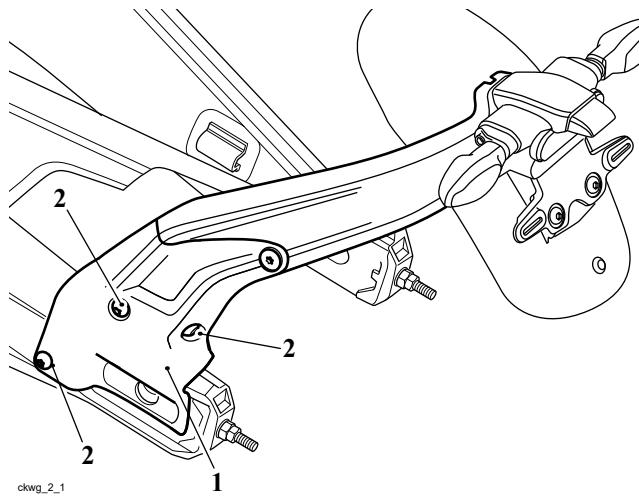
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

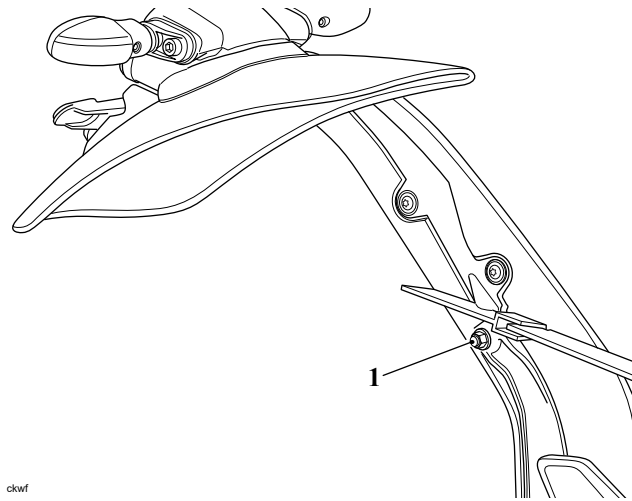
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Remove the rear wheel spindle nut.
2. Remove the fixings from the rear hanger cover.



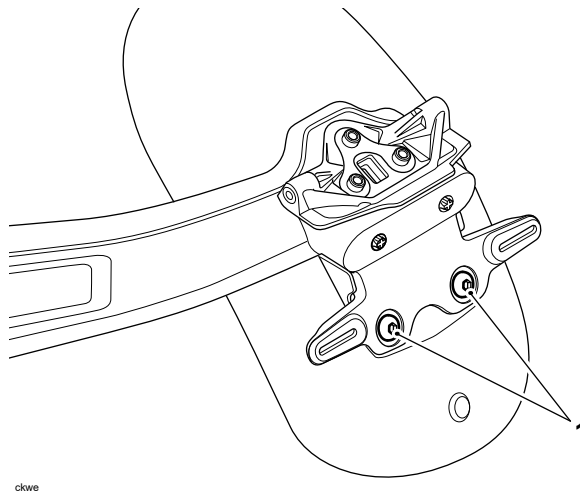
1. Rear hanger cover
2. Fixings

3. Remove the lock nut and upper fixing and support the rear mudguard assembly. Collect the rear hanger cover and discard the lock nut.



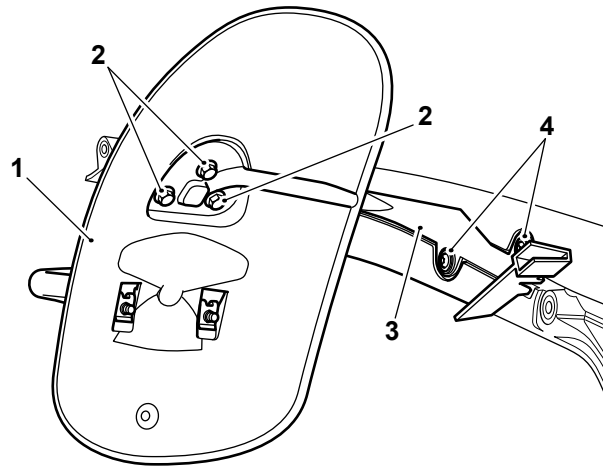
1. Fixing and lock nut (rear wheel removed for clarity)

4. Cut the cable tie, disconnect the rear subharness and remove the rear mudguard assembly.
5. If required, remove the rear direction indicators (see [Rear Direction Indicators - Removal](#)).
6. If required, remove the rear licence plate light (see [Rear Licence Plate Light - Removal](#)).
7. If the spray guard needs to be removed, first remove and discard the two rear fixings.



1. Fixings

8. Remove the three underside fixings and remove the spray guard, collecting the indicator mounting bracket, indicator mount and three flanged sleeves.
9. If required, remove the two fixings and remove the harness cover from the licence plate hanger arm, noting the routing of the rear subharness for installation.



clwd

- 1. Spray guard
- 2. Fixings
- 3. Harness cover
- 4. Fixings

Rear Mudguard - Installation

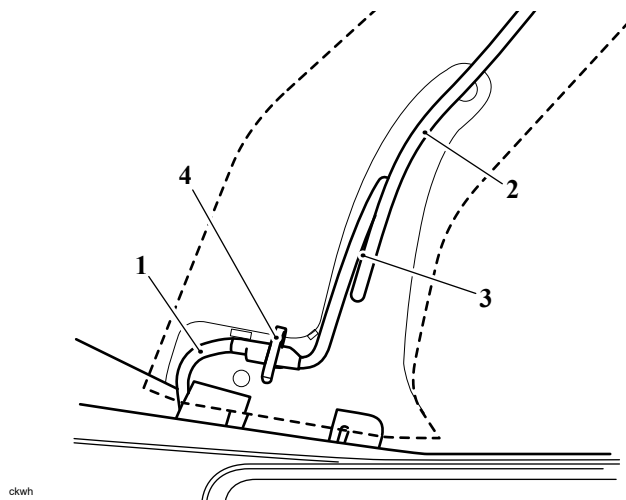
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

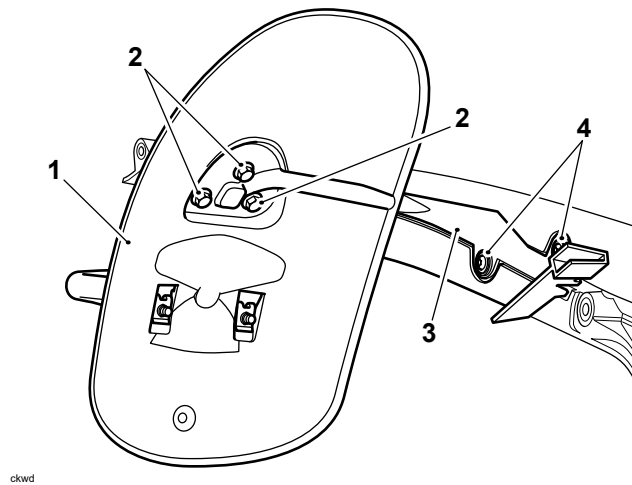
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If required, route the sub harness as noted during removal and install the harness cover to the rear licence plate hanger arm with two fixings. Tighten to 1 Nm.



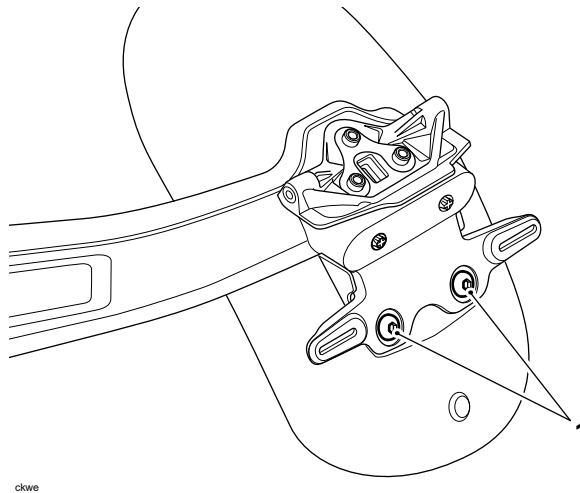
1. Main harness
2. Rear subharness
3. Rear harness slack
4. Cable tie

2. Make sure the two captive nuts are fitted to the spray guard.
3. If required, refit the spray guard to the hanger arm with the three flanged sleeves, indicator mount and indicator mounting bracket. Secure with three fixings and tighten to 6 Nm.



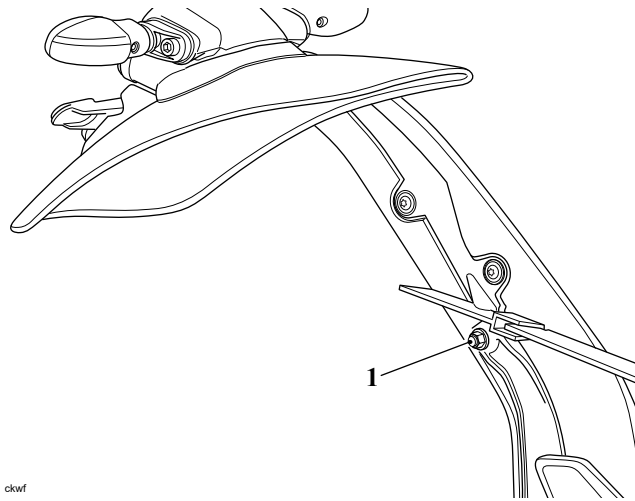
- 1. Spray guard (rear wheel removed for clarity)
- 2. Fixings
- 3. Harness cover
- 4. Fixings

4. Install two new fixings to the rear of the spray guard. Tighten to 3 Nm.



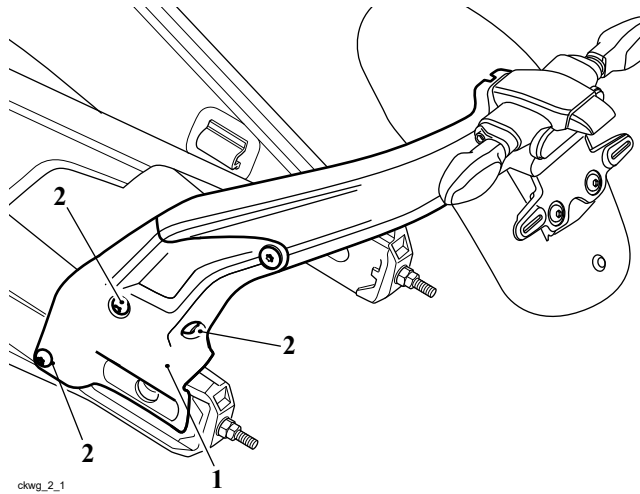
- 1. Fixings

- 5. If required, refit the rear licence plate light (see [Rear Licence Plate Light - Installation](#)).
- 6. If required, refit the rear direction indicators (see [Rear Direction Indicators - Installation](#)).
- 7. Reconnect the rear subharness to the harness and secure with a cable tie. Ensure the routing of the subharness remains as explained in step 1.
- 8. Install the rear mudguard assembly and rear hanger cover to the swinging arm and loosely assemble the one upper fixing and a new lock nut.



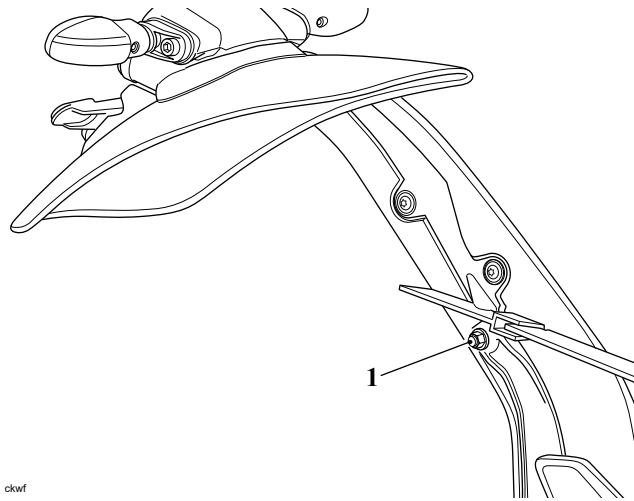
1. Fixing and lock nut(rear wheel removed for clarity)

9. Loosely assemble the three fixings and wheel spindle nut to the rear hanger cover and rear mudguard assembly.



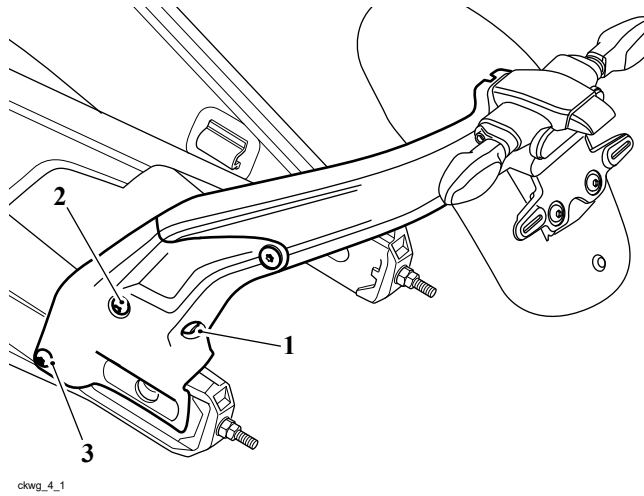
1. Rear hanger cover
2. Fixings

10. Torque the upper fixing whilst holding the lock nut to 3 Nm.



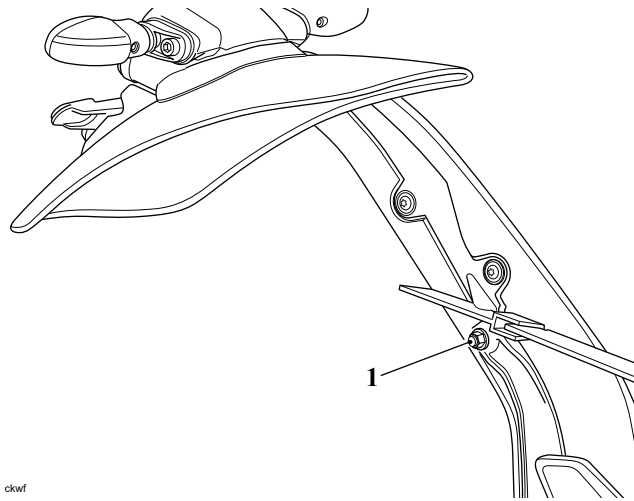
1. Fixing and lock nut (rear wheel removed for clarity)

11. Tighten the outer fixings in the sequence below to 3 Nm.



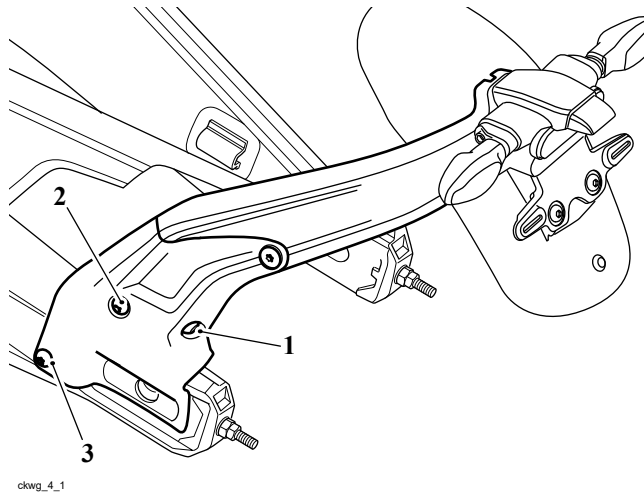
Tightening sequence

12. Tighten the upper fixing whilst holding the lock nut to 32 Nm.



1. Fixing

13. Tighten the outer fixings in the sequence below to 32 Nm.

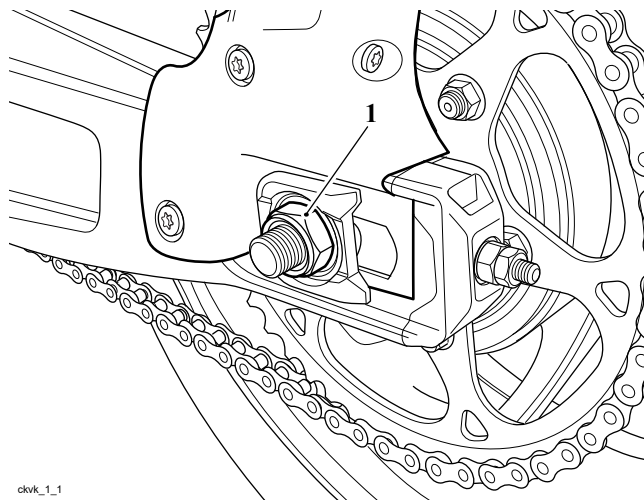


Tightening sequence

NOTICE

Make sure the wheel spindle is fully inserted before tightening the wheel spindle nut.

14. Make sure the wheel spindle is fully inserted before tightening the wheel spindle nut. Tighten the wheel spindle nut to 110 Nm.



1. Rear wheel spindle nut

15. Lower the motorcycle to the ground.

16. Check and, if necessary, adjust the chain (see [Drive Chain Free Movement - Adjustment](#)).

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.

17. Check the operation of the rear brake.

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Battery Tray - Removal

WARNING

Make sure the motorcycle is stabilised and adequately supported.

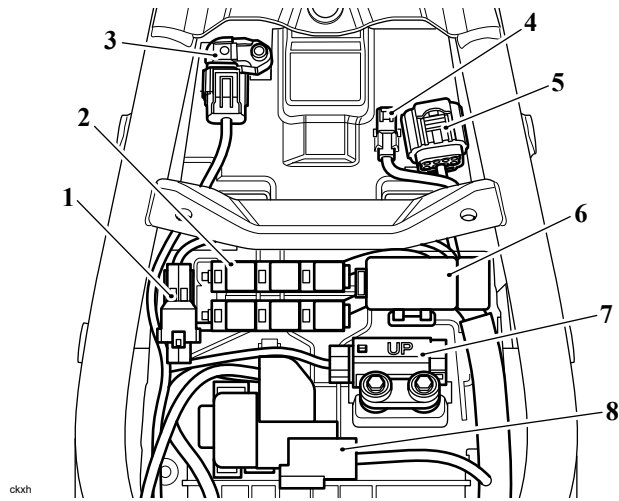
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

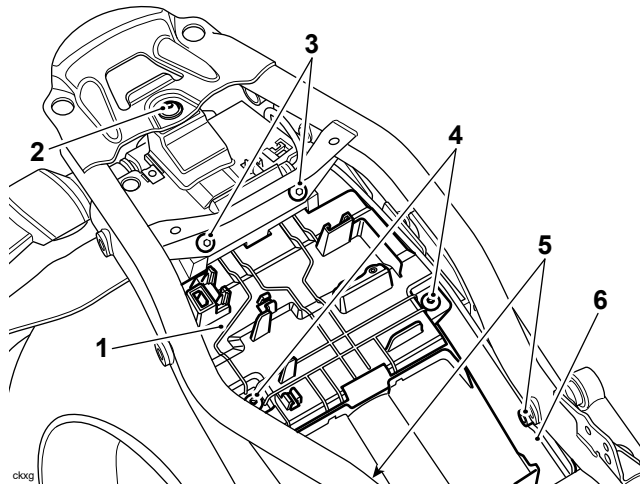
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Side Panels - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Rear Light - Removal](#)
- [Rear Panels - Removal](#)

1. Note the position and routing of the harness.
2. Remove the starter solenoid from the engine ECM tray and rest to one side.
3. Release the fixing and remove the ambient air pressure sensor and rest to one side.
4. Tilt the alarm electrical connector towards the rear and slide rearwards to release from the battery tray.
5. Unclip the rear light connector from the battery tray.
6. Disconnect the fall detection switch electrical connector.
7. Remove the two relay blocks and rest to one side, noting the position of each block for installation. The rear block has blue tape to identify.
8. Remove the fuse box from the engine ECM tray.



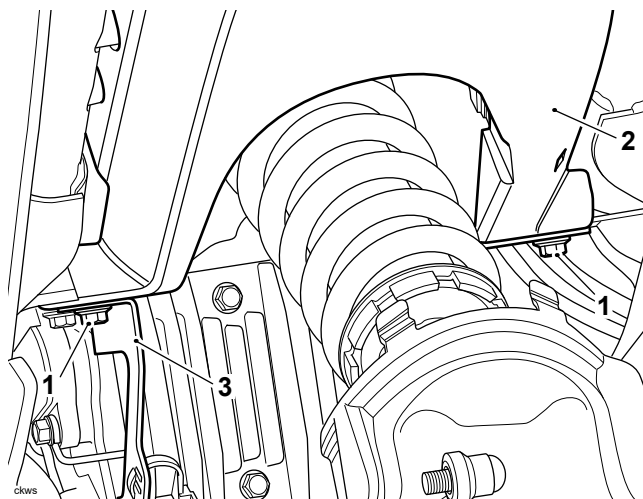
1. Accessory USB connector
2. Relays
3. Ambient air pressure sensor
4. Rear light connector
5. Alarm connector
6. Fuse box
7. Fall detection switch
8. Starter solenoid

9. Release the two fixings and remove the engine ECM tray from the battery tray.
10. Unclip the accessory USB connector from the engine ECM tray.
11. Disconnect the three engine ECM harness connectors and remove the engine ECM.
12. Remove and discard the two side fixings from the battery tray.
13. Remove the two centre fixings and the rear fixing and washer from the battery tray.



- Harness not shown for clarity
1. Engine ECM tray
 2. Rear fixing
 3. Centre fixings
 4. Engine ECM tray fixings
 5. Side fixings
 6. Battery tray

14. Remove the two front fixings from the battery tray and alternator regulator/rectifier bracket.



Some parts removed for clarity

- 1. Fixings
- 2. Battery tray
- 3. Alternator regulator/rectifier bracket

15. Unclip the seat lock cable and remove the battery tray, noting the position of the harness for installation.

Battery Tray - Installation

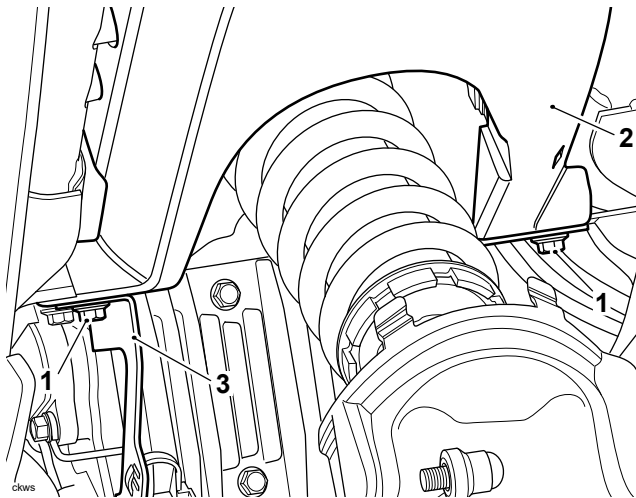
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

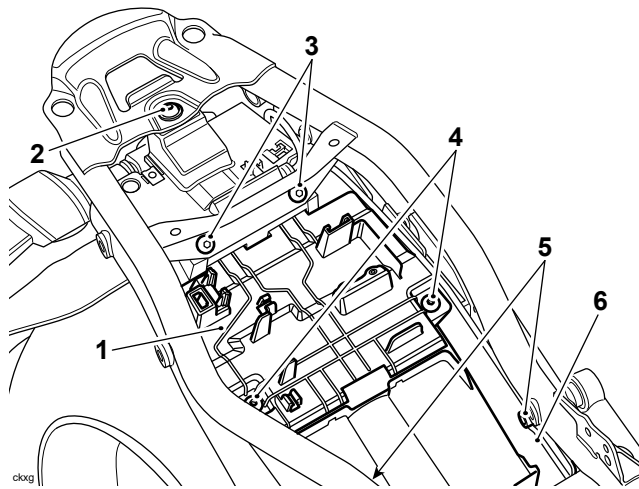
1. Align the battery tray to the frame and alternator regulator/rectifier bracket and position the harness as noted during removal.
2. Secure the battery tray to the alternator regulator/rectifier bracket with two fixings. Tighten to 5 Nm.



Some parts removed for clarity

1. Fixings
2. Battery tray
3. Alternator regulator/rectifier bracket

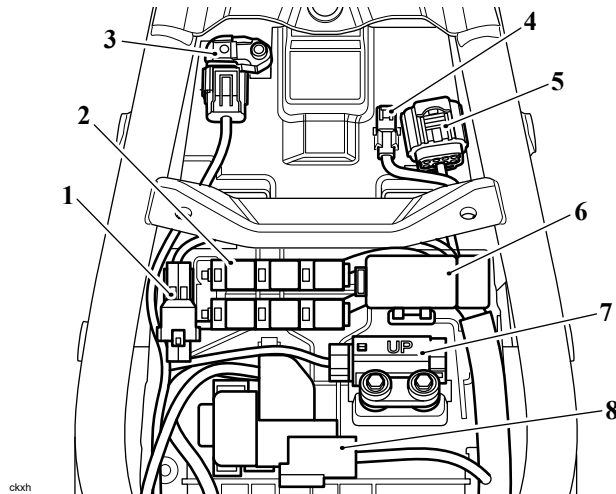
3. Locate the seat lock cable to the battery tray and position the harness as noted during removal.
4. Install the two centre fixings and the rear fixing and washer to the battery tray. Tighten to 3 Nm.
5. Install two new side fixings and tighten to 4 Nm.
6. Install the engine ECM and reconnect the three electrical connectors.
7. Reclip the accessory USB connector to the engine ECM tray.
8. Refit the engine ECM tray with two fixings and tighten to 5 Nm.



Harness not shown for clarity

1. Engine ECM tray
2. Rear fixing
3. Centre fixings
4. Engine ECM tray fixings
5. Side fixings
6. Battery tray

9. Refit the fuse box to the engine ECM tray.
10. Refit the relay blocks to the engine ECM tray in the positions as noted during removal.
11. Reconnect the fall detection switch electrical connector.
12. Refit the starter solenoid to the battery tray.
13. Reclip the alarm and rear light connectors to the battery tray.
14. Refit the ambient air pressure sensor to the battery tray and tighten the fixing to 3 Nm.



1. Accessory USB connector
2. Relays
3. Ambient air pressure sensor
4. Rear light connector
5. Alarm connector
6. Fuse box
7. Fall detection switch
8. Starter solenoid

Perform the following operations:

- **Rear Panels - Installation**

- [Rear Light - Installation](#)
- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Side Panels - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Side Stand - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Raise and support the motorcycle.

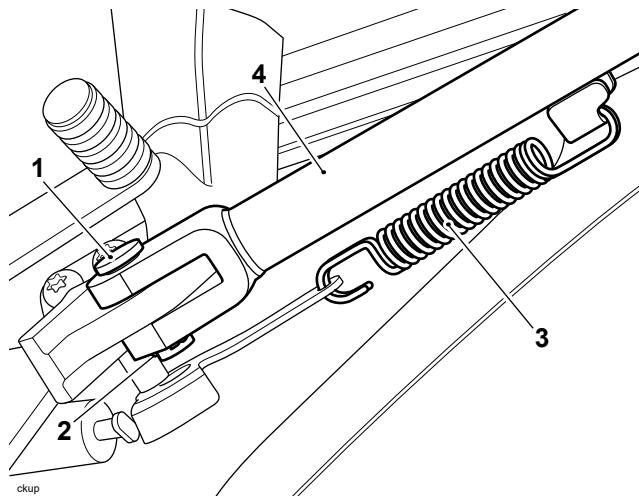
⚠ WARNING

Wear hand, eye and face protection when unhooking the stand spring. Take great care to minimise the risk of personal injury and loss of components.

NOTICE

The side stand is held in the up position by spring tension.

2. With the side stand in the up position, unhook the spring from the side stand and remove it from the motorcycle.



1. Pivot pin
2. Circlip
3. Spring
4. Side stand

3. Remove and discard the circlip securing the pivot pin.
4. Remove the pivot pin and remove the side stand.

Side Stand - Installation

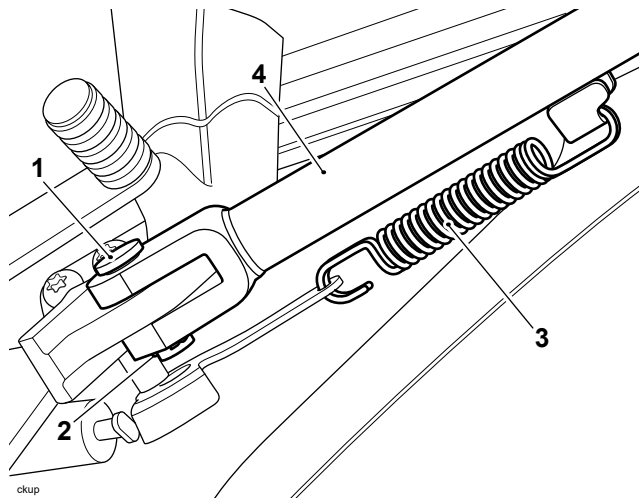
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the side stand to the motorcycle.
2. Insert the pivot pin and install a new circlip.



1. Pivot pin
2. Circlip
3. Spring
4. Side stand

⚠ WARNING

Wear hand, eye and face protection when fitting the stand spring. Take great care to minimise the risk of personal injury and loss of components.

3. With the side stand in the up position, hook the spring onto the upper plate then carefully hook it onto the side stand lug.
4. Check the operation of the side stand before riding the motorcycle. Ensure the spring holds the stand securely in the retracted position.

Side Panels - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

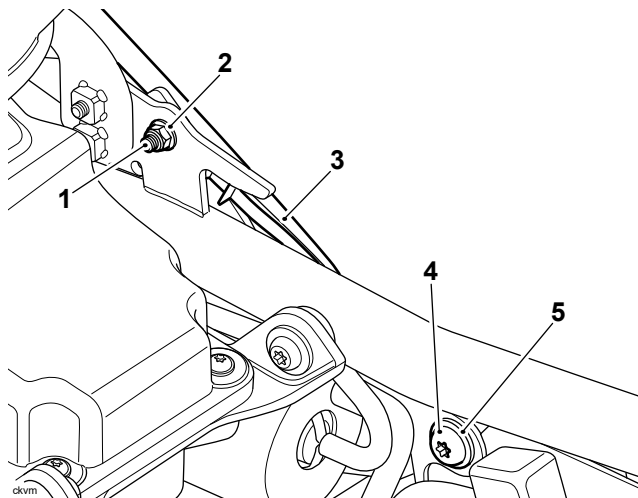
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

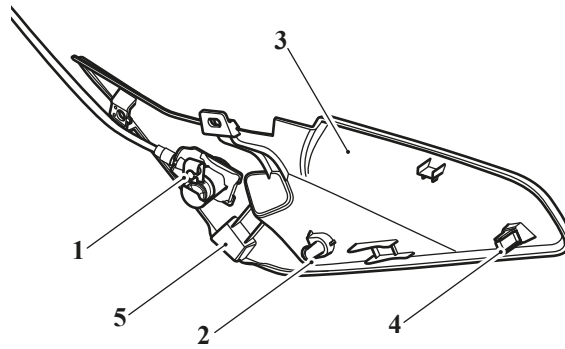
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Remove the central fixings and lock nuts. Discard the lock nuts.
2. Remove the rear fixings and washers.



1. Central fixing
2. Lock nut
3. Side panel
4. Rear fixing
5. Washer

3. Ease the front of the side panel away from the motorcycle, releasing the front clip and the spigot from the rubber grommet. Note their position for installation. Raise the side panel to release the locating slot from the frame.
4. On the left hand side panel, rotate the seat lock cable end 180 degrees and release it from the seat lock assembly and bracket, noting the position of the cable in the bracket locating feature for installation.



- 1. Seat lock cable end
- 2. Spigot
- 3. Side panel
- 4. Clip
- 5. Locating slot

Side Panels - Installation

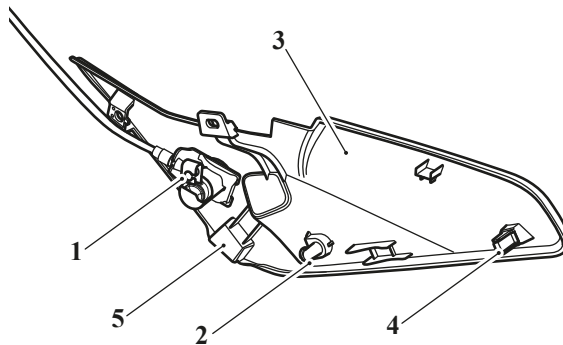
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

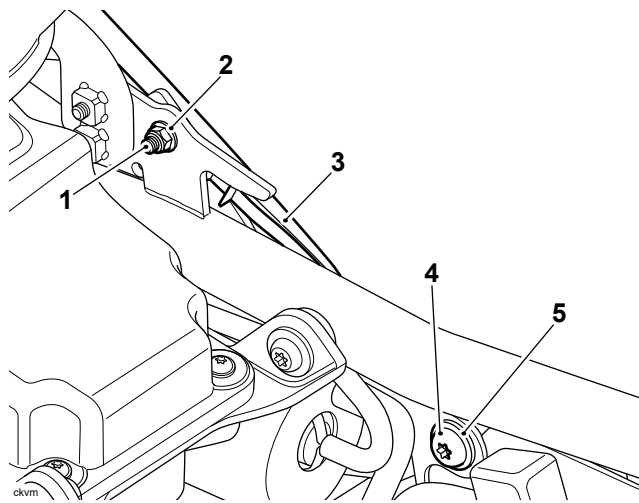
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Ensure the rubber grommets and plastic clips are in place as noted during removal.
2. For the left hand side panel, install the seat lock cable to the seat lock assembly and bracket. Make sure the cable is located in the bracket locating feature as noted during removal.
3. Align the side panel locating slot to the frame locating tang. Press the spigots into the rubber grommets and make sure the plastic clips are locked in place.



1. Seat lock cable end
2. Spigot
3. Side panel
4. Clip
5. Locating slot

4. Install the central fixings with new lock nuts. Install the rear fixings and washers. Tighten the fixings to 3 Nm.



1. Central fixing
2. Lock nut
3. Side panel
4. Rear fixing
5. Washer

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Rear Panels - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

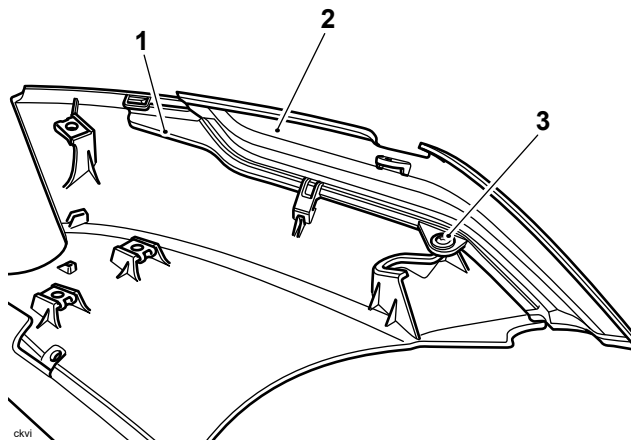
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Light - Removal](#)

1. If required, remove the screws securing the rear infill panels to the rear undertray.



1. Rear undertray
2. Rear infill panel
3. Screw

Rear Panels - Installation

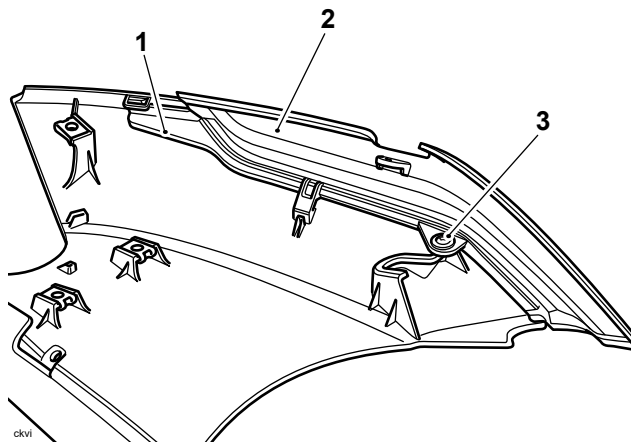
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. If required, fit the rear infill panels to the rear undertray and secure with two screws. Tighten to 1 Nm.



1. Rear undertray
2. Rear infill panel
3. Screw

Perform the following operations:

- [Rear Light - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Radiator Cowl - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

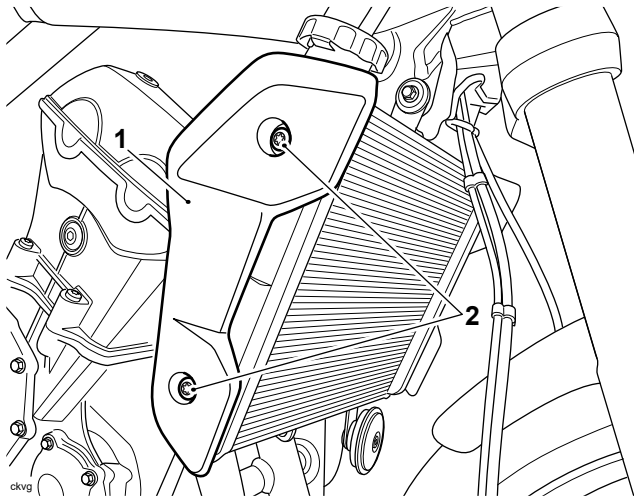
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

NOTICE

Follow the same procedure for both left and right hand sides.

1. Remove and discard the two fixings securing the radiator cowl to the radiator.



1. Radiator cowl (right hand side shown)
2. Fixings

2. Remove the radiator cowl and collect the flanged sleeves, noting their orientation for installation.
3. Unclip the horn harness from the left hand side radiator cowl, noting the routing for installation.

Radiator Cowl - Installation

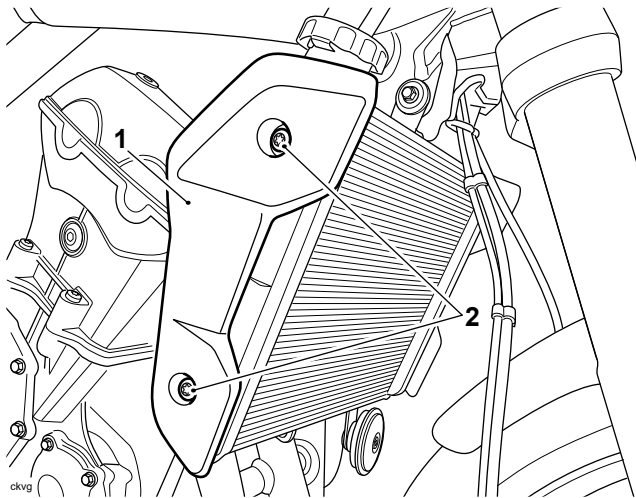
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Clip the horn harness to the left hand side radiator cowl as noted during removal.
2. Install the flanged sleeves to the radiator cowls as noted during removal and align the radiator cowl to the radiator.



1. Radiator cowl (right hand side shown)
2. Fixings

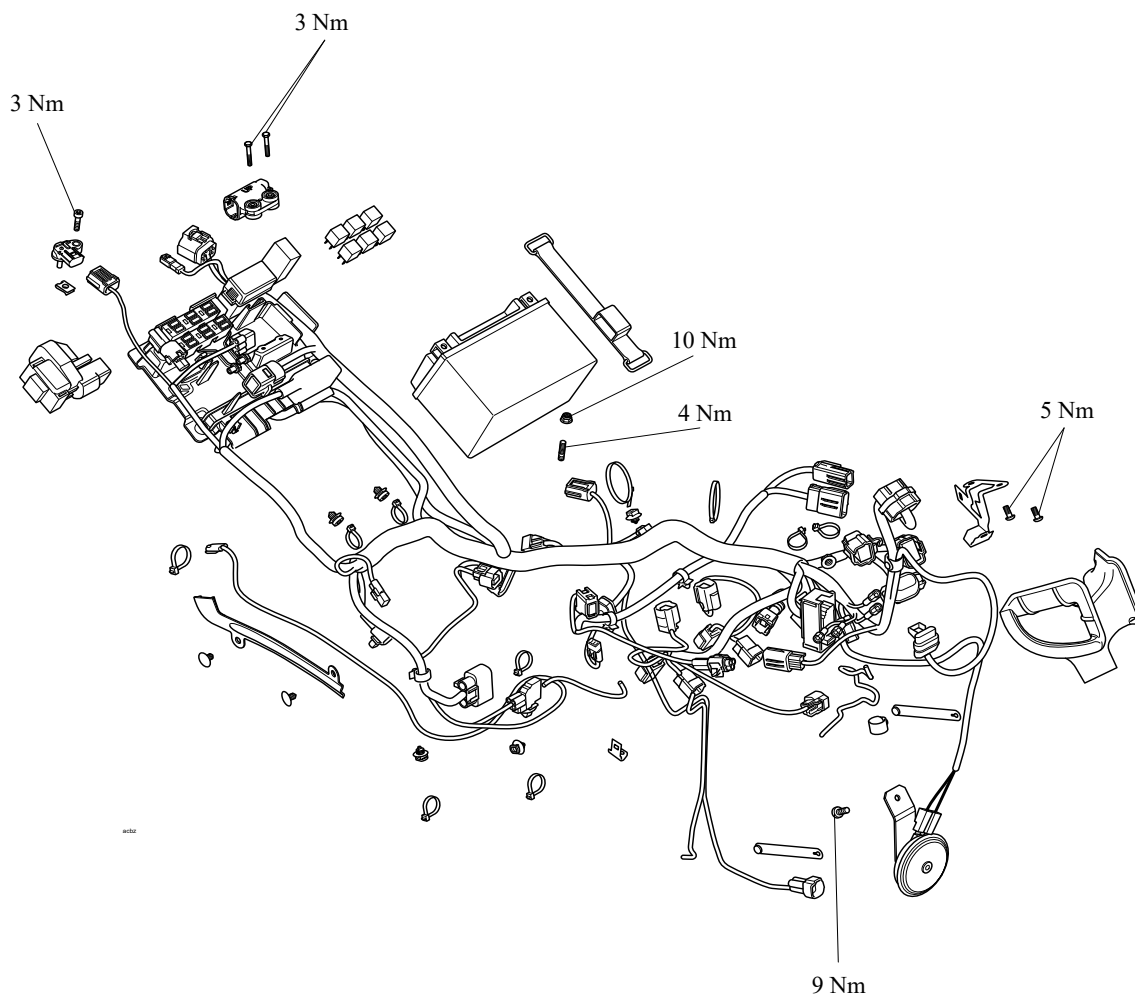
3. Install two new fixings and tighten to 2.5 Nm.

 / Electrical

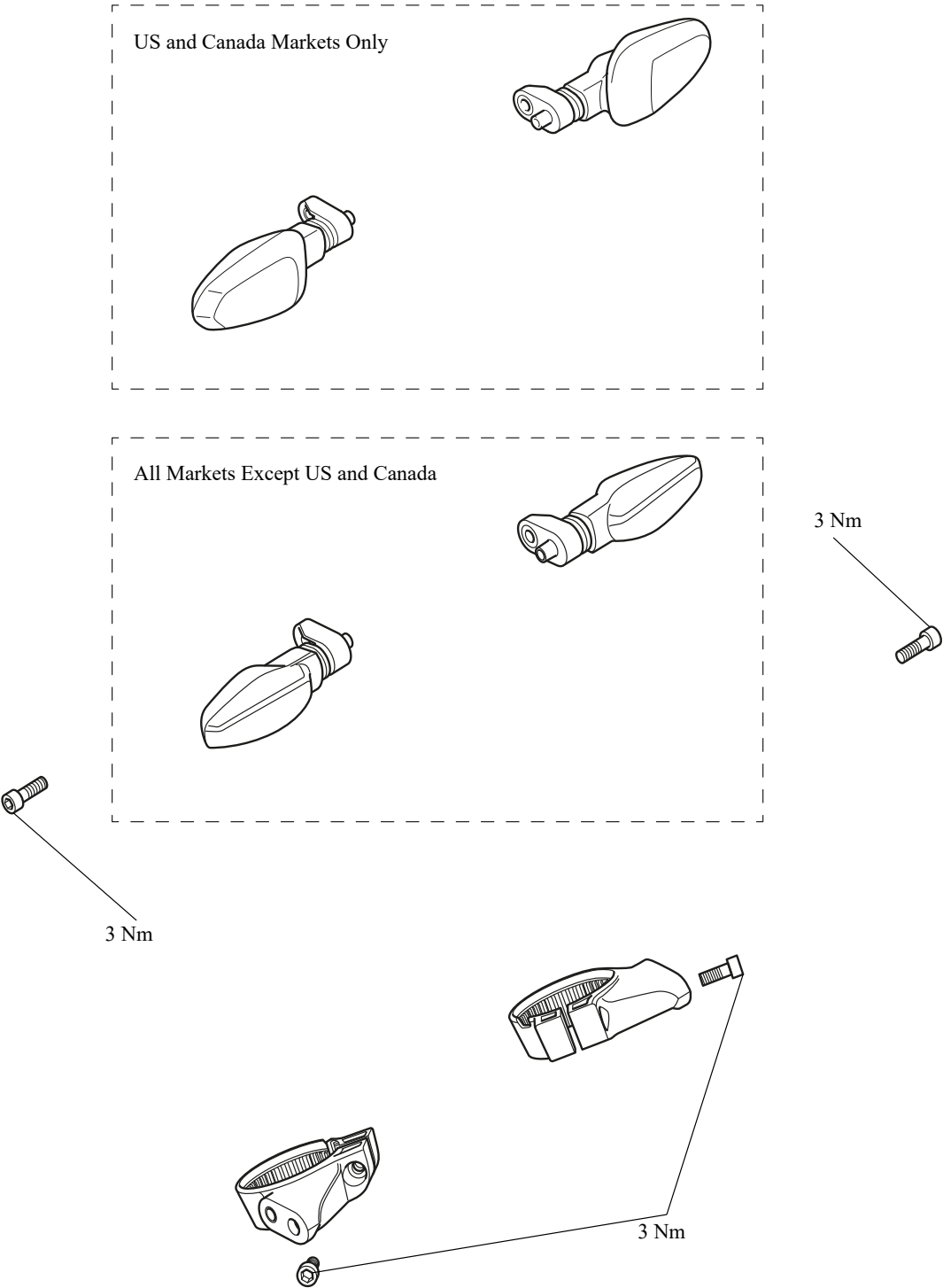
Electrical

Exploded Views

Exploded View - Battery, Horn and Wiring

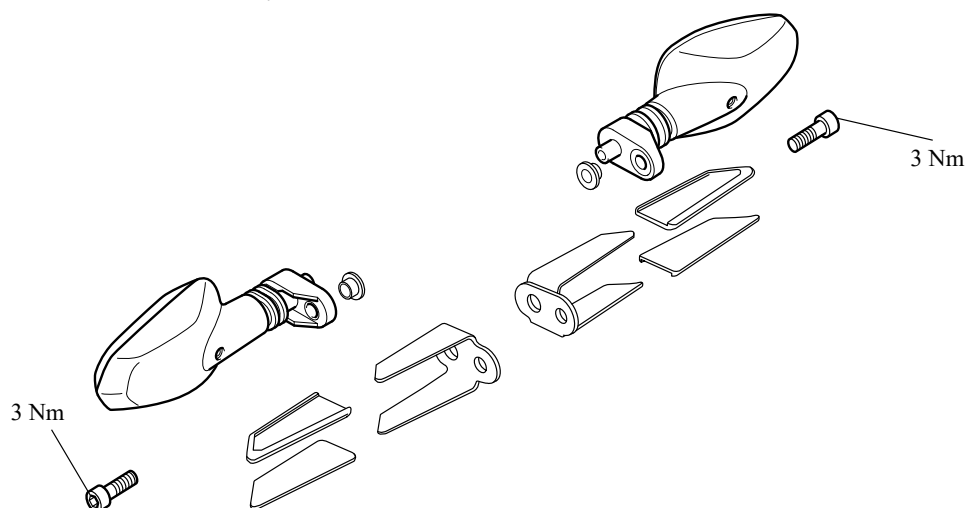


Exploded View - Front Direction Indicators

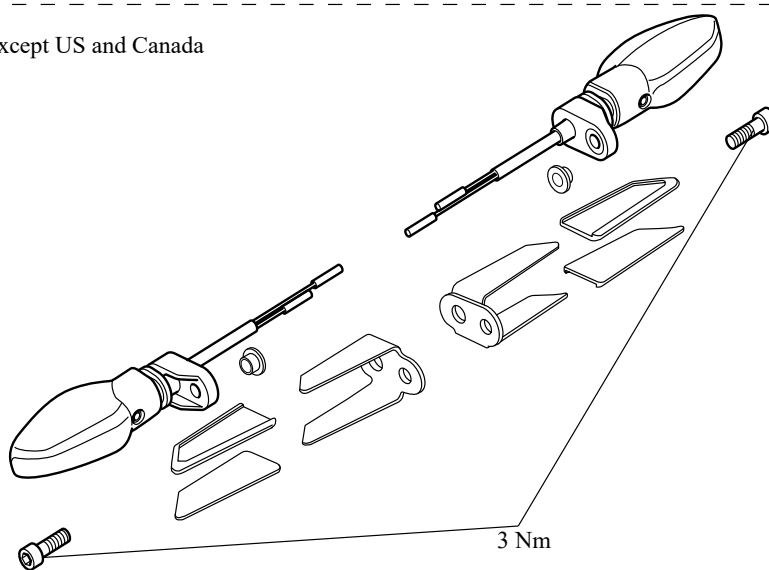


Exploded View - Rear Direction Indicators

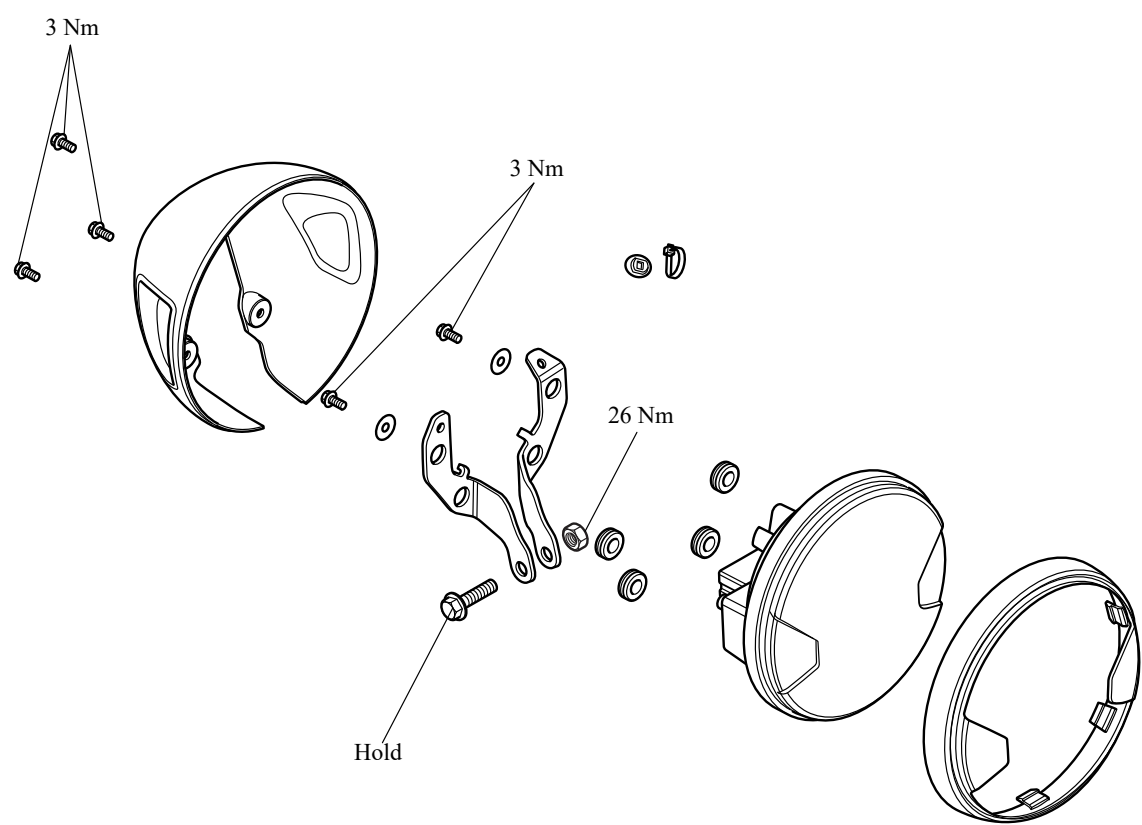
US and Canada Markets Only



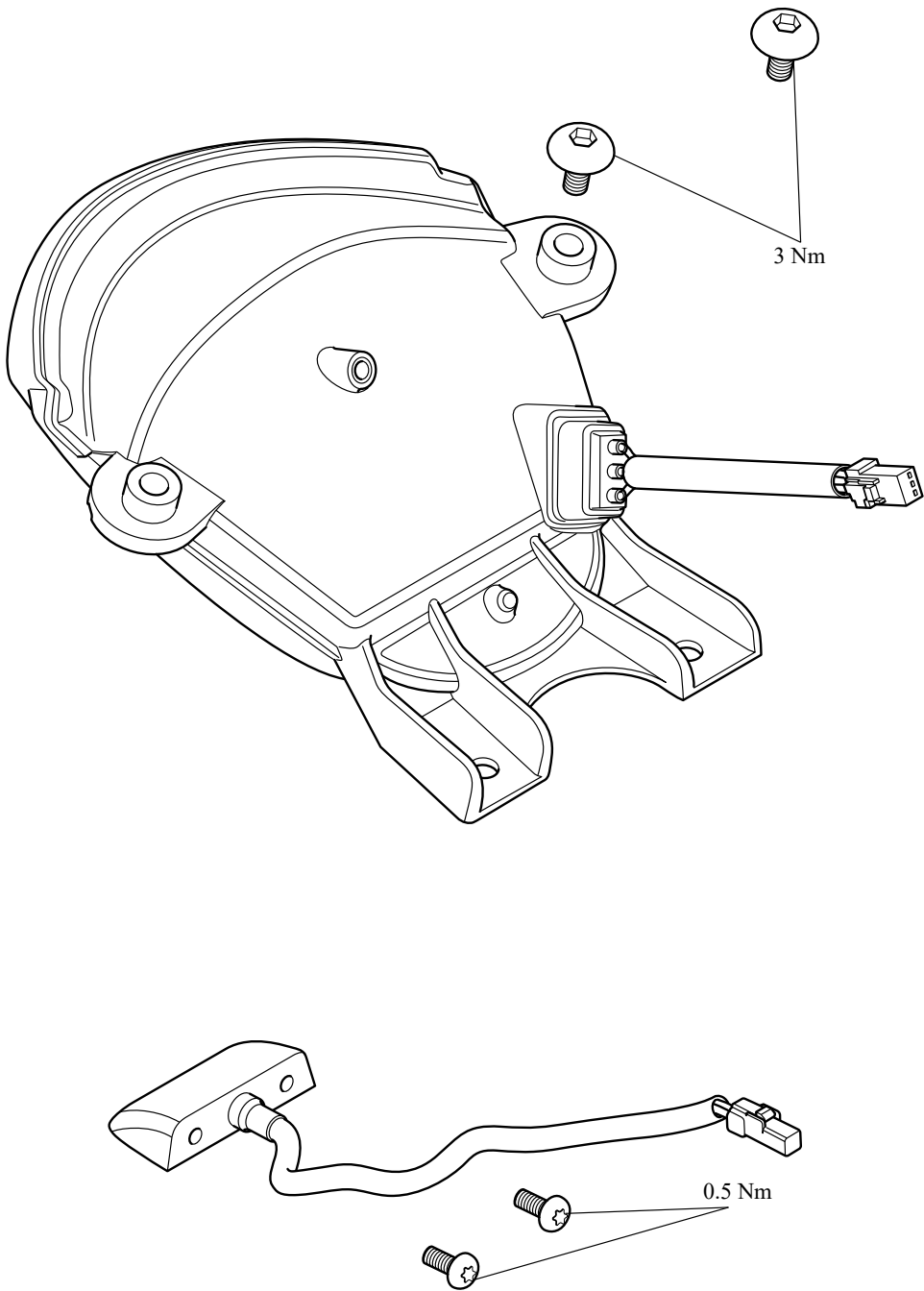
All Markets Except US and Canada



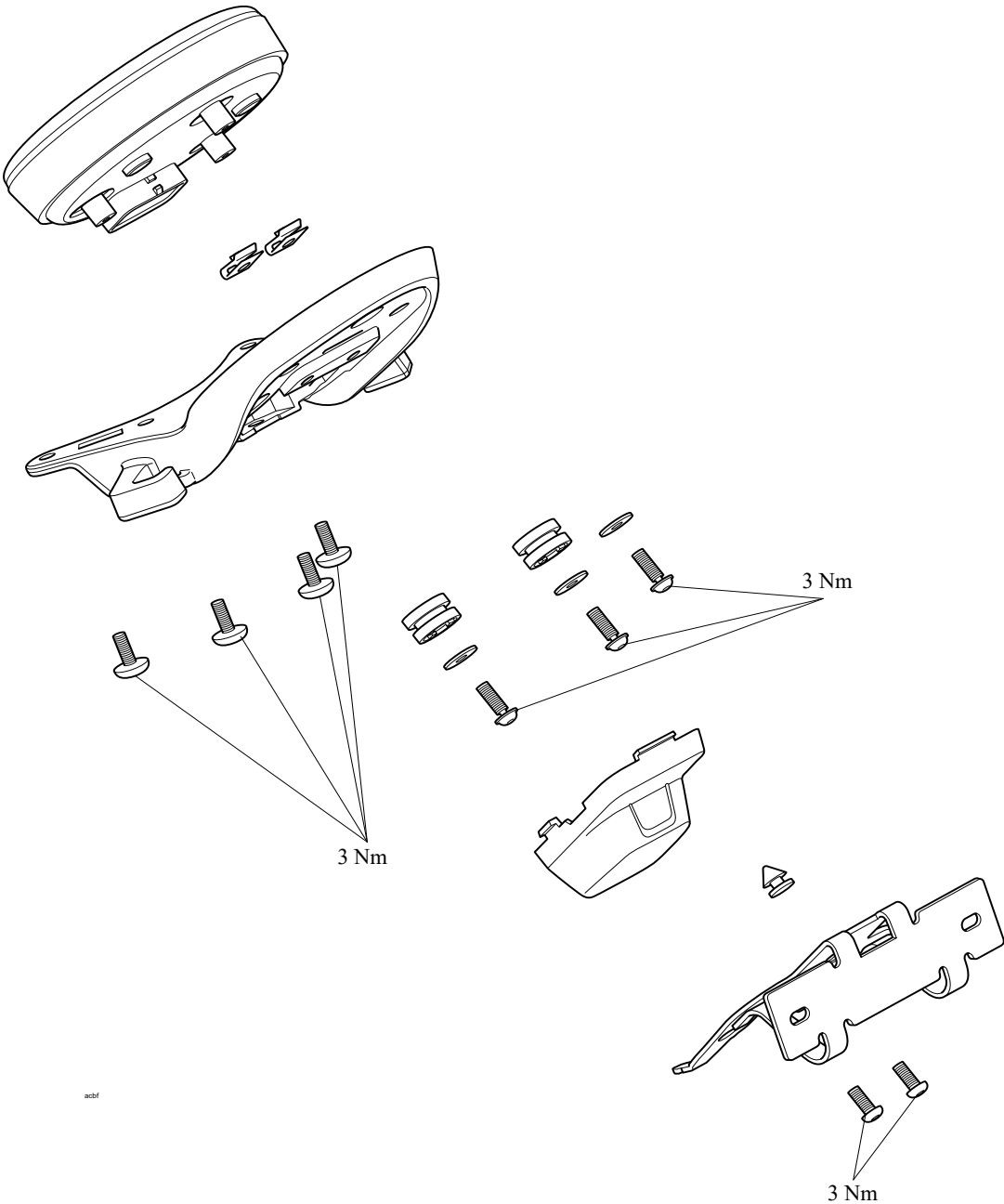
Exploded View - Headlight



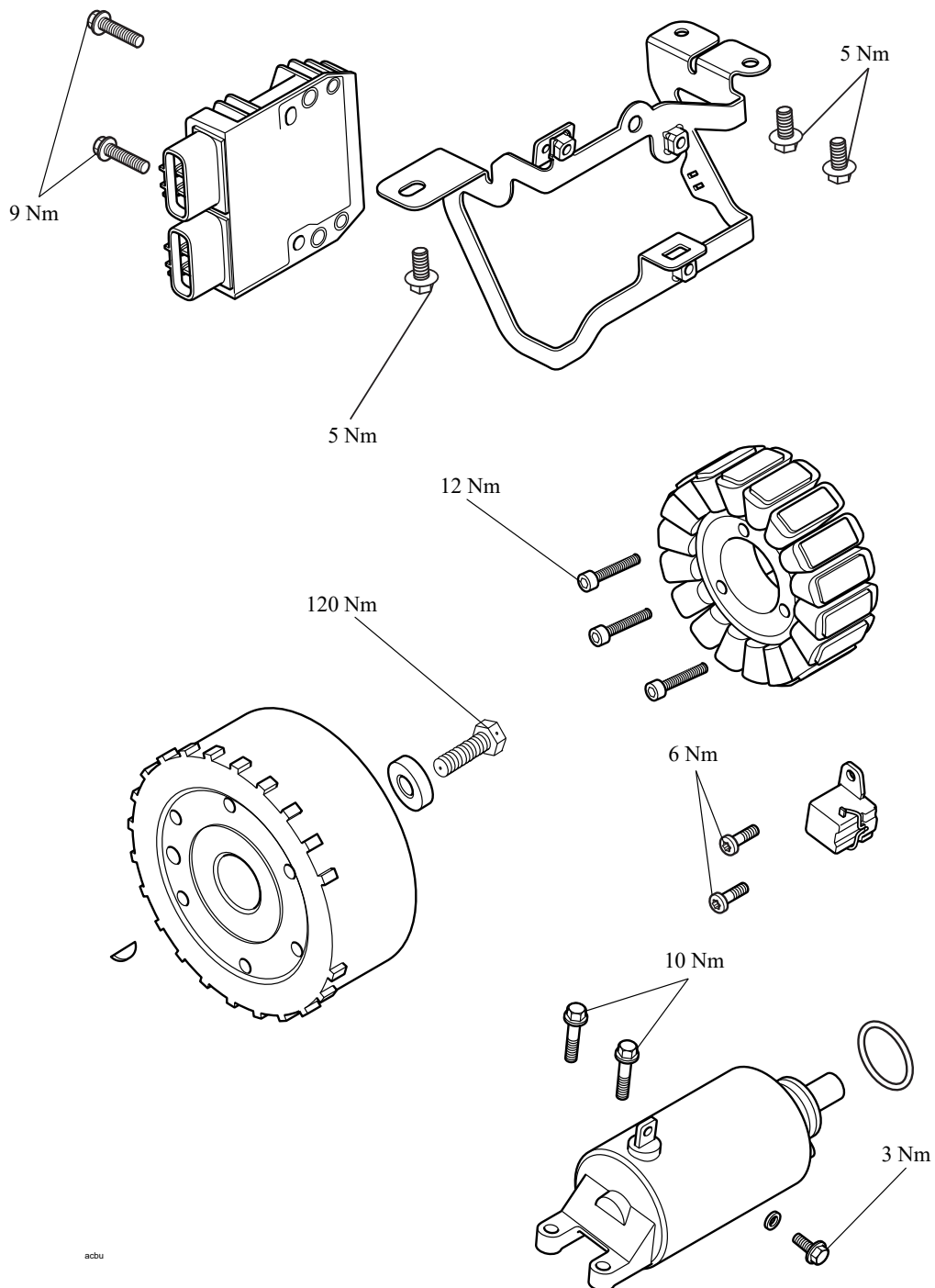
Exploded View - Rear Lights



Exploded View - Instruments



Exploded View - Starter Motor and Alternator



Battery, Fuses and Relays

Battery

WARNING

Under some circumstances, the battery can give off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging or using the battery in an enclosed space.

The battery contains sulphuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.

If electrolyte gets on your skin, flush with water immediately.

If electrolyte gets in your eyes, flush with water for at least 15 minutes and SEEK MEDICAL ATTENTION IMMEDIATELY.

If electrolyte is swallowed, drink large quantities of water and SEEK MEDICAL ATTENTION IMMEDIATELY.

KEEP ELECTROLYTE OUT OF THE REACH OF CHILDREN.

WARNING

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

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

Battery Disposal

Should the battery ever require replacement, the original battery must be handed to a recycling agent who will ensure that the dangerous substances from which the battery is manufactured do not pollute the environment.

Battery Maintenance

The battery is a sealed type and does not require any maintenance other than checking the voltage and routine recharging such as during storage.

It is not possible to adjust the electrolyte level in the battery.

NOTICE



The charge level in the battery must be maintained to maximise the battery life.

With normal use of the motorcycle, the charging system will keep the battery charged. If the motorcycle is unused, the battery will gradually discharge due to battery self discharge and the continuous current drain for the clock and the engine control module memory.

The rate of battery discharge can be greatly increased by the addition of electrical security systems or other accessories.

Allowing a battery to discharge, or leaving it discharged over a period of time, causes sulphation of the lead plates within the battery.

Sulphation is a normal chemical reaction inside the battery and over a period of time sulphate will crystallise on to the lead plates making charging difficult or impossible. The result is a permanently damaged battery, which would not be covered by the motorcycle warranty.

Keeping a battery at full charge reduces the chance of it freezing in cold conditions. Allowing a battery to freeze can cause serious internal damage to the battery.

When leaving the motorcycle standing for more than a few days, regularly check the battery voltage using a digital multimeter. Should the battery voltage fall below 12.8 V, charge the battery using the BatteryMate Battery Charger - see latest Parts Catalogue for part number information. Refer to the instructions supplied with the BatteryMate Battery charger.

For extended periods of storage (beyond two weeks) the battery should be removed and the battery voltage checked regularly and charged when below 12.8 V.

Battery Already in Service

NOTICE

Before carrying out the following procedure the battery must be disconnected and removed from the motorcycle.

Use the guidelines in the table below for charging. Always verify the battery condition before charging, and 30 minutes after charging.

NOTICE

A fully charged battery should read 12.8 volts or higher after the battery has been off the charger for 30 minutes or more.

Table of Battery Charging Times

State of charge	Voltage	Action	Charge time (using BatteryMate 150-9)
100%	12.8 V - 13.0 V	None. Check at 4 months from date of delivery	None required
75% - 100%	12.5 V - 12.8 V	Charge and check in 4 months from date of last check	3 - 6 hours
50% - 75%	12.0 V - 12.5 V	Needs charge	5 - 11 hours
25% - 50%	11.5 V - 12.0 V	Needs charge	At least 13 hours
0% - 25%	11.5 V or less	Needs recovery using BatteryMate 150-9. Retest after recovery	20 hours

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. Check the battery carefully for damage.

⚠ 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.

2. Read the instructions and warnings delivered with the battery.
3. Place the battery on a flat level surface and remove the sealing foil.
4. Remove the battery sealing strip from the electrolyte container 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 on the battery and fill the battery according to the manufacturers 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 2 hours.
9. Remove the electrolyte container 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 Battery Charger. Refer to the instructions supplied with the BatteryMate Battery Charger.

⚠ 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's service 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 - Removal

WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

WARNING

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

The riding modes allow the rider to adjust the throttle response (MAP), Anti-lock Brake System (ABS) and Traction Control (TC) settings to suit differing road conditions and rider preference.

Before disconnecting the battery or removing a fuse, note and record the rider's settings. Once the fuse has been refitted or the battery reconnected the rider's settings should be reset as noted.

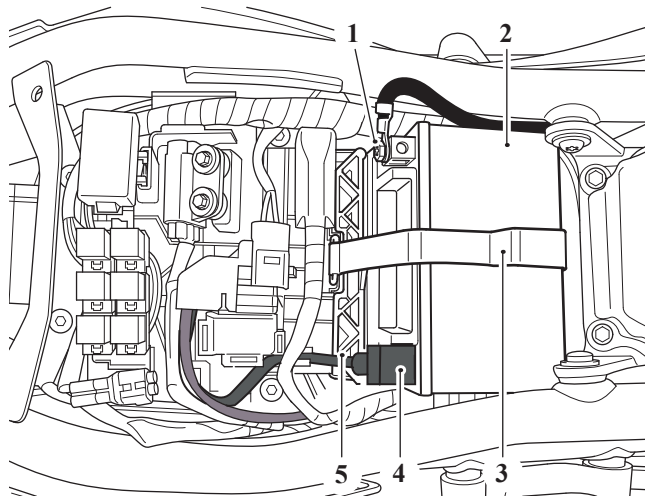
WARNING

If the battery has been disconnected or the fuses removed for any reason advise the rider to confirm the original mode settings have been correctly set. Failure to reset the motorcycle to the rider's preferred rider mode settings and subsequently being ridden may cause loss of motorcycle control and an accident.

Perform the following operations:

- [Seat - Removal](#)

1. Disconnect the battery leads, negative (black) lead first.
2. Remove the battery strap.



1. Negative (black) terminal
2. Battery
3. Battery strap
4. Positive (red) terminal
5. Battery insert

3. Remove the battery insert.
4. Remove the battery.

Battery - Installation

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

⚠️ WARNING

Ensure that the battery terminals do not touch the motorcycle frame as this may cause a short circuit or spark, which would ignite battery gases causing a risk of personal injury.

NOTICE

Once the battery has been reconnected the rider's configuration settings should be reset as noted prior to the battery being disconnected.

⚠️ WARNING

If the battery has been disconnected or the fuses removed for any reason advise the rider to confirm the original mode settings have been correctly set. Failure to reset the motorcycle to the rider's preferred rider mode settings and subsequently being ridden may cause loss of motorcycle control and an accident.

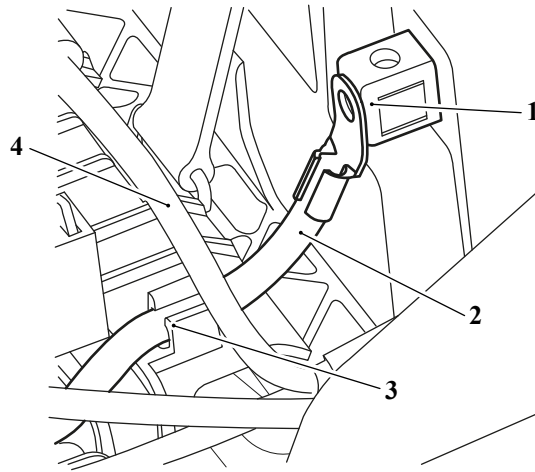
1. Place the battery into the battery tray and install the battery insert.
2. Reattach the battery strap.

NOTICE

The battery positive and negative leads are to be connected to the vertical face of the battery terminals.

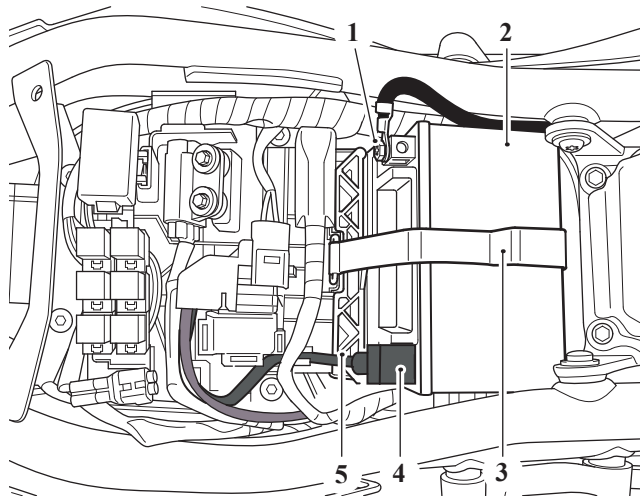
The battery positive lead routes underneath the diagnostic connector cable and clips to the Engine ECM moulding.

3. Reconnect the battery, positive (red) lead first, routing the positive lead underneath the diagnostic connector cable, and tighten the battery terminals to 4.5 Nm.
4. Make sure the battery positive (red) lead is clipped to the engine ECM tray.



1. Battery positive terminal
2. Battery positive lead
3. Retaining feature on engine ECM moulding
4. Diagnostic connector cable

5. Apply a light coat of grease to the terminals to prevent corrosion.
6. Cover the positive terminal with the protective cap.



1. Negative (black) terminal
2. Battery
3. Battery strap
4. Positive (red) terminal
5. Battery insert

Perform the following operations:

- [Seat - Installation](#)

Fuse Identification

⚠ WARNING

Always replace blown fuses with new ones of the correct rating (as specified on the fuse box cover) and never use a fuse of higher rating.

Use of an incorrect fuse could lead to an electrical problem, resulting in motorcycle damage, loss of motorcycle control and an accident.

The riding modes allow the rider to adjust the throttle response (MAP), Anti-lock Brake System (ABS) and Traction Control (TC) settings to suit differing road conditions and rider preference.

Before disconnecting the battery or removing a fuse for any reason, note and record the rider's settings. Once the fuse has been refitted or the battery reconnected the rider's settings should be reset as noted.

⚠ WARNING

If the battery has been disconnected or the fuses removed for any reason advise the rider to confirm the original mode settings have been correctly set. Failure to reset the motorcycle to the rider's preferred rider mode settings and subsequently being ridden may cause loss of motorcycle control and an accident.

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 identification table to establish which fuse has blown.

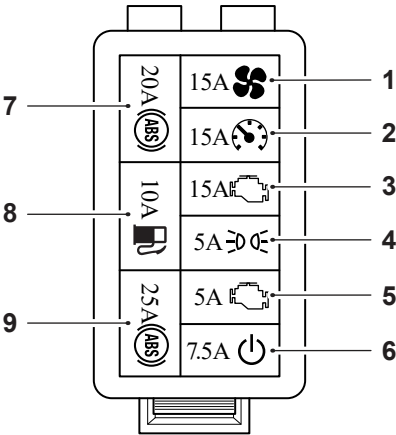
The fuse boxes are located underneath the seat.

To allow access to the fuse boxes, the seat must be removed (see [Seat - Removal](#)).

NOTICE

Numbers shown in the following illustration correspond to the position numbers in the fuse identification table.

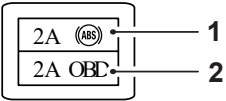
Fuse Box 1



Fuse Box 1

Position	Circuit Protected	Rating (Amps)
1	Cooling Fan	15
2	Instruments	15
3	Engine Management System (EMS)	15
4	Position Lighting	5
5	Engine Control Unit (ECU)	5
6	Ignition	7.5
7	ABS Solenoid	20
8	Fuel Pump	10
9	ABS Pump	25

Fuse Box 2



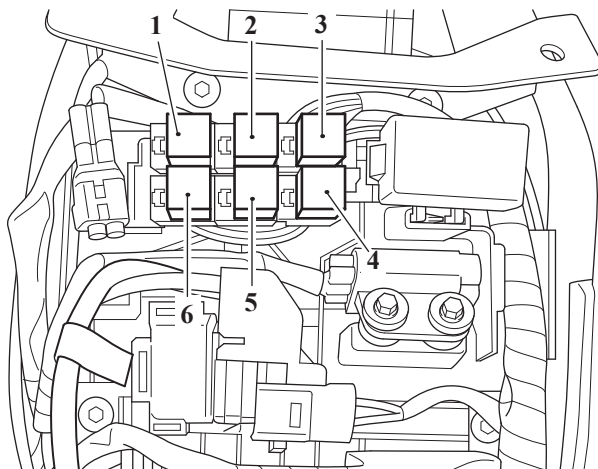
Fuse Box 2

Position	Circuit Protected	Rating (Amps)
1	ABS ECU	2
2	Diagnostics	2

Relays

Identification and Location

The relays are located underneath the seat. To gain access to the relays, remove the seat (see [Seat - Removal](#)).



1. Cooling fan
2. Main beam
3. Fuel pump
4. Engine management relay (EMS)
5. Horn
6. Starter motor

Electrical Diagnostics

Pin Point Tests

Select the relevant diagnostics chapter.

- Engine: [Diagnostic Trouble Codes - Index - Engine](#)
- Immobiliser/TPMS: [Diagnostic - Trouble Codes - Index - Immobiliser/TPMS](#)
- ABS: [Diagnostic Trouble Codes - Index - ABS](#)
- Instruments: [Diagnostic - Trouble Codes - Index - Instruments](#)
- CAN errors (five digit fault code): [Diagnostics - Trouble Codes - Index - CAN Errors](#)

Lighting Adjustment and Bulb Replacement

Headlight

⚠️ WARNING



Adjust road speed to suit the visibility and weather conditions in which the motorcycle is being operated.

Make sure that the head light beam is adjusted to illuminate the road surface sufficiently far ahead without dazzling oncoming traffic. An incorrectly adjusted headlight may impair visibility causing an accident.

⚠️ WARNING



Never attempt to adjust a headlight beam when the motorcycle is in motion.

Any attempt to adjust a headlight beam when the motorcycle is in motion may result in loss of control and an accident.

⚠️ CAUTION



Do not cover the headlight or lens with any item likely to obstruct air flow to, or prevent heat escaping from, the headlight lens.

Covering the headlight lens during operation with items of clothing, luggage, adhesive tape, devices intended to alter or adjust the headlight beam or non genuine headlight lens covers will cause the headlight lens to overheat and distort, causing irreparable damage to the headlight assembly.

Damage caused by overheating is not considered a manufacturing defect and will not be covered under warranty.

If the headlight must be covered during use - such as taping of the headlight lens required during closed-course conditions - the headlight must be disconnected.

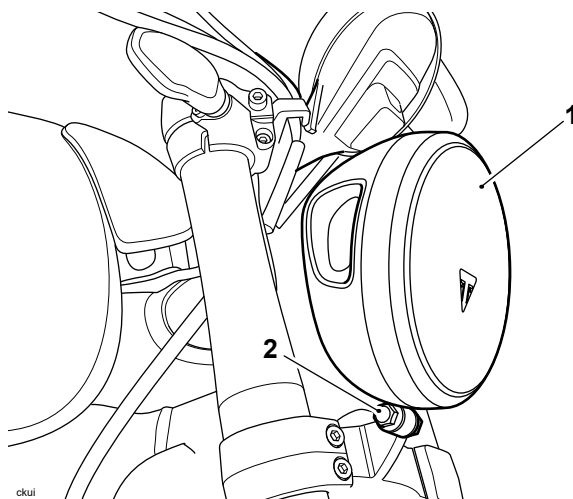
14. Fit the battery to the motorcycle, positive (red) lead first.

Headlight Vertical Adjustment

NOTICE

Check and correct the tyre pressures prior to adjusting the headlight.

1. Switch the headlight dipped beam on.
2. Loosen the headlight pivot lock nut sufficiently to allow restricted movement of the headlight.
3. Adjust the position of the headlight to give the required beam setting.
4. Tighten the mounting fixings to 26 Nm.
5. Recheck the headlight beam setting.
6. Switch the headlight off when the beam setting is satisfactorily set.



- 1. Headlight Assembly
- 2. Pivot bolt

LED Headlight Unit - Replacement

The LED headlight unit is a sealed, maintenance free unit. The headlight unit must be replaced in the event of the failure of the headlight or position light. See [Headlights - Removal](#).

Rear Light Bulb Replacement - LED

The LED rear light units are sealed, maintenance free LED units. The rear light units must be replaced in the event of the failure of the rear lights.

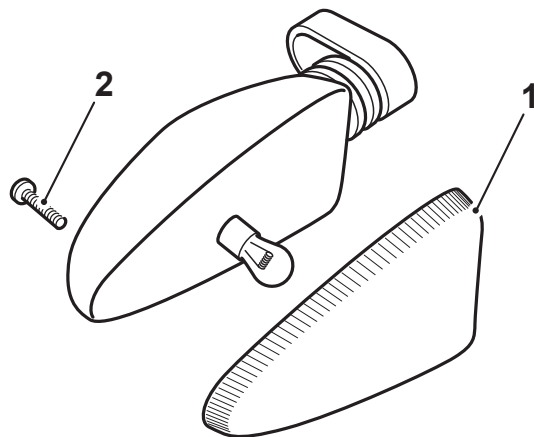
Direction Indicators - US and Canada Markets Only

⚠️ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.



celc_2

- 1. Direction indicator lens
- 2. Fixing

1. Release the fixing and remove the lens to gain access to the bulb for replacement.

LED Direction Indicators - All Markets Except US and Canada

The LED direction indicators are sealed for life units and must be replaced in the event of a failure.

LED Rear Licence Plate Light

The LED rear licence plate light unit is a sealed, maintenance free LED unit. The rear licence plate light unit must be replaced in the event of the failure.

Removal and Installation - Electrical Components

Instruments - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

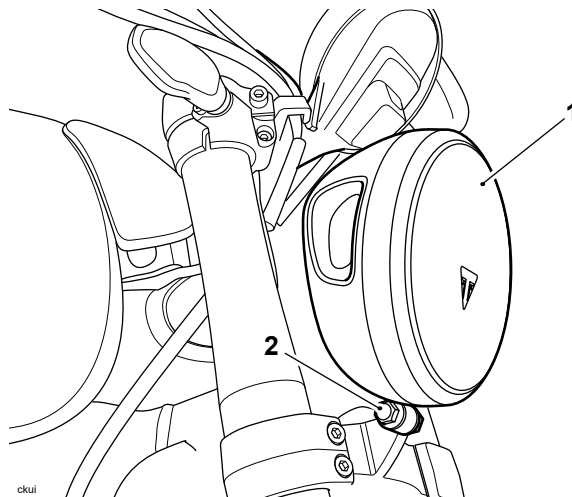
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

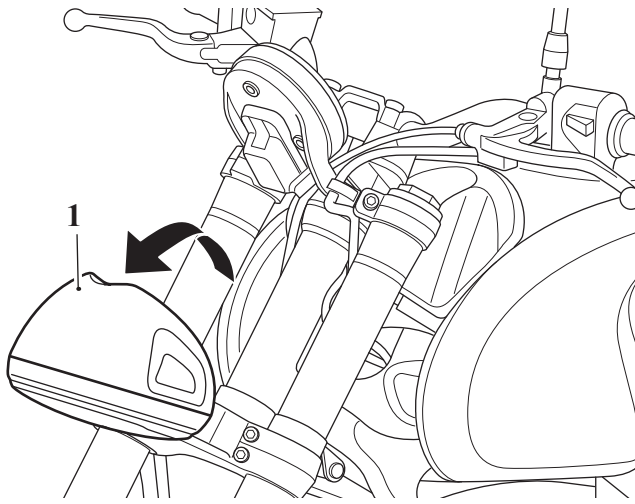
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Loosen, but do not remove, the headlight pivot fixings.



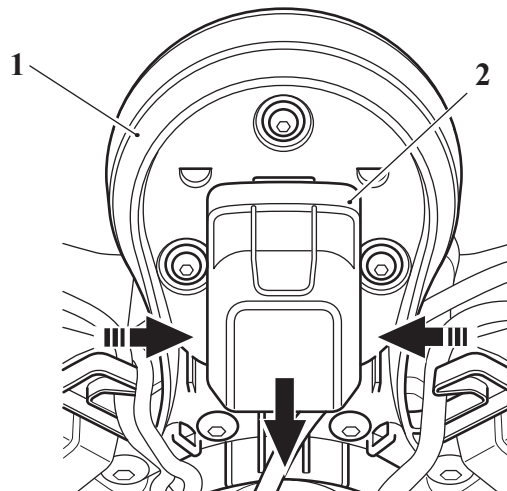
- 1. Headlight Assembly
- 2. Pivot bolt

2. Tilt the headlight forwards in order to gain access to the instruments fixings.



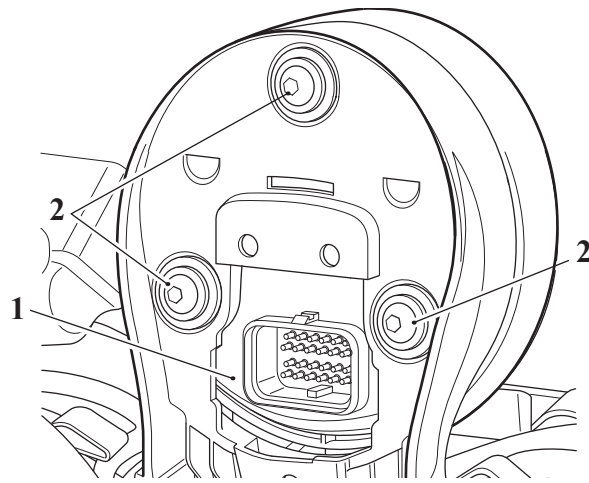
1. Headlight

3. Remove the instruments shroud from the instruments bracket by pressing the sides of the shroud to release the retaining clips and pulling it downwards clear of the instruments bracket. Disconnect the instruments electrical connector.



1. Instruments bracket
2. Instruments shroud

4. Remove the three fixings and washers and remove the instruments from the bracket.



- | |
|---|
| <p>1. Instruments</p> <p>2. Fixings</p> |
|---|

Instruments - Installation

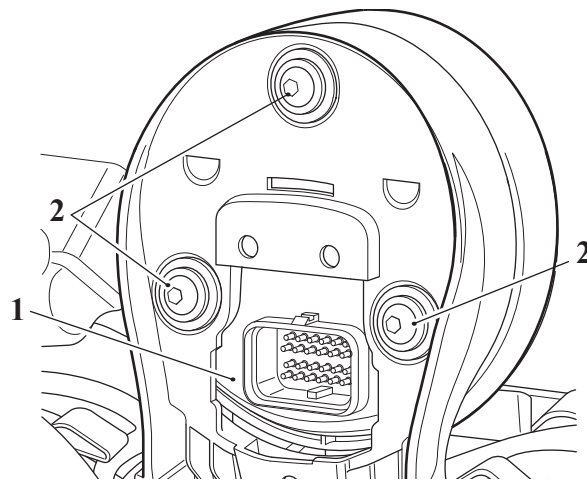
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

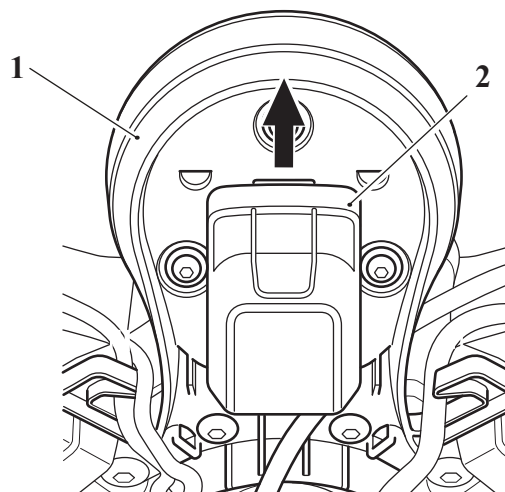
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Install the instruments to the instruments bracket with three fixings and washers. Tighten to 3 Nm.



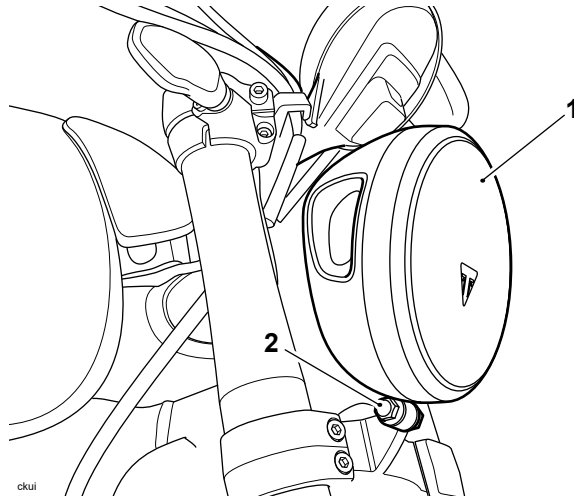
- 1. Instruments
- 2. Fixings

2. Reconnect the instruments electrical connector and install the instruments shroud.



- 1. Instruments bracket
- 2. Instruments shroud

3. Raise the headlight to the desired position and tighten the lock nut to 26 Nm.



- | |
|---|
| <p>1. Headlight Assembly</p> <p>2. Pivot bolt</p> |
|---|

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Ignition Switch - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

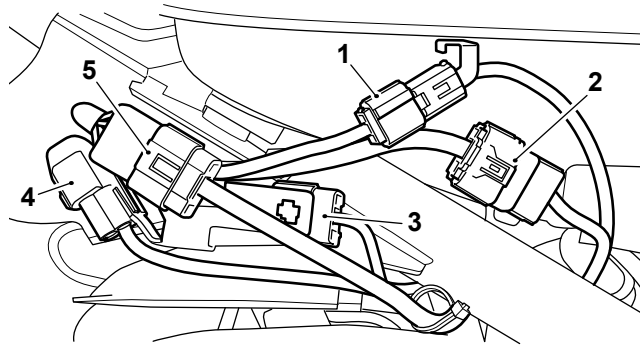
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)

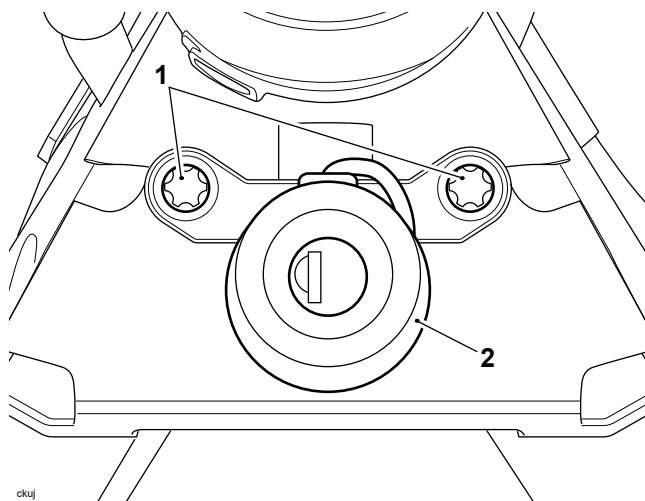
1. Disconnect the ignition switch electrical connector.



akuc

1. Right hand switch housing connector
2. Left hand switch housing connector
3. Left hand switch housing connector
4. Fuse box 2
5. Ignition switch connector

2. Remove the sheared bolts then remove the ignition switch.



- 1. Sheared bolts
- 2. Ignition switch

Ignition Switch - Installation

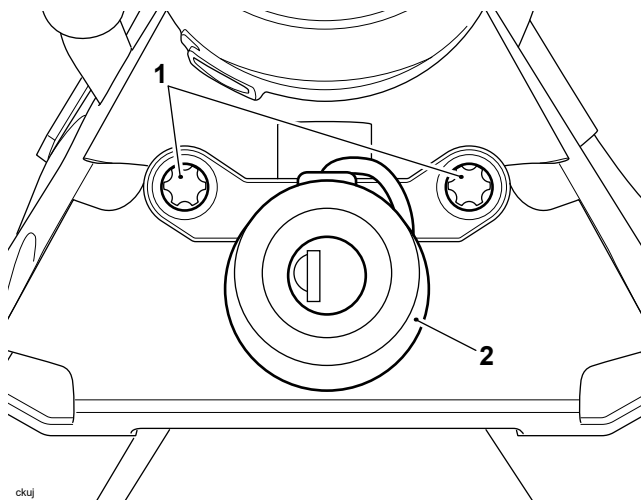
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

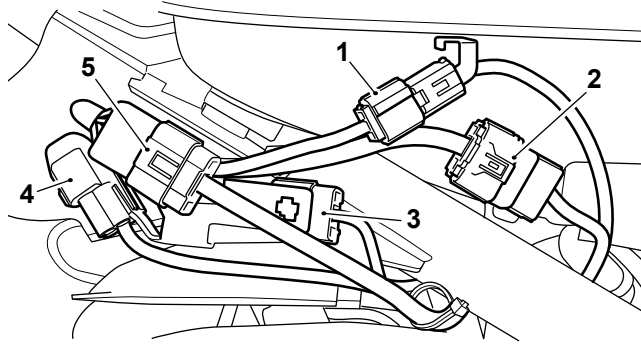
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the ignition switch to the frame.
2. Fit new shear bolts and tighten to 16 Nm.



1. Shear bolts
2. Ignition switch

3. Reconnect the ignition switch electrical connector.



dkuc

1. Right hand switch housing connector
2. Left hand switch housing connector
3. Left hand switch housing connector
4. Fuse box 2
5. Ignition switch connector

Perform the following operations:

- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Headlights - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

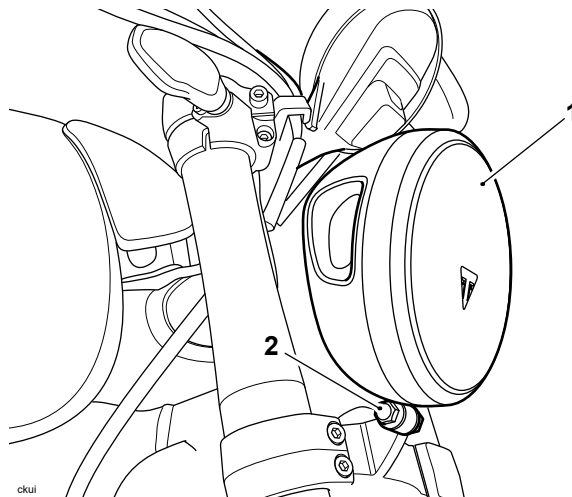
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

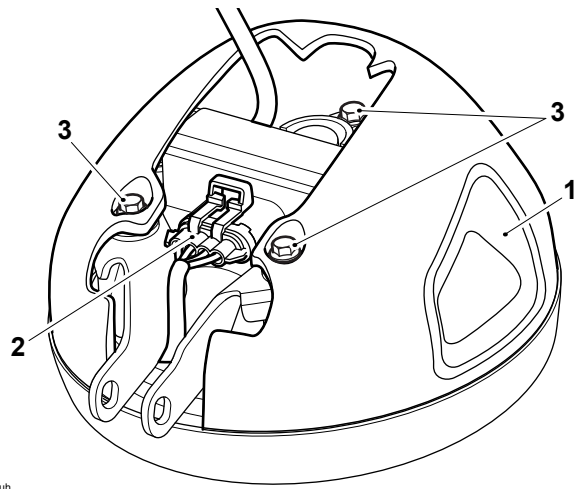
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Support the headlight assembly and remove the headlight pivot fixings.



- 1. Headlight Assembly
- 2. Pivot bolt

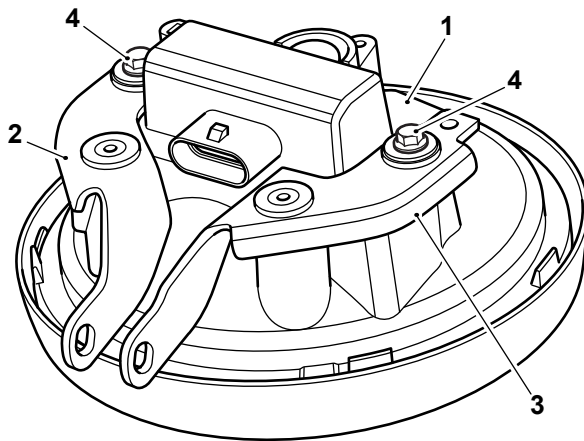
2. Remove the three fixings and remove the headlight assembly rear cover.



ckuh

- | |
|---|
| 1. Headlight assembly rear cover
2. Electrical connector
3. Fixings |
|---|

- 3. Disconnect the electrical connector and remove the headlight from the harness, noting the routing of the harness for installation.
- 4. If required, remove the two fixings and washers to remove the headlight brackets from the headlight.



ckug

- | |
|---|
| 1. Headlight
2. Headlight bracket, left hand side
3. Headlight bracket, right hand side
4. Fixings |
|---|

Headlights - Installation

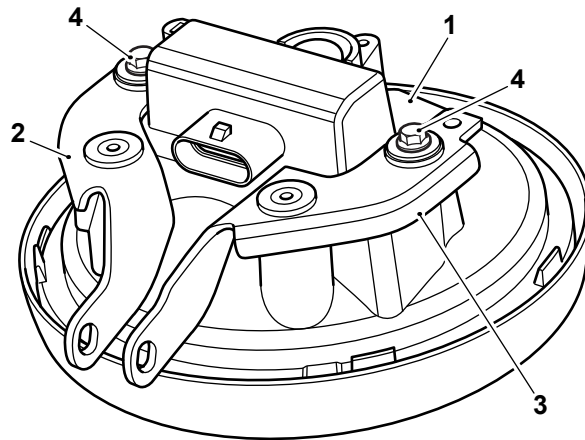
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

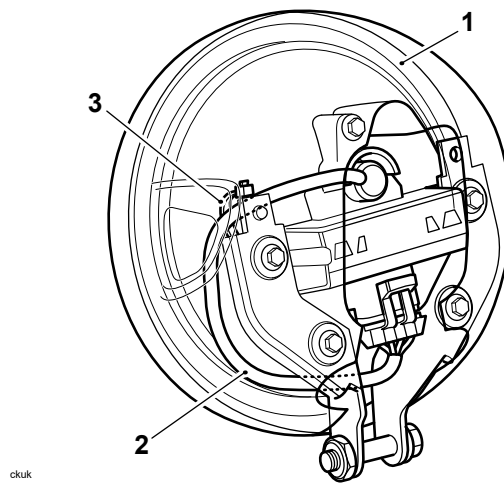
1. If required, ensure the rubber grommets are fitted to the headlight brackets. Position the brackets to the headlight and secure with two fixings and washers and tighten to 3 Nm.



ckug

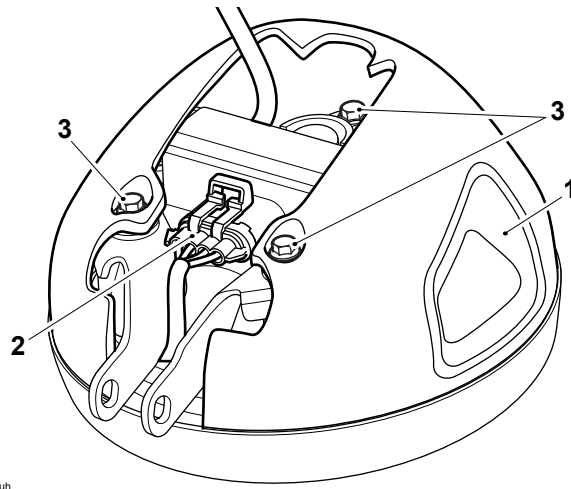
1. Headlight
2. Headlight bracket, left hand side
3. Headlight bracket, right hand side
4. Fixings

2. Reconnect the electrical connector and position the harness as noted during removal. Install a new cable tie to secure the harness.



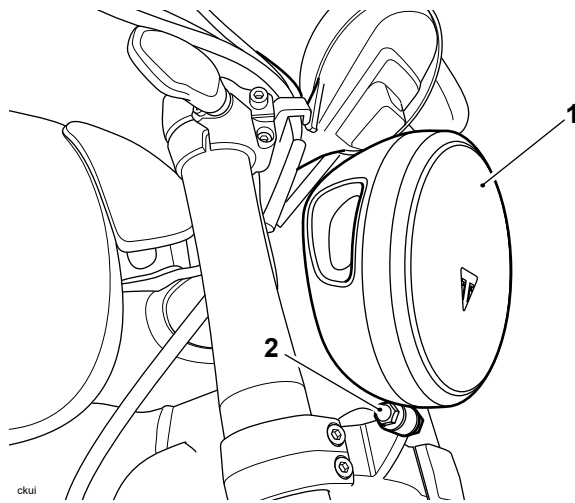
- 1. Headlight assembly rear cover
- 2. Harness
- 3. Cable tie

3. Install the headlight assembly rear cover to the headlight and secure with three fixings. Tighten the fixings to 3 Nm.



- 1. Headlight assembly rear cover
- 2. Electrical connector
- 3. Fixings

4. Position the headlight to the lower yoke and install the pivot bolt and lock nut. Adjust the headlight to the correct height and tighten the lock nut to 26 Nm.



1. Headlight Assembly
2. Pivot bolt

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Rear Light - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

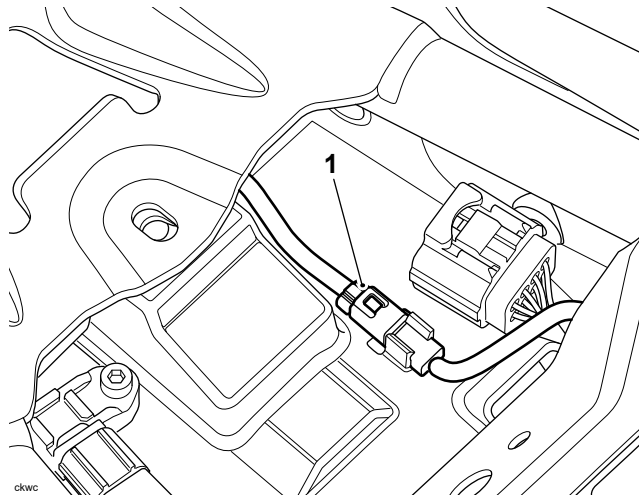
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

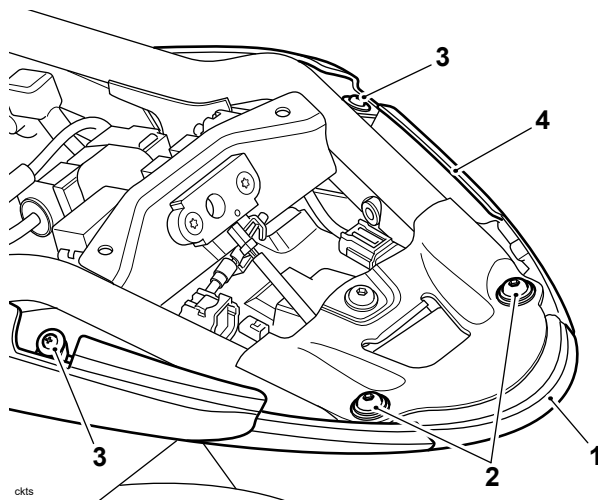
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Disconnect the rear light electrical connector from the harness.



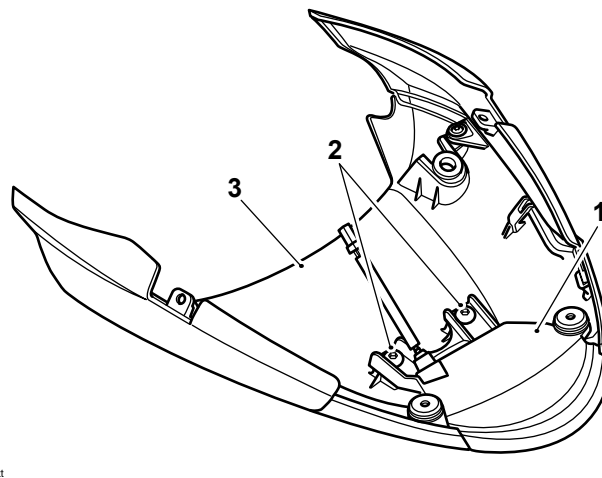
1. Rear light electrical connector

2. Support the rear light and release the two rear light fixings and two scrivenets. Remove the rear light and rear undertray as an assembly.



- 1. Rear light
- 2. Fixings
- 3. Scrivets
- 4. Rear undertray assembly

3. Release the two fixings and remove the rear light from the undertray assembly.



- 1. Rear light
- 2. Fixings
- 3. Rear undertray assembly

Rear Light - Installation

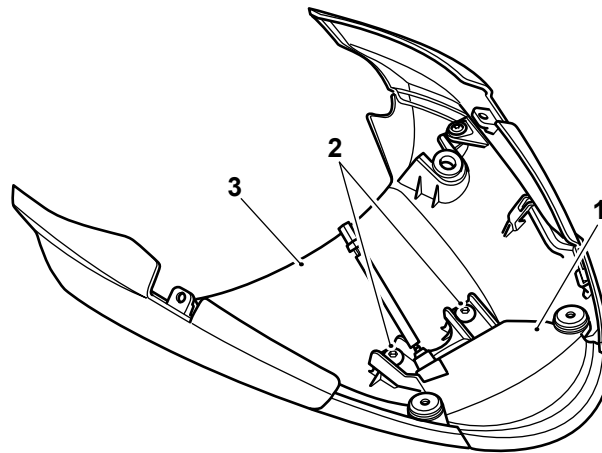
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

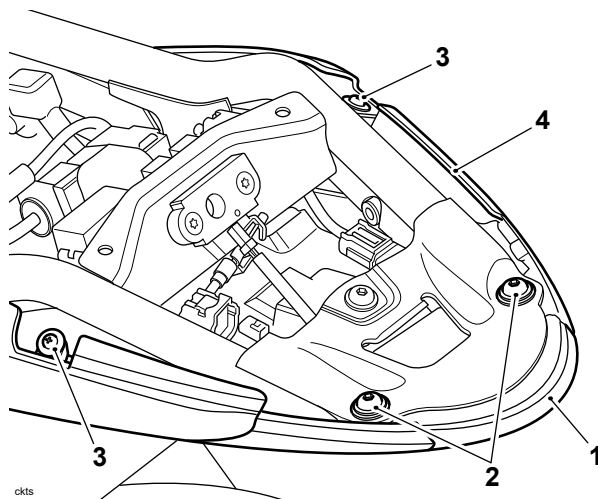
1. Fit the rear light to the rear undertray assembly with two fixings and tighten to 3 Nm.



cktt

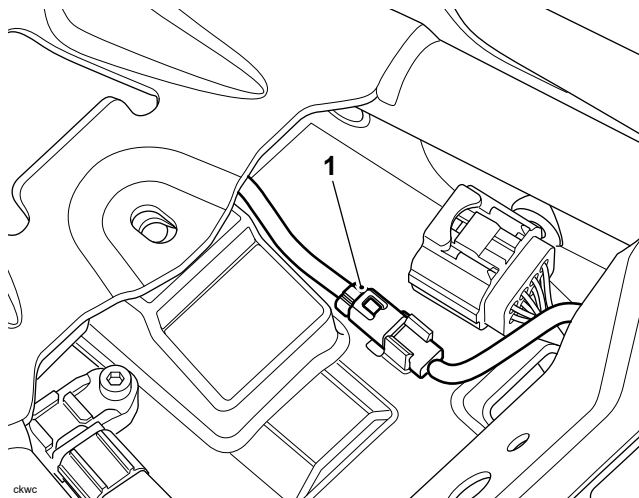
1. Rear light
2. Fixings
3. Rear undertray assembly

2. Install the rear undertray and rear light assembly to the motorcycle, aligning the two locating slots to the rubber grommets. Secure with two rear fixings and two scrivenets and tighten the fixings to 3 Nm.



1. Rear light
2. Fixings
3. Scrivets
4. Rear undertray assembly

3. Reconnect the rear light electrical connector to the harness.



1. Rear light electrical connector

Perform the following operations:

- [Battery - Installation](#)
- [Seat - Installation](#)

Front Direction Indicators - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

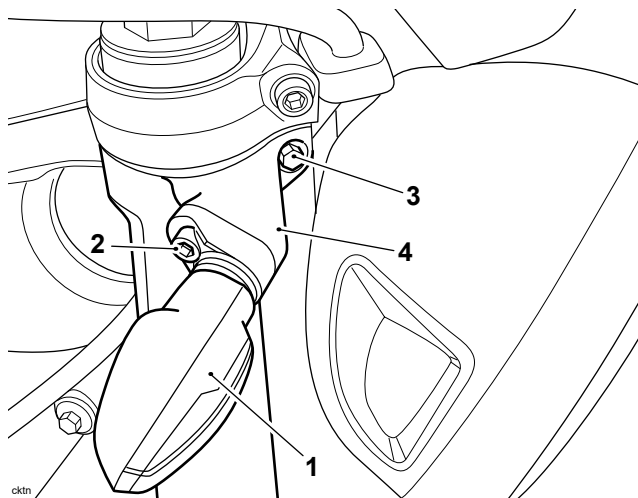
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)

1. Remove the direction indicator fixing.
2. Loosen the direction indicator bracket fixing and lower the bracket in order to access the cable.



- | |
|---|
| <ol style="list-style-type: none">1. Direction indicator2. Fixing3. Direction indicator bracket fixing4. Direction indicator bracket |
|---|

3. Disconnect the direction indicator electrical connectors and feed the cable up to the direction indicator, noting the routing for installation.
4. Remove the direction indicator.

Front Direction Indicators - Installation

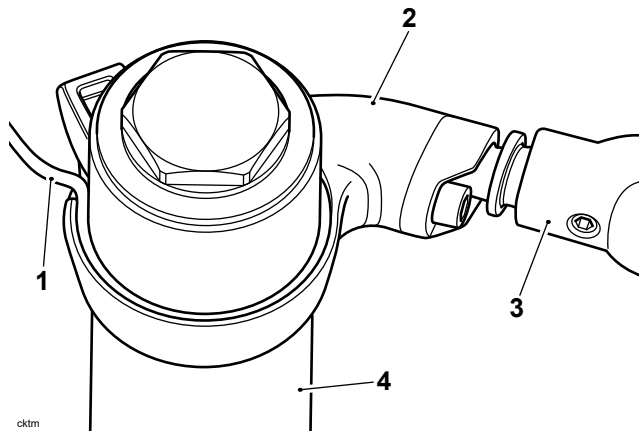
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

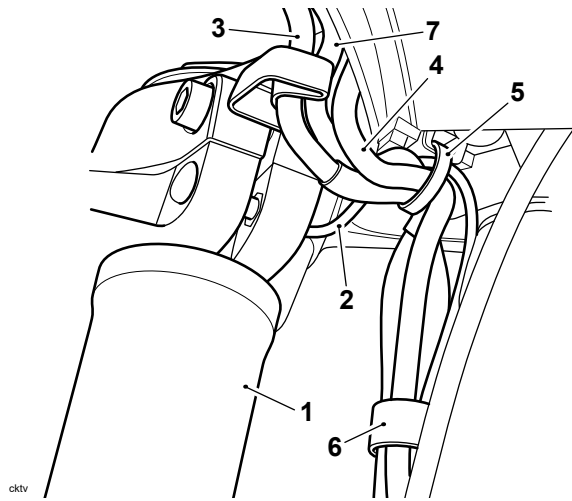
1. Install the direction indicator to the bracket and route the cable around the top of the bracket as noted during removal.



Right hand direction indicator shown, left hand similar (upper yoke shown removed for clarity)

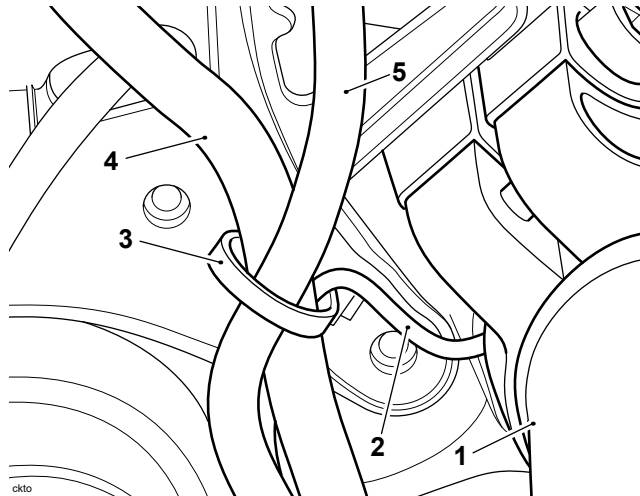
1. Direction indicator cable
2. Bracket
3. Direction indicator
4. Fork leg

2. Install the direction indicator fixing but do not tighten.
3. Raise the bracket up to align with the upper yoke and tighten the bracket fixing to 3 Nm.
4. Tighten the direction indicator fixing to 3 Nm.
5. Route the cable down to the electrical connectors as shown.
6. Reconnect the electrical connectors.



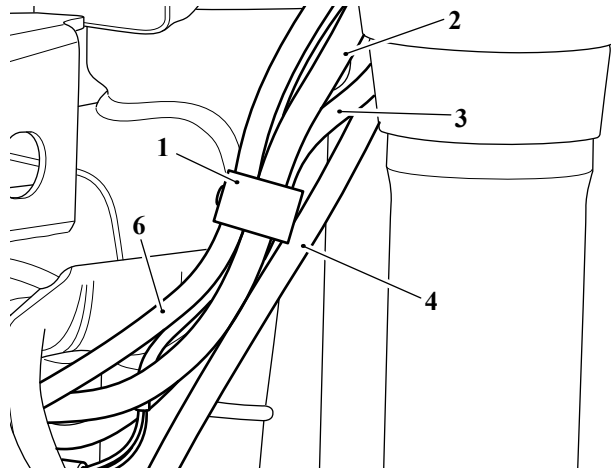
Right hand direction indicator cable routing

1. Fork leg
2. Direction indicator cable
3. Front brake hose
4. Right hand switch housing cable
5. Cable tie
6. Rubber band
7. Twist grip position sensor cable



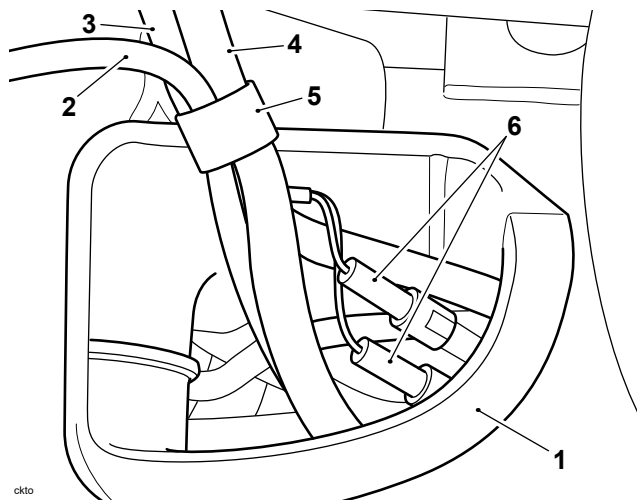
Left hand direction indicator routing

1. Fork leg
2. Direction indicator cable
3. Cable tie
4. Instruments cable
5. Left hand switch housing cable



Right hand direction indicator routing

1. Rubber band
2. Front brake hose
3. Right hand switch housing cable
4. Clutch cable
5. Right hand direction indicator connectors
6. Twist grip position sensor cable



Left hand direction indicator routing

1. Headstock rubber guide
2. Headlight cable
3. Left hand switch housing cable
4. Instruments cable
5. Rubber band
6. Left hand direction indicator connectors

Perform the following operations:

- **Battery - Installation**
- **Seat - Installation**
- Check the operation of the direction indicators, rectify as necessary.

Rear Direction Indicators - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

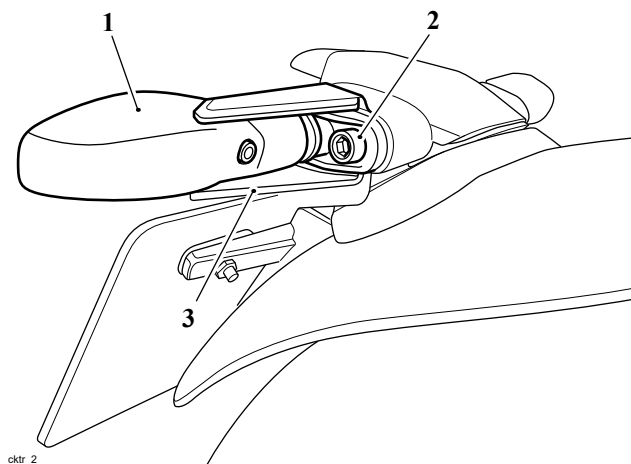
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

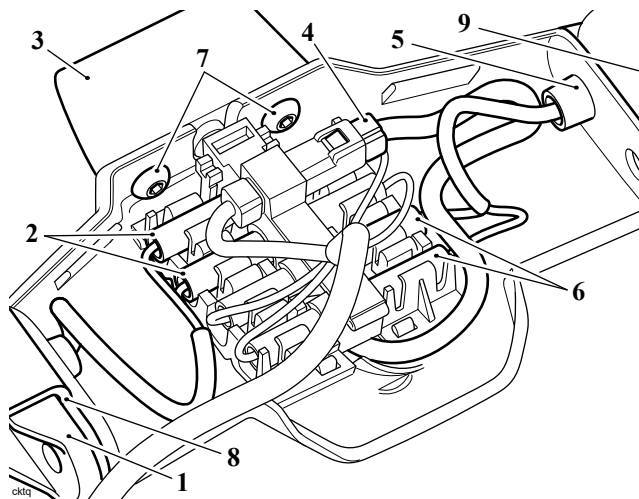
- [Seat - Removal](#)
- [Battery - Removal](#)

1. Remove the rear direction indicator fixings and raise the rear direction indicators and support moulding as an assembly.



- 1. Rear direction indicator (right hand side shown)
- 2. Fixing
- 3. Support bracket (right hand side shown)

2. Disconnect the rear licence plate light electrical connector. Unclip and move the connector holder to gain access to the direction indicator connectors.
3. Noting the position and routing of the wiring, disconnect both direction indicator connectors and remove the direction indicators and support brackets from the support moulding.



1. Left rear direction indicator
2. Left rear direction indicator connectors
3. Rear licence plate light
4. Rear licence plate light connector
5. Right rear direction indicator
6. Right rear direction indicator fixings
7. Rear licence plate light fixings
8. Left hand support bracket
9. Right hand support bracket

Rear Direction Indicators - Installation

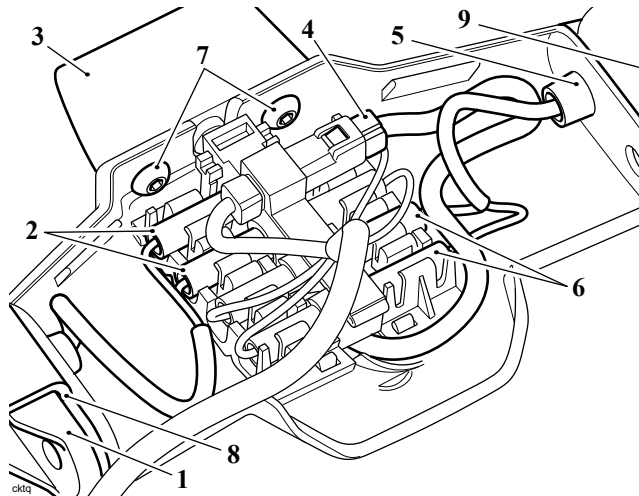
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

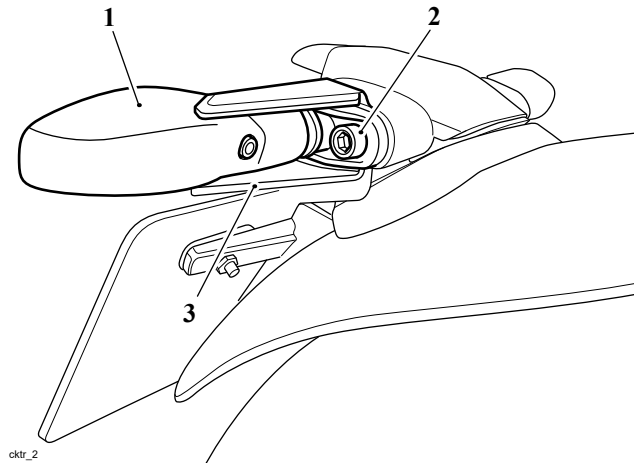
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Position the direction indicators and support brackets to the support moulding and reconnect the electrical connectors as noted during removal.
2. Reconnect the rear licence plate light connector and reposition the connector holder as noted during removal.



1. Left rear direction indicator
2. Left rear direction indicator connectors
3. Rear licence plate light
4. Rear licence plate light connector
5. Right rear direction indicator
6. Right rear direction indicator fixings
7. Rear licence plate light fixings
8. Left hand support bracket
9. Right hand support bracket

3. Install the support moulding and direction indicators to the rear mudguard and secure with two fixings. Tighten to 3 Nm.



1. Rear direction indicator (right hand side shown)
2. Fixing
3. Support bracket (right hand side shown)

Perform the following operations:

- **Battery - Installation**
- **Seat - Installation**
- Check the operation of the rear indicators and the licence plate light. Rectify if necessary.

Rear Licence Plate Light - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

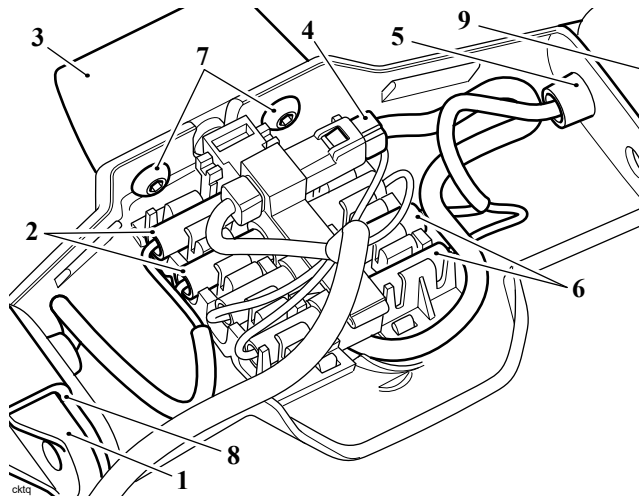
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Direction Indicators - Removal](#)

1. Disconnect the rear licence plate electrical connector.
2. Release the two fixings and remove the rear licence plate light from the support moulding.



1. Left rear direction indicator
2. Left rear direction indicator connectors
3. Rear licence plate light
4. Rear licence plate light connector
5. Right rear direction indicator
6. Right rear direction indicator fixings
7. Rear licence plate light fixings

Rear Licence Plate Light - Installation

WARNING

Make sure the motorcycle is stabilised and adequately supported.

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An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Align the rear licence plate light to the support moulding and secure with two fixings. Tighten to 0.5 Nm.
2. Reconnect the rear licence plate electrical connector.

Perform the following operations:

- [Rear Direction Indicators - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Side Stand Switch - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

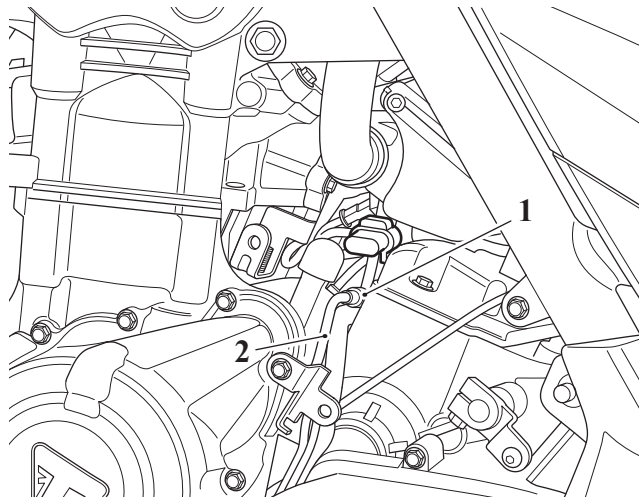
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Coolant Expansion Tank - Removal](#)
- [Gear Change Linkage - Removal](#)

⚠ CAUTION

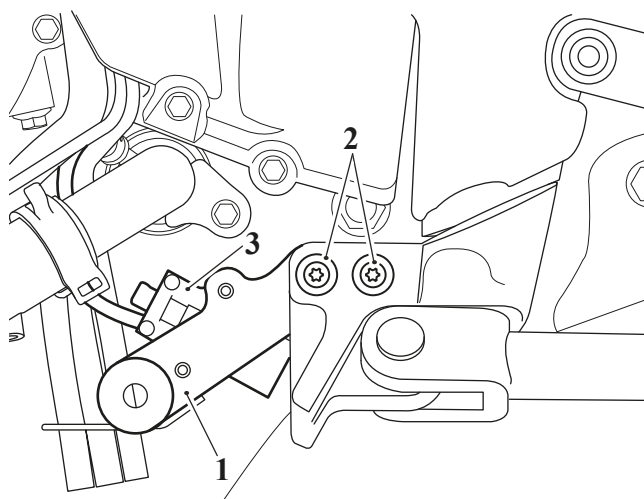
Note the routing and the retaining clips of the side stand switch harness for installation.

1. Disconnect the side stand switch electrical connector from the engine sub harness at the rear of the starter motor and feed it down to the side stand switch.



1. Side stand switch electrical connector
2. Side stand switch harness

2. Release the fixings and remove the gear change bracket from the frame.
3. Release the fixings and remove the side stand switch from the gear change bracket. Discard the fixings.



- 1. Gear change bracket
- 2. Fixings
- 3. Side stand switch

Side Stand Switch - Installation

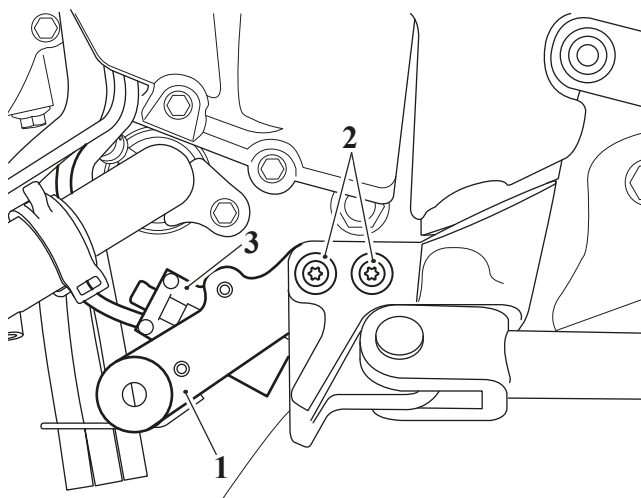
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

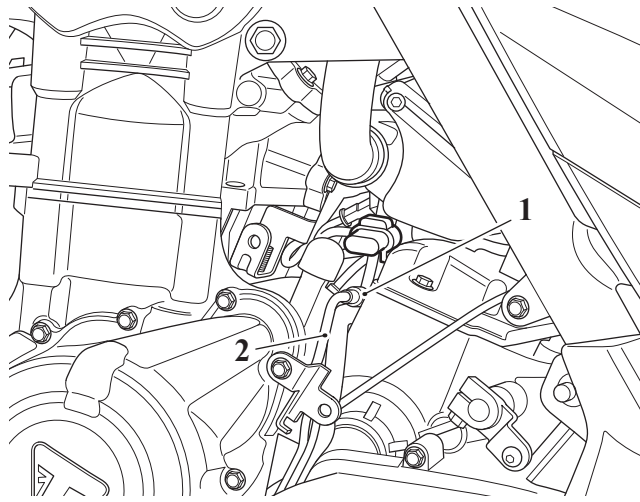
An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the side stand switch to the gear change bracket tighten the new fixings to 7 Nm.
2. Fit the gear change bracket to the frame and tighten the fixings to 24 Nm.



1. Gear change bracket
2. Fixings
3. Side stand switch

3. Route the side stand switch harness and reconnect to the engine sub harness as noted for removal.



1. Side stand switch electrical connector
2. Side stand switch harness

Perform the following operations:

- [Gear Change Linkage - Installation](#)
- [Coolant Expansion Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Starter Motor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

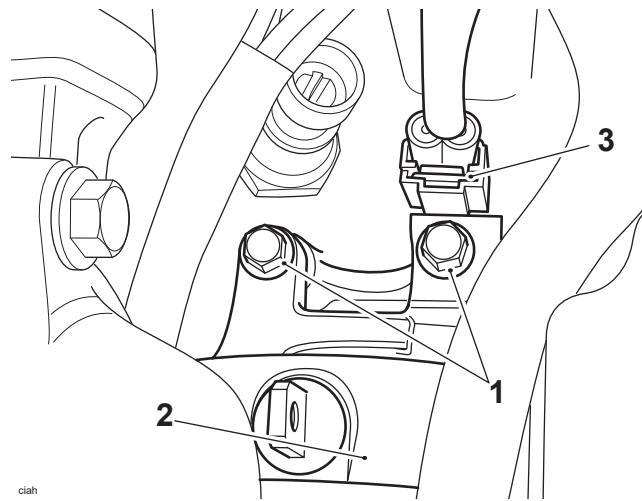
- [Seat - Removal](#)
- [Battery - Removal](#)
- [Fuel Tank - Removal](#)
- [Airbox - Removal](#)
- [Coolant Expansion Tank - Removal](#)
- [Purge Control Valve - Removal](#)
- [Throttle Body - Removal](#)
- [Inlet Manifold - Removal](#)

1. Disconnect the low oil pressure warning light switch.
2. Ease the boot from the starter cable terminal and then release the cable bolt.
3. Detach the cable from the starter motor.

NOTICE

Note the position of the mounting bracket for the crankshaft position sensor multiplug for installation.

4. Release the fixings securing the starter to the crankcase.



- 1. Fixings
- 2. Starter motor
- 3. Multiplug, crankshaft position sensor

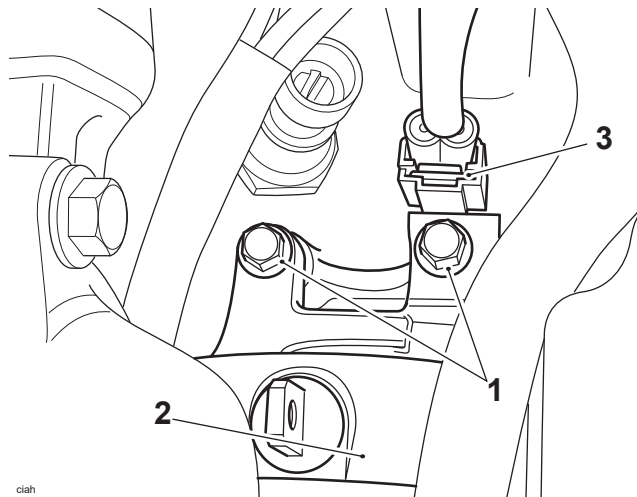
5. Ease the starter motor from the upper crankcase.

Starter Motor - Inspection

1. Ensure the starter turns freely and without binding.
2. Check the starter O-ring for damage and deterioration. Replace as necessary.

Starter Motor - Installation

1. Fit a new O-ring to the starter motor.
2. Lubricate the starter motor O-ring with a small amount of petroleum jelly.
3. Fit the starter motor to the upper crankcase with the multiplug for the crankshaft position sensor as noted for removal. Ensure that the O-ring does not become damaged during installation.



- | |
|--|
| <ol style="list-style-type: none">1. Fixings2. Starter motor3. Multiplug, crankshaft position sensor |
|--|

4. Fit and tighten the starter motor bolts to 10 Nm.
5. Refit the starter cable and secure with the bolt. Tighten to 3 Nm.
6. Refit the starter cable boot.
7. Connect the low oil pressure warning light switch.

Perform the following operations:

- [Inlet Manifold - Installation](#)
- [Throttle Body - Installation](#)
- [Purge Control Valve - Installation](#)
- [Coolant Expansion Tank - Installation](#)
- [Airbox - Installation](#)
- [Fuel Tank - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Alternator Rotor - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

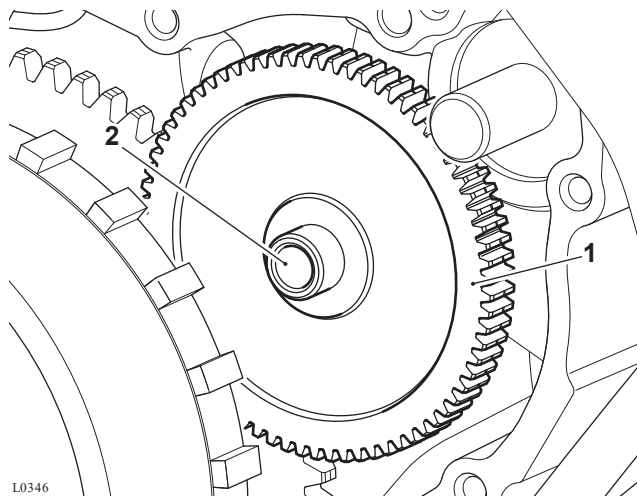
A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Alternator Cover - Removal](#)

1. Withdraw the starter idler gear and shaft, noting the fitted position of the components.

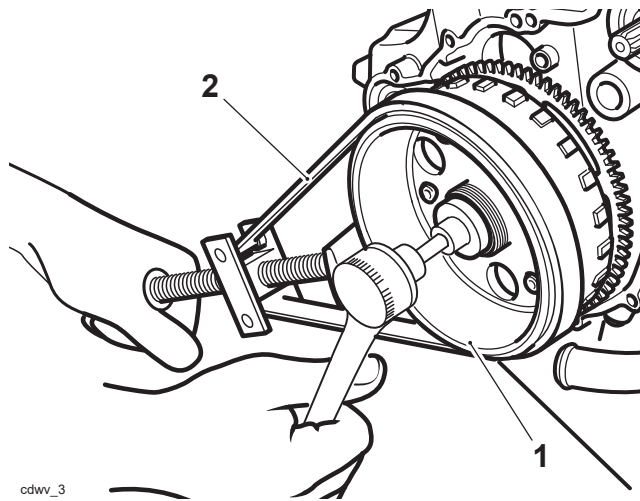


- 1. Idler gear
- 2. Idler shaft

⚠ CAUTION

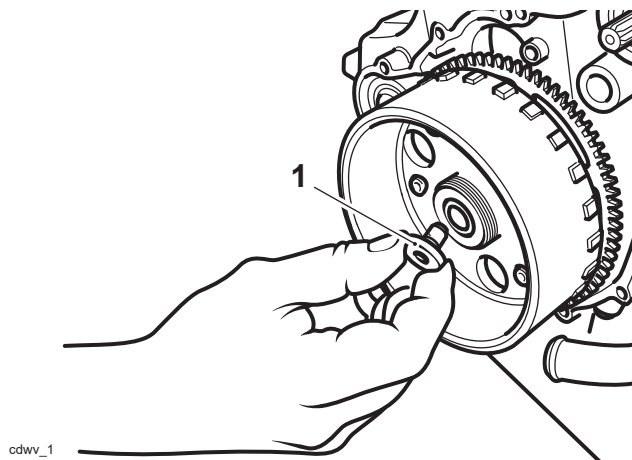
Do not use tools to tighten service tool T3880375. Tighten the tool by hand only. Over-tightening of the tool will lead to damage to the alternator rotor.

2. To remove the rotor, clean the alternator rotor to remove all traces of oil, and fit service tool T3880375 to the rotor as shown below. Retain the tool to prevent the crankshaft from rotating and remove the centre bolt from the crankshaft.



- 1. Rotor
- 2. T3880375 - Alternator Rotor Holder

3. With the bolt removed, locate the spigot from the larger of the two thrust pads supplied with service tool T3880365 to the crankshaft.

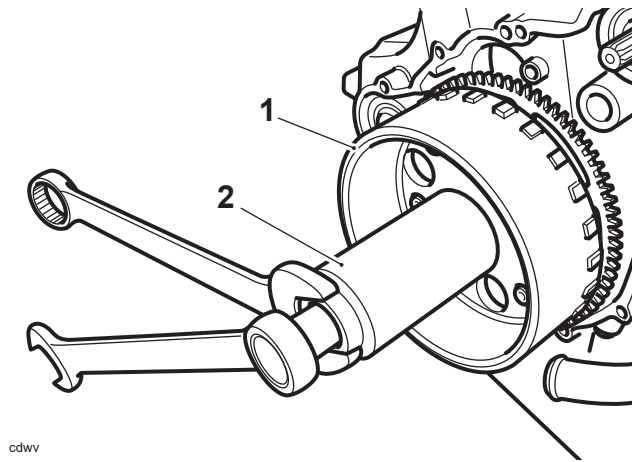


- 1. Thrust pad

NOTICE

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

- 4. Assemble service tool T3880174 to the threaded centre section of the rotor.
- 5. Hold the centre of service tool T3880174 to prevent rotation then tighten the draw-bolt in the centre of the tool to release the taper seating of the rotor from the crankshaft.



- | |
|--|
| <p>1. Rotor</p> <p>2. T3880174 - Alternator Housing Puller</p> |
|--|

6. Withdraw the rotor and tool as an assembly and then separate the tool from the rotor. Collect the Woodruff key and the tool thrust pad from the crankshaft.

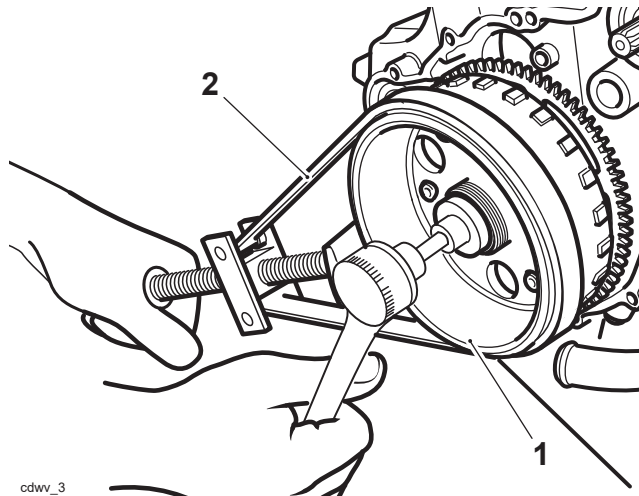
Alternator Rotor - Installation

1. Refit the Woodruff key to the crankshaft.
2. Assemble the rotor to the keyway on the crankshaft, ensuring the Woodruff key remains in position.

⚠ CAUTION

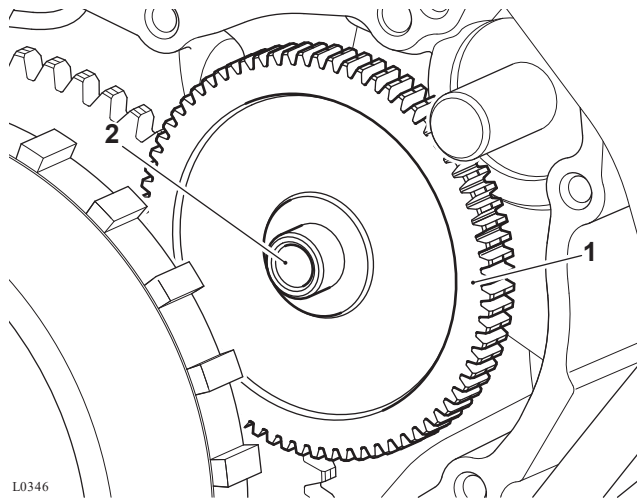
Do not use tools to tighten service tool T3880375. Tighten the tool by hand only. Over-tightening of the tool will lead to damage to the alternator rotor.

3. Refit the service tool T3880375 to prevent the crankshaft from rotating, ensuring the rotor is free from oil and the tool is not over-tightened.
4. Tighten the rotor retaining bolt to 120 Nm.



1. Rotor
2. T3880375 - Alternator Rotor Holder

5. Remove the service tool T3880375.
6. Lubricate the idler gear shaft with new engine oil which meets specification API SH (or higher) and JASO MA.
7. Fit the starter idler gear and shaft to the crankcase.



- | |
|--|
| <ol style="list-style-type: none">1. Idler gear2. Idler shaft |
|--|

Perform the following operations:

- **Alternator Cover - Installation**
- **Battery - Installation**
- **Seat - Installation**
- **Crankshaft Position Adaption (European Markets Only)**

Alternator Stator - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

Perform the following operations:

- **Alternator Cover - Removal**

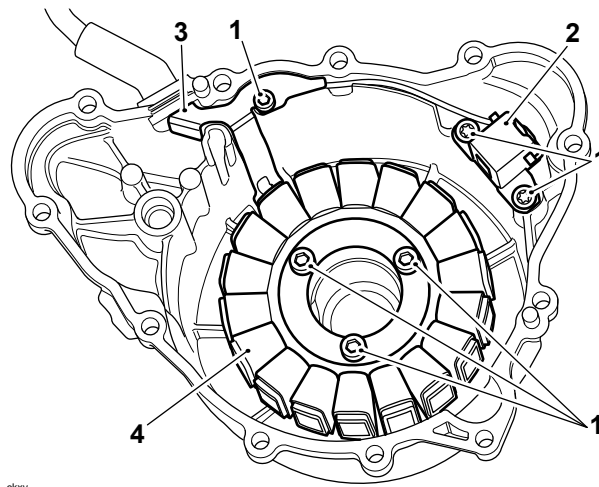
NOTICE

If the alternator stator needs to be replaced, the crankshaft position sensor will also be replaced as they are one assembly.

NOTICE

Note the routing of the stator harness for installation.

1. Remove and discard the fixings securing the crankshaft position sensor to the alternator cover.
2. Remove and discard the fixing securing the cable bracket to the alternator cover.
3. Remove and discard the fixings securing the stator to the alternator cover and remove the stator.



1. Fixings
2. Crankshaft position sensor
3. Cable bracket
4. Alternator stator

Alternator Stator - Installation

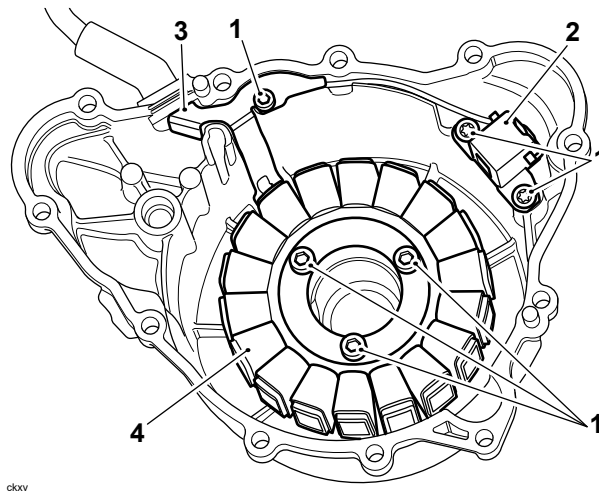
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Locate the stator and crankshaft position sensor to the engine cover.
2. Apply silicone sealer to the cable grommet (at the factory, ThreeBond 1215 is used) and align the cable to the exit slot.
3. Fit the cable retainer bracket and tighten the new fixings to 6 Nm.
4. Tighten the alternator stator new fixings to 12 Nm.
5. Tighten the crankshaft position sensor new fixings to 6 Nm.



- | |
|--|
| <ul style="list-style-type: none">1. Fixings2. Crankshaft position sensor3. Cable bracket4. Alternator stator |
|--|

Perform the following operations:

- [Alternator Cover - Installation](#)
- [Crankshaft Position Adaption \(European Markets Only\)](#)

Alternator Regulator/Rectifier - Removal

⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

The alternator regulator/rectifier is located in between the rear suspension unit and the gearbox.

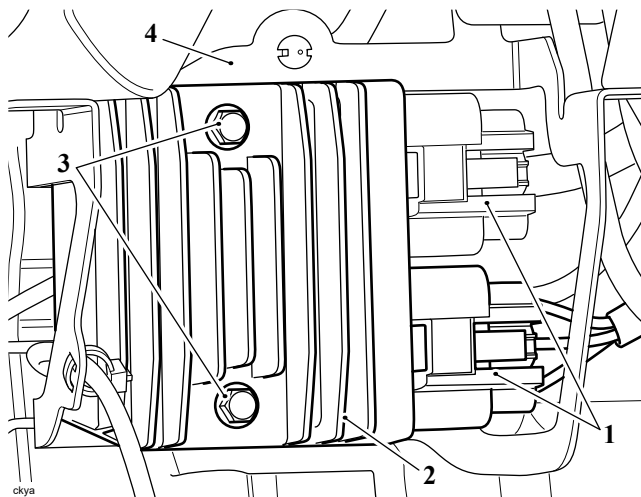
Perform the following operations:

- [Seat - Removal](#)
- [Battery - Removal](#)
- [Rear Suspension Unit - Removal](#)

NOTICE

Note the position of the two electrical connectors for installation.

1. Disconnect the two electrical connectors, noting their position for installation.
2. Release the fixings and remove the regulator/rectifier from its bracket



1. Electrical connectors
2. Regulator/Rectifier
3. Fixings
4. Mounting bracket

Alternator Regulator/Rectifier - Installation

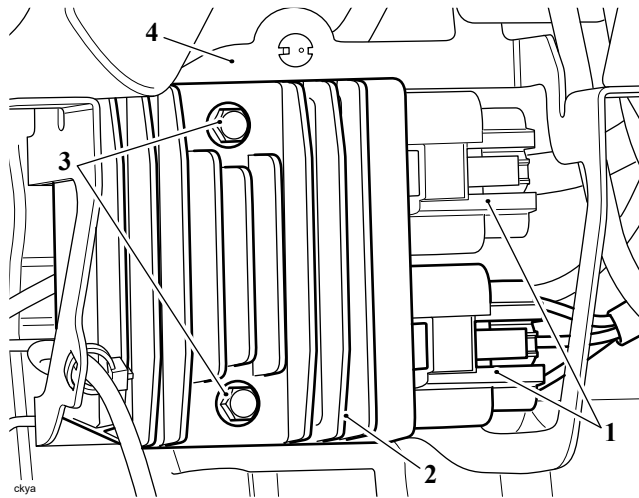
⚠ WARNING

Make sure the motorcycle is stabilised and adequately supported.

A correctly supported motorcycle will help prevent it from falling.

An unstable motorcycle may fall, causing injury to the operator or damage to the motorcycle.

1. Fit the regulator/rectifier to its bracket and tighten its fixings to 9 Nm.
2. Reconnect the two electrical connectors as noted for removal.



1. Electrical connectors
2. Regulator/Rectifier
3. Fixings
4. Mounting bracket

Perform the following operations:

- [Rear Suspension Unit - Installation](#)
- [Battery - Installation](#)
- [Seat - Installation](#)

Circuit Diagrams

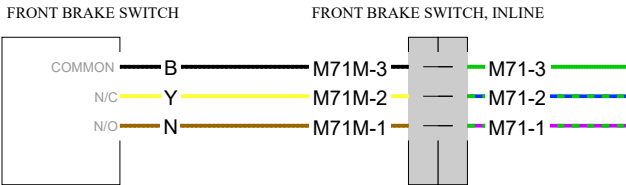
Glossary of Circuit Diagram Symbols

The following is a description of the symbols and information found in the circuit diagrams for this model.

NOTICE

Wire colours and connector pin references shown in the illustrations below are examples and may differ from those contained in circuit diagrams for this model.

Components with a Fly lead and an In-line Connector



The illustration shows an example of a component with a fly lead and an in-line connector.

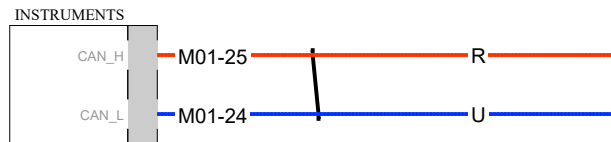
The component is represented by a white box, with fly lead wires leading to an in-line connector (shaded grey). Information provided with the component includes:

- The component name - located above the component.
- A function reference for each terminal - located inside the component, adjacent to the connecting wire (provided in English only).
- Wire colour references - located on each wire.
- An in-line connector name - located above the in-line connector.
- A component and pin number reference - located on each wire entering the in-line connector.

In the above example, the component and pin number references can be interpreted as follows:

M71	Component reference for the front brake switch
M	Identifies the mating connector (component side only)
-	Separator
1, 2, 3	Connector pin number reference

Components with an Integral Connector



The illustration shows an example of a component with an integral connector.

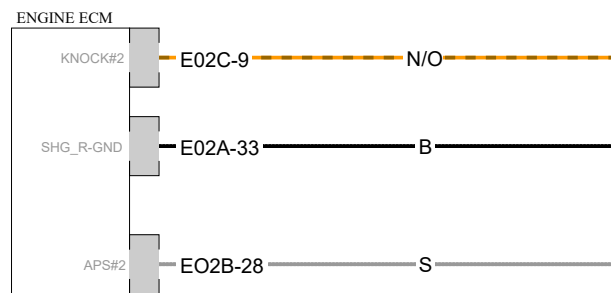
The component is identified by a white box, with a grey shaded area representing the integral connector. Information provided with the component includes:

- The component name - located above the component.
- A function reference for each terminal - located inside the component, adjacent to the connecting wire (provided in English only).
- Wire colour references - located on each wire.
- A component and pin number reference - located on each wire entering the integral connector.

In the above example, the component and pin number references can be interpreted as follows:

M01	Component reference for the instruments
-	Separator
24, 25	Connector pin number reference

Components with Multiple Integral Connectors



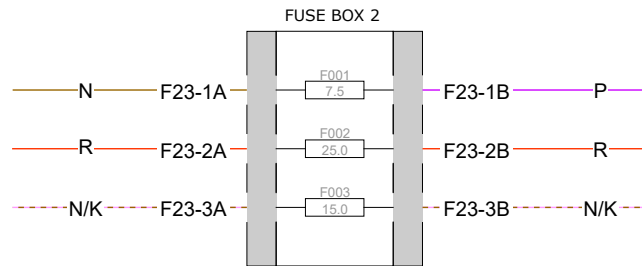
The illustration shows an example of a component with multiple integral connectors.

The multiple integral connectors can be identified by separated grey shaded areas (as shown), or by a grey shaded area that is divided into multiple sections by black line(s).

The above example shows an engine ECM with three integral connectors, connectors A, B and C. The component, connector and pin number references can be interpreted as follows:

E02	Component reference for the engine ECM
A, B, C	Connector reference
-	Separator
9, 28, 33	Connector pin number reference

Fuse Boxes



The illustration shows an example of a fuse box.

A fuse is a device which protects a circuit in the event of a fault. The fuse will 'blow' should a short circuit occur, protecting that circuit from further damage.

Information provided with the fuse box includes:

- The fuse box name - located above the fuse box.
- A fuse number/location reference for each fuse - located above the fuse.
- A fuse rating (in Amps) for each fuse - located inside the fuse.
- A fuse box, terminal number and terminal block reference - located on each wire entering the fuse box.

In the above example, the fuse box, terminal number and terminal block references can be interpreted as follows:

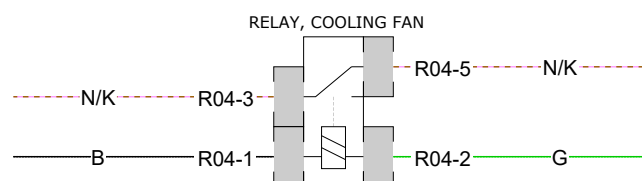
F	Reference code for a fuse box
2	Denotes the type of fuse box: 1 = Fuse box 1 (Main fuse) 2 = Fuse box 2 (Individual circuit protection)
3	Indicates the number of fuses contained in the fuse box
-	Separator
1, 2, 3	Connector terminal number reference
A or B	Terminal block reference A (power in) or B (power out)

Relays

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.

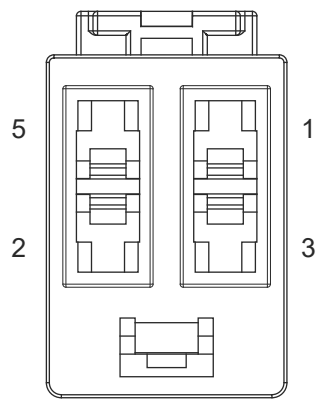
Relays are used when the electrical current is too great for a mechanical switch, usually when the switching must be done quickly to prevent arcing across the switch contacts. If a mechanical switch were used, the mechanical switch contacts would quickly burn away.

Relays Connected with a Single Socket Connector



The illustration above shows an example of a relay connected to the wiring harness with a single socket relay connector.

A pin diagram of a typical single socket relay connector is shown below.



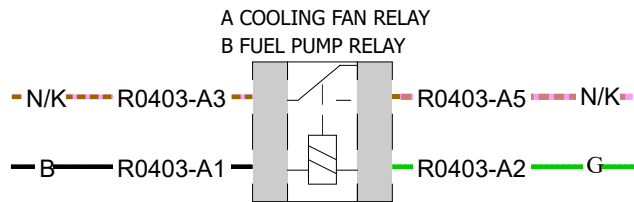
Information provided on the circuit diagram for relays with a single socket harness connector includes:

- The relay name - located above the relay.
- A relay and terminal number reference - located on each wire entering the relay connector terminals.

In the above example, the relay and terminal number reference can be interpreted as follows:

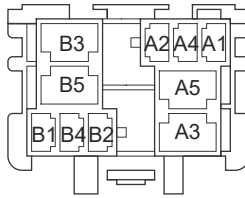
R	Indicates the component is a relay
04	Reference number for the relay (cooling fan relay in the example shown)
-	Separator
1, 2, 3, 5	Connector terminal number reference

Relays connected with a Dual Socket Connector



The illustration above shows an example of a relay connected to the wiring harness with a dual socket relay connector.

A dual socket relay connector provides sockets for two individual relays, socket A and socket B. A pin diagram of a typical dual socket relay connector is shown below.



Information provided on the circuit diagram for relays with a dual socket harness connector includes:

- The names of the relays connected to sockets A and B - located above the relay.
- A dual relay and terminal number reference - located on each wire entering the relay connector terminals.

In the above example, the relay and terminal number reference can be interpreted as follows:

R	Indicates the component is a relay
04	Reference number for the relay connected to socket A (cooling fan relay in the example shown)
03	Reference number for the relay connected to socket B (fuel pump relay in the example shown)
-	Separator
A or B	Socket reference (socket A or socket B) In the example above, all references show socket A. This indicates that the component shown is the cooling fan relay.
1, 2, 3, 5	Connector terminal number reference for the socket/relay identified

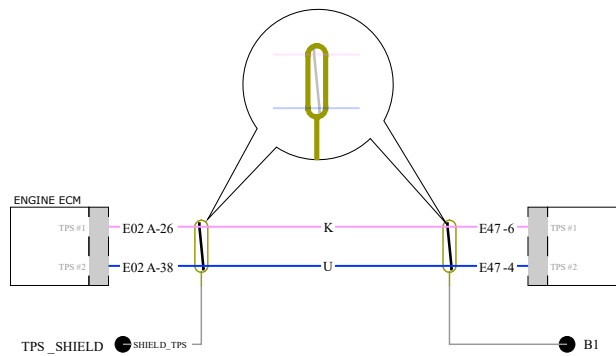
Ring Terminals



The illustration shows the symbol used to identify a ring terminal (commonly used as ground points).

A ring terminal reference is provided on the wire entering the terminal.

Shielded Wires



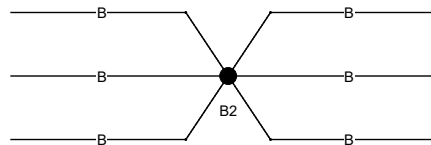
The illustration shows the symbol used to identify wires that are shielded against electromagnetic interference.

Examples of components that have shielded wires include:

- ABS wheel speed sensors
- Immobiliser antenna
- Throttle position sensor
- USB socket

The wire shielding is typically connected to ground.

Splices

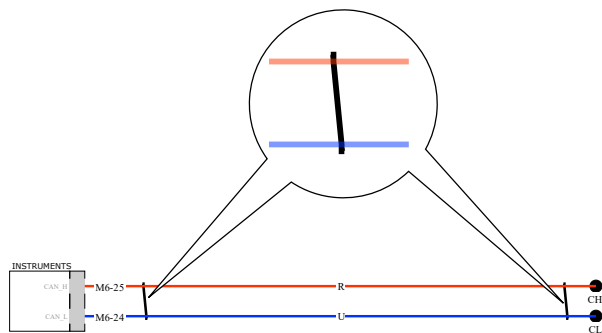


The illustration shows an example of a splice.

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

A splice reference code is provided at the nearest convenient location to the splice symbol.

Twisted Wires



The illustration shows the symbol used to indicate a pair of wires that are twisted together, such as CAN circuit wires.

Starter Motor Grounding

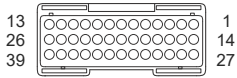
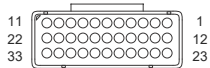
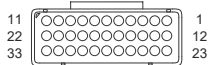
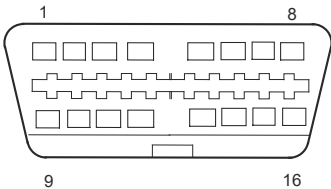
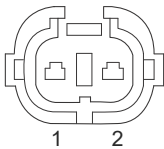
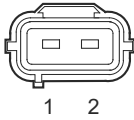
Starter motors fitted to Triumph motorcycles are connected to ground through the mating faces of the starter motor body and the crankcase.

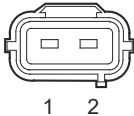
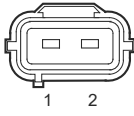
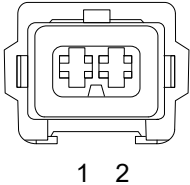
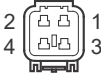
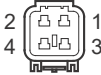
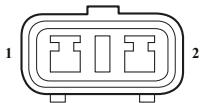
Key To Wiring Colour Codes

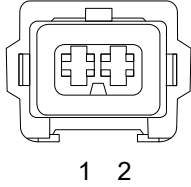
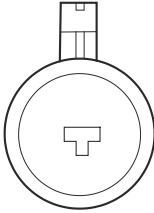
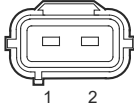
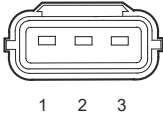
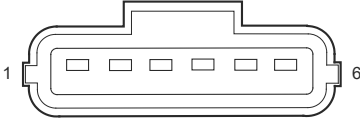
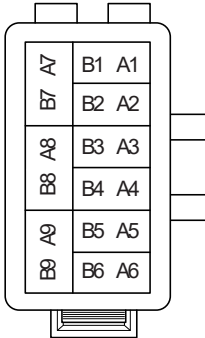
Code	Wiring Colour
B	Black
U	Blue
N	Brown
G	Green
S	Slate/Grey
O	Orange
K	Pink
R	Red
P	Purple
W	White
Y	Yellow
LG	Light Green
LU	Light Blue

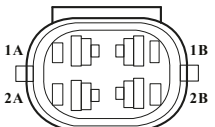
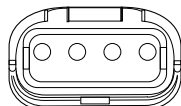
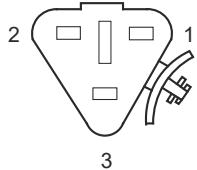
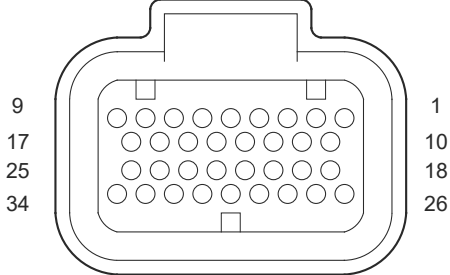
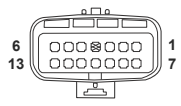
Main Wiring Harness Electrical Connectors

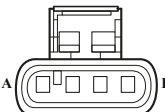
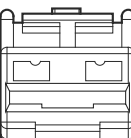
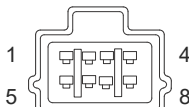
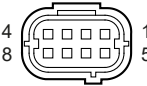
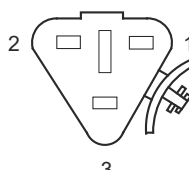
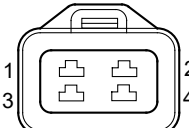
The table below shows the connector pin diagrams for each electrical connector on the main wiring harness for this model.

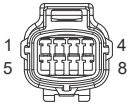
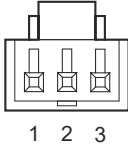
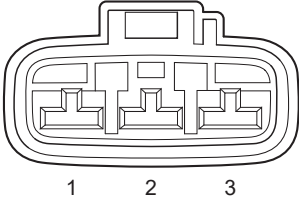
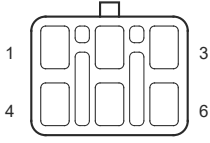
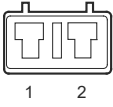
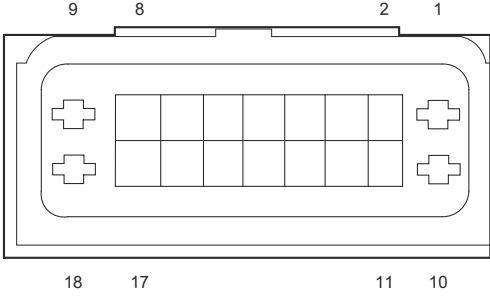
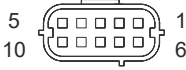
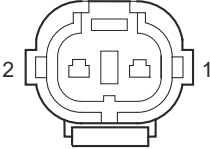
	
E02A - Engine ECM connector A	E02B - Engine ECM connector B
	
E02C - Engine ECM connector C	E04 - Diagnostic connector
	
E05 - Crankshaft position sensor	E06 - Fuel pump

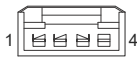
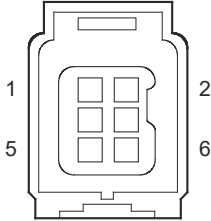
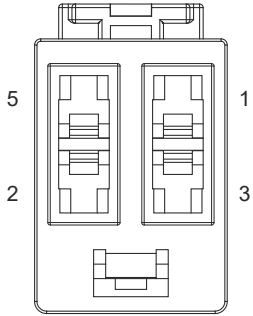
	
E07 - Fuel level sensor	E09 - Purge valve
	
E10 - Coolant temperature sensor	E11 - Fuel injector 1 E12 - Fuel injector 2 E13 - Fuel injector 3
	
E15 - Gear position sensor	E16 - Oxygen sensor, bank 1 sensor 1
	
E17 - Side stand switch	E19 - Cooling fan 1

	
E20 - Intake air temperature sensor	E21 - Ignition coil 1 E22 - Ignition coil 2 E23 - Ignition coil 3
	
E25 - Oil pressure sensor	E37 - Secondary air injection
	
E38 - Manifold absolute pressure sensor E39 - Ambient air pressure sensor	E47 - Throttle body
	
E48 - Triumph shift assist	F19 - Fuse box 1

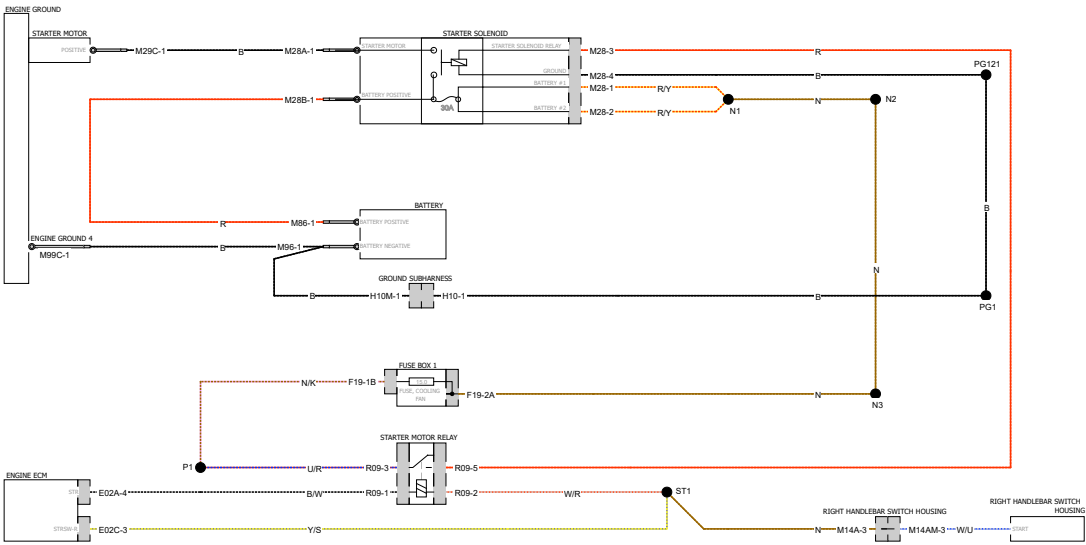
	
F22 - Fuse box 2	H03 - Rear light subharness
	
F32 - Fuse box 3	H05 - Engine subharness
	
H10 - Sub harness ground	M01 - Instruments
	
M02A - Left handlebar switch housing connector A	M02B - Left handlebar switch housing connector B

	
M04A - Front left direction indicator connector A M04B - Front left direction indicator connector B	M07 - Headlight
	
M11A - Horn connector A M11B - Horn connector B	M13 - Ignition switch
	
M14A - Right handlebar switch housing connector A	M19A - Front right direction indicator connector A M19B - Front right direction indicator connector B
	
M26 - Rear brake switch	M28 - Starter solenoid

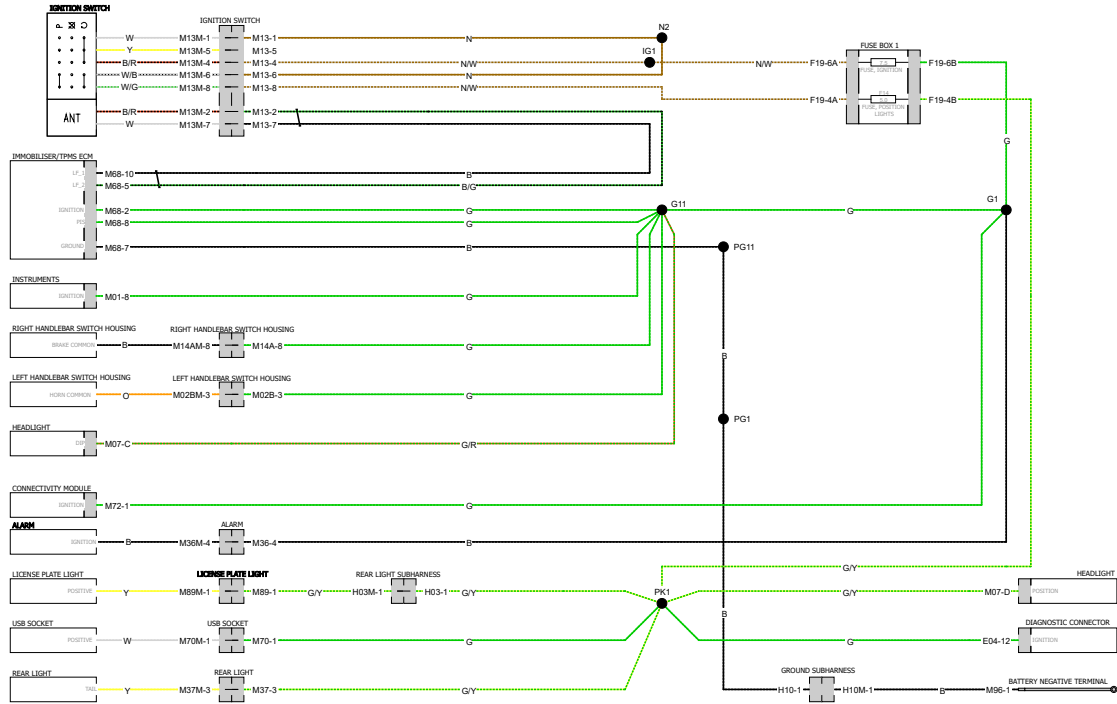
	
M36 - Alarm	M37 - Rear light
	
M48A - Regulator rectifier connector A	M51 - Fall detection switch
	
M57 - Front ABS wheel speed sensor M58 - Rear ABS wheel speed sensor	M59 - ABS modulator
	
M68 - Immobiliser/TPMS ECM	M70 - USB socket

	
M72 - Bluetooth module	M73 - Twist grip position sensor
	
R04 - Cooling fan relay R03 - Fuel pump relay R05 - Horn relay R11 - Dip beam relay R09 - Starter motor relay R07 - Engine management system relay R12 - Main beam relay	

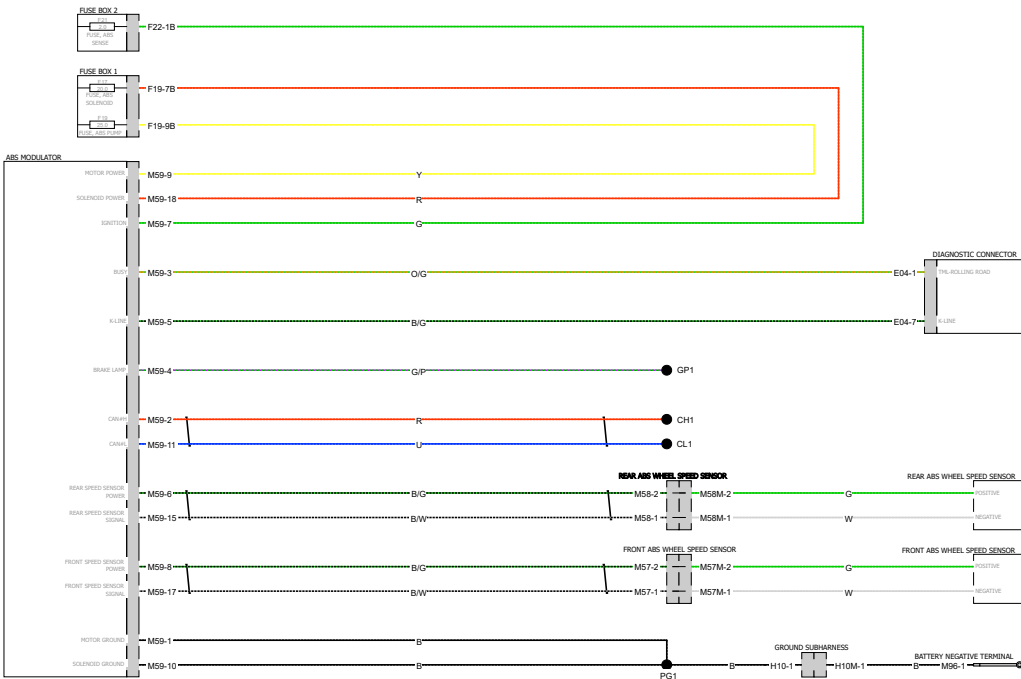
Starter Motor Circuit



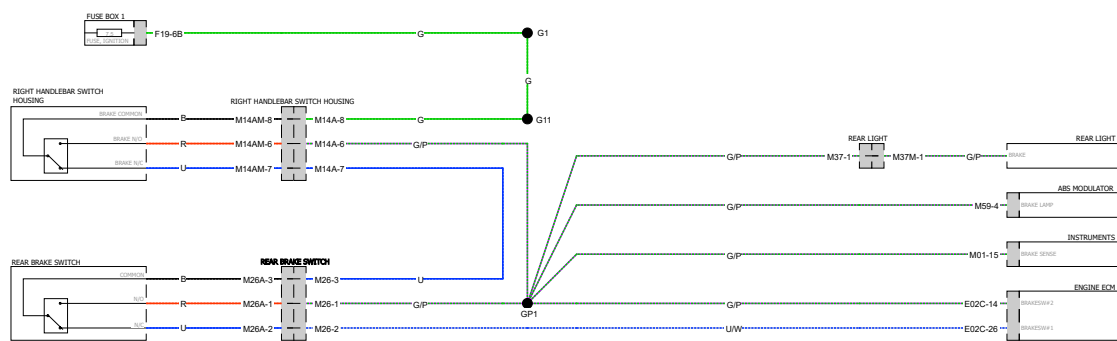
Ignition Circuit



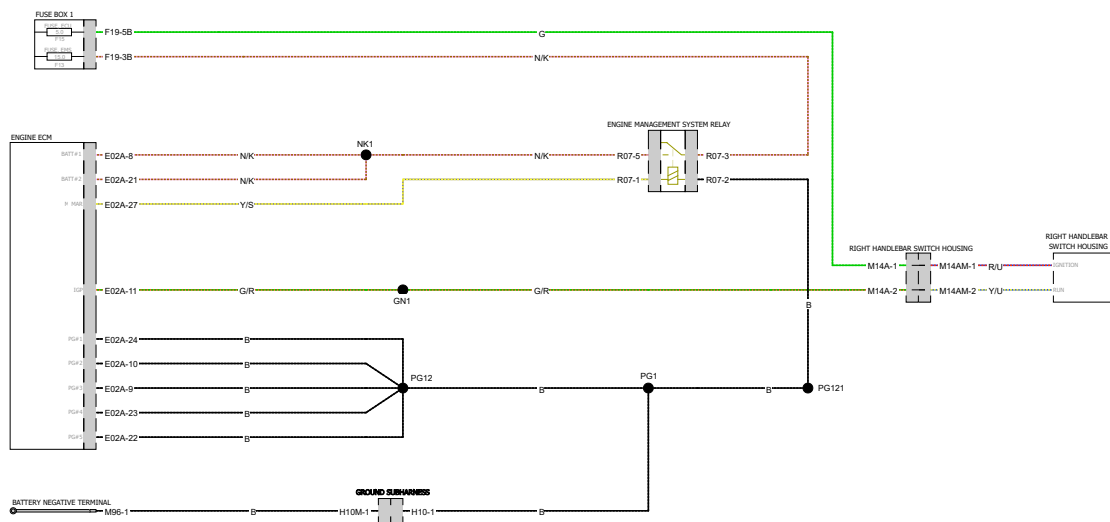
ABS Circuit



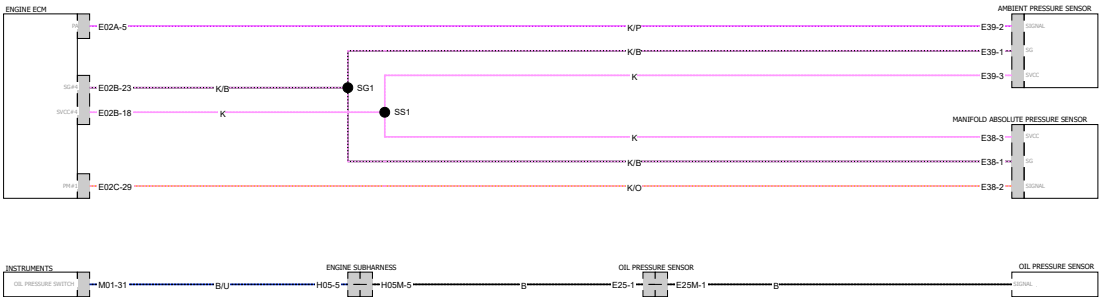
Brake Circuit



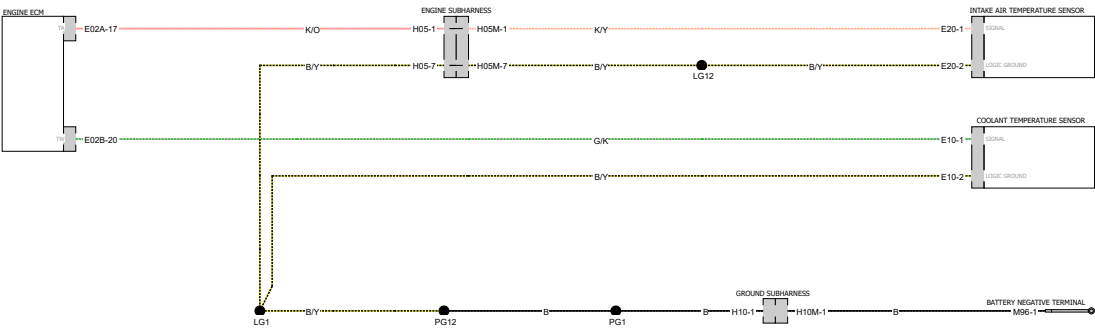
Engine Management – ECM Power and Ground



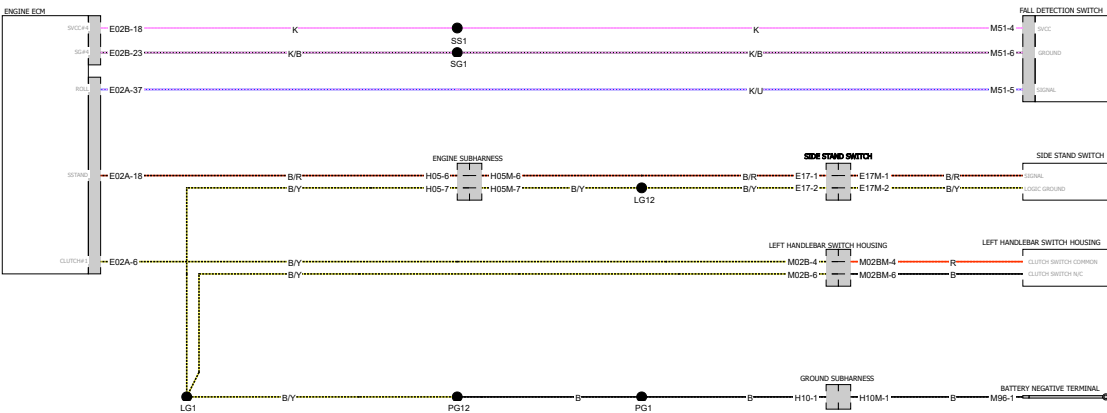
Engine Management – Pressure Sensors



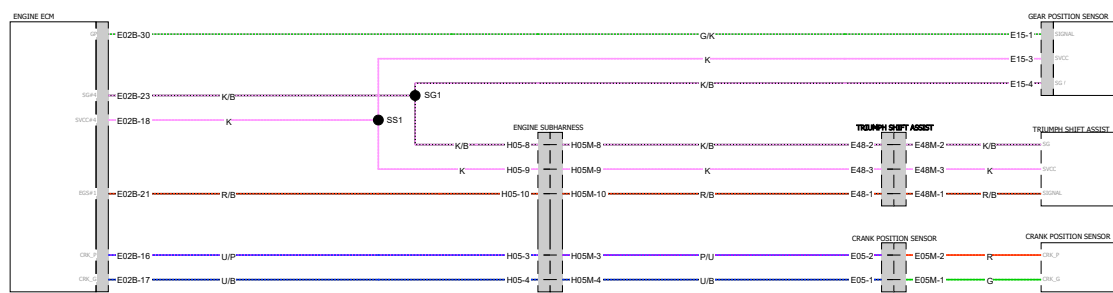
Engine Management – Temperature Sensors



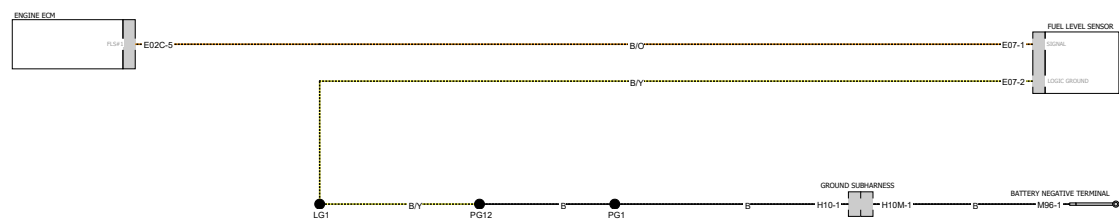
Engine Management - Switches



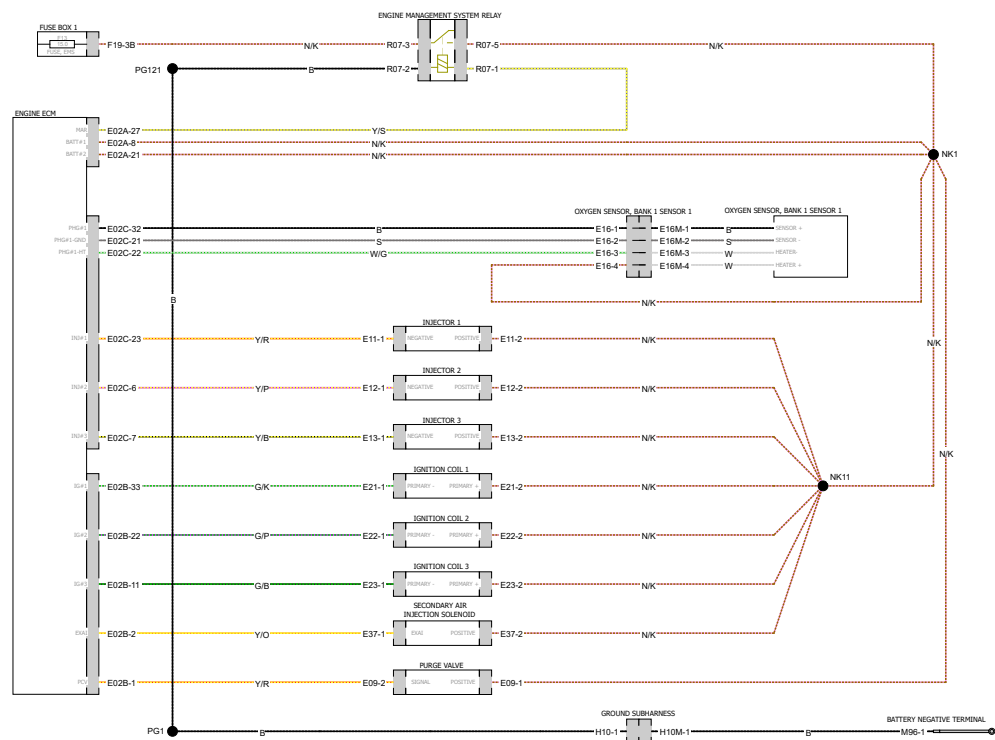
Engine Management - Position Sensors



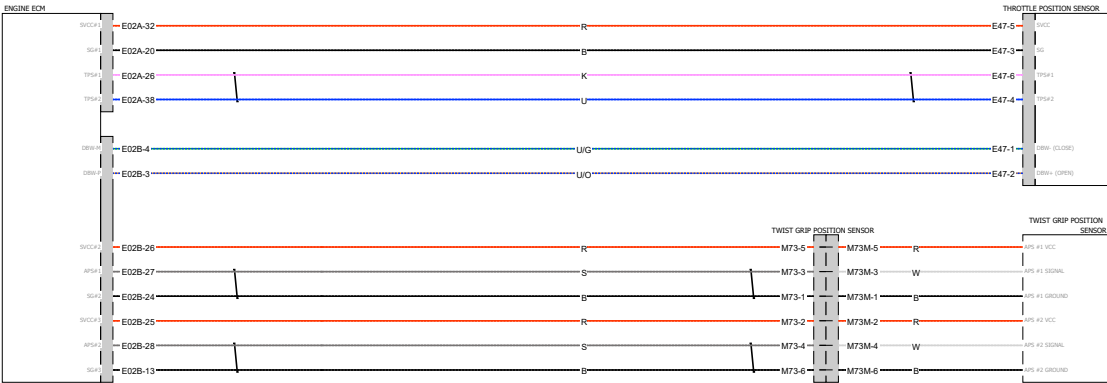
Engine Management – Level Sensor



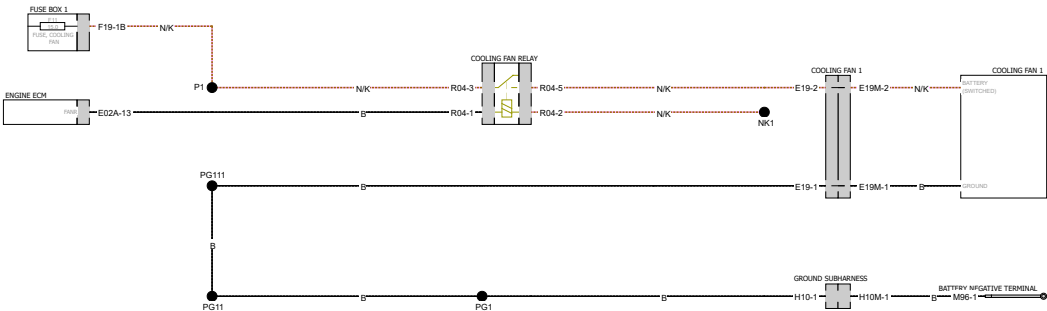
Engine Management – Fuel Injection Components



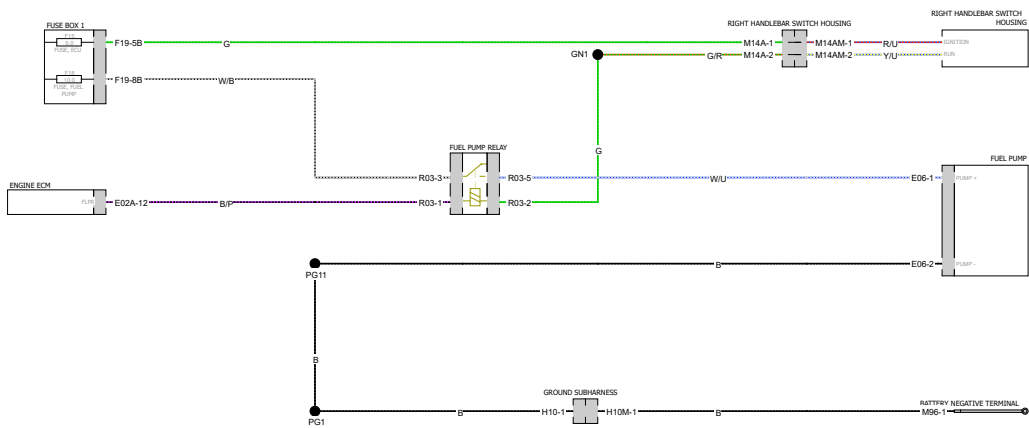
Engine Management – Throttle Control



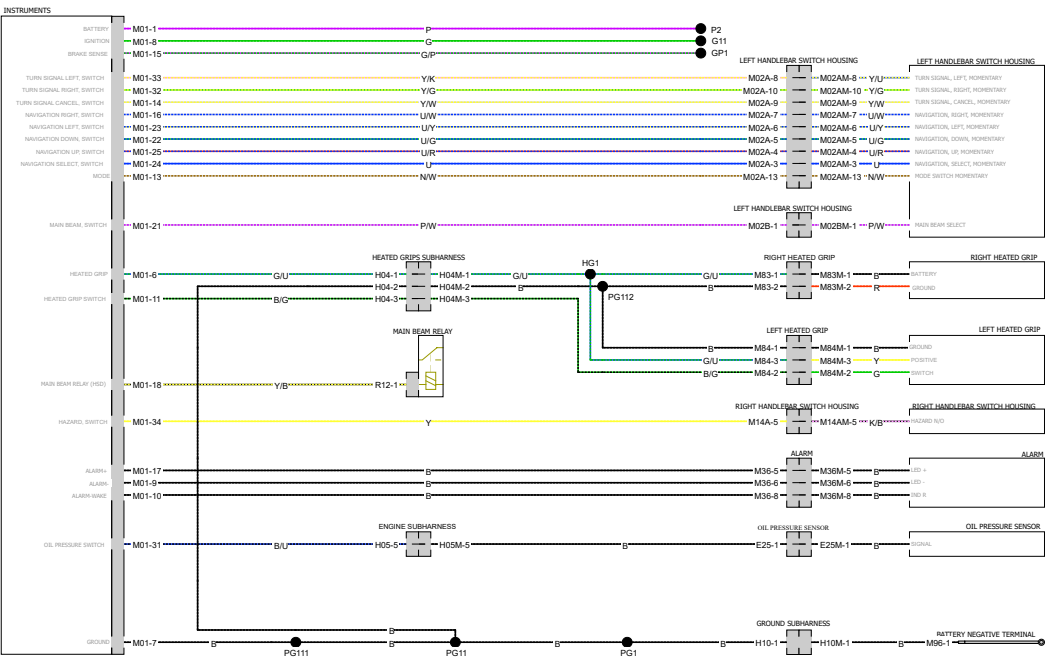
Engine Management - Cooling Fan



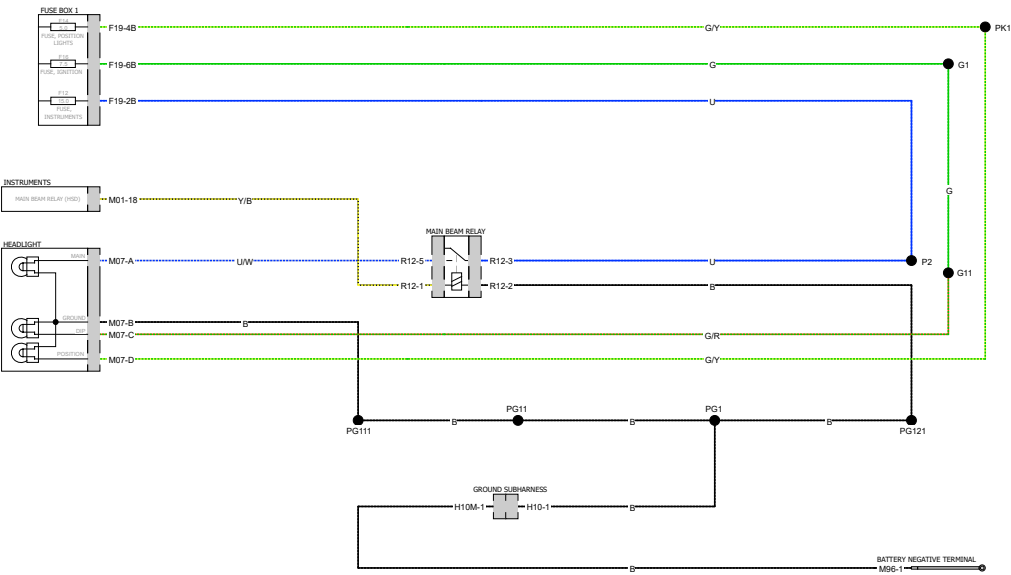
Engine Management - Fuel Pump



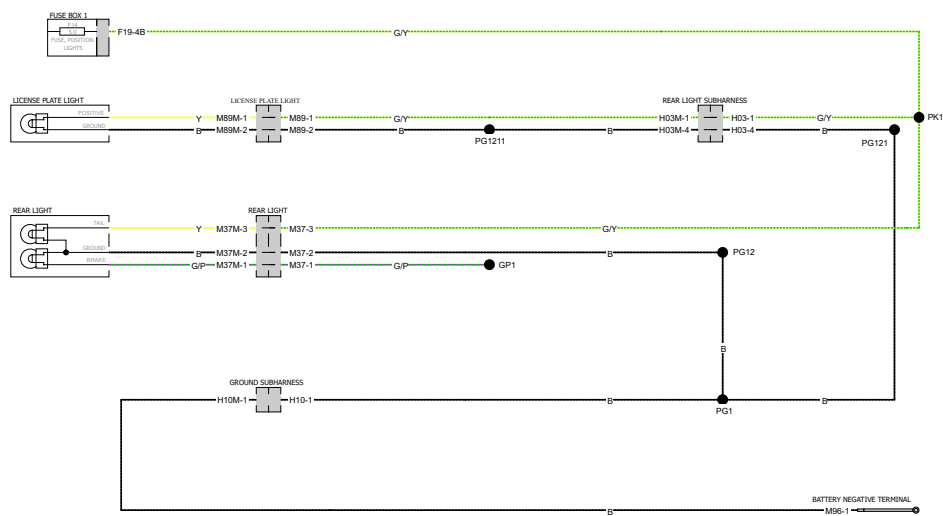
Instruments Circuit



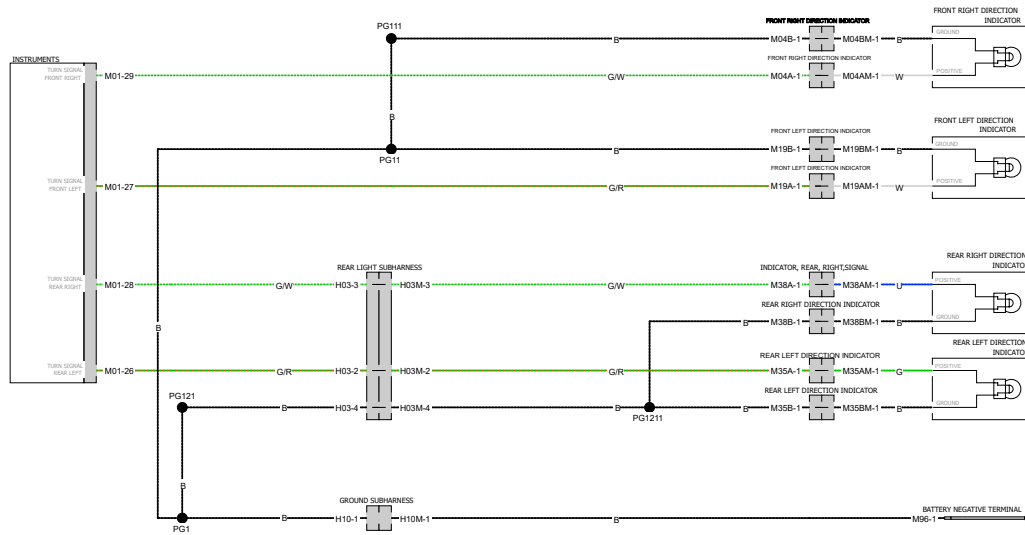
Lighting Circuit - Front



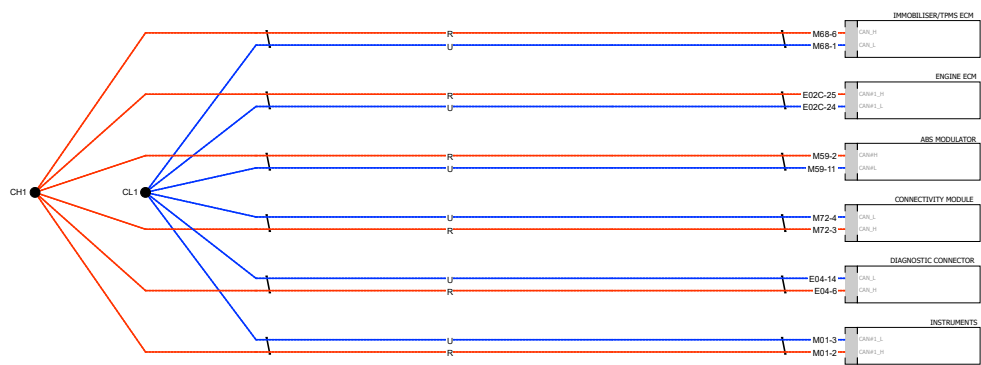
Lighting Circuit - Rear



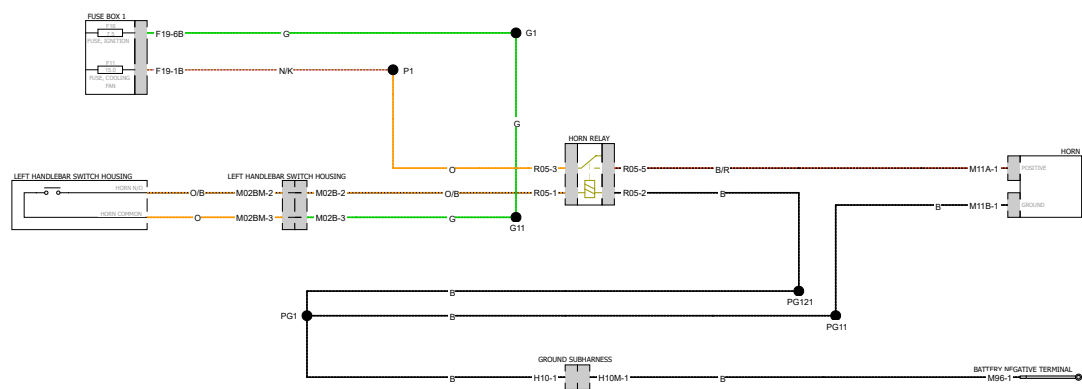
Lighting Circuit - Indicators



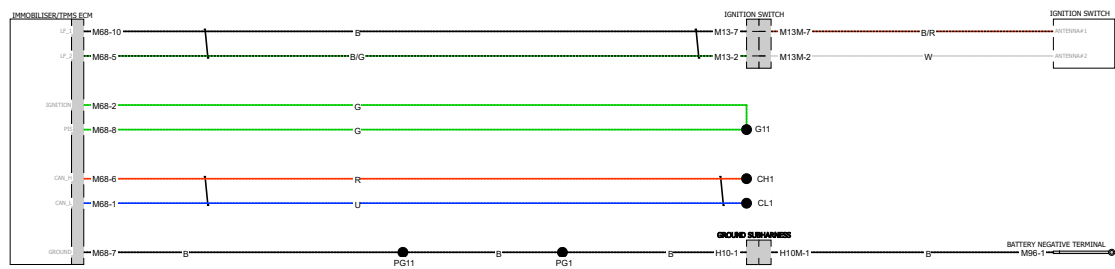
Communication Networks Circuit



Horn Circuit

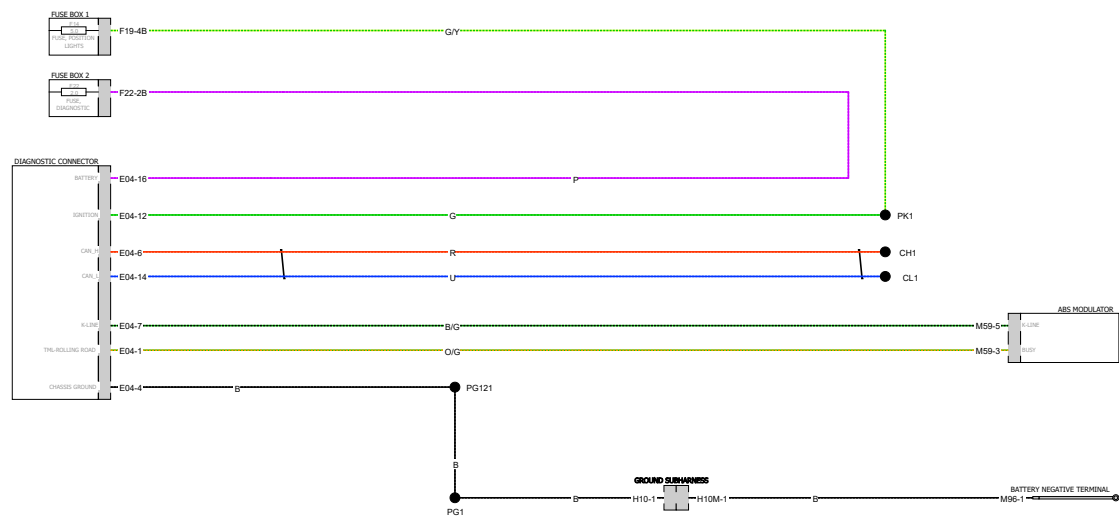


Immobiliser Circuit

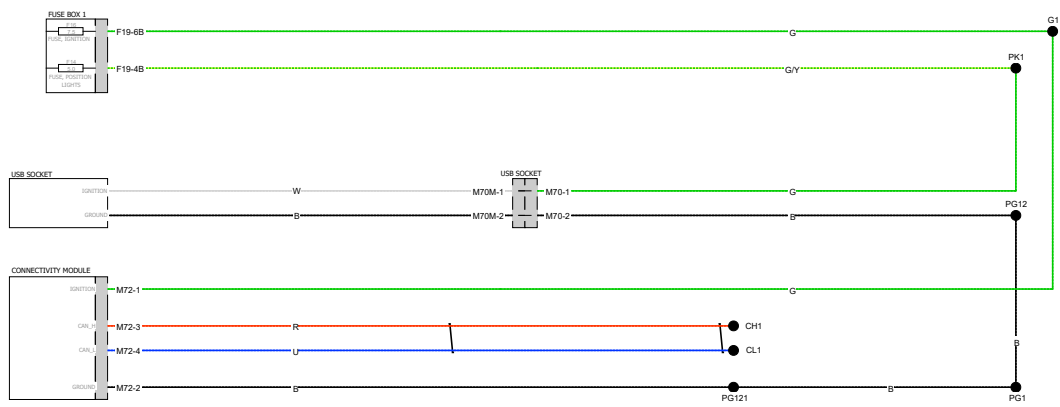


Diagnostic Connector Circuit

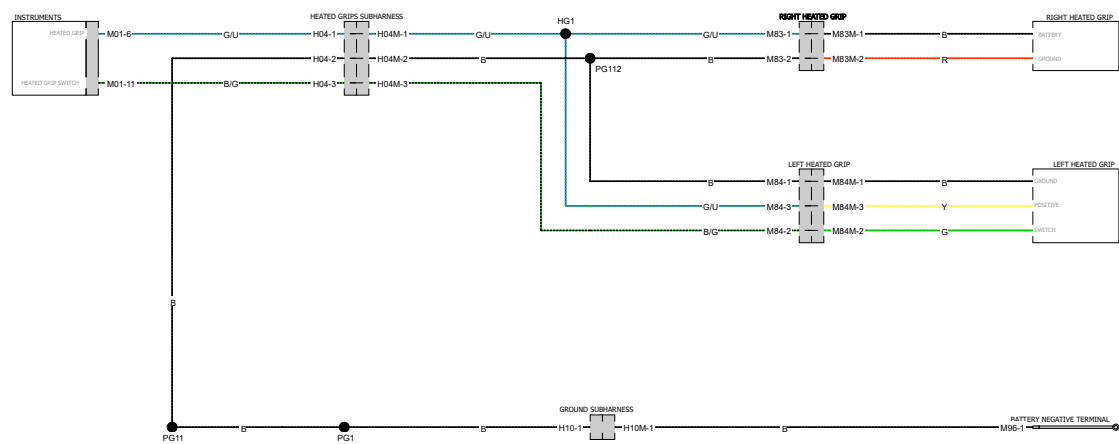
ELECTRICAL CIRCUIT

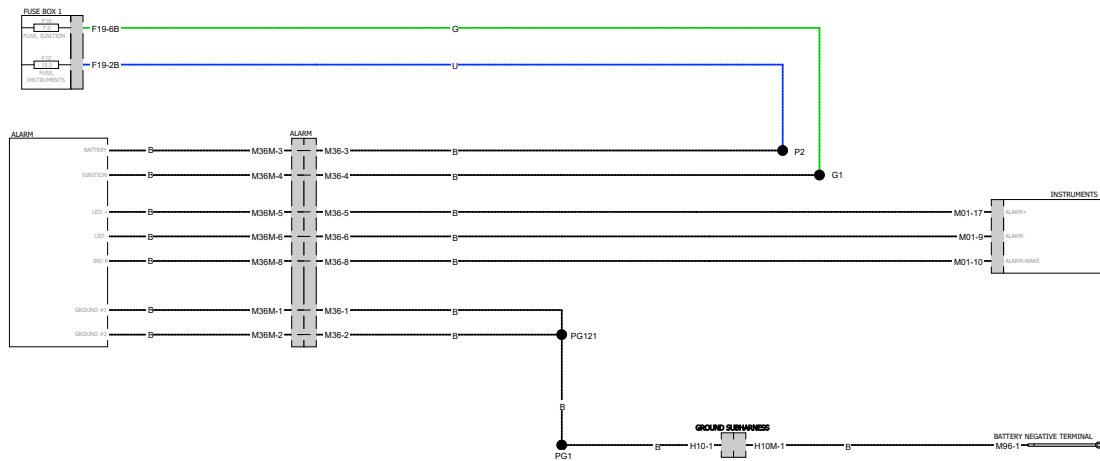


Accessories Circuit

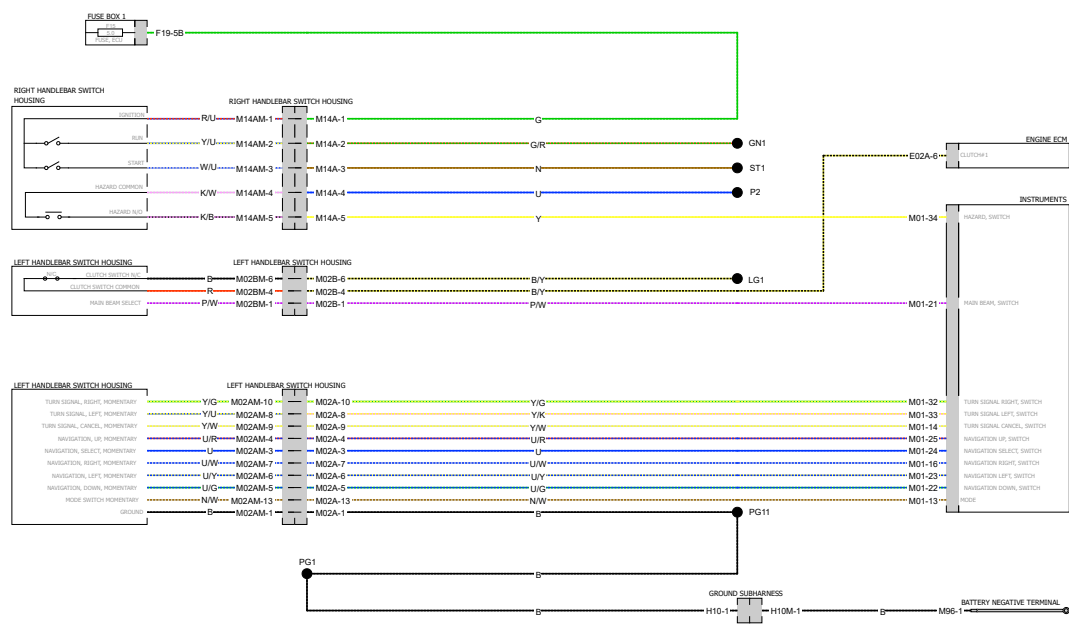


Heated Accessories Circuit

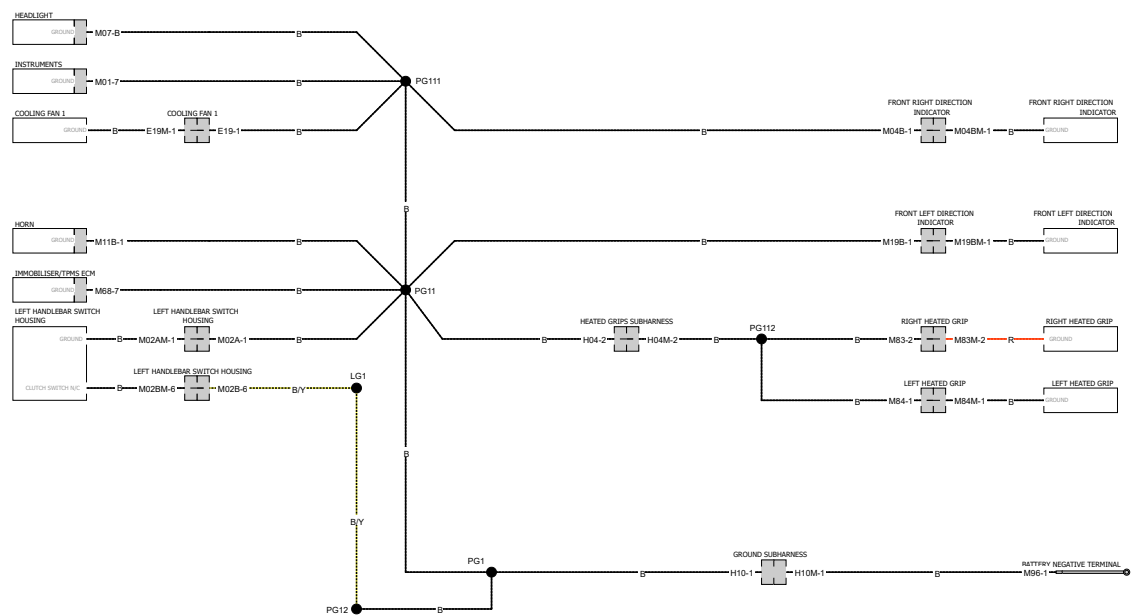




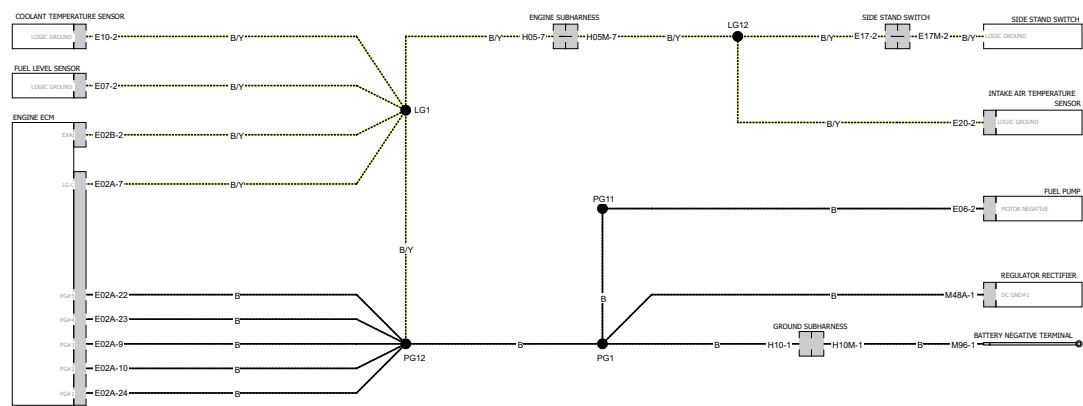
Rider Information Circuit



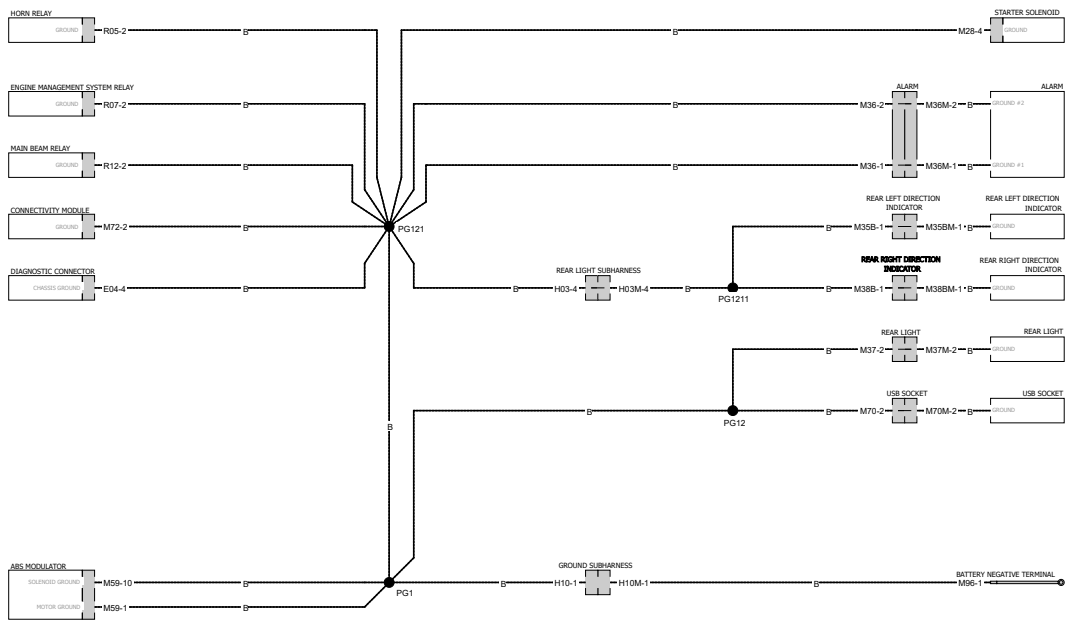
Ground Circuit - Front



Ground Circuit - Middle



Ground Circuit - Rear



Diagnostics

General Information

Calibration Downloading General Information

⚠ CAUTION

The calibration download procedures detailed in the flow charts provided in the following chapters must be followed precisely. Failure to precisely follow the procedures may result in permanent damage to the component receiving the calibration download.

⚠ CAUTION

When downloading a calibration, always ensure the calibration selected is correct for your model and region. Failure to select the correct calibration may result in permanent damage to the component receiving the calibration download.

⚠ CAUTION

When downloading an engine ECM calibration, always ensure the correct calibration is selected for your fuel type. Engine damage may result if a calibration for an incorrect fuel type is installed.

NOTICE

Before starting a download, make sure the battery voltage is at least 12.8 Volts. An approved motorcycle battery charger should be connected to maintain battery charge during download.

The headlight fuse may be removed prior to starting a download to prevent the headlight draining the battery. Refer to the label on the fuse box cover for the fuse location.

Ensure the ignition and engine Start/Stop switches are set to the positions detailed at the beginning of each download process flowchart.

Once the calibration download has been started, do not switch the ignition or engine Start/Stop switches to a different position unless instructed to do so by the Triumph Diagnostic Tool/download process flow chart.

Do not disconnect the diagnostic interface during the calibration download.

During a calibration download, multiple files are downloaded and the progress bar displayed will repeatedly rise from 0% to 100% as each file is downloaded. Always wait for the Verifying Download screen to appear to confirm that the full calibration has downloaded successfully and click the Finish button to end the process. Do not click the Cancel button while the download is still in progress.

Instrument Calibration Downloads

Following an instrument calibration download, the following items (if fitted) may return to their factory default settings. Before starting an instrument calibration download, record the settings of each item where applicable so that the settings can be restored after the download has finished.

- Time/date
- Distance/time to next service
- TPMS instrument display (enabled/disabled)
- All riding mode settings
- Self cancelling indicators (enabled/disabled).

Downloading Sequence - Calibration Downloads to Multiple ECMs

When planning to download a calibration, check each of the motorcycle's ECMs for out of date calibrations and make sure all ECMs are updated as necessary. Where calibration updates are available for more than one ECM, the ECMs should be updated in the following order.

1. Keyless ECM
2. Chassis ECM
3. Suspension ECM
4. Headlight ECM
5. Blind spot radar ECM
6. Instruments
7. Engine ECM

Electronic Control Module (ECM) Connectors

Electronic Control Module (ECM) Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

NOTICE

A major cause of hidden electrical faults can be traced to faulty electrical connectors.

For example:

- Dirty/corroded terminals
- Damp terminals
- Broken or bent cable pins within multiplugs.

For example, the ABS electronic control module (ABS modulator/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 battery supply and ground pins should be virtually battery volts with a small deviation allowable for usual voltage drop within wiring circuits. If there is a noticeable change, suspect faulty/dirty connections. Refer to the ABS circuit diagram within this Service Manual for pin numbers.

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:

- Make sure 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.

Instruments Management System Overview

Odometer Reset

This model is equipped with an odometer that allows the recorded odometer value to be reset to zero during the PDI check.

In the event of replacement this functionality will also allow a new set of instruments to be programmed with the motorcycle's existing odometer value.

NOTICE

Motorcycles with the odometer reset functionality enabled will display the Set/Reset Odometer option in the chassis diagnostics menu.

If the odometer has recorded more than 120 miles (200 km) or previously been reset the option will not be available and the buttons will be greyed out.

Triumph Motorcycles LTD. would like to emphasise the importance of following the correct process whilst using the Triumph Diagnostic Tool to SET/RESET the odometer.

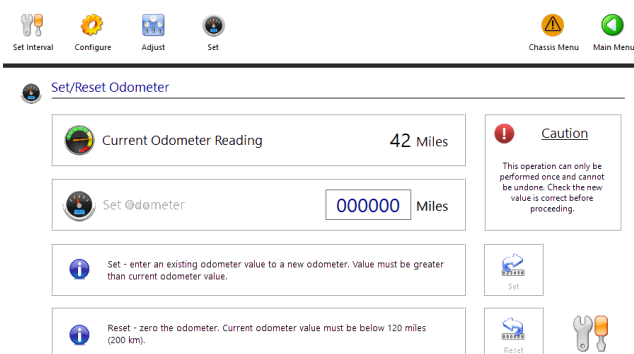
⚠ CAUTION

This operation can only be performed once and cannot be undone.

Check the new value is correct before proceeding.

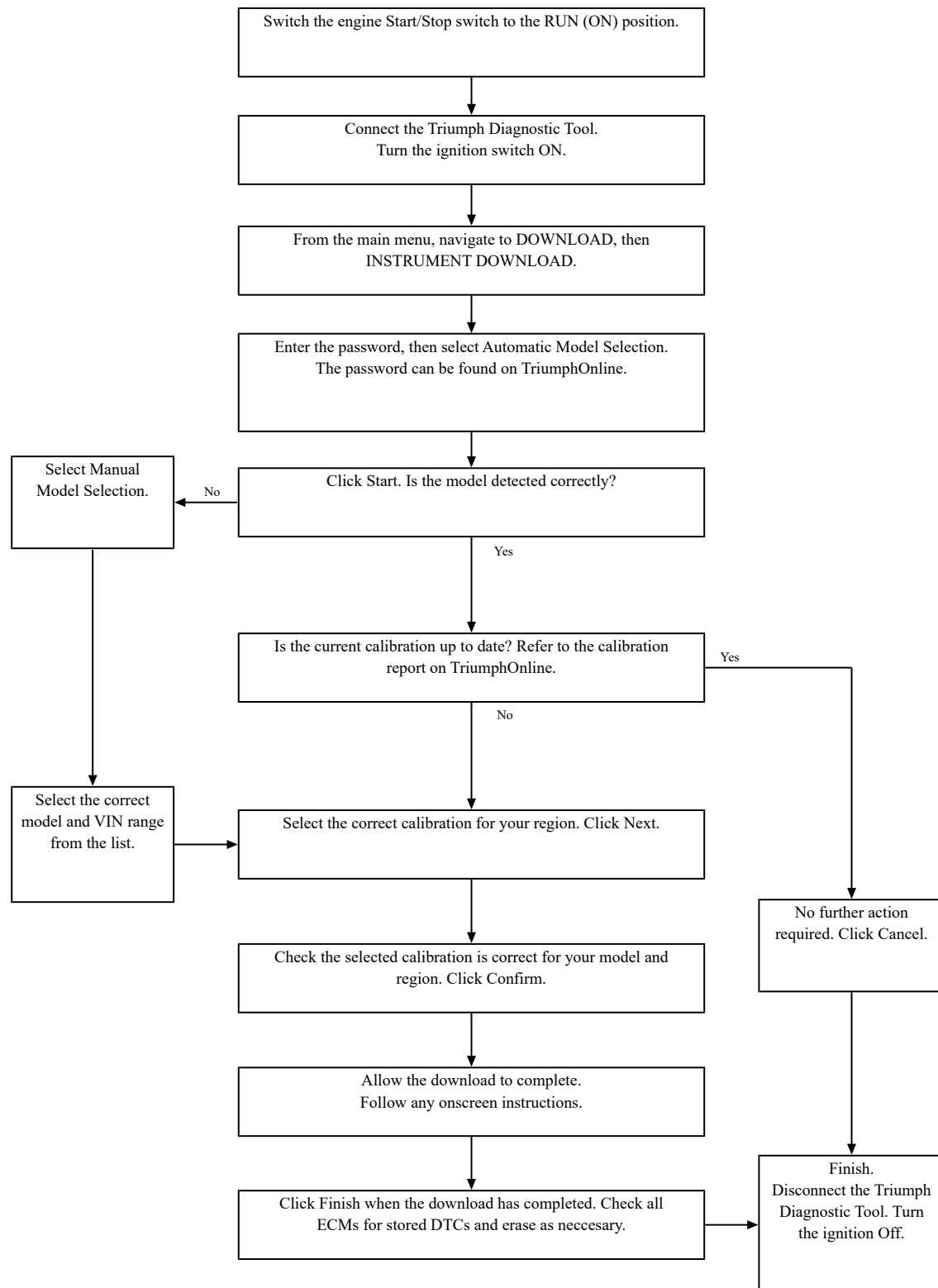
When setting or resetting the odometer value ensure:

- The CORRECT odometer value is displayed in the Set Odometer box before pressing the Set or Reset button.
- DO NOT press the Set or Reset buttons before entering the correct odometer value. Once pressed the option to set or reset the odometer will no longer be available.
- REMEMBER, pressing the set or reset buttons will lock the odometer and no further programming will be allowed.



To Set/Reset the Odometer always refer to Set/Reset Odometer in the Chassis Diagnostics chapter of the Triumph Diagnostic User Guide.

Instrument Calibration Download Flow Chart



NOTICE

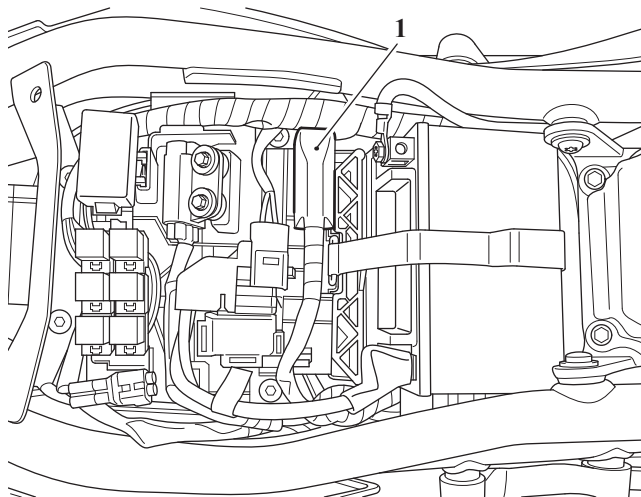


If the download fails to complete, restart the download using manual model selection.

System Diagnostics

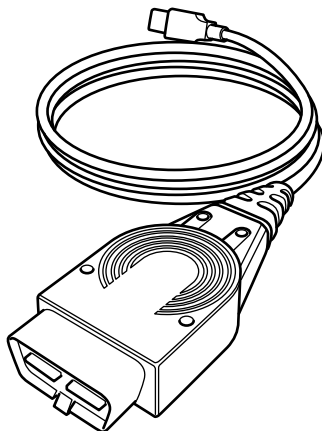
Diagnostic Tool Connection

1. To connect the Triumph diagnostic interface to the motorcycle, remove the seat (see [Seat - Removal](#)) and release the diagnostic connector from its location on the battery tray.



1. Diagnostic connector

2. Plug the Triumph diagnostic interface directly into the diagnostic connector.



T3880057 - Triumph Diagnostic Interface

3. When the diagnostic session is completed, disconnect the Triumph diagnostic interface.
4. Refit the diagnostic connector to its location and refit the seat (see [Seat - Installation](#)).

Systems Diagnostics

The management systems on this model have on-board diagnostic features which allows service technicians to retrieve stored data from the relevant electronic control module (ECM) using Triumph diagnostic software. **Full details of the Triumph diagnostic software operation and how to interpret the results are given in the Triumph Diagnostic Tool User Guide.**

The software allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system.

To connect to the Triumph diagnostic tool see [Diagnostic Tool Connection](#).

The DTCs are reported to the Triumph diagnostic tool as a five digit code.

When the system detects a fault, it begins to count the number of times the fault occurs before confirming the fault and storing a fault code. A confirmed fault may be indicated by the effected system(s) simply becoming inoperative, or by the illumination of a system warning light and/or instrument warning message.

Similarly, if a fault clears, the Instruments also records this fact and will extinguish any warning lights or instrument messages and restore normal operation to the affected system, when sufficient no-fault ignition switch cycles have taken place. Any fault codes will remain in the memory until the required number of no-fault ignition switch cycles have taken place. The number of ignition switch cycles required to restore normal operation will always be less than the number required to remove a DTC from the memory.

DTCs can be removed at any time using the Triumph diagnostic tool.

Engine ECM

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted. For example, if there is a fault in the crankshaft position sensor, the counter will increment its count each time the crankshaft turns through 360°, provided the fault is still present.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a predetermined threshold, the fault becomes confirmed. If the fault is an emissions related fault or a serious malfunction affecting engine performance, a DTC (Diagnostic Trouble Code) and freeze-frame data will be logged in the ECM's memory and the MIL (Malfunction Indicator Lamp) on the motorcycle instrument panel is illuminated. Once a fault is confirmed, the number of warm-up cycles made by the engine is counted. If the fault clears, the warm-up cycle counter will extinguish the MIL (Malfunction Indicator Lamp) at a predetermined count, and erase the DTC and freeze-frame data from the ECM memory at another (higher) count.

A single warm-up cycle is deemed to have taken place when the following criteria have been met:

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

NOTICE

When a fault has been rectified, the MIL will remain illuminated until sufficient non-fault warm-up cycles have taken place to turn it off. The MIL will be immediately extinguished if, after first rectifying the fault, the DTC (diagnostic trouble code) that caused the MIL illumination is erased from the ECM memory using the Triumph diagnostic software.

NOTICE

In some cases, when a fault is detected, the engine management system will revert to a limp-home mode. In this mode, the engine will still function though the performance and fuel economy may be marginally affected. In some cases, the rider may not notice any appreciable difference from normal operation.

🔑 The service symbol will illuminate for five seconds after the motorcycle start up sequence as a reminder that a service is due in approximately 60 miles (100 km). The service symbol will illuminate permanently when the mileage is reached, it will remain permanently illuminated until the service interval is reset using the Triumph Diagnostic tool.

🔑 The general warning symbol will flash if an ABS or engine management fault has occurred and the ABS and/or MIL warning lights are illuminated. Rectify the fault and clear the diagnostic trouble codes using the Triumph Diagnostic tool.

To view the engine ECM DTC index see [Diagnostic Trouble Codes - Index - Engine](#). The index has links to the relevant pin point tests.

ABS ECM

 **WARNING**

The ABS warning light will illuminate when the rear wheel is driven at high speed for more than 30 seconds when the motorcycle is on a stand, or driven on a dynamometer. This reaction is normal.

When the ignition is switched off and the motorcycle is restarted, the warning light will illuminate until the motorcycle reaches a speed exceeding 19 mph (30 km/h) when it will go off.

Diagnostic Trouble Code (DTC) C1612 will remain stored in the ABS ECM memory for 40 ignition cycles before being deleted.

Under normal operation, the ABS warning light will flash after the ignition is switched on and until the vehicle speed exceeds 6 mph (10 km/h). The ABS performs a self check and if no faults are found the flashing light is extinguished. If a trouble code is stored the ABS warning light will stay illuminated and the ABS will not function, however the brakes will operate as a non-ABS braking system. If the ABS warning light does not extinguish, or illuminates whilst the motorcycle is being ridden.

Dependant on the DTC stored, the ABS ECM will act in one of two ways:

1. Inhibit ABS operation immediately, irrespective of the ABS operating mode;
2. 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:

1. Allow the ABS to resume operation if the fault clears;
2. Allow ABS operation after an ignition cycle if the fault clears;
3. Inhibit the ABS function until the fault is rectified and the DTC erased.

To view the ABS ECM DTC index see [Diagnostic Trouble Codes - Index - ABS](#). The index has links to the relevant pin point tests.

Instruments ECM

Diagnostic Trouble Codes (DTCs) are logged in the Instruments memory when there is a confirmed fault in the system.

To view the instruments ECM DTC index see [Diagnostic - Trouble Codes - Index - Instruments](#). The index has links to the relevant pin point tests.

CAN Errors

The diagnostic trouble codes are reported to the Triumph diagnostic tool as a **five digit fault code** (DTC) followed by a **four digit code** (Failure Type).

To view the CAN Errors DTC index see [Diagnostics - Trouble Codes - Index - CAN Errors](#). The index has links to the relevant pin point tests.

Further Diagnosis

Pinpoint Tests

Pin point tests, if used correctly, help to diagnose a fault in the system once a diagnostic trouble code has been stored.

Before Starting 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.

After Completion of Pinpoint Tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 km/h. If the DTC is repeated, proceed to the relevant pinpoint test.
4. If a DTC is stored, there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

Pinpoint Tests

Pinpoint Tests - Engine ECM

Diagnostic Trouble Codes - Index - Engine

The system will log the diagnostic trouble codes listed below.

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0030	Oxygen sensor heater open circuit or short to ground - bank 1 sensor 1	3	40	Yes	P0030, P0032 - Oxygen Sensor Heater Circuit
P0032	Oxygen sensor heater short circuit to battery positive - bank 1 sensor 1	3	40	Yes	P0030, P0032 - Oxygen Sensor Heater Circuit
P0053	Oxygen sensor heater resistance - bank 1 sensor 1	3	40	Yes	P0053, P0134, P0171, P0172 - Oxygen Sensor Heater Circuit
P0068	Manifold absolute pressure sensor correlation error with throttle position sensor	3	40	Yes	P0068, P0069, P0107, P0105, P1105 - Manifold Absolute Pressure (MAP) Sensor
P0069	Manifold absolute pressure sensor correlation error with ambient pressure sensor	3	40	Yes	P0068, P0069, P0107, P0105, P1105 - Manifold Absolute Pressure (MAP) Sensor
P0105	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	P0068, P0069, P0107, P0105, P1105 - Manifold Absolute Pressure (MAP) Sensor
P0107	Manifold absolute pressure sensor 1 short circuit to ground	3	40	Yes	P0068, P0069, P0107, P0105, P1105 - Manifold Absolute Pressure (MAP) Sensor
P0110	Intake air temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	P0110, P0111, P0112 - Intake Air Temperature Sensor
P0111	Intake air temperature sensor signal out of range	3	40	Yes	P0110, P0111, P0112 - Intake Air Temperature Sensor
P0112	Intake air temperature sensor short circuit to ground	3	40	Yes	P0110, P0111, P0112 - Intake Air Temperature Sensor
P0115	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	P011B, P0115, P0117, P0125, P050C - Coolant Temperature Sensor

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P0117	Engine coolant temperature sensor short circuit to ground	3	40	Yes	P011B, P0115, P0117, P0125, P050C - Coolant Temperature Sensor
P011B	Engine coolant temperature sensor correlation error with intake air temperature sensor	3	40	Yes	P011B, P0115, P0117, P0125, P050C - Coolant Temperature Sensor
P0120	Throttle position sensor 1 short circuit to battery positive or open circuit	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P0121	Throttle position sensor 1 signal out of range	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P0122	Throttle position sensor 1 short circuit to ground	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P0125	Engine coolant temperature sensor signal low - not reaching temperature required for closed loop fuel control	3	40	Yes	P011B, P0115, P0117, P0125, P050C - Coolant Temperature Sensor
P0130	Oxygen sensor open circuit or short circuit to battery positive - bank 1 sensor 1	3	40	Yes	P0130, P0131 - Oxygen Sensor
P0131	Oxygen sensor short circuit to ground - bank 1 sensor 1	3	40	Yes	P0130, P0131 - Oxygen Sensor
P0133	Oxygen sensor circuit slow response - bank 1 sensor 1	3	40	Yes	P0133 - Oxygen Sensor 1
P0134	Oxygen sensor circuit no activity detected - bank 1 sensor 1	3	40	Yes	P0053, P0134, P0171, P0172 - Oxygen Sensor Heater Circuit
P0171	System too lean - bank 1	3	40	Yes	P0053, P0134, P0171, P0172 - Oxygen Sensor Heater Circuit
P0172	System too rich - bank 1	3	40	Yes	P0053, P0134, P0171, P0172 - Oxygen Sensor Heater Circuit
P0201	Injector 1 circuit malfunction	3	40	Yes	P0201, P0202, P0203 - Injector Circuit Malfunction
P0202	Injector 2 circuit malfunction	3	40	Yes	P0201, P0202, P0203 - Injector Circuit Malfunction
P0203	Injector 3 circuit malfunction	3	40	Yes	P0201, P0202, P0203 - Injector Circuit

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
					Malfunction
P0220	Throttle position sensor 2 short circuit to battery positive or open circuit	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P0221	Throttle position sensor 2 signal out of range	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P0222	Throttle position sensor 2 short circuit to ground	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P0300	Random/Multiple Cylinder Misfire Detected	3	40	Yes	P0300, P0301, P0302, P0303 - Cylinder Misfire Detected
P0301	Cylinder 1 Misfire Detected	3	40	Yes	P0300, P0301, P0302, P0303 - Cylinder Misfire Detected
P0302	Cylinder 2 Misfire Detected	3	40	Yes	P0300, P0301, P0302, P0303 - Cylinder Misfire Detected
P0303	Cylinder 3 Misfire Detected	3	40	Yes	P0300, P0301, P0302, P0303 - Cylinder Misfire Detected
P0315 (European markets only)	Crankshaft position not adapted	3	40	Yes	P0315, P0335 - Crankshaft Position Not Adapted
P0335	Crankshaft sensor circuit malfunction	3	40	Yes	P0315, P0335 - Crankshaft Position Not Adapted
P0351	Ignition coil 1 malfunction	3	40	Yes	P0351, P0352, P0353 - Ignition Coil Malfunction
P0352	Ignition coil 2 malfunction	3	40	Yes	P0351, P0352, P0353 - Ignition Coil Malfunction
P0353	Ignition coil 3 malfunction	3	40	Yes	P0351, P0352, P0353 - Ignition Coil Malfunction
P0412	Secondary air injection short circuit to ground or open circuit	3	40	Yes	P0412, P044F, Secondary Air Injection Valve
P0443	Purge valve short circuit to ground or open circuit	3	40	Yes	P0443, P0459 - Purge valve short circuit to ground or open circuit

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P044F	Secondary air injection short circuit to battery positive	3	40	Yes	P0412, P044F, Secondary Air injection Valve
P0459	Purge valve short circuit to battery positive	3	40	Yes	P0443, P0459 - Purge valve short circuit to ground or open circuit
P0460	Fuel level sensor circuit malfunction	0	40	No	P0460 - Fuel Level Sensor Circuit Malfunction
P0500	Vehicle speed sensor - Wheel speed sensor fault	3	40	Yes	P0500 - Vehicle speed sensor malfunction
P050C	Engine coolant temperature sensor signal high - too warm for cold start conditions	3	40	Yes	P011B, P0115, P0117, P0125, P050C - Coolant Temperature Sensor
P0506	Idle control system RPM lower than expected	3	40	Yes	P0506 - Idle Control System RPM Lower Than Expected
P0507	Idle control system RPM higher than expected	3	40	Yes	P0507 - Engine Idle Higher Than Expected
P0560	System voltage - battery circuit malfunction	3	40	Yes	P0560 - System Voltage - Battery Circuit Malfunction
P06A4	5V Sensor Circuit D - reference voltage low	3	40	Yes	P06A4, P06A5, P06A9, 5V Sensor Circuit D
P06A5	5V Sensor Circuit D - reference voltage high	3	40	Yes	P06A4, P06A5, P06A9, 5V Sensor Circuit D
P06A6	5V Sensor Circuit A - reference voltage out of range	3	40	Yes	P0642, P0643, P06A6 - 5 V Sensor Circuit A
P06A7	5V Sensor Circuit B - reference voltage out of range	3	40	Yes	P0652, P0653, P06A7 - 5V Sensor Circuit B
P06A8	5V Sensor Circuit C - reference voltage out of range	3	40	Yes	P0698, P0699, P06A8 - 5V Sensor Circuit C
P06A9	5V Sensor Circuit D - reference voltage out of range	3	40	Yes	P06A4, P06A5, P06A9, 5V Sensor Circuit D
P06B8	EEPROM Error	0	40	No	P06B8 - EEPROM Error
P0606	ECM internal error	0	0	Yes	P0606, P1607, P1608 - Engine ECM Internal Error
P0642	5V Sensor Circuit A - reference voltage low	3	40	Yes	P0642, P0643, P06A6 - 5 V Sensor Circuit A

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
P0643	5V Sensor Circuit A - reference voltage high	3	40	Yes	P0642, P0643, P06A6 - 5 V Sensor Circuit A
P0652	5V Sensor Circuit B - reference voltage low	3	40	Yes	P0652, P0653, P06A7 - 5V Sensor Circuit B
P0653	5V Sensor Circuit B - reference voltage high	3	40	Yes	P0652, P0653, P06A7 - 5V Sensor Circuit B
P0698	5V Sensor Circuit C - reference voltage low	3	40	Yes	P0698, P0699, P06A8 - 5V Sensor Circuit C
P0699	5V Sensor Circuit C - reference voltage high	3	40	Yes	P0698, P0699, P06A8 - 5V Sensor Circuit C
P0704	Clutch switch 1 input circuit malfunction	3	40	Yes	P0704 - Clutch Switch 1 Input Circuit Malfunction
P0914	Gear position sensor short circuit to ground or open circuit	3	40	Yes	P0914, P0917 - Gear Position Sensor
P0915	Gear position sensor signal error - correlation error with vehicle speed	3	40	Yes	P0915 - Gear Position Sensor
P0917	Gear position sensor short circuit to 5 Volt sensor supply	3	40	Yes	P0914, P0917 - Gear Position Sensor
P1105	Manifold absolute pressure sensor 1 pipe malfunction	3	40	Yes	P0068, P0069, P0107, P0105, P1105 - Manifold Absolute Pressure (MAP) Sensor
P1135	Traction Control prevented due to ABS malfunction	3	40	Yes	P1135 - Traction Control Disabled Due To Malfunction
P1231	Fuel pump relay short circuit to ground or open circuit	3	40	Yes	P1231, P1232 - Fuel Pump Relay
P1232	Fuel pump relay short circuit to battery Voltage	3	40	Yes	P1231, P1232 - Fuel Pump Relay
P1520	Unmatched ABS module	3	40	Flashing	P1520 - Unmatched ABS Module
P1521	CAN fault - lost communication with ABS module or ABS system status error	3	40	Yes	P1521 - CAN Fault - Lost Communication With ABS Module Or ABS System Status Error
P1552	Cooling fan relay short circuit to ground or open circuit	3	40	Yes	P1552, P1553 - Cooling Fan Relay
P1553	Cooling fan relay short circuit to battery positive or over temp	3	40	Yes	P1552, P1553 - Cooling Fan Relay

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
P1576	Brake switch 1 correlation error with brake switch 2	3	40	Yes	P1576, P1577 - Brake Switches
P1577	Brake switch 2 correlation error with brake switch 1	3	40	Yes	P1576, P1577 - Brake Switches
P1604	ECM tamper detected - return to Triumph	0	0	Yes	P1604 - Engine ECM Tamper Detected - Return To Triumph
P1605	ECM locked by the tune lock function	Only if tune lock is unlocked	N/A	Flashing	P1605 - Engine ECM Locked By The Calibration Lock Function
P1607	ECM ride by wire internal error	3	40	Yes	P0606, P1607, P1608 - Engine ECM Internal Error
P1608	ECM ride by wire internal error	3	40	Yes	P0606, P1607, P1608 - Engine ECM Internal Error
P1614	Instrument ID incompatible	Only if Instrument ID Matching	N/A	Flashing	P1614 - Instrument ID incompatible Or Instruments Locked By Calibration Lock Function
P1631	Fall detection circuit short circuit to ground	3	40	Yes	P1631, P1632 - Fall Detection Switch
P1632	Fall detection circuit short circuit to battery positive	3	40	Yes	P1631, P1632 - Fall Detection Switch
P1650	CAN fault - lost communication with Immobiliser ECM	0	40	No	P1650 - CAN Fault - Lost communication With Immobiliser ECM
P1659	Ignition power supply malfunction	3	40	Yes	P1659 - Ignition Power Supply Malfunction
P1685	Main relay circuit malfunction	3	40	Yes	P1685 - Main Relay Circuit Malfunction
P1690	CAN Fault	3	40	Yes	P1690 - CAN Fault
P1695	CAN fault - lost communication with instrument panel	0	40	No	P1695 - CAN Fault - Lost Communication With Instrument Panel
P1702	Shift force sensor circuit low voltage	3	40	Yes	P1702, P1703 - Shift Force Sensor Circuit (Triumph Shift Assist)
P1703	Shift force sensor circuit high voltage	3	40	Yes	P1702, P1703 - Shift Force Sensor Circuit (Triumph Shift Assist)
P2100	Throttle actuator control motor open circuit	3	40	Yes	P2100 - Throttle Actuator Control Motor Open Circuit

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged	Pinpoint test page number
P2102	Throttle actuator control internal motor relay does not operate	3	40	Yes	P2102, P2103 - Throttle Actuator Control
P2103	Throttle actuator control internal motor relay operates continually	3	40	Yes	P2102, P2103 - Throttle Actuator Control
P2111	Throttle valve drive error (stuck open)	3	40	Yes	P2111, P2119 - Throttle Valve Drive Error
P2119	Throttle valve drive error	3	40	Yes	P2111, P2119 - Throttle Valve Drive Error
P2120	Twist grip position sensor 1 short circuit to ground or open circuit	3	40	Yes	P2120, P2121, P2123 - Twist Grip Position Sensor 1
P2121	Twist grip position sensor 1 signal out of range	3	40	Yes	P2120, P2121, P2123 - Twist Grip Position Sensor 1
P2123	Twist grip position sensor 1 short circuit to battery positive	3	40	Yes	P2120, P2121, P2123 - Twist Grip Position Sensor 1
P2125	Twist grip position sensor 2 short circuit to ground or open circuit	3	40	Yes	P2125, P2126, P2128 - Twist Grip Position Sensor 2
P2126	Twist grip position sensor 2 signal out of range	3	40	Yes	P2125, P2126, P2128 - Twist Grip Position Sensor 2
P2128	Twist grip position sensor 2 short circuit to battery positive	3	40	Yes	P2125, P2126, P2128 - Twist Grip Position Sensor 2
P2135	Throttle position sensor 1 correlation error with throttle position sensor 2	3	40	Yes	P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor
P2138	Twist grip position sensor 1 correlation error with twist grip position 2	3	40	Yes	P2138 - Twist Grip Position Sensor 1 Correlation Error with Twist Grip Position 2
P2226	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	3	40	Yes	P2226, P2228 - Ambient Air Pressure Sensor
P2228	Ambient air pressure sensor circuit short circuit to ground	3	40	Yes	P2226, P2228 - Ambient Air Pressure Sensor

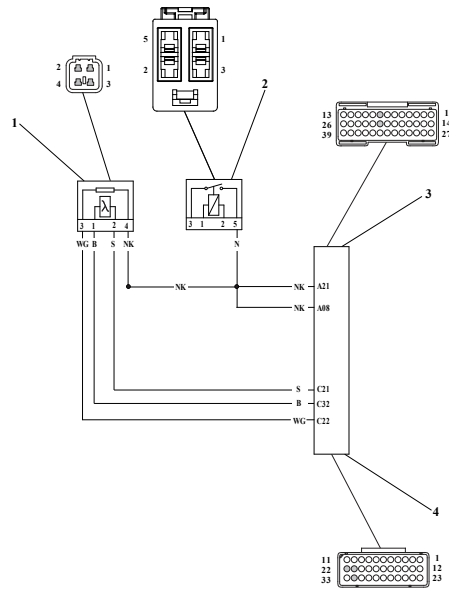
P0030, P0032 - Oxygen Sensor Heater Circuit

Fault Code	Possible cause	Action
P0030	Oxygen sensor heater open circuit or short to ground - bank 1 sensor 1	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P0032	Oxygen sensor heater short circuit to battery positive - bank 1 sensor 1	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A08 - EMS relay pin 5	OK	Disconnect oxygen sensors and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin A08 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Engine ECM pin A08 to oxygen sensor pin 4 - Engine ECM pin C22 to oxygen sensor pin 3	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Check cable for short circuit: - Engine ECM pin C22 to Engine ECM pin A08	OK	Renew oxygen 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. Check adaption status.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Oxygen Sensor
2. Engine Management System Relay
3. Engine ECM Connector A
4. Engine ECM Connector C

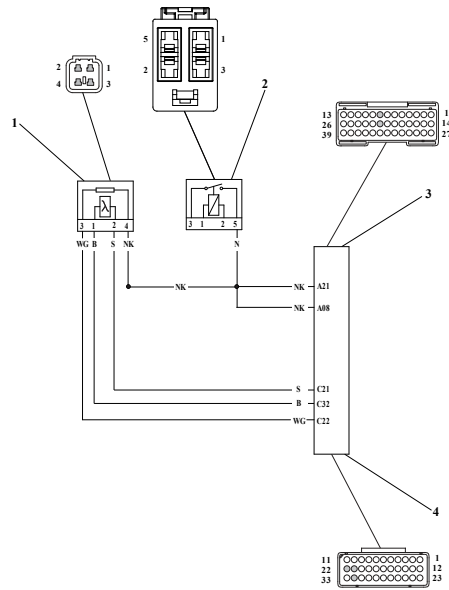
P0053, P0134, P0171, P0172 - Oxygen Sensor Heater Circuit

Fault Code	Possible cause	Action
P0053	Oxygen sensor heater resistance - bank 1 sensor 1	View and note 'freeze-frame' data if available. Disconnect engine ECM and proceed to pinpoint test 1:
P0134	Oxygen sensor circuit no activity detected - bank 1 sensor 1	
P0171	System too lean - bank 1	
P0172	System too rich - bank 1	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: -Oxygen sensor pin 3 -Oxygen sensor pin 4 -EMS relay pin B05 -Engine ECM pin C22	OK Disconnect oxygen sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check sensor resistance: - Oxygen sensor pin 3 to 4	13 to 18.5 Ohms Proceed to test 3
	Faulty	Rectify fault, proceed to test 5
3	Check cable for short circuit: - Engine ECM pin C22 to ground	OK Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable continuity: -Engine ECM pin C22 to oxygen sensor pin 3 -Engine ECM pin A08 to oxygen sensor pin 4 -Engine ECM pin A21 to oxygen sensor 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. Check adaption status.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Oxygen Sensor
2. Engine Management System Relay
3. Engine ECM Connector A
4. Engine ECM Connector C

P0068, P0069, P0107, P0105, P1105 - Manifold Absolute Pressure (MAP) Sensor

NOTICE	
For Fault Code P0068, carry out the actions as listed in the action column for P0068. Only carry out the Camshaft Timing Check/Adjust if all the previous checks listed for P0068 do not clear the fault code.	

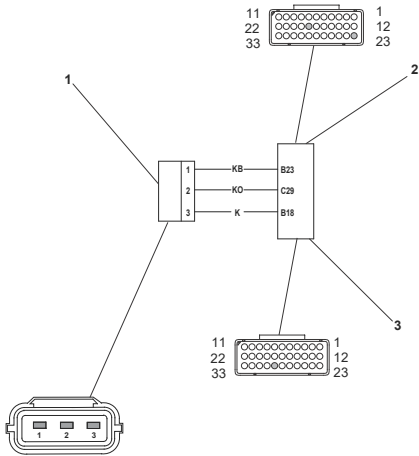
Fault Code	Possible cause	Action
P0068	Manifold absolute pressure sensor correlation error with throttle position sensor	Check for air leak at the throttle body/transition piece to cylinder head face. Check for trapped, twisted and damaged MAP sensor hose(s). Check for air leak at the MAP sensor hoses. View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1: Camshaft Timing Check/Adjust, as described in the service manual
P0069	Manifold absolute pressure sensor correlation error with ambient pressure sensor	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:
P0107	Manifold absolute pressure sensor 1 short circuit to ground	
P0105	Manifold absolute pressure sensor 1 open circuit or short circuit to 5 Volt sensor supply	
P1105	Manifold absolute pressure sensor 1 pipe malfunction	Check connection/condition of pipes from MAP sensors to throttle body.

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B23 - Engine ECM pin B18 - Engine ECM pin C29 - MAP sensor pin 1, 2, 3	OK	Disconnect MAP sensors and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - Engine ECM pin C29 to Engine ECM pin B23 - Engine ECM pin C29 to Engine ECM pin B18 - Engine ECM pin B18 to Engine ECM pin B23 - Engine ECM pin B18 to ground - Engine ECM pin C29 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4

Test		Result	Action
3	Check cable for continuity: - Engine ECM pin B18 to MAP sensor pin 3 - Engine ECM pin B23 to MAP sensor pin 1 - Engine ECM pin C29 to MAP sensor pin 2	OK	Renew relevant MAP pressure sensor, proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



- 1. MAP Sensor
- 2. Engine ECM Connector B
- 3. Engine ECM Connector C

P0110, P0111, P0112 - Intake Air Temperature Sensor

Fault Code	Possible cause	Action
P0110	Intake air temperature sensor open circuit or short circuit to 5 volt sensor supply	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Make sure sensor connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P0111	Intake air temperature sensor signal out of range	
P0112	Intake air temperature sensor short circuit to ground	Disconnect engine ECM and sensor and proceed to pinpoint test 6:

Pinpoint Tests

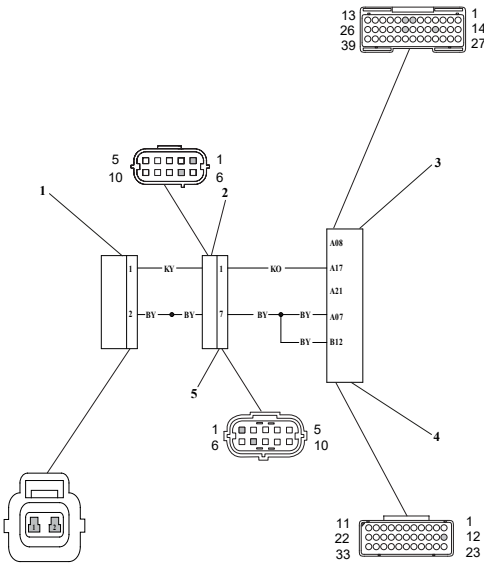
Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A07 - Engine ECM pin A17	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - Engine ECM pin A17 to ground (Temperature dependent - see below)	OK	Proceed to test 6
		Open circuit	Disconnect air temperature sensor and proceed to test 3
		Short circuit	Disconnect air temperature sensor and proceed to test 4
3	Check cable continuity: - Engine ECM pin A17 to sensor pin 1 - Engine ECM pin A07 to sensor pin 2 - Engine ECM pin B12 to sensor pin 2 - Ground to sensor pin 2	OK	Proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable for short circuit: - Engine ECM pin A17 to Engine ECM pin A08 - Engine ECM pin A17 to Engine ECM pin A21 - Engine ECM pin A17 to Engine ECM pin B12	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 7
5	Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent - see below)	OK	Proceed to test 7
		Faulty	Renew air temperature sensor, proceed to test 7
6	Check cable for short circuit: - Engine ECM pin A17 to ground	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
7	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Resistance Data

If engine is warm, remove the sensor and allow time to cool to ambient temperature prior to test.

Ambient Temperature	Resistance Value
80°C	200 to 400 Ohms
20°C	2.35 to 2.65 K Ohms
-10°C	8.50 to 10.25 K Ohms

Circuit Diagram



- 1. Inlet Air Temperature Sensor
- 2. Engine Subharness Connector (Subharness Side)
- 3. Engine ECM Connector A
- 4. Engine ECM Connector B
- 5. Engine Subharness Connector (Main Harness Side)

P011B, P0115, P0117, P0125, P050C - Coolant Temperature Sensor

Fault Code	Possible cause	Action
P011B	Engine coolant temperature sensor correlation error with intake air temperature sensor	View and note diagnostic software freeze frame data if available View and note diagnostic software sensor data Make sure the sensor connector is secure Disconnect ECM and proceed to pinpoint test 1
P0115	Engine coolant temperature sensor open circuit or short circuit to 5 Volt sensor supply	
P0117	Engine coolant temperature sensor short circuit to ground	
P0125	Engine coolant temperature sensor signal low - not reaching temperature required for closed loop fuel control	
P050C	Engine coolant temperature sensor signal high - too warm for cold start conditions	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B20 - Engine ECM pin B12 - Engine ECM pin A07 - Coolant Temperature Sensor pin 1 - Coolant Temperature Sensor pin 2	OK Proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - Engine ECM pin B20 to ground - Engine ECM pin B20 to Engine ECM pin A08 - Engine ECM pin B20 to Engine ECM pin A21	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3	Check cable continuity: - Engine ECM pin B20 to sensor pin 1 - Engine ECM pin B12 to sensor pin 2 - Engine ECM pin A07 to sensor pin 2 - Coolant Temperature Sensor pin 2 to ground	OK Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4	Check resistance value: - Engine ECM pin B20 to ground Temperature dependent see Resistance Data below	OK Disconnect temp sensor and proceed to test 5
		Open circuit Disconnect temp sensor and proceed to test 5
		Short circuit Disconnect temp sensor and proceed to test 5
5	Check sensor resistance: - Sensor pin 1 to sensor pin 2 Temperature dependent see Resistance Data below	OK Proceed to test 6
		Short circuit Renew temp sensor, proceed to test 6

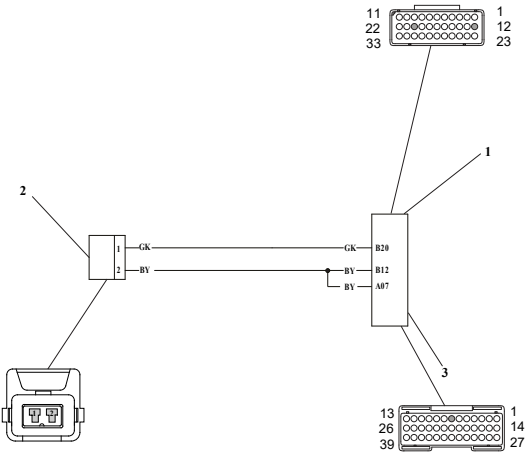
Test		Result	Action
6	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Resistance Data

Resistance data under typical conditions:

Temperature	Resistance Value
Warm engine	200 to 400 Ohms
Cold engine: 20°C ambient	2.35 to 2.60 K Ohms
Cold engine: -10°C ambient	8.50 to 10.20 K Ohms

Circuit Diagram



- 1. Engine ECM Connector B
- 2. Coolant Temperature Sensor
- 3. Engine ECM Connector A

P0120, P0121, P0122, P0220, P0221, P0222, P2135 - Throttle Position Sensor

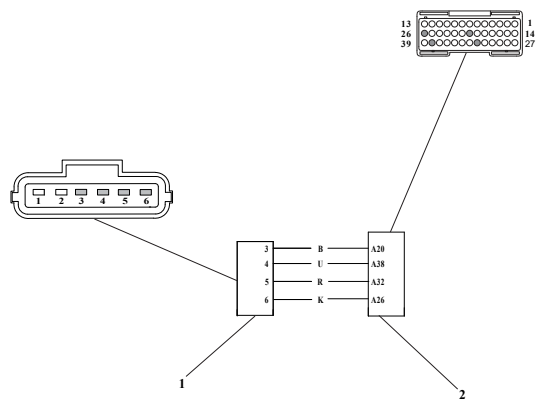
Fault Code	Possible cause	Action
P0120	Throttle position sensor 1 short circuit to battery positive or open circuit	View and note diagnostic software 'freeze-frame' data if available. View and note diagnostic software 'sensor' data. Make sure the throttle position sensor connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P0121	Throttle position sensor 1 signal out of range	
P0122	Throttle position sensor 1 short circuit to ground	
P0220	Throttle position sensor 2 short circuit to battery positive or open circuit	
P0221	Throttle position sensor 2 signal out of range	
P0222	Throttle position sensor 2 short circuit to ground	
P2135	Throttle position sensor 1 correlation error with throttle position sensor 2	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A20 - Engine ECM pin A38 - Engine ECM pin A26 - Engine ECM pin A32	OK Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin A26 to ground - Engine ECM pin A38 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin A32 to throttle position sensor connector pin 5 - Engine ECM pin A38 to throttle position sensor connector pin 4 - Engine ECM pin A20 to throttle position sensor connector pin 3 - Engine ECM pin A26 to throttle position sensor connector pin 6	OK Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A26 to Engine ECM pin A32 - Engine ECM pin A26 to Engine ECM pin A38 - Engine ECM pin A32 to Engine ECM pin A38	OK Renew throttle position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5

Test		Result	Action
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



- 1. Throttle Position Sensor
- 2. Engine ECM Connector A

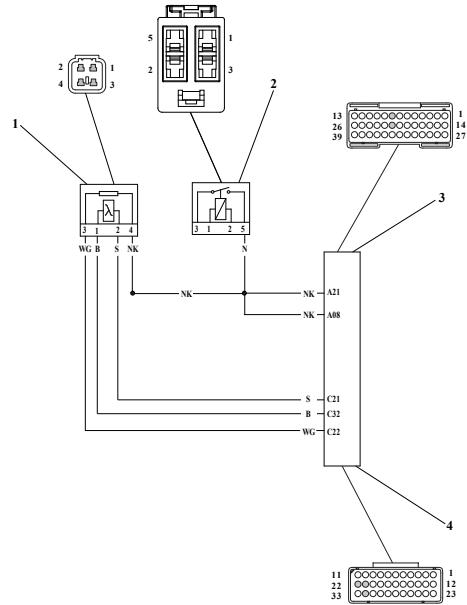
P0130, P0131 - Oxygen Sensor

Fault Code	Possible cause	Action
P0130	Oxygen sensor open circuit or short circuit to battery positive - bank 1 sensor 1	Disconnect oxygen sensor and proceed to pinpoint test 4:
P0131	Oxygen sensor short circuit to ground - bank 1 sensor 1	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C32	OK Disconnect oxygen sensors and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin C32 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin C32 to oxygen sensor pin 1	OK Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A08 to Engine ECM pin C32	OK Renew oxygen sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine. Check adaption status.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Oxygen Sensor
2. Engine Management System Relay
3. Engine ECM Connector A
4. Engine ECM Connector C

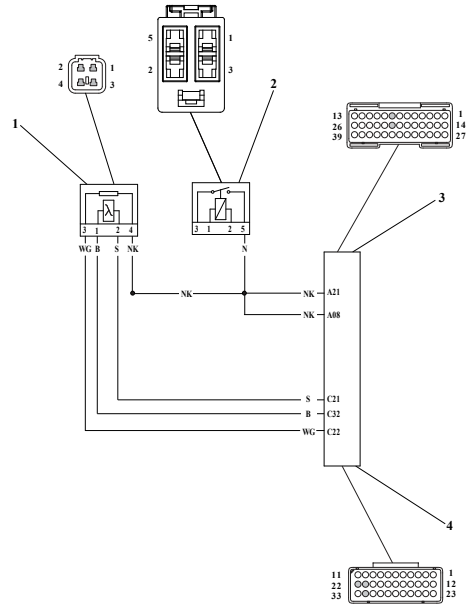
P0133 - Oxygen Sensor 1

Fault Code	Possible cause	Action
P0133	Oxygen sensor 1 circuit slow response - bank 1 sensor 1	View and note 'freeze-frame' data if available. Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: -Oxygen sensor pin 1 -Oxygen sensor pin 2 -EMS relay pin B05 -Engine ECM pin C22	OK
	Faulty	Disconnect oxygen sensor and proceed to test 2
2	Check cable for short circuit: - Engine ECM pin C22 to ground Check sensor resistance: - Oxygen sensor pin 1 to 2	OK
	Short circuit	Proceed to test 3
3	Check cable continuity: -Engine ECM pin C22 to oxygen sensor pin 3 -Engine ECM pin A08 to oxygen sensor pin 4	Locate and rectify wiring fault, proceed to test 4
	Open circuit	Proceed to test 4
4	Reconnect harness, clear fault code and run engine. Check adaption status.	OK
	Fault still present	Action complete - quit test Contact Triumph service

Circuit Diagram



1. Oxygen Sensor
2. Engine Management System Relay
3. Engine ECM Connector A
4. Engine ECM Connector C

P0201, P0202, P0203 - Injector Circuit Malfunction

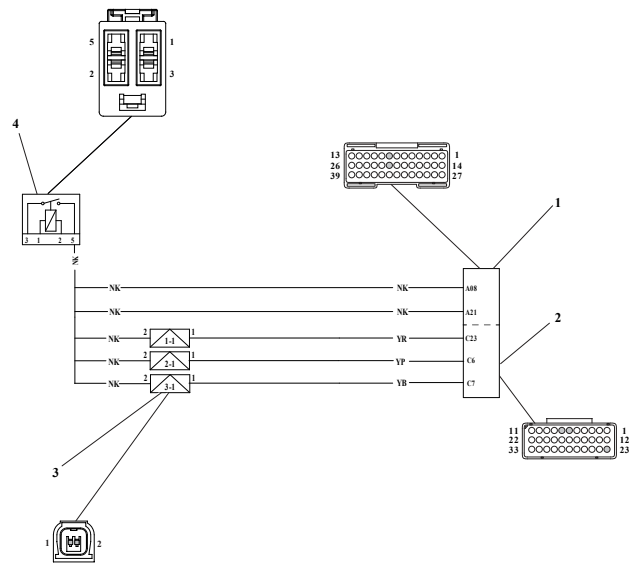
Fault Code	Possible cause	Action
P0201	Injector 1 circuit malfunction	View and note diagnostic software 'freeze-frame' data if available. Make sure the relevant injector connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P0202	Injector 2 circuit malfunction	
P0203	Injector 3 circuit malfunction	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C23 - Engine ECM pin C6 - Engine ECM pin C7	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - Engine ECM pin A08 to Engine ECM pin C23 (injector 1) - Engine ECM pin A08 to Engine ECM pin C6 (injector 2) - Engine ECM pin A08 to Engine ECM pin C7 (injector 3) - Engine ECM pin A21 to Engine ECM pin C23 (injector 1) - Engine ECM pin A21 to Engine ECM pin C6 (injector 2) - Engine ECM pin A21 to Engine ECM pin C7 (injector 3)	3.0 Ohms to 4.2 Ohms	Proceed to test 3
		Open circuit	Disconnect relevant injector and proceed to test 4
		Short circuit	Disconnect relevant injector and proceed to test 5
3	Check cable for short circuit to ground: - Engine ECM pin C23 to ground - Engine ECM pin C6 to ground - Engine ECM pin C7 to ground	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: - EMS relay pin 5 to relevant injector pin 2 - Engine ECM pin C23 to injector 1 pin 1 - Engine ECM pin C6 to injector 2 pin 1 - Engine ECM pin C7 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 to supply: - Engine ECM pin A08 to Engine ECM pin C23 (injector 1) - Engine ECM pin A08 to Engine ECM pin C6 (injector 2) - Engine ECM pin A08 to Engine ECM pin C7 (injector 3) - Engine ECM pin A21 to Engine ECM pin C23 (injector 1) - Engine ECM pin A21 to Engine ECM pin C6 (injector 2) - Engine ECM pin A21 to Engine ECM pin C7 (injector 3)	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check relevant injector resistance: - Injector pin 1 to injector pin 2	11.4 Ohms to 12.6 Ohms	Proceed to test 7
		Faulty	Renew relevant injector, proceed to test 7
7	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test

Test		Result	Action
		Fault still present	Contact Triumph service

Circuit Diagram



- 1. Engine ECM Connector A
- 2. Engine ECM Connector C
- 3. Fuel Injectors
- 4. Engine Management System Relay

P0300, P0301, P0302, P0303 - Cylinder Misfire Detected

Fault Code	Possible cause	Action
P0300	Random/Multiple Cylinder Misfire Detected	View and note diagnostic software freeze frame data if available Make sure the relevant fuel injector and coil connectors are secure. Disconnect Engine ECM and proceed to pinpoint test 1
P0301	Cylinder 1 Misfire Detected	
P0302	Cylinder 2 Misfire Detected	
P0303	Cylinder 3 Misfire Detected	

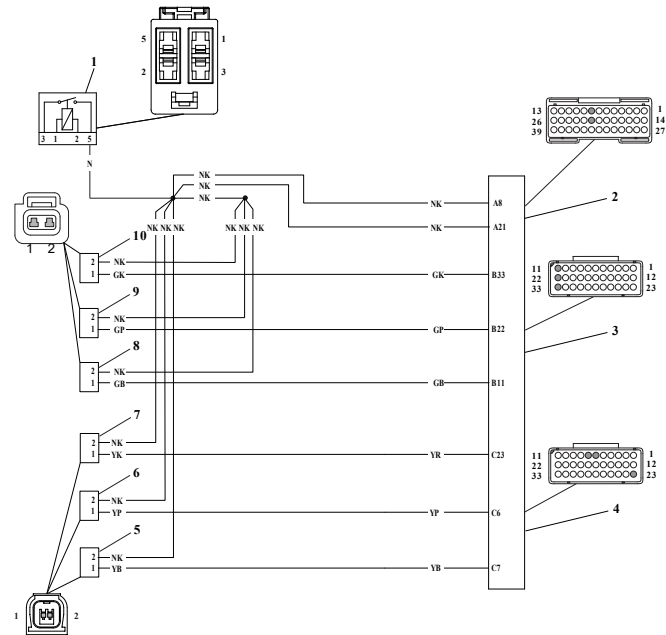
Pinpoint Tests

Test		Result	Action
1	Check cables and terminal integrity for the relevant fault code, P0300 will require all terminals/cables listed to be checked: P0301 - Engine ECM pin C23 - Fuel injector 1 pin 1 - Engine ECM pin B33 P0302 - Engine ECM pin C6 - Fuel injector 2 pin 1 - Engine ECM pin B22 P0303 - Engine ECM pin C7 - Fuel injector 3 pin 1 - Engine ECM pin B11 All - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit to ground integrity for the relevant fault code, P0300 will require all terminals/cables listed to be checked: P0301 - Engine ECM pin C23 to ground - Engine ECM pin B33 to ground P0302 - Engine ECM pin C6 to ground - Engine ECM pin B22 to ground P0303 - Engine ECM pin C7 to ground - Engine ECM pin B11 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 9
3	Check cable for short circuit to supply for the relevant fault code, P0300 will require all terminals/cables listed to be checked: P0301 - Engine ECM pin A8 to Engine ECM pin C23 - Engine ECM pin A21 to Engine ECM pin C23 - Engine ECM pin A08 to Engine ECM pin B33 - Engine ECM pin A21 to Engine ECM pin B33	OK	Proceed to test 4

Test		Result	Action
	P0302 - Engine ECM pin A8 to Engine ECM pin C6 - Engine ECM pin A21 to Engine ECM pin C6 - Engine ECM pin A8 to Engine ECM pin B22 - Engine ECM pin A21 to Engine ECM pin B22 P0303 - Engine ECM pin A8 to Engine ECM pin C7 - Engine ECM pin A21 to Engine ECM pin C7 - Engine ECM pin A8 to Engine ECM pin B11 - Engine ECM pin A21 to Engine ECM pin B11	Open circuit	Locate and rectify wiring fault, proceed to test 9
4	Check cable continuity for the relevant fault code, P0300 will require all terminals/cables listed to be checked: P0301 - EMS relay pin 5 to fuel injector 1 pin 2 - EMS relay pin 5 to ignition coil 1 pin 2 - Engine ECM pin C23 to fuel injector 1 pin 1 - Engine ECM pin B33 to ignition coil 1 pin 1 P0302 - EMS relay pin 5 to fuel injector 2 pin 2 - EMS relay pin 5 to ignition coil 2 pin 2 - Engine ECM pin C6 to fuel injector 2 pin 1 - Engine ECM pin B22 to ignition coil 2 pin 1 P0303 - EMS relay pin 5 to fuel injector 3 pin 2 - EMS relay pin 5 to ignition coil 3 pin 2 - Engine ECM pin C7 to fuel injector 3 pin 1 - Engine ECM pin B11 to ignition coil 3 pin 1	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 9
5	Check fuel injector resistance value integrity for the relevant fault code, P0300 will require all terminals listed to be checked: P0301 - Engine ECM pin A8 to Engine ECM pin C23 - Engine ECM pin A21 to Engine ECM pin C23 P0303 - Engine ECM pin A8 to Engine ECM pin C6 - Engine ECM pin A21 to Engine ECM pin C6 P0303 - Engine ECM pin A8 to Engine ECM pin C7 - Engine ECM pin A21 to Engine ECM pin C7	OK 11.4 Ohms to 12.6 Ohms	Proceed to test 7
		Faulty	Disconnect relevant fuel injector and proceed to test 6
6	Check relevant fuel injector resistance: - Fuel injector pin 1 to fuel injector pin 2	OK 11.4 Ohms to 12.6 Ohms	Proceed to test 9
		Faulty	Renew relevant fuel injector, proceed to test 9
7	Check coil resistance value for the relevant fault code, P0300 will require all terminals listed to be checked: P0301 - Engine ECM pin A8 to Engine ECM B33 - Engine ECM pin A21 to Engine ECM B33 P0302 - Engine ECM pin A8 to Engine ECM B22 - Engine ECM pin A21 to Engine ECM B22 P0303 - Engine ECM pin A8 to Engine ECM B11 - Engine ECM pin A21 to Engine ECM B11	OK 3.0 Ohms to 4.2 Ohms	Proceed to test 9
		Faulty	Disconnect relevant ignition coil, proceed to test 8
8	Check relevant ignition coil resistance: - Ignition coil pin 1 to ignition coil pin 2	OK	Proceed to test 9

Test		Result	Action
		3.0 Ohms to 4.2 Ohms	
		Faulty	Renew relevant ignition coil, proceed to test 9
9	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine Management System Relay
2. Engine ECM Connector A
3. Engine ECM Connector B
4. Engine ECM Connector C
5. Fuel Injector 3
6. Fuel Injector 2
7. Fuel Injector 1
8. Ignition Coil 3
9. Ignition Coil 2
10. Ignition Coil 1

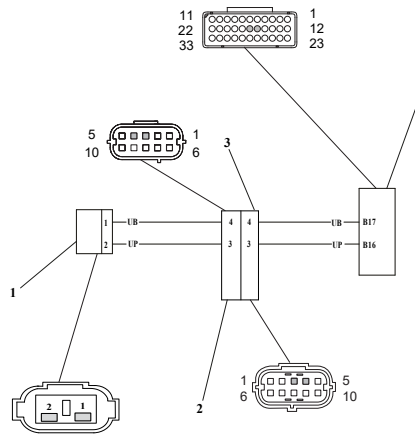
P0315, P0335 - Crankshaft Position Not Adapted

Fault Code	Possible cause	Action
P0315	Crankshaft position not adapted.	See Crankshaft Position Adaption (European Markets Only) .
P0335	Crankshaft sensor circuit malfunction	View and note diagnostic software freeze frame data if available Ensure sensor is fitted correctly and connector is secure Disconnect Engine ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1	Check terminal and cable integrity: - Engine ECM pin B17 - Engine ECM pin B16	OK
		Disconnect sensor and proceed to test 2
2	Check cable for short circuit: - Engine ECM pin B17 to ground - Engine ECM pin B16 to ground	Faulty
		Rectify fault, proceed to test 6
3	Check cable continuity: - Engine ECM pin B16 to sensor pin 2 - Engine ECM pin B17 to sensor pin 1	OK
		Proceed to test 3
4	Check cable for short circuit: - Engine ECM pin B17 to Engine ECM pin B16	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 4
6	Reconnect harness, clear fault code and run engine to verify fault cleared.	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
6	Reconnect harness, clear fault code and run engine to verify fault cleared.	Fault still present
		Contact Triumph service

Circuit Diagram



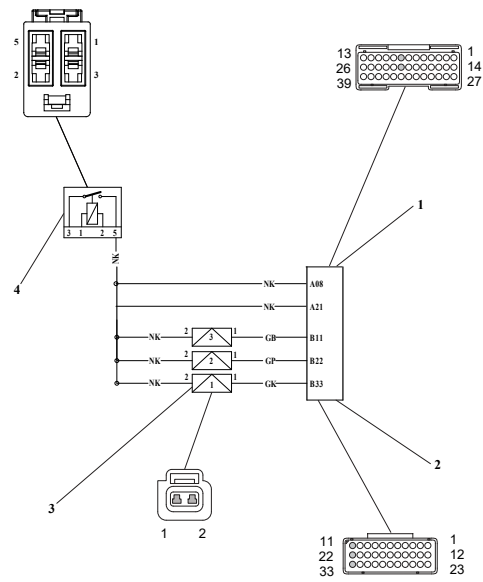
1. Crankshaft Position Sensor
2. Engine Subharness Connector (Subharness Side)
3. Engine Subharness Connector (Main Harness Side)
4. Engine ECM Connector B

P0351, P0352, P0353 - Ignition Coil Malfunction

Fault Code	Possible cause	Action
P0351	Ignition coil 1 malfunction	View and note diagnostic software 'freeze-frame' data if available. Make sure relevant ignition coil connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P0352	Ignition coil 2 malfunction	
P0353	Ignition coil 3 malfunction	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B33 - Engine ECM pin B22 - Engine ECM pin B11 - EMS relay pin 5	OK Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2	Check resistance value: Engine ECM pin A08 to - Engine ECM pin B33 (ignition coil 1) - Engine ECM pin B22 (ignition coil 2) - Engine ECM pin B11 (ignition coil 3) Engine ECM pin A21 to - Engine ECM pin B33 (ignition coil 1) - Engine ECM pin B22 (ignition coil 2) - Engine ECM pin B11 (ignition coil 3)	3.0 Ohms to 4.2 Ohms Proceed to test 3
	Open circuit	Disconnect relevant ignition coil and proceed to test 4
	Short circuit	Disconnect relevant ignition coil and proceed to test 5
3	Check cable for short circuit: - Engine ECM pin B33 to ground - Engine ECM pin B22 to ground - Engine ECM pin B11 to ground	OK Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
4	Check cable continuity: - EMS relay pin 5 to relevant ignition coil pin 2 - Engine ECM pin B33 to ignition coil 1 pin 1 - Engine ECM pin B22 to ignition coil 2 pin 1 - Engine ECM pin B11 to ignition coil 3 pin 1	OK Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 6
5	Check relevant ignition coil resistance: - Ignition coil pin 1 to ignition coil pin 2	3.0 Ohms to 4.2 Ohms Proceed to test 6
	Faulty	Renew relevant ignition coil, 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



1. Engine ECM Connector A
2. Engine ECM Connector B
3. Ignition Coils
4. Engine Management System Relay

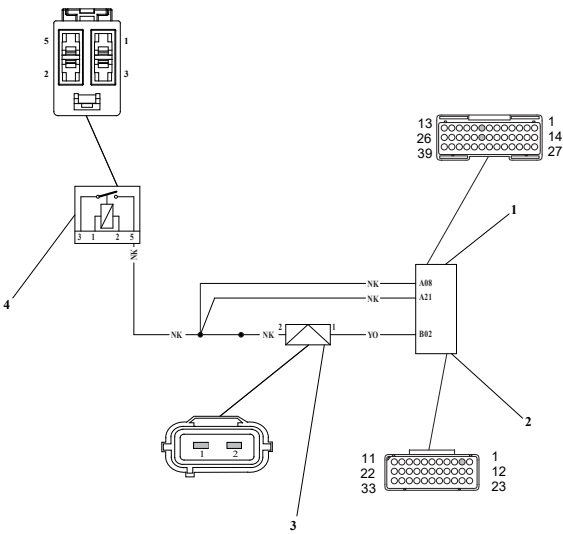
P0412, P044F, Secondary Air injection Valve

Fault Code	Possible cause	Action
P0412	Secondary air injection short circuit to ground or open circuit	View and note diagnostic tool sensor data. Ensure SAI valve connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P044F	Secondary air injection short circuit to battery positive	Disconnect engine ECM and SAI valve and proceed to pinpoint test 5:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B02 - EMS Relay pin 5	OK Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - Engine ECM pin A08 to Engine ECM pin B02 - Engine ECM pin A21 to Engine ECM pin B02	18 Ohms to 24 Ohms 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: - Engine ECM pin B02 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 SAI valve pin 2 - Engine ECM pin B02 to SAI valve pin 1	OK Proceed to test 6
		Short circuit Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: - Engine ECM pin A08 to Engine ECM pin B02 - Engine ECM pin A21 to Engine ECM pin B02	OK Proceed to test 6
		Fault still present Locate and rectify wiring fault, proceed to test 7
6	Check SAI valve resistance: - SAI valve pin 1 to SAI valve pin 2	18 Ohms to 24 Ohms 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



- 1. Engine ECM Connector A
- 2. Engine ECM Connector B
- 3. Secondary Air Injection Valve
- 4. Engine Management System Relay

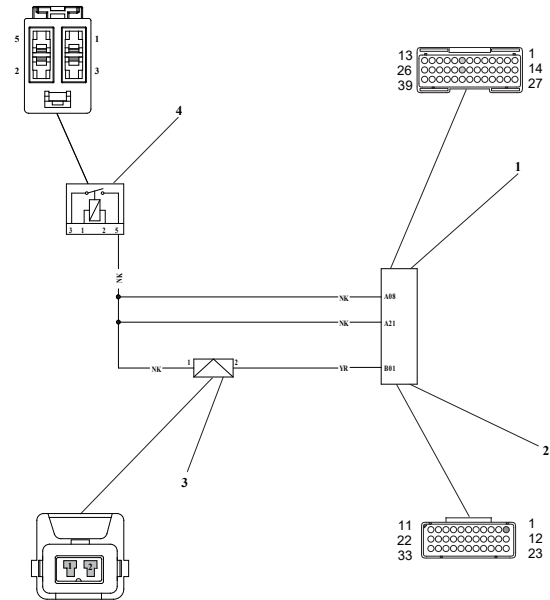
P0443, P0459 - Purge valve short circuit to ground or open circuit

Fault Code	Possible cause	Action
P0443	Purge valve short circuit to ground or open circuit	View and note diagnostic software 'sensor' data. Ensure purge valve connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P0459	Purge valve short circuit to battery positive	Disconnect the purge valve and proceed to pinpoint test 5:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A08 - Engine ECM pin A21 - Engine ECM pin B01 - EMS relay pin 5	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: - Engine ECM pin A08 to Engine ECM pin B01 - Engine ECM pin A21 to Engine ECM pin B01	22 Ohms to 30 Ohms	Proceed to test 3
		Open circuit	Disconnect purge valve and proceed to test 4
		Short circuit	Disconnect purge valve and proceed to test 5
3	Check cable for short circuit: - Engine ECM pin B01 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 - Engine ECM pin B01 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: - Engine ECM pin A08 to Engine ECM pin B01 - Engine ECM pin A21 to Engine ECM pin B01	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check purge valve resistance: - Valve pin 1 to valve pin 2	22 Ohms to 30 Ohms	Proceed to test 7
		Faulty	Renew purge valve, proceed to test 7
7	Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of purge valve.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector A
2. Engine ECM Connector B
3. Purge Valve
4. Engine Management System Relay

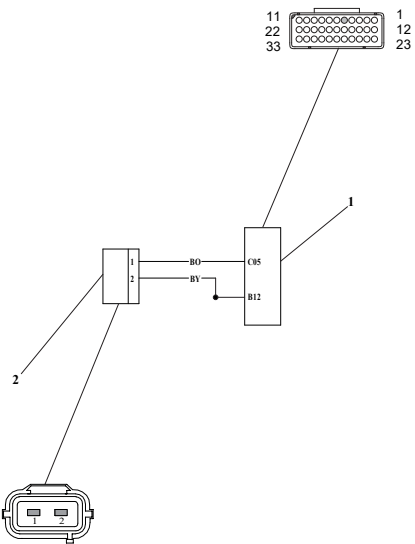
P0460 - Fuel Level Sensor Circuit Malfunction

Fault Code	Possible cause	Action
P0460	Fuel level sensor circuit malfunction	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C05	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - Engine ECM pin C05 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Engine ECM pin C05 to sensor pin 1 - Engine ECM pin B12 to sensor pin 2	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector C
2. Fuel Level Sensor

P0500 - Vehicle speed sensor malfunction

Fault Code	Possible cause	Action
P0500	Wheel speed sensor fault	Refer to the following ABS DTCs C1611 - Front Wheel Sensor Short Circuit To Ground or Open Circuit C1612 - Front Wheel Sensor Incorrect or Missing Signal C1613 - Rear Wheel Sensor Short Circuit To Ground or Open Circuit C1614 - Rear Wheel Sensor Incorrect or Missing Signal

Pinpoint Tests

Not Applicable

Circuit Diagram

Not Applicable

P0506 - Idle Control System RPM Lower Than Expected

Fault Code	Possible cause	Action
P0506	Idle control system RPM lower than expected	View and note 'freeze-frame' data if available. Check for associated DTCs and perform tests as required. Reset DTCs, if fault still present check the following: • Air vacuum leak (MAP sensor hoses) • Air restriction at air intake • Restriction in the exhaust system • Restriction in the fuel system • Make sure the injector connectors are secure. • Make sure the ignition coil connectors are secure.

P0507 - Engine Idle Higher Than Expected

Fault Code	Possible cause	Action
P0507	Idle control system RPM higher than expected	View and note 'freeze-frame' data if available. Check for associated DTCs and perform tests as required. Reset DTCs, if fault still present check the following: • Air vacuum leak (MAP sensor hoses) • Leaking air intake after the throttle bodies • Evaporative system • Secondary air injection system

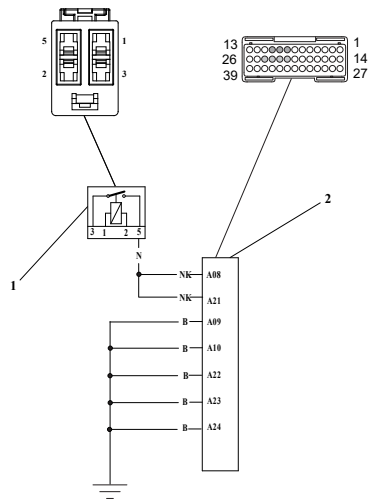
P0560 - System Voltage - Battery Circuit Malfunction

Fault Code	Possible cause	Action
P0560	System voltage - battery circuit malfunction	View and note diagnostic software 'sensor' data. Make sure voltage across battery is acceptable, note voltage.
		Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A08 - Engine ECM pin A21 - Engine EMS relay pin 5	OK
		Proceed to test 2
2	With Ignition on check voltage at: - Engine ECM pin A08 - Engine ECM pin A21	Faulty
		Rectify fault, proceed to test 3
3	Reconnect harness, clear fault code and run engine to verify fault cleared.	Same as across battery voltage
		Proceed to test 3
3		Less than across battery voltage
		Locate and rectify wiring fault, proceed to test 3
3		OK
		Action complete - quit test
3		Fault still present
		Contact Triumph service

Circuit Diagram



1. Engine Management System Relay
2. Engine ECM Connector A

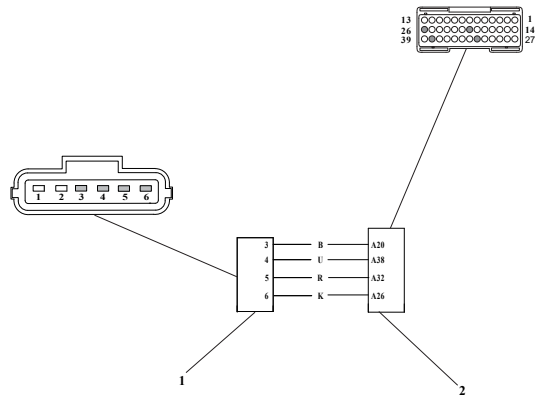
P0642, P0643, P06A6 - 5 V Sensor Circuit A

Fault Code	Possible cause	Action
P0642	5V Sensor Circuit A - reference voltage low	View and note diagnostic software 'freeze-frame' data if available. Disconnect engine ECM and proceed to pinpoint test 1:
P0643	5V Sensor Circuit A - reference voltage high	
P06A6	5V Sensor Circuit A - reference voltage out of range	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A32	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin A32 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin A32 to throttle position sensor connector pin 5	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A32 to Engine ECM pin A20 - Engine ECM pin A32 to Engine ECM pin A08 - Engine ECM pin A32 to Engine ECM pin A21	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Throttle Position Sensor
2. Engine ECM Connector A

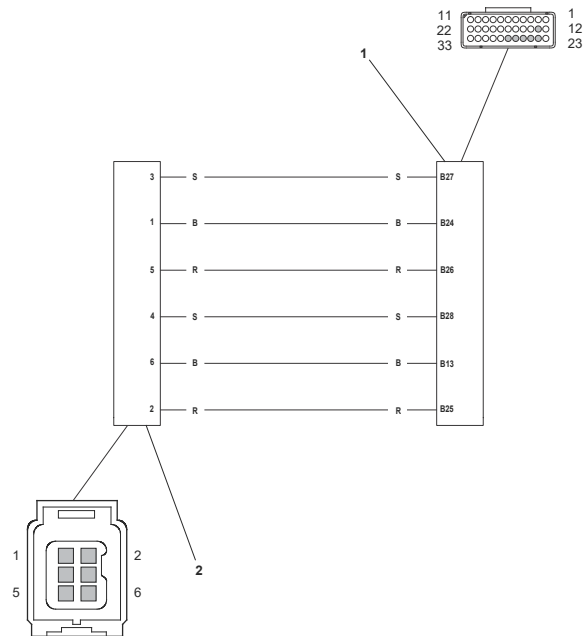
P0652, P0653, P06A7 - 5V Sensor Circuit B

Fault Code	Possible cause	Action
P0652	5V Sensor Circuit B - reference voltage low	View and note diagnostic tool freeze frame data if available. View and note diagnostic tool sensor data. Disconnect twist grip position sensor and proceed to pinpoint test 1:
P0653	5V Sensor Circuit B - reference voltage high	
P06A7	5V Sensor Circuit B - reference voltage out of range	

Pinpoint Tests

Test		Result	Action
1	Check terminal and cable integrity: - Engine ECM pin B26	Ok	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B26 to ground	OK	Proceed to test 3
		Short circuit	Rectify fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B26 to twist grip position sensor pin 5	OK	Proceed to test 4
		Open circuit	Locate and rectify fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B26 to Engine ECM pin B24 - Engine ECM pin B26 to Engine ECM pin A08 - Engine ECM pin B26 to Engine ECM pin A21	OK	Proceed to test 5
		Short circuit	Locate and rectify fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector B
2. Twist Grip Position Sensor

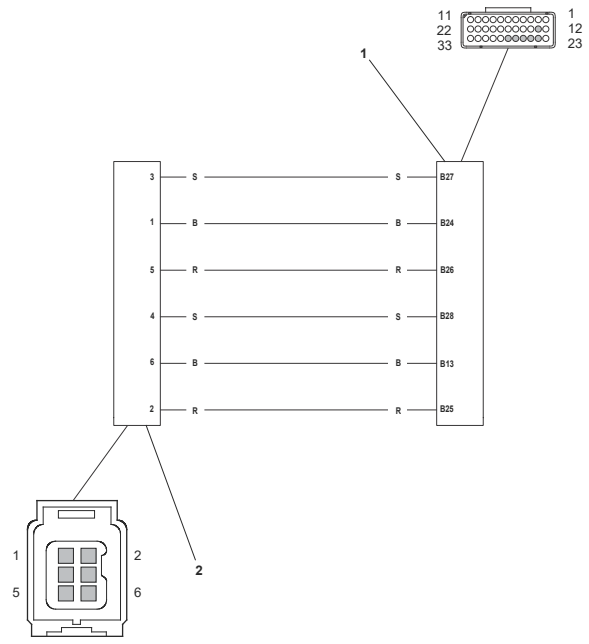
P0698, P0699, P06A8 - 5V Sensor Circuit C

Fault Code	Possible cause	Action
P0698	5V Sensor Circuit C - reference voltage low	View and note diagnostic tool freeze frame data if available. View and note diagnostic tool sensor data. Disconnect twist grip position sensor and proceed to pinpoint test 1:
P0699	5V Sensor Circuit C - reference voltage high	
P06A8	5V Sensor Circuit C - reference voltage out of range	

Pinpoint Tests

Test		Result	Action
1	Check terminal and cable integrity: - Engine ECM pin B25	Ok	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B25 to ground	OK	Proceed to test 3
		Short circuit	Rectify fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B25 to twist grip position sensor pin 2	OK	Proceed to test 4
		Open circuit	Locate and rectify fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B25 to Engine ECM pin B13 - Engine ECM pin B25 to Engine ECM pin A08 - Engine ECM pin B25 to Engine ECM pin A21	OK	Proceed to test 5
		Short circuit	Locate and rectify fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



- 1. Engine ECM Connector B
- 2. Twist Grip Position Sensor

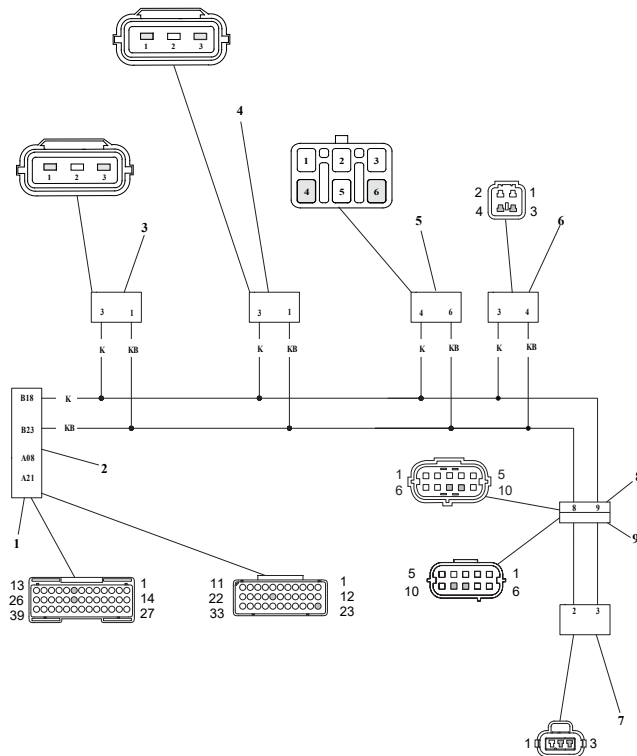
P06A4, P06A5, P06A9, 5V Sensor Circuit D

Fault Code	Possible cause	Action
P06A4	5V Sensor Circuit D - reference voltage low	View and note diagnostic tool freeze frame data if available. View and note diagnostic tool sensor data. Disconnect twist grip position sensor and proceed to pinpoint test 1:
P06A5	5V Sensor Circuit D - reference voltage high	
P06A9	5V Sensor Circuit D - reference voltage out of range	

Pinpoint Tests

Test		Result	Action
1	Check terminal and cable integrity: - Engine ECM pin B18	Ok	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B18 to ground	OK	Proceed to test 3
		Short circuit	Rectify fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B18 to ambient pressure sensor pin 3 - Engine ECM pin B18 to MAP sensor pin 3 - Engine ECM pin B18 to Triumph shift assist sensor pin 3 - Engine ECM pin B18 to fall detection switch pin 4 - Engine ECM pin B18 to gear position sensor pin 3	OK	Proceed to test 4
		Open circuit	Locate and rectify fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B18 to Engine ECM pin B23 - Engine ECM pin B18 to Engine ECM pin A08 - Engine ECM pin B18 to Engine ECM pin A21	OK	Proceed to test 5
		Short circuit	Locate and rectify fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector A
2. Engine ECM Connector B
3. Ambient Air Pressure Sensor
4. Manifold Absolute Pressure (MAP) Sensor
5. Fall Detection Switch
6. Gear Position Sensor
7. Triumph Shift Assist (If Fitted)
8. Engine Subharness Connector (Main Harness Side)
9. Engine Subharness Connector (Subharness Harness Side)

P0606, P1607, P1608 - Engine ECM Internal Error

Fault Code	Possible Cause	Action
P0606	Engine ECM internal error	Contact Triumph service.
P1607 P1608	Engine ECM ride by wire internal error	

P06B8 - EEPROM Error

Fault Code	Possible cause	Action
P06B8	EEPROM Error	View and note freeze frame data if available. No tests available - contact Triumph service.

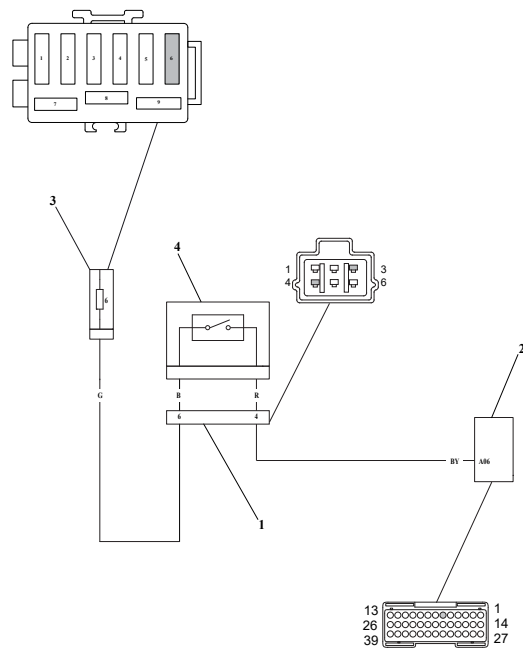
P0704 - Clutch Switch 1 Input Circuit Malfunction

Fault Code	Possible cause	Action
P0704	Clutch switch 1 input circuit malfunction	View and note diagnostic tool freeze frame data if available. Disconnect Engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check terminal and cable integrity: - Engine ECM pin A06	Ok	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin A06 to ground	OK	Proceed to test 3
		Short circuit	Rectify fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin A06 to left hand switch housing connector B pin 4	OK	Proceed to test 4
		Open circuit	Locate and rectify fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A06 to A08 - Engine ECM pin A06 to A21	OK	Proceed to test 5
		Short circuit	Locate and rectify fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Left Hand Switch Housing Inline Connector
2. Engine ECM Connector A
3. Fuse Box 1
4. Left Hand Switch Housing

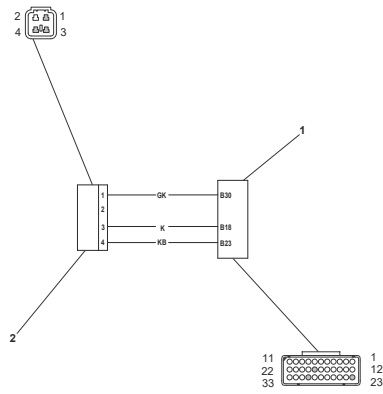
P0914, P0917 - Gear Position Sensor

Fault Code	Possible cause	Action
P0914	Gear position sensor short circuit to ground or open circuit	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure the sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:
P0917	Gear position sensor short circuit to 5 Volt sensor supply	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B18 - Engine ECM pin B23 - Engine ECM pin B30	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B18 to ground - Engine ECM pin B30 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B18 to sensor pin 3 - Engine ECM pin B23 to sensor pin 4 - Engine ECM pin B30 to sensor pin 1	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B30 to Engine ECM pin B18 - Engine ECM pin B30 to Engine ECM pin B23 - Engine ECM pin B30 to Engine ECM pin A08 - Engine ECM pin B30 to Engine ECM pin A21	OK	Renew gear position sensor and contact pin and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector B
2. Gear Position Sensor

P0915 - Gear Position Sensor

Fault Code	Possible cause	Action
P0915	Gear position sensor signal error - correlation error with vehicle speed	See information below

This is a calculation error between wheel speed and engine rpm, so the calculated gear position does not match the indicated gear position.

Possible causes can include incorrect front or rear sprocket sizes, incorrect gearing or an incorrect rear ABS pulser ring.

P1135 - Traction Control Disabled Due To Malfunction

Fault Code	Possible cause	Action
P1135	Traction Control disabled due to malfunction	Check that there is no other DTC linked to the ABS system or CAN communication stored. Contact Triumph service.

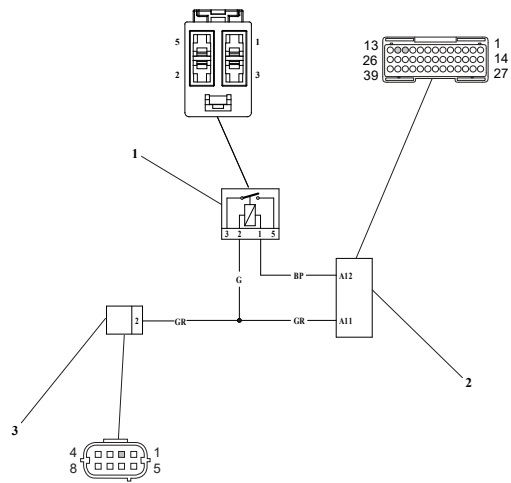
P1231, P1232 - Fuel Pump Relay

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 Engine ECM and proceed to pinpoint test 1
P1232	Fuel pump relay short circuit to battery positive	Disconnect fuel pump relay and proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A12 - Right hand switch housing pin 2	OK Disconnect fuel pump relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit to ground: - Engine ECM pin A12 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin A12 to fuel pump relay pin 1 - Right hand switch housing pin 2 to fuel pump relay pin 2	OK Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A12 to Right hand switch housing pin 2	OK Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run diagnostic software function test to verify operation of fuel pump.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Fuel Pump Relay
2. Engine ECM Connector A
3. Right Hand Switch Housing

P1520 - Unmatched ABS Module

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 engine ECM calibration is correct for the motorcycle, using the diagnostic tool.	OK	Proceed to test 3
		Incorrect	Update calibration using service tool, proceed to test 3
3	Clear fault code, check for normal operation	OK	Action complete - quit test
		Fault still present	Contact Triumph service

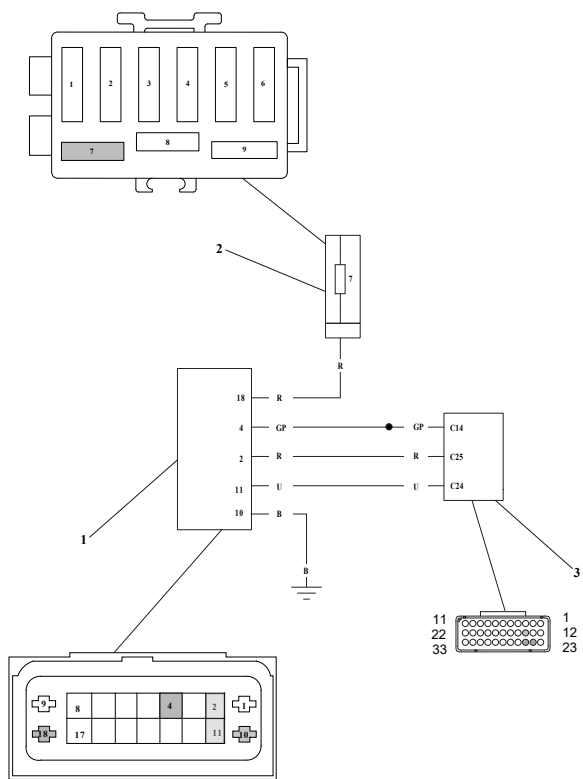
P1521 - CAN Fault - Lost Communication With ABS Module Or ABS System Status Error

Fault Code	Possible cause	Action
P1521	CAN fault - lost communication with ABS module or ABS system status error	View and note 'freeze-frame' data if available. Make sure ABS modulator connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C25 - Engine ECM pin C24 - ABS modulator pin 2 - ABS modulator pin 10 - ABS modulator pin 11 - ABS modulator pin 18	OK	Disconnect ECM and proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - Engine ECM pin C25 to ground - Engine ECM pin C24 to ground	OK	Disconnect ABS modulator and proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 6
3	Check fuse box fuse 7 integrity.	OK	Proceed to test 5
		Faulty	Proceed to test 4
4	Check cable for short circuit: - ABS pin 2 to ground - ABS pin 11 to ground	OK	Proceed to test 5
		Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5	Check cable continuity: - Engine ECM pin C25 to ABS pin 2 - Engine ECM pin C24 to ABS pin 11 - ABS pin 10 to ground - Fuse box fuse 7 to ABS pin 18 - Engine ECM pin C14 to ABS pin 4	OK	Proceed to test 6
		Fault still present	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. ABS Modulator
2. Fuse Box
3. Engine ECM Connector C

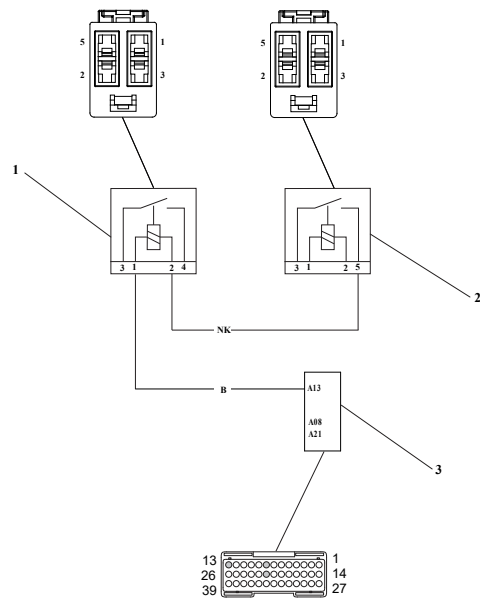
P1552, P1553 - Cooling Fan Relay

Fault Code	Possible cause	Action
P1552	Cooling fan relay short circuit to ground or open circuit	View and note diagnostic software 'sensor' data. Ensure fan relay connector is secure. Disconnect engine ECM and proceed to pinpoint test 1:
P1553	Cooling fan relay short circuit to battery positive or over temp	Disconnect engine ECM and fan relay and proceed to pinpoint test 4:

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin A13 - Cooling fan relay pin 1 - Cooling fan relay pin 2	OK Disconnect fan relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin A13 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin A13 to fan relay pin 1 - EMS relay pin 5 fan relay pin 2	OK Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin A13 to Engine ECM pin A08	OK Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run diagnostic software function test to visually verify operation of cooling fan.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Cooling Fan Relay
2. Engine Management System Relay
3. Engine ECM Connector A

P1576, P1577 - Brake Switches

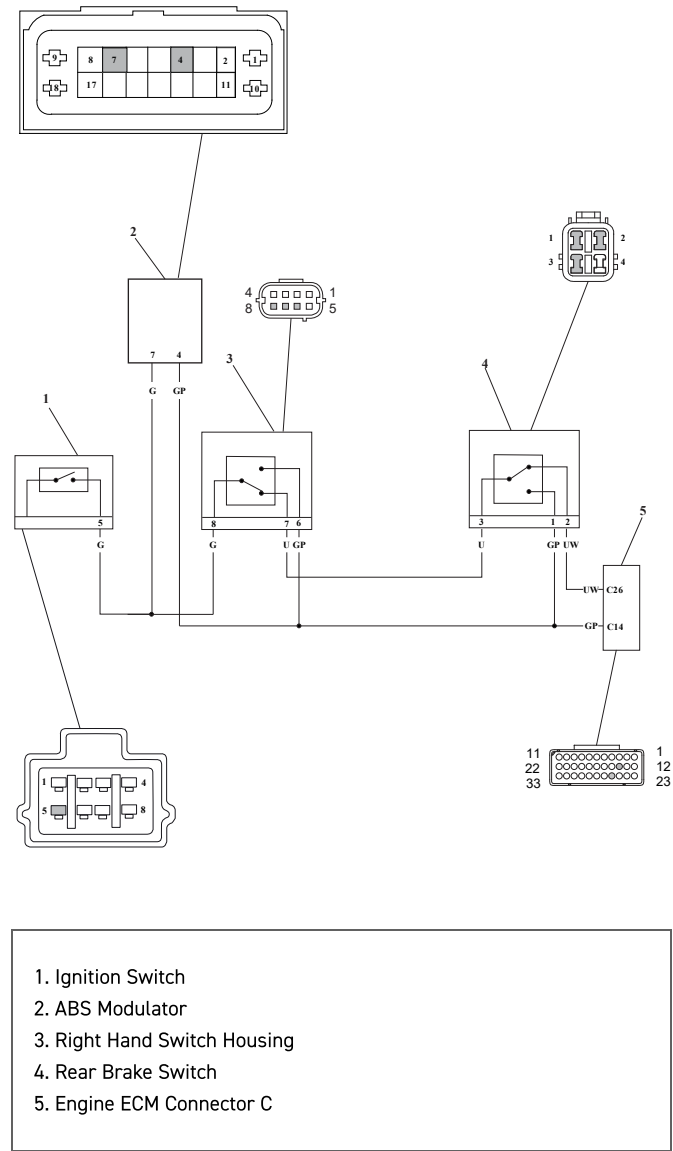
Fault Code	Possible cause	Action
P1576	Brake 1 switch correlation error with brake switch 2	View and note freeze frame data if available. Make sure the brake switches connectors are secure. Make sure the battery voltage is greater than 10V. Disconnect engine ECM and proceed to pinpoint test 1:
P1577	Brake 2 switch correlation error with brake switch 1	

Pinpoint Tests

	Test	Result	Action
1	Turn ignition on, operate rear brake switch and check brake light operation.	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable and terminal integrity: - Engine ECM pin C14 - Engine ECM pin C26 - Ignition switch pin 8	OK	Disconnect front and rear brake switch connectors, proceed to test 3
		Faulty	Rectify fault, proceed to test 6
3	With brakes released, check front and rear brake switch operation: The following should be short circuit: - Front brake switch pin 8 to pin 7 - Rear brake light switch pin 3 to pin 2 The following should be open circuit: - Front brake switch pin 8 to pin 6 - Rear brake light switch pin 3 to pin 1 With the front brake switch pressed the following should be short circuit: - Front brake switch pin 8 to pin 6 The following should be open circuit: - Front brake switch pin 8 to pin 7 With the rear brake switch pressed the following should be open circuit: - Rear brake light switch pin 3 to pin 2	OK	Proceed to test 4
		Faulty	Replace relevant brake switch, proceed to test 6
4	Re-Connect the brake switch connectors. Check cable continuity: - Engine ECM pin C14 to front brake switch pin 6 - Engine ECM pin C26 to rear brake switch pin 2 - Engine ECM pin C14 to rear brake switch pin 1 - Engine ECM pin C14 to front brake switch pin 6 With the brake switches released: - Engine ECM pin C26 to ignition switch pin 4	OK	Proceed to test 5
		Open Circuit	Locate and rectify wiring fault, proceed to test 6
5	Re-Connect the brake switch connectors. With the ignition switch on, measure the following Voltages: - Engine ECM pin C26 to ground - Rear brake switch pin 1 to ground (with rear brake pedal depressed)	Greater than 10V	Proceed to test 6

	Test	Result	Action
	- Rear brake switch pin 2 to ground (with rear brake pedal released) - Rear brake switch pin 3 to ground - Front brake switch pin 8 to ground - Front brake switch pin 7 to ground (with front brake lever released) - Front brake switch pin 6 to ground (with front brake lever pressed)	Less than 10V	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



P1604 - Engine ECM Tamper Detected - Return To Triumph

Fault Code	Possible cause	Action
P1604	Engine ECM tamper detected - return to Triumph	Contact Triumph service

P1605 - Engine ECM Locked By The Calibration Lock Function

Fault Code	Possible cause	Action
P1605	Engine ECM locked by the Calibration Lock function	This is also identified by a fast flashing MIL indication, and a disabled engine management system. Unlock the engine ECM using the diagnostic software and supplied unlock code from Triumph service.

P1614 - Instrument ID incompatible Or Instruments Locked By Calibration Lock Function

Fault Code	Possible cause	Action
P1614	Instrument ID incompatible Instrument or calibration is incorrect, causing the engine 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 calibration is correct for the motorcycle, using the diagnostic software	OK	Proceed to test 3
		Faulty	Update the calibration using the diagnostic software, proceed to test 3
3	Clear fault code, check for normal operation	OK	Action complete - quit test
		Short circuit	Contact Triumph service

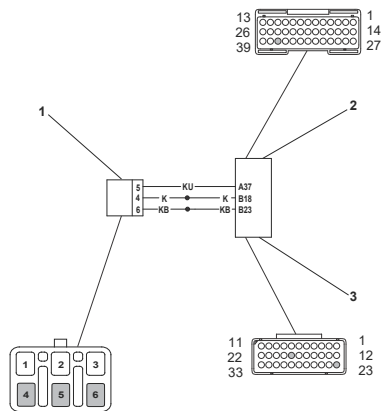
P1631, P1632 - Fall Detection Switch

Fault Code	Possible cause	Action
P1631	Fall detection circuit short circuit to ground	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P1632	Fall detection circuit short circuit to battery Voltage	Ensure switch connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B23 - Engine ECM pin B18 - Engine ECM pin A37 - Sensor pin 4, 5, 6	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - Engine ECM pin A37 to Engine ECM pin B18 - Engine ECM pin A37 to Engine ECM pin B23	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Engine ECM pin B18 to sensor pin 4 - Engine ECM pin B23 to sensor pin 6 - Engine ECM pin A37 to sensor pin 5	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Fall Detection Switch
2. Engine ECM Connector A
3. Engine ECM Connector B

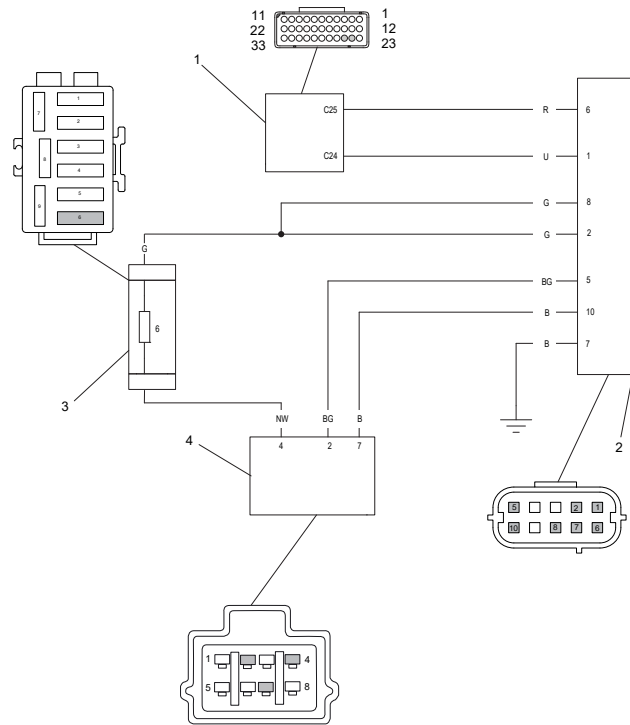
P1650 - CAN Fault - Lost communication With Immobiliser ECM

Fault Code	Possible cause	Action
P1650	Lost communication with Immobiliser ECM	View and note 'freeze-frame' data if available. Make sure the immobiliser control module connector is secure. Make sure 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: - Engine ECM pin C25 - Engine ECM pin C24 - Immobiliser pin 1 - Immobiliser pin 2 - Immobiliser pin 6 - Immobiliser pin 7 - Immobiliser pin 8	OK	Disconnect ECM and proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - Engine ECM pin C25 to ground - Engine ECM pin C24 to ground	OK	Disconnect immobiliser, ignition switch and proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 6
3	Check fuse box fuse 6 integrity.	OK	Proceed to test 5
		Faulty	Proceed to test 4
4	Check cable for short circuit: - Immobiliser pin 2 to ground - Immobiliser pin 8 to ground	OK	Proceed to test 5
		Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5	Check cable continuity: - Engine ECM pin C25 to immobiliser pin 6 - Engine ECM pin C24 to Immobiliser pin 1 - Immobiliser pin 7 to ground - Fuse box fuse 6 to immobiliser pin 2	OK	Proceed to test 6
		Fault still present	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector C
2. Immobiliser/TPMS Control Module
3. Fuse Box
4. Ignition Switch

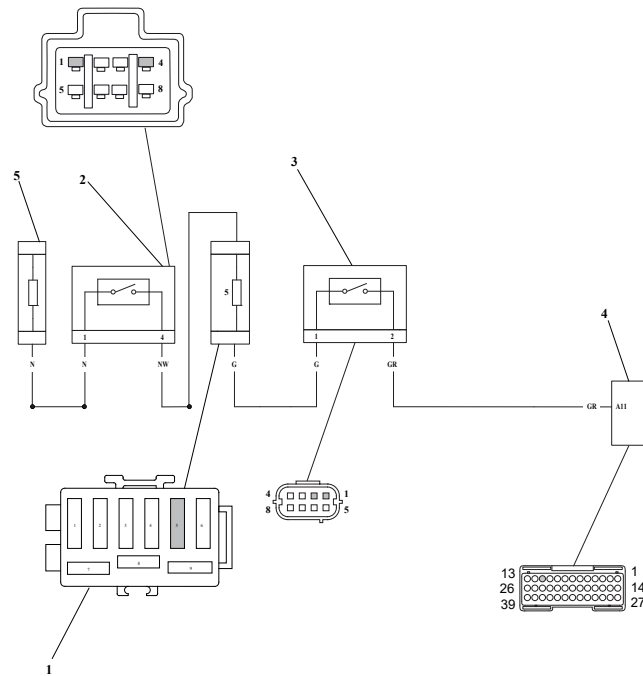
P1659 - Ignition Power Supply Malfunction

Fault Code	Possible cause	Action
P1659	Ignition power supply malfunction	Make sure that the engine stop switch is in the RUN position and any alarm fitted is disarmed Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check fuse box fuse 5 integrity.	OK	Proceed to test 3
		Faulty	Proceed to test 2
2	Check cable for short circuit: - Engine ECM pin A11 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: - Engine ECM pin A11 - Right hand switch housing pin 1 - Right hand switch housing pin 2	OK	Proceed to test 4
		Faulty	Rectify fault, proceed to test 5
4	Check cable continuity: - Engine ECM pin A11 to fuse box fuse 5 Note that the engine stop switch must be in the RUN position, fuse 5 must be removed and any alarm fitted must be disarmed.	OK	Replace fuse 6 and proceed to test 5
		Open circuit	Locate and rectify wiring, immobiliser or engine stop switch fault, replace fuse 5 and proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Fuse Box
2. Ignition Switch
3. Right Hand Switch Housing Connector
4. Fuel Pump Relay
5. Engine ECM Connector A

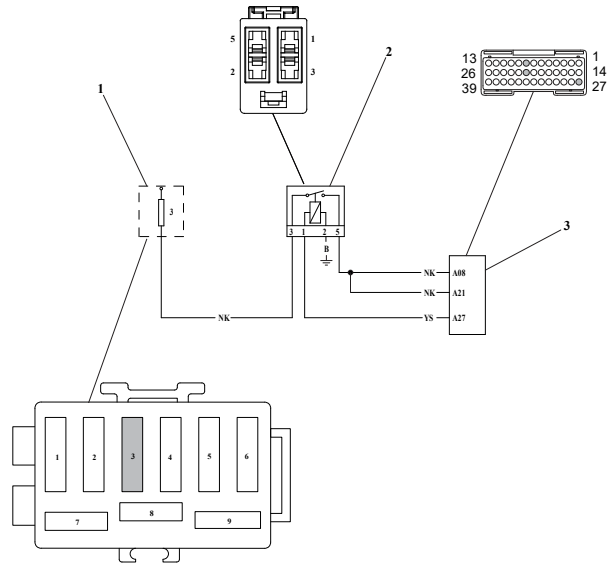
P1685 - Main Relay Circuit Malfunction

Fault Code	Possible cause	Action
P1685	Main relay circuit malfunction	Note that the starter motor cannot be powered if a main relay fault exists. Make sure 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 90 seconds. Identify EMS main relay on the harness. Check that relay operates when the ignition is switched ON and the stop and run switch is in the RUN position.	OK Proceed to test 4
	Faulty	Disconnect EMS main relay and engine ECM. Proceed to test 4
2	Check cable for short circuit: - Engine ECM pin A27 to ground - Engine ECM pin A08 to ground - Engine ECM pin A21 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, replace Fuse 5 and proceed to test 6
3	Check cable and terminal integrity: - Engine ECM pin A27 - EMS main relay pin 1 - EMS main relay pin 2 - EMS main relay pin 3 - EMS main relay pin 5	OK Disconnect main relay and proceed to test 4
	Faulty	Rectify fault, proceed to test 5
4	Check fuse box fuse 3 integrity.	OK Proceed to test 5
	Fuse blown or open circuit	Replace fuse and proceed to test 5
5	Check cable continuity: - Engine ECM pin A08 to EMS main relay pin 5 - Engine ECM pin A21 to EMS main relay pin 5 - Engine ECM pin A27 to EMS relay pin 1 - EMS main relay pin 2 to ground - EMS main relay pin 3 to fuse box fuse 3	OK Replace EMS main relay and proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code. Switch ignition off for longer than 90 seconds. Switch ignition on and check that the EMS main relay operates. Start engine as final check.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Fuse Box
2. Engine Management System Relay
3. Engine ECM Connector A

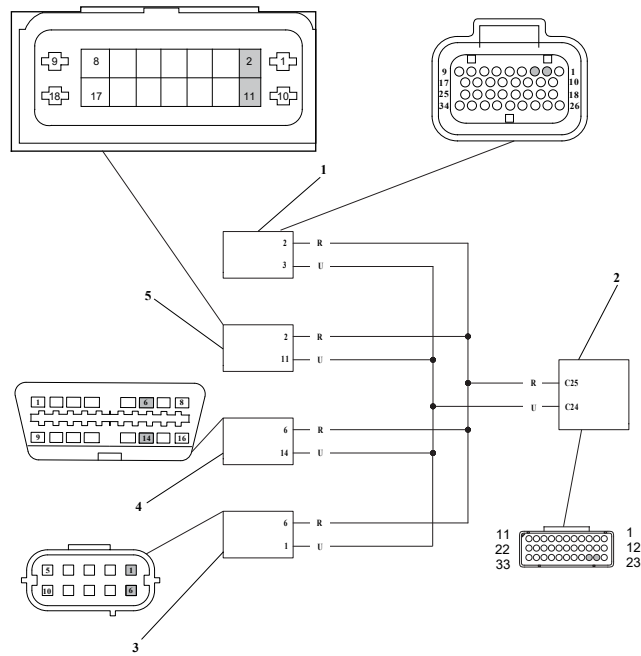
P1690 - CAN Fault

Fault Code	Possible cause	Action
P1690	CAN Fault	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure Instrument connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C24 - Engine ECM pin C25 - Instrument pin 3 - Instrument pin 2 - ABS module pin 2 - ABS module pin 11 - Diagnostic connector pin 6 - Diagnostic connector pin 14 - Immobiliser module pin 1 - Immobiliser module pin 6	OK	Disconnect instruments and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin C24 to ground - Engine ECM pin C25 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin C24 to Instrument pin 3 - Engine ECM pin C25 to Instrument pin 2 - Engine ECM pin C24 to ABS control module pin 11 - Engine ECM pin C25 to ABS control module pin 2 - Engine ECM pin C24 to Diagnostic connector pin 14 - Engine ECM pin C25 to Diagnostic connector pin 6 - Engine ECM pin C24 to Immobiliser module pin 1 - Engine ECM pin C25 to Immobiliser module pin 6	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin C24 to Engine ECM pin C25	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Instruments
2. Engine ECM Connector C
3. Immobiliser/TPMS Control Module
4. Diagnostic Connector
5. ABS Control Module

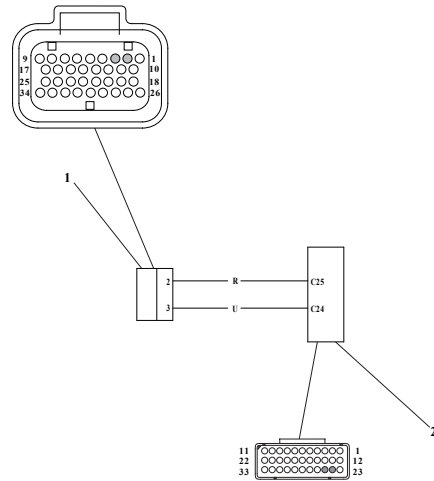
P1695 - CAN Fault - Lost Communication With Instrument Panel

Fault Code	Possible cause	Action
P1695	Lost communication with instrument panel	View and note 'freeze-frame' data if available. Disconnect engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C25 - Engine ECM pin C24 - Instrument pin 3 - Instrument pin 2	OK	Disconnect instruments and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin C25 to ground - Engine ECM pin C24 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin C25 to Instrument pin 2 - Engine ECM pin C24 to Instrument pin 3	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin C25 to Engine ECM pin C24	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Instruments
2. Engine ECM Connector C

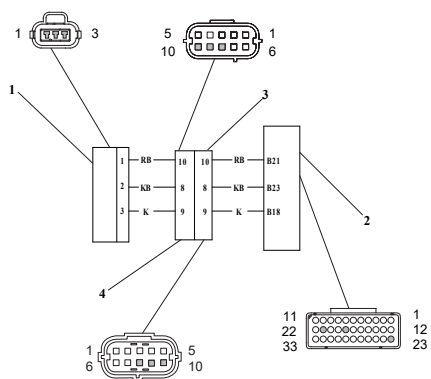
P1702, P1703 - Shift Force Sensor Circuit (Triumph Shift Assist)

Fault Code	Possible Cause	Action
P1702	Shift force sensor short circuit to ground or open circuit Shift force sensor voltage too low	View and note diagnostic tool 'sensor' data Disconnect engine ECM and proceed to pinpoint test 1:
P1703	Shift force sensor short circuit to 5 volt supply Shift force sensor voltage too high	Disconnect engine ECM and proceed to pinpoint test 2:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B21 - Engine ECM pin B18 - Engine ECM pin B23	OK	Disconnect shift force sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - Engine ECM pin B21 to Engine ECM pin B23 - Engine ECM pin B18 to Engine ECM pin B23	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Engine ECM pin B21 to sensor pin 1 - Engine ECM pin B23 to sensor pin 2 - Engine ECM pin B18 to sensor pin 3	OK	Renew shift force sensor and proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Shift Force Sensor
2. Engine ECM Connector B
3. Engine Subharness Connector (Main Harness Side)
4. Engine Subharness Connector (Subharness Side)

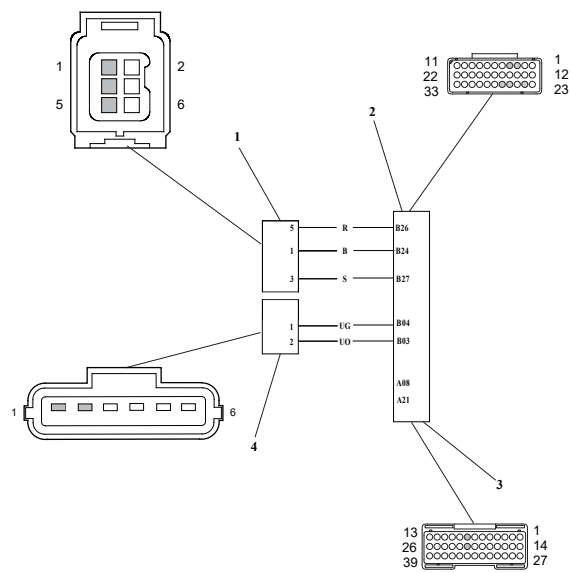
P2100 - Throttle Actuator Control Motor Open Circuit

Fault Code	Possible cause	Action
P2100	Throttle actuator control motor open circuit Throttle actuator short circuit to ground or short circuit to battery positive Throttle actuator with default spring open circuit	View and note diagnostic tool freeze frame data if available. View and note diagnostic tool sensor data. Make sure accelerator position sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B04 - Engine ECM pin B03 - Throttle body connector pin 1 - Throttle body connector pin 2	OK	Disconnect accelerator position sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B04 to ground - Engine ECM pin B03 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B26 to sensor pin 5 - Engine ECM pin B27 to sensor pin 3 - Engine ECM pin B24 to sensor pin 1	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B04 to Engine ECM pin A08 - Engine ECM pin B04 to Engine ECM pin A21 - Engine ECM pin B03 to Engine ECM pin A08 - Engine ECM pin B03 to Engine ECM pin A21	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.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Twist Grip Position Sensor
2. Engine ECM Connector B
3. Engine ECM Connector A
4. Throttle Body

P2102, P2103 - Throttle Actuator Control

Fault Code	Possible cause	Action
P2102	Throttle actuator control internal motor relay does not operate	View and note 'freeze-frame' data if available. View and note 'sensor' data.
P2103	Throttle actuator control internal motor relay operates continually	Check throttle body for mechanical malfunctions. Clear fault code and contact Triumph service if fault is still present.

P2111, P2119 - Throttle Valve Drive Error

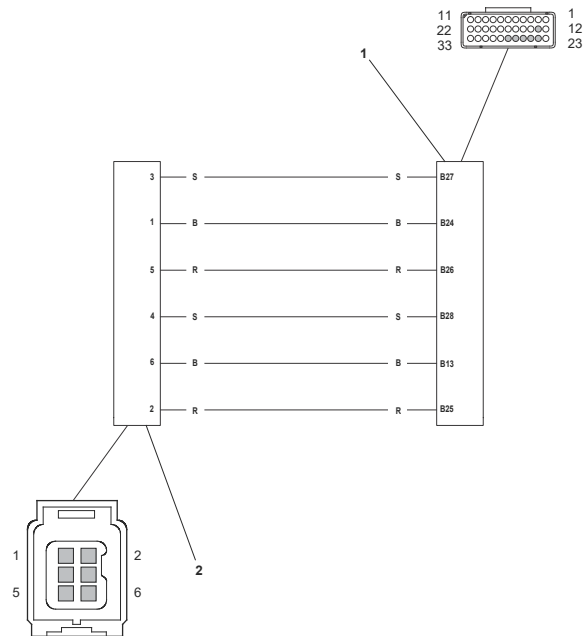
Fault Code	Possible cause	Action
P2111	Throttle valve drive error (stuck open)	View and note diagnostic tool freeze frame data if available. View and note diagnostic tool sensor data.
P2119	Throttle valve drive error	Check throttle body for mechanical malfunctions. Clear fault code and contact Triumph service if fault still present

P2120, P2121, P2123 - Twist Grip Position Sensor 1

Fault Code	Possible cause	Action
P2120	Twist grip position sensor 1 short circuit to ground or open circuit	View and note 'sensor' data. Note ECM sensors requiring a power supply will not be active. Make sure the twist grip position sensor is secure. Disconnect the engine ECM and proceed to pinpoint test 1:
P2121	Twist grip position sensor 1 signal out of range	
P2123	Twist grip position sensor 1 short circuit to battery positive	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B26 - Engine ECM pin B27 - Engine ECM pin B24 - Engine ECM pin B28 - Engine ECM pin B25 - Engine ECM pin B13	OK Disconnect twist grip position sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B25 to ground - Engine ECM pin B26 to ground - Engine ECM pin B27 to ground - Engine ECM pin B28 to ground	OK Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B26 to sensor pin 5 - Engine ECM pin B27 to sensor pin 3 - Engine ECM pin B24 to sensor pin 1 - Engine ECM pin B25 to sensor pin 2 - Engine ECM pin B28 to sensor pin 4 - Engine ECM pin B13 to sensor pin 6	OK Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B27 to Engine ECM pin B26 - Engine ECM pin B27 to Engine ECM pin B24 - Engine ECM pin B27 to Engine ECM pin B25 - Engine ECM pin B28 to Engine ECM pin B25 - Engine ECM pin B28 to Engine ECM pin B26 - Engine ECM pin B28 to Engine ECM pin B24	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



1. Engine ECM Connector B
2. Twist Grip Position Sensor

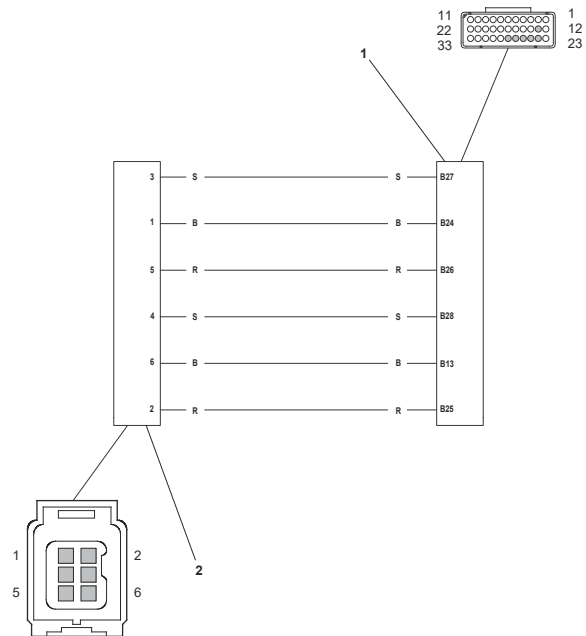
P2125, P2126, P2128 - Twist Grip Position Sensor 2

Fault Code	Possible cause	Action
P2125	Twist grip position sensor 2 short circuit to ground or open circuit	View and note 'sensor' data. Note ECM sensors requiring a power supply will not be active. Make sure the twist grip position sensor is secure. Disconnect the engine ECM and proceed to pinpoint test 1:
P2126	Twist grip position sensor 2 signal out of range	
P2128	Twist grip position sensor 2 short circuit to battery positive	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B13 - Engine ECM pin B28 - Engine ECM pin B25	OK	Disconnect twist grip position sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin B28 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin B13 to sensor pin 6 - Engine ECM pin B28 to sensor pin 4 - Engine ECM pin B25 to sensor pin 2	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin B28 to Engine ECM pin B13 - Engine ECM pin B28 to Engine ECM pin B25	OK	Renew twist grip position sensor, proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector B
2. Twist Grip Position Sensor

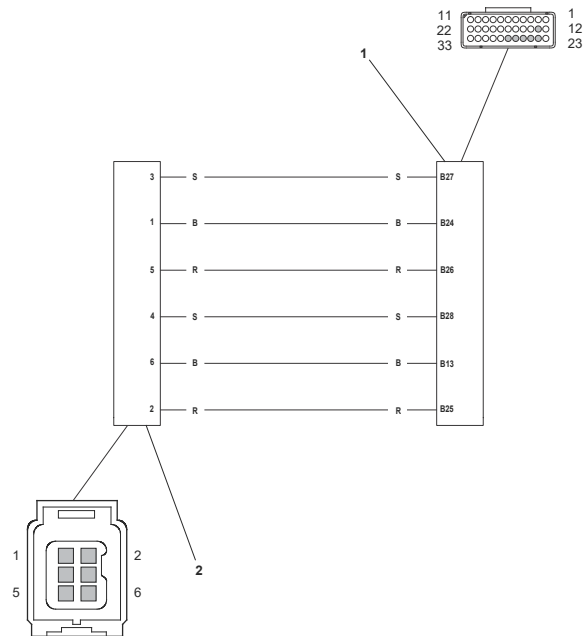
P2138 - Twist Grip Position Sensor 1 Correlation Error with Twist Grip Position 2

Fault Code	Possible cause	Action
P2138	Twist grip position sensor 1 correlation error with twist grip position sensor 2	View and note diagnostic tool freeze frame data if available. View and note diagnostic tool sensor data. Disconnect twist grip position sensor and proceed to pinpoint test 1:

Pinpoint Tests

Test	Result	Action
1	Turn the ignition on and measure the Voltage between: - Engine ECM pin B25 and Engine ECM pin B13 - Engine ECM pin B26 and Engine ECM pin B24	Ok - 5V DC Proceed to test 2
	Faulty	Rectify fault, proceed to test 2
2	Check cable continuity: - Engine ECM pin B27 to sensor pin 3 - Engine ECM pin B28 to sensor pin 4	OK Renew the twist grip and proceed to test 3
	Open circuit	Rectify fault, proceed to test 3
3	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector B
2. Twist Grip Position Sensor

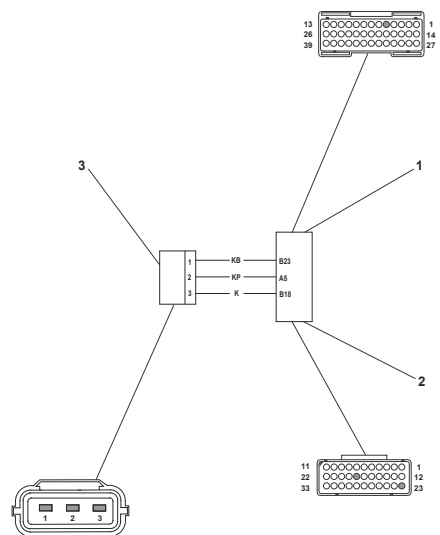
P2226, P2228 - Ambient Air Pressure Sensor

Fault Code	Possible cause	Action
P2226	Ambient air pressure sensor circuit open circuit or short circuit to 5 Volt sensor supply	View and note 'freeze-frame' data if available. View and note 'sensor' data. Make sure sensor connector is secure. Disconnect the engine ECM and proceed to pinpoint test 1:
P2228	Ambient air pressure sensor circuit short circuit to ground	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin B23 - Engine ECM pin A5 - Engine ECM pin B18 - Sensor pin 1, 2, 3	OK	Disconnect ambient pressure sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit to ground: - Engine ECM pin B23 to Engine ECM pin A5 - Engine ECM pin B23 to Engine ECM pin B18	OK	Proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 5
3	Check cable for short circuit to supply: - Engine ECM pin B18 to Engine ECM pin A5	OK	Proceed to test 4
		Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for continuity: - Engine ECM pin B23 to sensor pin 1 - Engine ECM pin A5 to sensor pin 2 - Engine ECM pin B18 to sensor pin 3	OK	Renew ambient pressure sensor and proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector A
2. Engine ECM Connector B
3. Ambient Air Pressure Sensor

1. Engine electronic control module
2. Ambient air pressure sensor
3. Engine ECM - Connector A
4. Engine ECM - Connector B

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Pinpoint Tests - Immobiliser/TPMS

Diagnostic - Trouble Codes - Index - Immobiliser/TPMS

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	Pinpoint test
L0001	Front Wheel Unit Sensor Battery Alert	For low battery Voltage -lo bAtt 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	L0001 - Front Wheel Unit Sensor Battery Alert
L0002	Rear Wheel Unit Sensor Battery Alert		L0002 - Rear Wheel Unit Sensor Battery Alert
L0003	Front Wheel Unit Sensor Fault Alert	TPMS warning light ON and the TPMS symbol in the display screen will flash ON and OFF	L0003 - Front Wheel Unit Sensor Fault Alert
L0004	Rear Wheel Unit Sensor Fault Alert		L0004 - Rear Wheel Unit Sensor Fault Alert
L0005	Front Wheel Unit Sensor Loss of Communication		L0005 - Front Wheel Unit Sensor Loss of Communication
L0006	Rear Wheel Unit Sensor Loss of Communication		L0006 - Rear Wheel Unit Sensor Loss of Communication
L0007	Immobiliser/TPMS Control Module Fault		L0007 - Immobiliser/TPMS Control Module Fault
L0008	Invalid Key: Key Authentication Unsuccessful	Alarm/Immobiliser light ON	L0008 - Invalid Key: Key Authentication Unsuccessful

L0001 - Front Wheel Unit Sensor Battery Alert

NOTICE

All the fault codes for the tyre pressure monitoring system and the immobiliser system can only be viewed in the Chassis 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	Low battery voltage	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 handbook before fitting.

L0002 - 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 'R' symbol with 'lo bAtt' shown in the display screen	Low battery voltage	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 handbook before fitting.

L0003 - 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 handbook before fitting.

L0004 - 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 handbook before fitting.

L0005 - Front Wheel Unit Sensor Loss of Communication

NOTICE

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 handbook before fitting.

L0006 - Rear Wheel Unit Sensor Loss of Communication

NOTICE

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 handbook before fitting.

L0007 - Immobiliser/TPMS Control Module Fault

NOTICE

Refer to the owner's handbook for the wheel pressure sensors ID numbers.

Fault Code	Possible cause	Action
L0007	Immobiliser/TPMS control module 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 handbook before fitting.

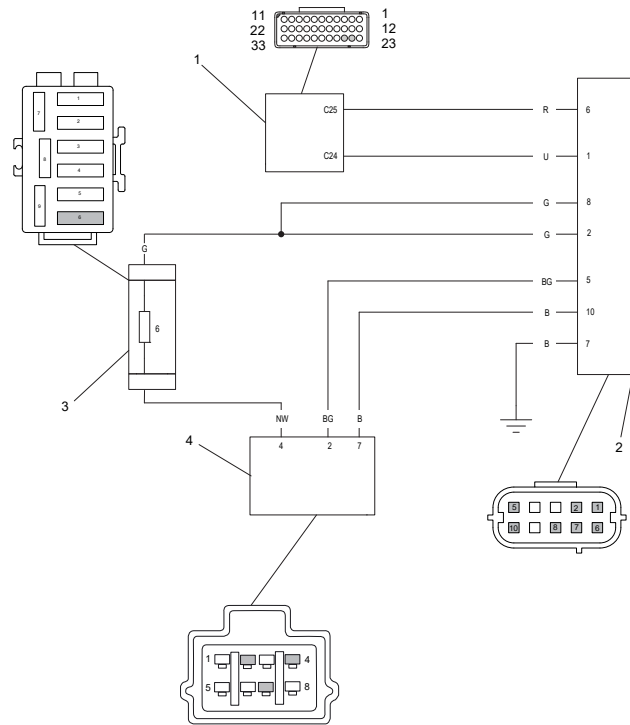
L0008 - Invalid Key: Key Authentication Unsuccessful

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 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 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	7 Ohms to 13 Ohms	Proceed to test 4
		Faulty	Replace the ignition switch, register new keys and proceed to test 5
4	Check cable continuity: - Ignition switch pin 2 to Immobiliser control module pin 5 - Ignition switch pin 7 to Immobiliser control module pin 10	OK	Proceed to test 4
		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



1. Engine ECM Connector C
2. Immobiliser/TPMS Control Module
3. Fuse Box
4. Ignition Switch

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Pinpoint Tests - ABS ECM

Diagnostic Trouble Codes - Index - ABS

The system will log the diagnostic trouble codes listed below:

NOTICE	
ABS is Active means that the ABS system is completing an ABS manoeuvre.	

The system will log the diagnostic trouble codes listed below.

Fault code and description	ABS warning light Illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)	Pinpoint Test Page Number
C1611 Front wheel sensor short circuit to ground or open circuit	Yes	Yes		No DTC stored for 40 cycles.	C1611 - Front Wheel Sensor Short Circuit To Ground or Open Circuit
C1612 Front wheel sensor incorrect or missing signal	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1612 - Front Wheel Sensor Incorrect or Missing Signal
C1613 Rear wheel sensor short circuit to ground or open circuit	Yes	Yes		No DTC stored for 40 cycles.	C1613 - Rear Wheel Sensor Short Circuit To Ground or Open Circuit
C1614 Rear wheel sensor incorrect or missing signal	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1614 - Rear Wheel Sensor Incorrect or Missing Signal
C1621 Front wheel pulser ring missing teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1621 - Front Wheel Pulser Ring Missing Teeth

Fault code and description	ABS warning light Illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)	Pinpoint Test Page Number
C1623 Rear wheel pulser ring missing teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1623 - Rear Wheel Pulser Ring Missing Teeth
C1631 Front wheel input solenoid short circuit to ground or open circuit	Yes	Yes		No	C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit to Ground or Open Circuit
C1632 Front wheel output solenoid short circuit to ground or open circuit	Yes		Yes	No	C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit to Ground or Open Circuit
C1633 Rear wheel input solenoid short circuit to ground or open circuit	Yes	Yes		No	C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit to Ground or Open Circuit
C1634 Rear wheel output solenoid short circuit to ground or open circuit	Yes		Yes	No	C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit to Ground or Open Circuit
C1635 Master cylinder isolation valve short circuit to ground or open circuit	Yes	Yes		No	C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit to Ground or Open Circuit
C1636 Low pressure feed valve short circuit to ground or open circuit	Yes	Yes		No	C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit

Fault code and description	ABS warning light Illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)	Pinpoint Test Page Number
					to Ground or Open Circuit
C1641 Front wheel speed signal error; simulated wheel lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1641, C1643 - Wheel Speed Signal Error; Simulated Wheel Lock
C1643 Rear wheel speed signal error; simulated wheel lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1641, C1643 - Wheel Speed Signal Error; Simulated Wheel Lock
C1651 Motor circuit fault	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1651, C1652, C1653 - Motor - Lock; Motor Circuit Fault; Motor Does Not Run; Motor Runs Continually
C1652 Motor - does not run	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1651, C1652, C1653 - Motor - Lock; Motor Circuit Fault; Motor Does Not Run; Motor Runs Continually
C1653 Motor - runs continually	Yes		Yes	Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1651, C1652, C1653 - Motor - Lock; Motor Circuit Fault; Motor Does Not Run; Motor Runs Continually
C1661 Power source voltage too low	Yes	Yes		Yes, if voltage rises above a preset threshold.	C1661, C1662, C1663, C1664 - Power Source Voltage
C1662 Power source voltage too high	Yes	Yes		Yes, if voltage drops below a preset threshold.	C1661, C1662, C1663, C1664 - Power Source Voltage
C1663 Power source - short term under-voltage detected	Yes	Yes		Yes, if voltage rises above a preset threshold.	C1661, C1662, C1663, C1664 - Power Source Voltage
C1664 Power source - long term Under-	Yes	Yes		No DTC stored for 40 cycles.	C1661, C1662, C1663, C1664 - Power Source Voltage

Fault code and description	ABS warning light Illuminated when fault is logged	ABS operation is inhibited immediately when fault is logged	ABS continues to operate if performing an ABS manoeuvre when fault is logged Operation is inhibited when ABS manoeuvre is completed	ABS will automatically resume operation if fault clears(DTC still stored for 40 cycles)	Pinpoint Test Page Number
voltage detected					
C1671 Incorrect tyre size detected	Yes	Yes		Yes, if after ignition cycle, no fault is detected and ABS has initialised. DTC stored for 40 cycles.	C1671 - Incorrect Tyre Size Detected
C1681 ABS ECM internal error	Yes	Yes		No	C1681 - ABS ECM Internal Error
C1682 CAN fault - lost communication with engine ECM				DTC stored for 40 cycles.	C1682, C1683, C1684 - CAN Fault
C1683 CAN fault - lost communication with instrument panel				DTC stored for 40 cycles.	C1682, C1683, C1684 - CAN Fault
C1684 CAN fault - all communication lost				DTC stored for 40 cycles.	C1682, C1683, C1684 - CAN Fault
C1690 Modulator - active pressure control malfunction	Yes	Yes		No DTC stored for 40 cycles.	C1690, C1691, C1692 - ABS Modulator Malfunction
C1691 Modulator input (master cylinder) pressure sensor malfunction	Yes	Yes		No DTC stored for 40 cycles.	C1690, C1691, C1692 - ABS Modulator Malfunction
C1692 Modulator output (wheel) pressure sensor malfunction	Yes	Yes		No	C1690, C1691, C1692 - ABS Modulator Malfunction
C1700 ABS variant coding error	Yes	Yes	Not applicable	Not applicable	C1700 - ABS Variant Coding Error

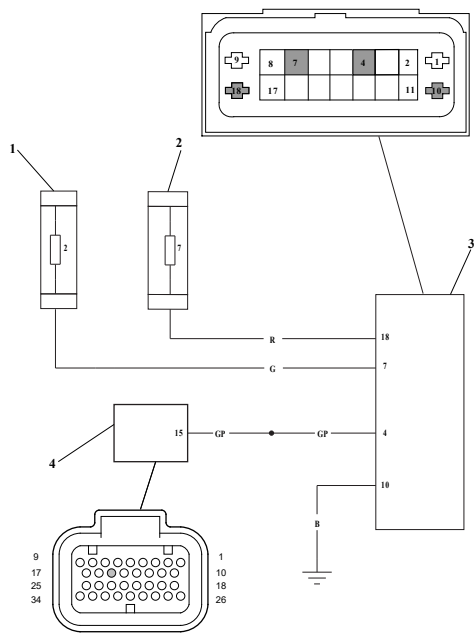
ABS Warning Light ON (No DTCs Stored)

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 7 and ground pin 10	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable continuity of the ABS ignition supply circuit: With the ignition 'ON', check voltage between: - ABS ECM connector pin 7 and ground pin 10	Voltage greater than 10 V	Proceed to test 3
		Voltage less than 10 V	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity of the ABS warning light circuit: Reconnect the ABS ECM connector Check voltage between: - ABS ECM connector pin 3 and ground pin 10 Disconnect the ABS ECM connector	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 3 and ground pin 10 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



1. Fuse Box 2
2. Fuse Box 1
3. ABS Control Module
4. Instruments

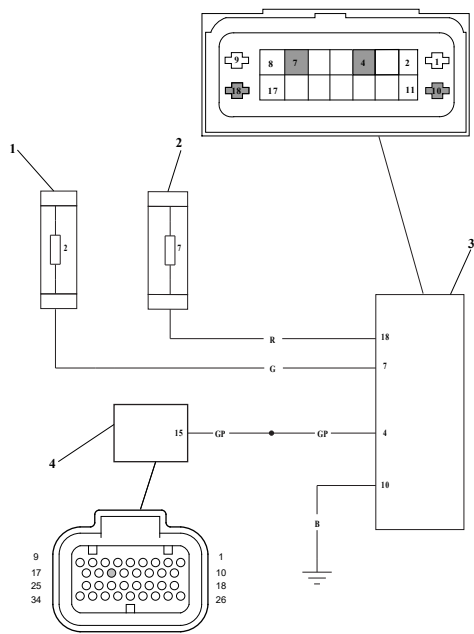
ABS Warning Light Does Not Illuminate (No DTCs Stored)

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 the ABS warning light circuit and ignition fuses - fuse 6 and fuse 7	OK	Proceed to test 2
		Faulty	Replace fuse, proceed to test 6
2	Check cable and terminal integrity: - ABS ECM connector pin 4 and ground pin 10	OK	Proceed to test 3
		Faulty	Rectify fault, proceed to test 6
3	Check cable for short to voltage: With ignition 'OFF', check voltage between: - ABS ECM connector pin 4 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 3 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 10 and ground:	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



- 1. Fuse Box 2
- 2. Fuse Box 1
- 3. ABS Control Module
- 4. Instruments

C1611 - Front Wheel Sensor Short Circuit To Ground or Open Circuit

Fault Code	Possible cause	Action
C1611	Front wheel sensor short circuit to ground or open circuit	Make sure the ABS ECM connector is secure. Make sure the 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 17 and ABS ECM connector pin 8 - Sensor connector pin 1 - Sensor connector pin 2	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit: - ABS ECM connector pin 8 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 17 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 8 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 17 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

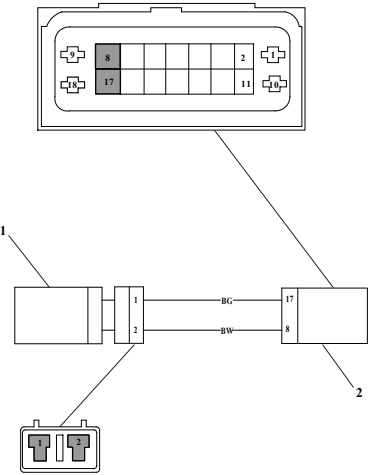
Test		Result	Action
8	Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 10 V and 16 V between ABS ECM connector pin 8 (negative) and pin 17 (positive), and measure the current consumption of the wheel speed sensor	1.8 mA to 16.8 mA	Proceed to test 9
		Faulty	Replace the wheel speed sensor, proceed to test 9
9	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Resistance Data

Wheel speed sensor current consumption data under typical conditions:

Supply Voltage	Min	Typical	Max
10 - 16 V	1.8 mA	7.5 mA	16.8 mA

Circuit Diagram



1. Front Wheel Sensor
2. ABS Control Module

C1612 - Front Wheel Sensor Incorrect or Missing Signal

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 modulator 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 0.74 mm and 1.36 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 C1611 - Front Wheel Sensor Short Circuit To Ground or Open Circuit).	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

C1613 - Rear Wheel Sensor Short Circuit To Ground or Open Circuit

Fault Code	Possible cause	Action
C1613	Rear wheel sensor short circuit to ground or open circuit	Make sure the ABS ECM connector is secure. Make sure the wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:

Pinpoint Tests

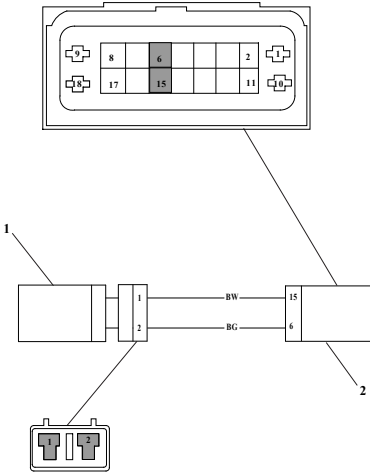
Test		Result	Action
1	Check cable and terminal integrity: - ABS modulator/ECM connector pin 6 and ABS ECM connector pin 15	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit: - ABS modulator/ECM connector pin 6 and ground	OK	Proceed to test 4
		Short circuit	Proceed to test 3
3	Disconnect the rear 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 modulator/ECM connector pin 15 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 modulator/ECM connector pin 6 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 modulator/ECM connector pin 15 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

Test		Result	Action
8	Reconnect the rear wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 10 V and 16 V between ABS ECM connector pin 6 (negative) and pin 15 (positive), and measure the current consumption of the wheel speed sensor	1.8 mA to 16.8 mA	Proceed to test 9
		Faulty	Replace the wheel speed sensor, proceed to test 9
9	Reconnect ABS modulator/ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Resistance Data

Supply Voltage	Min	Typical	Max
10 - 16 V	1.8 mA	7.5 mA	16.8 mA

Circuit Diagram



1. Rear Wheel Speed Sensor
2. ABS Control Module

C1614 - Rear Wheel Sensor Incorrect or Missing Signal

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	Make sure the ABS modulator connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Measure the air gap of the rear wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.74 mm and 1.36 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 C1613 - Rear Wheel Sensor Short Circuit To Ground or Open Circuit).	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

C1621 - Front Wheel Pulser Ring Missing Teeth

Fault Code	Possible cause	Action
C1621	Front wheel pulser gear missing teeth Incorrect wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Make sure the ABS modulator 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 0.74 mm and 1.36 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 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

C1623 - Rear Wheel Pulser Ring Missing Teeth

Fault Code	Possible cause	Action
C1623	Rear wheel pulser gear missing teeth Incorrect wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Make sure the ABS modulator connector is secure. Proceed to pinpoint test 1:

Pinpoint Tests

Test		Result	Action
1	Measure the air gap of the rear wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.74 mm and 1.36 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

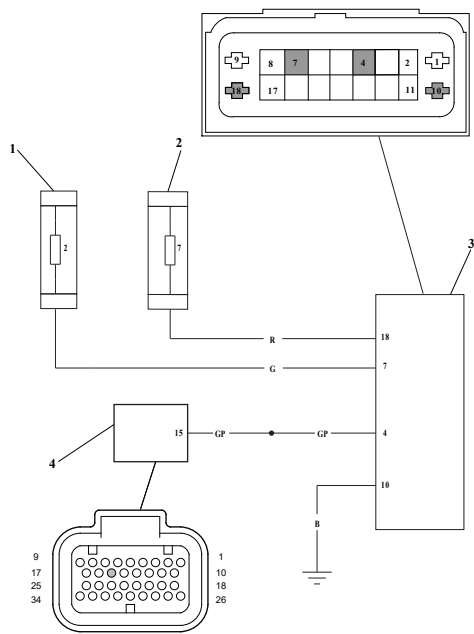
C1631, C1632, C1633, C1634, C1635, C1636 - Front or Rear Input/Output Solenoid Short Circuit to Ground or Open Circuit

Fault Code	Possible cause	Action
C1631	Front wheel input solenoid short circuit to ground or open circuit	Make sure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:
C1632	Front wheel output solenoid short circuit to ground or open circuit	
C1633	Rear wheel input solenoid short circuit to ground or open circuit	
C1634	Rear wheel output solenoid short circuit to ground or open circuit	
C1635	Master cylinder isolation valve short circuit to ground or open circuit	
C1636	Low pressure feed valve short circuit to ground or open circuit	

Pinpoint Tests

Test	Result	Action
1	Check the ABS main fuse 7:	OK
		Proceed to test 3
2	Faulty	Proceed to test 2
3	Check cable and terminal integrity: - ABS ECM connector pin 18 and ground pin 10	OK
		Replace fuse, proceed to test 5
4	Faulty	Rectify fault, replace fuse, proceed to test 5
5	Check cable for short to ground: With ignition 'ON', check voltage between: - ABS ECM connector pin 18 and ground pin 10	Voltage greater than 11 V
		Proceed to test 4
6		Voltage less than 11 V
		Locate and rectify fault, proceed to test 5
7	Check cable for continuity: - ABS ECM connector pin 10 and ground	OK
		Proceed to test 5
8	Faulty	Locate and rectify fault, proceed to test 5
9	Clear fault code and test ABS to verify fault cleared.	OK
		Action complete - quit test
10	Fault still present	Contact Triumph service

Circuit Diagram



1. Fuse Box 2
2. Fuse Box 1
3. ABS Control Module
4. Instruments

C1641, C1643 - Wheel Speed Signal Error; Simulated Wheel Lock

Fault Code	Possible cause	Action
C1641	Front wheel speed signal error simulated wheel lock Binding front brake Incorrect Wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor An abnormal manoeuvre was performed (a very long 'wheelie' or 'stoppie with the wheel stopped)	Make sure the ABS modulator connector is secure. Proceed to pinpoint test 1:
C1643	Rear wheel speed signal error simulated wheel lock Binding rear brake Incorrect Wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor An abnormal manoeuvre was performed (a very long 'wheelie' or 'stoppie with the wheel stopped)	

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 0.74 mm to 1.36 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

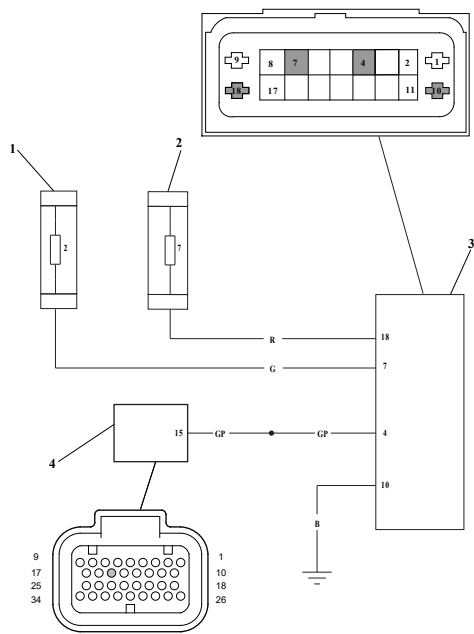
C1651, C1652, C1653 - Motor – Lock; Motor Circuit Fault; Motor Does Not Run; Motor Runs Continually

Fault Code	Possible cause	Action
C1651	Motor circuit fault	Make sure the ABS modulator connector is secure. Turn the ignition ON. Proceed to pinpoint test 1:
C1652	Motor does not run	
C1653	Motor runs continually	

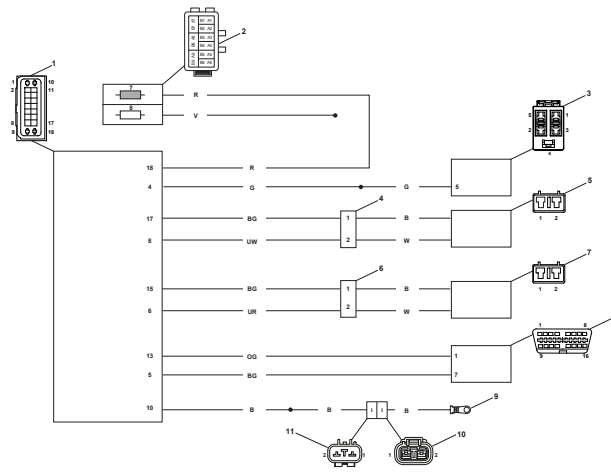
Pinpoint Tests

Test		Result	Action
1	Check the ABS main fuse 7	OK	Proceed to test 2
		Faulty	Replace fuse and proceed to test 5
2	Check the motor function: Check that with the motorcycle stationary and the ABS ECM modulator connected, the motor does not operate	OK	Proceed to test 3
		Motor runs continually	Contact Triumph service
3	Check cable continuity: With ignition 'ON', check voltage between: - ABS ECM connector pin 18 and ground pin 10	Voltage greater than 11 V	Proceed to test 4
		Voltage less than 11 V	Locate and rectify wiring fault, proceed to test 5
4	Check cable for continuity: - ABS ECM connector pin 10 and ground	OK	Proceed to test 5
		Faulty	Locate and rectify fault, proceed to test 5
5	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



- 1. Fuse Box 2
- 2. Fuse Box 1
- 3. ABS Control Module
- 4. Instruments



1. ABS ECM connector
2. Fuse box 1
3. Ignition relay
4. Front wheel speed sensor connector
5. Front wheel speed sensor
6. Rear wheel speed sensor connector
7. Rear wheel speed sensor
8. Diagnostic connector
9. Battery negative connector
10. Battery subharness connector (subharness side)
11. Battery subharness connector (main harness side)

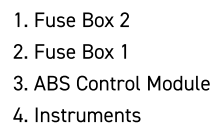
C1661, C1662, C1663, C1664 - Power Source Voltage

Fault Code	Possible Cause	Action
C1661	Power source voltage too low	Make sure ABS ECM connector is secure Disconnect ABS ECM connector and proceed to pinpoint test 1:
C1662	Power source voltage too high	
C1663	Power source - short term under-voltage detected	
C1664	Power source - long term Under-voltage detected	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 7 and ground pin 10	OK
		Proceed to test 2
		Faulty
		Rectify fault, proceed to test 5
2	Check the cable for continuity: - ABS ECM connector pin 10 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 7 and ground pin 10	Voltage greater than 11 V
		Proceed to test 4
		Voltage less than 11 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 11 V and 16 V
		Proceed to test 5
		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



1. Fuse Box 2
2. Fuse Box 1
3. ABS Control Module
4. Instruments

C1671 - Incorrect Tyre Size Detected

Fault Code	Possible cause	Action
C1671	Incorrect diameter wheels installed Incorrect tyre pressures Incorrect wheel speed sensor air gap Damaged or dirty pulser ring	Ensure ABS modulator/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 rings for damage or contamination by road grime or ferrous metal filings.	OK	Proceed to test 4
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
4	Measure the air gap of the wheel speed sensors between the sensor and the pulser ring: - Air gap should be in between 0.74 mm and 1.36 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

C1681 - ABS ECM Internal Error

Fault Code	Possible cause	Action
C1681	ABS ECM internal error Incorrect wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS modulator/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 0.74 mm to 1.36 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

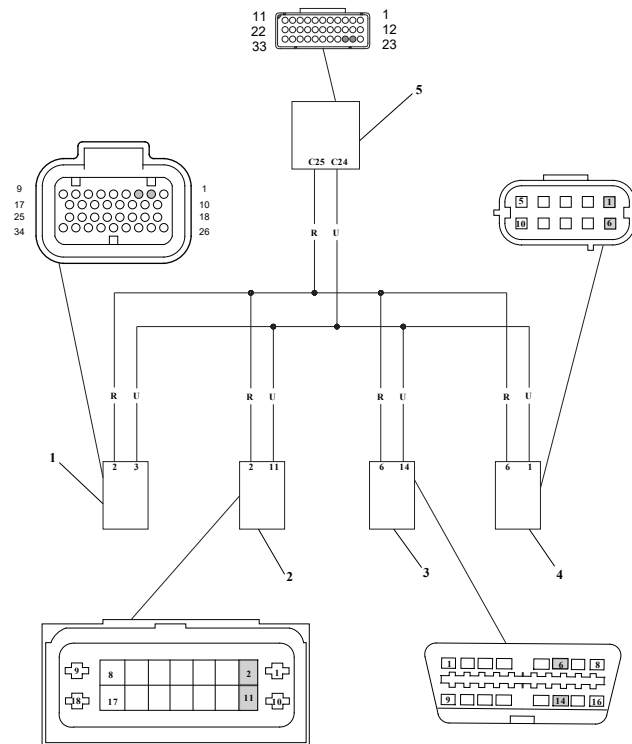
C1682, C1683, C1684 - CAN Fault

Fault Code	Possible cause	Action
C1682	CAN fault - lost communication with engine ECM	Make sure ABS ECM connector is secure. Proceed to pinpoint test 1:
C1683	CAN fault - lost communication with instrument panel	
C1684	CAN lost fault - all communication	

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 2 - ABS ECM connector pin 11	OK
		Faulty
2	Check the cable for short circuit: - ABS ECM pin 2 to ground - ABS ECM pin 11 to ground	OK
		Short circuit
3	Check cable continuity: - ABS ECM pin 2 to ECM pin C25 - ABS ECM pin 11 to ECM pin C24 - ABS ECM pin 2 to Instruments pin 2 - ABS ECM pin 11 to Instruments pin 3 - ABS ECM pin 2 to Diagnostic connector pin 6 - ABS ECM pin 11 to Diagnostic connector pin 14 - ABS ECM pin 2 to Immobiliser module pin 6 - ABS ECM pin 11 to Immobiliser module pin 1	OK
		Open circuit
4	Check cable for short circuit: - ABS ECM pin 2 to ABS ECM pin 11	OK
		Short circuit
5	Clear fault code and test ABS to verify fault cleared.	OK
		Fault still present

Circuit Diagram



1. Instruments
2. ABS Control Module
3. Diagnostic Connector
4. Immobiliser
5. Engine ECM Connector

C1690, C1691, C1692 - ABS Modulator Malfunction

Fault Code	Possible Cause	Action
C1690	Modulator - active pressure control malfunction	Contact Triumph service
C1691	Modulator input (master cylinder) pressure sensor malfunction	
C1692	Modulator output (wheel) pressure sensor malfunction	

C1700 - ABS Variant Coding Error

Fault Code	Possible cause	Action
C1700	ABS variant coding error	Note the ABS build data. Proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check ABS modulator part number is correct for the motorcycle.	OK	Proceed to test 2
		Incorrect	Replace ABS modulator with correct part and proceed to test 2
2	Clear fault code, check for normal operation.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

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Pinpoint Tests - Instruments

Diagnostic - Trouble Codes - Index - Instruments

The system will log the diagnostic trouble codes listed below.

Diagnostic Trouble Code (DTC)	Failure Type	Fault Description	Ignition switch cycles before clearing fault	Pinpoint test
C1300	18	Main Beam Relay	20	C1300 - Main Beam Relay
C1300	19	Main Beam Relay	20	C1300 - Main Beam Relay
C1302	18	Heated Grips	20	C1302 - Heated Grips
C1302	19	Heated Grips	20	C1302 - Heated Grips
C1303	18	Front Left Direction Indicator	20	C1303 - Front Left Direction Indicator
C1303	19	Front Left Direction Indicator	20	C1303 - Front Left Direction Indicator
C1304	18	Front Right Direction Indicator	20	C1304 - Front Right Direction Indicator
C1304	19	Front Right Direction Indicator	20	C1304 - Front Right Direction Indicator
C1305	18	Rear Left Direction Indicator	20	C1305 - Rear Left Direction Indicator
C1305	19	Rear Left Direction Indicator	20	C1305 - Rear Left Direction Indicator
C1306	18	Rear Right Direction Indicator	20	C1306 - Rear Right Direction Indicator
C1306	19	Rear Right Direction Indicator	20	C1306 - Rear Right Direction Indicator
C1307	16	Battery Voltage	20	C1307 - Battery Voltage
C1307	17	Battery Voltage	20	C1307 - Battery Voltage
C1308	16	Ambient Light Sensor Voltage	20	C1308 - Ambient Light Sensor Voltage
C1308	17	Ambient Light Sensor Voltage	20	C1308 - Ambient Light Sensor Voltage
C1309	4B	CPU Over Temperature	20	C1309 - CPU Over Temperature
C130A	03	Display Backlight Failure	20	C130A - Instrument Display

Diagnostic Trouble Code (DTC)	Failure Type	Fault Description	Ignition switch cycles before clearing fault	Pinpoint test
C130A	4B	Display Backlight Failure	20	C130A - Instrument Display
C130C	92	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C130D	00	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C130E	00	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C130F	47	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C1310	00	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C1311	41	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1311	46	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1311	54	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1311	56	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	41	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	46	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	54	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	56	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1313	05	Software Update Failure	20	C1313 - Software Update Failure
C1314	49	Internal Failure	20	C1314 - Internal Failure
C1315	64	Direction Indicator Switch Correlation Fault	0	C1315 - Direction Indicator Switch Correlation Fault - Left/Right
C1317	64	Navigation Switch Correlation Fault	40	C1317 - Navigation Switch Correlation Fault - Up/Down
C1318	64	Navigation Switch Correlation Fault	40	C1318 - Navigation Switch Correlation Fault - Left/Right

Diagnostic Trouble Code (DTC)	Failure Type	Fault Description	Ignition switch cycles before clearing fault	Pinpoint test
C1319	00	Instrument I.D	5	C1319, C131A - Instrument I.D
C131A	00	Instrument I.D	5	C1319, C131A - Instrument I.D

Diagnostic Trouble Code (DTC)	Failure Type	Fault Description	Ignition switch cycles before clearing fault	Pinpoint test
C1308	16	Ambient Light Sensor Voltage	20	C1308 - Ambient Light Sensor Voltage
C1308	17	Ambient Light Sensor Voltage	20	C1308 - Ambient Light Sensor Voltage
C1309	4B	CPU Over Temperature	20	C1309 - CPU Over Temperature
C130A	03	Display Backlight Failure	20	C130A - Instrument Display
C130A	4B	Display Backlight Failure	20	C130A - Instrument Display
C130C	92	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C130D	00	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C130E	00	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C130F	47	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C1310	00	CPU Fault	20	C130C, C130D, C130E, C130F, C1310 - CPU Fault
C1311	41	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1311	46	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1311	54	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1311	56	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	41	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	46	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1312	54	Calibration Failure	20	C1311, C1312 - Calibration Failure

Diagnostic Trouble Code (DTC)	Failure Type	Fault Description	Ignition switch cycles before clearing fault	Pinpoint test
C1312	56	Calibration Failure	20	C1311, C1312 - Calibration Failure
C1313	05	Software Update Failure	20	C1313 - Software Update Failure
C1314	49	Internal Failure	20	C1314 - Internal Failure
C1319	00	Instrument I.D	5	C1319, C131A - Instrument I.D
C131A	00	Instrument I.D	5	C1319, C131A - Instrument I.D

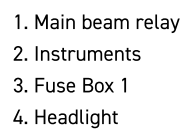
C1300 - Main Beam Relay

Fault Code	Possible Cause	Action
C1300	Relay control current is above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test	Result	Action
1	Check the main beam relay, instruments and headlight are connected	OK
		Proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Replace the main beam relay and check functionality	OK
		Done
	Faulty	Proceed to test 3
3	Check the harness for short circuit: - Main Beam Relay pin 1 to Ground	OK
		Proceed to test 4
	Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable continuity: - Main Beam Relay pin 2 to Ground	OK
		Contact Triumph service
	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



1. Main beam relay
2. Instruments
3. Fuse Box 1
4. Headlight

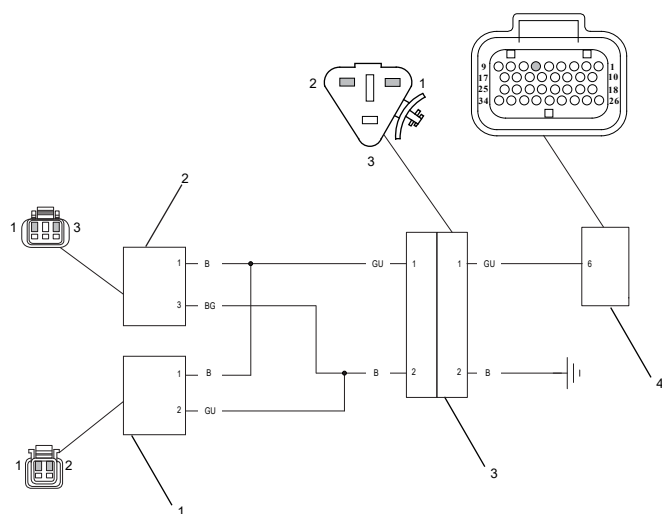
C1302 - Heated Grips

Fault Code	Possible Cause	Action
C1302	Heated grip current is above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test		Result	Action
1	Check the heated grips and instruments are connected	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check the harness for short circuit: - Instruments pin 6 to Ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Instruments pin 6 to left heated grip pin 1 - Instruments pin 6 to right heated grip pin 1	OK	Contact Triumph service
		Faulty	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Left heated grip
2. Right heated grip
3. Heated grip sub-harness connector (harness side)
4. Instruments

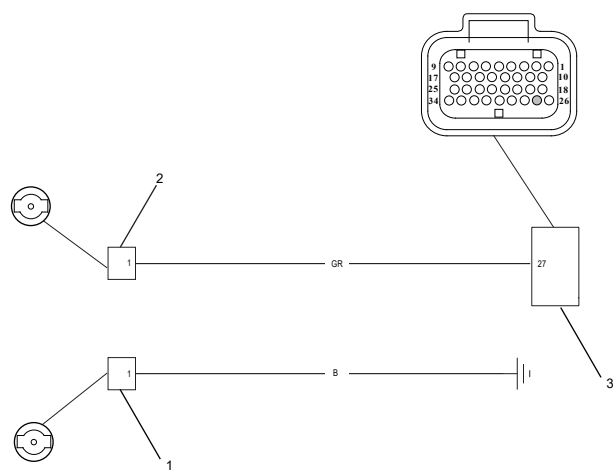
C1303 - Front Left Direction Indicator

Fault Code	Possible Cause	Action
C1303	Direction indicator current is above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test		Result	Action
1	Check the direction indicator and instruments are connected	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check the harness for short circuit: - Instruments pin 27 to Ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Instruments pin 27 to direction indicator connector A pin 1	OK	Contact Triumph service
		Faulty	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Direction indicator connector B
2. Direction indicator connector A
3. Instruments

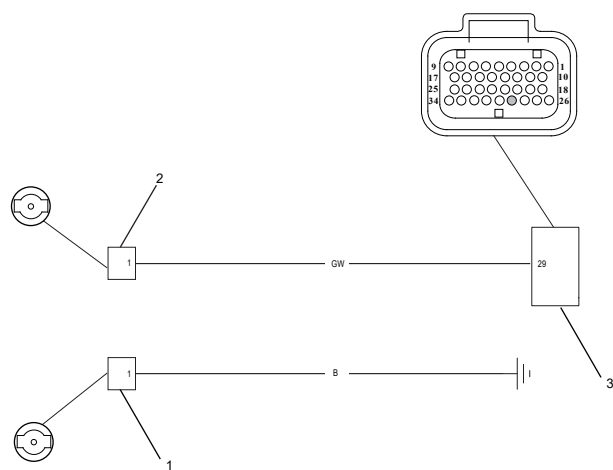
C1304 - Front Right Direction Indicator

Fault Code	Possible Cause	Action
C1304	Direction indicator current is above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test		Result	Action
1	Check the direction indicator and instruments are connected	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check the harness for short circuit: - Instruments pin 29 to Ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Instruments pin 29 to direction indicator connector A pin 1	OK	Contact Triumph service
		Faulty	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Direction indicator connector B
2. Direction indicator connector A
3. Instruments

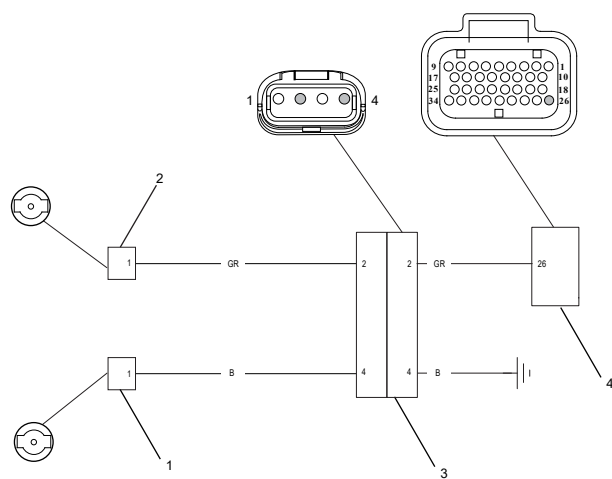
C1305 - Rear Left Direction Indicator

Fault Code	Possible Cause	Action
C1305	Direction indicator current is above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test		Result	Action
1	Check the direction indicator, rear light sub-harness and instruments are connected	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check the harness for short circuit: - Instruments pin 26 to Ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Instruments pin 26 to direction indicator connector A pin 1	OK	Contact Triumph service
		Faulty	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Direction indicator connector B
2. Direction indicator connector A
3. Rear light sub-harness (harness side)
4. Instruments

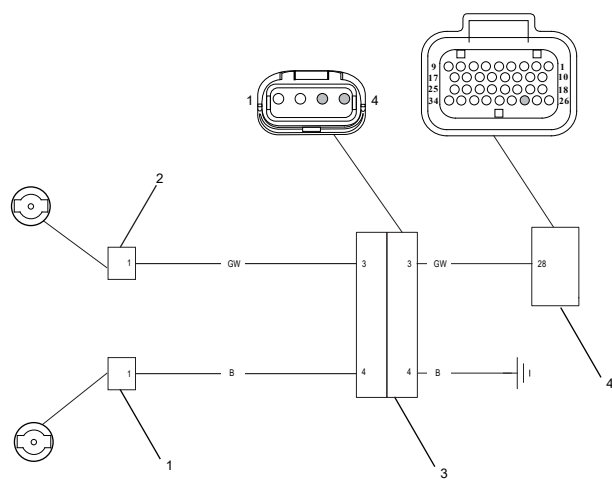
C1306 - Rear Right Direction Indicator

Fault Code	Possible Cause	Action
C1306	Direction indicator current is above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test		Result	Action
1	Check the direction indicator, rear light sub-harness and instruments are connected	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check the harness for short circuit: - Instruments pin 28 to Ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - Instruments pin 28 to direction indicator connector A pin 1	OK	Contact Triumph service
		Faulty	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Direction indicator connector B
2. Direction indicator connector A
3. Rear light sub-harness (harness side)
4. Instruments

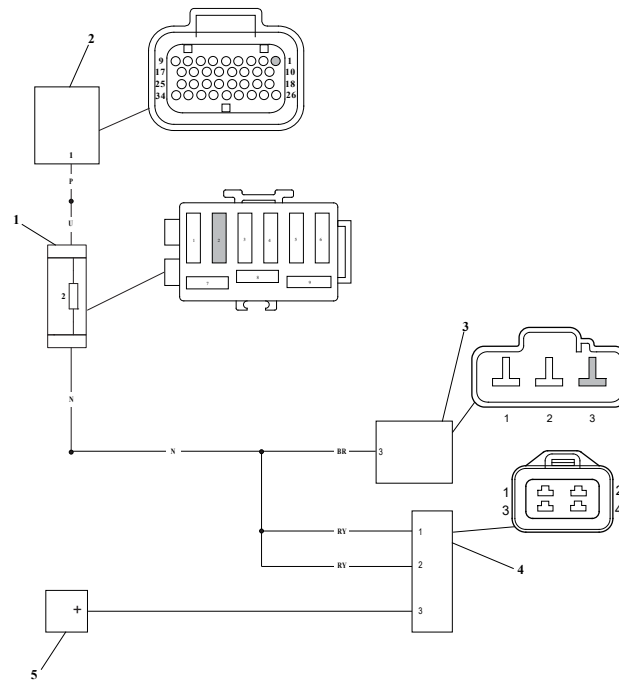
C1307 - Battery Voltage

Fault Code	Possible Cause	Action
C1307	Battery Voltage above or below threshold.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test		Result	Action
1	Check the starter solenoid, battery and instruments are connected	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Replace starter solenoid and check functionality	OK	Done
		Faulty	Proceed to test 3
3	Check harness for short circuit: Instruments pin 1 to Ground	OK	Proceed to test 4
		Short circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable continuity: - Instruments pin 1 to battery positive - Fuse box 1 fuse 2 to alternator regulator/rectifier pin 3 - Alternator regulator/rectifier pin 3 to starter solenoid pin 2 - Battery positive to starter solenoid pin 3	OK	Contact Triumph service
		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



1. Fusebox 1
2. Instruments
3. Alternator regulator/rectifier
4. Starter solenoid
5. Battery positive

C1308 - Ambient Light Sensor Voltage

Fault Code	Failure Type	Possible Cause	Action
C1308	16	Ambient Light Sensor Voltage Below Threshold	Make sure the ambient light sensor on the instruments is not covered. Make sure the diagnostic tool is using the latest software version.
C1308	17	Ambient Light Sensor Voltage Above Threshold	Update all ECM software. Clear fault code and retest. If fault is still present contact Triumph Service.

C1309 - CPU Over Temperature

Fault Code	Failure Type	Possible Cause	Action
C1309	4B	CPU Over Temperature	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Allow the instruments to return to ambient (room) temperature. Delete the Diagnostic Trouble Code (DTC). Test the instruments for full functionality. Switch the heated grips (if fitted) to the maximum heat setting and allow to heat to operating temperature. Clear fault code and retest. if OK action complete - quit test. Fault still present - contact Triumph Service.

C130A - Instrument Display

Fault Code	Failure Type	Possible Cause	Action
C130A	03	Display Backlight Failure	Contact Triumph Service.
C130A	4B	Display Over Temperature	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Allow the instruments to return to ambient (room) temperature. Delete the Diagnostic Trouble Code (DTC). Test the instruments for full functionality. Switch the heated grips (if fitted) to the maximum heat setting and allow to heat to operating temperature. Clear fault code and retest. If fault is still present contact Triumph Service.

C130C, C130D, C130E, C130F, C1310 - CPU Fault

Fault Code	Failure Type	Possible Cause	Action
C130C	92	Task Over-run Detected	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present contact Triumph Service.
C130D	00	Restart Due To CPU Fault	
C130E	00		
C130F	47		
C1310	00		

C1311, C1312 - Calibration Failure

Fault Code	Failure Type	Possible Cause	Action
C1311	41	Calibration Error	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present contact Triumph service.
C1311	46		
C1311	54		
C1311	56		
C1312	41		
C1312	46		
C1312	54		
C1312	56		

C1313 - Software Update Failure

Fault Code	Failure Type	Possible Cause	Action
C1313	05	Software Download Interrupted	Make sure the motorcycle battery is fully charged. Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present contact Triumph Service.

C1314 - Internal Failure

Fault Code	Failure Type	Possible Cause	Action
C1314	49	Internal Electronic Failure	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present contact Triumph Service.

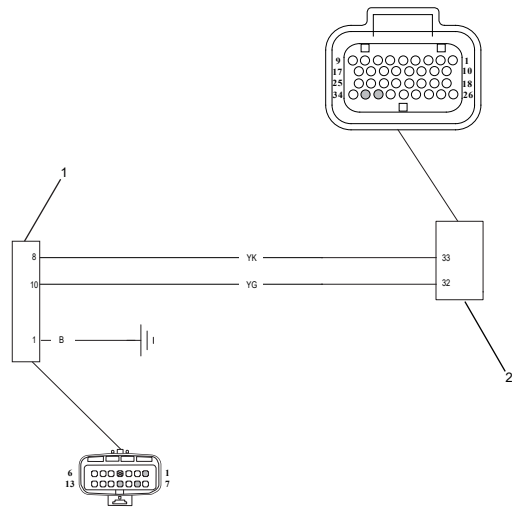
C1315 - Direction Indicator Switch Correlation Fault - Left/Right

Fault Code	Possible Cause	Action
C1315	Left and right direction indicator buttons both active.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test	Result	Action
1	Check the left hand switch housing connector A and instruments are connected	OK
		Proceed to test 2
2	Faulty	Rectify fault, proceed to test 5
3	Check cable continuity: - Instruments pin 33 to left hand switch housing connector A pin 8	OK
		Proceed to test 3
4	Faulty	Locate and rectify wiring fault, proceed to test 5
5	Check cable continuity: - Instruments pin 32 to left hand switch housing connector A pin 10	OK
		Proceed to test 4
6	Faulty	Locate and rectify wiring fault, proceed to test 5
7	Check the harness for short circuit: - Instruments pin 33 to left hand switch housing connector A pin 10 - Instruments pin 32 to left hand switch housing connector A pin 8	OK
		Contact Triumph service
8	Short circuit	Locate and rectify wiring fault, proceed to test 5
9	Reconnect harness, clear fault code and run engine	OK
		Action complete - quit test
10	Fault still present	Contact Triumph service

Circuit Diagram



1. Left hand switch housing connector A
2. Instruments

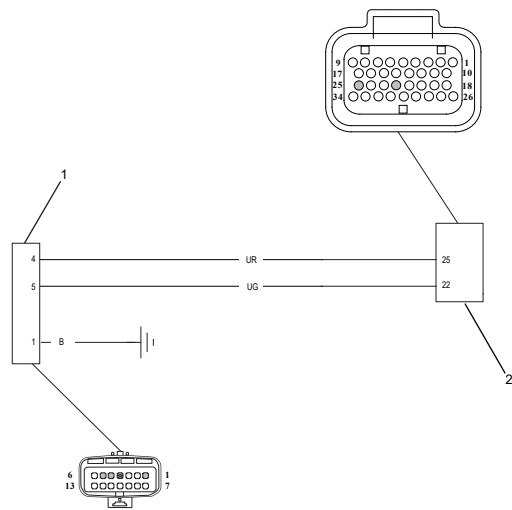
C1317 - Navigation Switch Correlation Fault - Up/Down

Fault Code	Possible Cause	Action
C1317	Up and down navigation buttons both active.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test	Result	Action
1	Check the left hand switch housing connector A and instruments are connected	OK
		Proceed to test 2
2	Faulty	Rectify fault, proceed to test 5
3	Check cable continuity: - Instruments pin 25 to left hand switch housing connector A pin 4	OK
		Proceed to test 3
4	Faulty	Locate and rectify wiring fault, proceed to test 5
5	Check cable continuity: - Instruments pin 22 to left hand switch housing connector A pin 5	OK
		Proceed to test 4
6	Faulty	Locate and rectify wiring fault, proceed to test 5
7	Check the harness for short circuit: - Instruments pin 25 to left hand switch housing connector A pin 5 - Instruments pin 22 to left hand switch housing connector A pin 4	OK
		Contact Triumph service
8	Short circuit	Locate and rectify wiring fault, proceed to test 5
9	Reconnect harness, clear fault code and run engine	OK
		Action complete - quit test
10	Fault still present	Contact Triumph service

Circuit Diagram



1. Left hand switch housing connector A
2. Instruments

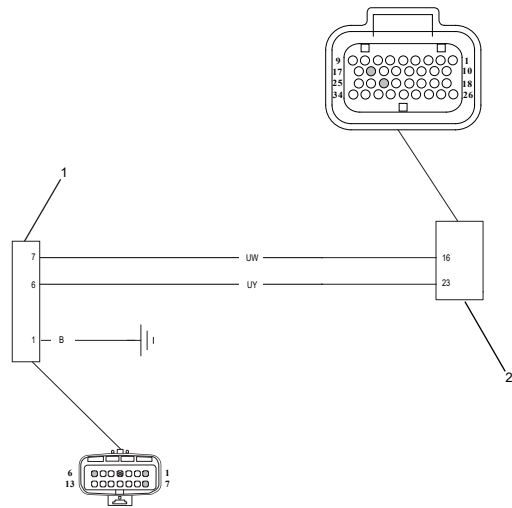
C1318 - Navigation Switch Correlation Fault - Left/Right

Fault Code	Possible Cause	Action
C1318	Left and right navigation buttons both active.	View and note diagnostic tool 'freeze frame' data if available. Proceed to pinpoint test 1.

Pinpoint Tests

Test	Result	Action
1	Check the left hand switch housing connector A and instruments are connected	OK
		Proceed to test 2
2	Faulty	Rectify fault, proceed to test 5
3	Check cable continuity: - Instruments pin 16 to left hand switch housing connector A pin 7	OK
		Proceed to test 3
4	Faulty	Locate and rectify wiring fault, proceed to test 5
5	Check cable continuity: - Instruments pin 23 to left hand switch housing connector A pin 6	OK
		Proceed to test 4
6	Faulty	Locate and rectify wiring fault, proceed to test 5
7	Check the harness for short circuit: - Instruments pin 16 to left hand switch housing connector A pin 6 - Instruments pin 23 to left hand switch housing connector A pin 7	OK
		Contact Triumph service
8	Short circuit	Locate and rectify wiring fault, proceed to test 5
9	Reconnect harness, clear fault code and run engine	OK
		Action complete - quit test
10	Fault still present	Contact Triumph service

Circuit Diagram



1. Left hand switch housing connector A
2. Instruments

C1319, C131A - Instrument I.D

Fault Code	Failure Type	Possible Cause	Action
C1319	00	Instrument I.D Lock Enabled	Make sure the diagnostic tool is using the latest software version. Update all ECM software. If the download fails to upload or the DTC is still present. If fault is still present contact Triumph Service.
C131A	00	Instrument I.D Lock Active	

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Pinpoint Tests - CAN Errors - U Codes

Diagnostics - Trouble Codes - Index - CAN Errors

The system will log the diagnostic trouble codes listed below.

Diagnostic Trouble Code (DTC)	Failure Code	DTC Description	Failure Description	Ignition switch cycles before clearing fault	Pinpoint test
U0028	88	CAN 1 Bus Off	Bus Off	20	U0028, U0037 - CAN Bus Fault
U0037	88	CAN 2 Bus Off	Bus Off	20	U0028, U0037 - CAN Bus Fault
U1208	87	Frame "ID208" on network "CAN 1"	Missing Message	40	U1208, U1209, U1210 - ABS CAN Fault
U1209	82	Frame "ID209" on network "CAN 1"	Alive / Sequence Counter Incorrect / Not Updated	40	U1208, U1209, U1210 - ABS CAN Fault
U1209	83	Frame "ID209" on network "CAN 1"	Value of Signal Protection Calculation Incorrect	40	U1208, U1209, U1210 - ABS CAN Fault
U1209	87	Frame "ID209" on network "CAN 1"	Missing Message	40	U1208, U1209, U1210 - ABS CAN Fault
U1210	82	Frame "ID210" on network "CAN 1"	Alive / Sequence Counter Incorrect / Not Updated	40	U1208, U1209, U1210 - ABS CAN Fault
U1210	87	Frame "ID210" on network "CAN 1"	Missing Message	40	U1208, U1209, U1210 - ABS CAN Fault
U1518	87	Frame "ID518" on network "CAN 1"	Missing Message	40	U1518, U1530, U1540, U1550, U1570 - Engine ECM CAN Circuit Fault
U1530	87	Frame "ID530" on network "CAN 1"	Missing Message	40	U1518, U1530, U1540, U1550, U1570 - Engine ECM CAN Circuit Fault
U1540	87	Frame "ID540" on network "CAN 1"	Missing Message	40	U1518, U1530, U1540, U1550, U1570 - Engine ECM CAN Circuit Fault

Diagnostic Trouble Code (DTC)	Failure Code	DTC Description	Failure Description	Ignition switch cycles before clearing fault	Pinpoint test
U1550	87	Frame "ID550" on network "CAN 1"	Missing Message	40	U1518, U1530, U1540, U1550, U1570 - Engine ECM CAN Circuit Fault
U1570	87	Frame "ID570" on network "CAN 1"	Missing Message	40	U1518, U1530, U1540, U1550, U1570 - Engine ECM CAN Circuit Fault
U1600	56	Frame "ID600" on network "CAN 1"	Invalid / Incompatible Configuration	40	U1600 - Immobiliser/TPMS Control Module CAN Circuit Fault
U1600	87	Frame "ID600" on network "CAN 1"	Missing Message	40	U1600 - Immobiliser/TPMS Control Module CAN Circuit Fault

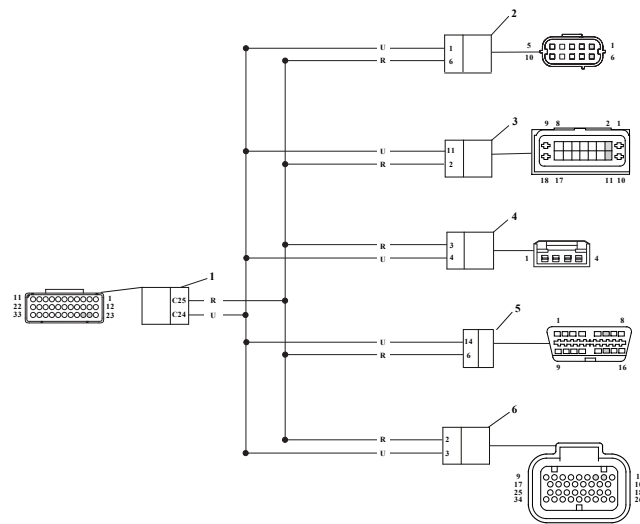
U0028, U0037 - CAN Bus Fault

Fault Code	Failure Type	Possible Cause	Action
U0028	88	CAN 1 Bus Off	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present contact Triumph Service.
U0037	88	CAN 2 Bus Off	

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM - Connector C pin 1 - Engine ECM - Connector C pin 6 - Instrument pin 3 - Instrument pin 2 - Positive battery ring terminal - Negative battery ring terminal - Diagnostic connector pin 6 - Diagnostic connector pin 14	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Instruments pin 3 to battery negative and positive ring terminals - Instruments pin 2 to battery negative and positive ring terminals	OK	Proceed to test 3
		Short Circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM - Connector C pin 1 to instrument pin 3 - Engine ECM - Connector C pin 6 to instrument pin 2	OK	Proceed to test 4
		Open circuit	Rectify wiring fault, proceed to test 5
4	Check CAN bus resistance: - Diagnostic connector pin 6 to diagnostic connector pin 14	OK (60 Ohms +/- 1 Ohms)	Proceed to test 5
		Faulty	Note measured resistance, Diagnostic Trouble Codes and contract Triumph Service
5	Reconnect harness, clear fault code and run engine to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine electronic control module - Connector C
2. Immobiliser/TPMS connector
3. ABS modulator
4. Connectivity modulator
5. Diagnostic Connector
6. Instruments

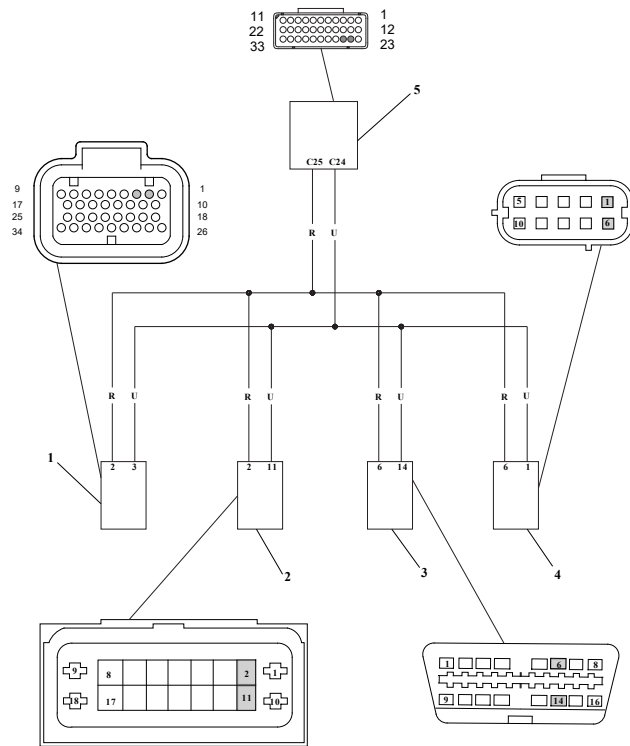
U1208, U1209, U1210 - ABS CAN Fault

Fault Code	Failure Type	Possible Cause	Action
U1208	87	ABS CAN 1 Circuit Fault	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present proceed to pinpoint test 1:
U1209	82		
U1209	83		
U1209	87		
U1210	82		
U1210	87		

Pinpoint Tests

Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 2 - ABS ECM connector pin 11	OK Disconnect instruments and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2	Check the cable for short circuit: - ABS ECM pin 2 to ground - ABS ECM pin 11 to ground	OK Proceed to test 3
	Short circuit	Rectify wiring harness fault, proceed to test 5
3	Check cable continuity: - ABS ECM pin 2 to ECM pin C25 - ABS ECM pin 11 to ECM pin C24 - ABS ECM pin 2 to Instruments pin 2 - ABS ECM pin 11 to Instruments pin 3 - ABS ECM pin 2 to Diagnostic connector pin 6 - ABS ECM pin 11 to Diagnostic connector pin 14 - ABS ECM pin 2 to Immobiliser module pin 6 - ABS ECM pin 11 to Immobiliser module pin 1	OK Proceed to test 4
	Open circuit	Rectify wiring harness fault, proceed to test 5
4	Check cable for short circuit: - ABS ECM pin 2 to ABS ECM pin 11	OK Proceed to test 4
	Short circuit	Rectify wiring harness fault, proceed to test 5
5	Clear fault code and test ABS to verify fault cleared.	OK Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



1. Instruments
2. ABS Control Module
3. Diagnostic Connector
4. Immobiliser
5. Engine ECM Connector

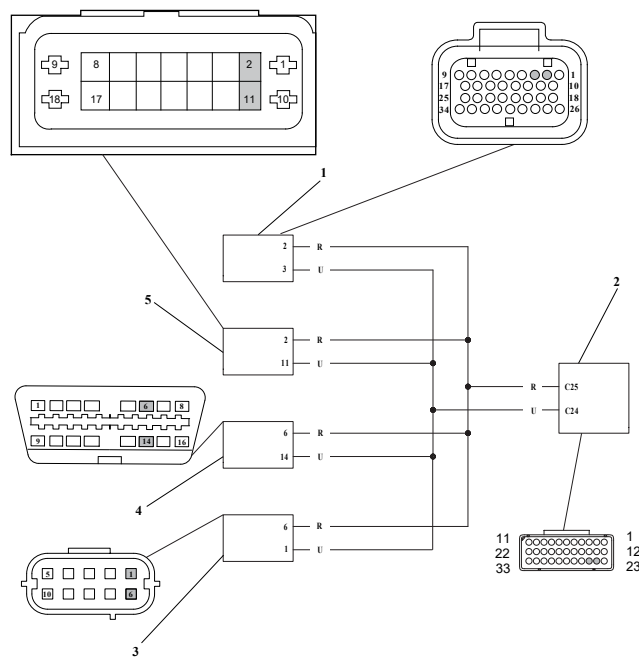
U1518, U1530, U1540, U1550, U1570 - Engine ECM CAN Circuit Fault

Fault Code	Failure Code	Possible Cause	Action
U1518	87	Engine ECM CAN 1 Circuit Fault	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present proceed to pinpoint test 1:
U1530	87		
U1540	87		
U1550	87		
U1570	87		

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C24 - Engine ECM pin C25 - Instrument pin 3 - Instrument pin 2 - ABS module pin 2 - ABS module pin 11 - Diagnostic connector pin 6 - Diagnostic connector pin 14 - Immobiliser module pin 1 - Immobiliser module pin 6	OK	Disconnect instruments and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - Engine ECM pin C24 to ground - Engine ECM pin C25 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - Engine ECM pin C24 to Instrument pin 3 - Engine ECM pin C25 to Instrument pin 2 - Engine ECM pin C24 to ABS control module pin 11 - Engine ECM pin C25 to ABS control module pin 2 - Engine ECM pin C24 to Diagnostic connector pin 14 - Engine ECM pin C25 to Diagnostic connector pin 6 - Engine ECM pin C24 to Immobiliser module pin 1 - Engine ECM pin C25 to Immobiliser module pin 6	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Engine ECM pin C24 to Engine ECM pin C25	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Instruments
2. Engine ECM Connector C
3. Immobiliser/TPMS Control Module
4. Diagnostic Connector
5. ABS Control Module

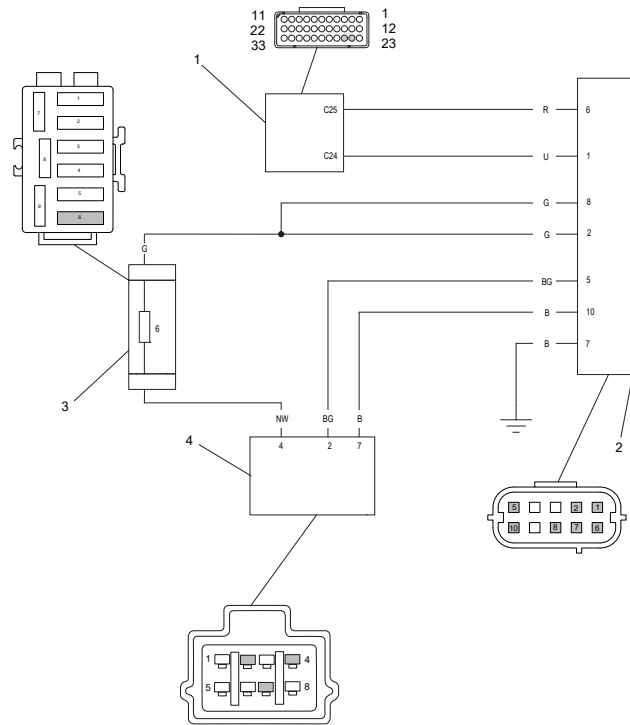
U1600 - Immobiliser/TPMS Control Module CAN Circuit Fault

Fault Code	Failure Code	Possible Cause	Action
U1600	56	Immobiliser/TPMS Control Module CAN 1 Circuit Fault	Make sure the diagnostic tool is using the latest software version. Update all ECM software. Clear fault code and retest. If fault is still present proceed to pinpoint test 1:
U1600	87		

Pinpoint Tests

Test		Result	Action
1	Check cable and terminal integrity: - Engine ECM pin C25 - Engine ECM pin C24 - Immobiliser pin 1 - Immobiliser pin 2 - Immobiliser pin 6 - Immobiliser pin 7 - Immobiliser pin 8	OK	Disconnect ECM and proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check cable for short circuit: - Engine ECM pin C25 to ground - Engine ECM pin C24 to ground	OK	Disconnect immobiliser, ignition switch and proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 6
3	Check fuse box fuse 6 integrity.	OK	Proceed to test 5
		Faulty	Proceed to test 4
4	Check cable for short circuit: - Immobiliser pin 2 to ground - Immobiliser pin 8 to ground	OK	Proceed to test 5
		Faulty	Locate and rectify wiring fault, replace relevant fuse, proceed to test 6
5	Check cable continuity: - Engine ECM pin C25 to immobiliser pin 6 - Engine ECM pin C24 to Immobiliser pin 1 - Immobiliser pin 7 to ground - Fuse box fuse 6 to immobiliser pin 2	OK	Proceed to test 6
		Fault still present	Locate and rectify wiring fault, proceed to test 6
6	Reconnect harness, clear fault code and run engine.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



1. Engine ECM Connector C
2. Immobiliser/TPMS Control Module
3. Fuse Box
4. Ignition Switch

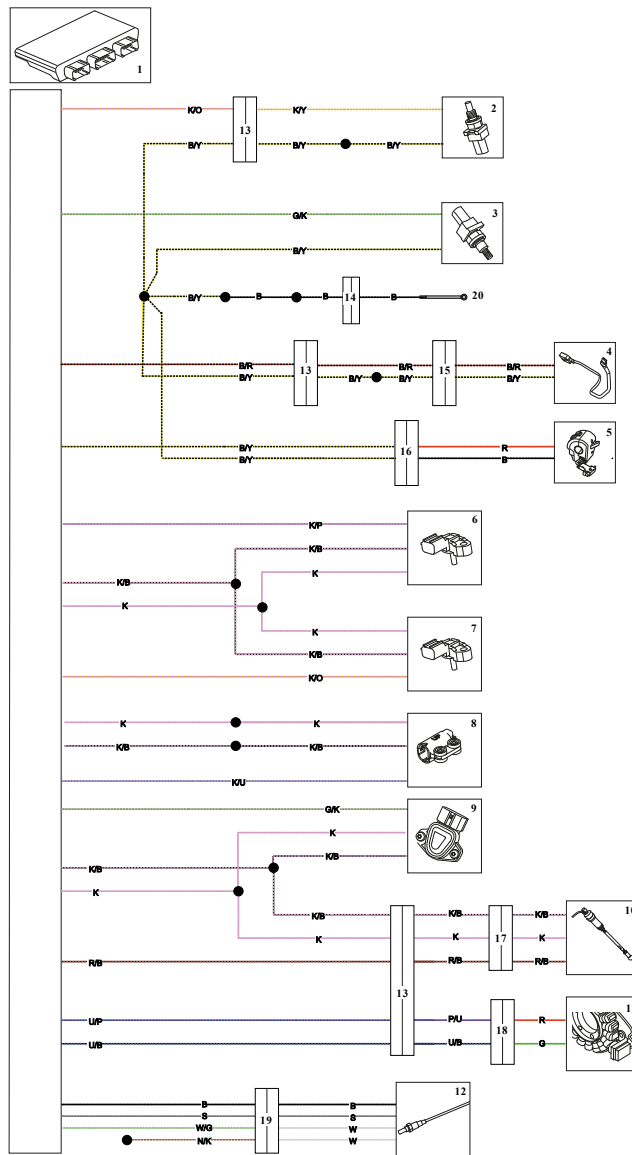
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Engine Management System

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Engine Management Components Overview

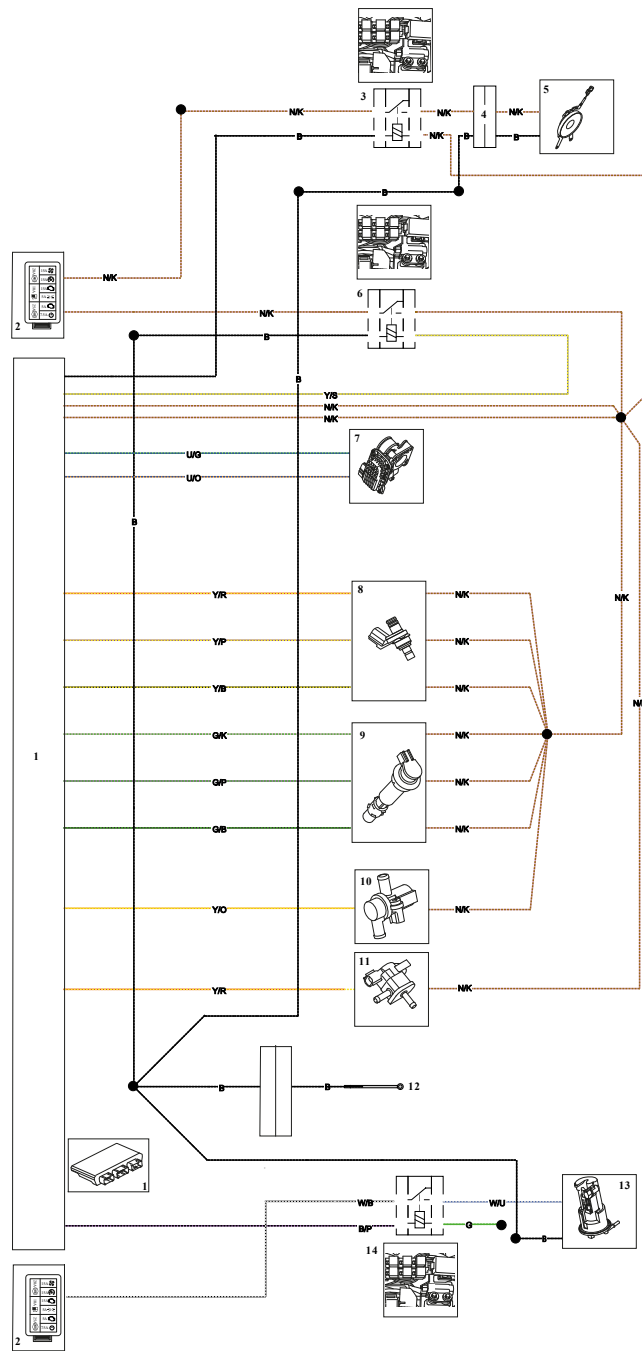
Engine Management Sensors



1. Engine ECM
2. Intake air temperature sensor
3. Coolant temperature sensor
4. Side stand switch
5. Clutch switch
6. Ambient air pressure sensor
7. MAP sensor
8. Fall detection switch
9. Gear position sensor
10. Triumph shift assist
11. Crankshaft position sensor
12. Oxygen sensor
13. Engine subharness
14. Engine ground subharness
15. Side stand switch connector
16. Left hand switch housing connector
17. Triumph shift assist connector
18. Crankshaft position sensor connector
19. Oxygen sensor connector

20. Engine ground

Engine Management Actuators



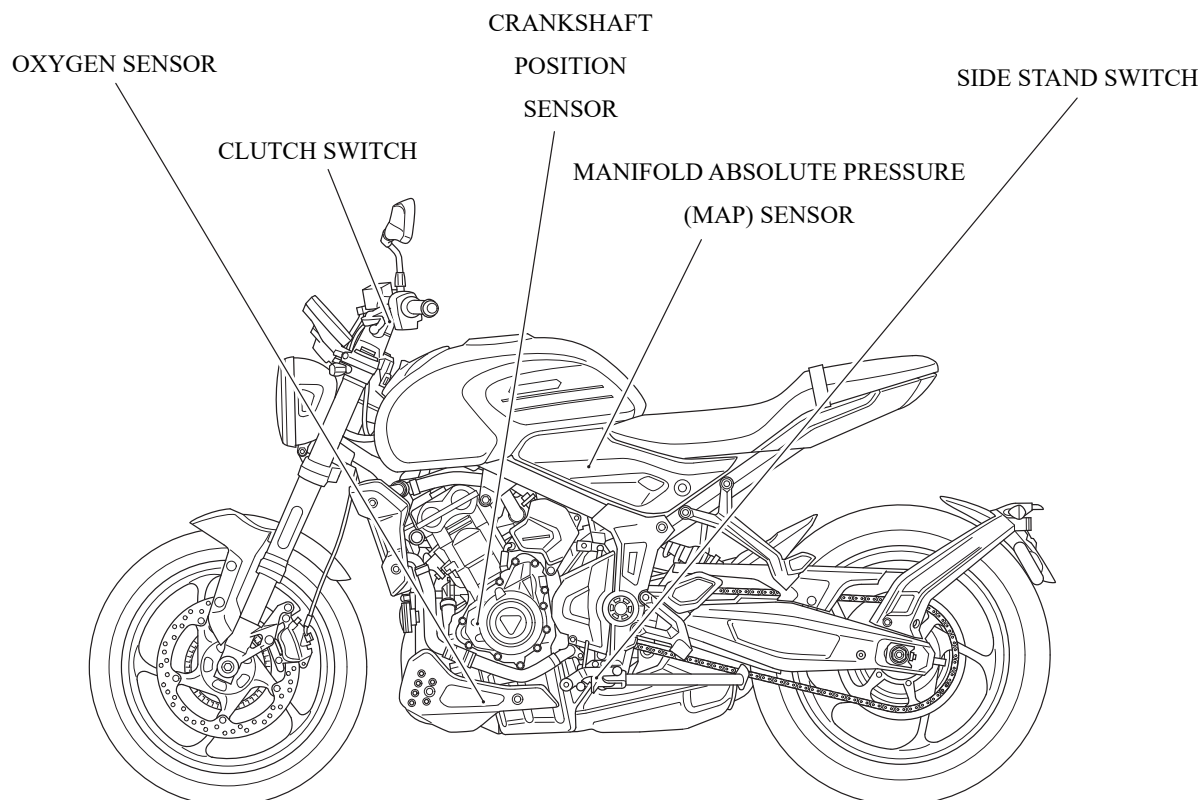
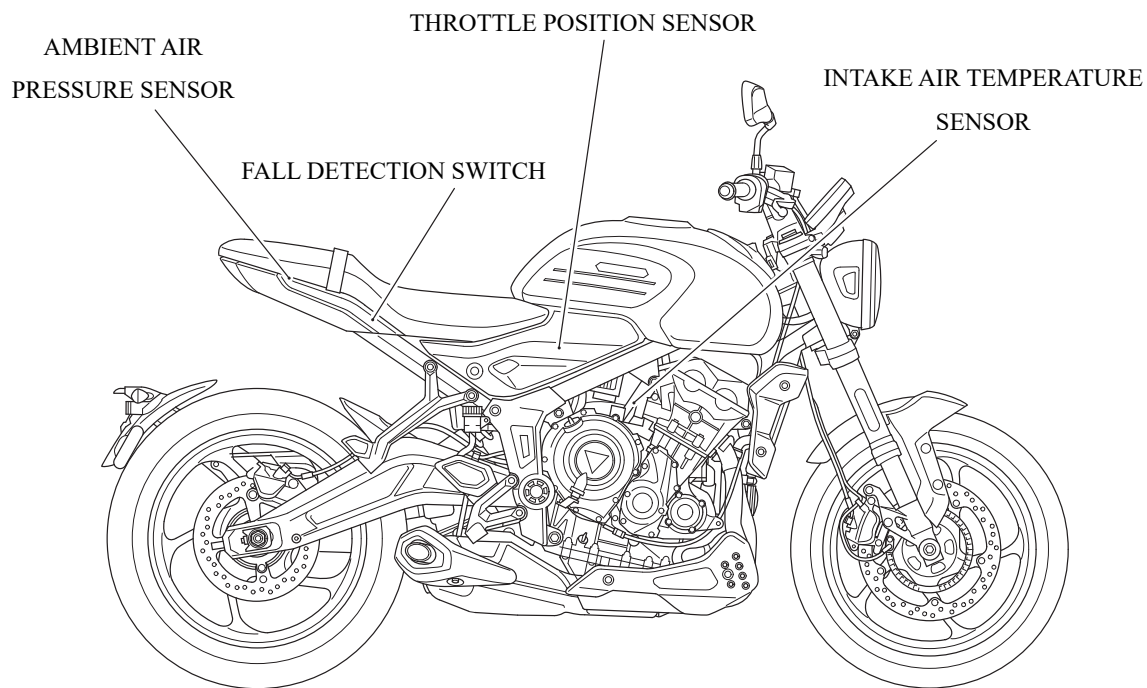
1. Engine ECM
2. Fuse box 1
3. Cooling fan relay
4. Cooling fan connector
5. Cooling fan
6. Engine management system relay
7. Throttle actuator motor
8. Injectors
9. Ignition coils
10. Secondary air injection solenoid
11. Purge valve
12. Engine ground
13. Fuel pump
14. Fuel pump relay



Engine Management System Sensors

- **Intake air temperature sensor** - situated underneath the inlet manifold. As the density of the air changes with temperature, the amount of oxygen available to ignite the fuel also changes. Changes in air temperature are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Ambient air pressure sensor** - situated at the rear of the battery tray under the seat. The ambient air pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.
- **Manifold Absolute Pressure (MAP) sensor** - situated to the left of the airbox, connected to the throttle body a hose. The MAP sensor provides information to the engine ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the 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.
- **Crankshaft position sensor** - situated in the alternator cover. The crankshaft position sensor detects movement of teeth attached to the alternator rotor. The teeth give a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the engine ECM to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the fuel occurs.
- **Engine coolant temperature sensor** - situated at the rear of the cylinder head near the thermostat housing. Coolant temperature information, received by the engine ECM, is used to optimise fueling at all engine temperatures and to calculate hot and cold start fueling requirements.
- **Oxygen sensor** - situated in the exhaust header pipe system upstream of the catalytic converter. The oxygen sensor constantly feeds information to the engine ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.
- **Side stand switch** - situated on the gear change bracket. If the side stand is in the down position, the engine will not run unless the transmission is in neutral.
- **Fall detection switch** - situated under the rider's seat, forward of the fuse box. The fall detection switch will detect if the motorcycle is on its side and will cut power to the engine 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.
- **Gear position sensor** - situated in the lower crankcase, above the drive chain front sprocket. The gear position sensor provides the engine ECM with selected gear information. This is used to prevent the engine from starting if the transmission is in gear. The sensor also provides information to the neutral lamp in the instruments.

Sensor Locations



Engine Management System Actuators

System Actuators

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

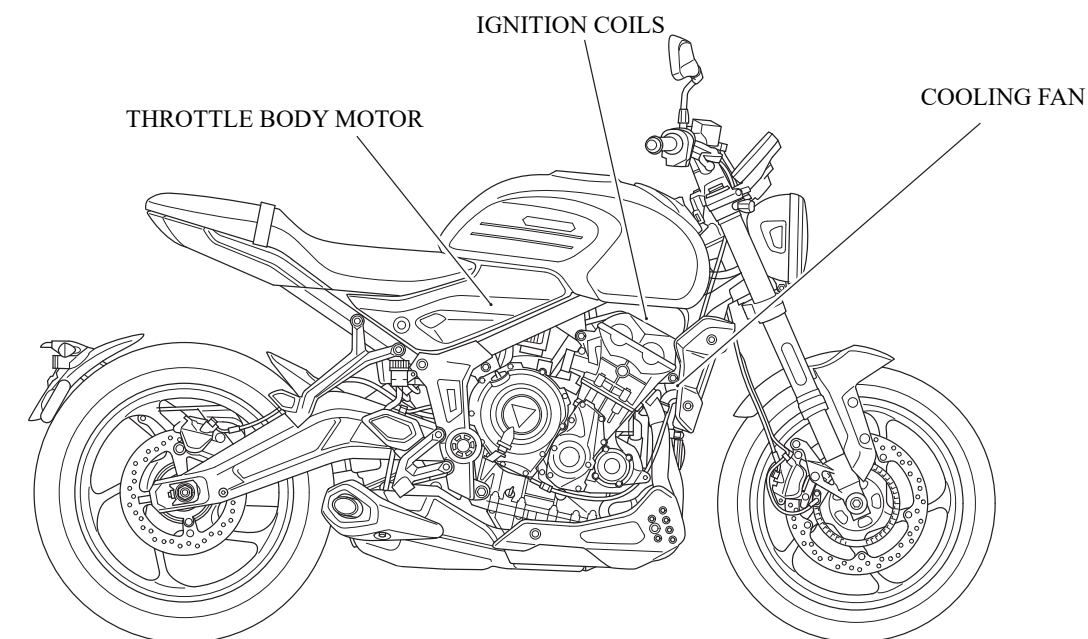
- **Throttle actuator motor** - situated within the throttle body. The throttle actuator motor opens and closes the throttle plates in the throttle body, in response to commands from the engine ECM. The throttle actuator motor is an integral part of the throttle body.
- **Canister purge valve** - situated in the vapour return line between the carbon canister and the throttle body. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is 'pulsed' by the engine ECM to give control over the rate at which the canister is purged.
- **Fuel Injectors** - located in the fuel rail. The engine is fitted with three injectors. The spray pattern of the injectors is fixed but the length of time each injector can remain open is variable according to operating conditions. The duration of each injection is calculated by the engine ECM using data received from the various sensors in the system.
- **Ignition coils** - plug-top coils are located in the camshaft cover. There are three coils fitted, one for each spark plug. The engine ECM controls the point at which the coils are switched on and off. In calculating the switch-on time, the engine ECM allows sufficient time for the coils to charge to a level where a spark can be produced. The coils are switched off at the point of ignition, the timing of which is optimised for good engine performance.
- **Engine Management System (EMS) main relay** - situated under the seat. When the ignition is switched on, the EMS main relay is powered up to provide a stable Voltage supply for the engine ECM. When the ignition is turned off, the engine ECM carries out a power down sequence during which the EMS main relay remains powered by the engine ECM for one minute. The engine ECM power down sequence includes: writing the adaption data to engine ECM memory.
- **Fuel pump** - located inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant 3.5 bar pressure. The pump is run continuously when the engine is operating and is also run briefly when the ignition is first switched on to ensure that 3.5 bar is available to the system as soon as the engine is cranked. Fuel pressure is controlled by a regulator also situated inside the fuel tank.
- **Cooling fan** - located behind the radiator. The engine 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 engine ECM. When the coolant temperature falls sufficiently, the engine 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 above the camshaft cover. The secondary air injection solenoid controls airflow through the secondary air injection system.

NOTICE

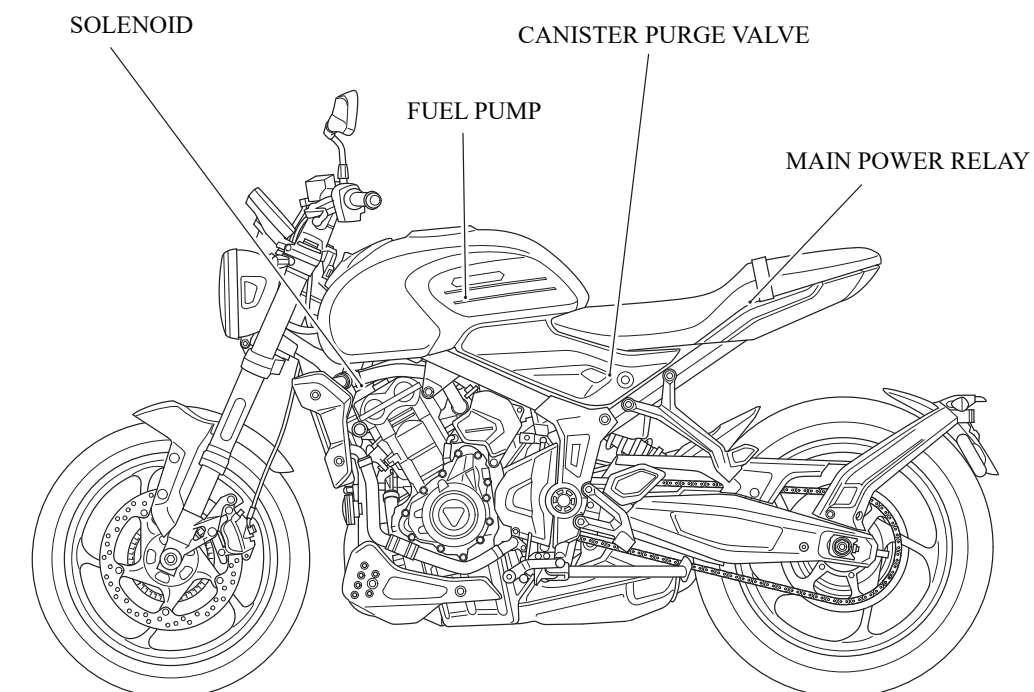


In this system, the starter lockout system (clutch switch, gear position sensor, side stand switch) all operate through the engine ECM.

Engine Management System Actuator Locations



SECONDARY AIR INJECTION



Fault Finding – Non Electrical

Symptom	Possible cause(s)
Poor throttle response at low rpm	Low fuel pressure caused by filter blockage/leaks
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter
Cutting out at idle	Throttle bodies out of balance
	Low fuel pressure caused by loose fuel pipes to the fuel pump and filter
	Low fuel pressure
	Weak mixture caused by air leak at the throttle body/transition piece to cylinder head face
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 loose fuel pipes to the fuel pump and filter
	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 Thermostat fault
Motorcycle will not start	Check the immobiliser system for faults
	Make sure that the keys, Engine ECM and Chassis ECM are all correctly paired

Engine Adaption

General Information

The engine management system fitted to this model is adaptive. This means that the system is able to learn about new or changing operating conditions. The fuelling and throttle system can continuously adapt itself without needing to constantly make major adjustments from a fixed baseline setting.

Adaptive changes can become necessary because of different fuels, changes in the region in which the motorcycle is operated (i.e. operation at high altitude where it was previously used at sea level) or because a new part may have been fitted which has slightly different characteristics to the old part. Fuelling and throttle system adaptive changes are automatic and require no intervention by rider or dealer.

Adaption Status and Range

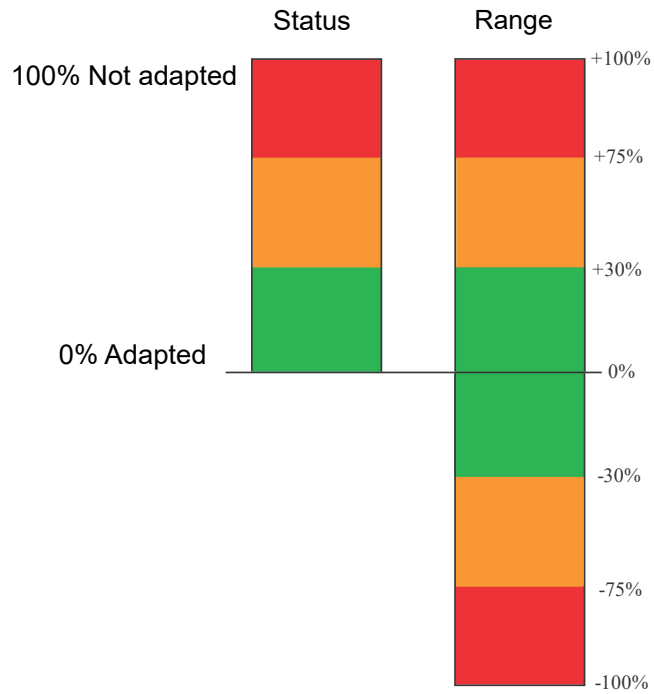
To see if a motorcycle has fully adapted, a facility named is provided on the diagnostic tool under Engine Diagnostics - Sensor Data - Engine Adaption. The following adaption details can be examined:

Function Examined	Report Method	Range/Status Description
Closed throttle position reference status	Adapted/not adapted	N/A
Twist grip adapted	Adapted/not adapted	N/A
Idle speed control adaption status	%	N/A
Oxygen sensor 1 adaption status (off idle)	%	Status off idle
Oxygen sensor 1 adaption range (off idle)	%	Range off idle
Oxygen sensor 1 adaption status (idle)	%	Status idle
Oxygen sensor 1 adaption range (idle)	%	Range idle
Oxygen sensor 2 adaption status (off idle)	%	Status off idle
Oxygen sensor 2 adaption range (off idle)	%	Range off idle
Oxygen sensor 2 adaption status (idle)	%	Status idle
Oxygen sensor 2 adaption range (idle)	%	Range idle

Terminology

Where the term 'status' is used, this indicates how far the present operating parameter is from the stored (adapted) value. The nearer these figures are to zero the better as it indicates the motorcycle has adapted to its current operating conditions.

The term 'range' indicates how much (in percentage terms) of the adjustment range has been used to reach the current operating status.



Typical Values

In a correctly adapted motorcycle, the following will be typical:

Function Examined	Read Out	Range/Status Description
Closed throttle position reference status	Adapted	N/A
Twist grip adapted	Adapted	N/A
Idle speed control adaption status	Between +100 and -100%	N/A
Oxygen sensor 1 adaption status (off idle)	0% +/- 10%	Status off idle
Oxygen sensor 1 adaption range (off idle)	Between +100 and -100%	Range off idle
Oxygen sensor 1 adaption status (idle)	0% +/- 10%	Status idle
Oxygen sensor 1 adaption range (idle)	Between +100 and -100%	Range idle
Oxygen sensor 2 adaption status (off idle)	0% +/- 10%	Status off idle
Oxygen sensor 2 adaption range (off idle)	Between +100 and -100%	Range off idle
Oxygen sensor 2 adaption status (idle)	0% +/- 10%	Status idle
Oxygen sensor 2 adaption range (idle)	Between +100 and -100%	Range idle

Forcing Adaption to Take Place

If the read out indicates that the motorcycle is not adapted, the following will force the system to make adaptations:

⚠ WARNING

Never start the engine or let it run for any length of time in a closed area. The exhaust fumes are poisonous and may cause loss of consciousness and death within a short time. Always operate the motorcycle in the open-air or in an area with adequate ventilation.

NOTICE

Resetting adaptations with the motorcycle connected to an exhaust extraction system may cause incorrect values to be set, causing poor engine running. Always reset the adaptations with the engine disconnected from any exhaust extraction system whilst ensuring the motorcycle is positioned in a well ventilated area.

1. Ensure the engine is cold.
2. WITHOUT TOUCHING THE THROTTLE, start the engine and allow it to warm up until the cooling fan comes on.
3. Turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.

Resetting the Adaptions

A reset engine adaptations facility is provided in the diagnostic tool. This function can be used to:

- Force fast fuelling and throttle adaption.
- Reset (erase) current adaptations.

Fast Fuelling and Throttle Adaption

To force the fuelling and throttle system to quickly adapt to the current operating conditions:

1. Connect the diagnostic tool and turn the ignition ON.
2. Start the engine.
3. Allow the engine to reach normal operating temperature (90°C for liquid cooled models, 60°C for air cooled models).
4. Make sure the system is in closed loop control mode.
5. Navigate to Engine Diagnostics - Adjust.
6. Select 'RESET ENGINE ADAPTIONS' and click 'ADJUST'.

NOTICE

This will force a fast adaption routine to take place in around five seconds. For this to happen, the engine MUST be running, it must be at normal operating temperature and in closed loop control mode. Under any other conditions fast adaption will not take place and the current adaption settings may be erased as described below.

Reset (Erase) Current Adaptions

To reset the currently stored adaptations:

1. Connect the diagnostic tool and turn the ignition ON. Do NOT start the engine.
2. Navigate to Engine Diagnostics - Adjust.
3. Select 'RESET ENGINE ADAPTIONS' and click 'ADJUST'.

The following adaptations will be reset:

- Fuelling
- Throttle
- Twist Grip
- Crankshaft Position (Euro 5 Motorcycles in Applicable Markets Only)



The following adaptations will not be reset:

- Neutral Position
- Gear Position
- Shift Force Sensor (TSA)

To Re-Adapt

1. Connect the diagnostic tool and turn the ignition ON.
2. Start the engine.
3. Allow the engine to reach normal operating temperature (90°C for liquid cooled models, 60°C for air cooled models).
4. Adapt the crankshaft position (Euro 5 Motorcycles in Applicable Markets Only).
5. If applicable, perform a cruise control switch check as described in the Service Manual.

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 possible causes will be incorrect fuel pressure, incorrectly connected oxygen sensors, faulty injectors or air leaks at the throttle bodies or airbox.

In these circumstances, locate and rectify the fault, and reset the adaptations as described above.

Crankshaft Position Adaption (European Markets Only)

Signals from the crankshaft position sensor are used by the motorcycle's engine misfire detection system. In order to accurately detect an engine misfire, the crankshaft position must be adapted to allow for manufacturing and assembly tolerances.

The motorcycle is delivered from the factory with the crankshaft position fully adapted. If for any reason the crankshaft position is not adapted, the Malfunction Indicator Light (MIL) will be illuminated and DTC P0315 will be stored.

In service, the crankshaft position must be re-adapted under the following conditions:

- The MIL is illuminated and DTC P0315 is stored, indicating that the crankshaft position sensor is not adapted.
- The crankshaft position sensor has been disturbed, removed or disconnected.
- The crankshaft position sensor has been replaced.
- The crankcases have been disassembled/reassembled.
- The engine ECM has been replaced.*
- The engine adaptations have been reset using the 'Reset Engine Adaptions' function in the Triumph diagnostic tool.*

* Under these conditions, the MIL is illuminated and DTC P0315 will be stored.

Preliminary Steps

1. Make sure the transmission is in neutral.
2. Connect the Triumph diagnostic tool and turn the ignition ON.
3. Make sure the engine stop switch is in the RUN position.
4. Navigate to ENGINE DIAGNOSTICS - Sensor Data - Inputs.
5. Make sure the Gear Position Status is reporting as Neutral.
6. Navigate to Sensor Data - Gear Position Adaption.
7. Make sure the Neutral Position Adaption Status is reporting as Adapted.
8. Reset and re-adapt the neutral position if any of the following conditions exist:
 - The Neutral Position Adaption is reported as Not Adapted.
 - The Gear Position Status is not reported as Neutral when the transmission is in neutral (regardless of the current Neutral Position Adaption Status).

See [Neutral Position Adaption](#)

NOTICE

If the neutral position adaption is reset and re-adapted, the ignition must be turned off for at least 60 seconds before starting the crankshaft position adaption process.

To Adapt the Crankshaft Position:

⚠ WARNING

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

1. Navigate to ENGINE DIAGNOSTICS - Function Test - Adapt the crankshaft position.
2. Click Start.

3. Follow the on-screen instructions.

NOTICE

The function test will check that the transmission is in neutral and that the neutral position is adapted. If these conditions are not met, the test will be aborted and you will be prompted to check the transmission and neutral adaption status.

If the transmission conditions are correct, you will be prompted to start the engine and bring the engine up to the required temperature.

Once the engine has reached the required temperature the test will progress automatically and you will be prompted to hold the throttle (twist grip) fully open.

The test will be aborted if the throttle is not opened within 60 seconds.

It is important that the throttle is held fully open during this stage of the test. The diagnostic tool will display a red light if the throttle is not in the correct position. The light will change to green when the throttle is held fully open.

4. Hold the throttle fully open within 60 seconds of being prompted by the diagnostic tool. Do not close the throttle until instructed to do so by the diagnostic tool.

NOTICE

Upon holding the throttle open, the engine speed will increase and decrease in cycles at approximately one cycle per second. The cycles are repeated until the crankshaft position adaption is complete.

Adaption is typically completed after the fourth cycle.

You will be prompted to close the throttle when adaption has completed.

The diagnostic tool will allow the test to operate with the throttle held open for a maximum of 10 seconds (approximately 10 cycles). If adaption is not completed in this time, the test will stop and you will be prompted to close the throttle and turn the ignition OFF. Note any on-screen messages and investigate the cause before attempting to restart the test.

5. Close the throttle when prompted by the diagnostic tool.
6. Note the results of the adaption and follow the on-screen instructions.
7. Click Finish.
8. Turn the ignition OFF as prompted by the diagnostic tool and wait for 60 seconds for the Engine ECM to fully power down.

Final Steps

Successful crankshaft position adaption can be verified as follows:

1. Turn the ignition ON.
2. Navigate to ENGINE DIAGNOSTICS - Read DTCs.
3. Check that DTC P0315 has cleared.
4. Check that the MIL light goes out when the engine is started.

NOTICE

The presence of other DTCs may cause the MIL light to remain illuminated. Where this is the case, rectify and erase any other stored DTCs as necessary.

Trouble Shooting

Symptom	Possible Causes	Action
Test is aborted immediately after clicking Start.	Transmission is not in neutral. Neutral position is not adapted. Neutral position adaption is in a state of error.	Check the transmission is in neutral. Reset the neutral position adaption. Start the engine and allow the neutral position to adapt.

Symptom	Possible Causes	Action
		Turn the ignition off for at least 60 seconds before restarting the crankshaft position adaption test.
Test is aborted after the engine has reached the required temperature.	The throttle was not held open within 60 seconds of the engine reaching the required temperature.	Turn the ignition off for at least 60 seconds before restarting the crankshaft position adaption test. Make sure the throttle is held open within 60 seconds of being instructed to do so by the diagnostic tool.
Crank adaption failed. Throttle was held fully open for 10 seconds before the diagnostic tool displayed an instruction to close the throttle.	Ignition was not turned off for 60 seconds after adapting the neutral position.	Turn the ignition off for at least 60 seconds before restarting the crankshaft position adaption test.
Crank adaption failed. The diagnostic tool displayed an instruction to close the throttle at the expected time (after the forth engine revving cycle).	Adaption has completed abnormally. Mechanical fault. Crankshaft position signal out of range. Crankshaft trigger wheel out of tolerance.	Investigate potential mechanical faults. Contact Triumph Service.

Gear Position Sensor Diagnosis

This model is fitted with a hall effect gear position sensor that provides a constant voltage output ranging from 0.5 to 4.5 Volts. The output voltage is used to determine which gear is currently engaged.

Voltage Characteristics

The gear position is determined by the following voltage ranges:

Gear	Minimum Voltage	Maximum Voltage
1	0.5 V	0.7 V
N	0.9 V	1.1 V
2	1.3 V	1.5 V
3	2.0 V	2.2 V
4	2.8 V	3.0 V
5	3.5 V	3.7 V
6	4.3 V	4.5 V

The sensor voltage can be read using the Triumph diagnostic tool.

Further Diagnostics

Refer to [P0914, P0917 - Gear Position Sensor](#) for details of pinpoint tests relating to diagnostic trouble codes P0914 and P0917.

Neutral Position Adaption

The motorcycle is delivered from the factory with the neutral position fully adapted.

The neutral position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see [P0914, P0917 - Gear Position Sensor](#)).
- The sensor has been removed or disconnected for any reason.

Refer to [Neutral Position Adaption](#).

Neutral Position Adaption

The neutral position adaption is required to allow for manufacturing tolerances of the gearbox and gear position sensor. The motorcycle is delivered from the factory with the neutral position fully adapted.

The neutral position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see [P0914, P0917 - Gear Position Sensor](#)).
- The gear position sensor has been removed or disconnected for any reason.

Adaption Reset

The Gear Position/Neutral Position Adaption Reset function provided in the Triumph diagnostic tool will erase all previous Gear Position/Neutral Position Adaptions.

To reset the Neutral Position adaptions:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Gear Position/Neutral Position Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.
7. The neutral position will now be reported as Not Adapted.

Re-Adaption

⚠ WARNING

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

To re-adapt the neutral position:

1. Ensure the transmission is in neutral.
2. Start the engine.

NOTICE

For successful and accurate adaption, The engine must be at normal idle speed and the gear change pedal must be in its normal rested position.

During adaption, do not raise the engine speed and do not touch or move the gear change pedal.

3. The neutral position will adapt shortly after engine start provided the above conditions are met.
4. The adaption status can be confirmed by selecting GEAR POSITION ADAPTATION STATUS on the Triumph diagnostic tool.
5. Turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.

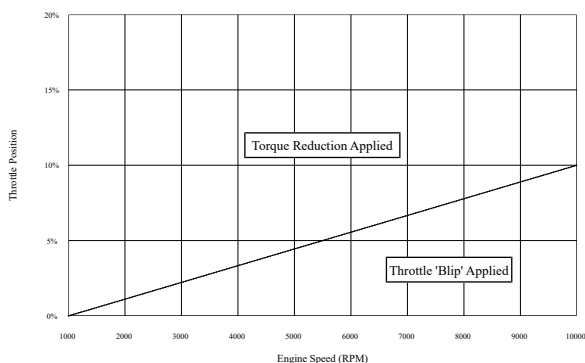
Triumph Shift Assist System (if fitted)

System Description

The Triumph Shift Assist (TSA) system enables the rider to change gears without the use of the clutch. The system uses signals from the **Shift Force Sensor Diagnosis (if fitted)** (located on the gear change linkage) and the **Gear Position Sensor Diagnosis** to detect when a shift force is applied to the gear change pedal. Engine torque is then adjusted to facilitate a smooth, clutch free gear change.

System Operation

- The Triumph shift assist system allows clutch free shifts for the majority of gear changes. However, it is recommended that the clutch is used for gear changes at slow riding speeds, or when riding in slow traffic.
- The clutch must be used when selecting any gear from neutral, and also when selecting neutral from any other gear.
- To ensure a smooth gear change, use a positive pedal force to select the next gear then release the pedal. Do not hold the pedal in its upper or lower positions.
- Clutch free Up shifts are disabled by the system at engine speeds lower than 1,500 revolutions per minute (rpm) to prevent stalling.
- At maximum engine speeds, clutch free up shifts are allowed by the system, but clutch free down shifts are disabled to prevent engine over speed.
- The Triumph shift assist system is disabled if the motorcycle is traveling at its limited top speed. The system is automatically re-enabled when the motorcycle slows down from its limited top speed.
- Engine torque is reduced when changing gear at high engine loads.
- A throttle 'blip' is applied when changing gear at low engine loads.
- Engine torque is returned to normal control when the gear change is complete.



Malfunction Action

- If a Triumph shift assist malfunction occurs, the system will be inhibited and the Transmission Warning symbol will be illuminated on the instrument panel.
- All Triumph shift assist related malfunctions must be rectified before the system can be re-enabled.
- If the malfunction is related to the gear position sensor, the neutral position and gear position adaption must be reset and re-adapted before the system can be enabled.
- If the malfunction is related to the shift force sensor, the shift force sensor adaption must be reset and re-adapted before the system can be enabled.
- The Transmission Warning symbol will continue to be displayed until each adaption is completed successfully.

Shift Force Sensor Diagnosis (if fitted)

The shift force sensor is used to detect when a force is applied to the gear change pedal.

Voltage Characteristics

The sensor output voltage changes as follows during normal operation:

Sensor State	Voltage
At rest	2.5 V
In compression (up shift)	2.5 V to 0.5 V
In tension (down shift)	2.5 V to 4.5 V

The sensor voltage can be read using the Triumph diagnostic tool.

Further diagnostics

Refer to [P1702, P1703 - Shift Force Sensor Circuit \(Triumph Shift Assist\)](#) for details of pinpoint tests relating to diagnostic trouble codes P1702 and P1703.

Adaption

If Triumph Shift Assist is fitted as standard, the motorcycle is delivered from the factory with the shift force sensor fully adapted.

If the Triumph Shift Assist has been fitted as an accessory, the shift force sensor must be adapted as part of the accessory kit installation process.

The shift force sensor adaption must be reset and the sensor re-adapted under the following conditions:

- If a shift force sensor malfunction occurs (DTC P1702 and P1703, see [P1702, P1703 - Shift Force Sensor Circuit \(Triumph Shift Assist\)](#)).
- The sensor has been removed or disconnected for any reason.

Refer to [Shift Force Sensor Adaption \(if fitted\)](#).

Shift Force Sensor Adaption (if fitted)

The shift force sensor adaption is required to allow for manufacturing tolerances of the shift force sensor.

If Triumph Shift Assist is fitted as standard, the motorcycle is delivered from the factory with the shift force sensor fully adapted.

If the Triumph Shift Assist has been fitted as an accessory, the shift force sensor must be adapted as part of the accessory kit installation process.

The shift force sensor adaption must be reset and re-adapted under the following conditions:

- If a shift force sensor malfunction occurs (DTC P1702 and P1703, see [P1702, P1703 - Shift Force Sensor Circuit \(Triumph Shift Assist\)](#)).
- If the shift force sensor has been removed or disconnected for any reason.

Adaption Reset

The Shift Force Sensor Adaption Reset function provided in the Triumph diagnostic tool will erase all previous shift force sensor adaptations.

To reset the shift force sensor adaption:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Shift Force Sensor Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.
7. The Shift Force Sensor Adaption Status will now be reported as Not Adapted.

Re-Adaption

⚠ WARNING ^

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

NOTICE ^

If necessary, the neutral position can be re-adapted simultaneously with the shift force sensor re-adaption (see [Neutral Position Adaption](#)).

To re-adapt the shift force sensor:

1. Ensure the transmission is in neutral.
2. Start the engine.

NOTICE



For successful and accurate adaption, The engine must be at normal idle speed and the gear change pedal must be in its normal rested position.

During adaption, do not raise the engine speed and do not touch or move the gear change pedal.

3. The shift force sensor will adapt shortly after engine start provided the above conditions are met.
4. The adaption status can be confirmed by selecting TRIUMPH SHIFT ASSIST ADAPTION STATUS on the Triumph diagnostic tool.
5. Turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.

Gear Position Adaption

Gear position adaption is required to allow for manufacturing tolerances of the gearbox and gear position sensor.

If Triumph Shift Assist is fitted as standard, the motorcycle is delivered from the factory with each gear position fully adapted.

If the Triumph Shift Assist has been fitted as an accessory, each gear position must be fully adapted as part of the accessory kit installation process.

Gear position adaption must be reset and re-adapted under the following conditions:

- If a gear position sensor malfunction occurs (DTC P0914 and P0917, see [P0914, P0917 - Gear Position Sensor](#)).
- The gear position sensor has been removed or disconnected for any reason.

Adaption Reset

The Gear Position/Neutral Position Adaption Reset function provided in the Triumph diagnostic tool will erase all previous Gear Position/Neutral Position Adaptions.

To reset the Gear Position/Neutral Position adaptions:

1. Connect the Triumph diagnostic tool and turn the ignition ON.
2. Select ENGINE DIAGNOSTICS.
3. Check and erase any stored DTCs.
4. Select ADJUST TUNE then select Gear Position/Neutral Position Adaption Reset.
5. Click Start.
6. The software will confirm that the adaption has been successfully reset.
7. The neutral position and each gear position will now be reported as Not Adapted.

Re-Adaption

 **WARNING** 

Exhaust fumes are poisonous, always operate a motorcycle in the open-air or in an area with adequate ventilation.

Do not operate a motorcycle in an enclosed area without adequate ventilation.

Operating a motorcycle in an enclosed area without adequate ventilation can cause loss of consciousness and death within a short period of time.

 **WARNING** 

Do not start the motorcycle and engage gears while it is parked on its centre stand. Do not attempt to adapt the gear positions with the motorcycle parked on its centre stand.

Should the motorcycle fall off its centre stand while the rear wheel is in motion, the motorcycle would accelerate rapidly. This could result in serious injury or death as well as causing damage to the motorcycle and other property.

To re-adapt the gear positions:

1. Ensure the transmission is in neutral.
2. Start the engine and allow the neutral position to adapt (see [Neutral Position Adaption](#)).

WARNING

When riding the motorcycle the rider must always wear a safety helmet, eye protection, gloves, boots, trousers (close fitting around the knee and ankle) and a brightly coloured jacket. Brightly coloured clothing will considerably increase a rider's visibility to other operators of road vehicles. Although full protection is not possible, wearing correct protective clothing can reduce the risk of injury when riding.

NOTICE

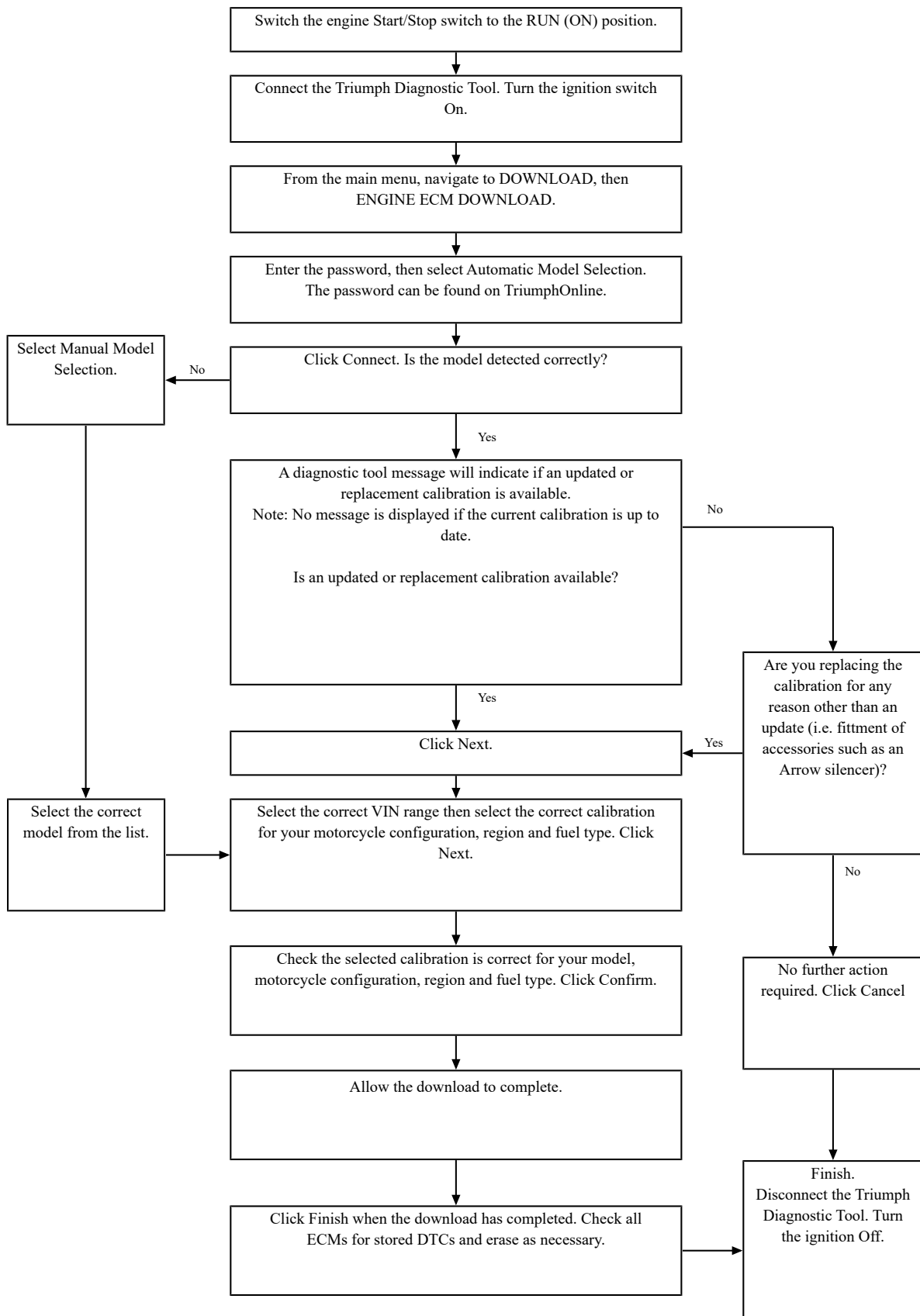
A suitable safe place should be found to carry out the road test.

The Transmission Warning symbol is illuminated on the instrument display.

3. Road test the motorcycle as follows:

- Ride the motorcycle smoothly at low engine speeds, changing up through each gear in turn.
- Fully close the throttle and use the clutch at each gear change.
- As soon as each gear engages, allow the gear change pedal to return to its normal resting position. Do not rest your foot on the pedal as any movement of the pedal can cause incorrect adaption.
- When each gear change is complete, release the clutch and ride normally using gentle acceleration. Avoid rapid acceleration or deceleration as this will prevent adaption.
- The gear position will adapt a few seconds after each gear change is completed.
- When all gear positions have successfully adapted, the Transmission Warning symbol will turn off.
- After completing the road test, turn the ignition OFF for at least 60 seconds to allow the adaption settings to be stored in ECM memory.
- The gear position adaption status can be confirmed using the Triumph diagnostic tool.

Engine ECM Calibration Download Flow Chart

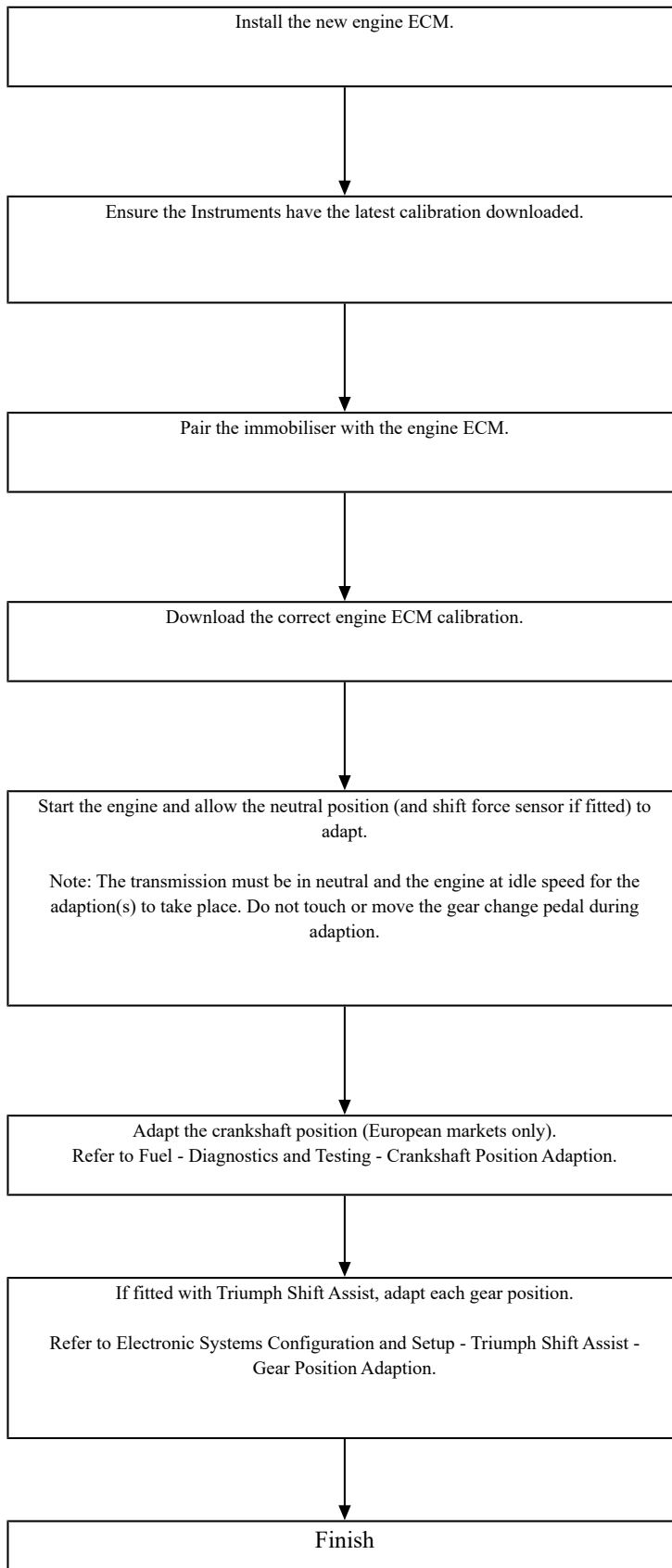


⚠ CAUTION

If the download fails to complete, turn the ignition OFF and allow the motorcycle to power down (approximately one minute). Restart the download using Manual Model Selection.

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Replacement Engine ECM Setup



[🏠](#) / [Diagnostics](#) / Immobiliser System

Immobiliser System

Immobiliser System

System Description

This model is fitted with an electronic immobiliser system to help protect it against theft. This system has to be paired with the engine 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 chassis ECM memory. This stored data can then be recovered using the Triumph diagnostic tool (see [Systems Diagnostics](#)).

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.
- **Immobilise/TPMS Control Module** - situated on the right hand side of the frame. This control module communicates with the transponder chip in the key and the engine 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.

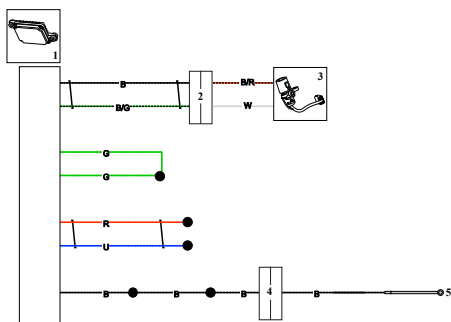
Diagnostics

To fully diagnose the immobiliser system it is necessary to check for fault codes in the immobiliser control module using the Triumph diagnostic tool (see [Systems Diagnostics](#)).

Further Diagnosis

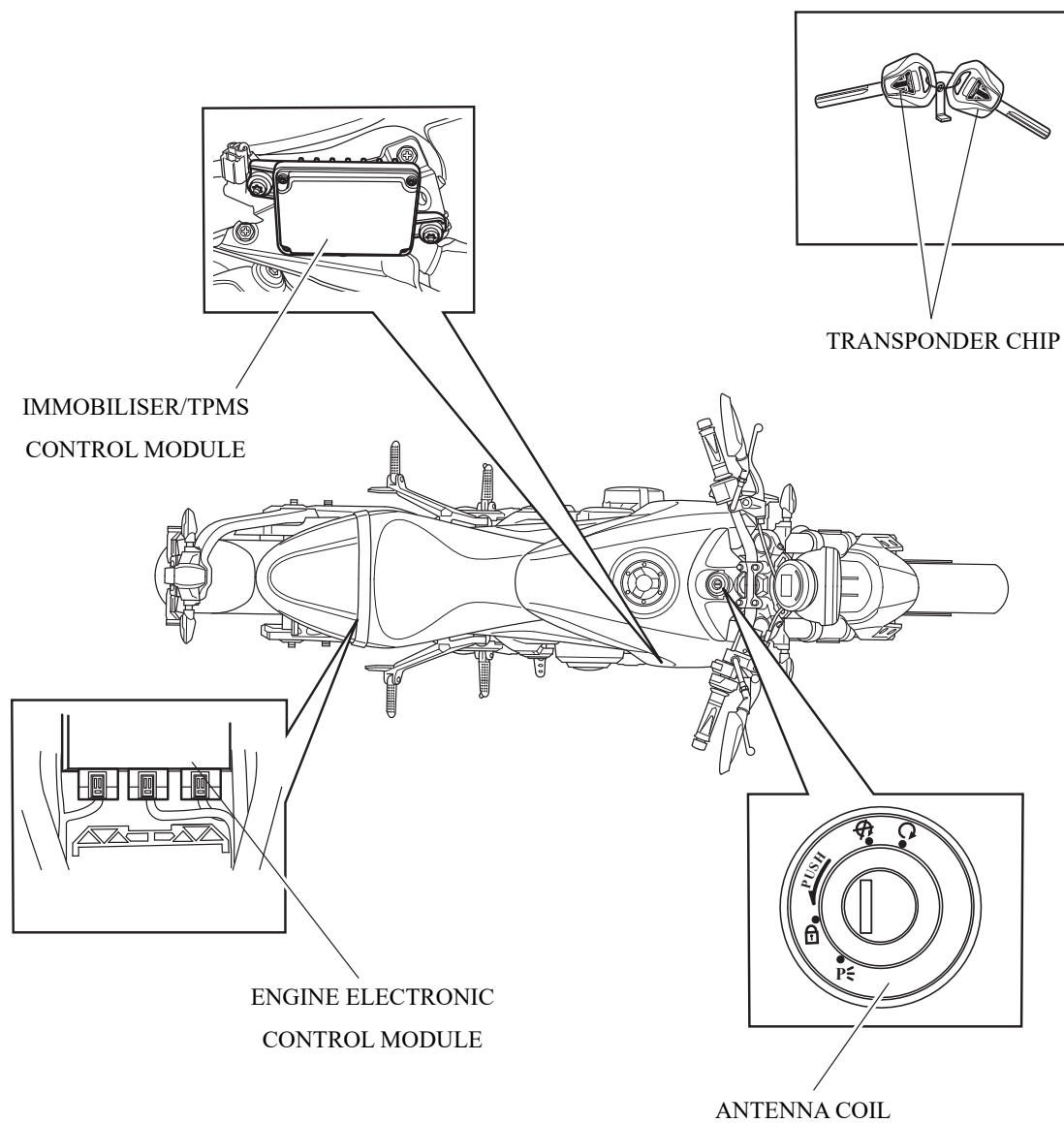
The diagnostic trouble code tables, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored (see [Systems Diagnostics](#)).

Immobiliser Components Overview



1. Immobiliser
2. Ignition switch connector
3. Ignition switch
4. Engine ground sub harness
5. Engine ground

Immobiliser System Components Location



[🏠](#) / [Diagnostics](#) / [ABS Management System](#)

ABS Management System

Anti-lock Brake System (ABS)

System Description

This model is fitted with an electronic anti-lock brake system which is designed to prevent the wheels from locking or skidding by reducing braking effort to the front or rear brake caliper as required.

The system consists of a hydraulic modulator and ECM assembly mounted to a bracket beneath the fuel tank, a front wheel speed sensor mounted to the front fork, and a rear wheel speed sensor mounted to the rear brake caliper carrier.

Both front and rear wheels have a pulser ring mounted on to the brake discs.

The front and rear master cylinders are connected via lines to the modulator and from the modulator the lines 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.

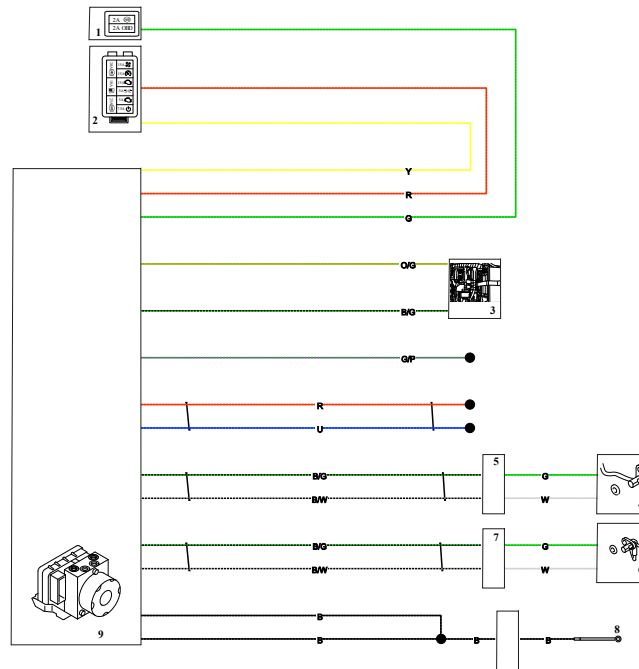
The ABS modulator ECM continuously calculates the front and rear wheel speeds, and from these inputs the ECM calculates the estimated motorcycle speed, wheel deceleration/acceleration, the wheel speed difference and the wheel slip (skid) rate. This is calculated by comparing the calculated wheel speeds with the calculated vehicle speed, so that if one wheel speed deviates significantly from the other two readings, this wheel is calculated to be slipping (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 reapplies the brake pressure to prevent the wheel from slipping.

This is felt through the brake pedal or lever as a rapid 'pulsing'.

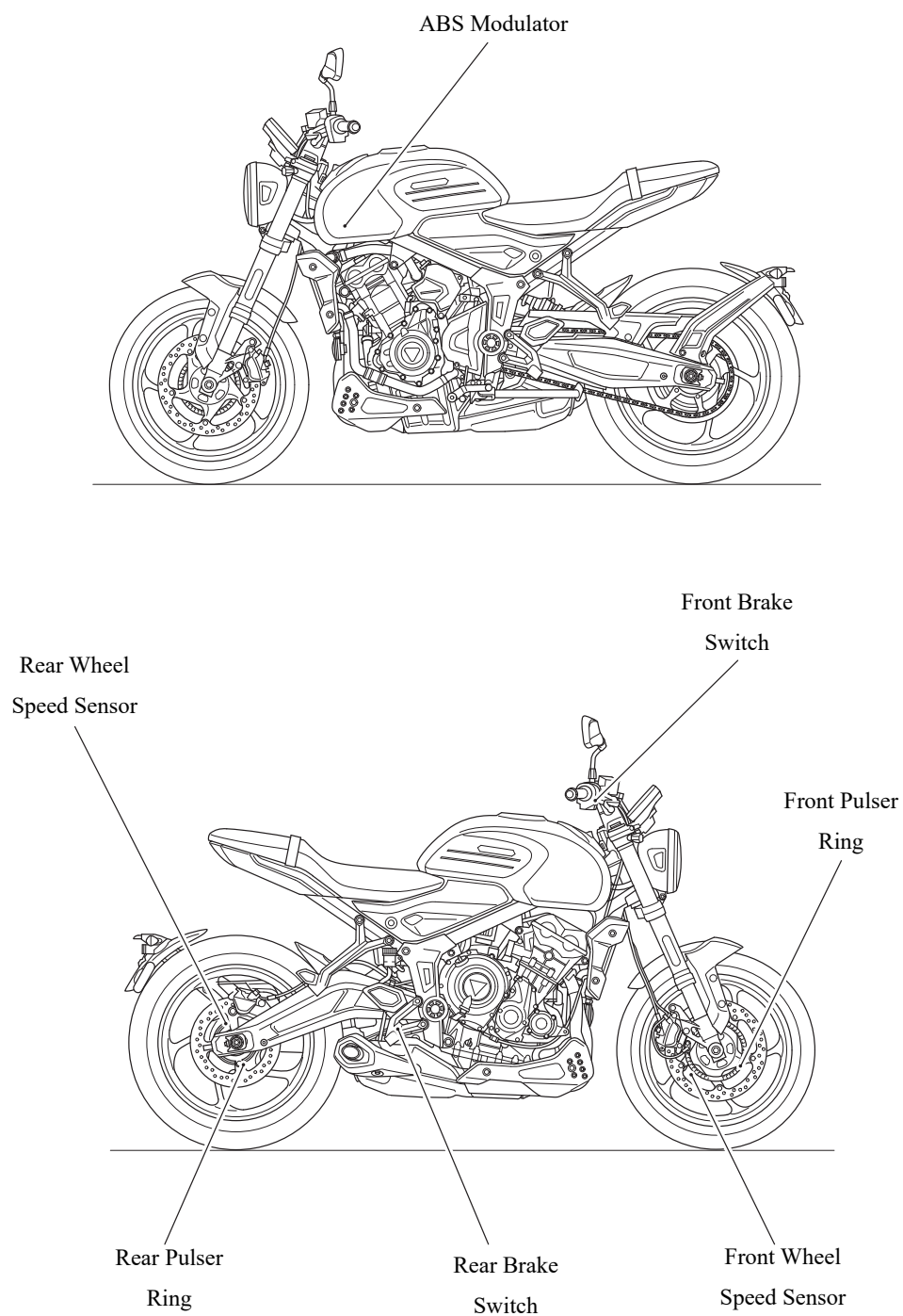
If the rider reduces braking effort, or traction increases (so that traction exceeds braking force, the wheel will rotate once more) the wheel will no longer lock up. The ABS system will detect this and stop controlling brake pressure, and return to its monitoring state.

ABS Management Components Overview



1. Fuse box 2
2. Fuse box 1
3. Diagnostic connector
4. Front ABS wheel speed sensor
5. Front ABS wheel speed sensor connector
6. Rear ABS wheel speed sensor
7. Rear ABS wheel speed sensor connector
8. Engine ground
9. ABS modulator

ABS Component Locations



Starter and Charger Diagnostics

Starting Circuit

All Triumph models are equipped with an electric start system.

This system consists of a starter relay, starter motor, starter switch, side stand switch, engine stop switch, clutch switch and the sprag clutch.

The starter motor is connected to the starter relay and the battery by heavy duty cables in order to supply the large currents required by the motor to start the engine.

When the starter button is pressed, the relay is energised, which then allows current to the starter motor.

The starter motor will not operate unless the clutch lever is pulled in. Also, the starter will not operate if the side stand is down, unless the transmission is in neutral. If the starter motor does not operate, the following basic checks must be carried out before further diagnosis is performed:

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

NOTICE

The engine will not crank if the instruments, ABS ECM, or immobiliser/keyless ECM (if fitted)/chassis ECM (if fitted) are disconnected.

Rectify any defects as necessary.

General Fault Finding – Starter Motor and Relay

Symptom	Possible cause(s)
Starter relay does not click, starter motor does not turn	Battery discharged or defective
	Blown main or starter relay fuse
	Defective starter relay wiring or starter switch
	Check that the side stand, transmission and clutch lever are positioned for engine starting i.e. transmission in neutral, clutch lever pulled in and the side stand down
	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

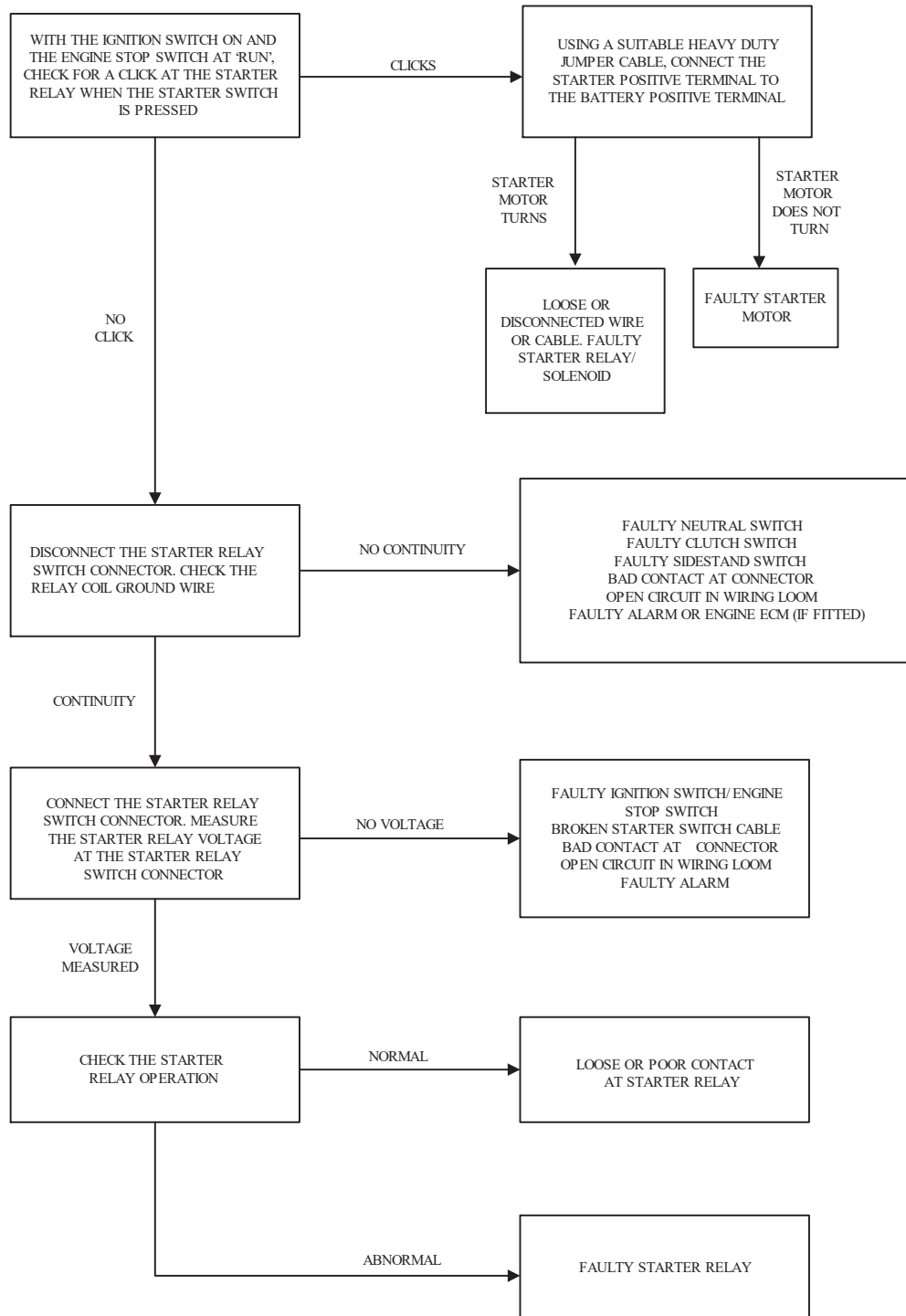
Symptom	Possible cause(s)
	Loose, corroded or dirty battery ground connections
Starter relay clicks but engine does not turn over	Battery discharged or defective
	Crankshaft does not turn due to engine defect
	Defective starter motor
	Starter cable open circuit
	Defective starter relay
Starter motor turns but engine does not turn over	Starter motor or starter ring gear

Diagnosis – Starter Circuit

NOTICE



Prior to carrying out the diagnosis, ensure the battery voltage is 12 - 13.5 V, the immobiliser system (if fitted) is functioning correctly, the transmission is in neutral and the clutch lever is pulled fully to the handlebar.



Alternator Stator

The alternator stator is an assembly of 18 coils, arranged into three phases. It is possible to check for continuity and short circuits through the coils and to ground.

NOTICE

Only repair the stator harness between the alternator regulator/rectifier and where the harness goes into the crankcase.

Do not attempt to repair the alternator stator coils.

If the battery is not fully charged, the charging voltage may be lower than specified when checking at 2,000 rpm.

Make sure all additional accessories (auxiliary lights, heated grips etc.) are switched off.

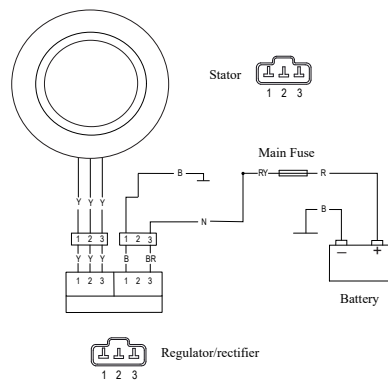
Fault	Possible cause	Action
Battery not charging	Main fuse	Check the condition of the fuse.
	Battery	Check the condition of the battery. Refer to the instructions supplied with recommended battery charger to make sure the battery is serviceable.
	Alternator	Proceed to pinpoint test 1:
	Regulator/Rectifier	Test the regulator/rectifier (see Regulator/Rectifier)

Pinpoint Tests

Test	Result	Action
1	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2	OK	Disconnect the battery leads, negative (black) lead first. Disconnect rectifier/regulator to main wiring harness connector (4 pin). Proceed to test 3
	Faulty	Locate and rectify wiring fault, proceed to test 6
3	OK	Reconnect the battery leads, positive (red) lead first. Reconnect the rectifier/regulator to main wiring harness connector (4 pin).

Test		Result	Action
	- Rectifier/regulator main harness connector pin 1 to battery lead negative		Disconnect the rectifier/regulator to alternator harness connector (3 pin). Proceed to test 4
	- Rectifier/regulator main harness connector pin 2 to battery lead negative		
	- Rectifier/regulator main harness connector pin 3 to battery lead positive		
	- Rectifier/regulator main harness connector pin 4 to battery lead	Open circuit	Locate and rectify wiring fault, proceed to test 6
4	positive	0.2 Ohms to 3 KOhms	Proceed to test 5
	Check resistance through the coils: - Alternator harness pin 1 to 2 - Alternator harness pin 2 to 3 - Alternator harness pin 3 to 1	<0.2 Ohms - Short circuit >3 KOhms - Open circuit	If the fault is between the connector and the crankcase, repair the harness. proceed to test 6 If the fault is after the crankcase, replace the unit. Proceed to test 6
5	Check for short to earth: - Alternator harness pin 1 to metal frame	Open circuit	Proceed to test 6
	- Alternator harness pin 2 to metal frame - Alternator harness pin 3 to metal frame	Short circuit	Replace unit. Proceed to test 6
6	Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:	13.5 V - 15 V	Action complete - quit test
		Fault still present	Test rectifier/regulator (see Regulator/Rectifier). If rectifier/regulator is serviceable, contact Triumph service

Circuit Diagram



Diagnosis - Alternator/Charging Circuit

The charging system consists of an alternator, a rectifier/regulator assembly and the battery.

The alternator is made up of two parts, the stator, which is mounted to the crankcase or the engine cover, and the rotor, mounted to the end of the crankshaft.

The stator is an assembly of 18 coils, arranged into 3 phases. The rotor is a series of magnets mounted in the engine flywheel, which are arranged so as to be positioned around the outside of the stator coils.

As the engine rotates the alternator produces an AC (alternating current) voltage in each of the three phases of the alternator, typically of around 35 to 40 volts AC at 4,000 - 5,000 rpm, although this figure varies between models.

As the battery requires DC (direct current) voltage for correct charging, this AC voltage must be first rectified to DC current, and then regulated to the correct voltage for the battery of 14.5 +/- 0.5 volts.

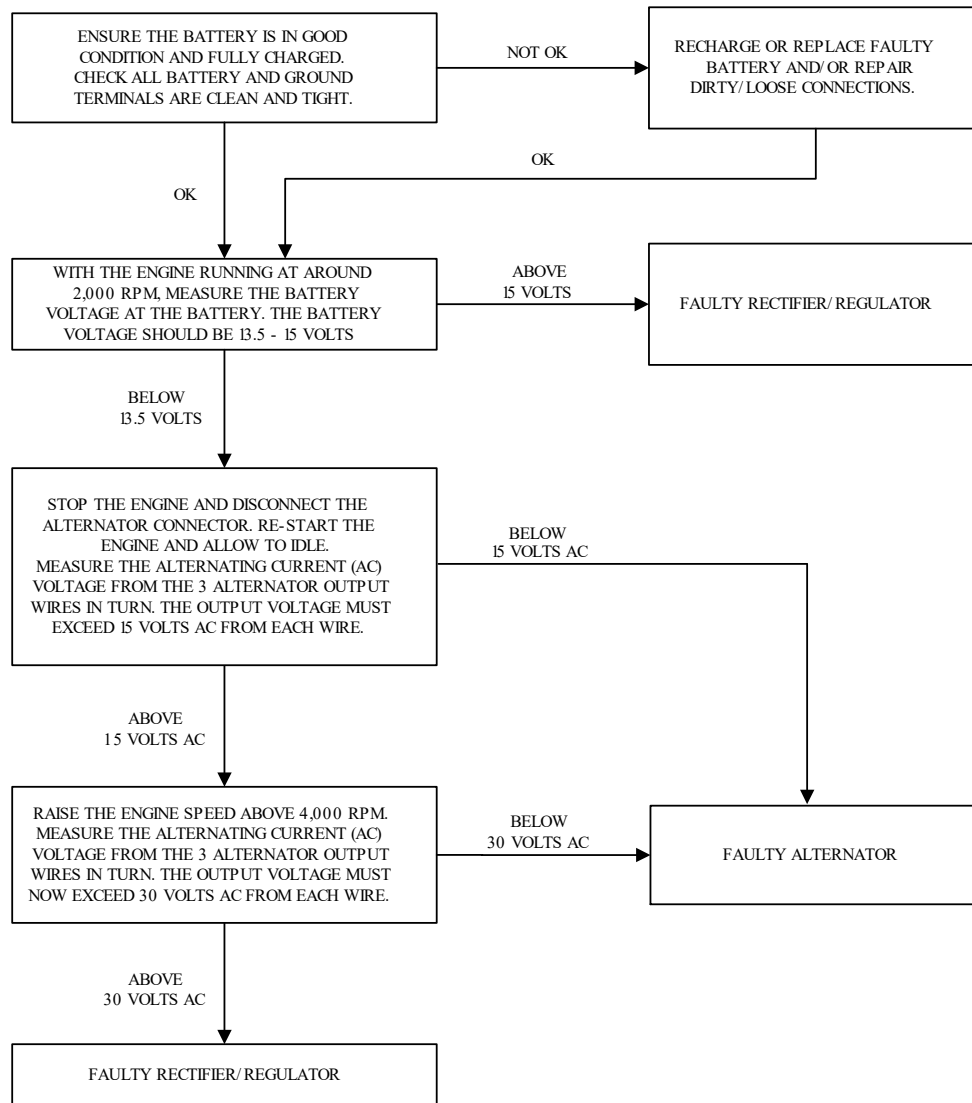
This is done by the rectifier/regulator, which uses diodes to convert the alternator output to DC Volts and limits the resulting output to the correct figure required for optimal battery charging.

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

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

Rectify any defects as necessary.

Diagnosis – Charging Circuit



Regulator/Rectifier

Internally the rectifier/regulator consists of three diodes, one between each input and the positive terminal, and three Field Effect Transistors (FETs), one between each input and the ground terminal.

As the voltage of the AC signal from the alternator rises, the voltage controller switches the FETs to avoid over voltage on the output.

The diodes and FETs can be checked using a multimeter on DIODE setting. Disconnect the two electrical connectors from the rectifier/regulator and check the readings as indicated below.

NOTICE	
This test does not check for voltage regulation.	

Fault	Possible cause	Action
Battery not charging	Main Fuse	Check the condition of the main 30A fuse:
	Battery	Check the condition of the battery. Refer to the instructions supplied with recommended battery charger to make sure the battery is serviceable.
	Regulator/Rectifier	Disconnect the black and the grey connectors from the rectifier/regulator and proceed to pinpoint test 1:
	Alternator	Test the alternator stator (see Alternator Stator).

Pinpoint Tests

Test	Result	Action
1	Check FET forward bias: Positive (+) probe to rectifier black socket pin 1 to: - Negative (-) probe to rectifier grey socket pin 1 - Negative (-) probe to rectifier grey socket pin 2 - Negative (-) probe to rectifier grey socket pin 3	0.4 V to 0.7 V Proceed to test 2
	Open circuit or short circuit	Replace the unit. Proceed to test 4
2	Check diodes function forward bias: Negative (-) probe to rectifier black socket pin 3 to: - Positive (+) probe to rectifier grey socket pin 1 - Positive (+) probe to rectifier grey socket pin 2 - Positive (+) probe to rectifier grey socket pin 3	0.1 V to 0.3 V Proceed to test 3
	Open circuit or short circuit	Replace the unit. Proceed to test 4
3	Check diodes reverse bias: Negative (-) probe to rectifier black socket pin 1 to: - Positive (+) probe to rectifier grey socket pin 1 - Positive (+) probe to rectifier grey socket pin 2 - Positive (+) probe to rectifier grey socket pin 3 Positive (+) probe to rectifier black socket pin 3 to: - Negative (-) probe to rectifier grey socket pin 1 - Negative (-) probe to rectifier grey socket pin 2 - Negative (-) probe to rectifier grey socket pin 3	More than 1.4 V or OL on meter Proceed to test 4
	Less than 1.4 V or short circuit	Replace the unit. Proceed to test 4

Test		Result	Action
4	Reconnect the harness and run the engine. Check the charging voltage at 2,000 rpm:	13 V - 15 V	Action complete - quit test
		Fault still present	Test alternator stator (see Alternator Stator)
			If alternator stator is serviceable, contact Triumph service

Circuit Diagram

