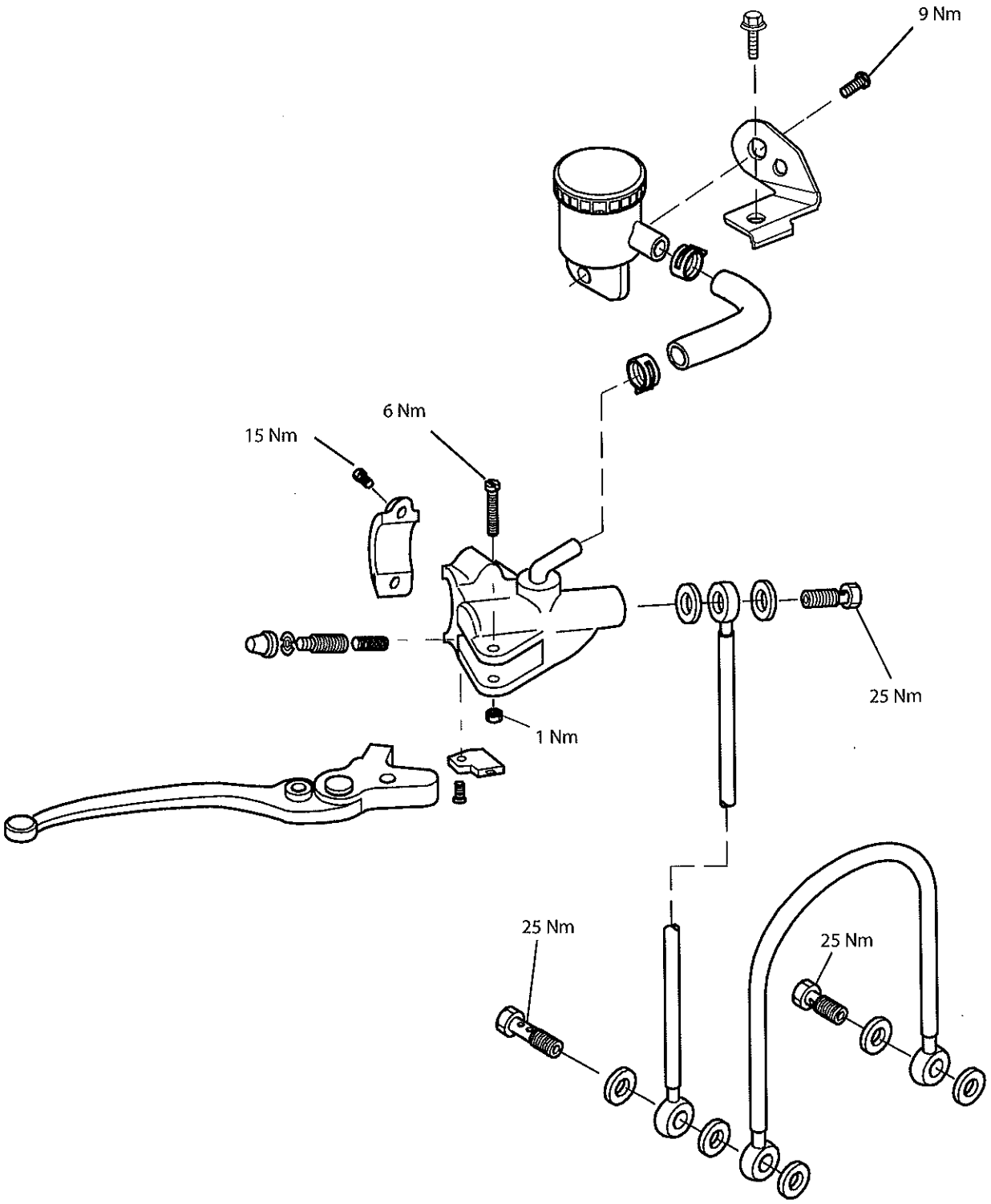
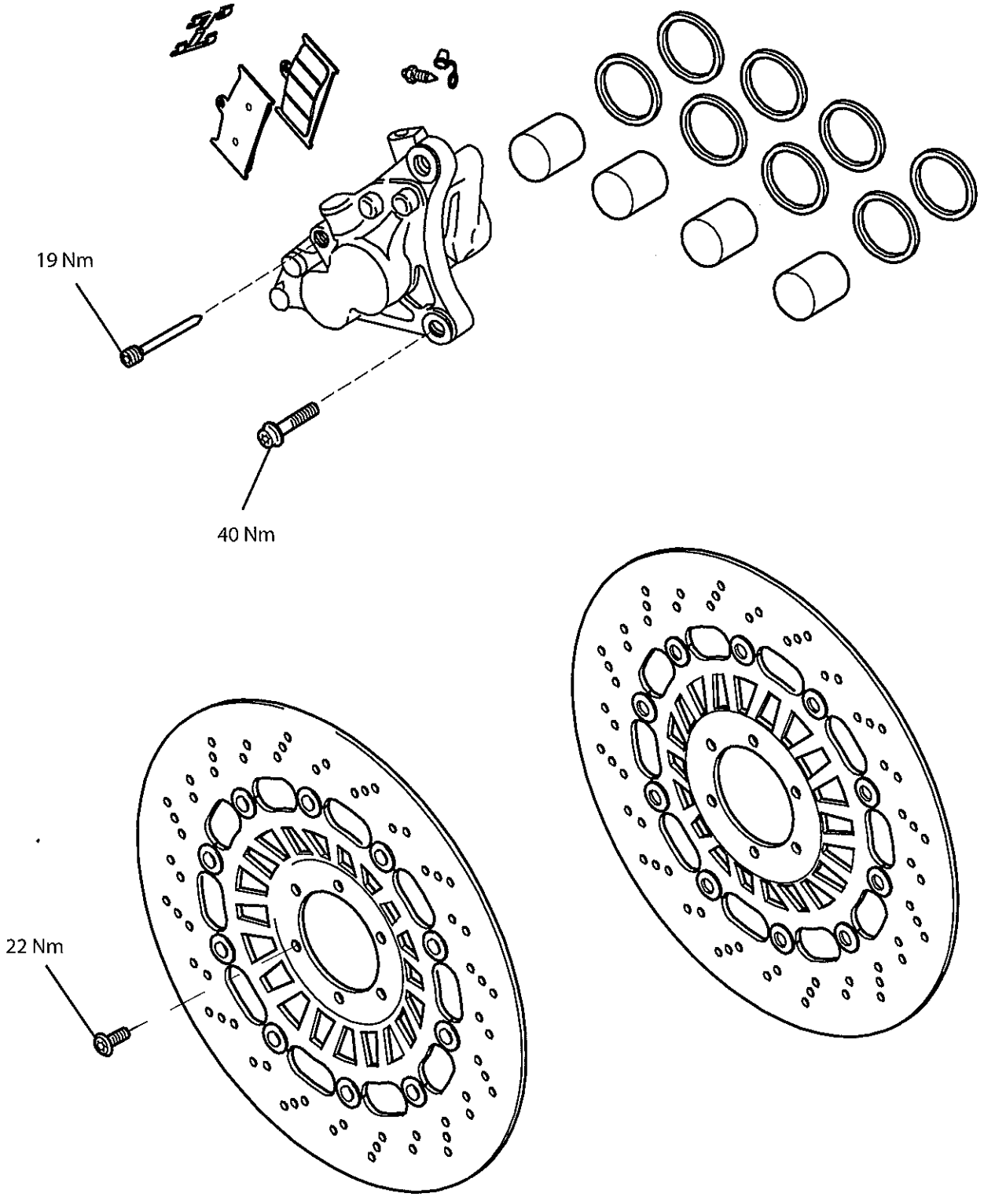
14 Brakes

Table of Contents

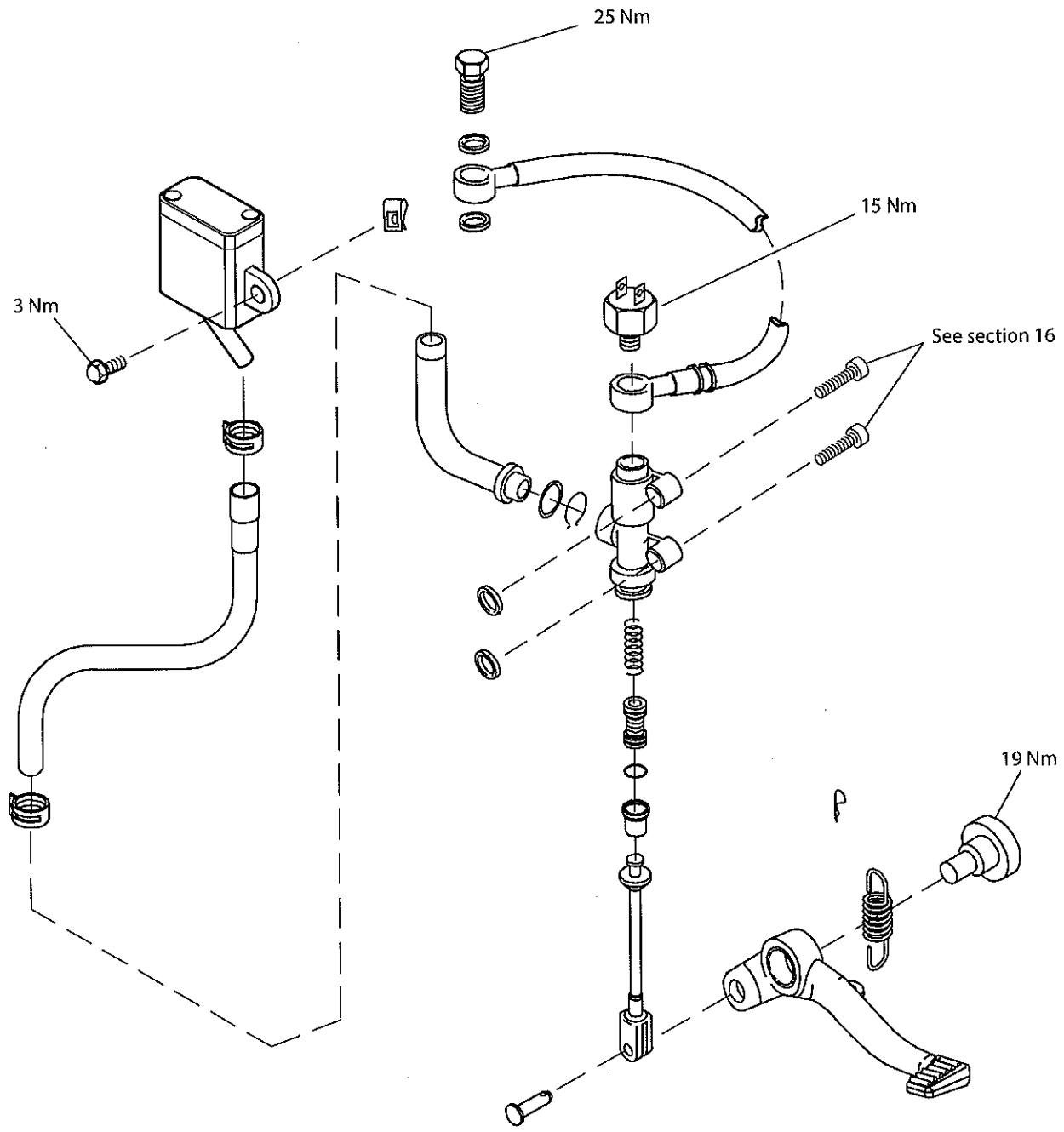
Exploded View - Front Brake Master Cylinder



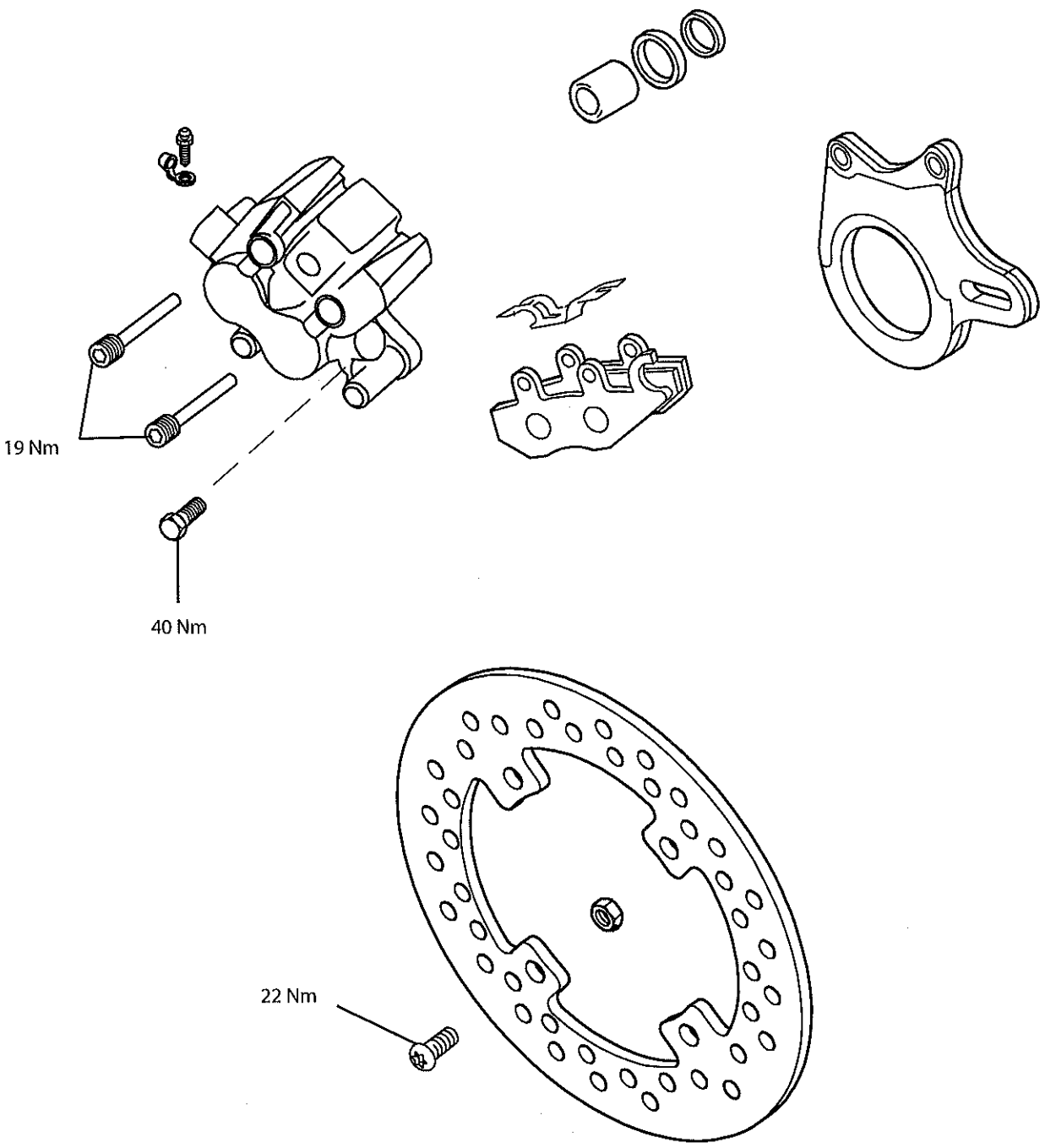
Exploded View - Front Brake Caliper



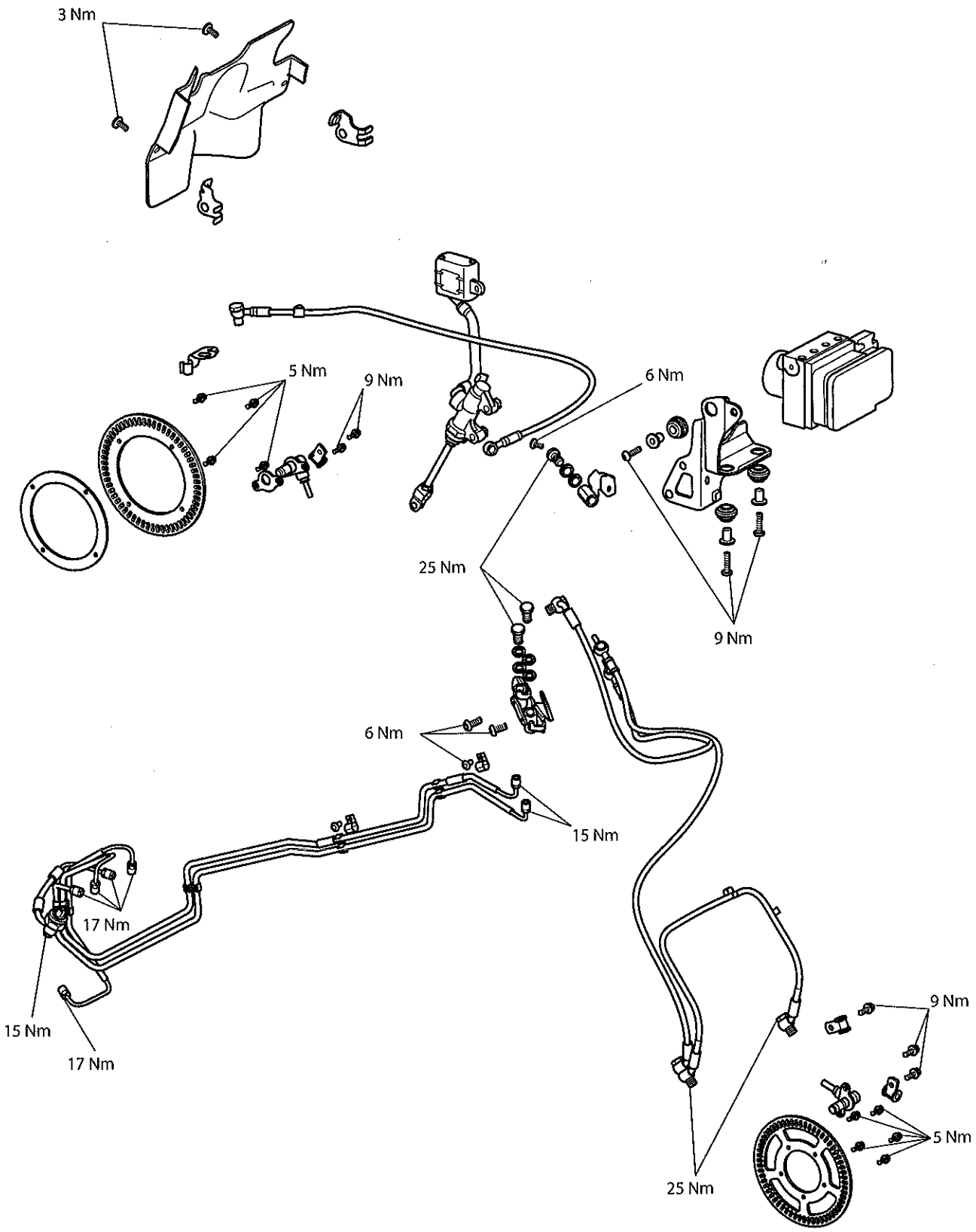
Exploded View - Rear Brake Master Cylinders



Exploded View - Rear Brake Caliper



Exploded View - ABS System



Braking System Maintenance Safety Precautions

Warning

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

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

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

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

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

Check regularly for brake hose damage.

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

Warning

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

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

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

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

Warning

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

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

Warning

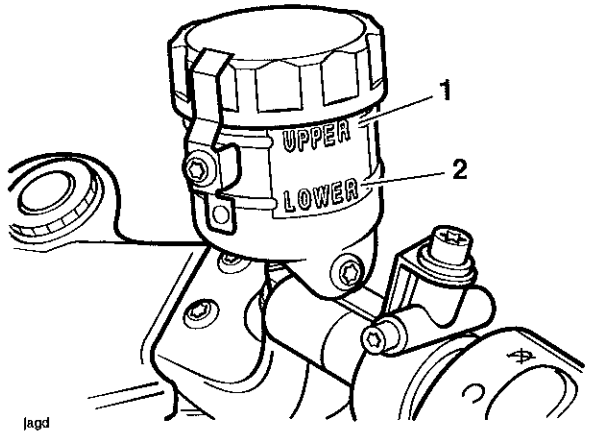
Never use mineral based grease in any part of the braking system or in any area where contact with the braking system is possible. Mineral based grease will damage the hydraulic seals in the calipers and master cylinders.

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

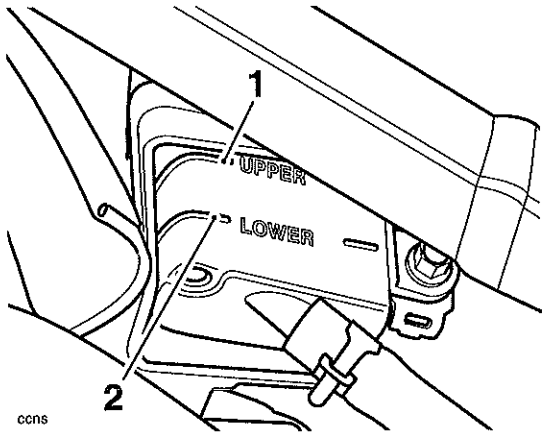
Fluid Level Inspection

In accordance with the scheduled maintenance chart, inspect the brake fluid level in the front and rear master cylinder reservoirs.

1. Ensure that the brake fluid level in the front and rear brake fluid reservoirs is between the upper and lower level lines (reservoir held horizontal).



1. Front Reservoir Upper Level
2. Front Reservoir Lower Level



1. Rear Reservoir Upper Level
2. Rear Reservoir Lower Level

Changing Brake Fluid

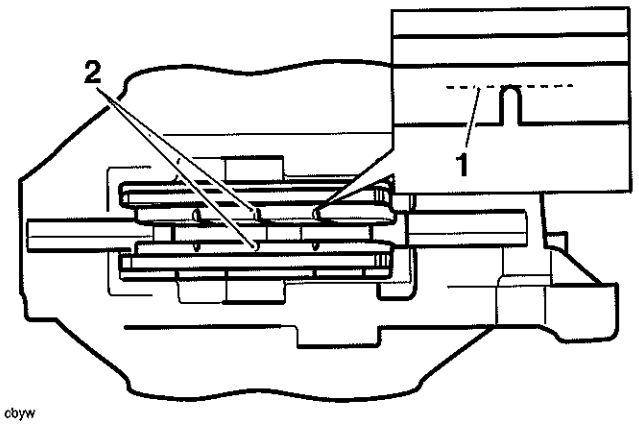
Brake fluid should be changed at the interval specified in the scheduled maintenance chart.

Brake Pads

Front and rear pad wear is automatically compensated for and has no effect on brake lever or pedal action.

Brake Wear Inspection

In accordance with the scheduled maintenance chart, inspect the brake pads for wear. The minimum thickness of lining material for any front or rear brake pad is 1.5 mm. If any pad has worn to the bottom of the groove in the pad centre, replace all the brake pads on that wheel.



1. Lining material thickness
2. Centre groove

Warning

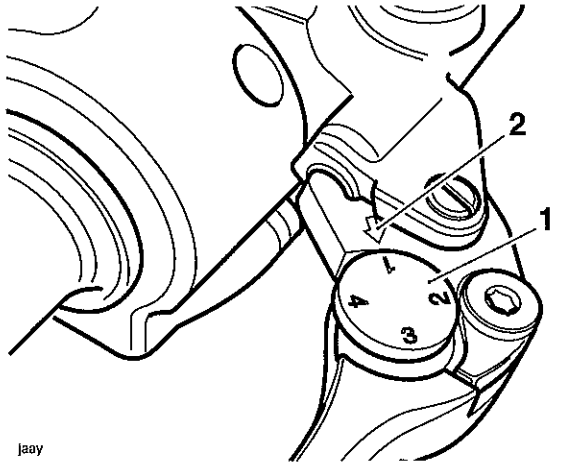
Do not replace individual brake pads, replace both pads in the brake caliper. On the front where two calipers are mounted on the same wheel, all the pads in both calipers must be replaced together. Replacing individual pads will reduce braking efficiency and may cause an accident.

Bleeding the Front Brakes, Renewing Brake Fluid

Note:

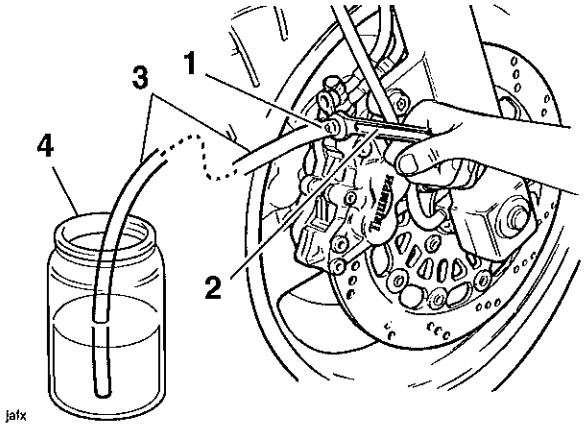
- **Models with ABS brakes: Refer to bleeding ABS brakes later in this section (see page *14-29*).**

1. Note the original setting of the brake lever adjuster in order that it can be returned to the same position when the bleeding operation is complete. Set the brake lever adjuster to position No.1.



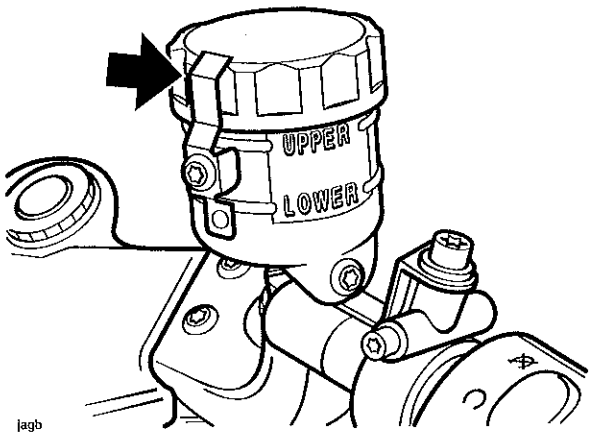
1. Adjuster
2. Indicator Mark

2. Remove the rubber cap from the bleed nipple on the right hand caliper.
3. Attach a transparent tube to the bleed nipple.



1. Bleed Nipple
2. Spanner
3. Bleed Tube
4. Container

4. Place the other end of the tube in a suitable receptacle containing new brake fluid.
5. Turn the handlebars to bring the fluid reservoir to a level position.



Arrowed - Safety Clip

6. Remove the safety clip from the brake reservoir cover.

⚠ Warning

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

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

⚠ Caution

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

7. Carefully remove the reservoir cover taking care not to spill any fluid.
8. Check the condition of the sealing diaphragm for the reservoir. Replace if necessary.
9. Release the bleed nipple.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

Note:

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

10. Slowly pull the brake lever to the handlebar and, holding the lever fully in, close the bleed nipple.

    Repeat steps 9 and 10 until no more air appears in the bleed tube.

11. Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
12. When all air has been expelled from the system, hold the lever in and close the bleed nipple. Tighten the nipple to **6 Nm**.
13. Fill the reservoir to the upper level with new DOT 4 fluid.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

14. Remove the transparent bleed tube.
15. Replace the bleed nipple cap.
16. Repeat the procedure for the left hand caliper.
17. Refit the reservoir cover and diaphragm. Refit the safety clip and screw.

Warning

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

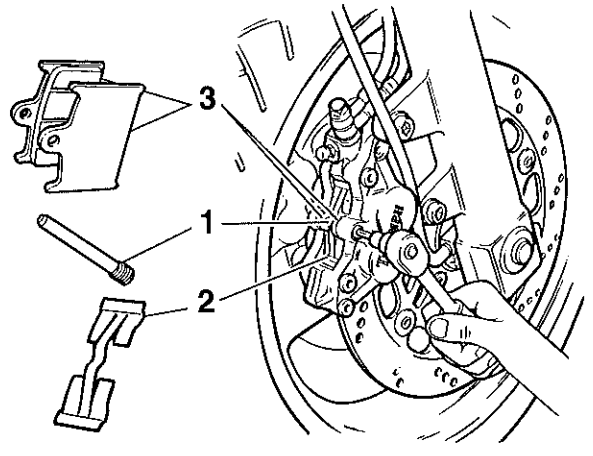
18. Reset the brake lever adjuster to the original setting.
19. Check that the brake operates correctly.

Warning

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

Front Brake Pads

Removal



1. Retaining Pin
2. Anti-rattle Spring
3. Brake Pads

1. Remove the brake pad retaining pin after removing and discarding its split pin. Inspect the retaining pin for damage, replace if necessary.
2. Remove the anti-rattle spring and inspect the spring for damage, replace if necessary.

Caution

Never lever directly against the disc, caliper or the pad lining material as this will damage these components. Always use a levering tool made from a soft material which will not cause damage to the load bearing surfaces.

Brake fluid will be displaced as the caliper pistons are compressed. To prevent body damage, ensure that the displaced fluid does not come into contact with any part of the bodywork.

3. Carefully push the brake pads apart to force the caliper pistons back and allow withdrawal of the pads.
4. Remove both brake pads and inspect for damage and wear beyond the service limit, replace if necessary.

Note:

- **Complete the assembly of the brake pads to one caliper (see assembly for details) before removing the pads from the other caliper.**

Installation

Warning

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

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

1. Fit new brake pads as an axle set or, if all the pads are in a serviceable condition, clean the pad grooves before refitting all pads in their original positions.

Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

2. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease.
3. Fit the anti-rattle spring over the pads and push down in the centre to allow the pad retaining pin to slide across the top of the spring.
4. Tighten the pad retaining pin to **19 Nm**, and secure with a new split pin.
5. Pump the brake lever to correctly position the caliper pistons.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

6. Check the front brake fluid level and top up as required with new DOT 4 fluid (see page *14-13*).
7. Check that the brake operates correctly.

Warning

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

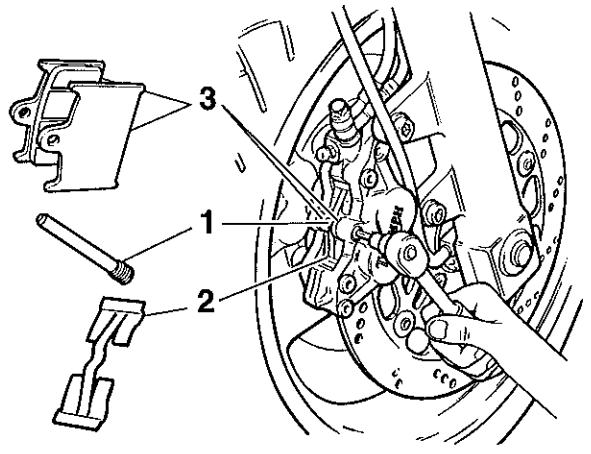
Front Brake Caliper

Removal

Caution

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

1. Disconnect the brake hose at the caliper (two hoses on right hand caliper), and place the free end of the hose in a suitable container to collect brake fluid.
2. If the caliper is to be overhauled, remove the split pin and slacken the pad retaining pin.



1. Retaining Pin
2. Anti-rattle Spring
3. Brake Pads

Caution

Never lever directly against the disc, caliper or the pad lining material. Always use a levering tool made from a soft material which will not cause damage to the load bearing surfaces.

Brake fluid will be displaced from the hose joint as the caliper pistons are compressed. To prevent body damage, ensure that the displaced fluid does not come into contact with any part of the bodywork.

3. Remove the two caliper securing bolts.
4. Manoeuvre the caliper clear of the disc, taking care not to damage the wheel.

Disassembly

Warning

Do not attempt to split the two halves of the caliper. A dangerous riding condition leading to an accident could occur if this warning is ignored.

1. Extract the brake pads (see page *14-15*).

Warning

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

2. Cover the caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake lever, remove the pistons one at a time.

Inspection

1. Check the pistons and caliper bores for corrosion, scoring and damage. Renew as necessary.

Warning

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

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

2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary.

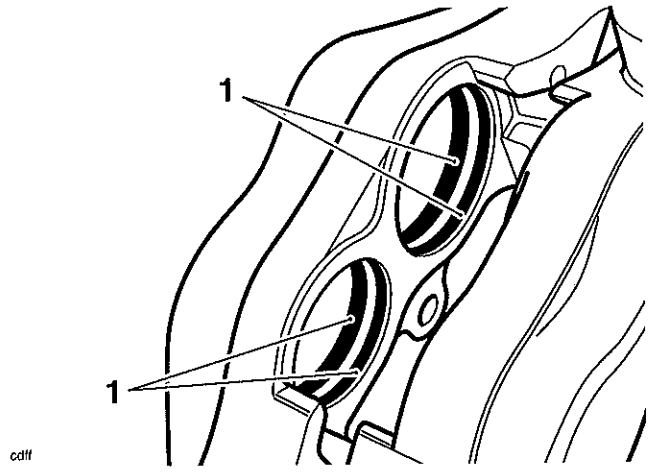
Assembly

Warning

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

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

1. Fit new fluid seals.



1. Fluid Seals

Warning

Ensure that the caliper bores do not become scratched during piston removal and assembly. Ensure that the pistons remain square to their bores during fitment otherwise damage to the caliper could result.

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

2. Apply brake fluid to the outside of the caliper pistons and fluid seals, and carefully push the pistons fully into the caliper bores by hand.

Installation

1. Position the caliper over the disc and tighten the caliper bolts to **40 Nm**.
2. Fit the brake pads to the caliper and locate the anti-rattle spring over the pads.

Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

3. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease. Push down in the centre of the anti rattle spring and fit the retaining pin.
4. Tighten the brake pad retaining pin to **19 Nm** and fit a new split pin.
5. Connect the brake hose(s) to the caliper using new sealing washers on each side of the banjo(s).
6. Tighten the banjo bolt to **25 Nm**.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

7. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
8. Bleed the front brake line as described on page *14-14*.
9. Check that the brake operates correctly.

Warning

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

Front Discs

Wear

1. Replace any brake disc if worn beyond the service limit or that exceeds the disc run-out limit.

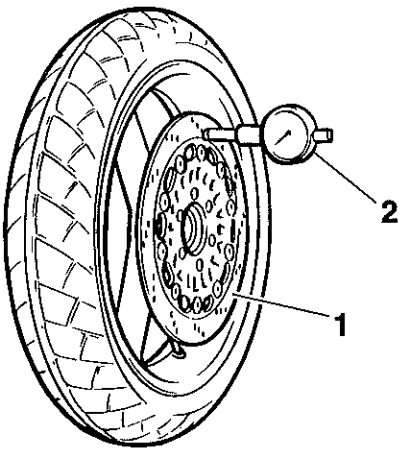
Front Disc Thickness

Standard:	4.0 mm
Service Limit:	3.5 mm

Disc Run-out

Standard:	0.1 mm
Service Limit:	0.3 mm

Measure disc run-out using an accurate dial gauge mounted on a surface plate.



gaeb

1. Disc
2. Dial Gauge

Removal

Warning

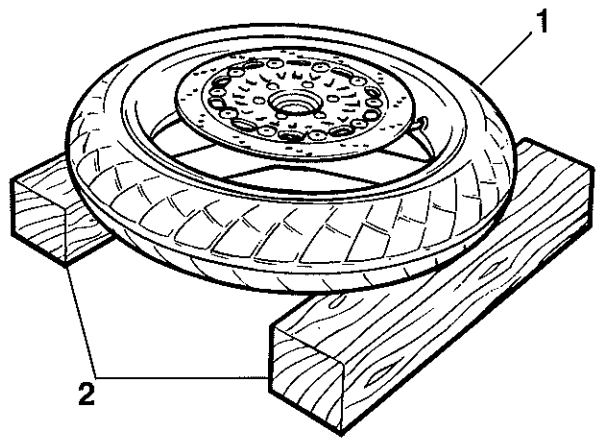
Do not renew front brake discs individually. Discs must always be renewed in pairs even if one of a pair is serviceable.
A dangerous riding condition leading to an accident could result if this warning is ignored.

1. Remove the front wheel (see page *15-6*).

Warning

Damage to the wheel centre could cause misalignment of the wheel when refitted. A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Support the wheel on blocks as illustrated to avoid damage to the wheel centre.



gads

1. Wheel
2. Support Block

Note:

- **The discs are handed. Observe the offset of each disc to its hub and the orientation of the cooling holes, for correct installation.**

3. Remove and discard the 6 bolts to detach the disc.
4. Repeat operations 2 and 3 to remove the disc on the opposite side.

Installation

1. Locate the first disc on the correct side of the wheel (offset outwards) as noted during removal.
2. Fit new bolts and tighten to **22 Nm**.
3. Fit the other disc in the same way.
4. Thoroughly clean and degrease the discs.
5. Refit the wheel (see page *15-7*).
6. Check that the brake operates correctly.

Warning

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

Front Brake Master Cylinder

Removal

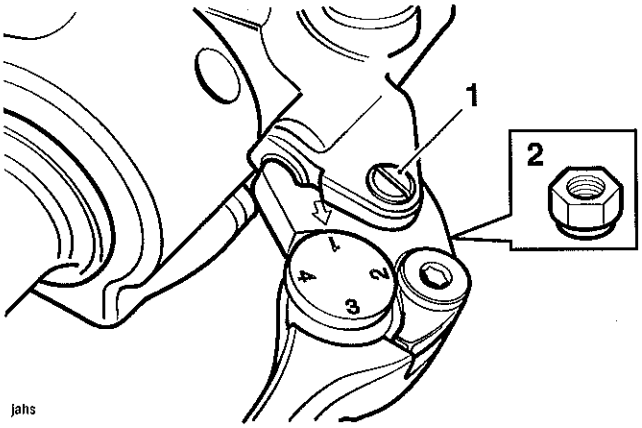
1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.

Caution

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

3. Drain the fluid from the master cylinder, attach a tube to the right hand caliper bleed nipple, slacken the nipple and allow the fluid to drain into a suitable container. Operate the brake lever until all fluid has been expelled.
4. Note the setting of the brake lever adjuster to ensure it is returned to the same position when the overhaul operation is complete.

5. Remove the pivot locknut and bolt securing the brake lever to the master cylinder, and remove the lever.

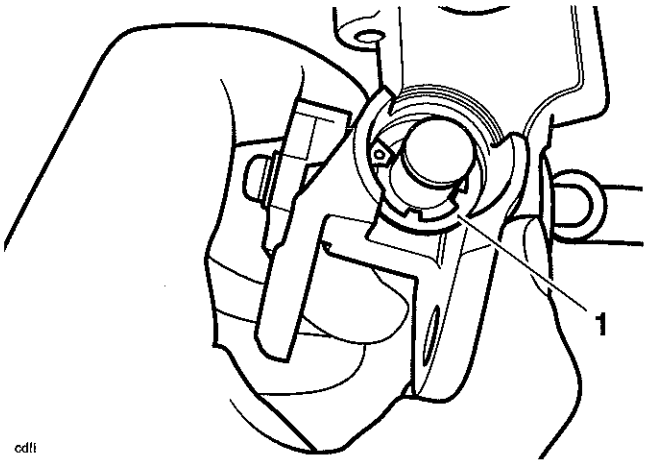


1. Pivot Bolt
2. Pivot Bolt Nut

6. Disconnect from the master cylinder:
   - brake hose.
   - brake light switch connections.
7. Release the clamp screws from the handlebar to remove the master cylinder.

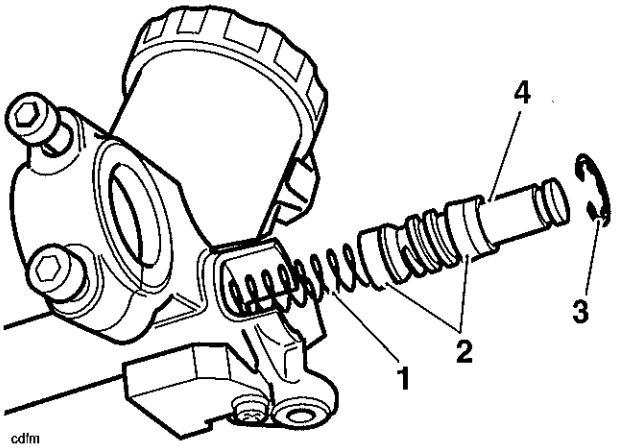
Disassembly

1. Remove or support the reservoir.
2. Detach the boot from the lever end of the cylinder.
3. Remove the circlip from beneath the boot.



1. Circlip

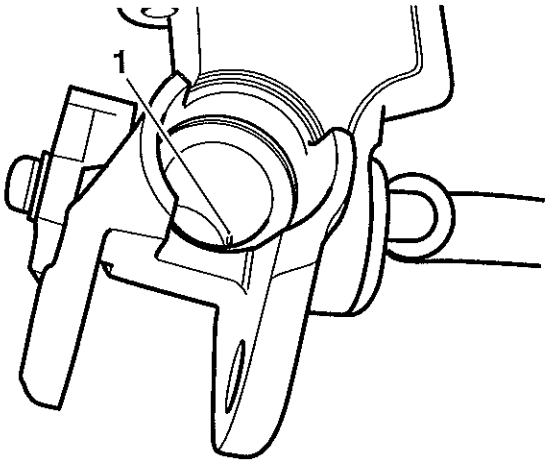
4. Remove the piston set from the master cylinder bore noting the relative position of the seals and piston components.



1. Spring
2. Piston Seals
3. Circlip
4. Piston

Inspection

1. Check the following for wear, damage, cracks or deterioration:
   - Cylinder bore
   - Dust cover
   - Spring
   - Piston
   - Pivot Bolt
2. Always renew the piston and seal set if the cylinder is dismantled.
3. Check that the relief and supply ports on the cylinder are not blocked.



1. Port

Assembly

Warning

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

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

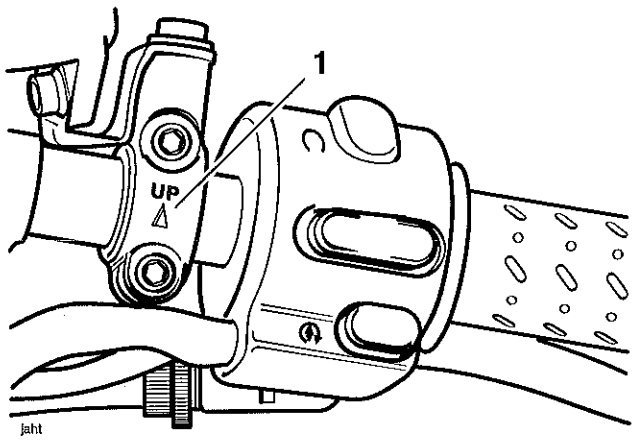
1. Lubricate the piston and cylinder with new, clean brake fluid.

Warning

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

2. Fit the new piston set into the master cylinder and retain with a new circlip.
3. Refit the master cylinder boot.

Installation



1. 'Up' Arrow Mark

1. Locate the master cylinder to the handlebars and position the clamp with the 'UP' arrow pointing upwards. Align the master cylinder/clamp split line with the dot mark on the handlebar.
2. Tighten the clamp bolts, upper first and then the lower to **15 Nm**.
3. Connect the brake light switch.
4. Position the brake lever ensuring that pivot boss is correctly aligned to the push rod. Fit and tighten the pivot bolt to **1 Nm**, and the locknut to **6 Nm**.
5. Connect the brake hose to the master cylinder using new sealing washers. Tighten the brake light switch to **25 Nm**.
6. Fill and bleed the front brakes (see page *14-14*).

Warning

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

7. Reset the brake lever adjuster to the original setting.
8. Examine the system for correct operation and fluid leaks. Rectify as necessary.

Warning

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

9. Connect the battery positive, (red) lead first.
10. Refit the seat.

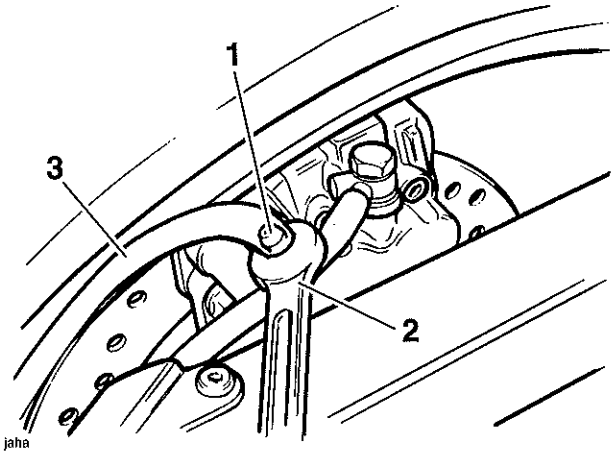
Bleeding the Rear Brakes, Renewing Brake Fluid

Note:

- **Models with ABS brakes: Refer to bleeding ABS brakes later in this section (see page *14-30*).**

1. Remove the seat (see page *16-8*).
2. Remove the cap from the rear bleed nipple.

3. Attach a transparent tube to the bleed nipple.



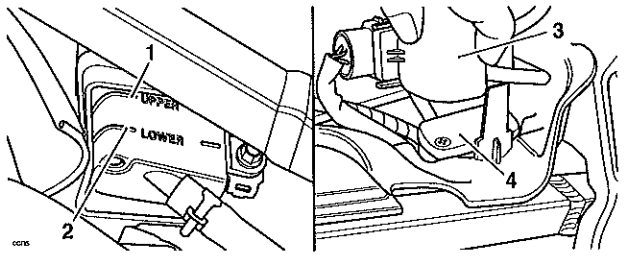
1. Bleed Nipple
2. Spanner
3. Bleed Tube

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

⚠ Caution

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

5. Gently pull off the starter solenoid / main fuse assembly with the rubber mounting that fits over the brake reservoir.
6. Remove the rear brake reservoir cover taking care not to spill any fluid.



1. Lower Level Line
2. Upper Level Line
3. Starter Solenoid / Main Fuse Assembly
4. Rear Brake Fluid Reservoir

⚠ 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.

7. Check the condition of the sealing diaphragm. Replace the diaphragm as necessary.
8. Release the bleed nipple.

Note:

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

9. Slowly depress the brake pedal and, holding the pedal fully down, close the bleed nipple. Repeat steps 8 and 9 until no more air appears in the bleed tube.
10. Maintain the brake fluid level between the upper and lower reservoir levels whilst bleeding is being carried out.
11. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **6 Nm**.
12. Fill the reservoir to the maximum level with new DOT 4 fluid.

⚠ Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

13. Fit the reservoir cover and diaphragm. Check for correct diaphragm fitment before final tightening of the cover.
14. Refit the starter solenoid / main fuse assembly with the rubber mounting over the brake reservoir

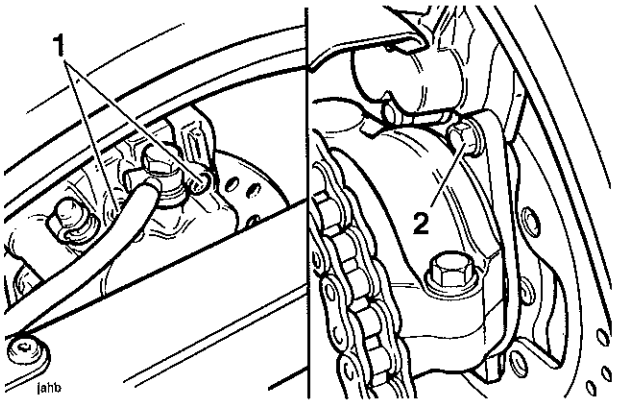
15. Refit the seat (see page *16-8*).
16. Remove the bleed tube from the nipple.
17. Replace the bleed nipple dust cap.
18. Check that the brake operates correctly.

Warning

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

Rear Brake Pads

Removal



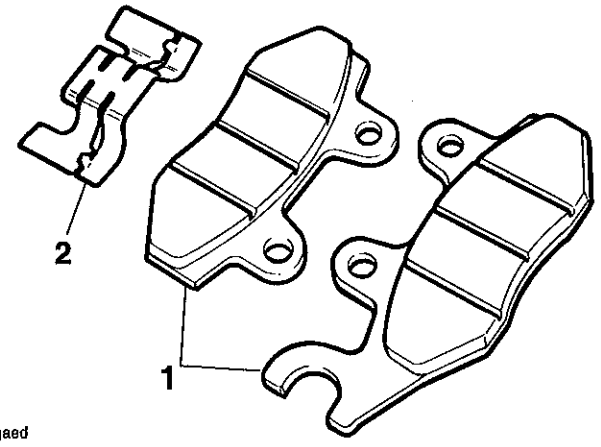
1. Pad Retaining Pins
2. Caliper Mounting Bolts

1. Remove the rear brake hose cover and upper chain guard.
2. Slacken the brake pad retaining pins.

Warning

Do not allow the caliper to hang on the brake hoses as this may damage the hoses and could lead to an accident.

3. Remove the caliper mounting bolts and position the caliper to allow withdrawal of the pad retaining pins.
4. Press downwards on both pads and remove the pad retaining pins.
5. Remove the brake pads and inspect for damage or wear beyond the service limit, replace if necessary.



1. Brake Pads
2. Anti Rattle Spring

6. Remove the anti-rattle spring and inspect for damage, replace if necessary.

Installation

Warning

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

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

Caution

Brake fluid will be displaced as the caliper pistons are compressed. To prevent body damage, ensure that the displaced fluid does not come into contact with any part of the bodywork or the rear wheel.

1. If fitting new pads, use hand pressure to compress the caliper pistons fully into their bores.
2. Fit the anti-rattle spring into the caliper.
3. Renew the brake pads as a pair or, if both pads are in a serviceable condition, clean the pad grooves before fitting them.

Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

4. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease. Press down on both pads and fit the retaining pins.
5. Position the caliper over the disc ensuring both pads are correctly aligned.
6. Fit the caliper retaining bolts, and tighten to **40 Nm**.
7. Tighten the brake pad retaining pin to **19 Nm**.
8. Pump the brake pedal to correctly position the caliper pistons.
9. Check the brake fluid level and top-up as required with new DOT 4 fluid.
10. Refit the upper chain guard and rear brake hose cover.
11. Check that the brake operates correctly.

Warning

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

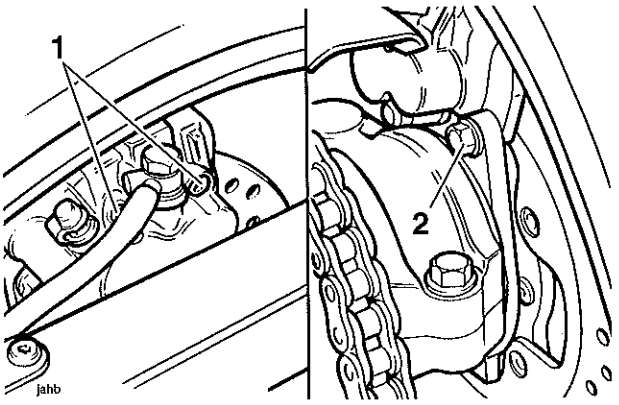
Rear Brake Caliper

Removal

Caution

To prevent body damage, do not allow brake fluid to contact any area of the bodywork or the rear wheel.

1. Remove the rear brake hose cover and upper chain guard.
2. Disconnect the rear brake hose at the caliper and place the free end of the hose in a suitable container to collect brake fluid.
3. Slacken the pad retaining pins.
4. Remove the caliper mounting bolts.
5. Remove the brake caliper assembly.



1. Pad Retaining Pins
2. Caliper Mounting Bolts (1 of 2)

Disassembly

1. Remove the brake pads (see page *14-23*).

Warning

To prevent injury, never place fingers or hands inside the caliper opening when removing the pistons. Always wear eye, hand and face protection when using compressed air. Eye, face and skin damage will result from direct contact with compressed air.

2. Cover the caliper opening with a clean, heavy cloth and, using either compressed air or by reconnecting the master cylinder and pumping the brake lever, remove the pistons one at a time.

Inspection

1. Check the piston and caliper bore for corrosion, scoring and damage. Renew as necessary.

Warning

Always renew caliper seals and pistons after removal from the caliper. An effective hydraulic seal can only be made if new components are used.

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

2. Inspect the brake pads for damage and wear beyond the service limit. Renew as necessary (see page *14-13*).

Assembly

Warning

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

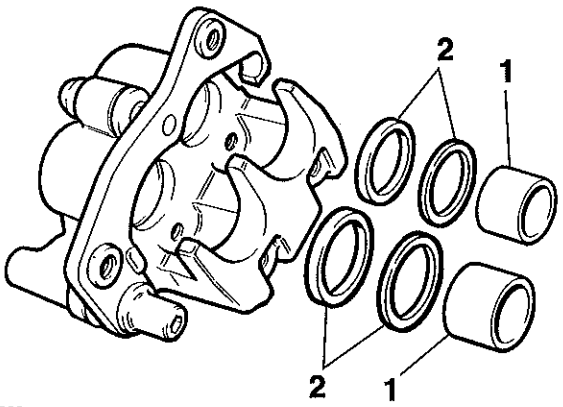
A dangerous riding condition leading to an accident could result if this warning is ignored.

Warning

Ensure that the caliper bores do not become scratched during removal and assembly.

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

1. Fit new fluid seals to the caliper. Apply brake fluid to the outside of the caliper piston and fluid seal.



gaec

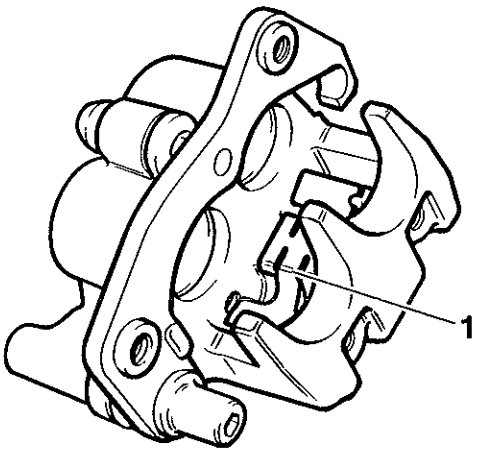
1. Pistons
2. Seals

Warning

Ensure that the pistons do not tip during assembly as this could damage the caliper.

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

2. Carefully push both pistons into the caliper by hand.
3. Install the anti-rattle spring into the caliper.



akw

1. Anti Rattle Spring

Warning

Do not apply more than a minimum coating of grease to the pad retaining pins. Excess grease may contaminate the brake pads, hydraulic seals and discs causing reduced braking efficiency and an accident.

4. Position the brake pads in the caliper. Lubricate the pad retaining pins using a minimum amount of proprietary high temperature 'Copperslip' type grease. Press down on both pads and fit the pad retaining pins.

Installation

1. Position the caliper over the disc ensuring the pads are correctly aligned on both sides of the disc.
2. Fit the caliper retaining bolts, and tighten to **40 Nm**.
3. Tighten the brake pad retaining pins to **19 Nm**.
4. Connect the brake hose to the caliper using new washers on each side of the banjo bolt.
5. Tighten the brake light switch to **15 Nm**.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

6. Fill the master cylinder with new, DOT 4 brake fluid from a sealed container.
7. Bleed the rear brake (see page *14-21*).
8. Refit the upper chain guard and rear brake hose cover.
9. Check that the brake operates correctly.

Warning

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

Rear Brake Disc

Wear

1. Replace any brake disc if worn beyond the service limit or that exceeds the disc run-out limit.

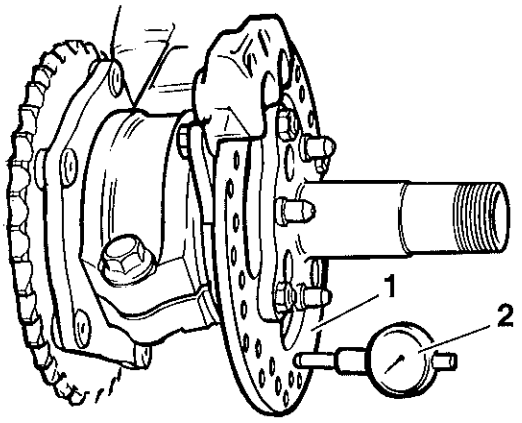
Rear Disc Thickness

Standard:	6.0 mm
Service Limit:	5.0 mm

Disc Run-out

Standard:	0.1 mm
Service Limit:	0.3 mm

Measure disc run out using an accurate dial gauge mounted on a surface plate.



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1. Disc
2. Dial Gauge

Removal

1. Remove the rear axle shaft (see page *12.17*).
2. Support the axle shaft carefully to avoid damage to the disc or axle shaft threads.
3. Motorcycles with ABS: Remove the ABS pulser ring and spacer (see page *14-31*).
4. Remove and discard the 4 bolts to detach the disc.

Installation

1. Locate the disc on the axle shaft.
2. Fit new bolts and tighten to **22 Nm**.
3. Motorcycles with ABS: Refit the ABS pulser ring and spacer (see page *14-31*)
4. Thoroughly clean and degrease the disc.
5. Refit the axle shaft (see page *12.19*).
6. Check that the brake operates correctly.

Rear Master Cylinder

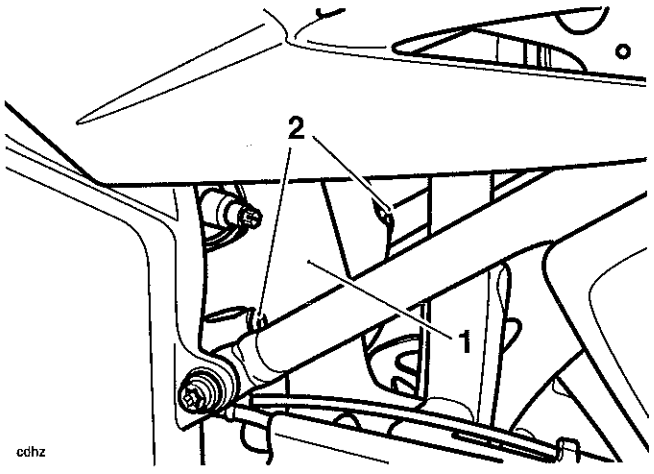
Removal

1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.

⚠ Caution

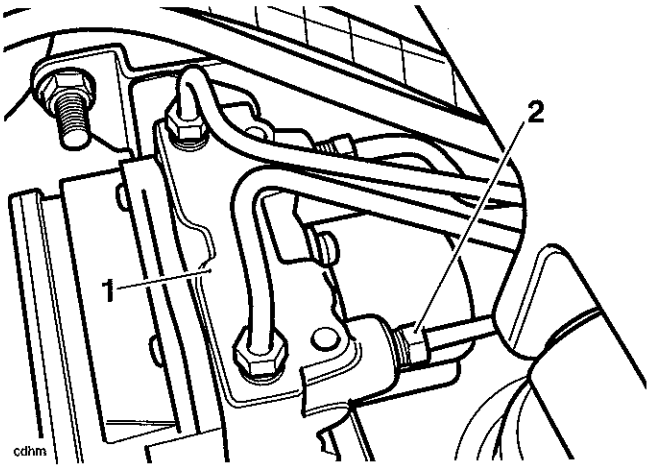
To prevent body damage, do not spill brake fluid onto any area of the bodywork or wheels.

3. Drain the fluid from the master cylinder by bleeding the system at the rear caliper until all fluid has been expelled (see page *14-21*).
4. Remove the clip and washer from the clevis pin at the lower end of the brake pushrod. Remove the clevis pin.
5. Carefully slide the cover off the brake light switch and disconnect the brake light switch multiplug.
6. Disconnect the reservoir hose from the master cylinder.
7. Models without ABS brakes: Disconnect the rear brake hose (noting orientation).
8. Models with ABS brakes: Remove the rear wheel splash shield.



1. Splash Shield
2. Fixings

9. Models with ABS brakes: Loosen the rear brake line union and, taking care not to bend the brake line, detach the line from the ABS modulator.



1. ABS Modulator
2. Rear Brake Line Union

10. Remove the nuts securing the master cylinder to the frame and collect the master cylinder.
11. Models with ABS brakes: Noting the orientation, remove the rear brake line from the master cylinder.

Disassembly

1. Detach the boot from the cylinder and pushrod.
2. Remove and discard the circlip retaining the pushrod to the cylinder.
3. Remove the pushrod and piston set from the master cylinder bore noting the relative position of the seals and piston components.

Inspection

1. Visually inspect the master cylinder bore for wear, scratches or corrosion. Replace as necessary.
2. Check the piston and cylinder bore for damage, wear or deterioration. Replace as necessary. Always renew the piston seals if the cylinder has been dismantled.
3. Examine the pushrod for bends and damage. Replace as necessary.

Assembly

Warning

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

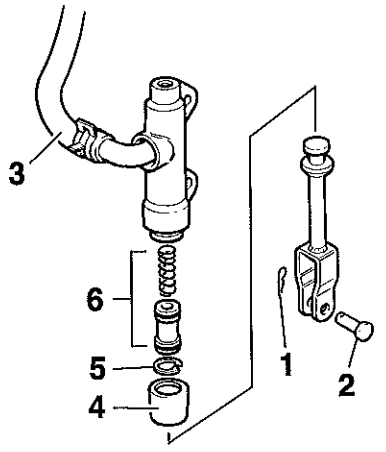
A dangerous riding condition leading to an accident could result if this warning is ignored.

1. Clean the master cylinder bore, piston and seals, with new brake fluid.
2. Ensure all ports are clear of obstruction.

Warning

Ensure that the piston and piston seal are fitted facing the same way as noted during removal. A dangerous riding condition leading to an accident could result from incorrect assembly of the master cylinder.

3. Install the spring and piston set together.
4. Apply a small amount of brake grease to the pushrod.
5. Install the pushrod in the master cylinder and retain with a new circlip. Refit the boot.



1. Clip
2. Clevis Pin
3. Reservoir Hose
4. Dust Boot
5. Circlip
6. Piston Set

Installation

1. Models with ABS brakes: Incoporating new washers, fit the brake line and brake light switch to the master cylinder. Ensuring the brake line is located as noted on removal, tighten the switch to **15 Nm**.
2. Connect the reservoir hose to the master cylinder.
3. Secure the master cylinder to the frame studs. Tighten the securing nuts to **20 Nm**.
4. Models with ABS brakes: Taking care not to bend the brake line, refit the rear brake line to the ABS modulator and tighten to **17 Nm**.
5. Models with ABS brakes:Fit the rear wheel splash shield. Tighten the fixings to **3 Nm**.
6. Connect the push rod to the brake pedal using the clevis pin and a new split pin.
7. Models without ABS brakes: Incoporating new washers, fit the brake hose and brake light switch to the master cylinder. Ensuring correct orientation of the brake hose, tighten the switch to **15 Nm**.
8. Connect the brake light switch multiplug and refit the cover.

Warning

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

Observe the brake fluid handling warnings given earlier in this section of the manual.

9. Fill and bleed the rear brake (see page *14-21*).
10. Reconnect the battery positive, (red) lead first.
11. Fit the seat (see page *16-8*).

Warning

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

12. Check that the brake operates correctly.

Bleeding the Front Brakes, Renewing Brake Fluid, Motorcycles with ABS

1. Complete the brake bleed procedure as for models without ABS brakes (see page *14-14*).
2. Connect the Triumph service diagnostic tool (See page *14-47*).
3. Follow the on screen menu to ABS diagnostics. From the menu, select 'BLEED SYSTEM' (see page *14-52*).
4. Select 'BLEED SYSTEM?' from the menu (see page *14-53*).

Note:

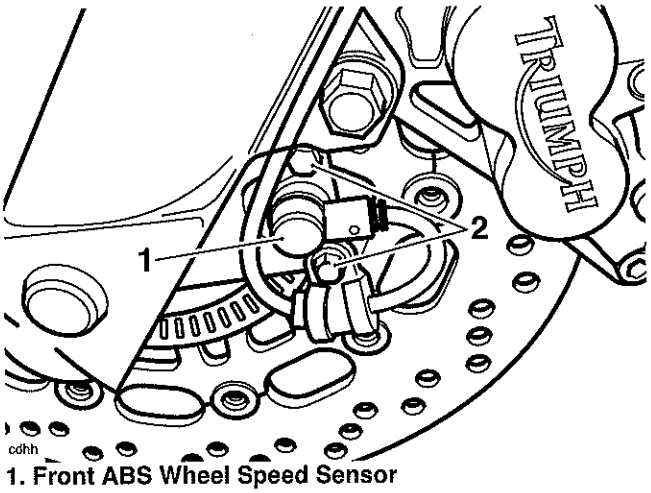
- **When the ABS modulator 2nd circuit is activated by the bleed command, the front brake lever travel will increase as ABS modulator solenoids are opened and will then decrease as the solenoids are automatically closed.**
- **Pressure must be applied to the front brake lever before operating the bleed sequence on the** diagnostic tool. An assistant will be required to open the bleed nipple while pressure is applied to the brake lever.

5. Apply pressure to the front brake lever, activate the bleed sequence on the diagnostic tool, and with assistance, release the bleed nipple.
6. Repeat the above procedure as necessary until all air is expelled from the system.
7. When all air has been expelled from the system, apply pressure to the brake lever and close the bleed nipple. Tighten the nipple to **6 Nm**.
8. Repeat the brake bleed procedure as for models without ABS brakes (see page *14-14*).

Front ABS Wheel Speed Sensor

Removal

1. Remove the seat (see page *16-8*).
2. Disconnect the battery, negative (black) lead first.
3. Disconnect the wheel speed sensor multiplug.
4. Release the wheel speed sensor harness from the brake hose clips.
5. Release the bolt securing the wheel speed sensor harness to the fork leg.
6. Release the bolts securing the wheel speed sensor to the fork leg, and remove the sensor.



1. Front ABS Wheel Speed Sensor
2. Fixings

Installation

1. Position the wheel speed sensor to the fork leg and tighten the fixings to **9 Nm**.
2. Secure the wheel speed sensor harness to the fork leg and tighten the fixing to **9 Nm**.
3. Secure the wheel speed sensor harness to the brake hose clips.
4. Connect the wheel speed sensor multiplug.
5. Connect the battery, positive (red) lead first.
6. Fit the seat (see page *16-8*).

Front ABS Pulser ring

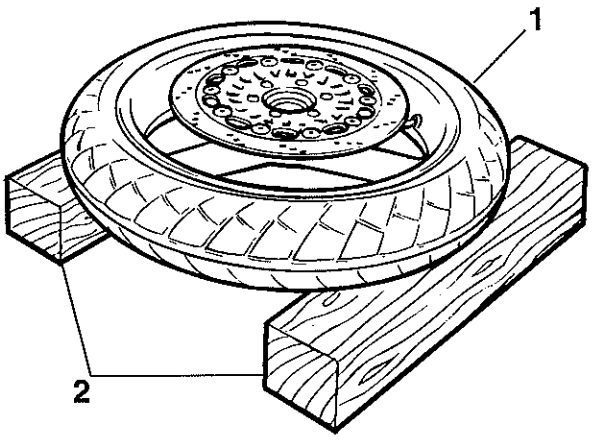
Removal

1. Remove the front wheel (see page *15-6*).

Warning

Damage to the wheel centre could cause misalignment of the wheel when refitted. A dangerous riding condition leading to an accident could result if this warning is ignored.

2. Support the wheel on blocks as illustrated to avoid damage to the wheel centre.

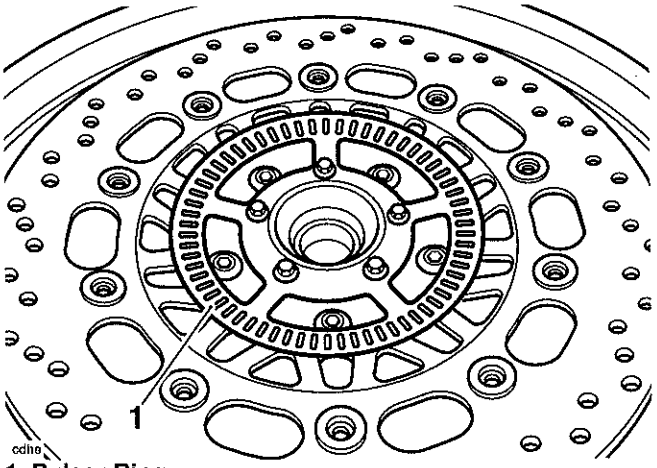


gads

1. Wheel

2. Support Block

3. Remove the 5 bolts to detach the pulser ring.



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1. Pulser Ring

Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

Installation

1. Locate the pulser ring on the wheel. Tighten the fixings to **5 Nm**.
2. Refit the front wheel (see page *15-7*).

Bleeding the Rear Brakes, Renewing Brake Fluid, Motorcycles with ABS

1. Complete the brake bleed procedure as for models without ABS brakes (see page *14-21*).
2. Connect the Triumph service diagnostic tool (See page *14-47*).
3. Follow the on screen menu to ABS diagnostics. From the menu, select 'BLEED SYSTEM' (see page *14-52*).
4. Select 'BLEED SYSTEM?' from the menu (see page *14-53*).

Note:

- **When the ABS modulator 2nd circuit is activated by the bleed command, the rear brake pedal travel will increase as ABS modulator solenoids are opened and will then decrease as the solenoids are automatically closed.**
- **Pressure must be applied to the rear brake pedal before operating the bleed sequence on the diagnostic tool. An assistant will be required to open the bleed nipple while pressure is applied to the brake pedal.**

5. Apply pressure to the front brake lever, activate the bleed sequence on the diagnostic tool, and with assistance, release the bleed nipple.
6. Repeat the above procedure as necessary until all air is expelled from the system.
7. When all air has been expelled from the system, hold down the brake pedal and close the bleed nipple. Tighten the nipple to **6 Nm**.
8. Repeat the brake bleed procedure as for models without ABS brakes (see page *14-21*).

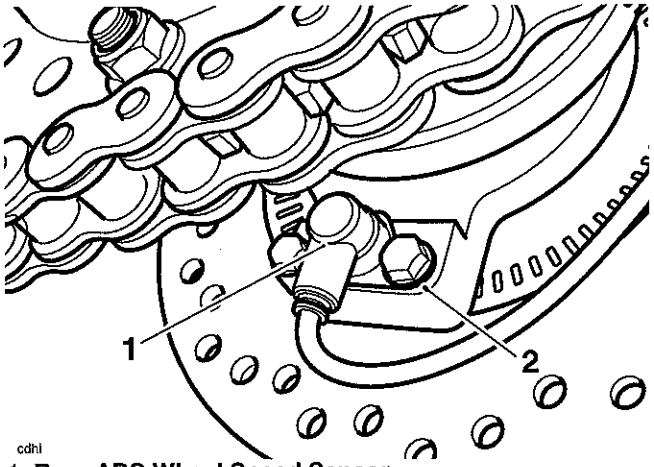
Rear ABS Wheel Speed Sensor

Removal

1. Remove the seat (see page *16-8*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the fuel tank (see page *10-87*).
4. Disconnect the wheel speed sensor multiplug.
5. Release the screws and remove the brake hose guide from the chain guard.
6. Release the wheel speed sensor harness from the clips.

Note: Note the position of the shim.

7. Release the bolts securing the wheel speed sensor to the rear brake caliper carrier, and remove the sensor. Collect the shim.



1. Rear ABS Wheel Speed Sensor
2. Shim Position

Installation

Note:

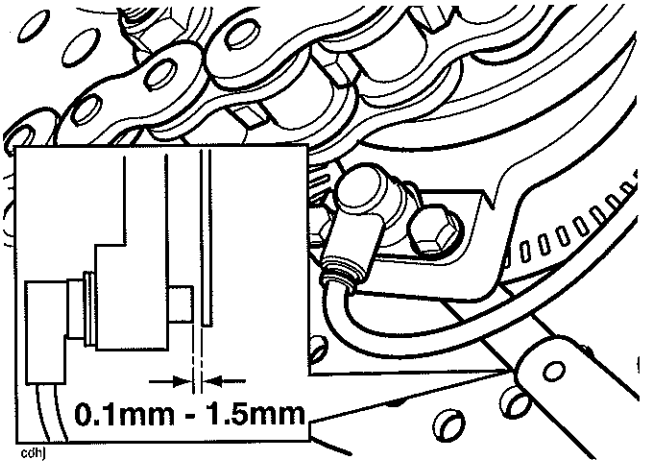
- **Check the condition of the shim before use. Do not use a shim which has been bent or damaged.**

1. Position the shim to the rear wheel speed sensor such that the shim will be installed between the wheel speed sensor and the brake caliper carrier.
2. Position the wheel speed sensor to the brake caliper carrier and tighten the fixings to **9 Nm.**

⚠ 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.

3. Carefully slide the caliper carrier towards the brake disc to eliminate any play in the caliper carrier.
4. Using feeler gauges, measure the air gap between the wheel speed sensor and the pulser ring.
5. Carefully slide the caliper carrier away from the brake disc to eliminate any play in the caliper carrier.
6. Repeat the air gap measurement.



ABS wheel speed sensor air gap measurement

7. 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.
8. Adjust the air gap using the correct shim to achieve an air gap of between 0.1 mm to 1.5 mm.

Note: Shims are available in the following 4 sizes:

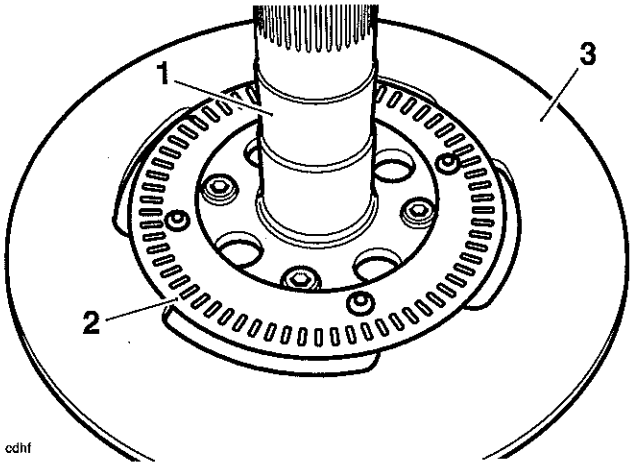
- **0.5 mm**
- **1.0 mm**
- **1.5 mm**
- **2.0 mm**

9. If necessary, release the wheel speed sensor, fit the correct thickness shim and refit the wheel speed sensor. Tighten the fixings to **9 Nm.**
10. Repeat the air gap measurement. Re-adjust as necessary.
11. Reposition the brake hose guide to the chain guard, ensuring the brake hose and wheel speed sensor harness are correctly routed. Tighten the fixings to **2 Nm.**
12. Secure the wheel speed sensor harness to the brake hose clips.
13. Connect the wheel speed sensor multiplug.
14. Refit the fuel tank (see page *10-88*).
15. Connect the battery, (red) lead first.
16. Fit the seat (see page *16-8*).

Rear ABS Pulser Ring

Removal

1. Remove the rear axle shaft (see page *12.17*).
2. Remove the 4 bolts to detach the pulser ring from the rear brakes disc. Collect the spacer ring.



1. Axle Shaft
2. Pulser Ring
3. Brake Disc

Inspection

1. Check the pulser ring for damaged, missing or cracked teeth or distortion. Renew the pulser ring as necessary.

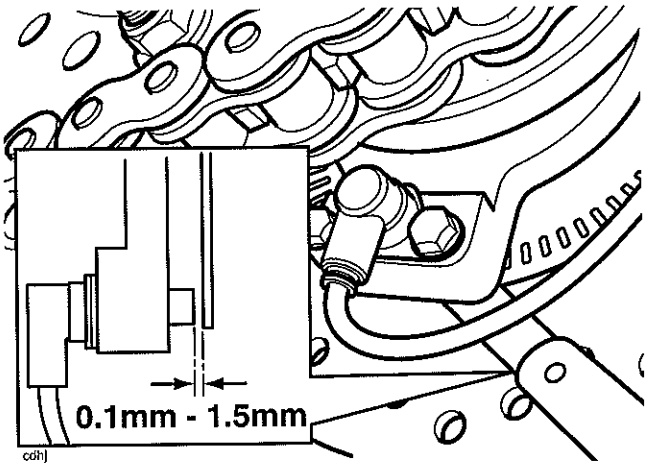
Installation

1. Locate the spacer ring on to the rear brake disc.
2. Locate the pulser ring on to the rear brake disc and tighten the fixings to **5 Nm.**
3. Refit the rear axle shaft (see page *12-19*).

⚠ 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.

4. Carefully slide the caliper carrier towards the brake disc to eliminate any free-play in the caliper carrier.
5. Using feeler gauges, measure the air gap between the wheel speed sensor and the pulser ring.
6. Carefully slide the caliper carrier away from the brake disc to eliminate any free-play in the caliper carrier.
7. Repeat the air gap measurement.



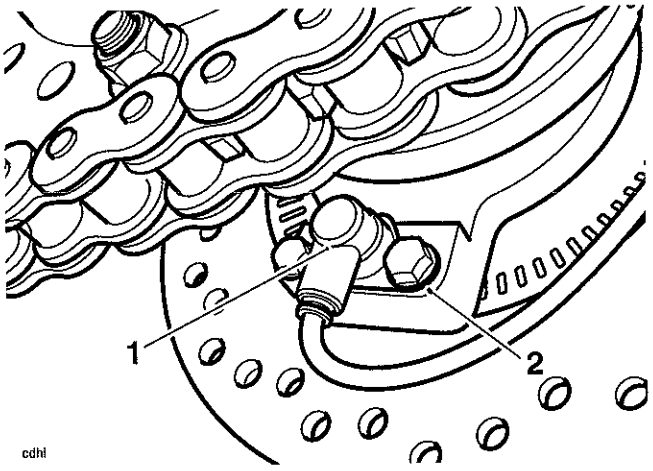
ABS wheel speed sensor air gap measurement

8. 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.
9. Adjust the air gap using the correct shim to achieve an air gap of between 0.1 mm to 1.5 mm.

Note: Shims are available in the following 4 sizes:

- **0.5 mm**
- **1.0 mm**
- **1.5 mm**
- **2.0 mm**

10. If necessary, release the wheel speed sensor, fit the correct thickness shim and refit the wheel speed sensor. Tighten the fixings to **9 Nm.**



1. Rear ABS Wheel Speed Sensor
2. Shim Position

11. Repeat the air gap measurement. Re-adjust as necessary.

.ABS Hydraulic Modulator / ECM

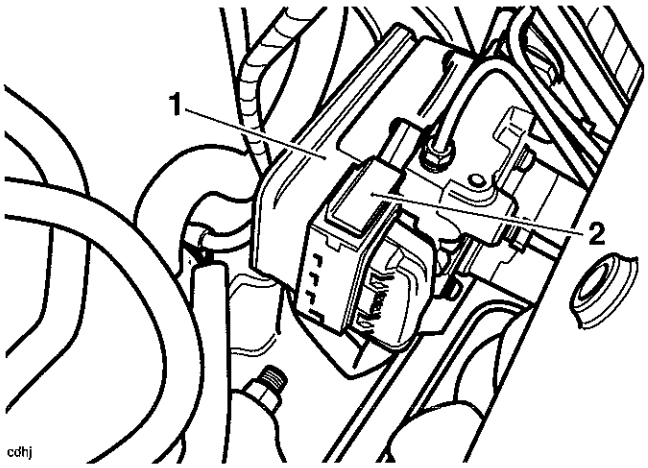
Removal

1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Remove the fuel tank (see page *10-87*).

⚠ Caution

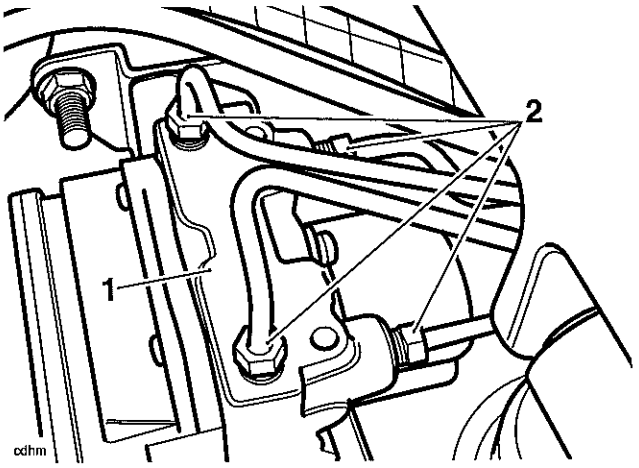
To prevent body damage, do not spill brake fluid onto any area of the bodywork or wheels.

4. Drain the fluid from the front master cylinder, attach a tube to the right hand caliper bleed nipple, slacken the nipple and allow the fluid to drain into a suitable container. Operate the brake lever until all fluid has been expelled (see page *14-14*).
5. Drain the fluid from the rear master cylinder by bleeding the system at the rear caliper until all fluid has been expelled (see page *14-21*).
6. Disconnect the ABS modulator multiplug (See page *14-56*).



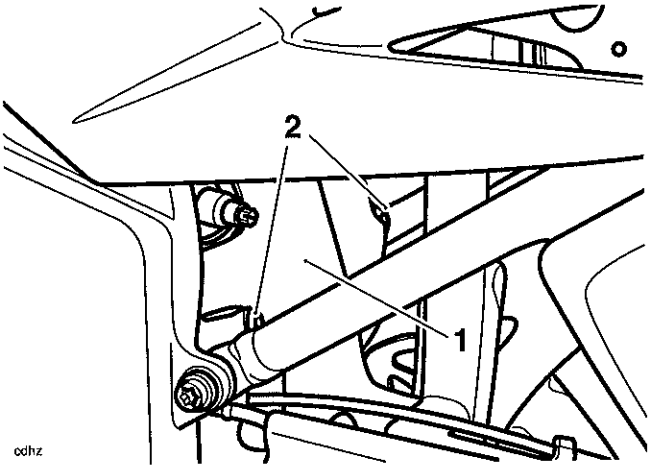
1. ABS Modulator
2. Multiplug

7. Carefully slide the cover off the brake light switch and disconnect the switch wires.
8. Loosen the 4 brake line unions and, taking care not to bend the brake lines, detach the lines from the ABS modulator.



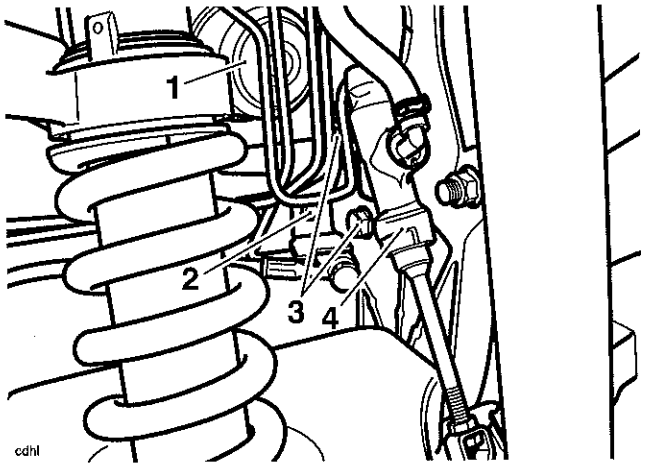
1. ABS Modulator
2. Brake Line Unions

9. Remove the clip and washer from the clevis pin at the lower end of the brake pushrod. Remove the clevis pin.
10. Remove the 2 fixings securing the rear wheel splash shield to the frame and remove the shield.



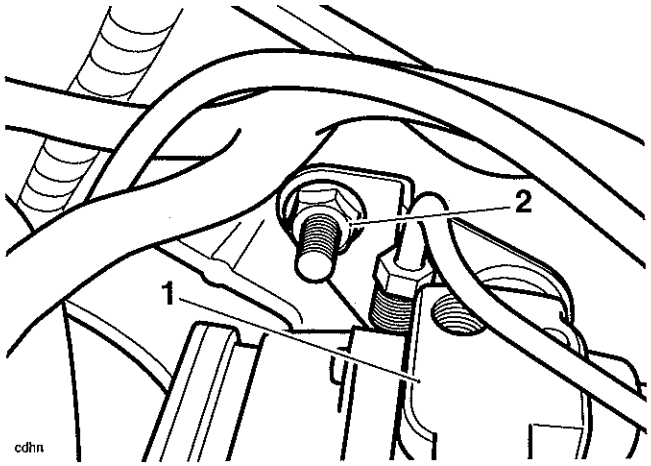
1. Splash Shield
2. Fixings

11. Remove the bolt securing the rear brake line to the ABS modulator mounting bracket.
12. Remove and discard the 2 nuts securing the rear master cylinder to the ABS modulator mounting bracket.
13. Noting the routing of the brake line from the modulator to the rear master cylinder, withdraw the master cylinder from the frame studs and position aside.



1. ABS Modulator
2. Rear Brake Line Fixing
3. Rear Master Cylinder Fixings
4. Rear Master Cylinder

14. Remove and discard the upper ABS modulator fixing nut, and withdraw the modulator from the frame studs.



1. ABS Modulator
2. Upper Fixing

15. Carefully manoeuvre the modulator from the frame, taking care not to damage the rear suspension unit. If the modulator is to be renewed, remove the mounting bracket from the modulator.

Installation

1. Install the mounting bracket to the modulator. Tighten the fixings to **9 Nm**.
2. Carefully manoeuvre the modulator on to the frame studs, taking care not to damage the rear suspension unit. Fit but do not fully tighten a new upper fixing nut.
3. Refit the rear master cylinder, ensuring the brake line is correctly routed as noted on removal. Fit new nuts.
4. Tighten the rear master cylinder and upper ABS modulator fixing to **20 Nm**.
5. Fit the rear wheel splash shield. Tighten the fixings to **3 Nm**.
6. Connect the push rod to the brake pedal using the clevis pin and a new split pin.
7. Connect the brake light switch multiplug and refit the cover.
8. Taking care not to bend the brake lines, refit the lines to the modulator and tighen to **17 Nm**.
9. Reconnect the ABS modulator multiplug, ensuring the locking device is fully engaged.
10. Bleed the front brakes (see page *14-29*).
11. Bleed the rear brakes (see page *14-30*).
12. Refit the fuel tank (see page *10-88*).
13. Connect the battery positive (red) lead first.

Warning

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

14. Refit the seat (see page *16-8*).
15. Check that the brakes operate correctly.

ABS

System Description

The ABS versions of the Sprint ST are fitted with an electronic anti-lock brake system (ABS) which is designed to prevent the wheels from locking or skidding by reducing braking effort to the front or rear brake caliper 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 wheel, the front being mounted to the wheel hub, the rear being mounted to the rear brake disc.

The front and rear master cylinders are connected via lines to the modulator and from the modulator the pipes connect to the brake calipers. The calipers and master cylinders are identical to the non-ABS equipped motorcycle.

The front and rear brake circuits operate as separate systems. The front and rear brakes are not connected in any way inside the modulator.

The modulator ECM continuously calculates the front and rear wheel speeds, and from these inputs the ECM calculates the estimated motorcycle speed, wheel deceleration/acceleration, the wheel speed difference and the wheel slip (skid) rate. This is calculated by comparing the calculated wheel speeds with the calculated vehicle speed, so that if one wheel speed deviates significantly from the other two readings, this wheel is 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 re-applies the brake pressure to prevent the wheel from slipping.

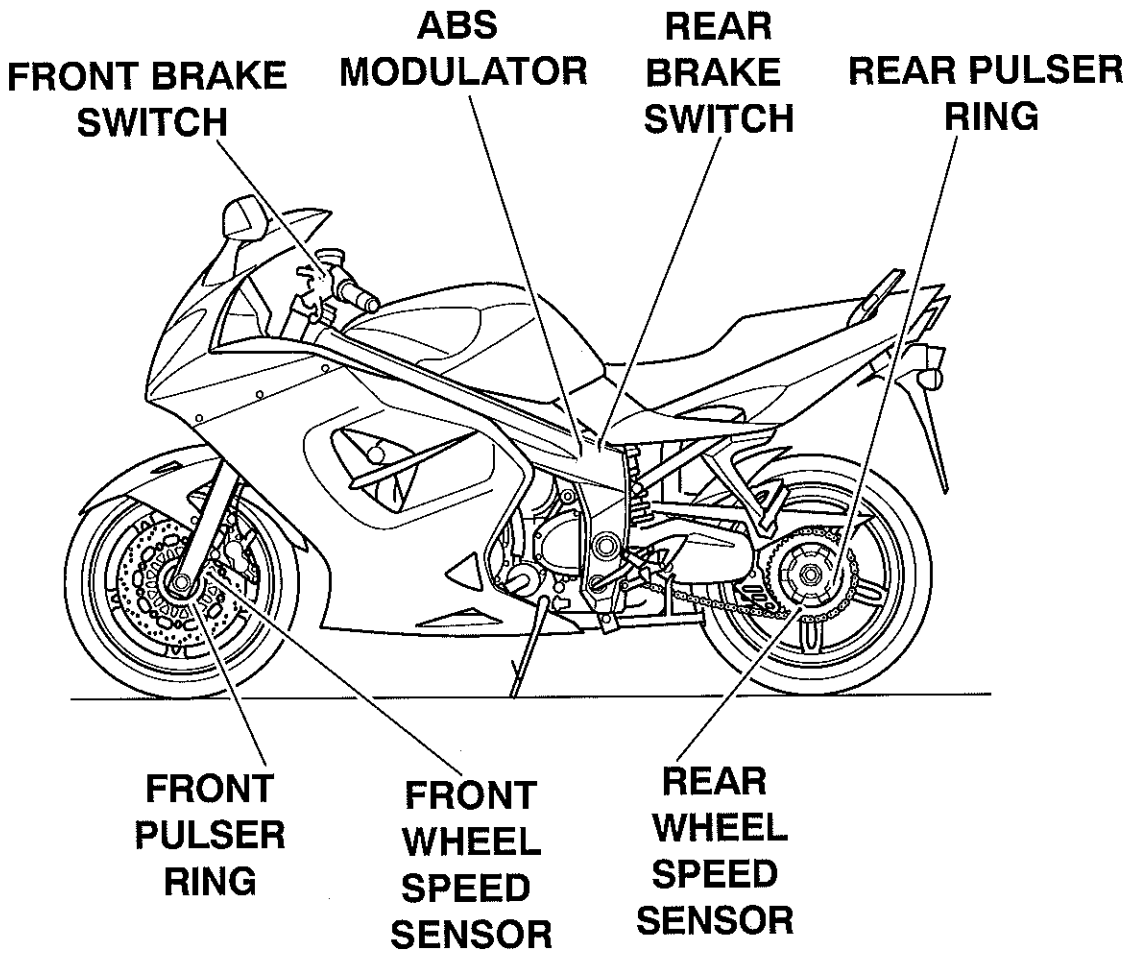
This is felt through the brake pedal or lever as a rapid 'pulsing'.

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.

The system has a self diagnostic function built-in which monitors the fail safe relay, solenoid valves, motor relay, wheel speed sensors, power supply and ground, as well as internal ECM functions. In the event of a malfunction being detected, the ECM will illuminate the ABS warning light, and store a diagnostic trouble code in the system memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

Under normal operation, the ABS warning light will stay illuminated after ignition on until the vehicle speed exceeds 6 km/h. The ABS performs a self check and if no faults are found the 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 normally. If the ABS warning light does not extinguish, or illuminates whilst the motorcycle is being ridden, refer to the ABS system diagnostics (see page 14.39).

Component Locations



ABS System Circuit Diagram - Sprint ST

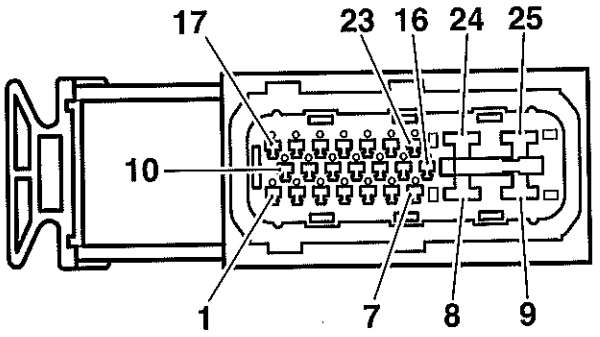
Key To Wiring Circuit Diagram

Key	Item Description
1	Fuse Box (Fuses 2 to 5)
2	Headlamp Relay
3	Ignition Switch
4	ABS Module
5	Diagnostic Connector
6	Engine Control Module
7	Front Whel Speed Sensor
8	Rear Whel Speed Sensor
9	Instruments
10	Rear Brake Light Switch Sub Harness Connector
11	Rear Brake Light Switch
12	Front Brake Light Switch
13	Brake Light

Key To Wiring Colour Codes

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

ABS ECM Connector Pin Numbering

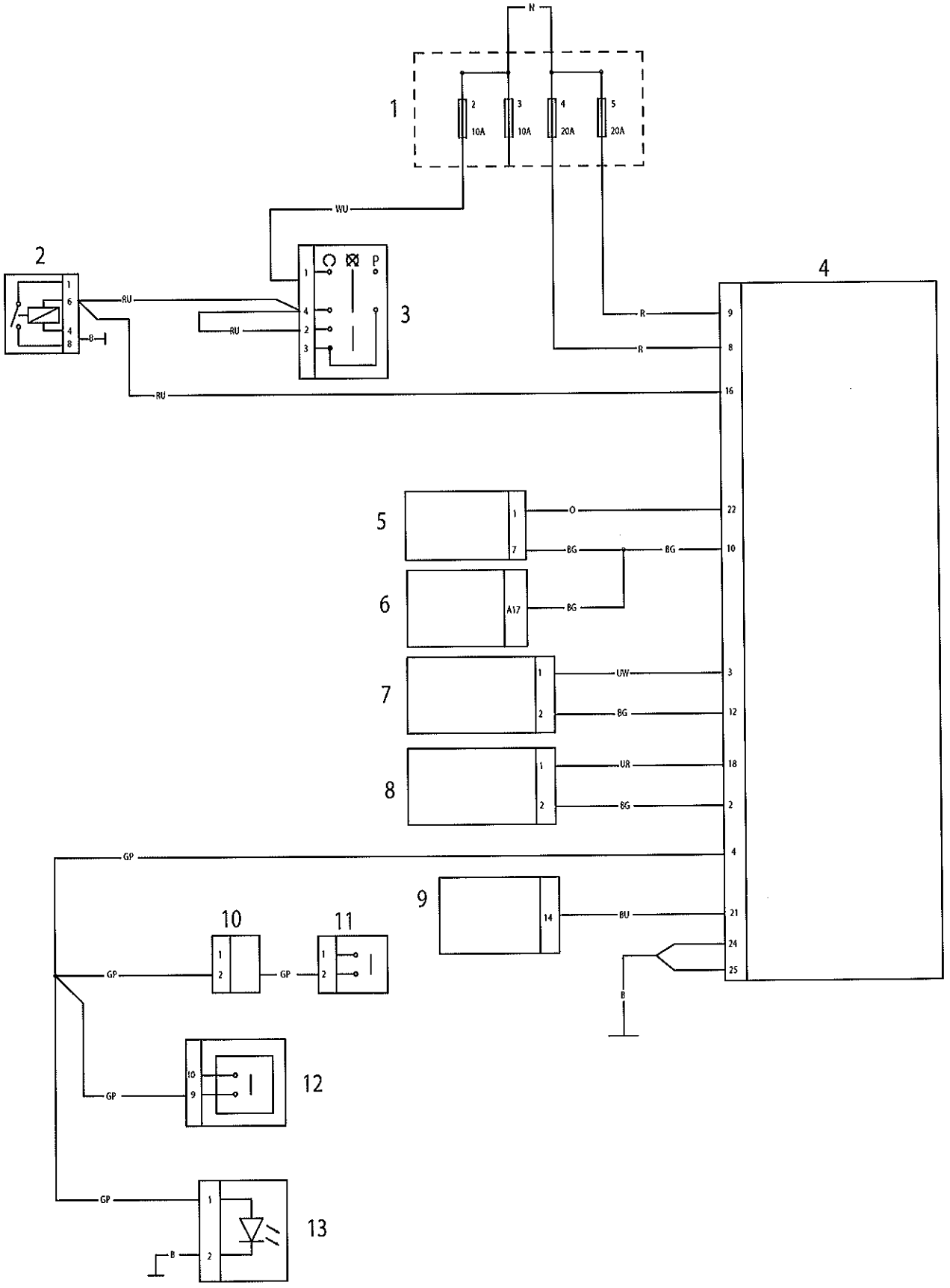


cdhg

The above illustration shows the pin numbering system used in the ABS circuit diagram.

As viewed on the mating face with the ABS ECM (as per the illustration), pins are numbered from left to right with number one in the bottom left hand corner.

ABS System Circuit Diagram - Sprint ST

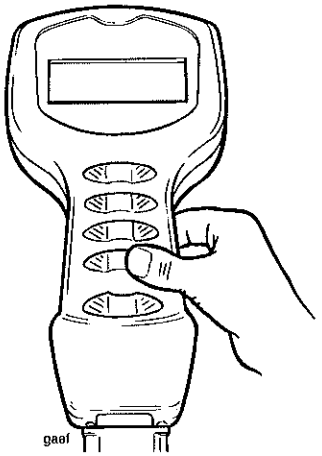


System Diagnostics

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

The tool is connected to the motorcycle using a dedicated diagnostic plug situated in the right hand storage compartment. By using a dedicated plug, no electrical connectors associated with the system are disturbed, reducing potential connector damage.

The tool allows the user to retrieve data associated with the system sensors, read build data and bleed the brake system. The data and tests available are described on the following pages.



Triumph Diagnostic Tool

Described on the following pages is the range of information which can be retrieved from the ECM's memory and the adjustments which can be performed using the Triumph service diagnostic tool.

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

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

Current Data

By using the Triumph diagnostic tool, live ABS data can be recovered from the motorcycle. The data available is:

Function Examined	Result Reported (Scale)
Front wheel speed	KPH
Rear wheel speed	KPH
Brake switch status	ON / OFF
ABS warning light status	ON / OFF

Bleed System

Using the Triumph diagnostic tool, it is possible to bleed the ABS modulator of trapped air. This is necessary when the hydraulic brake system has been dismantled, or the ABS modulator renewed.

Full details of this procedure are is provided later in this section.

Build data

The following items of build data can also be read.

Function Examined
ECM serial number

Diagnostic Trouble Codes

Diagnostic trouble codes (DTCs) are logged in the ABS ECM memory when there is a confirmed fault in the system.

The codes are reported to the Triumph diagnostic tool as a four digit code.

DTCs can be removed at any time using the Triumph diagnostic tool

The system will log the diagnostic trouble codes listed below:

Diagnostic Trouble Code (DTC)	Fault Description
C1611	Front Wheel Sensor Open Circuit / Short Circuit
C1612	Front Wheel Sensor Abnormal Input / Loosing Contact
C1613	Rear Wheel Sensor Open Circuit / Short Circuit
C1614	Rear Wheel Sensor Abnormal Input / Loosing Contact
C1621	Front Wheel Pulser Gear Missing Teeth
C1623	Rear Wheel Pulser Gear Missing Teeth
C1631	Front Wheel Input Solenoid Open / Short Circuit
C1632	Front Wheel Output Solenoid Open / Short Circuit
C1633	Rear Wheel Input Solenoid Open / Short Circuit
C1634	Rear Wheel Output Solenoid Open / Short Circuit
C1641	Front Wheel Actuator (Hydraulic Control) Wheel Lock
C1643	Rear Wheel Actuator (Hydraulic Control) Wheel Lock
C1651	Motor - Lock
C1652	Motor - Stuck OFF
C1653	Motor - Stuck ON
C1654	Solenoid Relay - Stuck OFF/ON
C1661	Power Source Voltage Drop
C1662	Power Source Voltage Rise
C1671	Different Tyre Diameter
C1681	Abnormal ECU

Diagnostic Trouble Codes

Dependant on the DTC stored, the ABS ECM will act in one of two ways:

- Inhibit ABS operation immediately, irrespective of the ABS operating mode.

Or:

- 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:

- Allow the ABS to resume operation if the fault clears.

Or:

- Allow ABS operation after an ignition cycle if the fault clears.

Or:

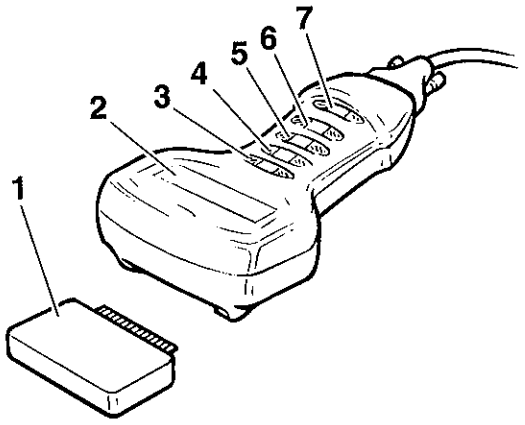
- Inhibit the ABS function until the fault is rectified and the DTC erased.

The ABS system will act on the DTC stored according to the following table:

Fault Description	**ABS warning light illuminated when fault is logged**	**ABS operation is inhibited when fault is logged**	**ABS continues to operate when fault is logged (Only when ABS is Active. When ABS is no longer active, operation is inhibited)**	**ABS will resume operation if fault clears**
Front Wheel Sensor Open Circuit / Short Circuit	Yes	Yes		No
Front Wheel Sensor Abnormal Input / Loosing Contact	Yes	Yes	Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Rear Wheel Sensor Open Circuit / Short Circuit	Yes	Yes		No
Rear Wheel Sensor Abnormal Input / Loosing Contact	Yes	Yes	Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Front Wheel Pulser Gear Missing Teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected for 1 second and speed exceeds 30 km/h. DTC remains stored
Rear Wheel Pulser Gear Missing Teeth	Yes		Yes	Yes, if after ignition cycle, no fault is detected for 1 second and speed exceeds 30 km/h. DTC remains stored
Front Wheel Input Solenoid Open / Short Circuit	Yes	Yes		No
Front Wheel Output Solenoid Open / Short Circuit	Yes		Yes	No

Fault Description	ABS warning light illuminated when fault is logged	ABS operation is inhibited when fault is logged	ABS continues to operate when fault is logged (Only when ABS is Active. When ABS is no longer active, operation is inhibited)	ABS will resume operation if fault clears
Rear Wheel Input Solenoid Open / Short Circuit	Yes	Yes		No
Rear Wheel Output Solenoid Open / Short Circuit	Yes		Yes	No
Front Wheel Actuator (Hydraulic Control) Wheel Lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Rear Wheel Actuator (Hydraulic Control) Wheel Lock	Yes		Yes	Yes, if after ignition cycle, no fault is detected. DTC remains stored
Motor - Lock	Yes		Yes	No
Motor - Stuck OFF	Yes		Yes	No
Motor - Stuck ON	Yes		Yes	No
Solenoid Relay - Stuck OFF/ ON	Yes	Yes		No
Power Source Voltage Drop	Yes, Light will extinguish if fault clears	Yes		Yes, if voltage rises above a preset threshold for more than 10 seconds
Power Source Voltage Rise	Yes, Light will extinguish if fault clears	Yes		Yes, if voltage drops below a preset threshold for more than 10 seconds
Different Tyre Diameter	Yes	Yes		No
Abnormal ECU	Yes	Yes		No

Service Diagnostic Tool



gajc

1. Memory card
2. Screen
3. Return key
4. Up key
5. Down key
6. Validate key
7. Help key

The memory card (1) contains all the information necessary to allow the technician to follow a number of different paths to:

- Diagnose faults
- Obtain data
- Bleed the system

It is removable to allow replacement / update cards to be inserted.

The screen comprises four horizontal lines and twenty vertical columns forming a series of boxes into which letters and numbers can be displayed to provide the necessary question, message, answer etc.

At the left of the screen, one or more symbols as detailed below may be displayed.

					A	B	S		D	I	A	G	N	O	S	T	I	C	S
		C	U	R	R	E	N	T		D	A	T	A						
▶		R	E	A	D		S	T	O	R	E	D		D	T	C	S		
▼		C	L	E	A	R		D	T	C	S								

Typical screen showing symbol examples

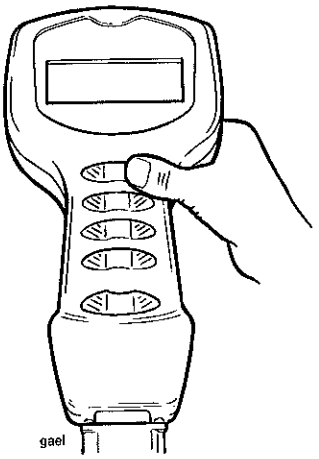
▲▼ Cursors to indicate that further lines of text are available to be seen above and/or below those already in view, by scrolling the text up or down using the 'Up' or 'Down' keys.

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

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

Tool Keys

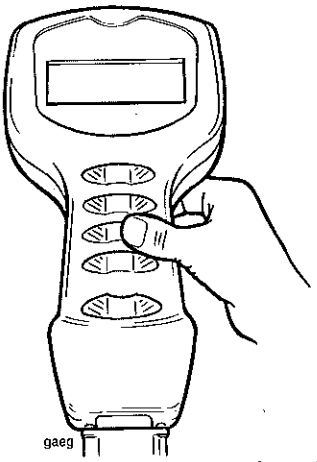
In most cases, the **Return** key (↵) enables the user to return to the screen last displayed.



gael

Return key

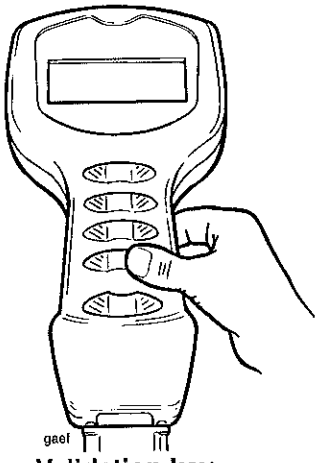
The Up and Down keys - press to move the lines of text up or down.



gaeg

Up/down keys (2 separate keys)

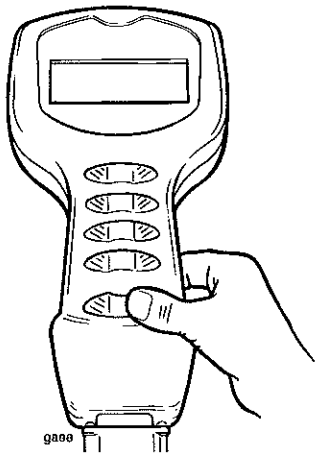
Press the **Validation** key (*) to move on to the next message.



gaef

Validation key

The **Help** key can be used when the **'?'** symbol shows, to get more information about that line of text. To return to the diagnostic screen from the help area, press the help **'?'** button again.



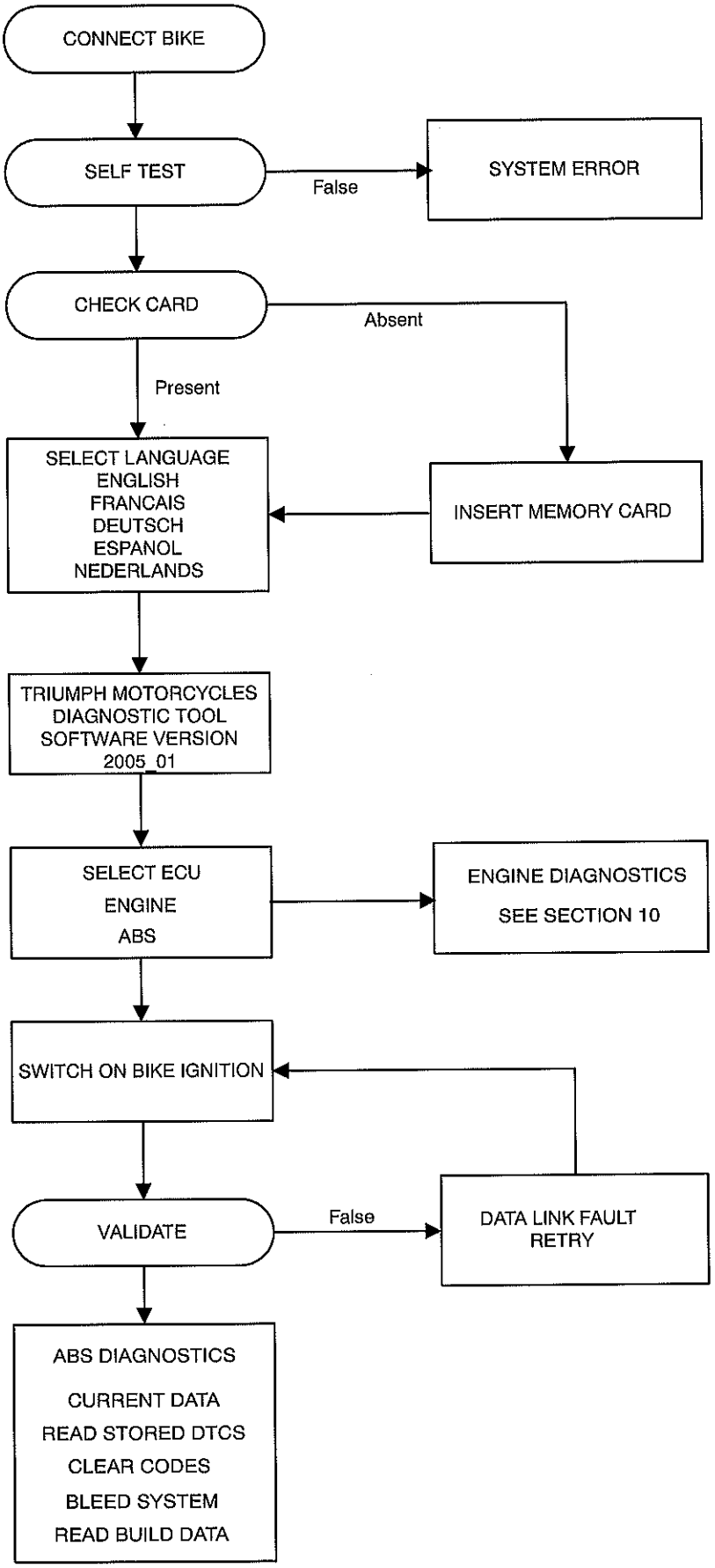
Help key

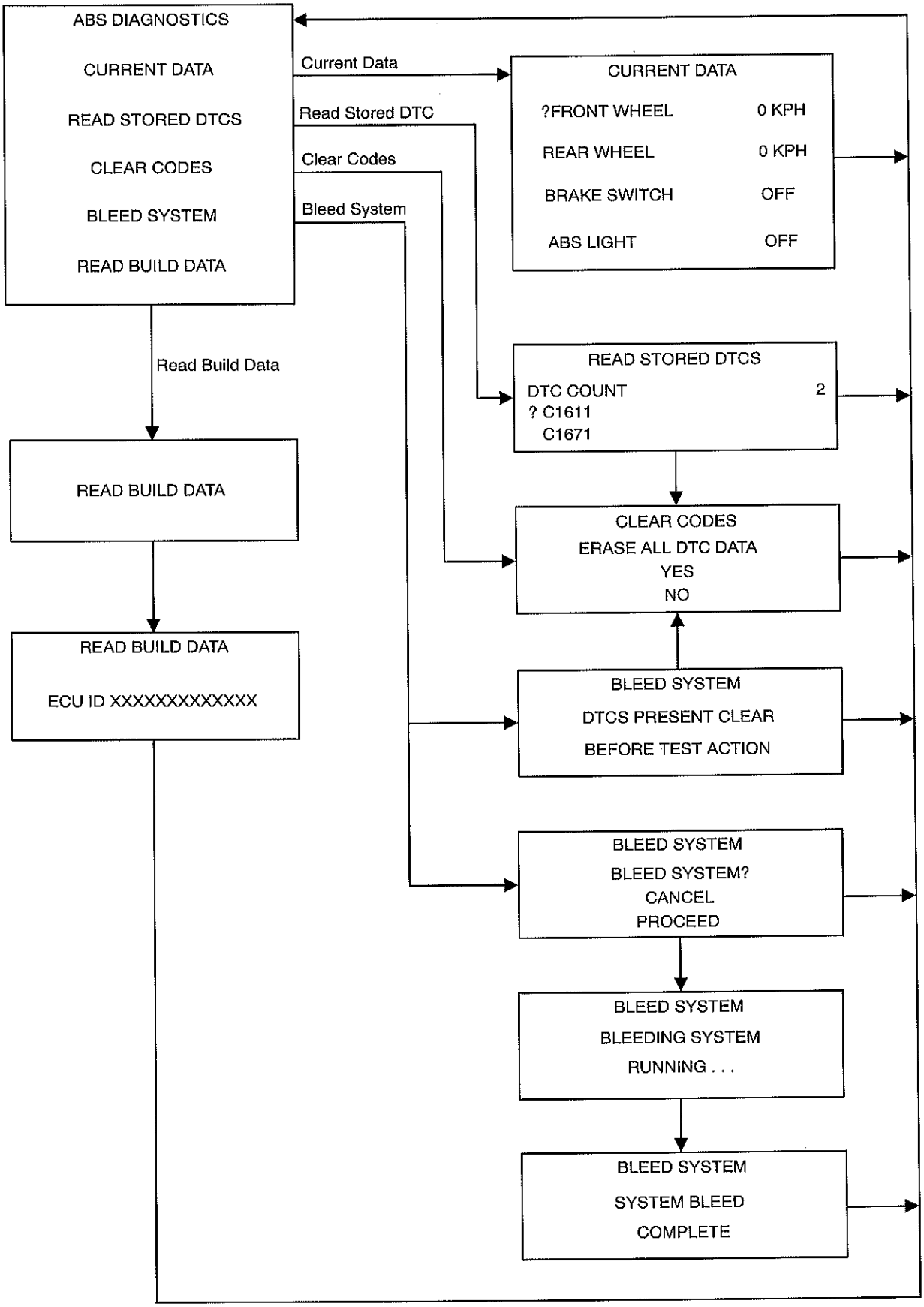
Test Procedure

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

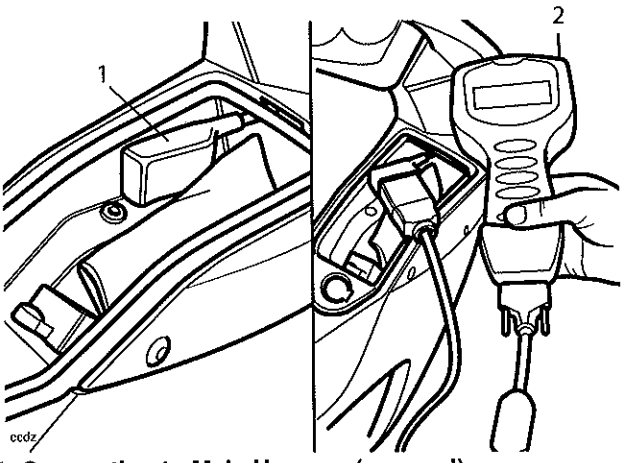
Note:

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


CONNECT BIKE
SELF TEST
False
SYSTEM ERROR
CHECK CARD
Absent
Present
SELECT LANGUAGE
ENGLISH
FRANCAIS
DEUTSCH
ESPANOL
NEDERLANDS
INSERT MEMORY CARD
TRIUMPH MOTORCYCLES
DIAGNOSTIC TOOL
SOFTWARE VERSION
2005_01
SELECT ECU
ENGINE
ABS
ENGINE DIAGNOSTICS
SEE SECTION 10
SWITCH ON BIKE IGNITION
VALIDATE
False
DATA LINK FAULT
RETRY
ABS DIAGNOSTICS
CURRENT DATA
READ STORED DTCS
CLEAR CODES
BLEED SYSTEM
READ BUILD DATA


ABS DIAGNOSTICS
CURRENT DATA
READ STORED DTCS
CLEAR CODES
BLEED SYSTEM
READ BUILD DATA
Current Data
Read Stored DTC
Clear Codes
Bleed System
CURRENT DATA
?FRONT WHEEL 0 KPH
REAR WHEEL 0 KPH
BRAKE SWITCH OFF
ABS LIGHT OFF
Read Build Data
READ STORED DTCS
DTC COUNT 2
? C1611
C1671
READ BUILD DATA
CLEAR CODES
ERASE ALL DTC DATA
YES
NO
READ BUILD DATA
ECU ID XXXXXXXXXXXXX
BLEED SYSTEM
DTCS PRESENT CLEAR
BEFORE TEST ACTION
BLEED SYSTEM
BLEED SYSTEM?
CANCEL
PROCEED
BLEED SYSTEM
BLEEDING SYSTEM
RUNNING . . .
BLEED SYSTEM
SYSTEM BLEED
COMPLETE

1. Connection and Power-Up



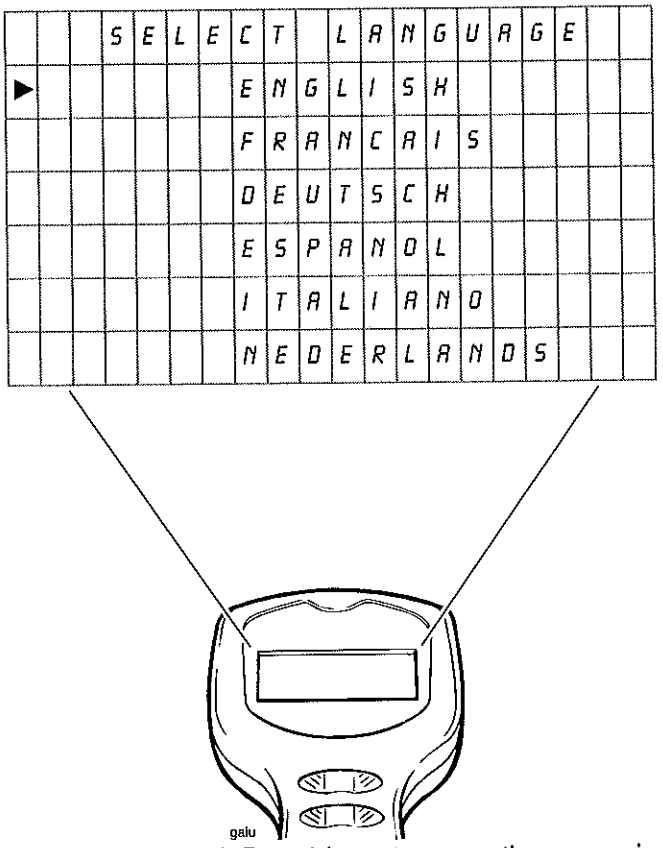
1. Connection to Main Harness (arrowed)
2. Triumph Service Diagnostic Tool

Connect the tool to the dedicated multiplug in the storage compartment on the right hand side of the motorcycle.

A message appears on the screen and certain checks are made automatically, e.g. Is the memory card fitted?

'SELECT LANGUAGE' will then be displayed.

2 SELECT LANGUAGE



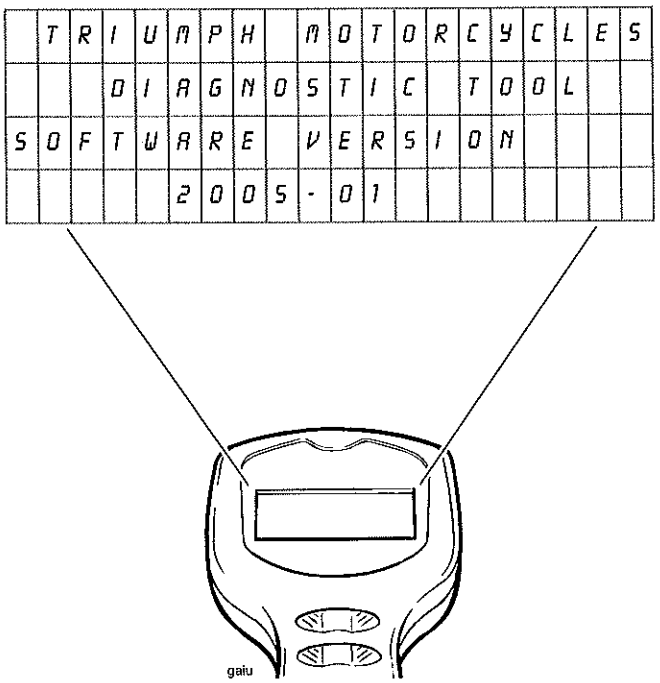
Use the 'Up' and 'Down' keys to move the cursor in column 1 and select the language required.

Note:

- **The tool will always select English as the default language, and it is only necessary to use the cursor to select one of the other languages. The entire diagnostic session will then continue in the chosen language.**

Press the validation key '*' to move on.

3 TRIUMPH MOTORCYCLES

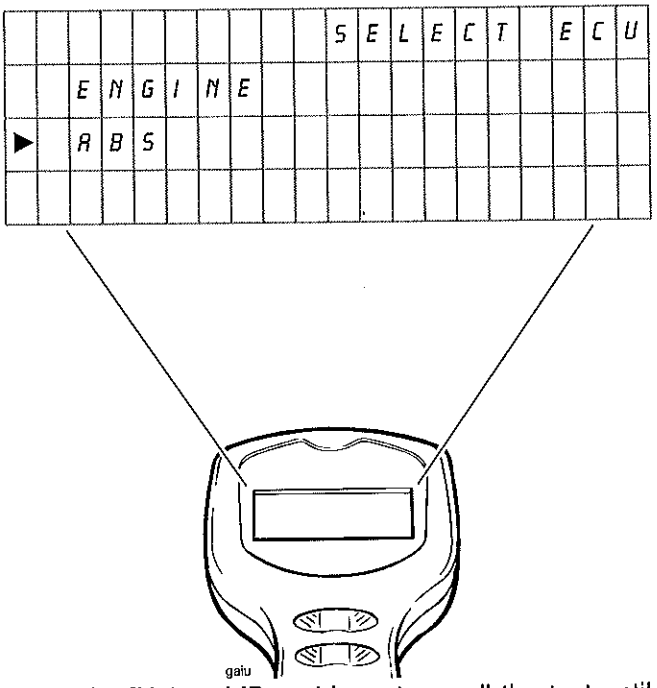


The screen will display the message 'Triumph Motorcycles Diagnostic Tool' and will also give the diagnostic software version and the software release year.

Press the validation key '*' to move on.

If the Return key (↵) is pressed, the tool will return to the **'SELECT LANGUAGE'** display.

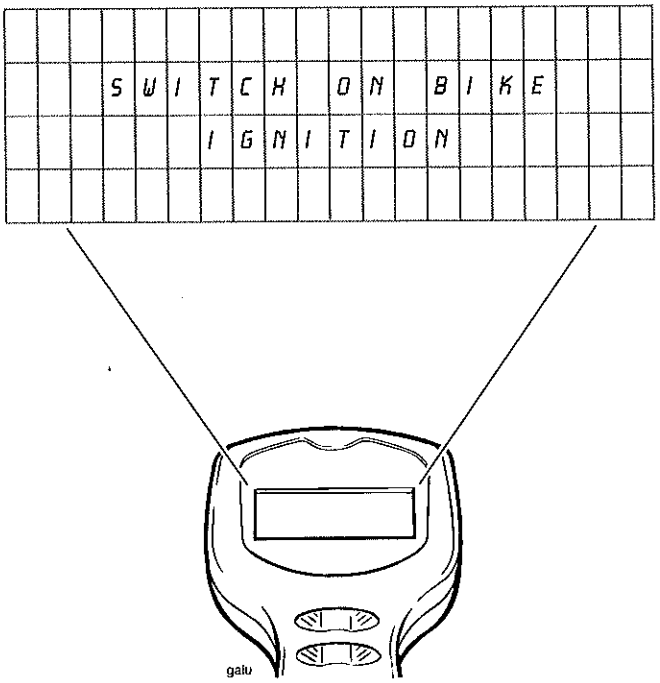
4 SELECT ECU



Use the 'Up' and 'Down' keys to scroll the text until the horizontal arrowhead is positioned opposite the **'ABS'**, and press the Validation key '*'.

'SWITCH ON BIKE IGNITION' will appear on the screen (see operation *5*).

5 SWITCH ON BIKE IGNITION



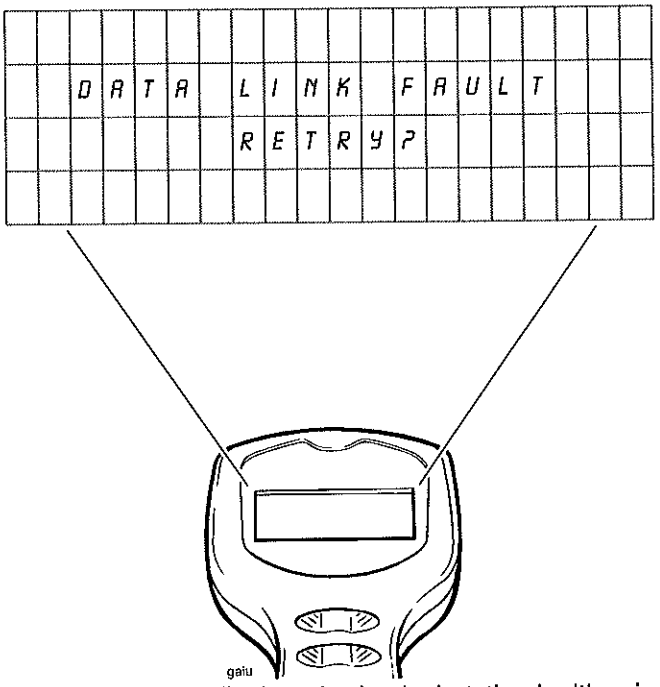
Switch on the ignition. Do NOT start the engine.

Press the validation key '⁎'. During a short delay period the tool will carry out certain validation checks.

If it detects a problem which will invalidate the test, **'DATA LINK FAULT RETRY?'** will be displayed (see operation *6*).

If all is OK, **'ABS DIAGNOSTICS'** will appear on the screen.

6 DATA LINK FAULT RETRY?



If the above is displayed, check that the ignition is switched on.

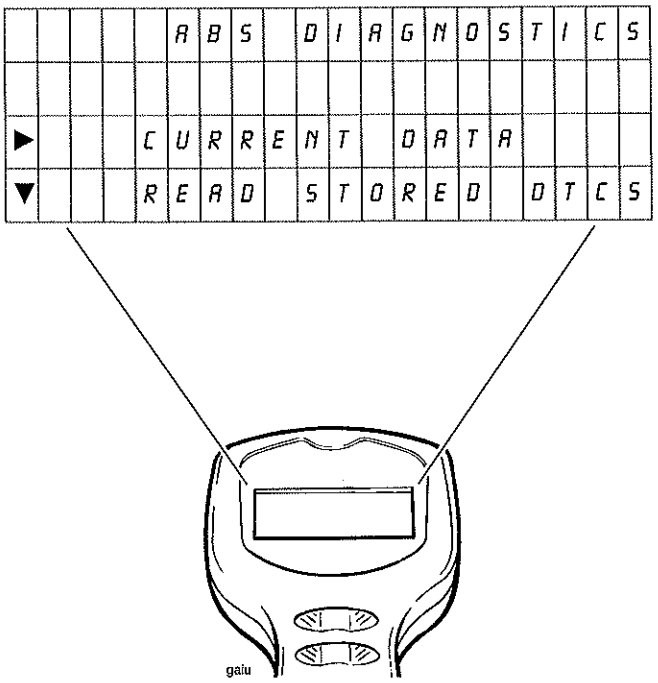
If the ignition is already on, the problem may be caused by bad connections, faulty ignition switch, cable break, faulty ABS ECM, flat battery etc.

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

Rectify the problem and press the Validation key '⁎' to return to **'SWITCH ON BIKE IGNITION'**.

Press the Validation key '⁎' again. If the tool accepts that the problem has been rectified, **'ABS DIAGNOSTICS'** will be displayed (see operation *7*).

7 ABS DIAGNOSTICS



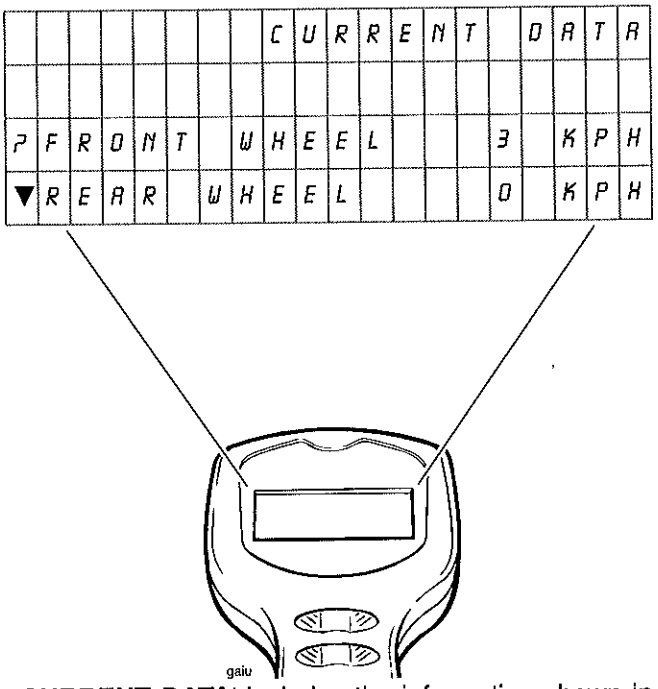
This display is the ' **ABS DIAGNOSTICS'** menu.

Use the 'Up' and 'Down' keys to scroll the text until the horizontal arrowhead is positioned opposite the desired choice, and press the Validation key '⁎'.

The choices are:

- **'CURRENT DATA'** (see operation *8*)
- **'READ STORED DTCS'** (see operation *10*)
- **'CLEAR DTCS'** (see operation *11*)
- **'BLEED SYSTEM'** (see operation *12*)
- **'READ BUILD DATA'** (see operation *17*)
- If **'QUIT'** is selected, the display will return to **'TRIUMPH MOTORCYCLES'**.

8 CURRENT DATA

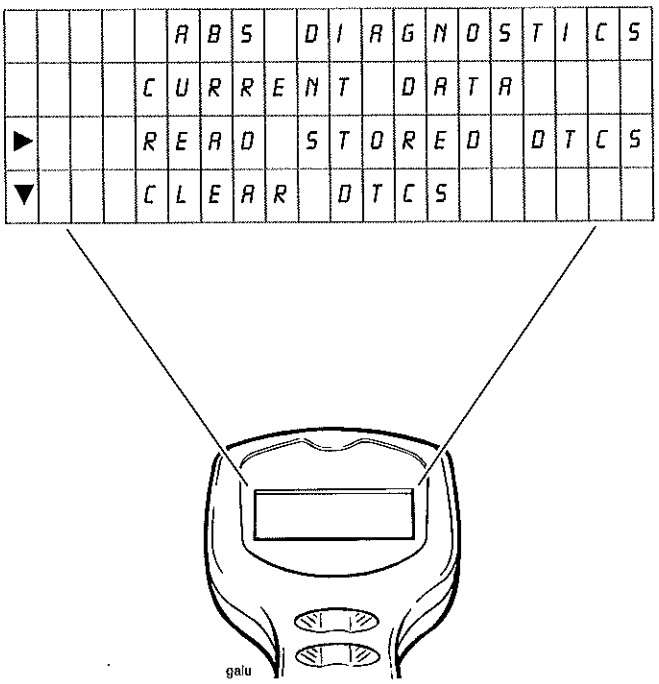


'CURRENT DATA' includes the information shown in the table below which can be accessed by scrolling, using the 'Up' and 'Down' keys. At the end of each line of text, the actual reading at that instant is provided to assist diagnosis e.g. **FRONT WHEEL 3 KPH**

For a complete list of the items reported, see the table titled 'CURRENT DATA' earlier in this section.

Press any key to return to the **'CURRENT DATA'** text. When all information has been noted, press either the Validation '⁎' or Return (↵) keys.

9 To select 'READ STORED DTCS' (Diagnostic Trouble Codes) from the ABS DIAGNOSTICS menu:

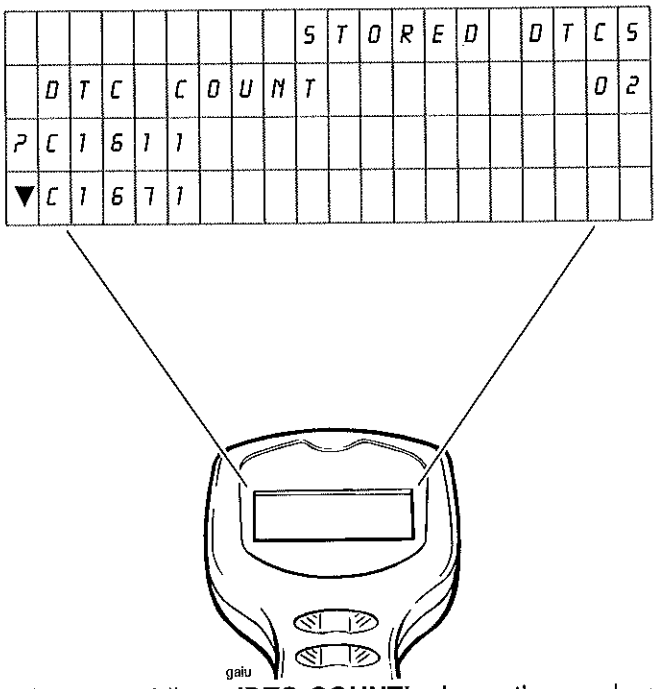


Use the 'Up' and 'Down' keys to position the cursor opposite **'READ STORED DTCS'**.

Press the Validation key '*'.

'STORED DTCS' will be displayed.

10 STORED DTCS



The second line - **'DTC COUNT'**, shows the number of DTCs stored in the ABS ECM memory.

Lines 3 and 4 display up to two of the DTCs stored (if any). If additional DTCs are stored, this will be indicated by a downward pointing arrowhead, and it/ they can be accessed using the 'Up' and 'Down' keys.

If there are no DTCs shown, press the Return key (↵) to return to **MAIN MENU**.

(If DTCs are present when the Return key is pressed, display will read **'STORED DTCS, ERASE ALL DTC DATA YES/NO'**).

Information about each DTC can be obtained by scrolling the text until the appropriate code is opposite the **'?'** in line 3; then press the **Help** key (**?**).

DTC example: *C1611*

Help text:

FRONT WHEEL SENSOR OPEN / SHORT CIRCUIT

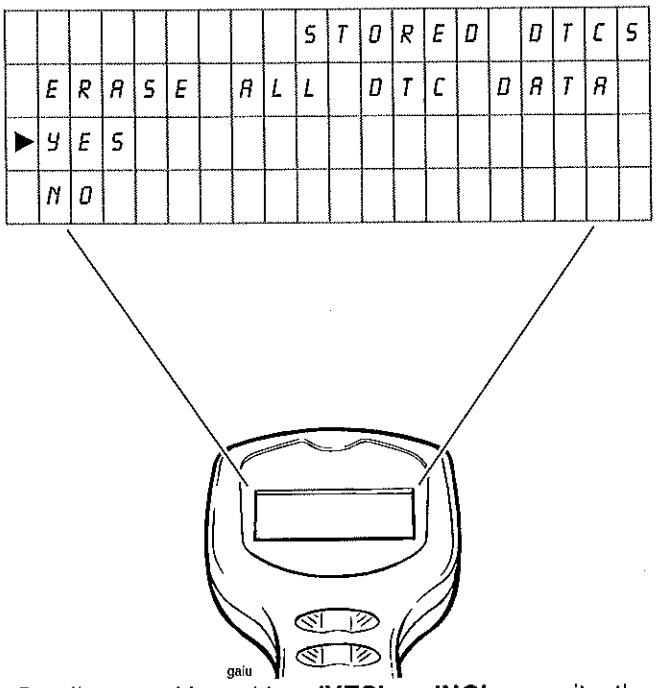
Press the Validation key '*' to continue.

Scroll to **'CLEAR DTCS'** and press the Validation key '*' to go on to operation *11*

Note:

- **A full list of all the possible DTCs can be found earlier in this section (see page *14-40*.**

11 CLEAR DTCS



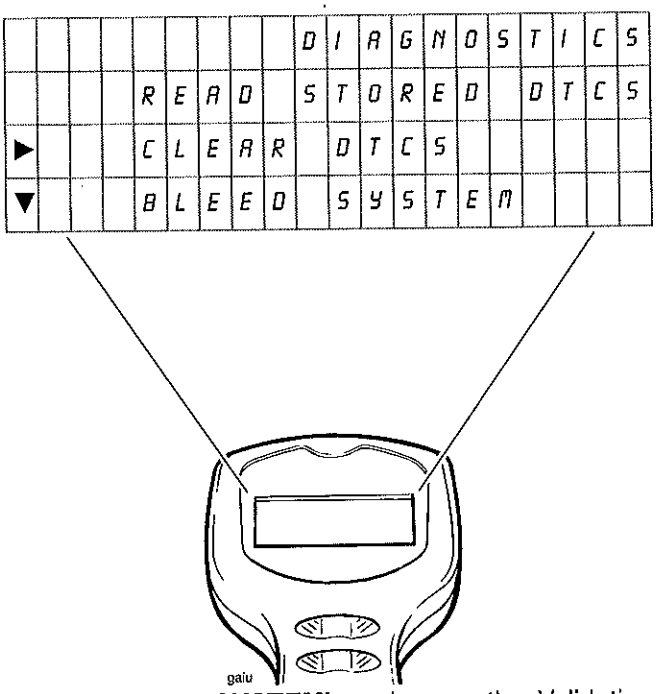
Scroll to position either **'YES'** or **'NO'** opposite the cursor.

If **'YES'** is selected, press the Validation key '⁎' to erase all DTC data from the memory. **'ABS DIAGNOSTICS'** will then be displayed.

If **'NO'** is selected, press the Validation key '⁎' to return to operation *7*.

That completes the DTC cycle.

12 To select 'BLEED SYSTEM' from the MAIN MENU:



Select **'BLEED SYSTEM'**, and press the Validation key '⁎'.

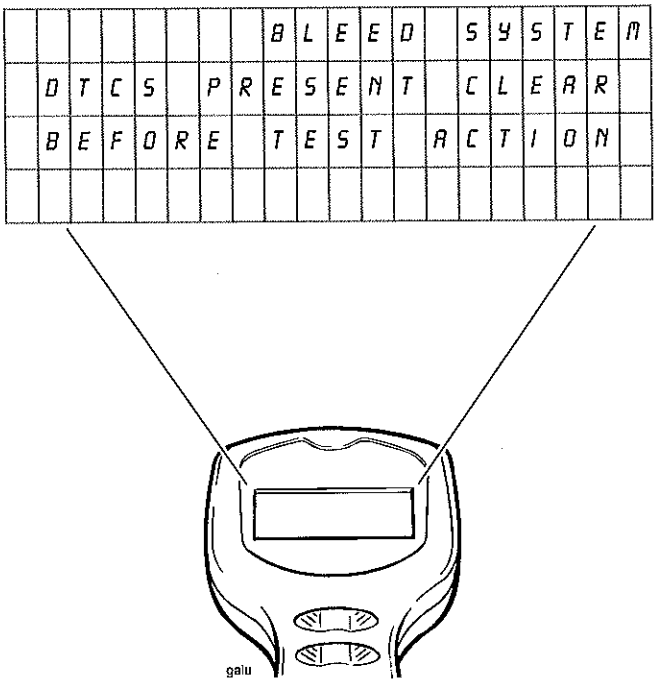
If no DTC'S are stored, **'BLEED SYSTEM?'** will be displayed (see operation *14*).

If one or more DTC'S are stored, the message **'DTCS PRESENT CLEAR BEFORE TEST ACTION'** will be displayed (see operation *14-53*).

Note:

- **The diagnostic tool will not allow the 'BLEED SYSTEM' command to be accessed until all DTCs in the memory are removed.**

13 BLEED SYSTEM - STORED DTCS



To clear the DTCs, press the Validation key '*'. **'STORED DTCS'** will be displayed (see operation *10*).

Scroll to **'YES'** and press the Validation key '*' to erase all DTC data; the **MAIN MENU** will be displayed again.

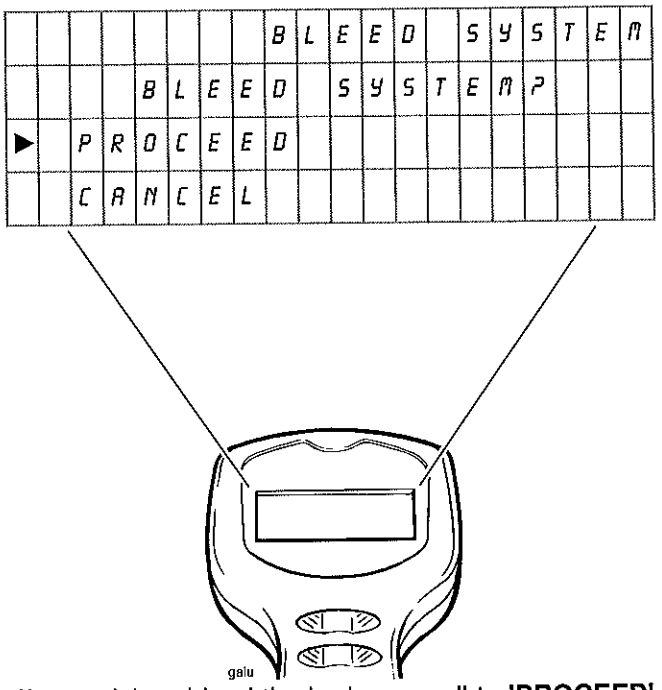
Note:

- **The fault(s) which caused the DTCs to be set must be rectified and cleared before continuing the Bleed System command.**
- **A full list of all the possible DTCs can be found earlier in this section.**

Select the **'ABS DIAGNOSTICS'** menu and **'BLEED SYSTEM'** again pressing the Validation key '*' each time.

Because the DTCs have now been erased, the **'BLEED SYSTEM?'** (see operation *14*) will now be displayed.

14 BLEED SYSTEM?



If you wish to bleed the brakes, scroll to **'PROCEED'** and press the Validation key '*'.

If you do not wish bleed the brakes scroll down to **'CANCEL'** and press the Validation key '*'. The display will return to the **'BLEED SYSTEM?'** command.

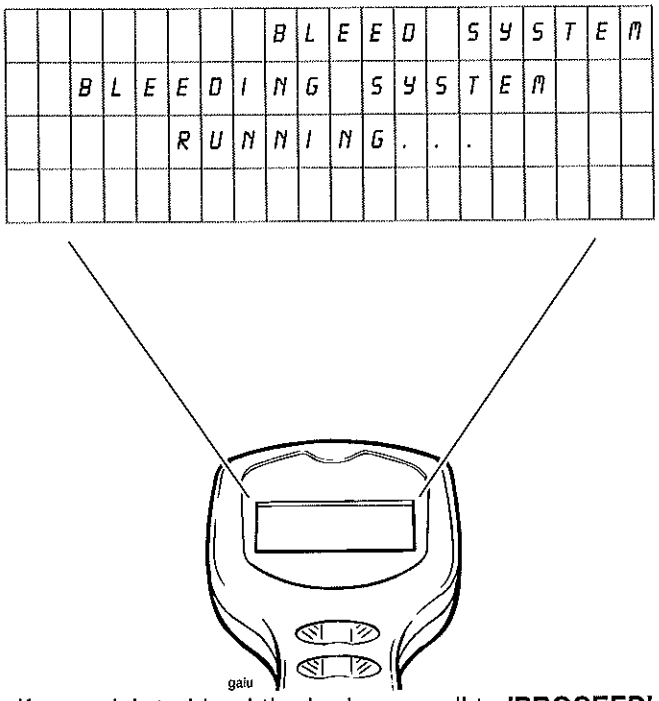
The ABS modulator solenoid valves are energised when the test is confirmed and ended when the bleed system command completes automatically (after approx. 7 seconds).

See Bleeding ABS Brakes earlier in this section (see page *14-29* for the front brakes or page *14-30* for the rear brake).

Note:

- **If the Return key (↵) is pressed, the tool will return to 'TRIUMPH MOTORCYCLES' (operation *3*).**

15 BLEEDING SYSTEM



If you wish to bleed the brakes, scroll to **'PROCEED'** and press the Validation key '*'.

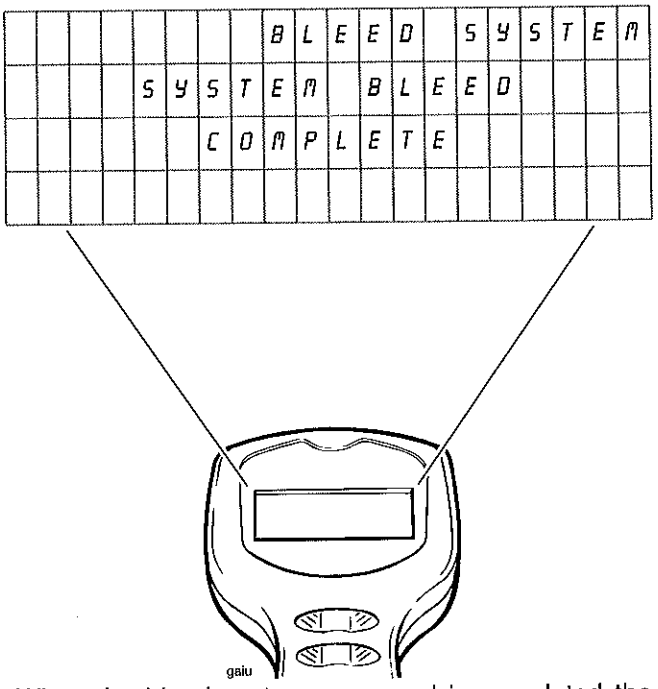
The the ABS modulator solenoid valves are energised when the test is confirmed and ended when the bleed system command completes automatically.

See Bleeding ABS Brakes earlier in this section (see page *14-29* for the front brakes or page *14-30* for the rear brake).

Note:

- **If the Return key (↵) is pressed, the tool will return to 'DIAGNOSTICS' menu (operation *7*).**

16 SYSTEM BLEED COMPLETE

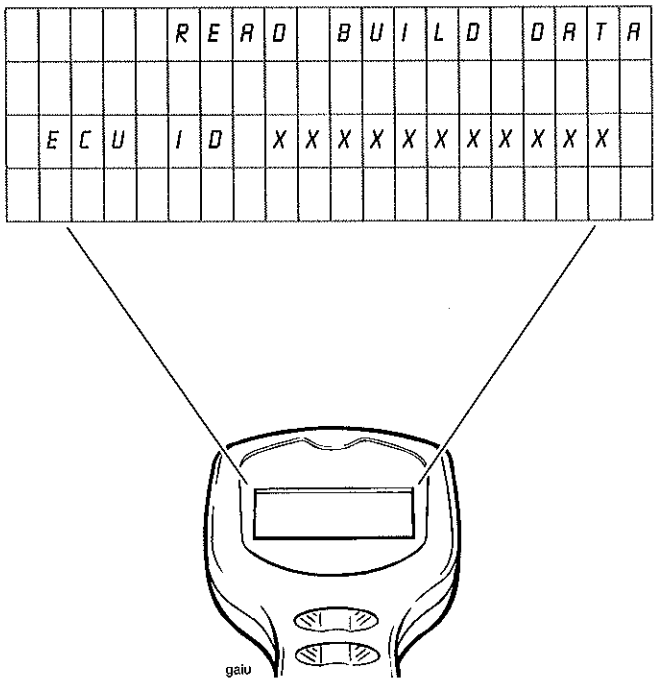


When the bleed system command is completed the display will read **'SYSTEM BLEED COMPLETE'**.

Press the Validation key '*' to return to **'BLEED SYSTEM?'** if the bleed system command is to be repeated (see operation *14*).

If you do not wish to repeat the bleed system command, press the Return key (↵). The display will return to **'TRIUMPH MOTORCYCLES'** menu (operation *3*).

17 READ BUILD DATA



The display will show the following information relating to the motorcycle under test.

- ABS ECM Serial number

Press the Validation '*' key to return to **'ABS DIAGNOSTICS'** menu (operation 7).

Electrical Connectors

Before beginning any diagnosis, the following connector related information should be noted:

Note: A major cause of hidden electrical faults can be traced to faulty electrical connectors.

For example:

- Dirty/corroded terminals.
- Damp terminals.
- Broken or bent cable pins within multi-plugs.

For example, the ABS electronic control module (ABS ECM) relies on the supply of accurate information to enable it to monitor and control the brake system. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

If, when carrying out fault diagnosis, a fault appears to clear by simply disconnecting and reconnecting an electrical plug, examine each disconnected plug for the following.

Before Disconnection:

- **If testing with a voltmeter, the voltage across a connector should be virtually battery volts (unless a resistor is fitted in the circuit). If there is a noticeable change, suspect faulty/dirty connections.**

When Disconnecting a Connector:

- **Check for a security device that must be released before the connector can be separated. E.G. barb, hook and eye etc.**

When Inspecting a Connector:

- **Check that the individual pins have not been bent.**
- **Check for dampness/dirt/corrosion.**
- **Check cables for security.**
- **Check cable pin joints for damage.**

When Connecting a Connector.

- **Ensure there is no dirt around the connector/seal.**
- **Push together squarely to ensure terminals are not bent or incorrectly located.**
- **Push the two halves together positively.**

Disconnection of ABS ECM connector

Caution

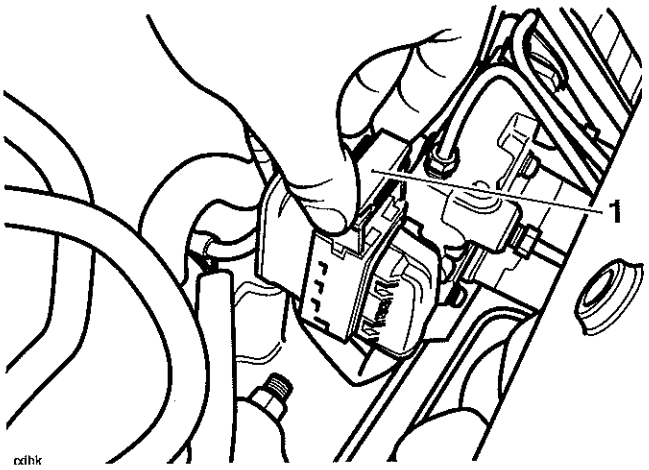
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

Caution

Never disconnect the ABS ECM when the ignition switch is in the 'ON' position as this may cause multiple fault codes to be logged in the ECM memory.

Always disconnect an ECM after disconnecting the battery negative (black) lead first.

1. Lift up the locking device and gently pull back on the connector to release it from the ECM.



1. Locking device

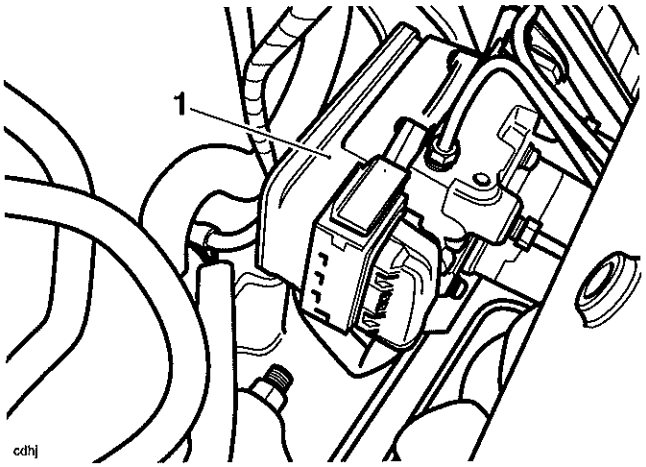
Note:

- **The ABS ECM is an integral part of the ABS modulator. Under no circumstances should the ECM be removed from the ABS modulator. If a new ECM is required, repair is by replacement of the ABS modulator and ECM as an assembly only.**

Reconnection of ABS ECM connector

Caution

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



1. ABS ECM

2. Fit the connector into its socket and, whilst holding the connector in place, push down gently on the locking device until it locks.

Further Diagnosis

The tables that follow will, if used correctly, help to pinpoint a fault in the system once a diagnostic trouble code has been stored.

Pinpoint Tests

Before starting pinpoint tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 Km/h. If the DTC is repeated proceed to the relevant pinpoint test.
4. If the DTC is not repeated this indicates the DTC may have been stored due to external influences such as bad road surfaces or electrical interference.

After completion of the pinpoint tests:

1. Delete the stored DTCs.
2. Switch the ignition OFF and ON.
3. Ride the motorcycle at a road speed in excess of 30 Km/h. If the DTC is repeated proceed to the relevant pinpoint test.
4. If a DTC is stored there is a further fault. Read the stored DTC and refer to the relevant pinpoint test.

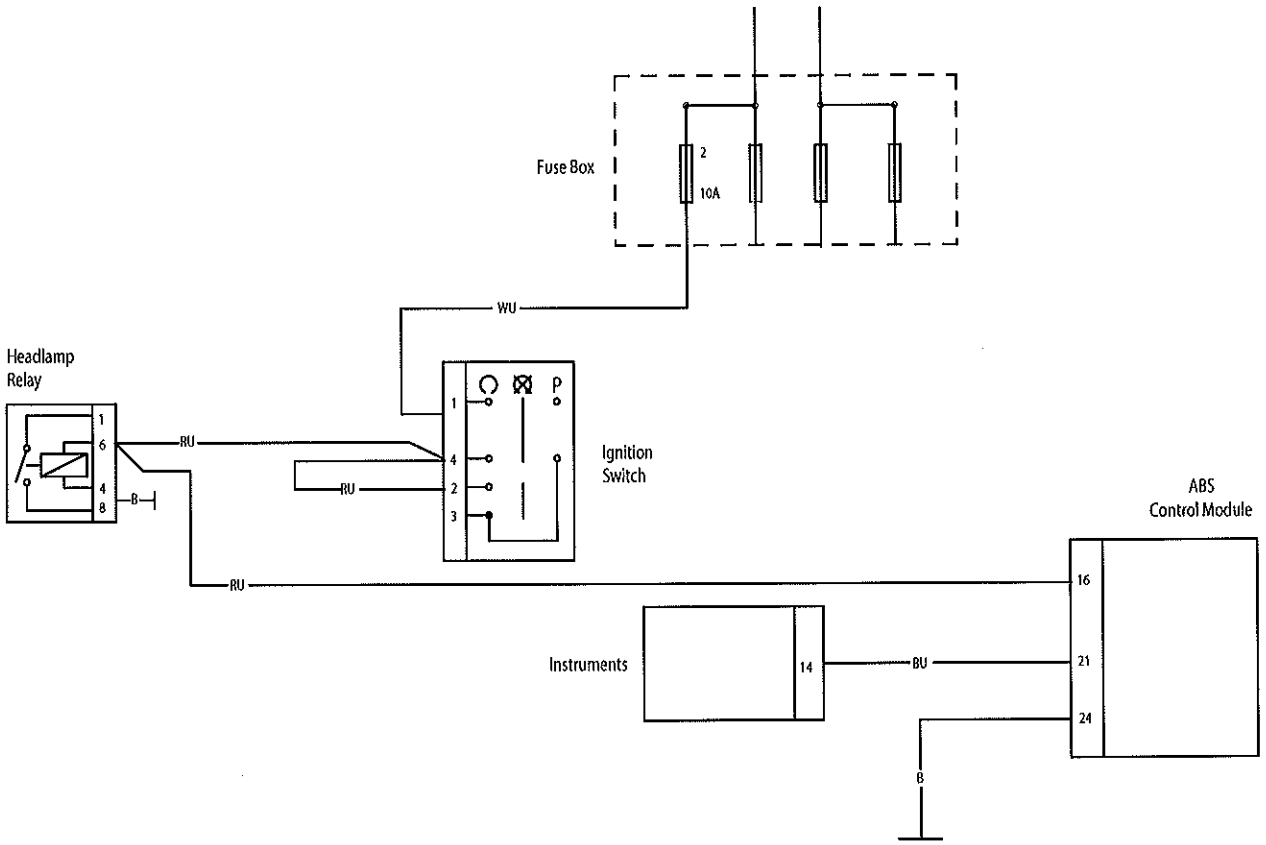
ABS Warning Light ON (No DTCs Stored)

Fault Code	Possible cause	Action
ABS Warning Light ON (No DTC's Stored)	ABS Ignition supply fuse/circuit fault ABS Warning light circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 16 and Ground pin 24	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable continuity of the ABS ignition supply circuit: With Ignition 'ON', check voltage between - ABS ECM connector pin 16 and Ground	Same as 'across battery' voltage	Proceed to test 3
		Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity of the ABS warning light circuit: Check voltage between: - ABS ECM connector pin 21 and Ground	Voltage greater than 1.5 V	Proceed to test 4
		Voltage less than 1.5 V	Locate and rectify fault, proceed to test 5
4	Check cable continuity of the ABS warning light circuit: - Short ABS ECM connector pin 21 and Ground pin 24 together: Turn Ignition 'ON'	ABS warning light 'OFF'	Proceed to test 5
		ABS warning light 'ON'	Locate and rectify fault, proceed to test 5
5	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



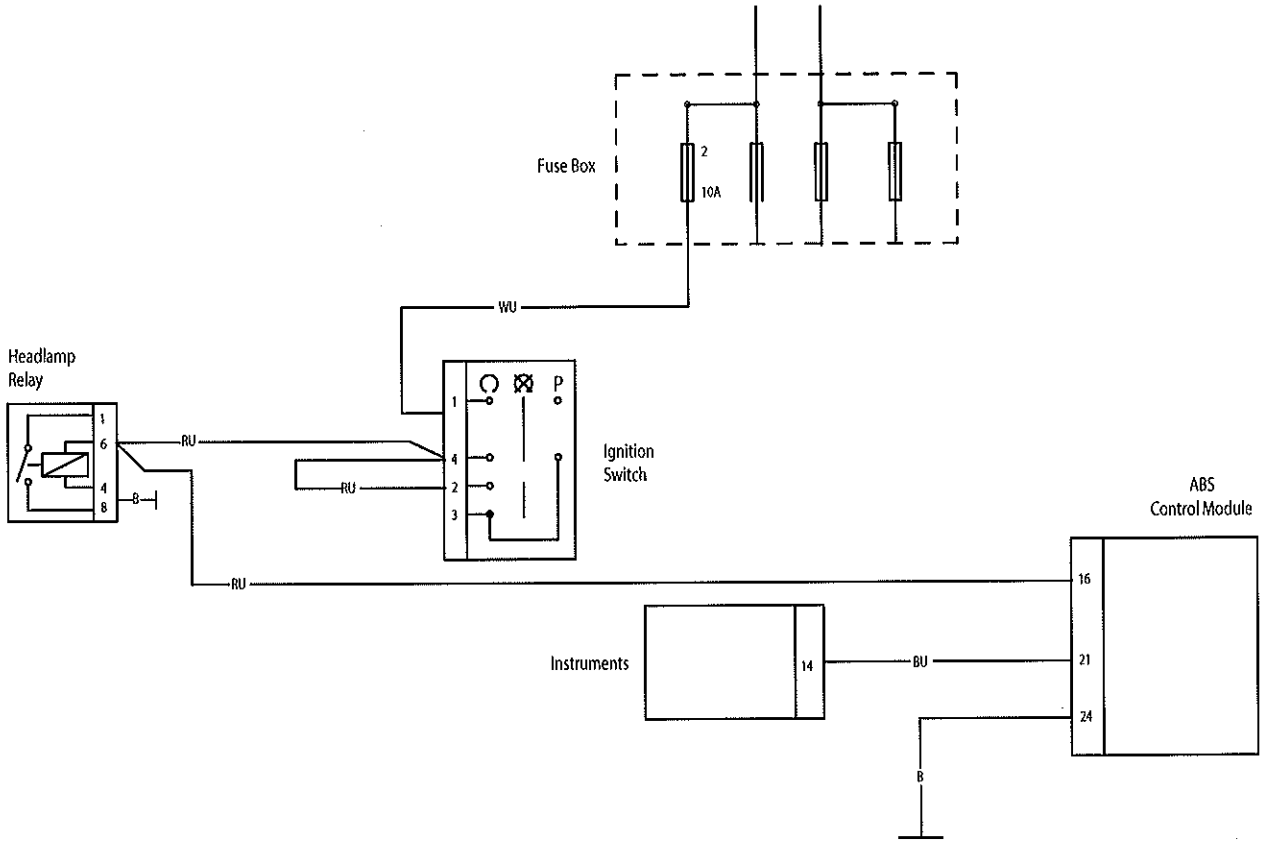
ABS Warning Light Does not Illuminate (No DTCs Stored)

Fault Code	Possible cause	Action
ABS Warning Light OFF (No DTC's Stored)	Warning light circuit fault ABS ECM ground circuit fault	Ensure ABS ECM connector is secure. Ensure ABS ECM ground connection is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 16 and Ground	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 6
2	Check the ABS warning light circuit fuse (fuse 2):	OK	Proceed to test 3
		Faulty	Replace fuse, proceed to test 6
3	Check cable for short to voltage: With Ignition 'OFF', check voltage between - ABS ECM connector pin 16 and Ground	0 V	Proceed to test 4
		Above 3 V	Locate and rectify wiring fault, proceed to test 6
4	Check cable for short to ground: With ignition 'ON', Check the ABS warning light circuit voltage between: - ABS ECM connector pin 21 and Ground	Voltage greater than 1.5 V	Proceed to test 5
		Voltage less than 1.5 V	Locate and rectify fault, proceed to test 6
5	Check cable for continuity: ABS ECM connector pin 24 and Ground: Turn Ignition 'ON'	OK	Proceed to test 6
		Faulty	Locate and rectify fault, proceed to test 6
6	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Front Wheel Sensor Open Circuit / Short Circuit

Fault Code	Possible cause	Action
C1611	Front wheel speed sensor circuit fault	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:-

Pinpoint Tests

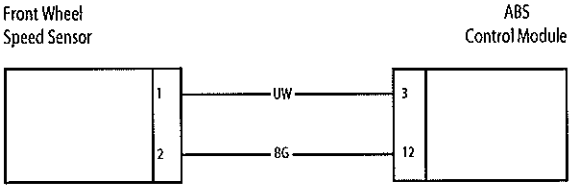
	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 3 and ABS ECM connector pin 12	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit: - ABS ECM connector pin 12 and Ground	OK	Proceed to test 4
		Short circuit	Proceed to test 3
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 3 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 12 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 3 and Wheel speed sensor connector pin 1 (motorcycle harness side)	OK	Proceed to test 8
		Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8	Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation: - Connect a suitable voltage supply between 4.5 V and 16 v between ABS ECM connector pin 12 (positive) and pin 3 (negative), and measure the current consumption of the wheel speed sensor	3 mA to 14 mA	Proceed to test 9
		Faulty	Replace the wheel speed sensor, proceed to test 9

9	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	3.1 mA	4.1 mA	5.3 mA
High (16V)	8.1 mA	10.5 mA	13.6 mA



Front Wheel Sensor Abnormal Input / Loosing Contact

Fault Code	Possible cause	Action
C1612	Front wheel speed sensor poor signal Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: -Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the wheel speed sensor circuit (See page 14.62)	OK	Contact Triumph service
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Rear Wheel Sensor Open Circuit / Short Circuit

Fault Code	Possible cause	Action
C1613	Rear wheel speed sensor circuit fault	Ensure ABS ECM connector is secure. Ensure wheel speed sensor connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:-

Pinpoint Tests

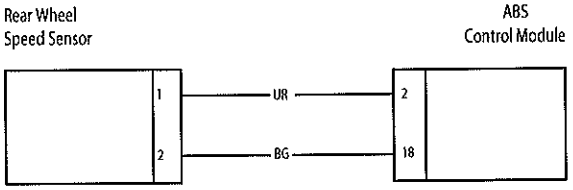
	Test	Result	Action
1	Check cable and terminal integrity:	OK	Proceed to test 2
	- ABS ECM connector pin 2 and ABS ECM connector pin 18	Faulty	Rectify fault, proceed to test 9
2	Check cable for short circuit:	OK	Proceed to test 4
	- ABS ECM connector pin 2 and Ground	Short circuit	Proceed to test 3
3	Disconnect the front wheel speed sensor connector. Check cable for short circuit:	OK	Replace the wheel speed sensor, proceed to test 9
	- Wheel speed sensor connector pin 2 (motorcycle harness side) and Ground	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
4	Check cable for short circuit:	OK	Proceed to test 6
	- ABS ECM connector pin 18 and Ground	Short circuit	Proceed to test 5
5	Check cable for short circuit:	OK	Replace the wheel speed sensor, proceed to test 9
	- Wheel speed sensor connector pin 1 (motorcycle harness side) and Ground	Short circuit	Locate and rectify wiring harness fault, proceed to test 9
6	Check cable continuity:	OK	Proceed to test 7
	- ABS ECM connector pin 2 and Wheel speed sensor connector pin 2 (motorcycle harness side)	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
7	Check cable continuity:	OK	Proceed to test 8
	- ABS ECM connector pin 18 and Wheel speed sensor connector pin 1 (motorcycle harness side)	Open circuit	Locate and rectify wiring harness fault, proceed to test 9
8	Reconnect the front wheel speed sensor connector. Check the wheel speed sensor operation:	3 mA to 14 mA	Proceed to test 9
	- Connect a suitable voltage supply between 4.5 V and 16 v between ABS ECM connector pin 2 (positive) and pin 18 (negative), and measure the current consumption of the wheel speed sensor	Faulty	Replace the wheel speed sensor, proceed to test 9

9	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram

Wheel speed sensor current consumption data under typical conditions:

Voltage	Min	Typical	Max
Low (4.5 V)	3.1 mA	4.1 mA	5.3 mA
High (16V)	8.1 mA	10.5 mA	13.6 mA



Rear Wheel Sensor Abnormal Input / Loosing Contact

Fault Code	Possible cause	Action
C1614	Rear wheel speed sensor poor signal Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque:	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the wheel speed sensor circuit (See page 14.65)	OK	Contact Triumph service
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Front Wheel Pulser Gear Missing Teeth

Fault Code	Possible cause	Action
C1621	Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque:	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the motorcycle wheel for damage/ incorrect size	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Rear Wheel Pulser Gear Missing Teeth

Fault Code	Possible cause	Action
C1623	Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor Damaged/incorrect wheels	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 5
2	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 3
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque:	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
4	Check the motorcycle wheel for damage/ incorrect size	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

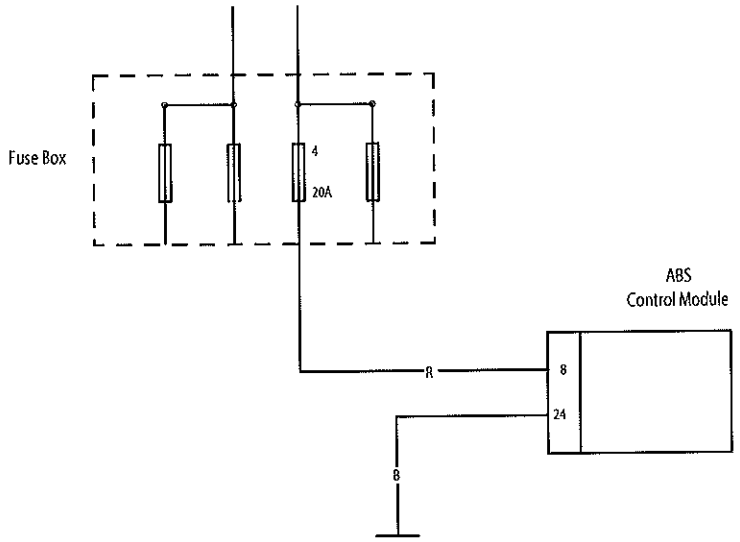
Front or Rear Input/output solenoid Open / Short Circuit

Fault Code	Possible cause	Action
Front: C1631; C1632 Rear: C1633; C1634 C1654	ABS solenoid 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 8 and Ground	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check the ABS solenoid fuse (fuse 4):	OK	Proceed to test 3
		Faulty	Replace fuse, proceed to test 5
3	Check cable continuity: With Ignition 'ON', check voltage between - ABS ECM connector pin 8 and Ground	Same as 'across battery' voltage	Proceed to test 4
		Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
4	Check cable for continuity: - ABS ECM connector pin 24 and Ground	OK	Proceed to test 5
		Faulty	Locate and rectify fault, proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Front or Rear Wheel Actuator (Hydraulic Control) Wheel Lock

Fault Code	Possible cause	Action
C1641; C1643	Binding brake Incorrect Wheel speed sensor air gap Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check the relevant wheel for brake bind caused by caliper or master cylinder faults, or other mechanical causes	OK	Proceed to test 2
		Faulty	Rectify the fault and proceed to test 4
2	Measure the air gap of the wheel speed sensor between the sensor and the pulser ring: - Air gap between 0.1 mm to 1.5 mm	OK	Proceed to test 3
		Faulty	Rectify the fault and proceed to test 4
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 4
4	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

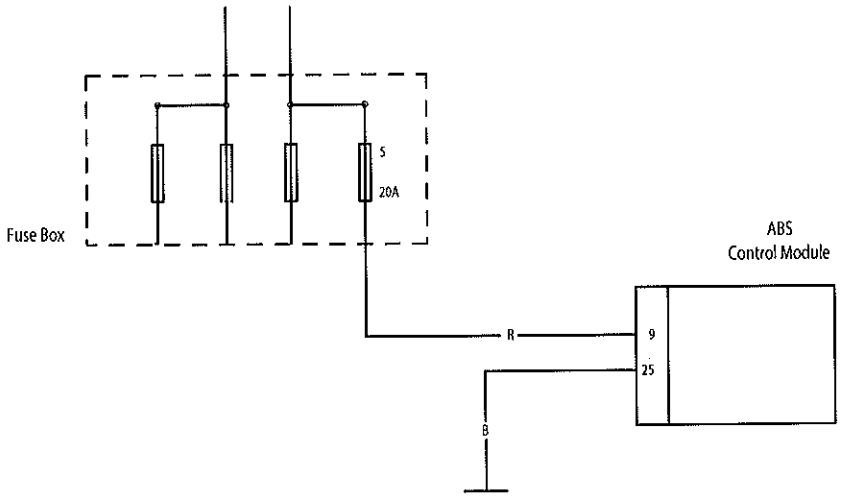
Motor - Lock; Motor Stuck OFF; Motor stuck ON

Fault Code	Possible cause	Action
C1651; C1652; C1653	Motor circuit fault Motor runs continually Motor does not run at all	Ensure ABS ECM connector is secure. Turn the ignition 'ON'. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check the motor function: Check that with the motorcycle stationary and the ABS ACM modulator connected, the motor does not operate.	OK	Proceed to test 2
		Motor runs continually.	Contact Triumph service
2	Check the ABS motor circuit fuse (fuse 5)	OK	Proceed to test 3
		Faulty	Replace fuse and proceed to test 5
3	Check cable continuity: With Ignition 'ON', check voltage between: - ABS ECM connector pin 9 and Ground	Same as 'across battery' voltage	Proceed to test 4
		Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 5
4	Check cable for continuity: - ABS ECM connector pin 25 and Ground	OK	Proceed to test 5
		Faulty	Locate and rectify fault, proceed to test 5
5	Reconnect ABS ECM harness, clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



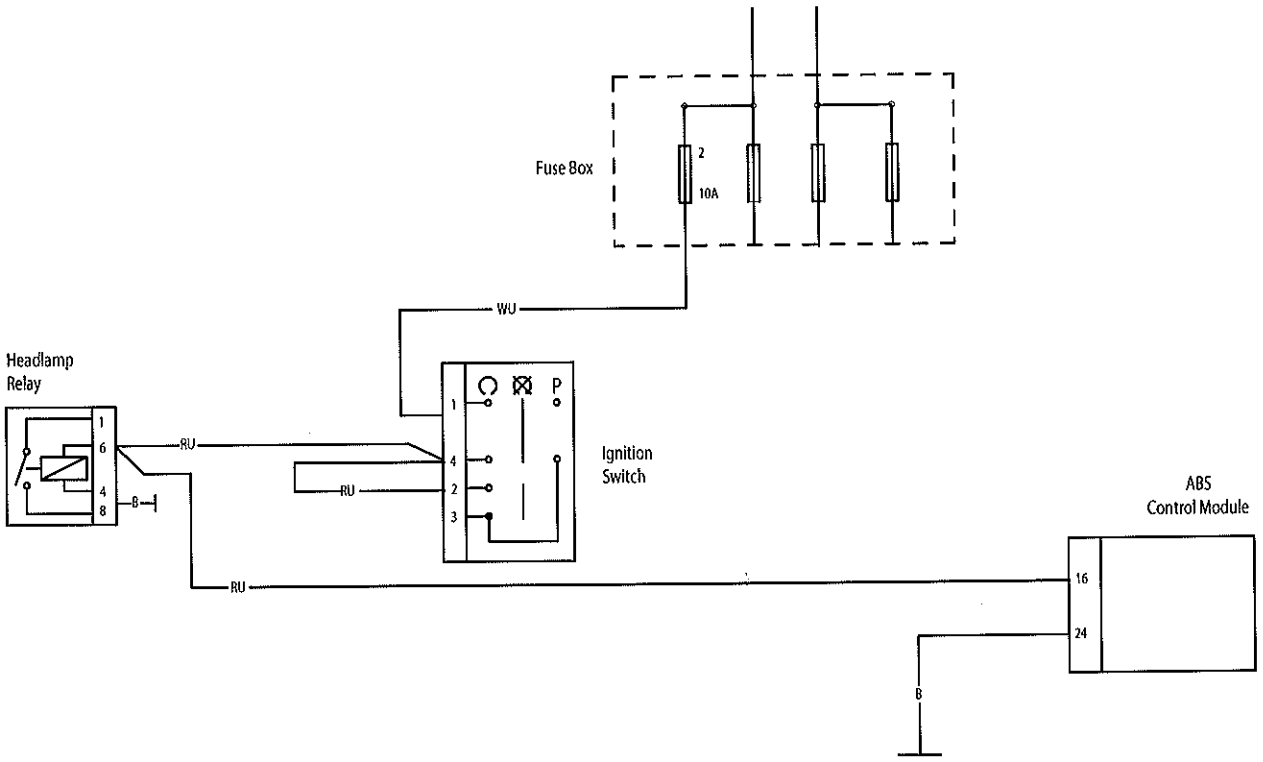
Power Source Voltage Drop/Voltage Rise

Fault Code	Possible cause	Action
C1661; C1662	Power supply circuit fault Battery charging circuit fault	Ensure ABS ECM connector is secure. Disconnect ABS ECM connector and proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ABS ECM connector pin 16 and Ground pin 24	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check the cable for continuity: - ABS ECM connector pin 24 and Ground	OK	Proceed to test 3
		Faulty	Rectify wiring harness fault, proceed to test 5
3	Check battery voltage: With ignition 'ON', Check the voltage between: - ABS ECM connector pin 16 and Ground pin 24	Voltage greater than 10 V	Proceed to test 4
		Voltage less than 10V	Locate and rectify fault, proceed to test 5
4	Check battery voltage: Reconnect ABS ECM connector and start the engine, Check the voltage between: - Battery positive (red) terminal and negative (black) terminal	Voltage between 10 V and 16 V	Proceed to test 4
		Voltage greater than 16V	Check the battery charging circuit. Locate and rectify fault, proceed to test 5
5	Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Different Tyre Diameter

Fault Code	Possible cause	Action
C1671	Incorrect diameter wheels installed Incorrect tyre pressures Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check for installation of wheels and tyres of the correct size	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check the tyre pressures	OK	Proceed to test 3
		Faulty	Rectify fault, proceed to test 5
3	Check the pulser ring for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 4
		Faulty	Clean or replace the ABS pulser ring, proceed to test 5
4	Measure the air gap of the front wheel speed sensor between the sensor and the pulser ring: - Air gap between 0 mm to 1.5 mm	OK	Proceed to test 5
		Faulty	Rectify the fault and proceed to test 5
5	Clear fault code and test ABS to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Abnormal ECU

Fault Code	Possible cause	Action
C1681	Incorrect Wheel speed sensor air gap Damaged or dirty pulser ring Loose or incorrectly installed wheel speed sensor	Ensure ABS ECM connector is secure. Proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Measure the air gap of the wheel speed sensors between the sensor and the pulser ring: - Air gap between 0 mm to 1.5 mm	OK	Proceed to test 1
		Faulty	Rectify the fault and proceed to test 4
2	Check the pulser rings for damage or contamination by road grime or ferrous metal filings	OK	Proceed to test 2
		Faulty	Clean or replace the ABS pulser ring, proceed to test 4
3	Check the wheel speed sensors for correct installation, and the fixings for correct torque	OK	Proceed to test 4
		Faulty	Rectify the fault and proceed to test 4
4	Clear fault code and test ABS to verify fault cleared.	OK	Action complete - quit test
		Fault still present	Contact Triumph service