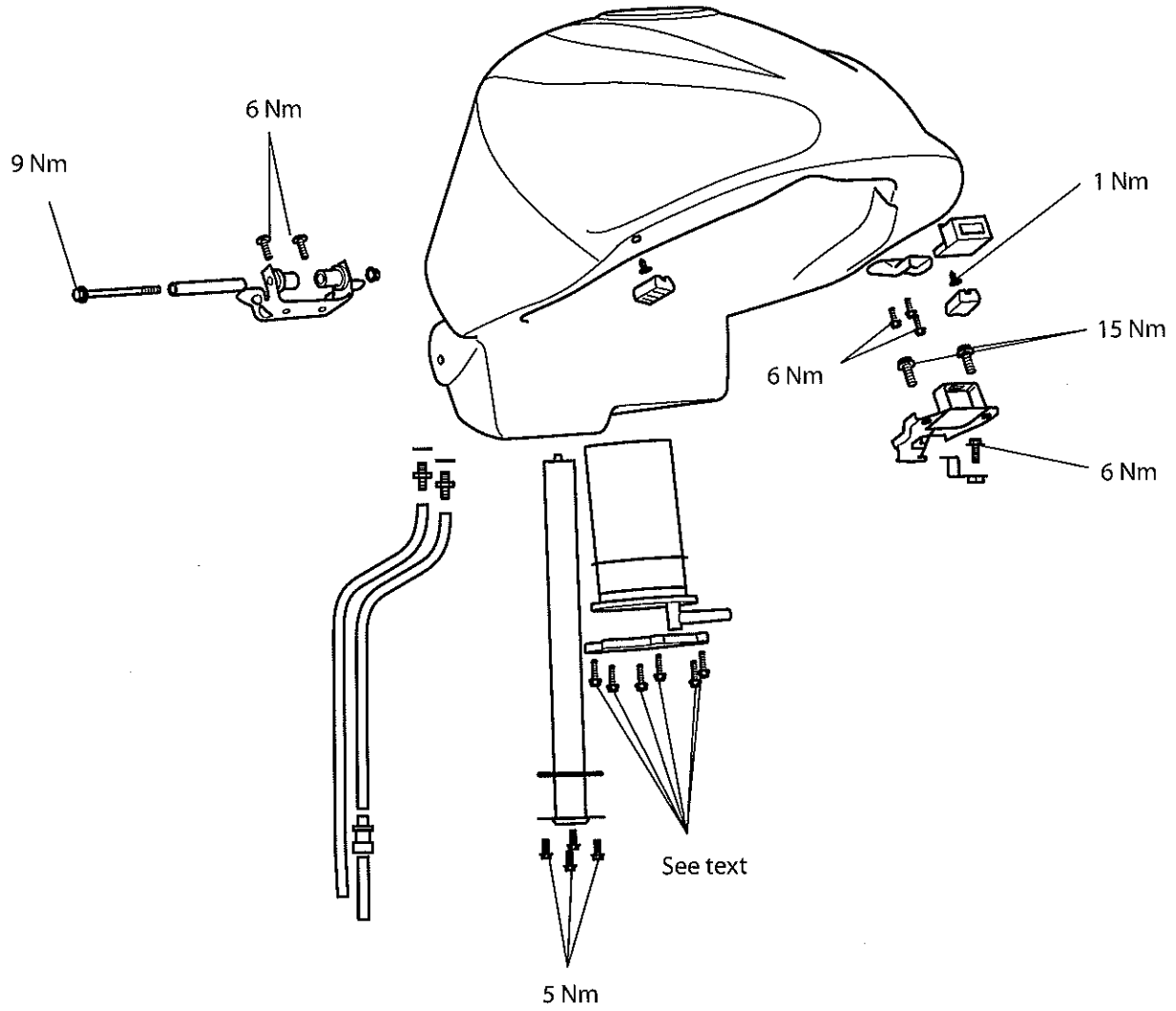
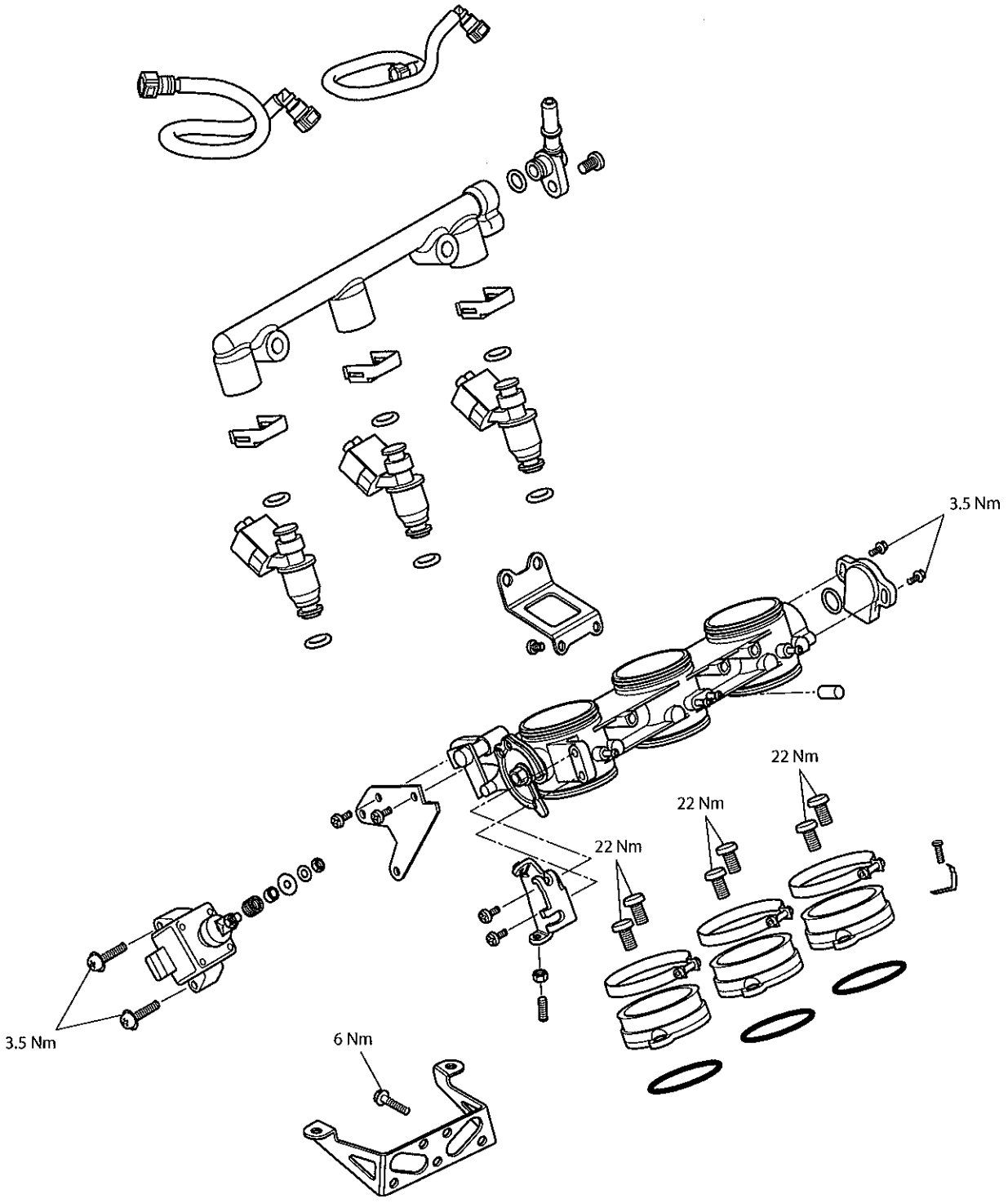
10 Fuel System/Engine Management

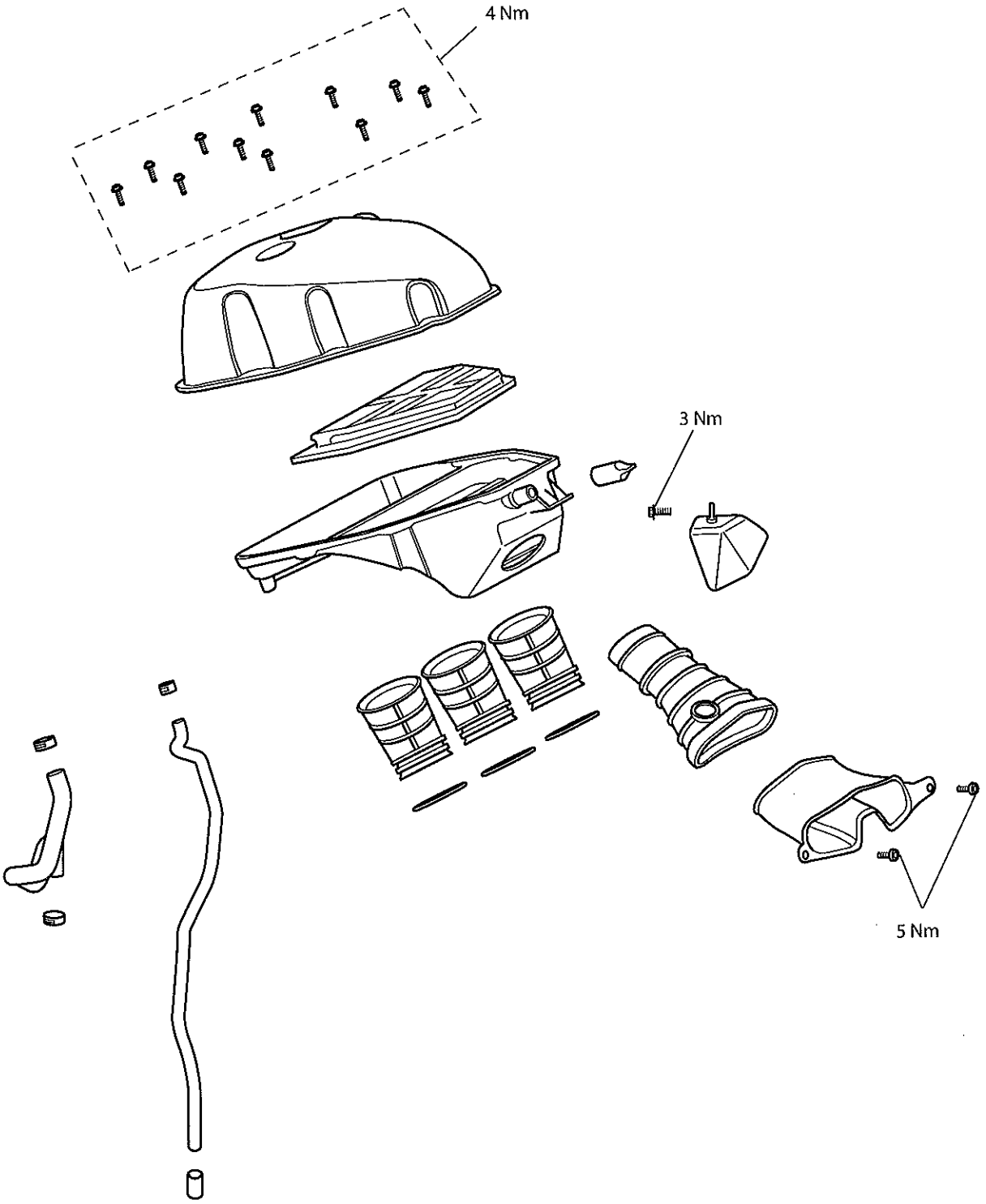
Exploded View - Fuel Tank



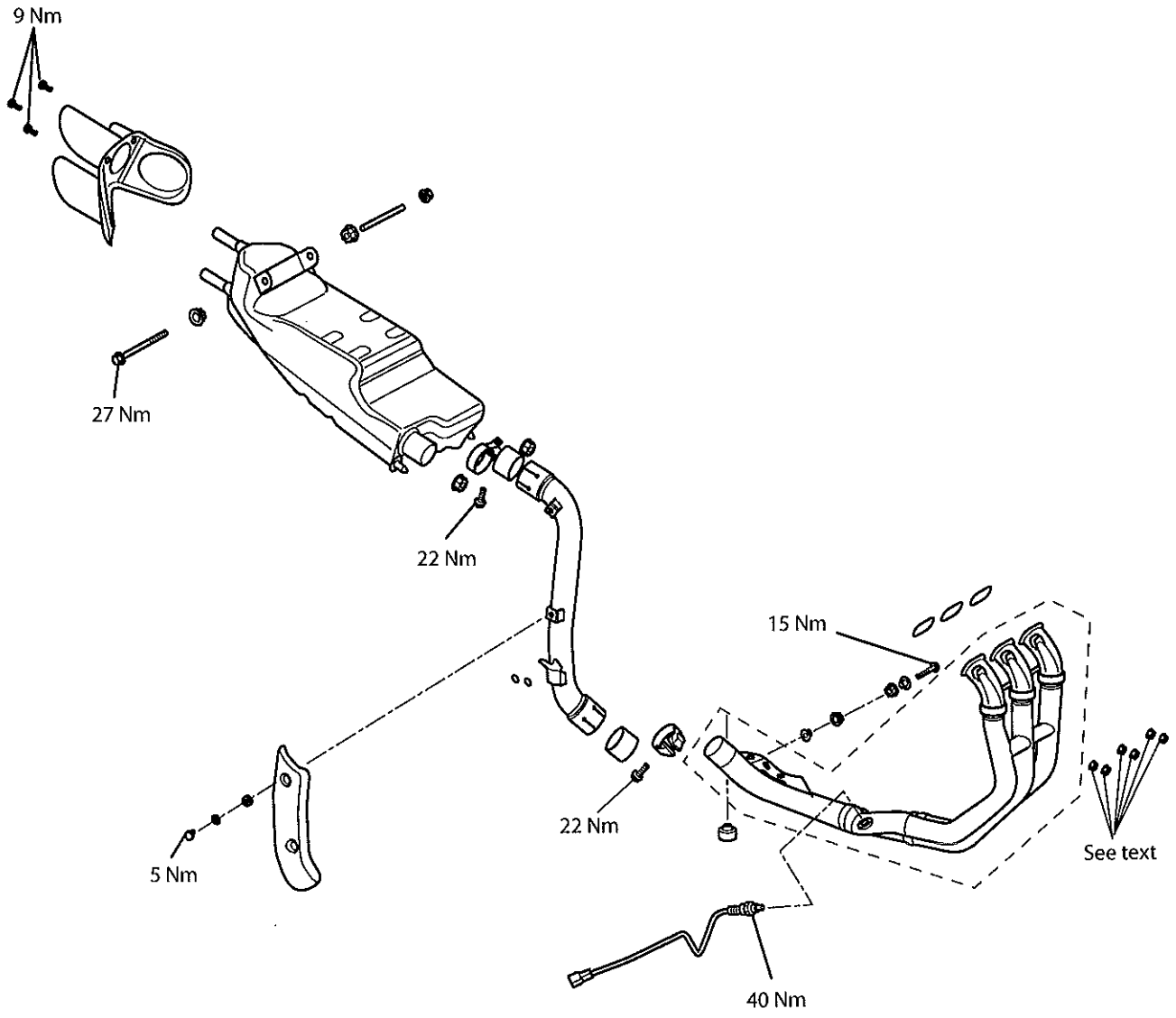
Exploded View - Fuel Rail, Throttles and Injectors



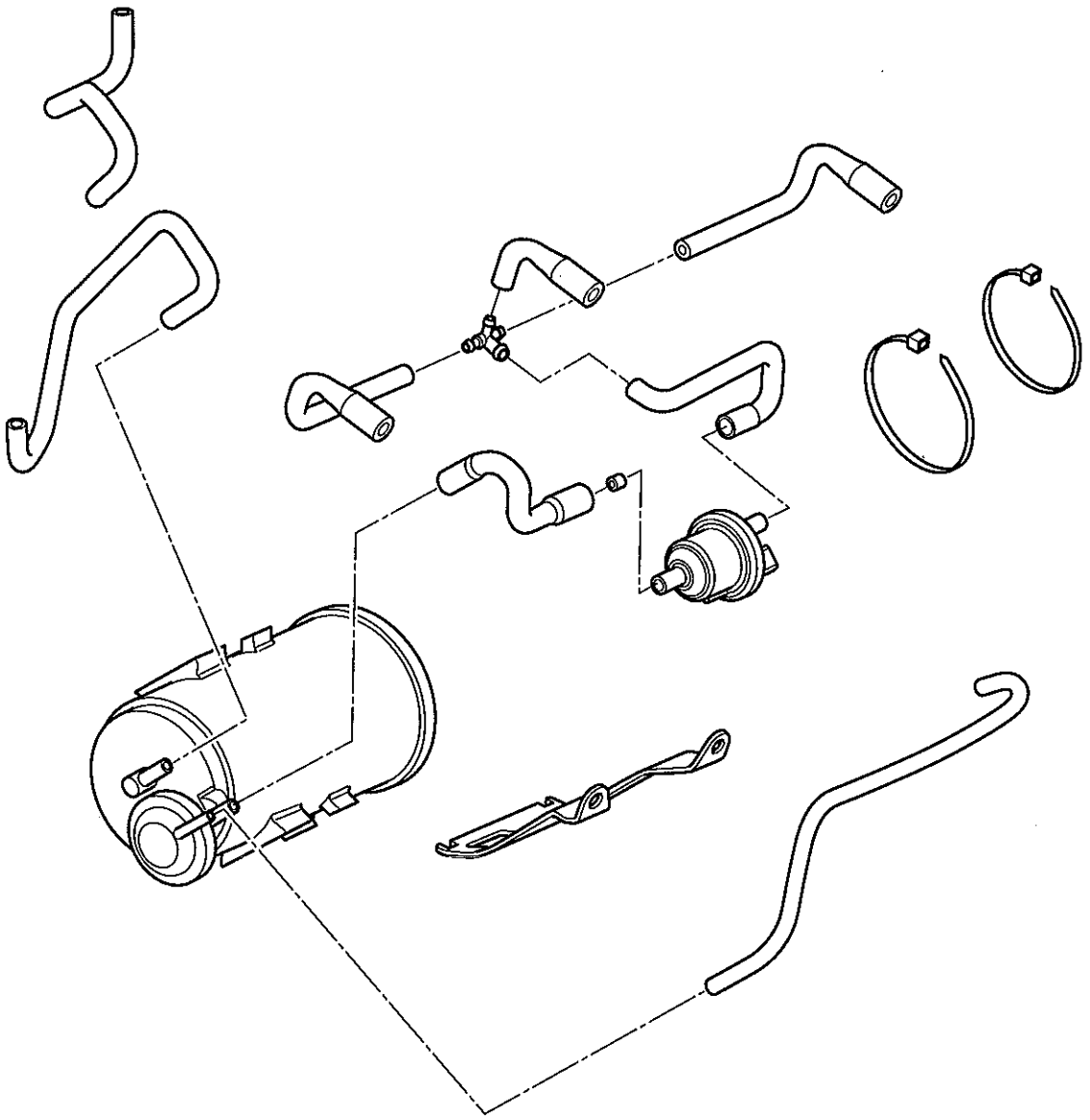
Exploded View - Airbox



Exploded View - Exhaust System



Exploded View - Evaporative System



Fuel Requirements

Fuel Requirements - all countries except USA

Outside America, this model must be run on 95 RON unleaded fuel.

Fuel Requirements - USA

In the United States of America where the octane rating of fuel is measured in a different way, the following information may be applied: This model is designed to run on unleaded gasoline with a CLC or AKI octane rating (R+M)/2 of 89 or higher.

Caution

The use of leaded gasoline is illegal in some countries, states or territories and will invalidate the vehicle and emissions control warranties. Additionally, leaded gasoline will cause damage to emissions control components

Oxygenated Gasoline

To help in meeting clean air standards, some areas of the U.S. use oxygenated gasoline to help reduce harmful emissions. This model will give best performance when using unleaded gasoline. However, the following should be used as a guide to the use of oxygenated fuels.

Caution

Because of the generally higher volatility of oxygenated fuels, starting, engine response and fuel consumption may be adversely affected by their use. Should any of these difficulties be experienced, run the motorcycle on normal unleaded gasoline.

Ethanol

Ethanol fuel is a mixture of 10% ethanol and 90% gasoline and is often described under the names 'gasohol', 'ethanol enhanced', or 'contains ethanol'. This fuel may be used in Triumph motorcycles.

Methanol

Caution

Fuels containing methanol should not be used in Triumph motorcycles as damage to components in the fuel system can be caused by contact with methanol.

MTBE (Methyl Tertiary Butyl Ether)

The use of gasolines containing up to 15% MTBE (Methyl Tertiary Butyl Ether) is permitted in Triumph motorcycles.

Glossary of Terms

The following terms and abbreviations will be found in this section. Below is given a brief explanation of what some of the more common terms and abbreviations mean.

Air temperature

The air temperature in the air box and intake system.

Air temperature sensor

Sensor located in the airbox to detect the temperature of the incoming air.

ATDC

After Top Dead Centre.

Barometric pressure

Pressure of the air in the airbox.

Battery voltage

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

BTDC

Before Top Dead Centre (TDC).

Catalyst

Device placed in the exhaust system which reduces exhaust emissions by stimulating secondary combustion of the exhaust gases.

Closed throttle position

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

Coolant temperature

The coolant temperature in the cylinder head.

Coolant temperature sensor

Sensor which detects coolant temperature.

Cooling fan status

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

DTC

Diagnostic Trouble Code.

ECM

Engine Control Module.

Engine speed

The crankshaft revolutions per minute.

Freeze frame

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

Idle fuel trim

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

Idle fueling

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

Idle reference speed

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

Ignition advance

The timing of ignition at the spark plug relative to top dead centre.

Ignition switch position

The 'on' or 'off' position of either or both the ignition switch and the engine stop switch.

Ignition timing

Same as 'ignition advance'.

Injector pulse time

The time during which an injector remains open (i.e. delivering fuel).

Long term fuel trim

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

MAP sensor

Manifold absolute pressure (the air pressure in the intake system).

MIL

Malfunction Indicator Lamp.

Illuminates when most Diagnostic Trouble Codes (DTCs) are set.

Neutral switch status

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

Off idle fuel trim

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

Open circuit

A break in an electrical circuit - current cannot flow.

Over temp

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

Primary Throttle Position Sensor

Sensor for the primary (lower) throttle position.

Primary Throttle Stepper Motor

Stepper motor used to vary throttle opening at idle and when the engine is clod.

Purge valve duty cycle

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

Road Speed Sensor

Gearbox mounted sensor which delivers information to the ECM that is converted to the road speed value that is displayed on the speedometer.

Sensor reference voltage

Supply voltage to the system sensors (nominally 5 volts).

Short circuit

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

Short term fuel trim

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

Sidestand status

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

Target dwell time

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

Throttle position

The position of the throttle butterfly given as a percentage of the movement range. When the data is displayed on the tool, fully open need not be 100% nor fully closed 0%.

Throttle voltage

Voltage at the throttle potentiometer.

Vbatt

Battery voltage.

Engine Management System

System Description

The Sprint ST is fitted with an electronic engine management system which encompasses control of both ignition and fuel delivery. The electronic control module (ECM) draws information from sensors positioned around the engine, cooling and air intake systems and precisely calculates ignition advance and fueling requirements for all engine speeds and loads.

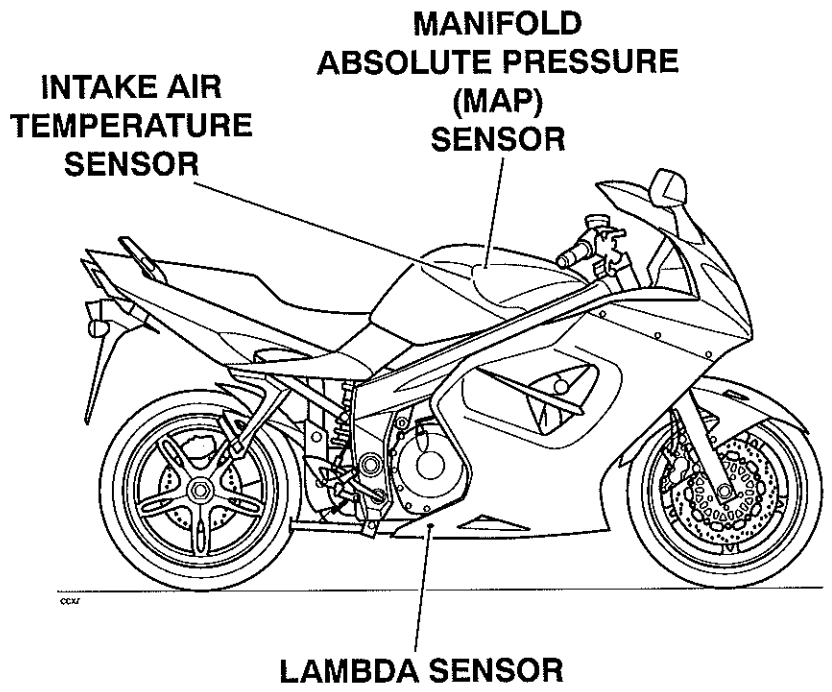
In addition, the system has an on-board diagnostic function. This ensures that, should a malfunction occur in the engine management system, the malfunction type, and engine data at the time the malfunction occurred, are stored in the ECM memory. This stored data can then be recovered using a special service tool which is mandatory for all Triumph dealers. In this way, precise diagnosis of a fault can be made and the fault quickly rectified.

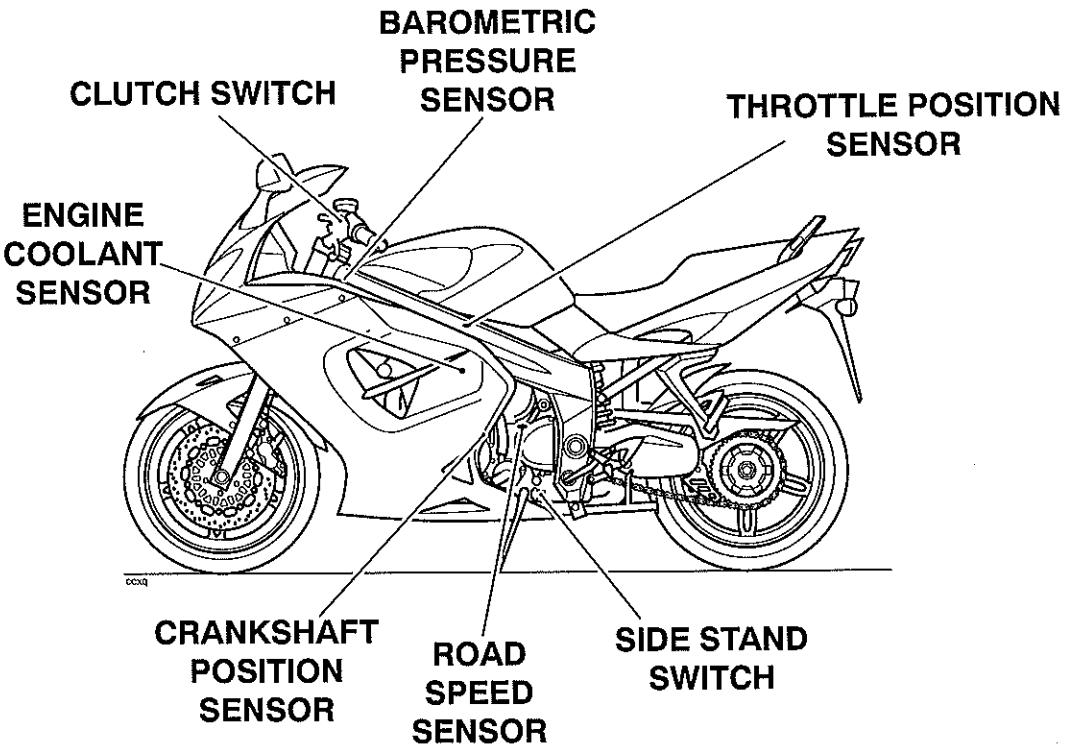
System Sensors

- **Intake air temperature sensor** - situated in the top of the airbox. As the density of the air (and therefore the amount of oxygen available to ignite the fuel) changes with temperature, an intake air temperature sensor is fitted. Changes in air temperature (and therefore air density) are compensated for by adjusting the amount of fuel injected to a level consistent with clean combustion and low emissions.
- **Barometric pressure sensor** - situated on the lower left hand side, at the front of the airbox. The barometric pressure sensor measures atmospheric air pressure. With this information, the amount of fuel per injection is adjusted to suit the prevailing conditions.
- **Manifold Absolute Pressure (MAP) sensor** - situated at the left side of the airbox, connected to each of the three throttle bodies by equal length tubes. The MAP sensor provides information to the ECM which is used at shallow throttle angles (very small throttle openings) to provide accurate engine load indications to the ECM. This degree of engine load accuracy allows the ECM to make very small adjustments to fuel and ignition which would otherwise not be possible from throttle angle data alone.
- **Clutch switch** - situated on the clutch lever. The clutch must be pulled in for the starter motor to operate.
- **Crankshaft position sensor** - situated in the crankcase, near the alternator cover. The crankshaft position sensor detects movement of a toothed wheel attached to the alternator rotor.

  The toothed wheel gives a reference point from which the actual crankshaft position is calculated. The crankshaft position sensor information is used by the ECM to determine engine speed and crankshaft position in relation to the point where fuel is injected and ignition of the fuel occurs.
- **Engine coolant temperature sensor** - situated at the rear of the cylinder head, on the left hand side. Coolant temperature information, received by the ECM, is used to optimise fueling at all engine temperatures and to calculate hot and cold start fueling requirements.
- **Throttle position sensor** - situated at the left end of the throttle body. Used to relay throttle position information to the ECM. Throttle opening angle is used by the ECM to determine fueling and ignition requirements for all throttle positions.
- **Road speed sensor** - situated in the upper crankcase, on the left hand side, above the sprocket cover. The road speed sensor provides the ECM with data from which road speed is calculated and displayed on the speedometer. A vehicle speed limitation device also receives information from the road speed sensor.
- **Lambda sensor** - situated in the exhaust header system upstream of the catalyst. The lambda sensor constantly feeds in formation to the ECM on the content of the exhaust gases. Based on this information, adjustments to air/fuel ratio are made.
- **Side stand switch** - situated at the top of the sidestand leg. If the sidestand is in the down position, the engine will not run unless the transmission is in neutral.

Sensor Locations





System Actuators

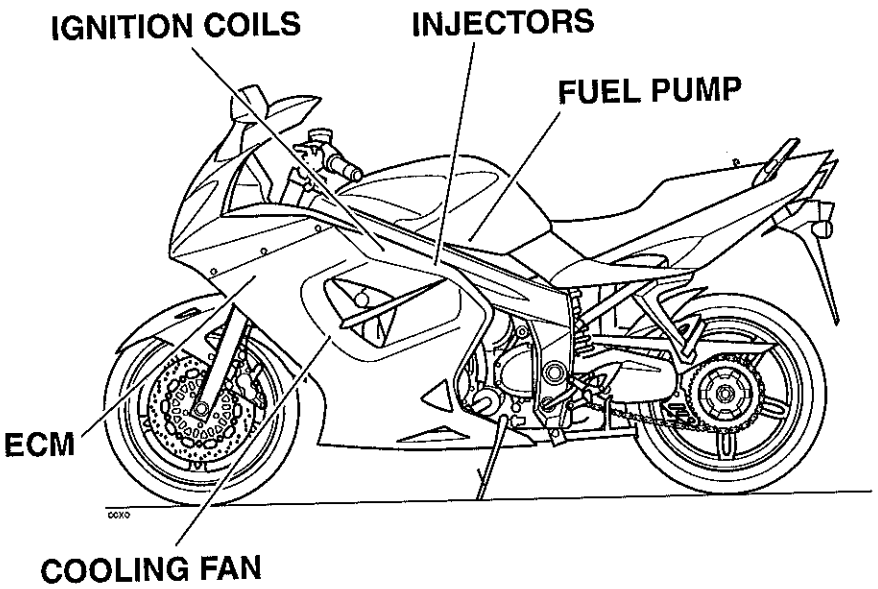
In response to signals received from the sensors, the ECM controls and directs messages to a series of electronic and electro-mechanical actuators. The function and location of the actuators is given below.

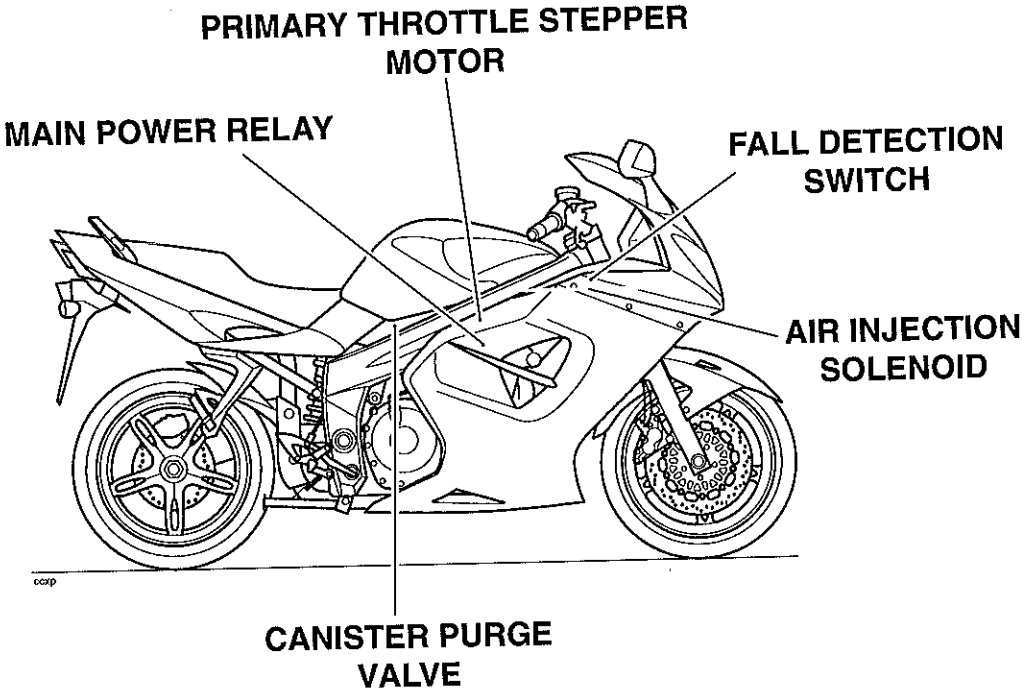
- **Primary throttle stepper motor** - situated at the right end of the throttle bodies. The primary throttle stepper actuates a cam/lever which causes variations in the closed throttle position. Although used primarily to ensure target idle speed is maintained, it also increases throttle opening when the engine is cold.
- **Canister purge valve (California models only)** - situated in the vapour return line between the carbon canister and the throttle bodies. The purge valve controls the return of vapour which has been stored in the carbon canister during the period when the engine is switched off. The valve is `pulsed' by the ECM to give control over the rate at which the canister is purged.
- **Injectors** - located in the cylinder head. The engine is fitted with three injectors. The spray pattern of the injectors is fixed but the length of time each injector can remain open is variable according to operating conditions. The duration of each injection is calculated by the ECM using data received from the various sensors in the system.
- **Ignition coils** - plug-top coils are located in the cam cover. There are three coils fitted, one for each spark plug. The ECM controls the point at which the coils are switched on and off. In calculating the switch-on time, the ECM allows sufficient time for the coils to charge to a level where a spark can be produced. The coils are switched off at the point of ignition, the timing of which is epitomised for good engine performance.
- **Fall detection switch** - situated at the front of the motorcycle. The fall detection switch will detect if the motorcycle is on its side and will cut power to the ECM immediately. This prevents the engine from running and the fuel pump from delivering fuel. In the event of a fall, the switch is reset by returning the bike to an upright position and switching the ignition off then back on again.
- **Main power relay** - situated under the seat. When the ignition is switched on, the main power relay is powered up to provide a stable voltage supply for the ECM.
- **Fuel pump** - located inside the fuel tank. The electric pump delivers fuel into the fuel system, via a pressure regulator, at a constant 3 bar pressure. The pump is run continuously when the engine is operating and is also run briefly when the ignition is first switched on to ensure that 3 bar is available to the system as soon as the engine is cranked. Fuel pressure is controlled by a regulator also situated inside the fuel tank.
- **Cooling fan** - located behind the radiator. The ECM controls switching on and off of the cooling fan in response to a signal received from the coolant temperature sensor. When the coolant temperature rises to a level where the cooling effect of natural airflow is insufficient, the cooling fan is turned on by the ECM. When the coolant temperature falls sufficiently, the ECM turns the cooling fan off. The fan only becomes operational when the engine is running. It will not operate at any other time.
- **Secondary air injection solenoid** - located in front of the airbox. The secondary air injection solenoid controls airflow through the secondary air injection system.

Note:

- **In this system, the starter lockout system (clutch switch, neutral switch, sidestand switch) all operate through the engine management ECM.**

Actuator Locations





Engine Management Circuit Diagram - Sprint ST

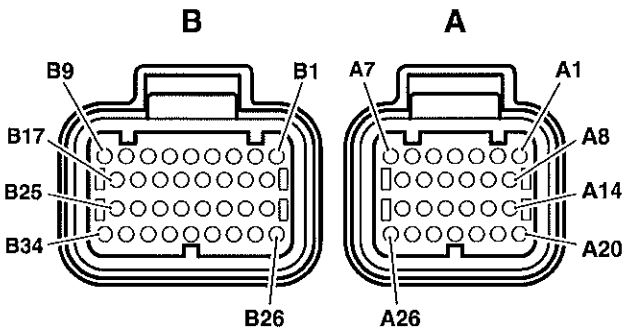
Key To Wiring Circuit Diagram

Key	Item Description
1	Engine Control Module
2	Diagnostic Connector
3	Vehicle Speed Sensor
4	Instrument Assembly
5	Clutch Switch
6	Starter Relay
7	Sidestand Switch
8	Fuel level sender
9	Fall Detection Sensor
10	Ambient Air Pressure Sensor
11	Intake Air Temperature Sensor
12	MAP Sensor
13	Coolant Temperature Sensor
14	Lambda Sensor
15	Throttle Position Sensor
16	Neutral switch
17	Fuel Pump
18	Fuel Pump Relay
19	Fuse Box (Fuse 7)
20	Cooling Fan
21	Cooling Fan Relay
22	Idle Speed Control Stepper Motor
23	Ignition Coils
24	Secondary Air Injection Solenoid
25	Fuel Injectors
26	Purge Valve
27	Crankshaft Sensor
28	Engine Management System Relay

Key To Wiring Colour Codes

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

ECM Connector Pin Numbering

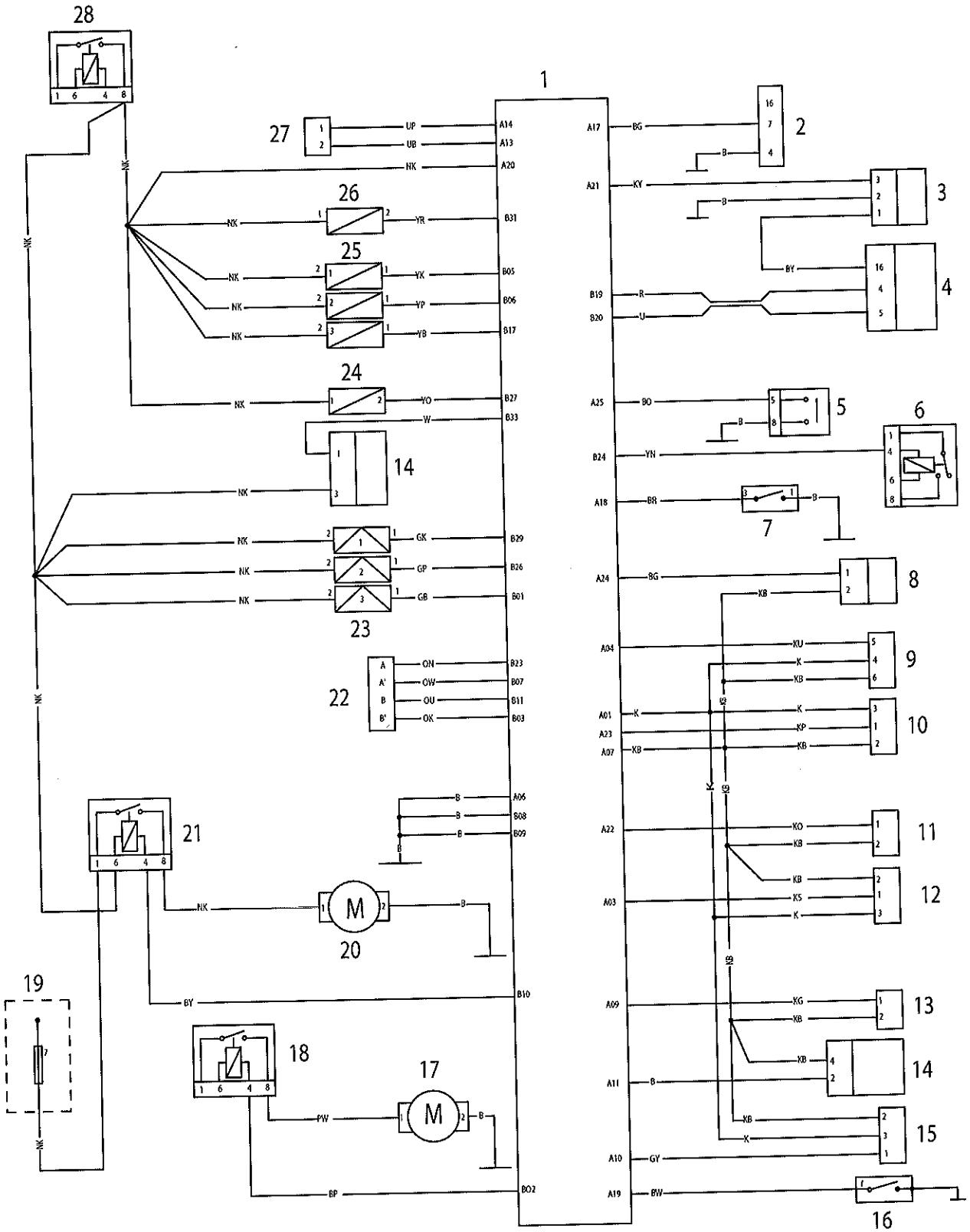


cbhs

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

The small connector's pins are prefixed A and the large connector's pins B. As viewed on the mating face with the ECM (as per the illustration), pins are numbered from right to left with number one in the top right corner.

Circuit Diagram - Engine Management System - Sprint ST



System Diagnostics

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

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

The tool allows the user to retrieve data associated with the system sensors and actuators, test various component functions, read build data and make minor adjustments to the set-up of the system. The data and tests available are described on the following pages.

On-board Fault Detection System

The on-board diagnostic system has two stages to fault detection. When a fault is detected, the DSM (Diagnostic Status Manager) raises a flag to indicate that a fault is present and increments a counter. The counter checks the number of instances that the fault is noted. For example, if there is a fault in the crankshaft position sensor, the counter will increment its count each time the crankshaft turns through 360°, provided the fault is still present.

When the count begins, the fault is detected but not confirmed. If the fault continues to be detected and the count reaches a pre-determined threshold, the fault becomes confirmed. If the fault is an emissions related fault or a serious malfunction affecting engine performance, a DTC (Diagnostic Trouble Code) and freeze-frame data will be logged in the ECM's memory and the MIL (Malfunction Indicator Lamp) on the motorcycle instrument panel is illuminated. Once a fault is confirmed, the number of warm-up cycles made by the engine is counted. If the fault clears, the warm-up cycle counter will extinguish the MIL (Malfunction Indicator Lamp) at a pre determined count, and erase the DTC and freeze frame data from the ECM memory at another (higher) count.

A single warm-up cycle is deemed to have taken place when the following criteria have been met:

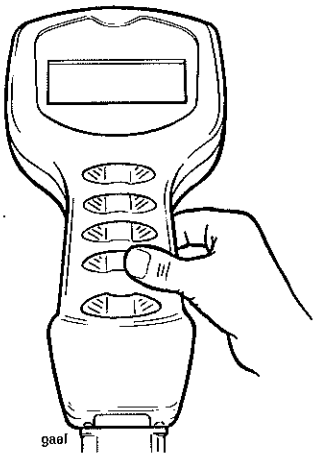
- The coolant temperature must be raised to 72°C or more.
- The coolant temperature must have risen by 23°C or more from its start temperature, when 72°C is reached.
- A controlled power-down sequence must take place.

Note:

- **When a fault has been rectified, the MIL will remain illuminated until sufficient non-fault warm-up cycles have taken place to turn it off. The MIL will be immediately extinguished if, after first rectifying the fault, the DTC (diagnostic trouble code) that caused the MIL illumination is erased from the ECM memory using the Triumph diagnostic tool.**

Note:

- **In most cases, when a fault is detected, the engine management system will revert to a `limp-home' mode. In this mode, the engine will still function though the performance and fuel economy may be marginally affected. In some cases, the rider may not notice any appreciable difference from normal operation.**



Triumph Diagnostic Tool

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

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

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

Current Data

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

Function Examined	Result Reported (Scale)
Engine speed	RPM
Calculated load	%
Coolant temperature	°C
Short term fuel trim	%
Throttle Position	%
Intake air temperature	°C
Vehicle speed	km/h
Ignition Advance	degrees
Heated oxygen sensor output voltage	volts
Intake manifold absolute pressure	mm/hg
Fuel system status	open or closed loop operation

Freeze-frame Data

Freeze frame data is stored at the time a DTC is recorded (confirmed) by the ECM. If multiple DTCs are recorded, the freeze-frame data which is stored will relate to the first recorded DTC only.

By calling up freeze frame data associated with the first recorded DTC, the technician can check the engine condition at the time the fault occurred. The data available is:

Function Examined	Result Reported (Scale)
Engine speed	RPM
Calculated load	%
Coolant temperature	°C
Short term fuel trim	%
Throttle Position	%
Intake air temperature	°C
Vehicle speed	km/h
Ignition Advance	degrees
Heated oxygen sensor output voltage	volts
Intake manifold absolute pressure	mm/hg
Fuel system status	open or closed loop operation

Function Tests

The system allows the diagnostic tool to perform a series of function tests on various actuators in the engine management system. In some cases it is necessary to make a visual observation of a component and in other, if faults are present, DTCs will be logged.

The function tests available are:

Function Examined	Report Method
Instrument panel	Visual inspection of instruments
Idle speed control stepper motor	Stored fault code*
Purge control valve	Stored fault code*
Fuel pump relay	Stored fault code*
Fuel pump operation	Stored fault code*/Fuel pressure test
Cooling fan	Stored fault code*/fan operation

* If a fault is detected.

Checks/Adjustments

Adjustments

Using the Triumph diagnostic tool, it is possible to reset the ECU to the factory default settings and to balance the throttle bodies.

Further facilities are provided to allow correct replacement/adjustment of the primary throttle position sensor and the primary throttle stepper motor. These facilities are needed as, after replacement of the parts concerned, adjustments have to be made to specific voltage settings, all with the throttles in a specific position.

Full details of these procedures are provided later in this section.

Adaption status

Because the fuel system is adaptive, the tool is able to automatically adjust to new working conditions. This screen displays information as to the adaption status of the vehicle which will show if it has adapted or not.

Function Examined	Report Method
Closed throttle position reference status	adapted/not adapted
Idle speed control adaption status	%
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption status (idle)	%
Oxygen sensor adaption range (idle)	%

Build data

The following items of build data can also be read.

Function Examined
Vehicle identification Number (VIN)
Triumph ECM part number
ECM manufacturer's part number
ECM serial number
Software version number (tune number)

Checks

When using this function it is possible to check the status of various sensors and actuators and also check certain items of factory data logged during vehicle assembly.

The data sets are dived into three groups, voltages/ pressures, throttles/coils/injectors and other data

The data available under voltages is:

Item Checked	Result Unit
Throttle position sensor voltage	Volts
Throttle position	% open
Manifold absolute pressure sensor voltage	Volts
Manifold absolute pressure (one reading per cylinder)	mmHg
Atmospheric pressure sensor voltage	Volts
Atmospheric pressure	mmHg
Battery voltage	Volts
Battery voltage scaling	Volts
Coolant temperature sensor voltage	Volts
Air temperature sensor voltage	Volts
Oxygen sensor voltage	Volts
Oxygen sensor reading	Volts
Gear position sensor voltage	Volts
Fuel level sensor voltage	Volts
Fall detection switch voltage	Volts
Fuel sensor voltage	Volts

The data available under throttles/coils/injectors is:

Item Checked	Result Unit
Injector 1 pulse time	milliseconds
Injector 2 pulse time	milliseconds
Injector 3 pulse time	milliseconds
Ignition timing cyl 1	degrees BTDC
Ignition timing cyl 2	degrees BTDC
Ignition timing cyl 3	degrees BTDC
Coil 1 dwell time	milliseconds
Coil 2 dwell time	milliseconds
Coil 3 dwell time	milliseconds

The data available under 'other' is:

Item Checked	Result Unit
Malfunction indicator light status	MIL off/on
Fan relay status	Fan off/on
Starter relay status	Starter on/off
Fall detection status	Normal/over
Oxygen sensor heater status	Heater on/off
Secondary air injection status	SAI on/off
Engine rpm	RPM
Vehicle speed	km/h
Short term fuel trim	+/-100%
Calculated load	%
Idle reference speed	RPM
Idle speed control target steps	numeric
Purge valve duty cycle	%
Gear position	numeric value
Neutral switch	Gear/neutral
Low fuel alarm status	On/off

Diagnostic Trouble Codes

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

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

As mentioned earlier, when the system detects a fault, it begins to count the number of times the fault occurs before illuminating the MIL and storing a fault code.

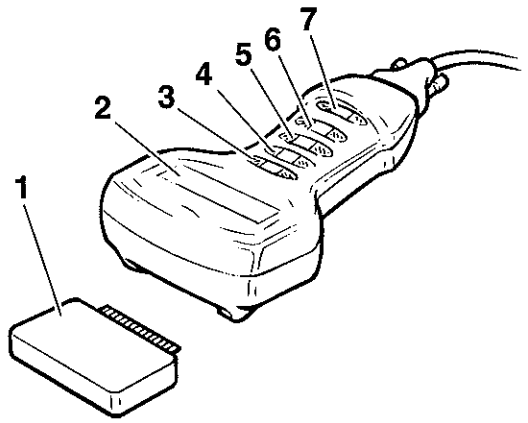
Similarly, if a fault clears, the ECM also records this fact and will turn off the MIL when sufficient no-fault warm-up cycles have taken place. Any fault codes will remain in the ECM memory until the required number of no-fault warm-up cycles have taken place. The number of warm-up cycles required to extinguish the MIL will always be less than the number required to remove a DTC from the ECM memory. DTCs can be removed at any time using the Triumph diagnostic tool

The system will log the diagnostic trouble codes listed below/over:

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged
P0201	Injector 1 circuit malfunction	3	40	Yes
P0202	Injector 2 circuit malfunction	3	40	Yes
P0203	Injector 3 circuit malfunction	3	40	Yes
P1201	Injector 1 open circuit/short to ground	3	40	Yes
P1202	Injector 2 open circuit/short to ground	3	40	Yes
P1203	Injector 3 open circuit/short to ground	3	40	Yes
P0335	Crankshaft sensor circuit malfunction	3	40	Yes
P0032	Oxygen sensor heater short circuit to battery	3	40	Yes
P0031	Oxygen sensor heater open circuit/short to ground	3	40	Yes
P0030	Oxygen sensor heater circuit malfunction	3	40	Yes
P0136	Oxygen sensor circuit malfunction	3	40	Yes
P0122	Throttle position sensor low input	3	40	Yes
P0123	Throttle Position sensor high input	3	40	Yes
P0107	Manifold absolute pressure sensor low voltage	3	40	Yes
P0108	Manifold absolute pressure sensor high voltage	3	40	Yes
P1105	Manifold absolute pressure sensor pipe malfunction	3	40	Yes
P1107	Ambient air pressure sensor circuit low voltage	3	40	Yes
P1108	Ambient air pressure sensor circuit high voltage	3	40	Yes
P0112	Intake air temperature too high	3	40	Yes
P0113	Intake air temperature too low	3	40	Yes
P0117	Engine coolant temperature too high	3	40	Yes
P0118	Engine coolant temperature too low	3	40	Yes
P0500	Vehicle speed sensor malfunction	3	40	Yes

Diagnostic Trouble Code (DTC)	Fault Description	Number of no-fault cycles before turning off MIL	Number of no-fault cycles before DTC is erased	MIL illuminated when fault is logged
P1552	Cooling fan short circuit/open circuit	3	40	Yes
P1553	Cooling fan short to battery voltage/over temperature	3	40	Yes
P1231	Fuel pump short circuit to ground or open circuit	3	40	Yes
P1232	Fuel pump relay short circuit to battery	3	40	Yes
P0444	Purge valve system short circuit to ground or open circuit	3	40	Yes
P0445	Purge valve system short circuit to battery	3	40	Yes
P0617	Starter relay short circuit to battery	3	40	Yes
P0616	Starter relay short circuit to ground or open circuit	3	40	Yes
P0414	Secondary air injection system short circuit to battery	3	40	Yes
P0413	Secondary air injection system short circuit to ground or open circuit	3	40	Yes
P0505	Idle speed control system malfunction	3	40	Yes
P1631	Fall detection sensor circuit low voltage	3	40	Yes
P1632	Fall detection sensor circuit high voltage	3	40	Yes
P0560	System voltage - battery circuit malfunction	3	40	Yes
P1500	Vehicle speed output circuit malfunction	0	40	No
P0654	Tachometer circuit malfunction	0	40	No
P1115	Coolant temperature gauge circuit malfunction	0	40	No
P0460	Fuel level sensor circuit malfunction	0	40	No
P0705	Gear position sensor circuit malfunction	0	40	No
P0656	Fuel gauge circuit malfunction	0	40	No
P1610	Low fuel output circuit malfunction	0	40	No
P0630	EEPROM fault	0	40	No
P1690	CAN communication fault	0	40	No

Service Diagnostic Tool



gejc

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

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

- Diagnose faults
- Obtain data
- Make checks / adjustments

It is 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.

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

Typical screen showing symbol examples

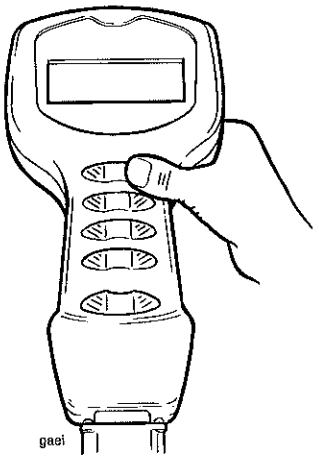
▲▼ Cursors to indicate that further lines of text are available to be seen above and/or below those already in view, by scrolling the text up or down using the 'Up' or 'Down' keys.

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

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

Tool Keys

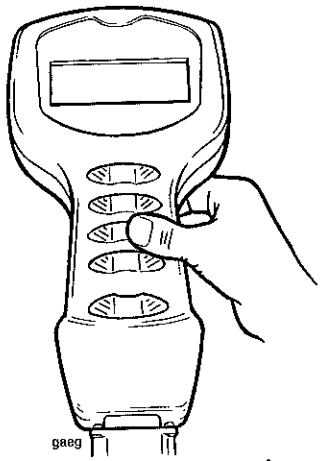
In most cases, the **Return** key (↵) enables the user to return to the screen last displayed.



gaei

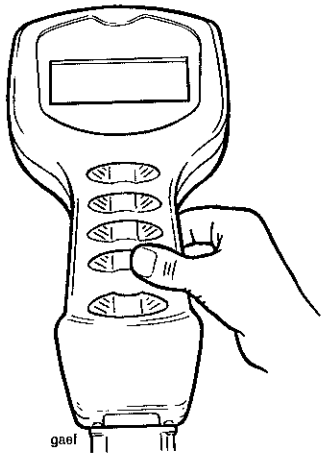
Return key

The **Up** and **Down** keys - press to move the lines of text up or down. They are also used to enter the Dealer number and the date.



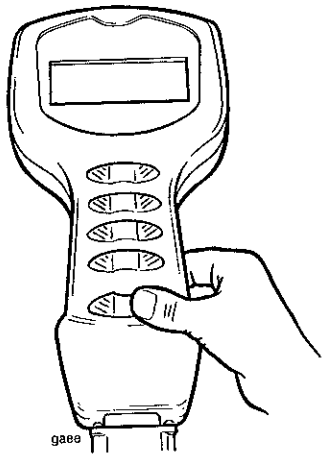
Up/down keys (2 separate keys)

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



Validation key

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



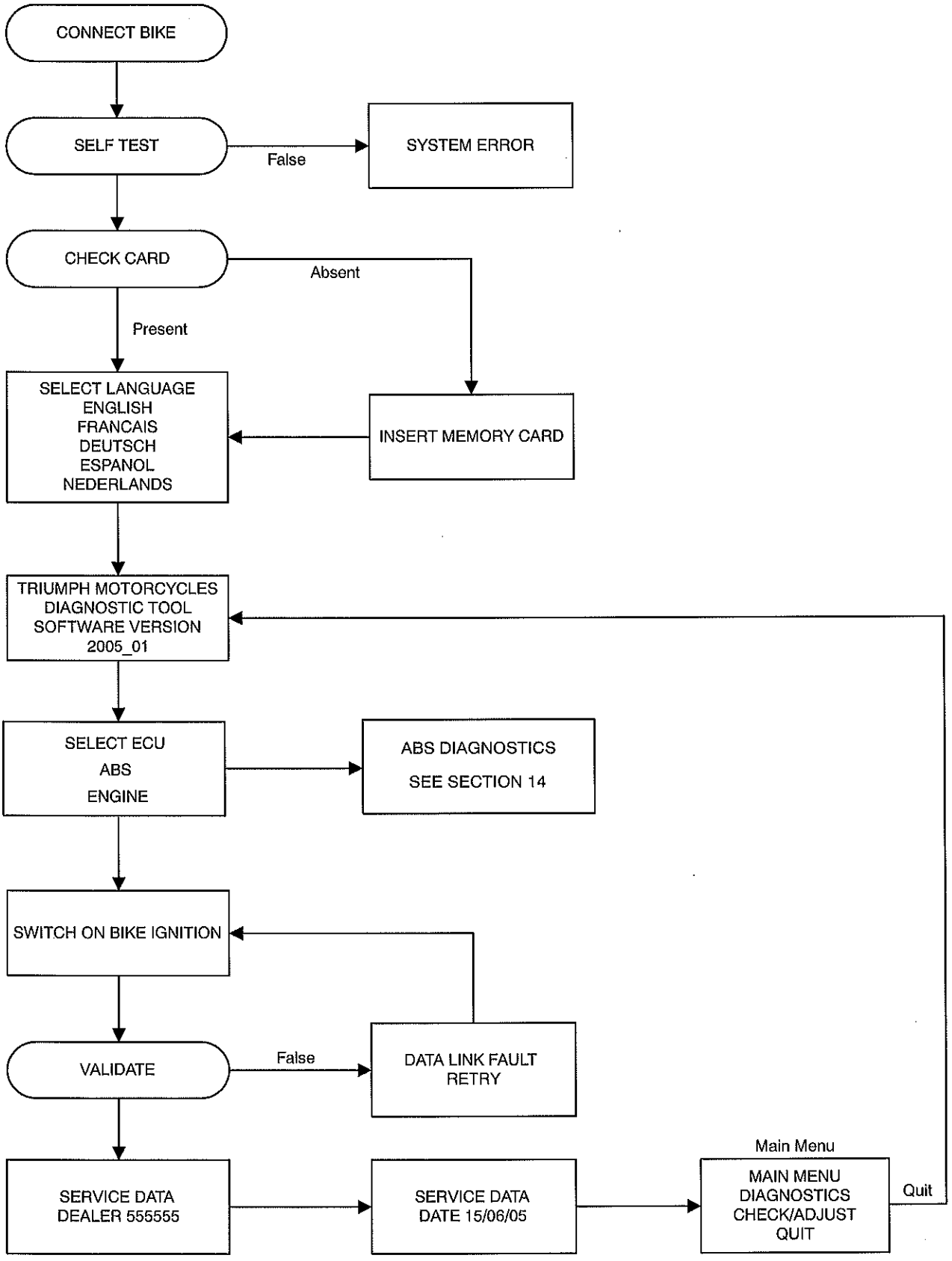
Help key

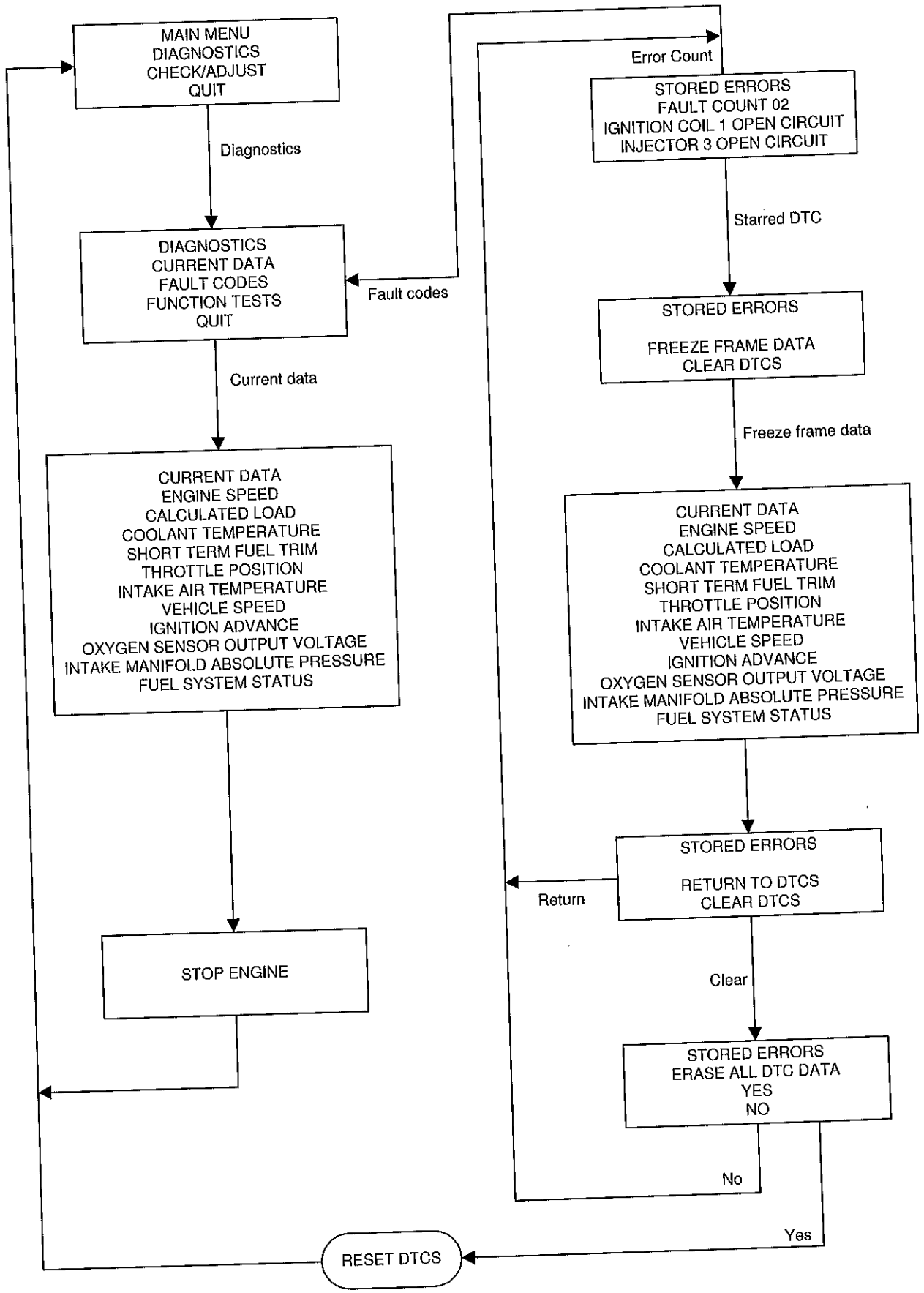
Test Procedure

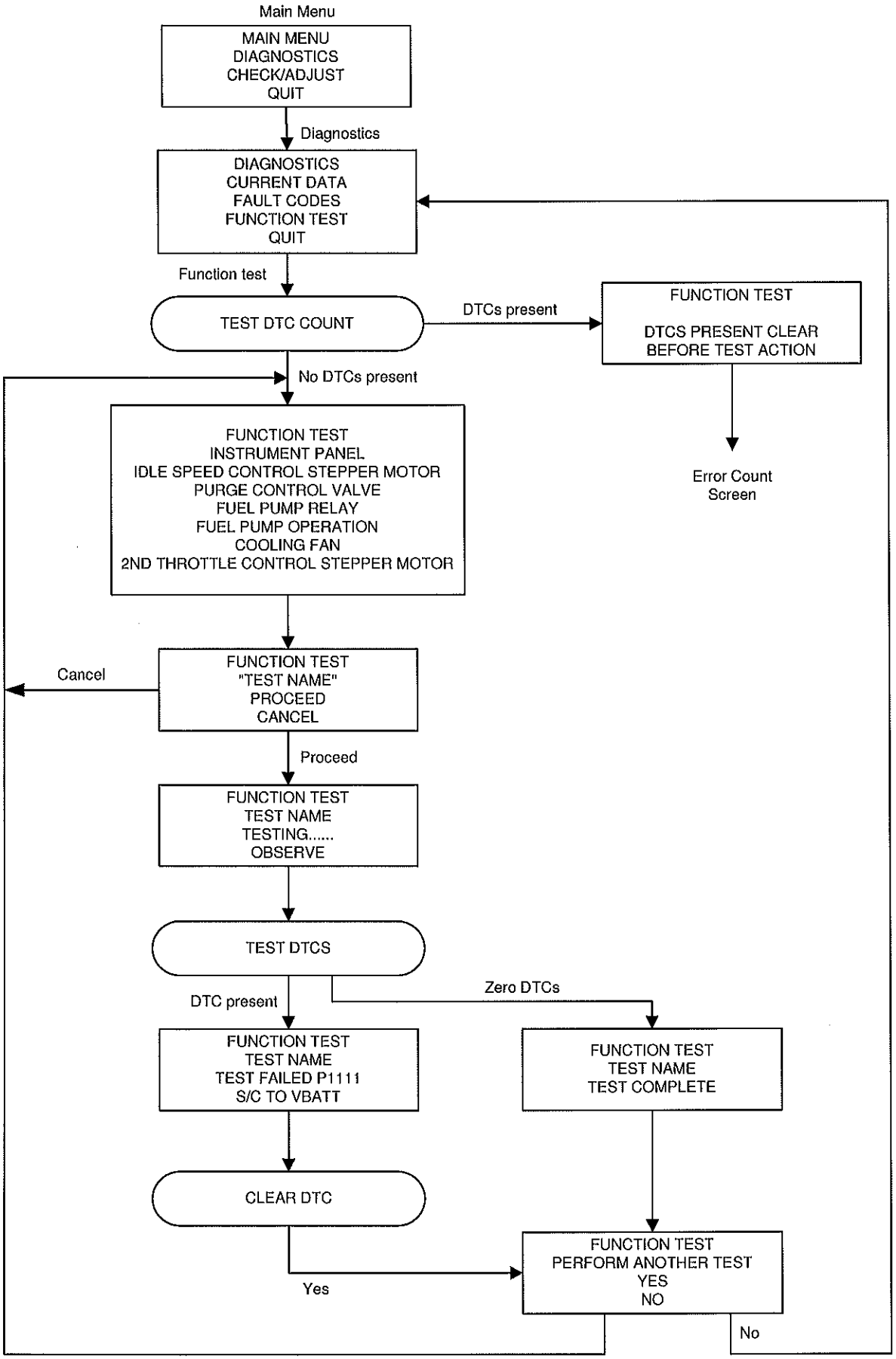
The following describes the procedure to follow when using the service diagnostic tool. It does not cover the further diagnosis that must be carried out once a fault area has been identified. For details of the procedure to follow when a fault area or fault code has been identified, refer to the diagnosis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

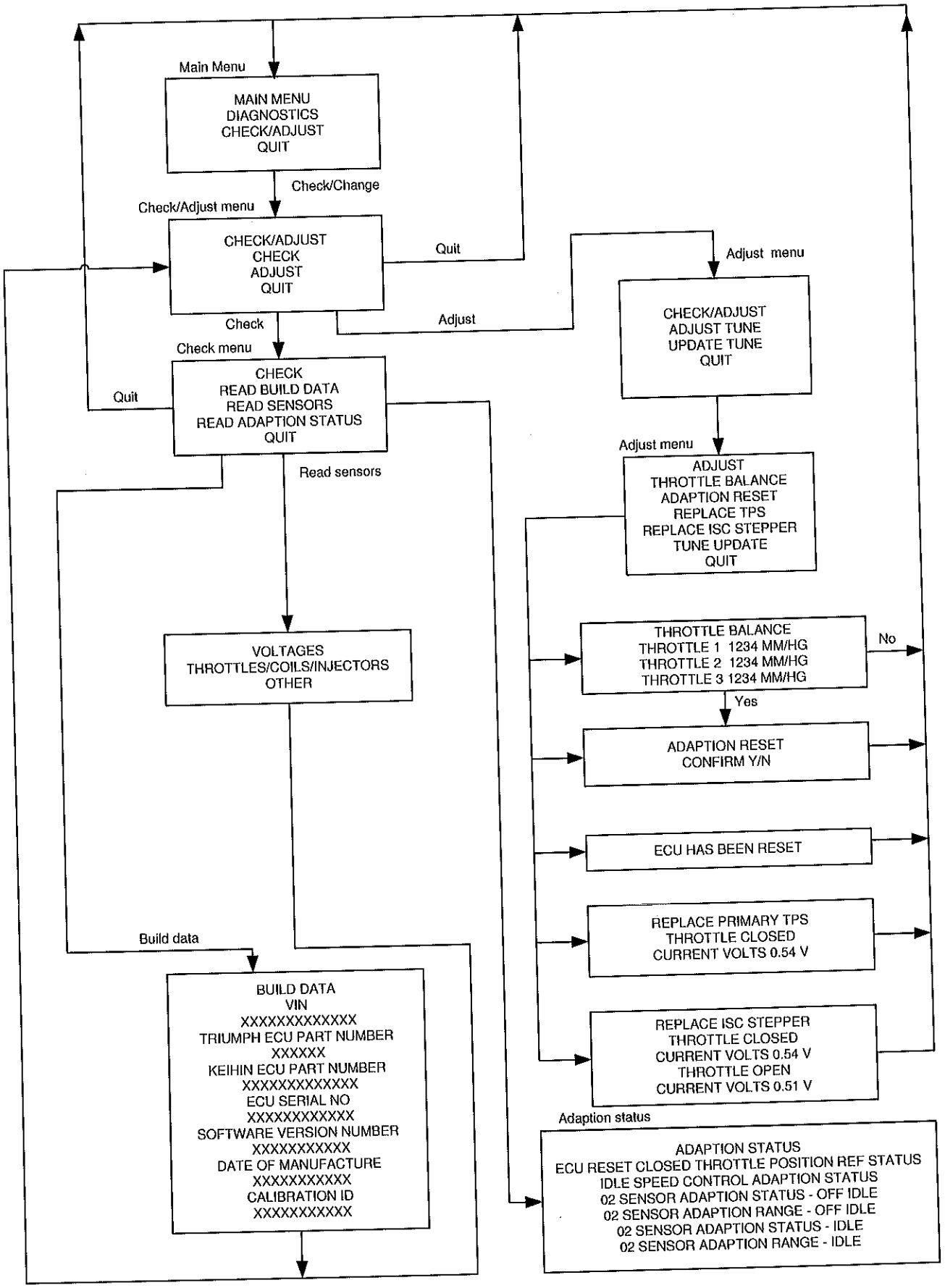
Note:

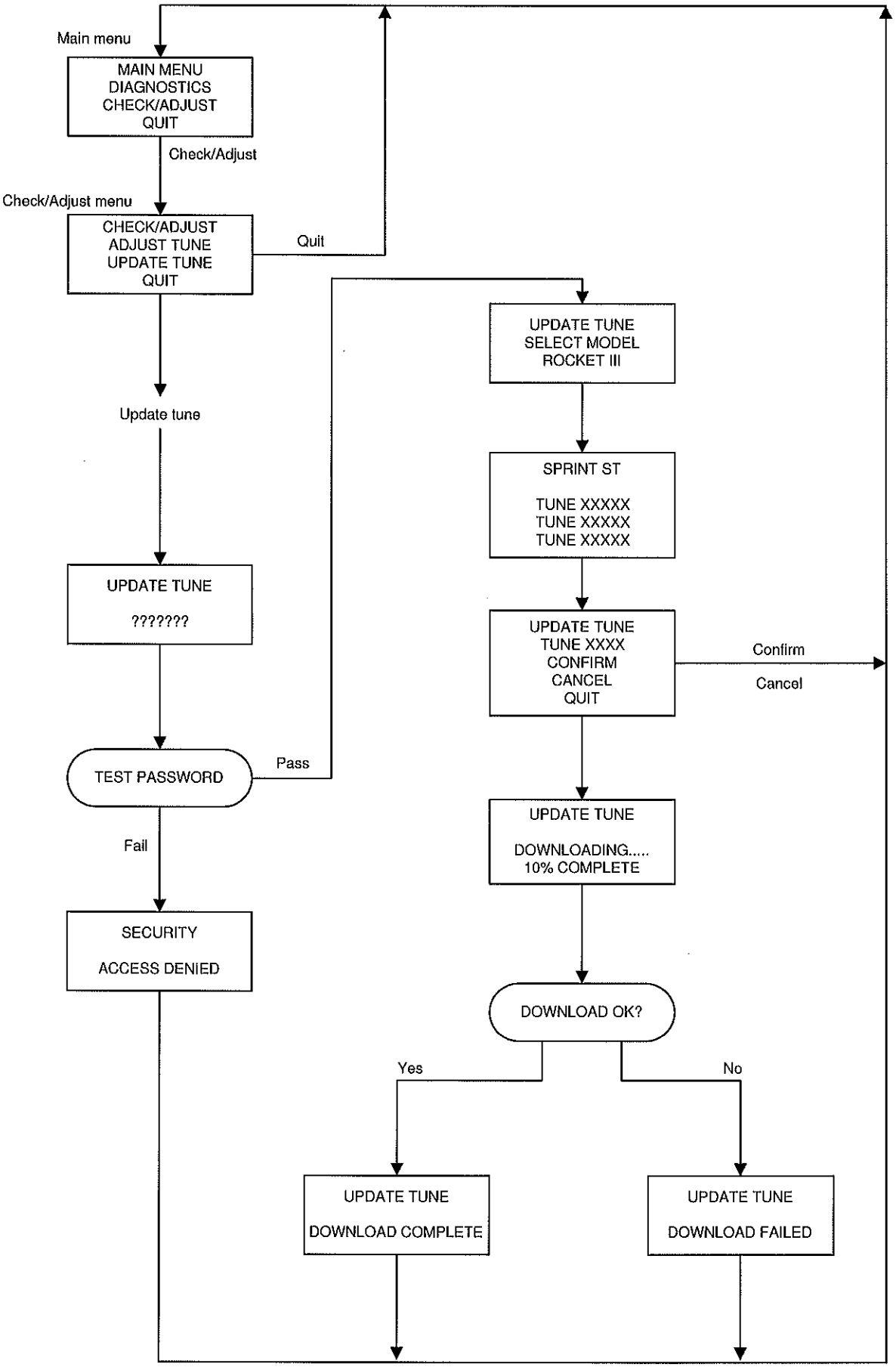
- **The tool does not retain any memory of faults, diagnosis etc. carried out on any particular motorcycle. Any such memory is only retained in the motorcycle's ECM.**
- **The following five pages describe the tool operations in flow chart form.**


CONNECT BIKE
SELF TEST
False
SYSTEM ERROR
CHECK CARD
Absent
Present
SELECT LANGUAGE
ENGLISH
FRANCAIS
DEUTSCH
ESPANOL
NEDERLANDS
INSERT MEMORY CARD
TRIUMPH MOTORCYCLES
DIAGNOSTIC TOOL
SOFTWARE VERSION
2005_01
SELECT ECU
ABS
ENGINE
ABS DIAGNOSTICS
SEE SECTION 14
SWITCH ON BIKE IGNITION
VALIDATE
False
DATA LINK FAULT
RETRY
SERVICE DATA
DEALER 555555
SERVICE DATA
DATE 15/06/05
Main Menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Quit

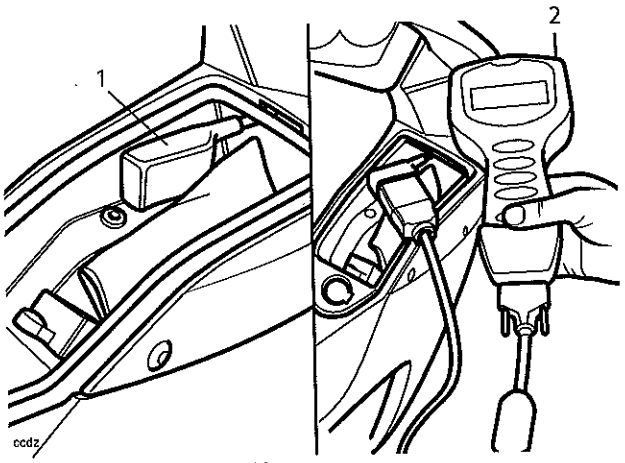

MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Diagnostics
DIAGNOSTICS
CURRENT DATA
FAULT CODES
FUNCTION TESTS
QUIT
Fault codes
Current data
CURRENT DATA
ENGINE SPEED
CALCULATED LOAD
COOLANT TEMPERATURE
SHORT TERM FUEL TRIM
THROTTLE POSITION
INTAKE AIR TEMPERATURE
VEHICLE SPEED
IGNITION ADVANCE
OXYGEN SENSOR OUTPUT VOLTAGE
INTAKE MANIFOLD ABSOLUTE PRESSURE
FUEL SYSTEM STATUS
STOP ENGINE
Error Count
STORED ERRORS
FAULT COUNT 02
IGNITION COIL 1 OPEN CIRCUIT
INJECTOR 3 OPEN CIRCUIT
Starred DTC
STORED ERRORS
FREEZE FRAME DATA
CLEAR DTCS
Freeze frame data
CURRENT DATA
ENGINE SPEED
CALCULATED LOAD
COOLANT TEMPERATURE
SHORT TERM FUEL TRIM
THROTTLE POSITION
INTAKE AIR TEMPERATURE
VEHICLE SPEED
IGNITION ADVANCE
OXYGEN SENSOR OUTPUT VOLTAGE
INTAKE MANIFOLD ABSOLUTE PRESSURE
FUEL SYSTEM STATUS
STORED ERRORS
RETURN TO DTCS
CLEAR DTCS
Return
Clear
STORED ERRORS
ERASE ALL DTC DATA
YES
NO
No
Yes
RESET DTCS


Main Menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Diagnostics
DIAGNOSTICS
CURRENT DATA
FAULT CODES
FUNCTION TEST
QUIT
Function test
TEST DTC COUNT
DTCs present
FUNCTION TEST
DTCS PRESENT CLEAR
BEFORE TEST ACTION
Error Count
Screen
No DTCs present
FUNCTION TEST
INSTRUMENT PANEL
IDLE SPEED CONTROL STEPPER MOTOR
PURGE CONTROL VALVE
FUEL PUMP RELAY
FUEL PUMP OPERATION
COOLING FAN
2ND THROTTLE CONTROL STEPPER MOTOR
Cancel
FUNCTION TEST
"TEST NAME"
PROCEED
CANCEL
Proceed
FUNCTION TEST
TEST NAME
TESTING.....
OBSERVE
TEST DTCS
DTC present
Zero DTCs
FUNCTION TEST
TEST NAME
TEST FAILED P1111
S/C TO VBATT
FUNCTION TEST
TEST NAME
TEST COMPLETE
CLEAR DTC
Yes
FUNCTION TEST
PERFORM ANOTHER TEST
YES
NO
No


Main Menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Check/Change
Check/Adjust menu
CHECK/ADJUST
CHECK
ADJUST
QUIT
Quit
Adjust menu
Adjust
CHECK/ADJUST
ADJUST TUNE
UPDATE TUNE
QUIT
Check
Check menu
CHECK
READ BUILD DATA
READ SENSORS
READ ADAPTION STATUS
QUIT
Quit
Adjust menu
ADJUST
THROTTLE BALANCE
ADAPTION RESET
REPLACE TPS
REPLACE ISC STEPPER
TUNE UPDATE
QUIT
Read sensors
VOLTAGES
THROTTLES/COILS/INJECTORS
OTHER
THROTTLE BALANCE
THROTTLE 1 1234 MM/HG
THROTTLE 2 1234 MM/HG
THROTTLE 3 1234 MM/HG
No
Yes
ADAPTION RESET
CONFIRM Y/N
ECU HAS BEEN RESET
REPLACE PRIMARY TPS
THROTTLE CLOSED
CURRENT VOLTS 0.54 V
REPLACE ISC STEPPER
THROTTLE CLOSED
CURRENT VOLTS 0.54 V
THROTTLE OPEN
CURRENT VOLTS 0.51 V
Build data
BUILD DATA
VIN
XXXXXXXXXXXX
TRIUMPH ECU PART NUMBER
XXXXXX
KEIHIN ECU PART NUMBER
XXXXXXXXXXXX
ECU SERIAL NO
XXXXXXXXXXX
SOFTWARE VERSION NUMBER
XXXXXXXXXX
DATE OF MANUFACTURE
XXXXXXXXXX
CALIBRATION ID
XXXXXXXXXX
Adaption status
ADAPTION STATUS
ECU RESET CLOSED THROTTLE POSITION REF STATUS
IDLE SPEED CONTROL ADAPTION STATUS
02 SENSOR ADAPTION STATUS - OFF IDLE
02 SENSOR ADAPTION RANGE - OFF IDLE
02 SENSOR ADAPTION STATUS - IDLE
02 SENSOR ADAPTION RANGE - IDLE


Main menu
MAIN MENU
DIAGNOSTICS
CHECK/ADJUST
QUIT
Check/Adjust
Check/Adjust menu
CHECK/ADJUST
ADJUST TUNE
UPDATE TUNE
QUIT
Quit
Update tune
UPDATE TUNE
???????
TEST PASSWORD
Pass
Fail
SECURITY
ACCESS DENIED
UPDATE TUNE
SELECT MODEL
ROCKET III
SPRINT ST
TUNE XXXXX
TUNE XXXXX
TUNE XXXXX
UPDATE TUNE
TUNE XXXX
CONFIRM
CANCEL
QUIT
Confirm
Cancel
UPDATE TUNE
DOWNLOADING.....
10% COMPLETE
DOWNLOAD OK?
Yes
No
UPDATE TUNE
DOWNLOAD COMPLETE
UPDATE TUNE
DOWNLOAD FAILED

1. Connection and Power-Up



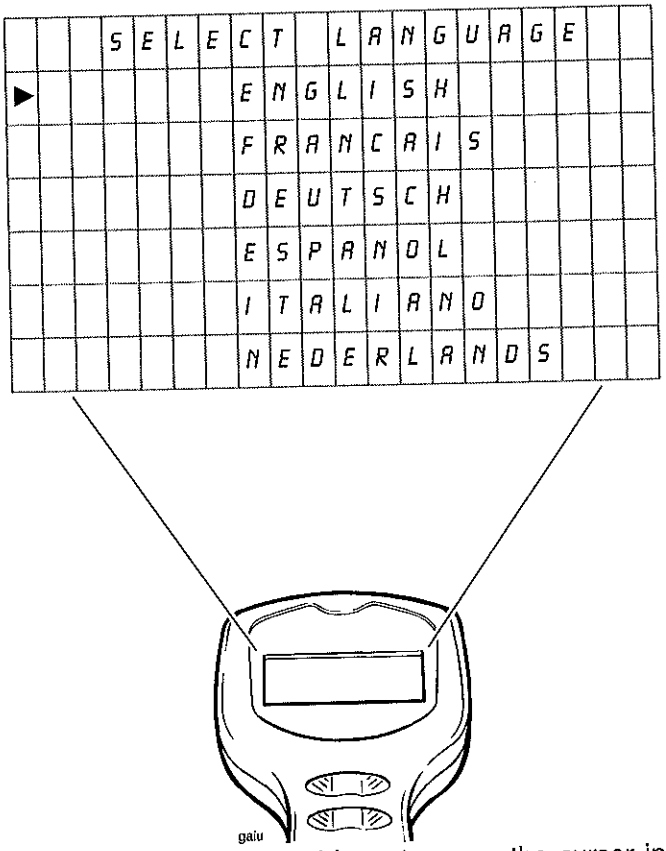
1. Connection to Main Harness
2. Triumph Service Diagnostic Tool

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



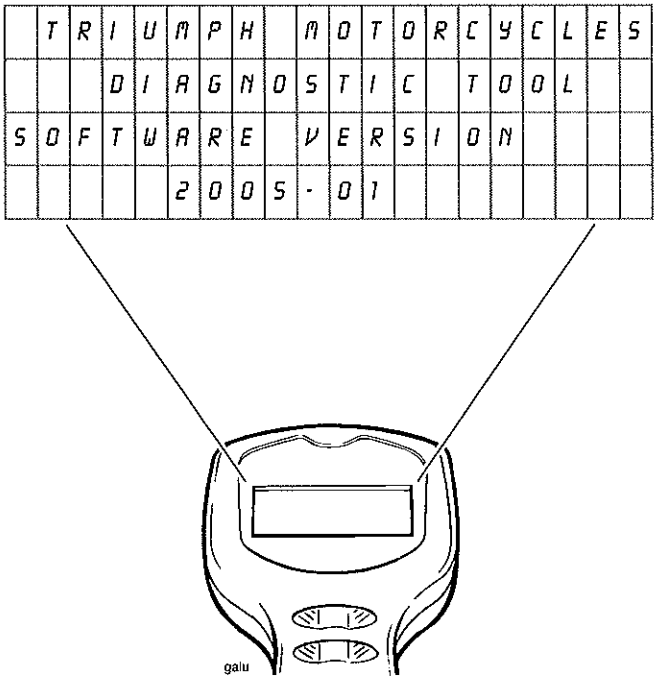
Use the 'Up' and 'Down' keys to move the cursor in column 1 and select the language required.

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

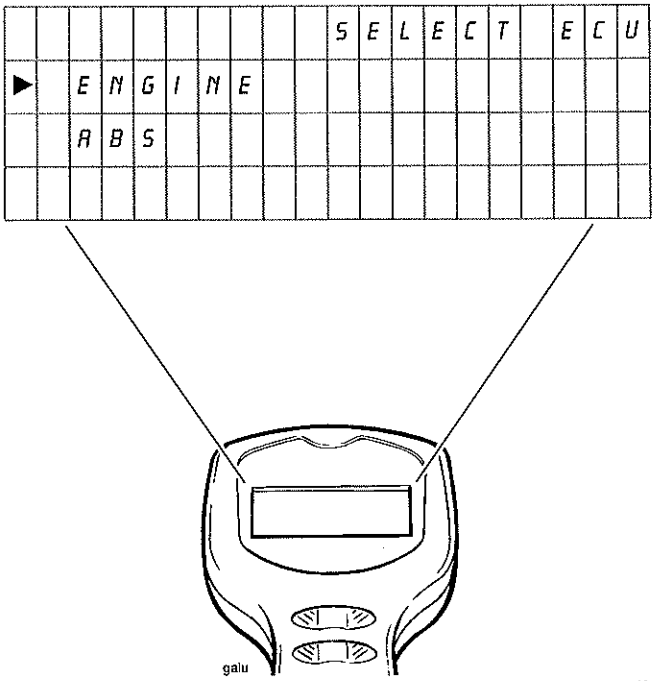


The screen will display the message 'Triumph Motorcycles Diagnostic Tool' and will also give the diagnostic software version and the software release year.

Press the validation key '⁎' to move on.

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

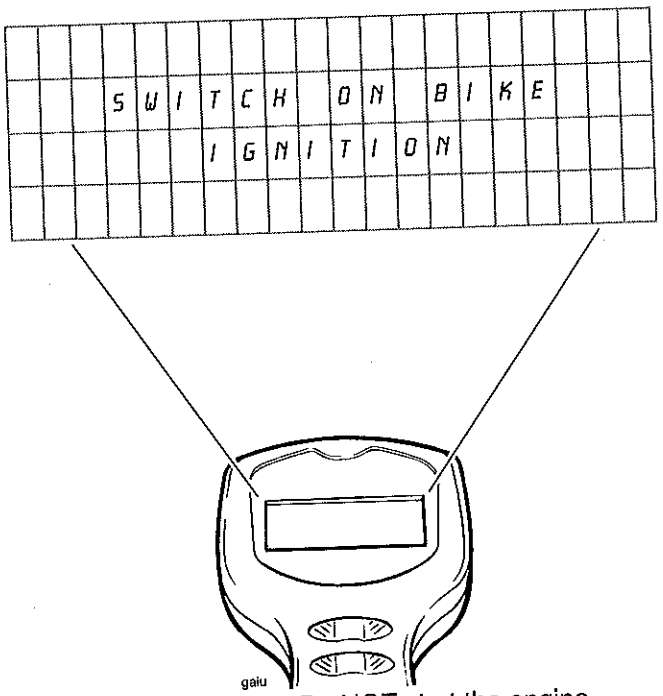
4 SELECT ECU



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

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

5. SWITCH ON BIKE IGNITION



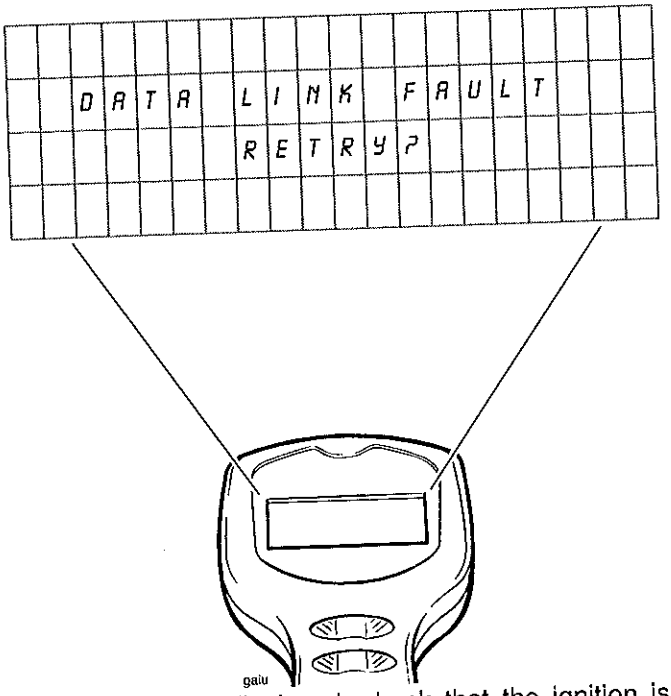
Switch on the ignition. Do NOT start the engine.

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.

If all is OK, **'SERVICE DATA'** 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 ECM, flat battery etc.

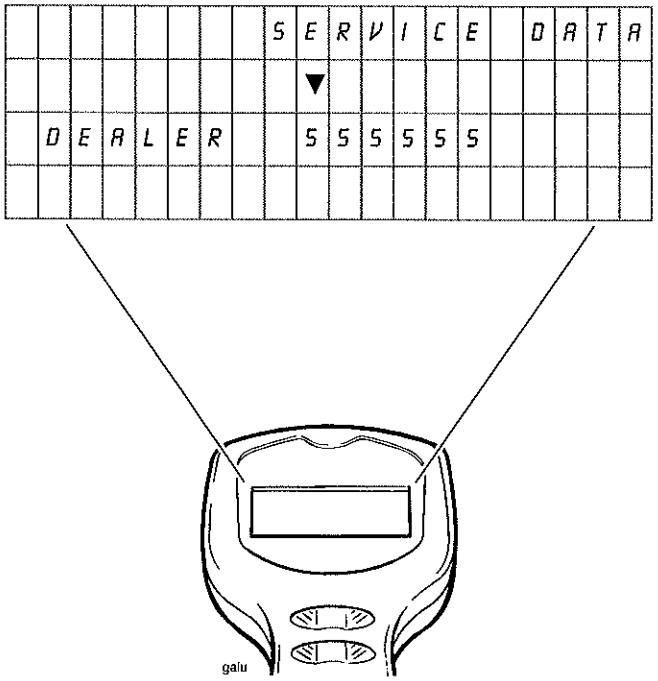
Press the **Help** key **'?'** for advice.

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

Press the Validation key '*' again. If the tool accepts that the problem has been rectified, **'SERVICE DATA'** will be displayed.

This is the first of 2 screens for which the operator has to input information, without which the testing cannot proceed further.

7. SERVICE DATA - DEALER



Enter your Dealer number as follows:

The number **'555555'** is displayed, with the cursor pointing down at the first digit.

Press the 'Up' or 'Down' keys to change this digit to the first digit of your dealer code.

Press the Validation key '⁎'.

The cursor will now re-position over the second digit '5'. Enter the 2nd digit of your Dealer number in the same way.

Continue until all 5 digits of your dealer code have been entered.

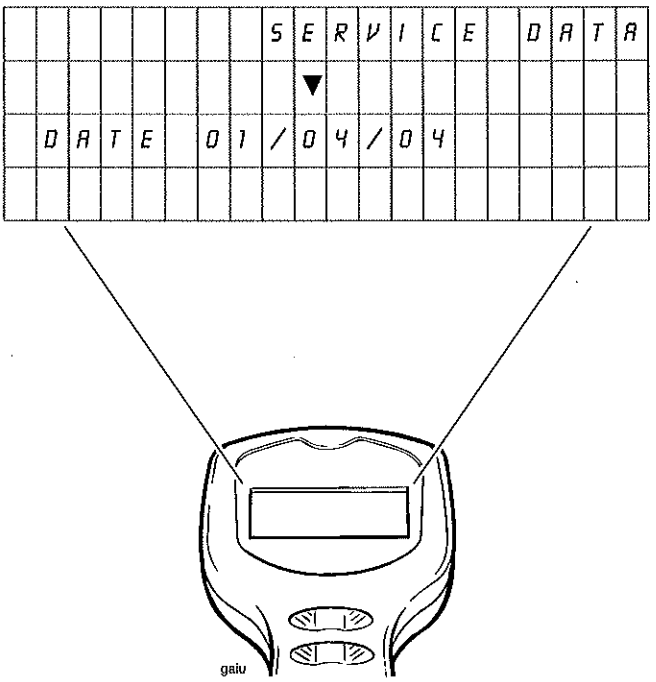
Note:

- **If any digit has been entered incorrectly, press the 'Return' key (↵) to start again.**

When all 5 digits have been entered correctly, press the Validation key '⁎'.

You must enter a valid Dealer Number to continue. If you do not know your dealer number, contact Triumph or your importer for advice.

8. SERVICE DATA - DATE



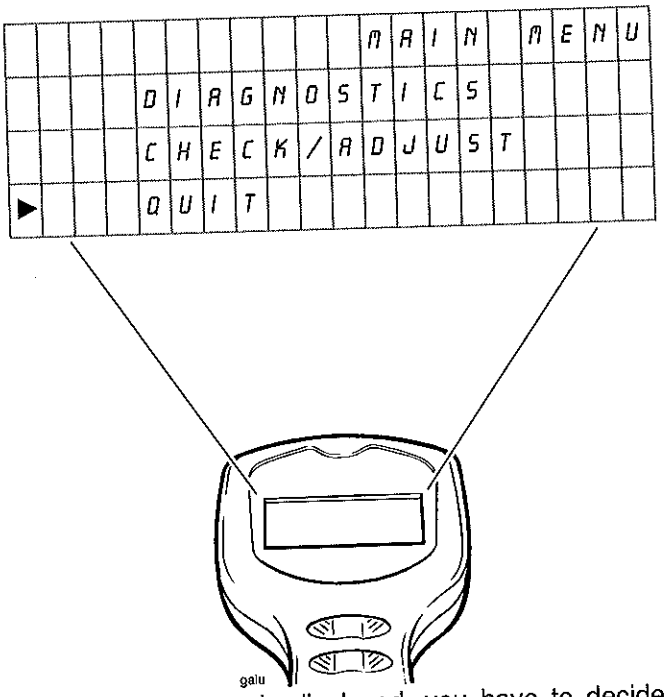
Enter the date using the 'Up' and 'Down' keys in the same way that the Dealer number was entered.

Note:

- **6 digits must always be entered, e.g. If it is the 7th month this must be entered as 07.**
- **The date must be entered in the order Day/ Month / Year.**

When complete, press the Validation key '⁎' to display - '**MAIN MENU**'.

9. MAIN MENU



When this screen is displayed, you have to decide whether to proceed along one of two routes:

- 'DIAGNOSTICS'
- 'CHECK/ADJUST'

The **'DIAGNOSTICS'** menu provides access to:

Current data e.g. actual engine temperature, engine speed etc.

Diagnostic Trouble Codes (DTCs) i.e. access to codes stored in the motor cycle ECM which indicate a confirmed fault(s) in the system.

Function tests e.g. of tachometer, water temperature gauge, fuel pump etc.

The **'CHECK/ADJUST'** menu provides:

Checks i.e. build information, system data.

Adjustments e.g. adjustment of idle fuel/CO etc., and entry of software updates.

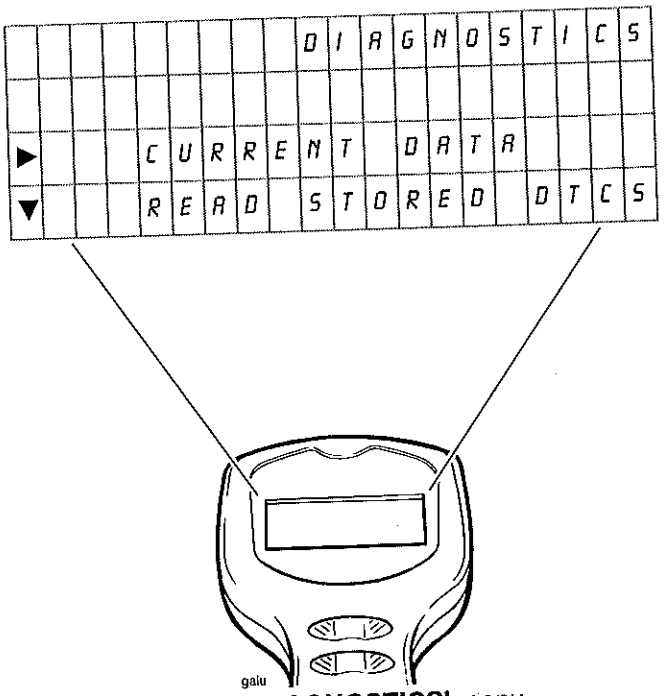
Use the `Up and Down' keys to position the cursor opposite the desired choice, and press the Validation key '*'.

Either **'DIAGNOSTICS'** (operation *10.*) or **'CHECK/ADJUST'** (operation *28.*) will be displayed, dependent on the selection.

Note:

- **If 'QUIT' is selected and the validation key '*' pressed, the display will return to 'TRIUMPH MOTORCYCLES'.**

10. DIAGNOSTICS *(If 'DIAGNOSTICS' is selected)*



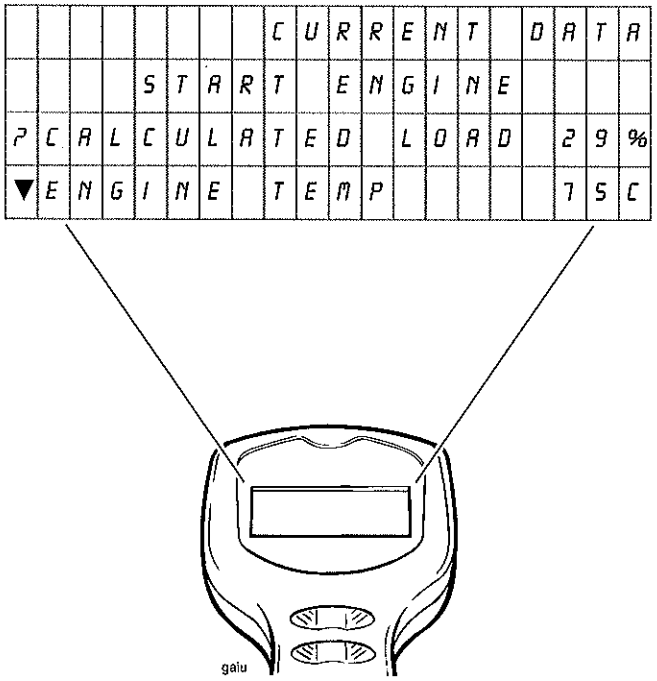
This display is the **'DIAGNOSTICS'** menu.

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

The choices are:

- **'CURRENT DATA'** (see operation *11.*)
- **'READ STORED DTCS'** (see operation *13.*)
- **'CLEAR DTCS'** (see operation *18.*)
- **'FUNCTION TESTS'** (see operation *19.*)
- If **'QUIT'** is selected, the display will return to **'TRIUMPH MOTORCYCLES'.**

11. CURRENT DATA



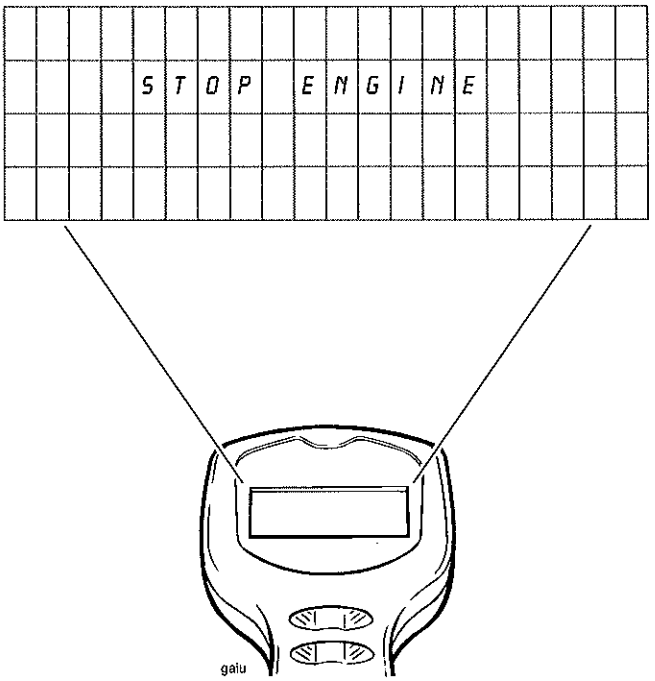
Start the engine. **'CURRENT DATA'** includes the information shown in the table below which can be accessed by scrolling, using the 'Up' and 'Down' keys. At the end of each line of text, the actual reading at that instant is provided to assist diagnosis e.g. **ENGINE TEMP - 75C.**

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

If further clarification of any line of displayed text is required, scroll that line opposite the **'?'** symbol in the left hand column and press the **Help** key (**?**). Limited information on the selected topic will then be displayed.

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

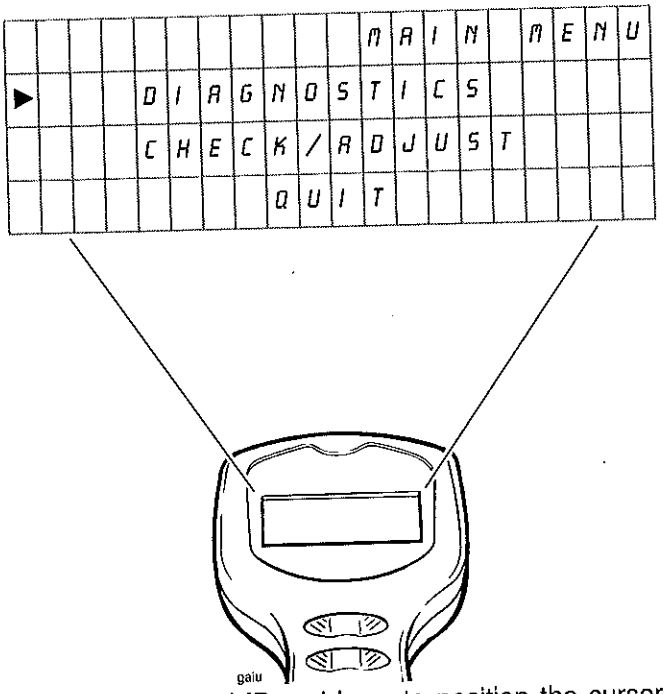
12. STOP ENGINE



Switch off the engine.

As the tool is powered from the motorcycle, this will end the diagnostic session. To continue, return to the power-up section and select tests as required.

13. To select 'READ STORED DTCS' (Diagnostic Trouble Codes) from the MAIN MENU:



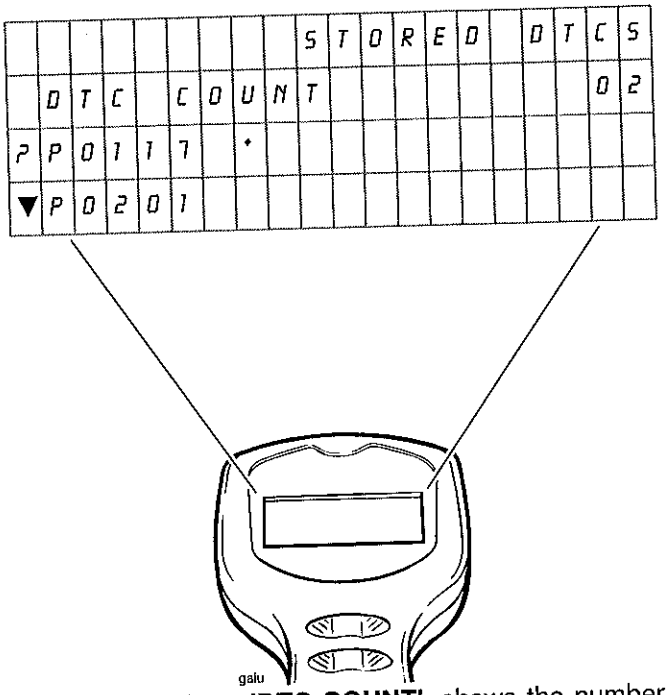
Use the 'Up' and 'Down' keys to position the cursor opposite **DIAGNOSTICS**.

Press the Validation key '*' to display **'DIAGNOSTICS'** menu.

Select **'READ STORED DTCS'**, and press the Validation key '*'.

'STORED DTCS' will be displayed.

14. STORED DTCS



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

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

If there are no 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: P0117

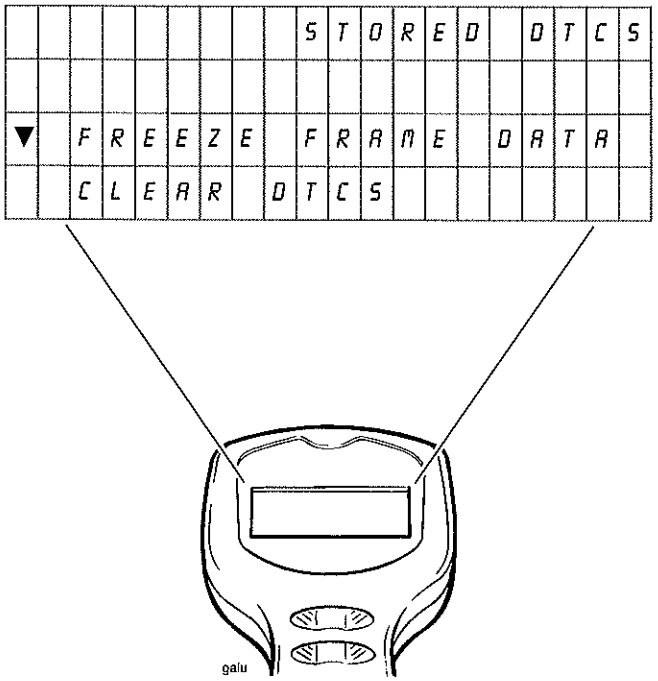
Help text MAP SENSOR LOW VOLTAGE

Press the Validation key '*' to continue (operation *15.*).

IMPORTANT:

If a DTC has an asterisk (*) to its right, this indicates that a snap shot of engine data at the time the DTC was stored is available to aid your fault diagnosis. To access this information, press the Validation key '*' to go to operation *15.* and open **'FREEZE FRAME DATA'**.

15. Three options are now available:

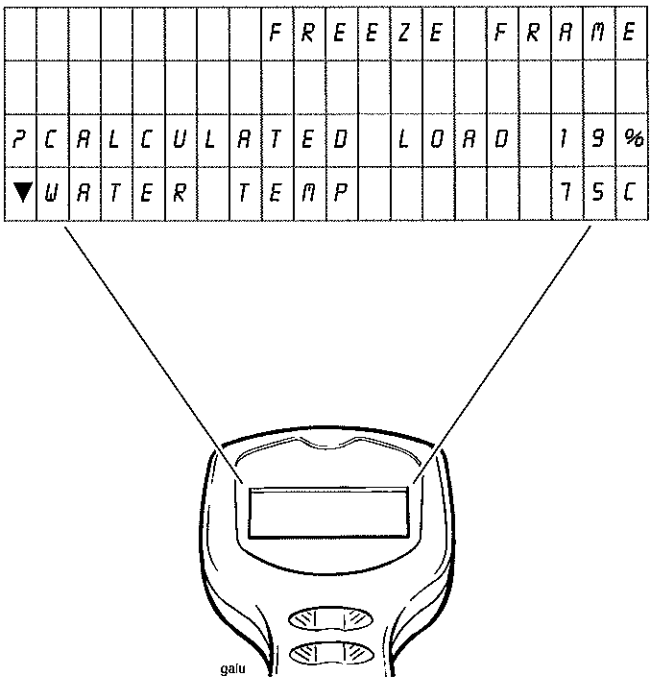


Align **'FREEZE FRAME DATA'** with the cursor, and press the validation key '⁎' to display **'FREEZE FRAME'** (operation *16.*).

Align **'CLEAR DTCS'** with the cursor, and press the validation key '⁎' to display **'ERASE ALL DTC DATA'** (operation *18.*).

Press the Return key (↵) to go back to **'STORED DTCS'** (operation *14.*).

16. FREEZE FRAME

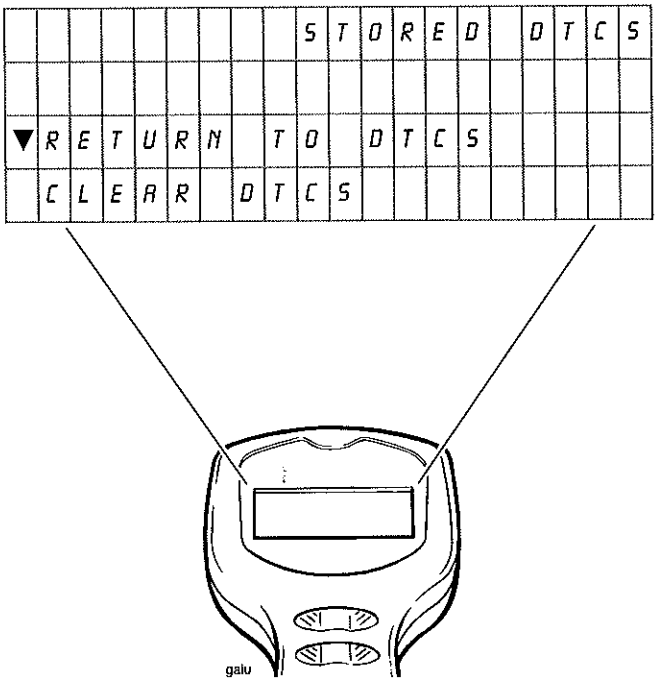


When a fault occurs which causes a DTC to be stored in the memory, the engine condition data at that instant is logged in the ECM. If another, more serious DTC is subsequently set, the original DTC data is automatically erased and new data associated with the latest DTC is logged in its place.

By selecting **'FREEZE FRAME'**, this information becomes available on the screen to aid diagnosis. Scroll the text up or down to view the data. More information can be gained by scrolling the text line in question to line 3 (**?**), then press the **Help** key (**?**) as before. Press the Validation key '⁎' to display **'STORED DTCS'** (operation *17.*).

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

17. STORED DTCS



2 options are now available:

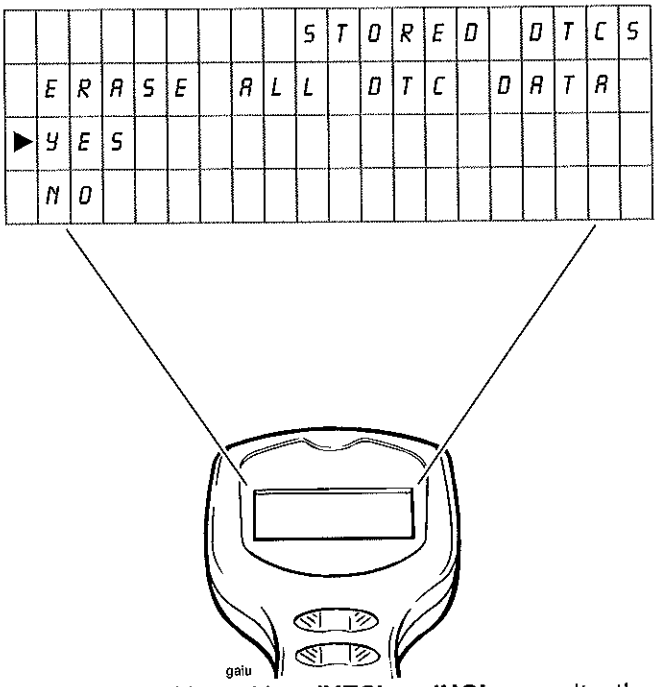
Scroll to **'RETURN TO DTCS'** and press the Validate key '*' to return to operation *14.*

Scroll to **'CLEAR DTCS'** and press the Validation key '*' to go on to operation *18.*

Note:

- **A full list of all the possible DTCs can be found earlier in this section.**

18. STORED DTCS, ERASE ALL DTC DATA



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

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

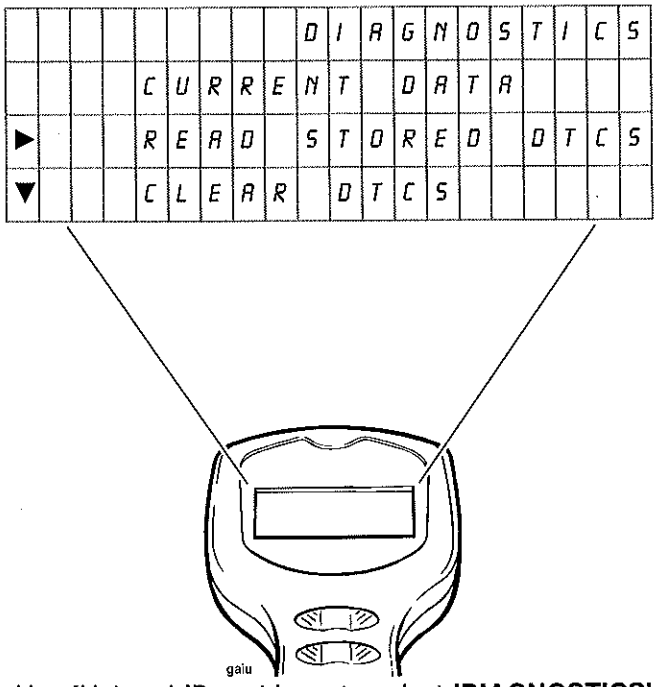
Note:

- **If you intend to examine the Function Tests, entry will be inhibited unless the DTCs have been erased.**

If **'NO'** is selected, press the Validation key '*' to return to operation ***14.***

That completes the DTC cycle.

19. To select 'FUNCTION TESTS' from the MAIN MENU:



Use 'Up' and 'Down' keys to select **'DIAGNOSTICS'** menu.

The following choices are available.

Press the Validation key '⁎'. **'DIAGNOSTICS'** will be displayed.

Select **'FUNCTION TESTS'**, and press the Validation key '⁎'.

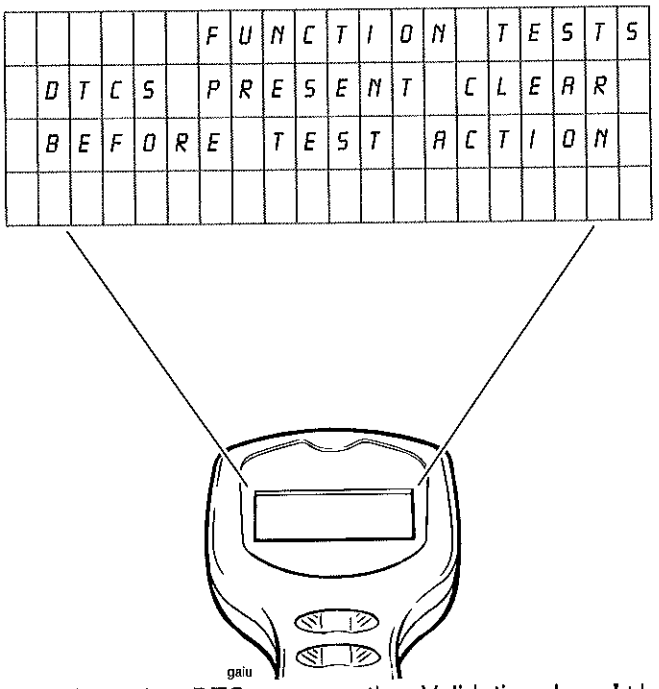
If no DTC'S are stored, `**FUNCTION TEST'** will be displayed (operation *21.*).

If one or more DTC'S are stored, the message **'DTCS PRESENT CLEAR BEFORE TEST ACTION'** will be displayed (operation *20.*).

Note:

- **The diagnostic tool will not allow Function Tests to be accessed until all DTCs in the memory are removed.**

20. FUNCTION TESTS



To clear the DTCs, press the Validation key '⁎'. **'STORED DTCS'** will be displayed (see operation *14.*).

Proceed as before via operations *15.* to *18.* Scroll to **'YES'** and press the Validation key '⁎' to erase all DTC data; the **MAIN MENU** will be displayed again.

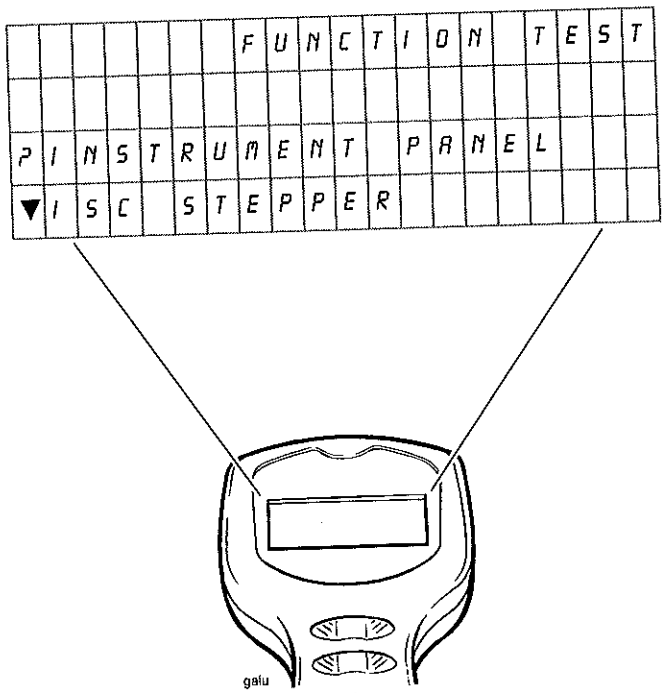
Note:

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

Select **'DIAGNOSTICS'** menu and **'FUNCTION TESTS'** again pressing the Validation key '⁎' each time.

Because the DTCs have now been erased, **'FUNCTION' TEST'** (operation *21.*) will now be displayed.

21. FUNCTION TEST



The following can be tested:

a) Instrument panel.
b) Idle speed control stepper.
c) Purge valve.
d) Fuel pump prime.
e) Cooling fan operation.
f) Fuel pump operation.

If the fault is electrical, this will then be reported as a DTC.

Instrument Panel test: A signal is sent which should cause the tachometer to read approximately 7,500 RPM, the water temperature gauge to show 100°C* and the speedometer 100 km/h*, all for 10 seconds.

Idle speed control stepper: A signal is sent which should cause the stepper to be driven to the fully closed position, then to the fully open position, pausing briefly in each position. DTCs are set if a malfunction is found.

* Or the imperial equivalents.

Purge valve (California models only): This test allows you to check operation of the valve. To detect valve operation, use a stethoscope to listen for valve operation. DTCs are set if a malfunction is found.

Fuel pump prime: This test provides you with the means to physically check the pump and relay operation. DTCs are set if a malfunction is found.

Cooling fan test: A signal is sent which should cause the fan to operate for a 10 second period. DTCs are set if a malfunction is found.

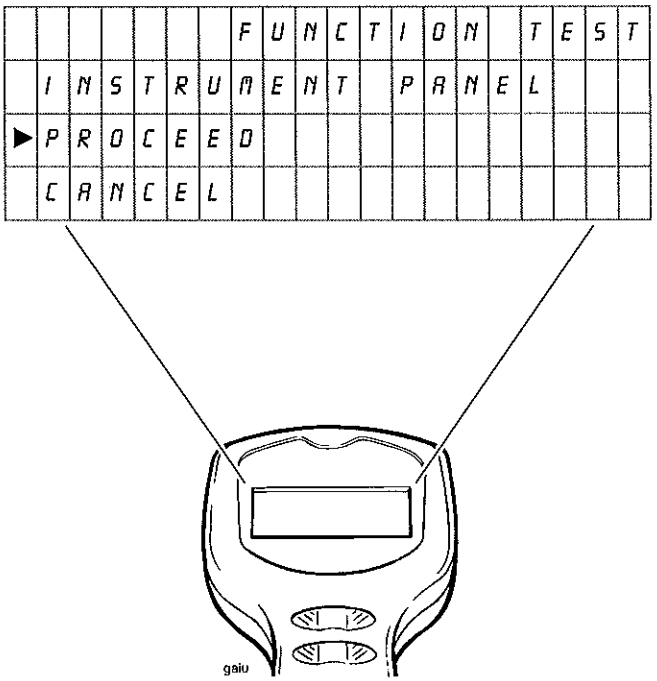
Fuel pump operation: This test provides you with the means to physically check the pump operation. DTCs are set if a malfunction is found. The pump is energised when the test is confirmed and ended when the Validation key '*' is pressed for a second time.

Press the **Help** key (**?**) for more information.

Note:

- **If the Return key (↵) is pressed, the tool will return to 'DIAGNOSTICS' menu (operation *10.*).**

22. FUNCTION TEST



The function selected at operation *21.* will now show on line 2. To show an example of this, we have chosen the **'INSTRUMENT PANEL'** test.

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

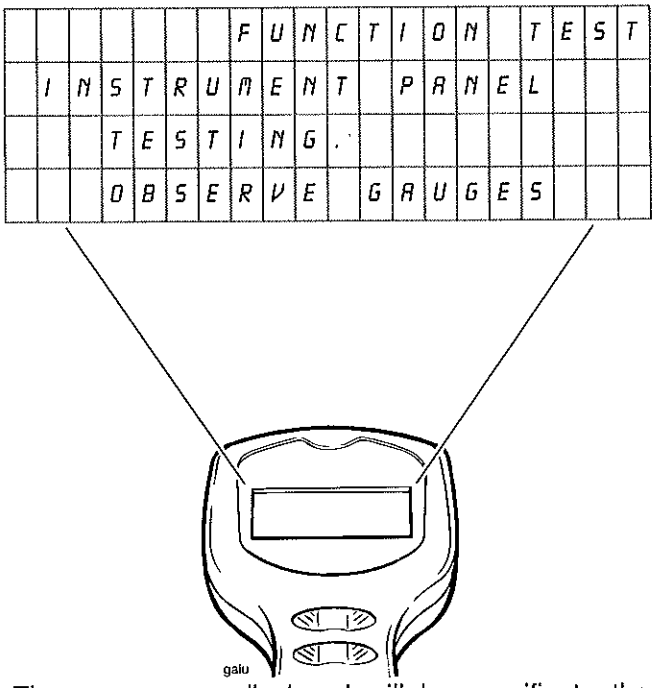
- TACHOMETER - 7500 RPM.
- TEMP GAUGE - not fitted, test will illuminate High Temp warning light.
- SPEEDOMETER - 100 km/h*.

* Or the imperial equivalents.

If you wish to cancel that selection, scroll to **'CANCEL'** and press the Validation key '*'. The display will return to operation *21.*

If you wish to test the component selected, scroll to **'PROCEED'** and press the Validation key '*'.

23. FUNCTION TEST

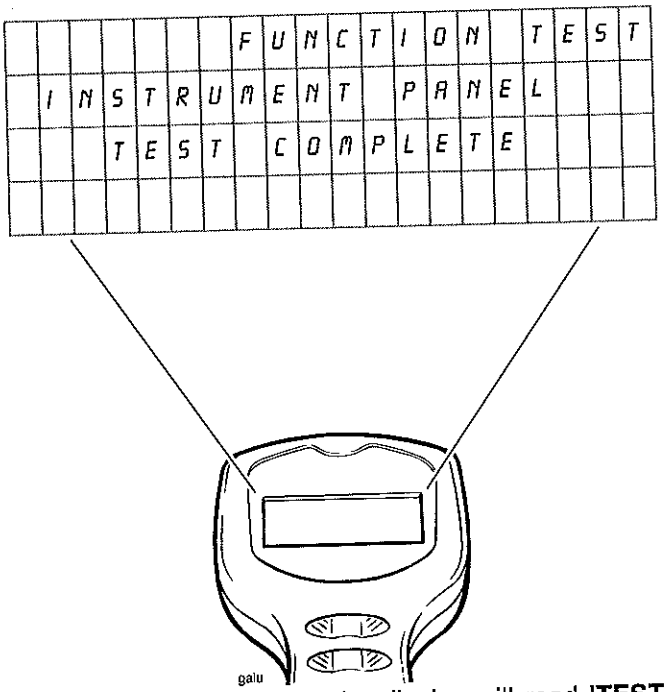


The screen now displayed will be specific to the component being tested:

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

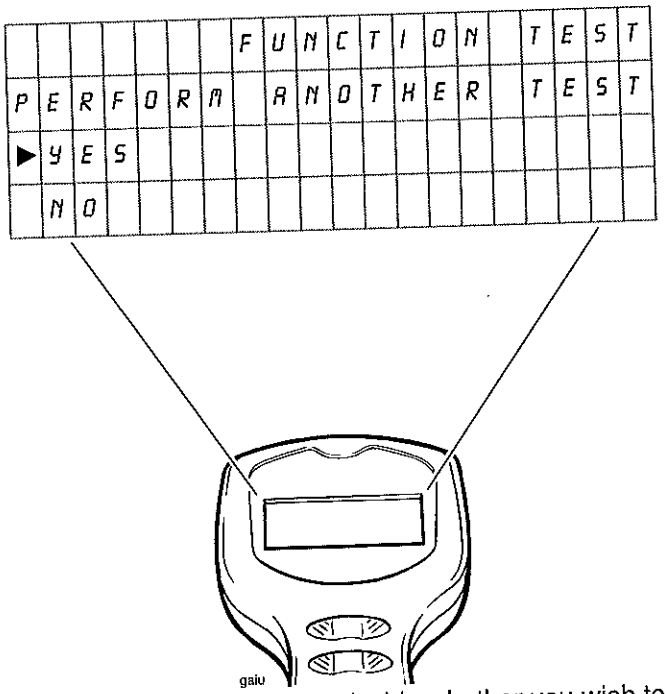
After a period of time, the screen will automatically change to either **'TEST COMPLETE'** (operation *24.*) which will indicate a satisfactory completion, or to **'TEST FAILED'** (operation *26.*) which will indicate failure.

24. FUNCTION TEST



If the test is satisfactory the display will read **'TEST COMPLETE'**. Press the Validation key '*' to display **'FUNCTION TEST'** (operation *25.*).

25. FUNCTION TEST

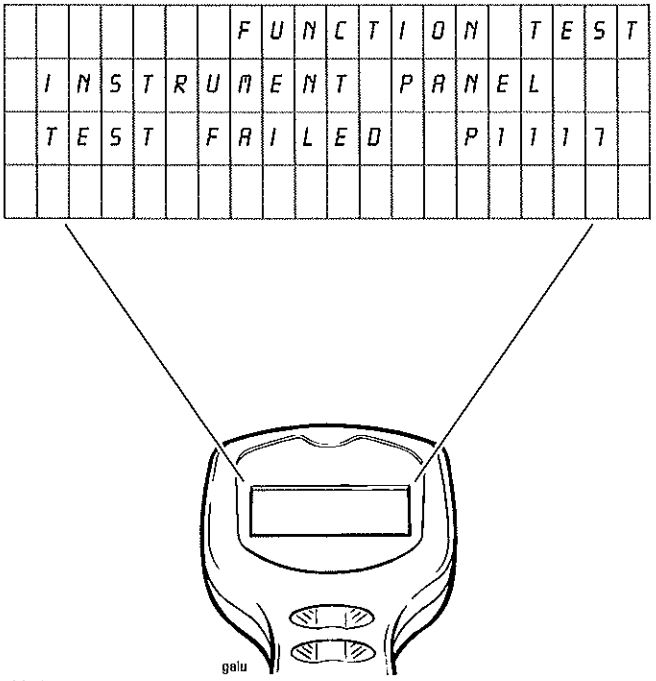


This display allows you to decide whether you wish to test another component.

Either - position the cursor on line 3 **'YES'** and press the Validation key '*' to return to the **'FUNCTION TEST'** selection menu,

or - position the cursor on line 4 **'NO'** and press the Validation key '*' to return to **'DIAGNOSTICS'** menu (operation *10.*).

26. FUNCTION TEST



If the test selected at operation *23.* is unsatisfactory, a DTC will be displayed on line 3 of this display.

Press the Help key (**?**) to access the diagnosis information associated with that code.

Press the Validation key '*' if you wish to test another component (operation *25.*).

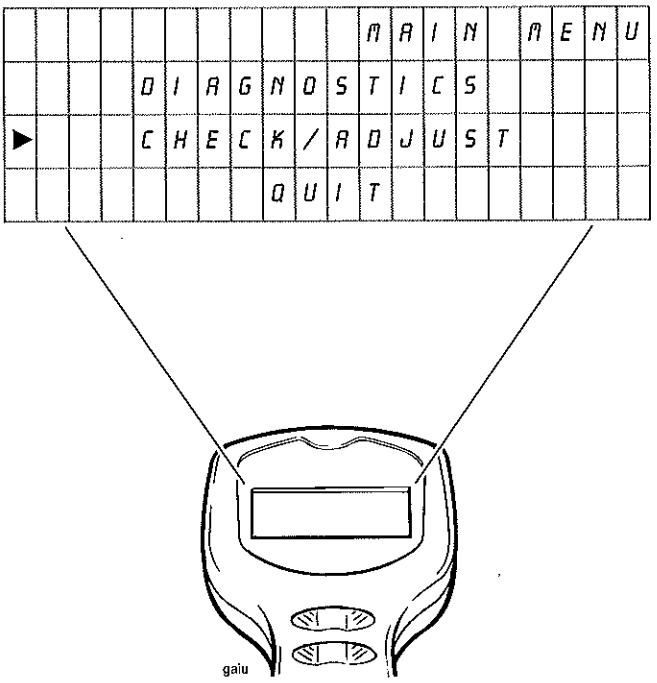
Note:

- **Any DTCs logged in the system will be automatically cleared at this point.**

To return to the **'DIAGNOSTICS'** menu, Select **'QUIT'** and press the Validation key '*' to return to the **'MAIN MENU'** (operation *9.*).

That completes the **FUNCTION TESTS** cycle.

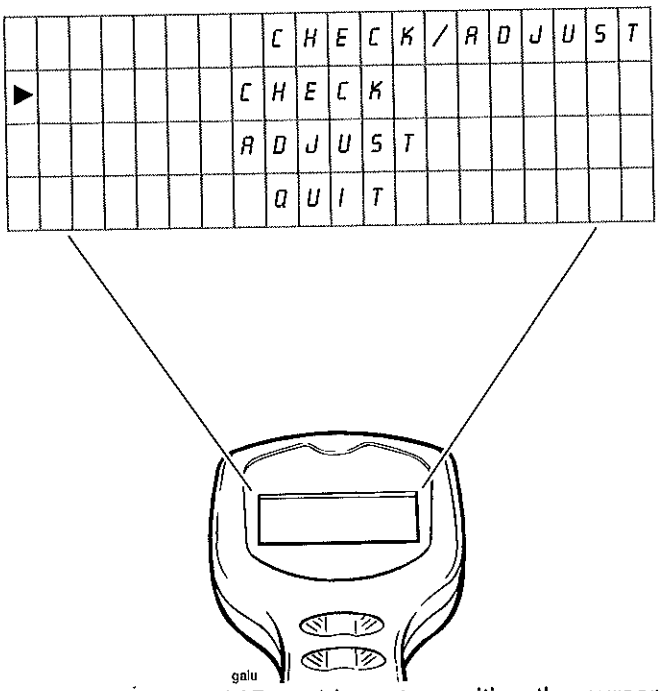
27. To select 'CHECKS/ADJUSTMENTS' from the MAIN MENU (operation *9.*):



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

Press the Validation key '*'; the **'CHECK/ADJUST'** menu will be displayed.

28. CHECK/ADJUST



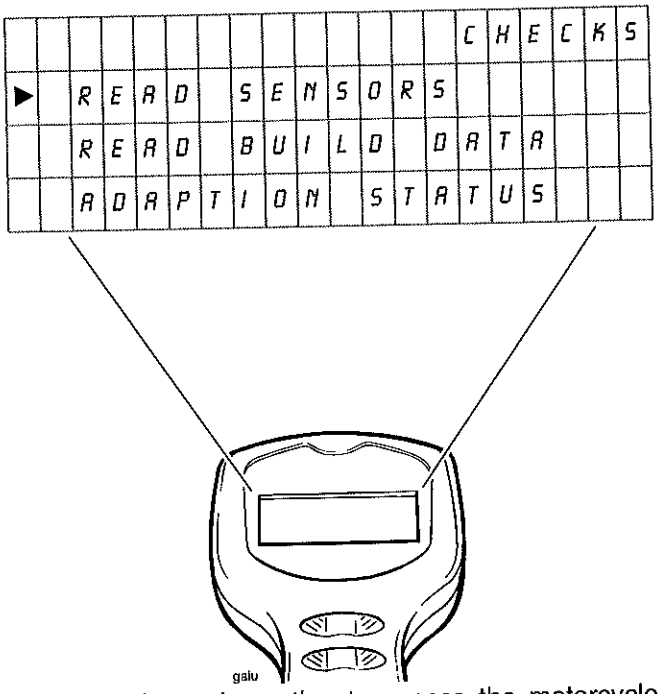
Use the `Up' and `Down' keys to position the cursor as follows, and then press the Validation key '*':

Opposite **'CHECK'** - **'CHECKS'** will be displayed (operation *29.*).

Opposite ADJUSTS' will be displayed (operation *33.*).

Opposite **'QUIT'** - to return to **'MAIN MENU'** (operation *9.*).

29. CHECKS



You now have the option to access the motorcycle **'BUILD DATA'** or the **'SYSTEM DATA'**, or to quit.

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

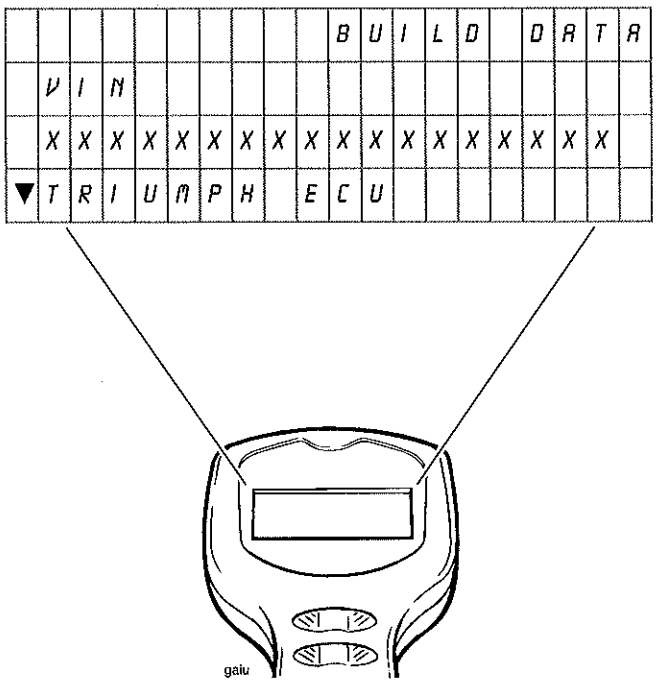
Opposite **'READ SENSORS'** - **'SENSOR DATA'** (operation *31.*) will be displayed.

Opposite **'READ BUILD DATA'** - **'BUILD DATA'** (operation *30.*) will be displayed.

Opposite **'ADAPTION STATUS'** - **'ADAPTION DATA'** (operation *32.*) will be displayed if the coolant temperature is higher than 90°C. If not, a holding screen will be displayed indicating the current temperature.

Opposite **'QUIT'** - to return to **'MAIN MENU'** (operation *9.*).

30. BUILD DATA

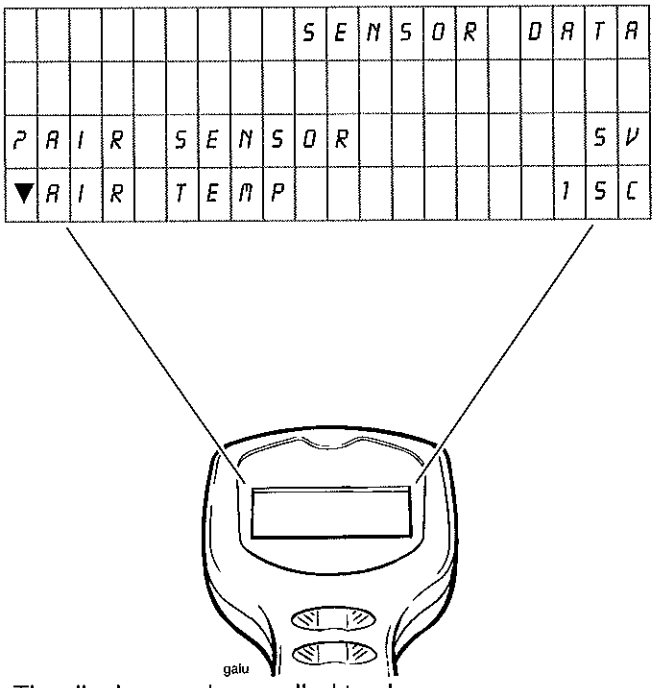


Providing the information was recorded at the time of build, the display will show the following information relating to the motorcycle under test by scrolling up and down. Before displaying the recorded information, the tool will briefly display the message, **'PLEASE WAIT, CHECKING BUILD DATA'**.

- Vehicle Identification Number (VIN)
- Triumph ECM part number
- Manufacturer's ECM part number
- ECM Serial number
- Tune Number

Press the Validation '*' keys to return to **'CHECK/ ADJUST'** menu (operation *28.*).

31. SENSOR DATA



The display can be scrolled to show:

The status of the various sensors and actuators

To obtain further data information, scroll the appropriate line to the help key mark (**?**) and press the Help key.

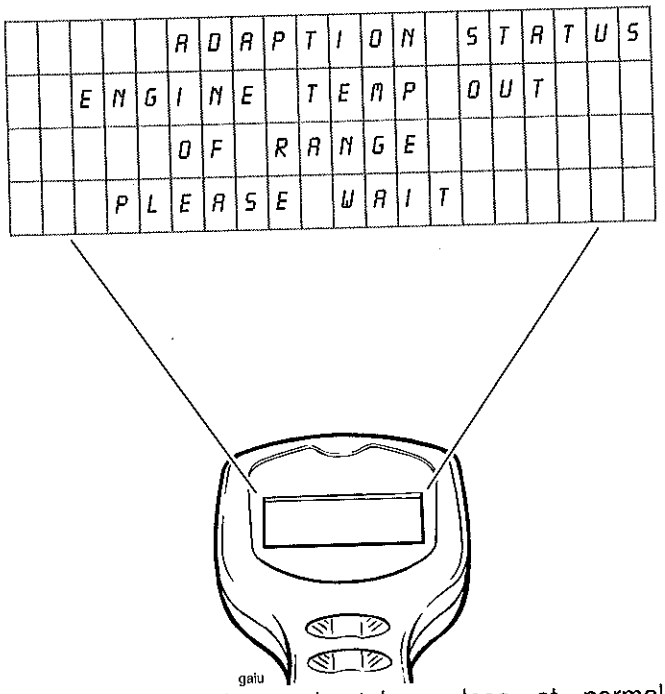
Note:

- **The help information shows the likely range of readings for a correctly functioning system at normal operating temperature.**

That completes examination of the Checks.

Press the Validation key '*' to return to **'CHECK/ ADJUST'** (operation *28.*).

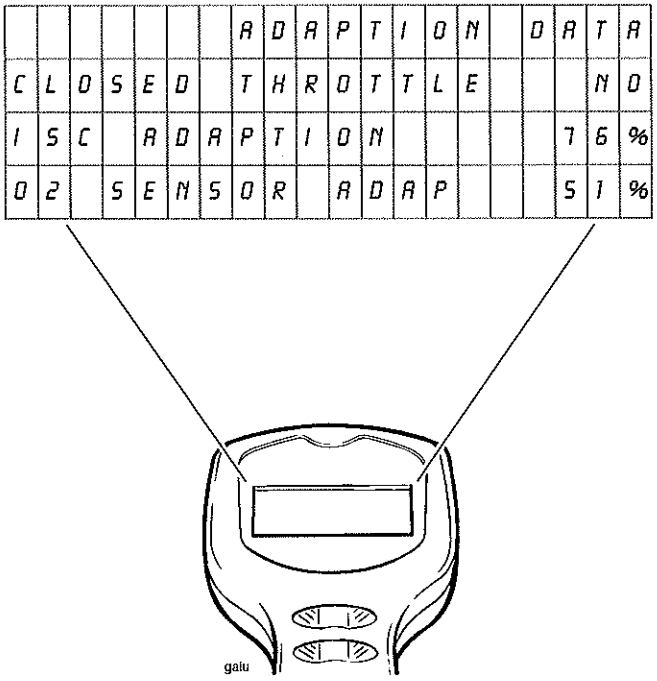
32. ADAPTION STATUS



Because adaption only takes place at normal operating temperature, the above screen will be displayed until the engine reaches normal operating temperature.

Until the engine warms or cools to the correct temperature range, the tool will not allow access to any other functions. If you wish to escape from this area (and not carry out the adjustment) switch off the ignition and disconnect the tool.

Once the correct temperature range has been reached, the **ADAPTION STATUS** screen (operation *33.*) will automatically be displayed.



The display can be scrolled to show:

The adaption status of the various sensors and actuators involved in the adaption process will give an indication as to whether or not the vehicle is correctly adapted. If the readings show an incorrect adaption status, refer to the table of contents for the location of further information and the actions necessary to force correct adaption.

See page *10-22* for additional information on forcing adaption.

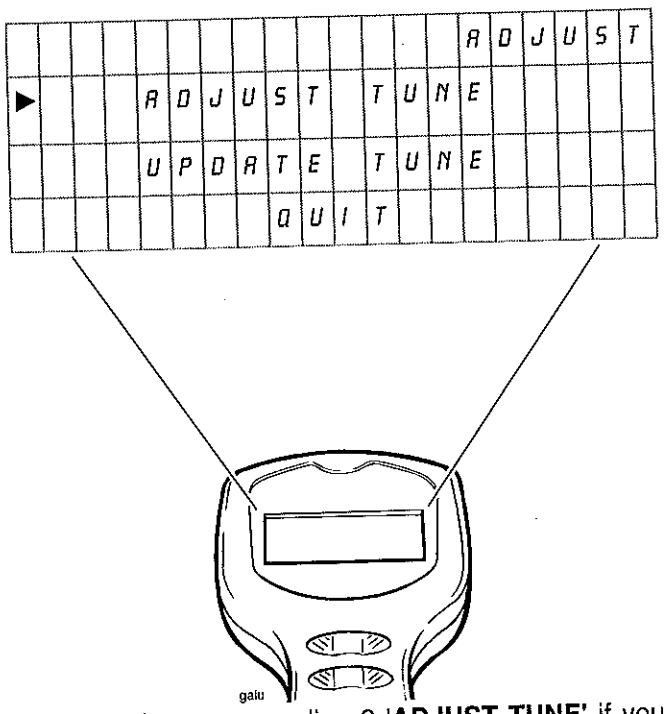
The data displayed under this option are:

Function Examined	Report Method
Closed throttle position reference status	adapted/not adapted
Idle speed control adaption status	%
Oxygen sensor adaption status (off idle)	%
Oxygen sensor adaption range (off idle)	%
Oxygen sensor adaption status (idle)	%
Oxygen sensor adaption range (idle)	%

Note:

- **Several forced adaptions may be needed to fully adapt an individual motorcycle.**

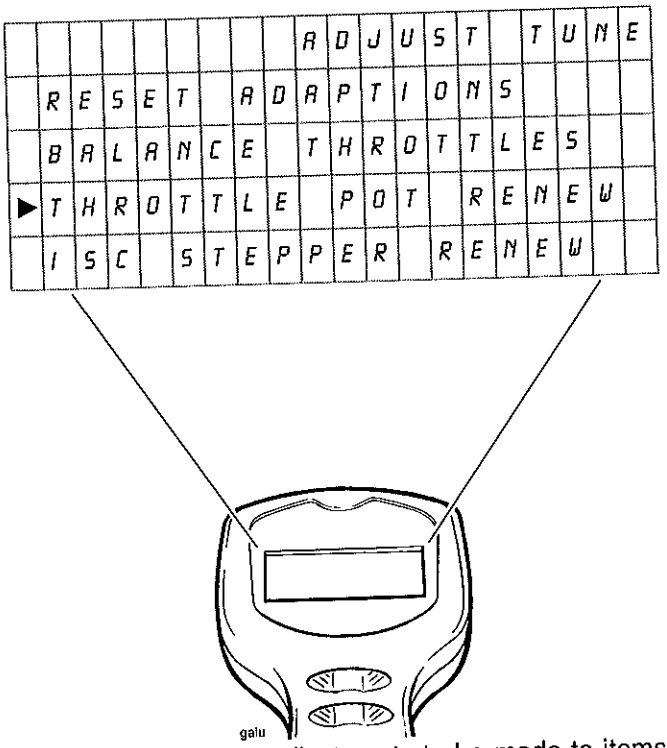
33. ADJUST



Position the cursor on line 2 '**ADJUST TUNE**' if you wish to check and/or adjust the values of certain tune items. Then press the Validation key '*' to display **ADJUST TUNE** (operation *34.*).

In special circumstances, Triumph will request you to introduce a completely new engine tune. Given this situation, select '**UPDATE TUNE**' and press the Validation key '*' (operation *37.*).

34. ADJUST TUNE



The following allow adjustments to be made to items which affect the engine operation

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

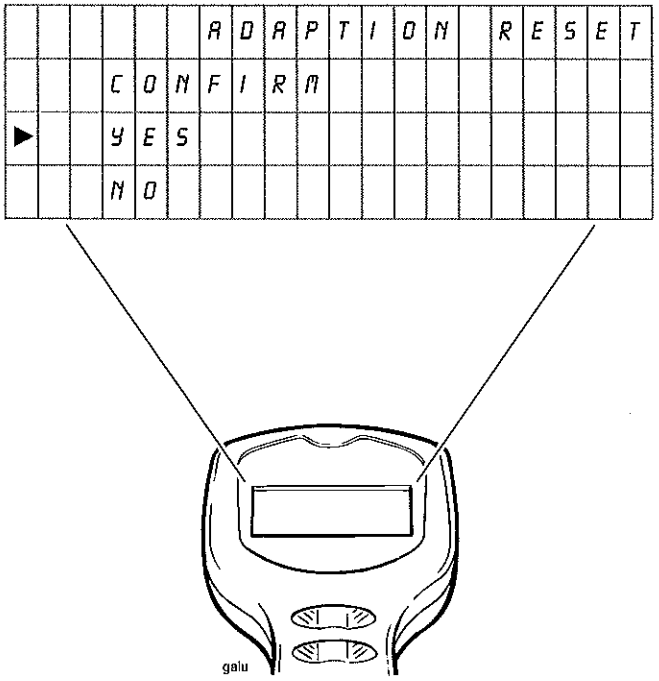
RESET ADAPTIONS. - See operation *35.*

BALANCE THROTTLES. - See operation *36.*

THROTTLE POT RENEW. - See page 8-102 for details on when and how to use this function.

IDLE SPEED CONTROL STEPPER RENEW - See page 8-106 for details on when and how to use this function.

35. ADJUST TUNE (adaption reset)



After selecting the adaption reset option, confirm or reject the option by positioning the cursor 'opposite the option chosen and press the Validation key '*'.

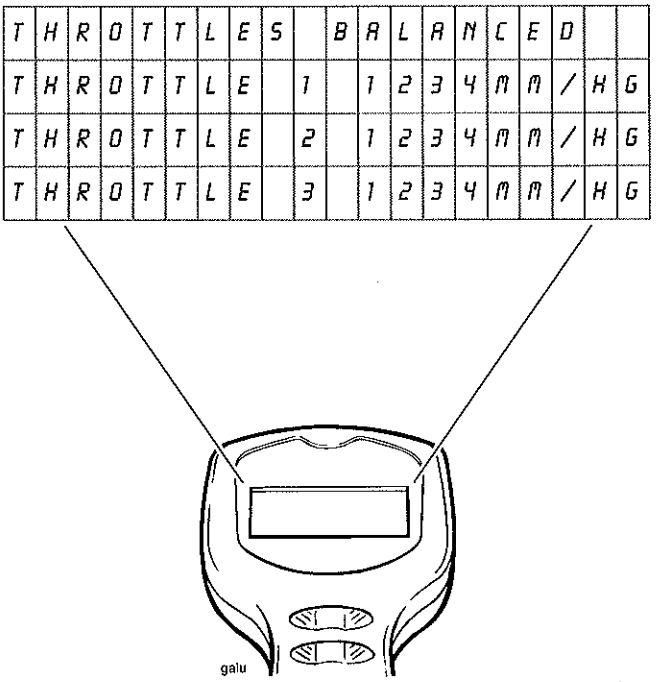
If YES is chosen, a screen will confirm that adaptions have been reset.

If NO is chosen, you will be returned to the adjust tune menu.

Note:

- **Resetting the adaption values does not adapt the motorcycle. This can only be done by the method explained later in this section. Adaption reset only returns adaption values to their 'start' point.**

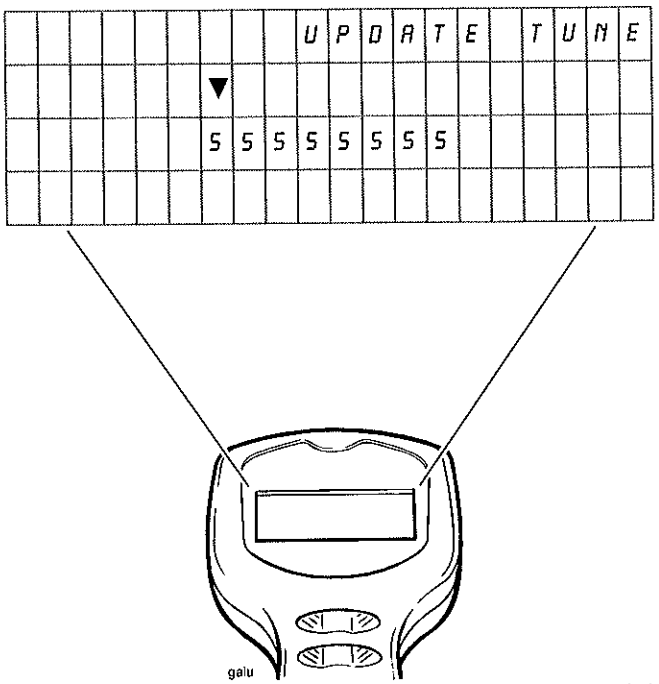
36. BALANCE THROTTLES



Using the **BALANCE THROTTLES** command, the throttles may be balanced without the need to connect an external device to measure the vacuum levels in each throttle body. The diagnostic tool displays data taken from the manifold absolute pressure sensor reading for each throttle.

Once throttle imbalance has been reduced to a pre-determined level, the top line of information will display the word ***BALANCED***. Under any other conditions where imbalance is detected, nothing will be displayed indicating that the throttles require balancing.

37. UPDATE TUNE



(Accessed from operation *33.*). On receipt of special instructions from Triumph you may be asked to input a completely new engine tune.

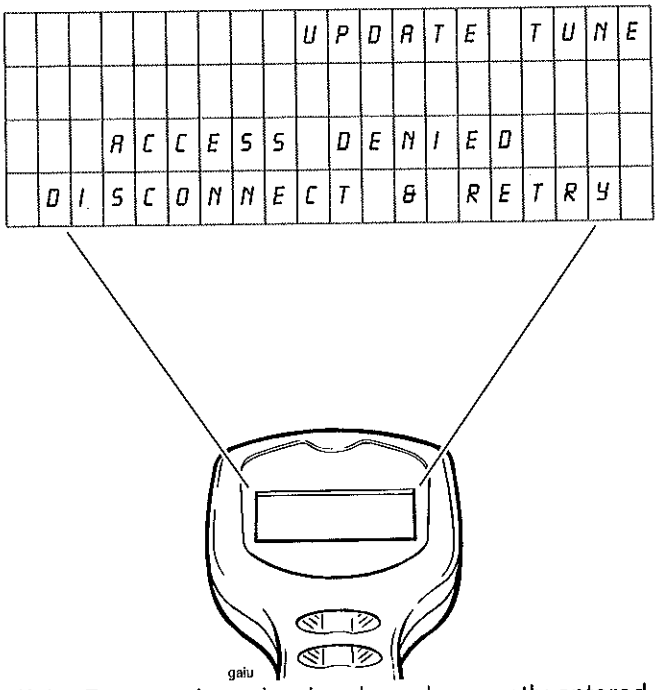
To do this, they will give you a password number which must be entered using the 'Up' and `Down' keys in the same way as was done to enter your dealer code number.

After entering the final digit, press the Validation key '*' again.

If the password number entered is invalid, the screen shown in operation *37.* will be displayed.

If the password number is valid, the tool will briefly display the message, **'PLEASE WAIT, CHECKING ECM TYPE'** then, **'UPDATE TUNE'** (operation *38.*) will be displayed.

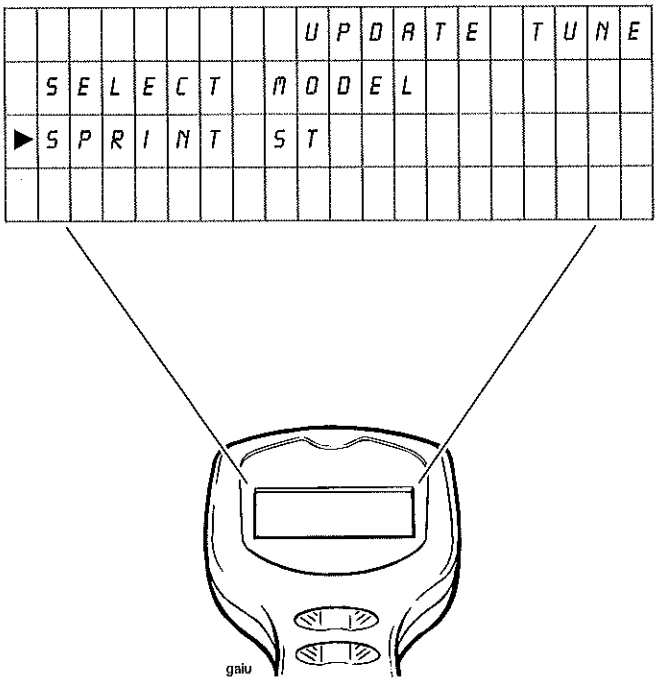
38. UPDATE TUNE



If the Password number has been incorrectly entered, the screen will display **'ACCESS DENIED'**. Press the Validation key '*' to return to **MAIN MENU** (operation *9.*) and start again.

If after a second attempt the entry is still invalid, the screen will display **'ACCESS DENIED DISCONNECT AND RETRY'**. The diagnostic tool must be disconnected and the complete procedure re-started.

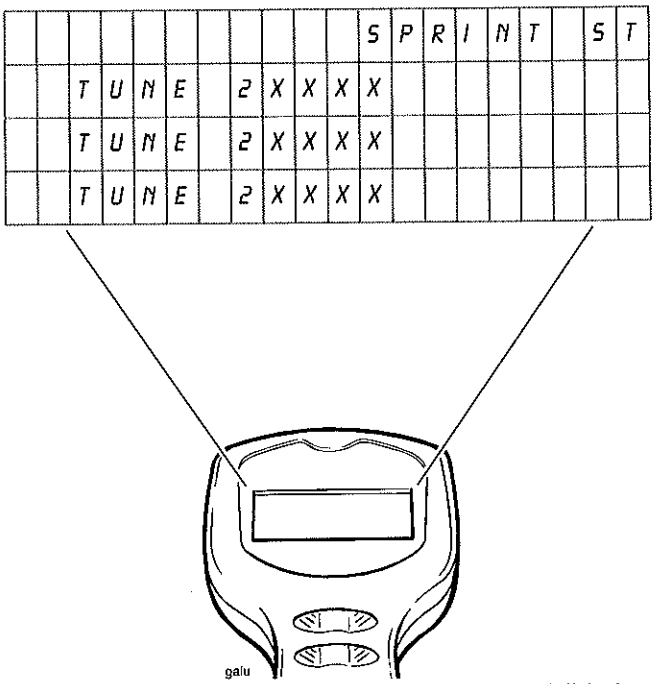
39. UPDATE TUNE



Align the cursor with the model to which a tune is to be downloaded and, when satisfied that the selection is correct, press the validation key '⁎'.

Once a model has been selected and the validation key pressed, screen *39.* will be displayed.

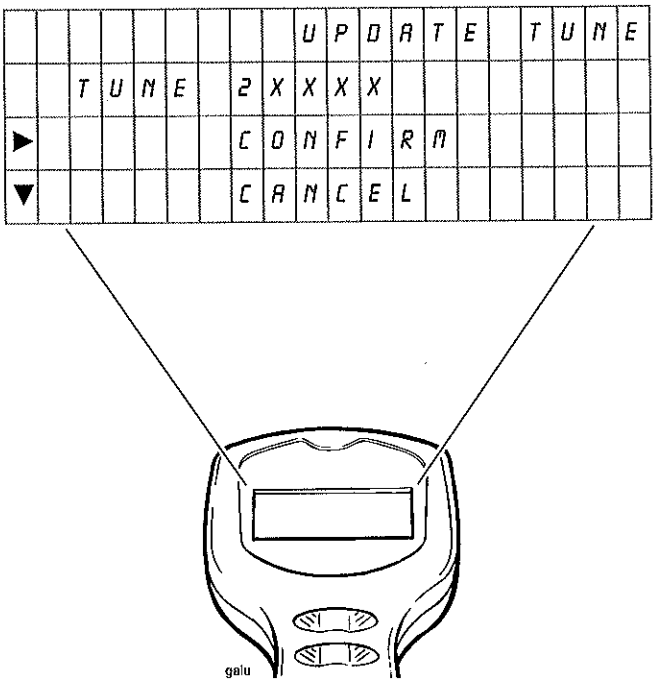
40. UPDATE TUNE



Scroll to the tune required and press the Validation key '⁎' to move on to operation *40.*

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

41. UPDATE TUNE



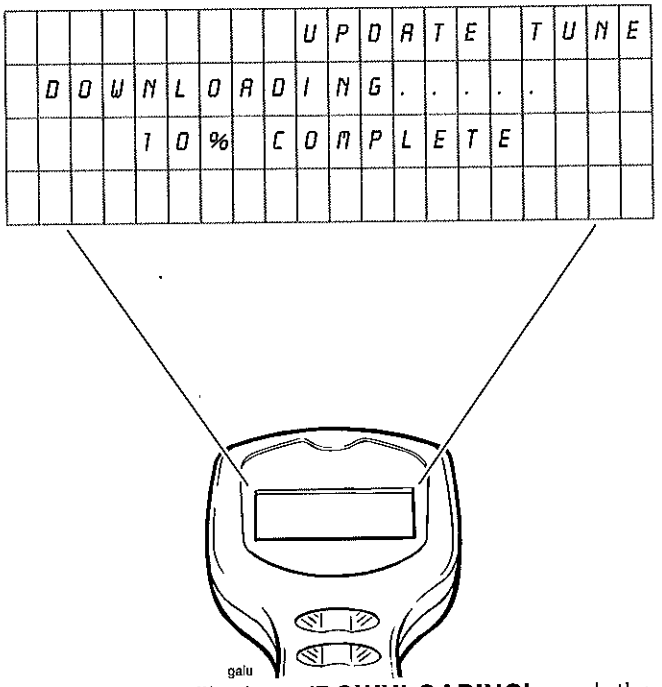
Scroll to either **'CONFIRM'**, **'CANCEL'** or **'QUIT'** (quit option will not be visible until the text has been scrolled) then press the Validation key '*'.

If **'QUIT'** has been selected - this will return to **MAIN MENU** (operation *9.*)

If **'CANCEL'** has been selected - return to operation *39.*

If **'CONFIRM'** has been selected, downloading will begin.

42. UPDATE TUNE (confirm selected)



The screen will show **'DOWNLOADING'**, and the selected software will be automatically downloaded into the ECM.

When complete, the screen will display **'DOWNLOAD COMPLETE'**.

Press the Validation key '*' to return to the **'MAIN MENU'** (operation *9.*).

If downloading has been unsuccessful the screen will display **'DOWNLOAD FAILED'**. Should this message appear, refer to *42.*, restarting tune download.

Press the Validation key '*' to return to the **'MAIN MENU'** (operation *9.*).

43. RESTARTING TUNE DOWNLOAD

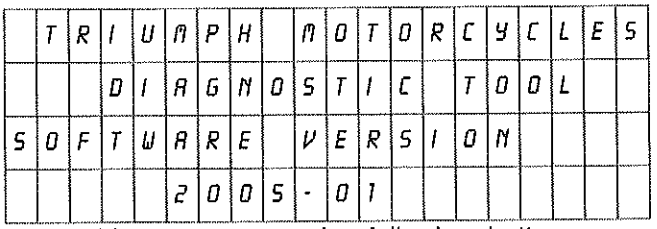
⚠ Caution

If, for any reason downloading is interrupted, the ECM will not function and tune download cannot be restarted in the normal way. This is because the tool's operating system has been erased from the ECM's memory and has not yet been fully replaced.

Download interruption can occur for a variety of reasons such as, accidental disconnection of the tool, a flat battery, turning the ignition switch to OFF during download etc.

In these circumstances, a special-tool key-press-sequence must be followed which is described below

To restart download, switch the motorcycle ignition to OFF and disconnect the tool. Reconnect the tool, switch the motorcycle ignition to ON, and scroll through to the screen shown below.



From this screen, use the following button press sequence:

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

The dealer log-in screen will then be displayed. From that screen, download can be restarted in the normal way.

Note:

- **The software version number is not relevant to this procedure. All versions of the diagnostic software will operate in the way described.**

Electrical Connectors

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

Note:

- **A major cause of hidden electrical faults can be traced to faulty electrical connectors. For example:**
- **Dirty/corroded terminals.**
- **Damp terminals.**
- **Broken or bent cable pins within multi-plugs.**

For example, the electronic control module (ECM) relies on the supply of accurate information to enable it to plan the correct fuelling and ignition timing. One dirty terminal will cause an excessive voltage drop resulting in an incorrect signal to the ECM.

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

Before Disconnection:

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

When Disconnecting a Connector:

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

When Inspecting a Connector:

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

When Connecting a Connector.

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

Disconnection of ECM connectors

Note:

- **Two different sized connectors are used in the ECM, which ensures correct connection is always made.**

Caution

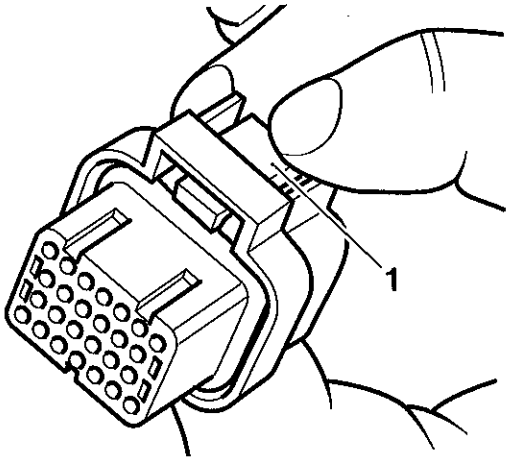
When disconnecting a connector, never pull directly on the wires as this may result in cable and connector damage.

Caution

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

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

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



cddx

1. Locking device

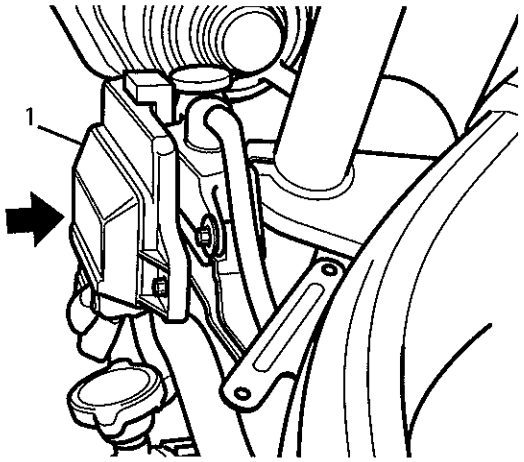
Note:

- **The ECM is located on the left hand side of the motorcycle near to the cooling system expansion tank.**

Reconnection of ECM connectors

Caution

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



cdea

1. ECM (arrowed)

2. Fit the connector into its socket and, whilst holding the connector in place, insert it fully into the ECM until the locking device retains it.

Further Diagnosis

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

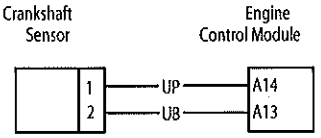
Crankshaft Sensor

Fault Code	Possible cause	Action
P0335	Crankshaft sensor system fault	View & note diagnostic tool 'freeze frame' data if available. Ensure sensor is fitted correctly and connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check terminal and cable integrity: - ECM pin A13 - ECM pin A14	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A13 to earth - ECM pin A14 to earth	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A14 to sensor pin 1 - ECM pin A13 to sensor pin 2	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - ECM pin A13 to ECM pin A14	OK	Renew crankshaft sensor, proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check crank toothed wheel: - Damage to teeth - magnetic debris contamination	OK	Proceed to test 6
	Faulty	Clean / renew toothed wheel, proceed to test 6
6 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



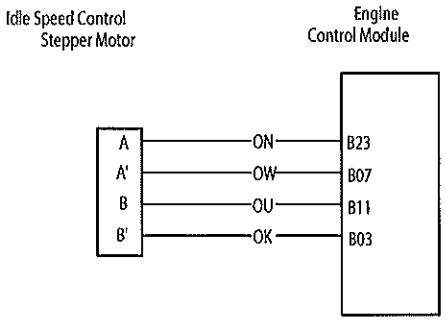
Idle Speed Control

Fault Code	Possible cause	Action
P0505	ISC stepper motor / wiring fault	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B23 - ECM pin BO7 - ECM pin B11 - ECM pin B03	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin B23 to ECM pin B07 - ECM pin B11 to ECM pin B03	4Ω to 12Ω	Disconnect stepper motor and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect stepper motor and proceed to test 5
3 Check cable for short circuit: - ECM pin B23 to earth - ECM pin B07 to earth - ECM pin B11 to earth - ECM pin B03 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin B23 to stepper motor pin A - ECM pin B07 to stepper motor pin A1 - ECM pin B11 to stepper motor pin B - ECM pin B03 to stepper motor pin B1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin B23 to ECM pin B07 - ECM pin B11 to ECM pin B03	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check stepper motor resistance: - Motor pin A to motor pin A1 - Motor pin B to motor pin B1	4Ω to 12Ω	Proceed to test 7
	Faulty	Renew stepper motor, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of stepper motor	OK	Action complete - quit test
	Fault	Contact Triumph service

Circuit Diagram



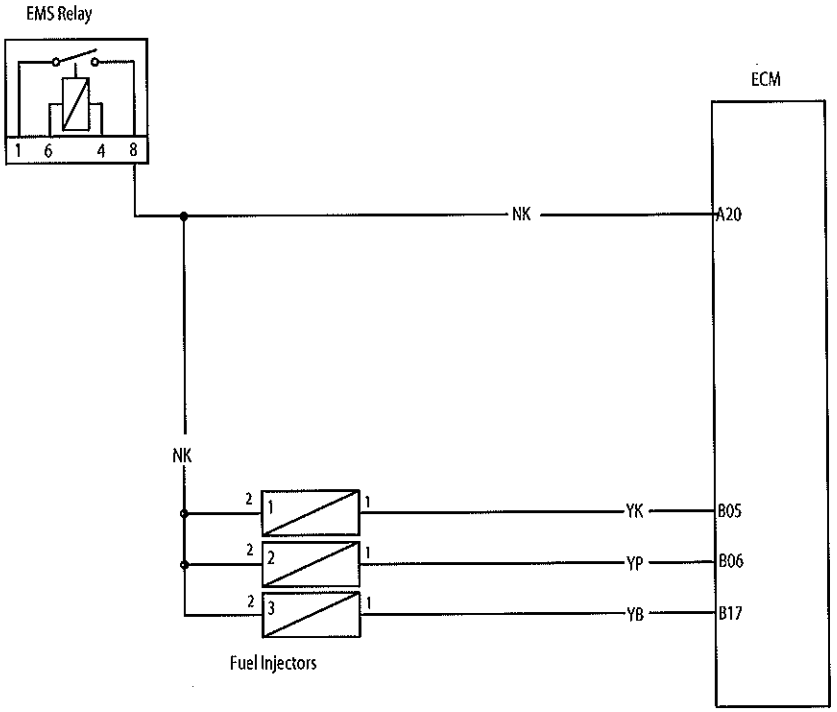
Fuel Injectors

Fault Code	Possible cause	Action
P0201/02/03	Injection system fault - Injector 1/2/3 - Misfire indicates open circuit - Flooding indicates short circuit	View & note diagnostic tool 'freeze frame' data if available. Ensure relevant injector connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B05 - ECM pin B06 - ECM pin B17	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A20 to ECM pin B05 (injector 1) - ECM pin A20 to ECM pin B06 (injector 2) - ECM pin A20 to ECM pin B17 (injector 3)	12.5Ω to 14.0Ω	Proceed to test 3
	Open circuit	Disconnect relevant injector and proceed to test 4
	Short circuit	Disconnect relevant injector and proceed to test 5
3 Check cable for short circuit to ground: - ECM pin B05 to earth - ECM pin B06 to earth - ECM pin B17 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin A20 to relevant injector pin 2 - ECM pin B05 to injector 1 pin 1 - ECM pin B06 to injector 2 pin 1 - ECM pin B17 to injector 3 pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit to supply box: - ECM pin A20 to ECM pin B05 (inj 1) - ECM pin A20 to ECM pin B06 (inj 2) - ECM pin A20 to ECM pin B17 (inj 3)	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check relevant injector resistance: - Injector pin 1 to injector pin 2	12.5Ω to 14.0Ω	Proceed to test 7
	Faulty	Renew relevant injector, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



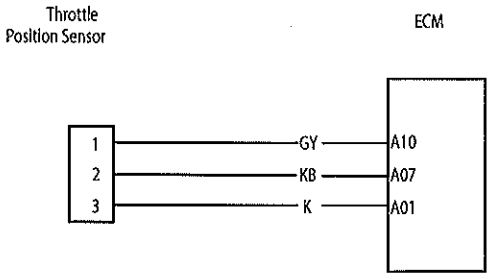
Throttle Position Sensor

Fault Code	Possible cause	Action
P0122 P0123	Throttle position sensor low input voltage (short to ground or open circuit) Throttle position sensor high input voltage (short circuit to sensor supply)	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A01 - ECM pin A07 - ECM pin A10	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A10 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin A10 to sensor pin 1 - ECM pin A07 to sensor pin 2 - ECM pin A01 to sensor pin 3	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A10 to ECM pin A01 - ECM pin A10 to ECM pin A07	OK	Renew throttle position sensor, proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



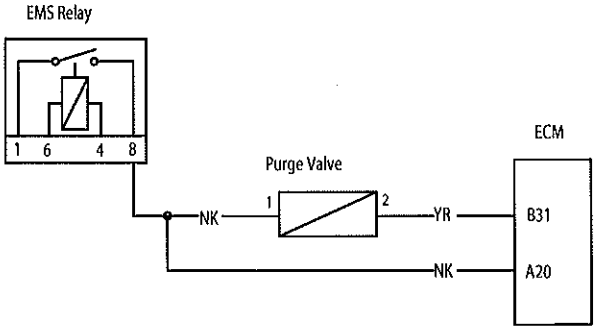
Purge Valve

Fault Code	Possible cause	Action
P0444	Open circuit or short circuit to earth	View & note diagnostic tool 'sensor' data. Ensure purge valve connector is secure. Disconnect ECM and proceed to pinpoint test 1
P0445	Short circuit to battery+	Disconnect purge valve and proceed to pinpoint test 5

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B31	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A20 to ECM pin B31	24Ω to 28Ω	Disconnect purge valve and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect purge valve and proceed to test 5
3 Check cable for short circuit: - ECM pin B31 to earth	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable continuity: - ECM pin B31 to valve pin 2 - ECM pin A20 to valve pin 1	OK	Proceed to test 6
	Open circuit	Locate and rectify wiring fault, proceed to test 7
5 Check cable for short circuit: - ECM pin A20 to ECM pin B31	OK	Proceed to test 6
	Short circuit	Locate and rectify wiring fault, proceed to test 7
6 Check purge valve resistance: - Valve pin 1 to valve pin 2	24Ω to 28Ω	Proceed to test 7
	Faulty	Renew purge valve, proceed to test 7
7 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of purge valve	OK	Action complete - quit test
	Fault	Contact Triumph service

Circuit Diagram



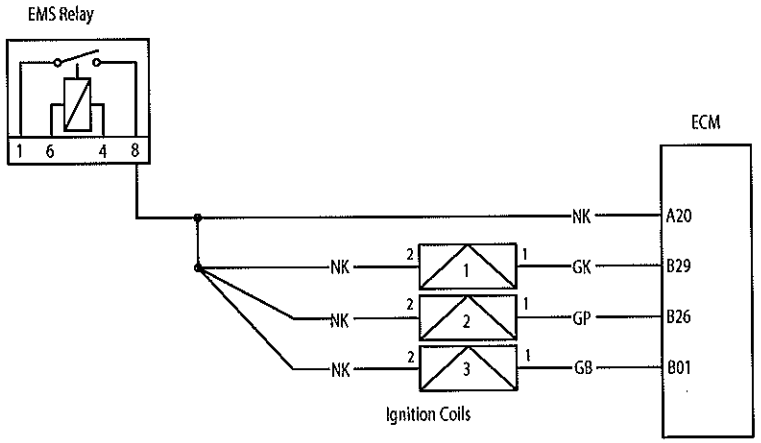
Ignition Coils

Fault Code	Possible cause	Action
P0351/52/53	Ignition system fault - Ign coil 1/2/3	View & note diagnostic tool 'freeze frame' data if available. Ensure relevant ign coil connector is secure. Disconnect ECM and proceed to pinpoint test 1:-

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B29 - ECM pin B26 - ECM pin B01	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 7
2	Check resistance value: ECM pin A20 to - ECM pin (ign coil 1) B29 - ECM pin (ign coil 2) B26 - ECM pin (ign coil 3) B01	0.8Ω to 1.2Ω	Proceed to test 3
		Open circuit	Disconnect relevant ignition coil and proceed to test 4
		Short circuit	Disconnect relevant ignition coil and proceed to test 5
3	Check cable for short circuit: - ECM pin to earth B29 - ECM pin to earth B26 - ECM pin to earth B01	OK	Proceed to test 7
		Short circuit	Locate and rectify wiring fault, proceed to test 7
4	Check cable continuity: Power latch relay pin 8 to any ign coil pin 2 - ECM pin B29 to ign coil 1 pin 1 - ECM pin B26 to ign coil 2 pin 1 - ECM pin B01 to ign coil 3 pin 1	OK	Proceed to test 6
		Open circuit	Locate and rectify wiring fault, proceed to test 7
5	Check cable for short circuit: ECM pin A20 to - ECM pin (ign coil 1) B29 - ECM pin (ign coil 2) B26 - ECM pin (ign coil 3) B01	OK	Proceed to test 6
		Short circuit	Locate and rectify wiring fault, proceed to test 7
6	Check relevant ign coil resistance: - Ign coil pin 1 to ign coil pin 2	0.8Ω to 1.2Ω	Proceed to test 7
		Faulty	Renew relevant ignition coil, proceed to test 7
7	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Coolant Temperature Sensor

Fault Code	Possible cause	Action
P0118	Open circuit, or short circuit to battery+	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:-
P0117	Short circuit to ground	Disconnect sensor and proceed to test 6

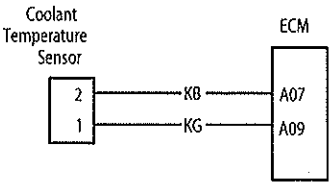
Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A09 - ECM pin A07	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A09 to ECM pin A07 (Temperature dependent,–see below)	OK	Disconnect temp sensor and proceed to test 6
	Open circuit	Disconnect sensor and proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin A09 to sensor pin 1 - ECM pin A07 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - ECM pin A09 to ECM pin A07	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent - see below)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin A09 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault	Contact Triumph service

Circuit Diagram

Resistance data under typical conditions:

Warm engine:	200 to 400Ω
Cold engine:	
20ºC ambient	2.35 to 2.65KΩ
-10ºC ambient	8.50 to 10.25KΩ



Inlet Air Temperature Sensor

Fault Code	Possible cause	Action
P0113	Open circuit, or short circuit to battery+	View & note diagnostic tool 'freeze frame' data if available. View & note diagnostic tool 'sensor' data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:-
P0112	Short circuit to ground	Disconnect sensor and proceed to pinpoint test 6

Pinpoint Tests

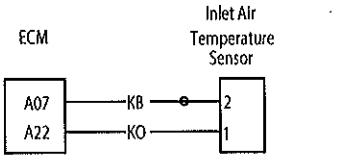
Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A22 - ECM pin A07	OK	Proceed to test 2
	Faulty	Rectify fault, proceed to test 7
2 Check resistance value: - ECM pin A22 to ECM pin A07 (Temperature dependent–see below)	OK	Disconnect temp sensor and proceed to test 6
	Open circuit	Disconnect temp sensor and proceed to test 3
	Short circuit	Disconnect temp sensor and proceed to test 4
3 Check cable continuity: - ECM pin A22 to sensor pin 1 - ECM pin A07 to sensor pin 2	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 7
4 Check cable for short circuit: - ECM pin A22 to ECM pin A07	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 7
5 Check sensor resistance: - Sensor pin 1 to sensor pin 2 (Temperature dependent–see below)	OK	Proceed to test 7
	Faulty	Renew temp sensor, proceed to test 7
6 Check cable for short circuit: - ECM pin A22 to ground	OK	Proceed to test 7
	Short circuit	Locate and rectify wiring fault, proceed to test 7
7 Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
	Fault	Contact Triumph service

Circuit Diagram

If engine is warm, remove sensor and allow time to cool to ambient prior to test.

Resistance data:

Ambient temp	Resistance value
80ºC	200 to 400Ω
20ºC	2.35 to 2.65KΩ
-10ºC	8.50 to 10.25KΩ



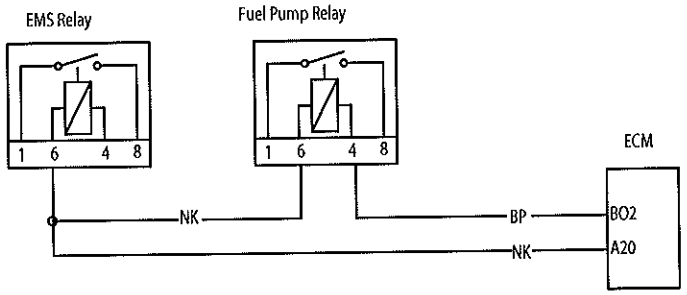
Fuel Pump Relay

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

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B02	OK	Disconnect fuel pump relay and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin B02 to earth	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin B02 to fuel pump relay pin 4 - Fuel pump relay pin 6 to EMS relay pin 8	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin B02 to ECM pin A20	OK	Proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run diagnostic tool function test to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



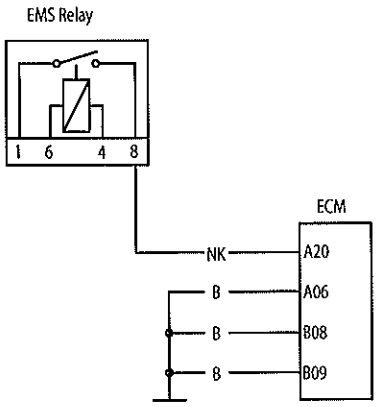
System Voltage

Fault Code	Possible cause	Action
P0560	Bike voltage system fault	View & note diagnostic tool 'sensor' data. Ensure voltage across battery is acceptable, note voltage. Disconnect ECM and proceed to pinpoint test 1

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A20	OK	Proceed to test 2
		Faulty	Rectify fault, proceed to test 3
2	With Ignition 'on', check voltage at: - ECM pin A20	Same as 'across battery' voltage	Proceed to test 3
		Less than 'across battery' voltage	Locate and rectify wiring fault, proceed to test 3
3	Reconnect harness, clear fault code and run engine to verify fault cleared	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



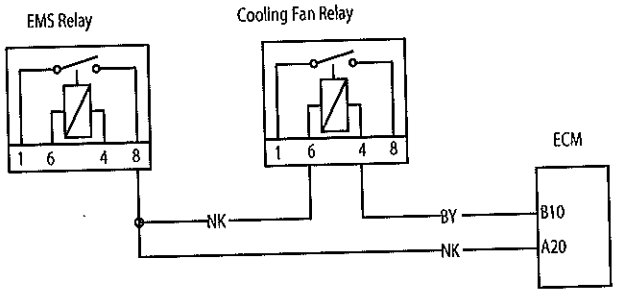
Cooling Fan Relay

Fault Code	Possible cause	Action
P1552	Fan relay open circuit, or short circuit to ground	View & note diagnostic tool 'sensor' data. Ensure fan relay connector is secure. Disconnect ECM and proceed to pinpoint test1:-
P1553	Short circuit to battery+	Disconnect fan relay and proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B10	OK	Disconnect fan relay and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B10 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - Fan relay pin 4 to ECM pin B10 - Fan relay pin 6 to EMS relay pin 8	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B10 to ECM pin A20	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run diagnostic tool function test to visually verify operation of cooling fan	OK	Action complete - quit test
	Fault still present	Contact Triumph service

Circuit Diagram



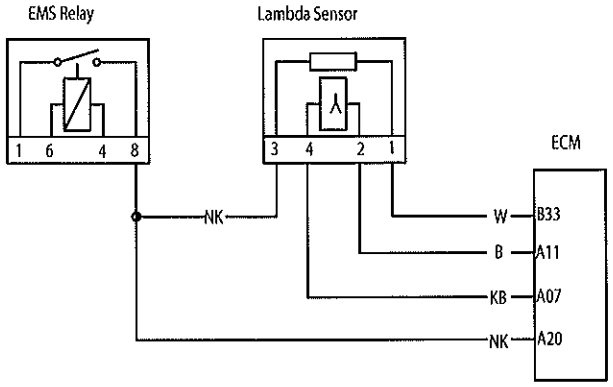
Lambda Sensor

Fault Code	Possible cause	Action
P0130	Lambda sensor circuit fault.	View & note "freeze frame" data if available. View & note "sensor" data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A11 - ECM pin A07	OK	Disconnect lambda sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin A11 to ECM pin A07 - ECM pin A11 to ECM pin A20	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - ECM pin A11 to sensor pin 2 - ECM pin A11 to sensor pin 4	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine. Check adaptation status.	OK	Action complete - quit test
		Fault still present	Contact Triumph service

Circuit Diagram



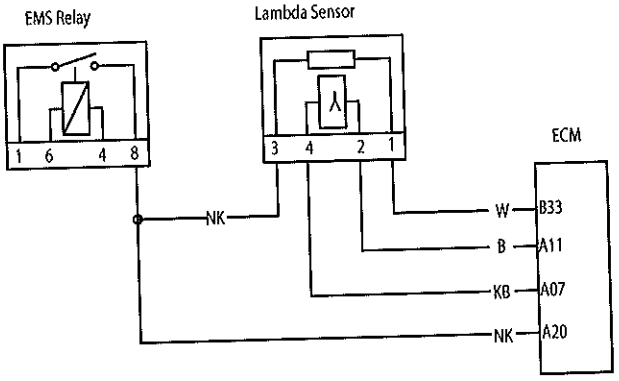
Lambda Sensor Heater

Fault Code	Possible cause	Action
P0031	Lambda sensor heater circuit short circuit to ground or open circuit.	View & note "freeze frame" data if available. View & note "sensor" data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test 1:
P0032	Lambda sensor heater circuit, short circuit to battery.	Disconnect lambda sensor and proceed to pinpoint test 4

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin B33	OK	Disconnect lambda sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin B33 to ground	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable continuity: - ECM pin B33 to sensor pin 1 - ECM pin A20 to sensor pin 3	OK	Proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin B33 to ECM pin A20	OK	Renew lambda sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine. Check adaption status.	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



EEPROM Error

Fault Code	Possible cause	Action
P0603	EEPROM error	View & note "freeze frame" data if available. No tests available - contact Triumph service.

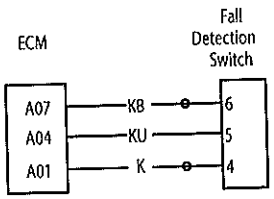
Fall Detection Switch

Fault Code	Possible cause	Action
P1631 P1632	Fall detection switch low input voltage Fall detection switch high input voltage or open circuit	View & note "freeze frame" data if available. View & note "sensor" data Ensure switch connector is secure. Disconnect ECM and proceed to pinpoint test1:

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A04	OK	Disconnect sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 6
2 Check cable for short circuit: - ECM pin A04 to ground - ECM pin A04 to ECM pin A20	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 6
3 Check cable continuity: - ECM pin A01 to sensor pin 4 - ECM pin A04 to sensor pin 5 - ECM pin A07 to sensor pin 6	OK	Proceed to test 4
	Open circuit	Locate and rectify wiring fault, proceed to test 6
4 Check cable for short circuit: - Sensor pin 4 to sensor pin 5 - Sensor pin 4 to sensor pin 6	OK	Proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 6
5 Check voltage (with ignition on): - Sensor pin 4	5V	Renew fall detection switch and proceed to test 6
	Less than 4.8V	Locate and rectify wiring fault, proceed to test 6
6 Reconnect harness, clear fault code.	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



2

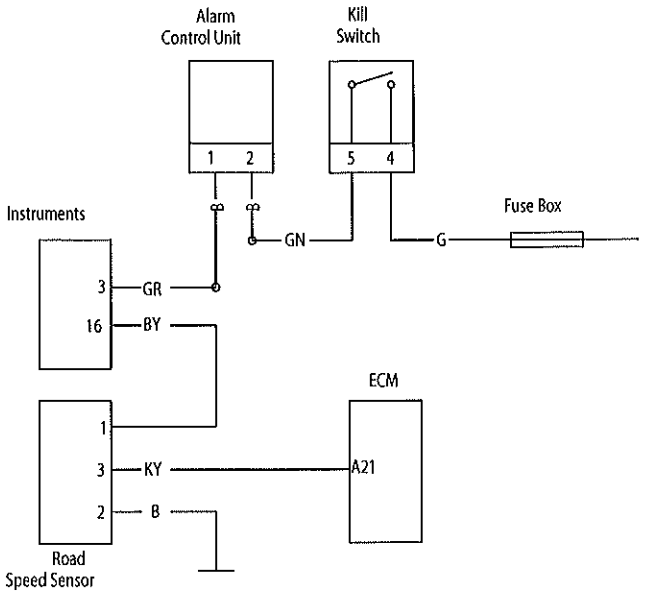
Vehicle Speed Sensor

Fault Code	Possible cause	Action
P0500	Vehicle speed sensor circuit fault	View & note "freeze frame" data if available. View & note "sensor" data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A21 - Instrument pin 16	OK	Disconnect ambient pressure sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin A21 to ground - ECM pin A21 to ECM pin A01 - ECM pin A21 to battery	OK	Proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 4
3	Check cable for continuity: - ECM pin A21 to sensor pin 3 - Sensor pin 2 to ground - Instruments pin 16 to sensor pin 1	OK	Renew vehicle speed sensor and proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 4
4	Reconnect harness, clear fault code and run engine.	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



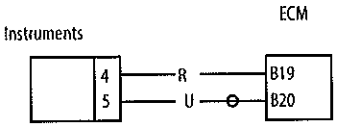
Instrument Communication (CAN)

Fault Code	Possible cause	Action
P1690	Fault in CAN communication between ECM and Instrument pack.	View & note "freeze frame" data if available. View & note "sensor" data. Ensure Instrument connector is secure. Disconnect ECM and proceed to pinpoint test 1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin B19 - ECM pin B20 - Instrument pin 4 - Instrument pin 5	OK	Disconnect instruments and proceed to test 2
		Faulty	Rectify fault, proceed to test 4
2	Check cable for short circuit: - ECM pin B19 to ground - ECM pin B20 to ground	OK	Proceed to test 3
		Faulty	Locate and rectify wiring fault, proceed to test 4
3	Check cable continuity: - ECM pin B19 to Instrument pin 4 - ECM pin B20 to Instrument pin 5	OK	Contact Triumph service
		Open circuit	Locate and rectify wiring fault, proceed to test 4
5	Reconnect harness, clear fault code and run engine.	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



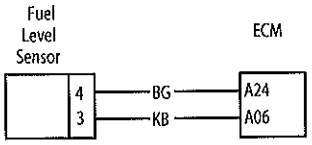
Fuel Level Sensor

Fault Code	Possible cause	Action
P0460	Fuel level sensor circuit fault	View & note "freeze frame" data if available. View & note "sensor" data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test1:

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A24 - ECM pin A06	OK	Disconnect sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A24 to ground	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable continuity: - ECM pin A24 to sensor pin 4 - ECM pin A06 to sensor pin 3	OK	Proceed to test 4
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - Sensor pin 3 to sensor pin 4	OK	Renew fuel level sensor and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code.	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



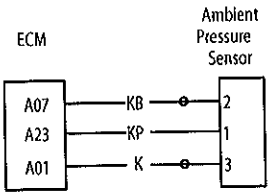
Ambient Pressure Sensor

Fault Code	Possible cause	Action
P1107	Ambient pressure sensor circuit short circuit to ground	View & note "freeze frame" data if available. View & note "sensor" data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test1:
P1108	Ambient pressure sensor circuit, short circuit to supply or open circuit	Disconnect ambient pressure sensor and proceed to pinpoint test 4.

Pinpoint Tests

Test	Result	Action
1 Check cable and terminal integrity: - ECM pin A23 - ECM pin A07 - ECM pin A01	OK	Disconnect ambient pressure sensor and proceed to test 2
	Faulty	Rectify fault, proceed to test 5
2 Check cable for short circuit: - ECM pin A23 to ECM A07	OK	Proceed to test 3
	Short circuit	Locate and rectify wiring fault, proceed to test 5
3 Check cable for continuity: - ECM pin A23 to sensor pin 1 - ECM pin A07 to sensor pin 2 - ECM pin A01 to sensor pin 3	OK	Renew ambient pressure sensor and proceed to test 5
	Open circuit	Locate and rectify wiring fault, proceed to test 5
4 Check cable for short circuit: - ECM pin A23 to ECM pin A01	OK	Renew ambient pressure sensor and proceed to test 5
	Short circuit	Locate and rectify wiring fault, proceed to test 5
5 Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
	Fault still present	Contact Triumph service

Circuit Diagram



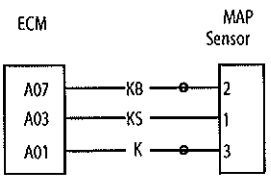
Manifold Absolute Pressure (Map) Sensor

Fault Code	Possible cause	Action
P0107	MAP sensor circuit short circuit to ground	View & note "freeze frame" data if available. View & note "sensor" data. Ensure sensor connector is secure. Disconnect ECM and proceed to pinpoint test1:
P0108	MAP sensor circuit, short circuit to supply or open circuit	Disconnect MAP sensor and proceed to test 4
P1105	MAP sensor pipe fault	Check connection/condition of pipe from MAP sensor to throttle body

Pinpoint Tests

	Test	Result	Action
1	Check cable and terminal integrity: - ECM pin A03 - ECM pin A07 - ECM pin A01	OK	Disconnect MAP sensor and proceed to test 2
		Faulty	Rectify fault, proceed to test 5
2	Check cable for short circuit: - ECM pin A03 to ECM A07	OK	Proceed to test 3
		Short circuit	Locate and rectify wiring fault, proceed to test 5
3	Check cable for continuity: - ECM pin A03 to sensor pin 1 - ECM pin A07 to sensor pin 2 - ECM pin A01 to sensor pin 3	OK	Renew MAP sensor and proceed to test 5
		Open circuit	Locate and rectify wiring fault, proceed to test 5
4	Check cable for short circuit: - ECM pin A03 to ECM pin A01	OK	Renew MAP sensor and proceed to test 5
		Short circuit	Locate and rectify wiring fault, proceed to test 5
5	Reconnect harness, clear fault code and run engine	OK	Action complete, quit test
		Fault still present	Contact Triumph service

Circuit Diagram



Fuel Tank

Removal

Warning

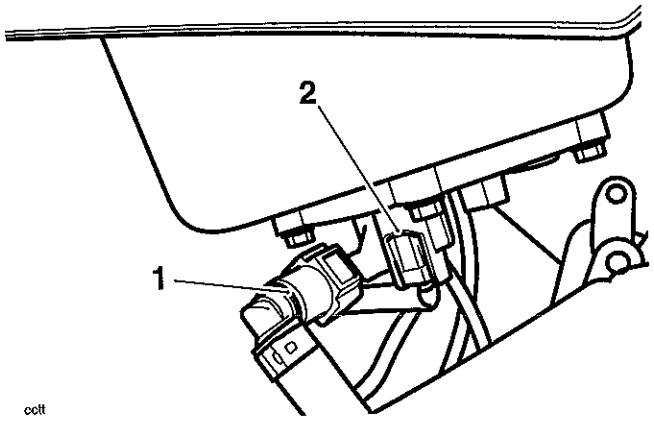
Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property, could result from spilled fuel or fuel not handled or stored correctly.

1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Remove the lower fairings and side panels (see page *16-11*).
4. Disconnect the fuel pump electrical connection then disconnect the fuel hose by squeezing the sides of the connector and pulling the hose free from the spigot.

Note:

- **The fuel pump has two electrical connection points, one is not used. Note the position of the connection point used.**

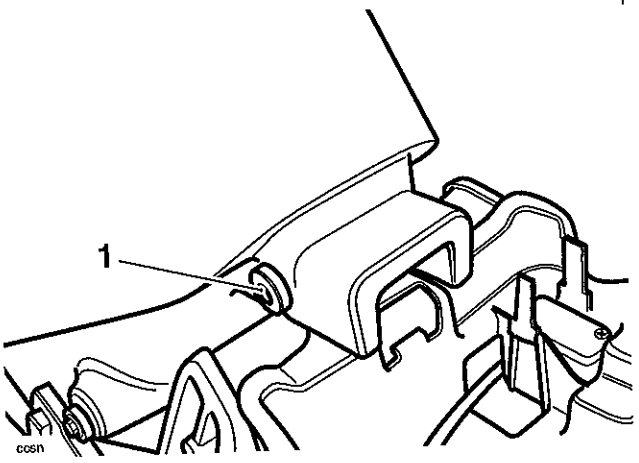


1. Fuel hose
2. Fuel pump electrical connection

Note:

- **When disconnected, the fuel tank is self-sealing. Some fuel may dribble from the hose though.**

5. Release and remove the bolt securing the rear of the fuel tank to the frame.

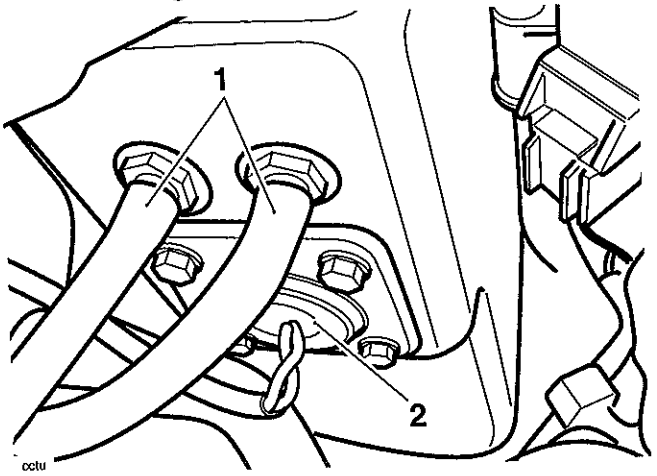


1. Fuel tank to frame bolt

6. Disconnect the two breather hoses and the electrical connection to the fuel level sender.

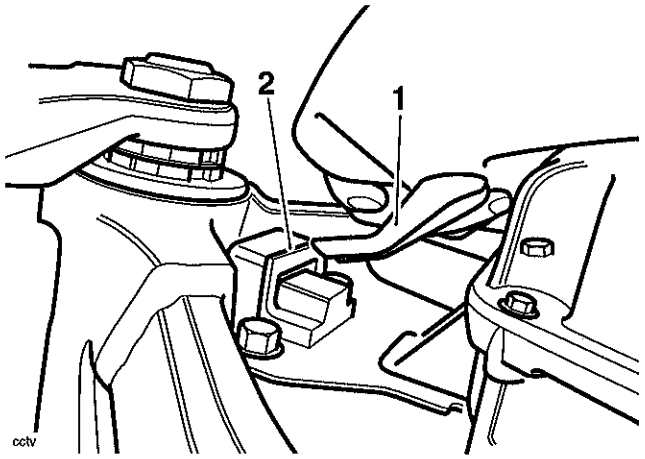
Note:

- **Before disconnection, note the position of the two breather hoses so that they can be returned to the same locations when refitting the tank.**



1. Breather hoses
2. Fuel level sender

7. Move the tank towards the rear of the motorcycle until the locating tab is released from the mounting bracket.

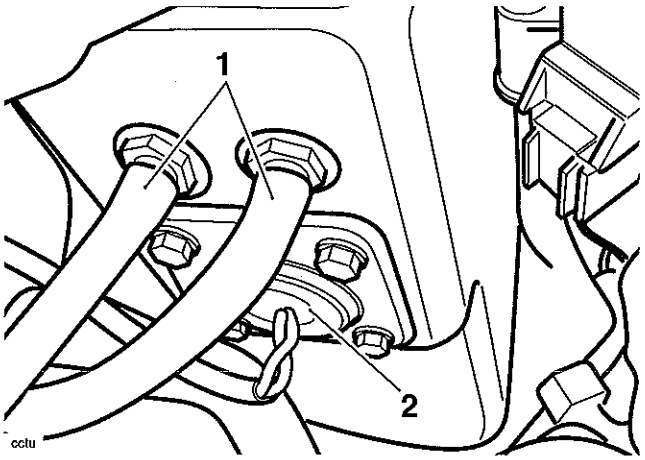


1. Locating tab
2. Mounting bracket

8. Remove the tank.

Installation

1. Position the fuel tank to the mounting points.
2. Connect the two breather hoses and the electrical connection to the fuel level sender as noted prior to removal.



1. Breather hoses
2. Fuel level sender

3. Align the fuel tank to the mounting points and tighten the rear fixing to **9 Nm.**
4. Reconnect the fuel feed hose by gently pushing inwards until the hose engages with a click.

Note:

- **The fuel pump has two electrical connection points, one is not used. Ensure the connection point noted prior to removal is used.**

5. Reconnect the fuel pump electrical connection.
6. Refit the side panels (see page *16-10*).
7. Reconnect the battery, positive (red) lead first.
8. Start the engine and check carefully for fuel leaks. Rectify as necessary.
9. Refit the seat (see page *16-8*).

Fuel Pump and Filter Assembly

Removal

Note:

- **The fuel pump and filter assembly is a sealed for life unit and must be replaced as a complete assembly.**

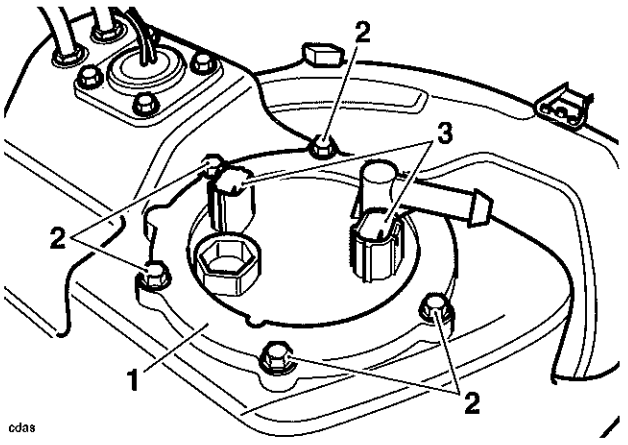
1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Remove the fuel tank (see page *10-87*).
4. Drain the fuel tank into a suitable container.

⚠ Warning

Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property, could result from spilled fuel or fuel not handled or stored correctly.

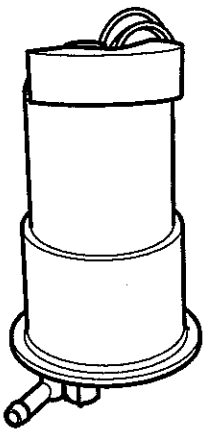
5. Invert the fuel tank and place on a protective surface to prevent paint damage.
6. Remove the fixings securing the fuel pump mounting plate to the tank. Remove the plate.



1. Mounting plate
2. Mounting plate fixings
3. Fuel pump electrical connection

7. Lift the fuel pump and filter assembly and manoeuvre it from the tank aperture.

8. Check the condition of the mounting plate 'O'-ring seal in the tank aperture and only remove if necessary.

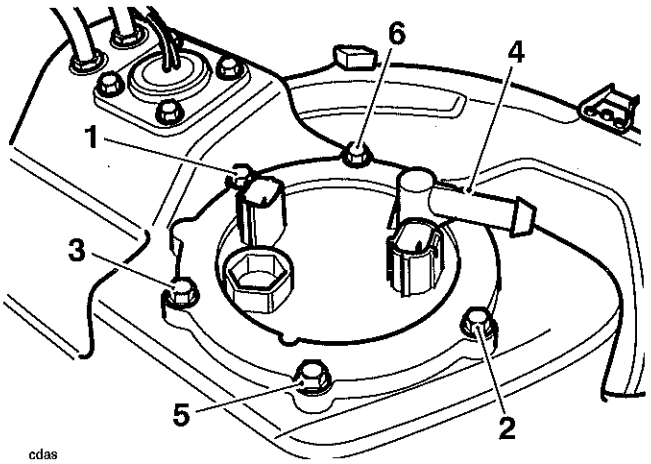


ccxh

1. Fuel pump and filter assembly

Assembly

1. Position a new 'O'-ring seal in the tank aperture and ensure that it is correctly seated.
2. Carefully manoeuvre the fuel pump and filter assembly into the tank aperture.
3. Locate the pump mounting plate to the fuel tank. Tighten the fixings in the sequence shown below to **9 Nm.**



cdas

Pump Mounting Plate Torque Sequence

4. Refit the fuel tank (see page *10-88*).
5. Refill the fuel tank with the fuel drained earlier.
6. Reconnect the battery, positive (red) lead first.
7. Refit the seat (see page *16-8*).

Fuel Level Sender Assembly / Float Replacement

Removal

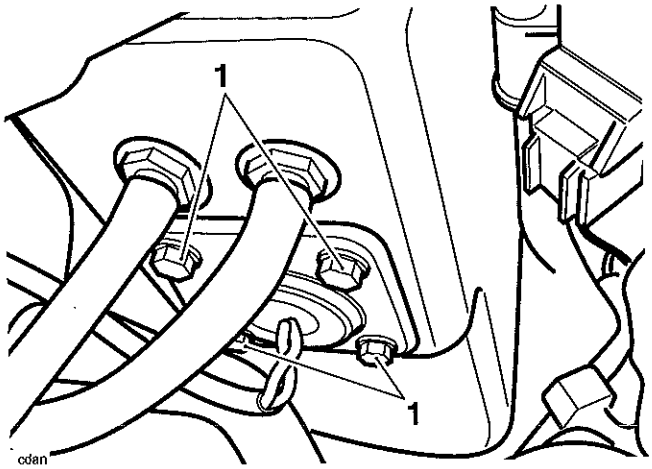
1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Remove the fuel tank (see page *10-87*).
4. Drain the fuel tank into a suitable container.

Warning

Observe the warning advice given in the general information section on the safe handling of fuel and fuel containers.

A fire, causing personal injury and damage to property, could result from spilled fuel or fuel not handled or stored correctly.

5. Invert the fuel tank and place on a protective surface to prevent paint damage.
6. Remove the four fixings securing the fuel level sender assembly to the tank.

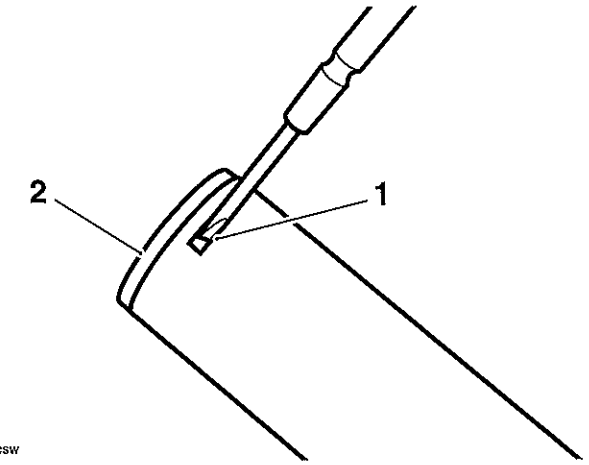


cdan

1. Fixings

7. Withdraw the assembly from the tank and allow any remaining fuel to drain into a suitable container.

8. Insert a small screwdriver into one of the tabs at the top of the float assembly and gently prise the lid free.



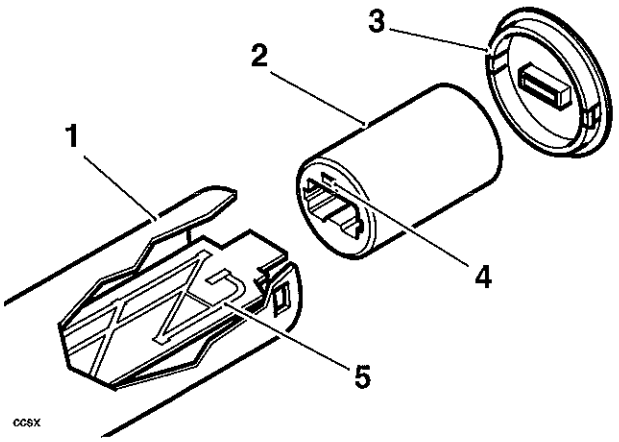
ccsw

1. Tab
2. Lid

9. Invert the assembly and allow the float unit to slide free.
10. Discard the old float unit.
11. Insert the new float unit in the orientation shown below ensuring the magnet cover on the face of the unit faces towards the bottom of the support tube.

Note:

- **It is possible to fit the float unit upside down. An incorrect fuel level reading will be indicated during motorcycle operation if the float unit is fitted upside down.**



ccsx

1. Support tube
2. Float unit
3. Lid
4. Magnet cover
5. Slider

12. Refit the lid ensuring the tabs on the lid locate correctly with the cut-outs in the top of the support tube.

Inspection

1. Check that the float unit slides easily on the slider. When correctly fitted the float unit should:
   - Slide to the bottom of the support tube when the assembly is slowly tilted upwards.
   - Slide to the top of the support tube when the assembly is slowly tilted downwards.
2. Check the rubber gasket at the base of the support tube for wear or damage. Ensure that the four metal spacers fitted to the gasket are correctly located. Replace as necessary.

Assembly

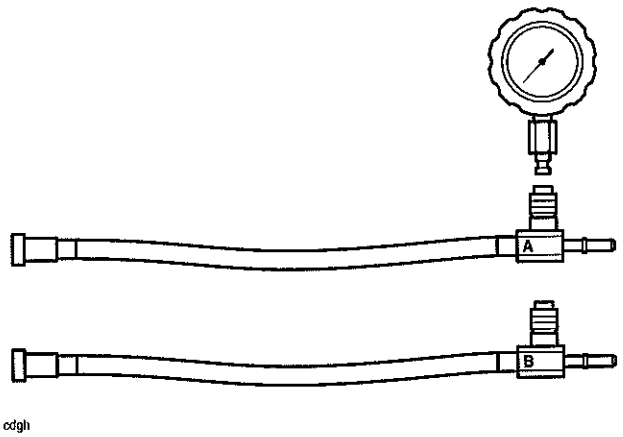
1. Refit the fuel level sender assembly to the fuel tank ensuring that the area where the assembly is to be fitted is clean. Tighten the bolts to **5 Nm.**
2. Refit the fuel tank (see page *10-88*).
3. Refill the fuel tank with the fuel drained earlier.
4. Reconnect the battery, positive (red) lead first.
5. Refit the seat (see page *16-8*).

Fuel Pressure Checking

Warning

Observe the fuel handling precautions given in the general information system.

Fuel pressure is checked using service tool T3880001.



cdgh

Tool T3880001

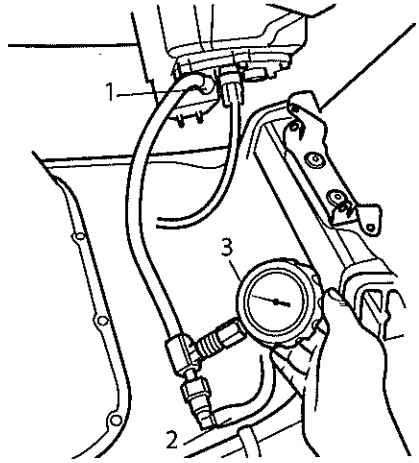
1. Release the fuel tank fixings and bodywork to gain access to the fuel pipe connections (see page *10-87*).

2. With the aid of an assistant, support the fuel tank and disconnect the fuel pipe from the fuel pump plate.
3. Select the fuel pressure gauge adapter marked 'B' from service tool T3880001.

Warning

Always us the correct fuel pressure gauge adapter **(adapter 'B' for 2005-onwards Sprint ST)**. Use of an incorrect adapter will result in a fuel leak. A fuel leak can result in a fire causing damage to property and injury to persons.

4. Connect the adapter between the fuel pump plate outlet and fuel hose as shown in the illustration below. Insert the gauge to the adapter also as shown in the illustration.



1. Fuel pump plate outlet
2. Fuel hose
3. Tool T3880001

Note:

- **To release the fuel pressure gauge from the adapter, slide the outer ferrule downwards. This will allow the gauge to spring upwards from the adapter.**
- **To insert the gauge to the adapter, push the gauge spigot in to adapter until a click can be heard.**

5. Ensuring the gauge is visible to the side of the motorcycle, lower the fuel tank into position.
6. Start the engine and observe the fuel pressure reading on the gauge.

Note:

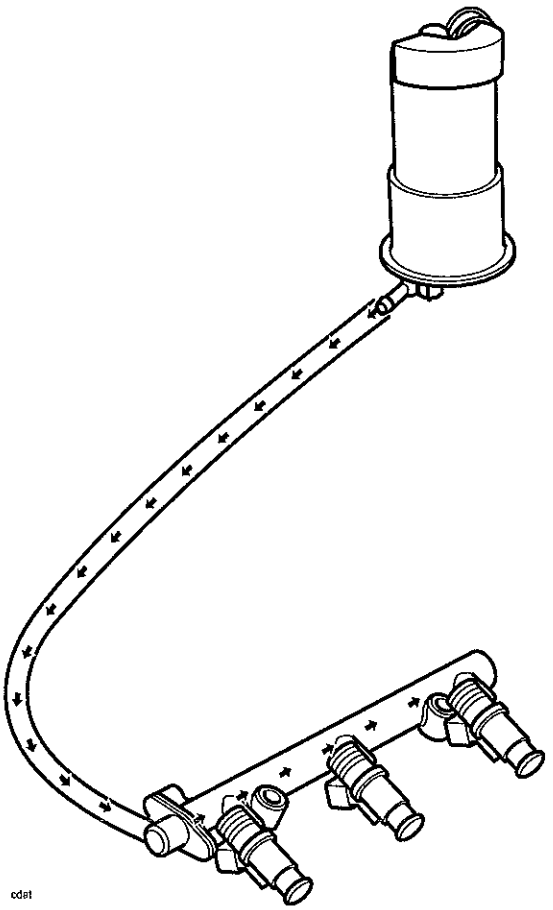
- **The fuel pressure should be 3.0 bar nominally.**

7. When fuel pressure checking is complete, have an assistant raise the fuel tank and disconnect the fuel pressure gauge adapter.
8. Reconnect the fuel hose and refit the fuel tank (see page *10-88*).

Fuel Delivery System

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

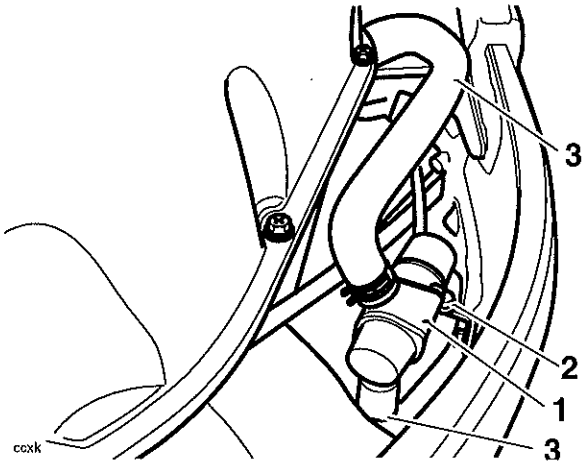
Incorporated in the system is a filter, a pressure regulator and a pick-up strainer.



Airbox

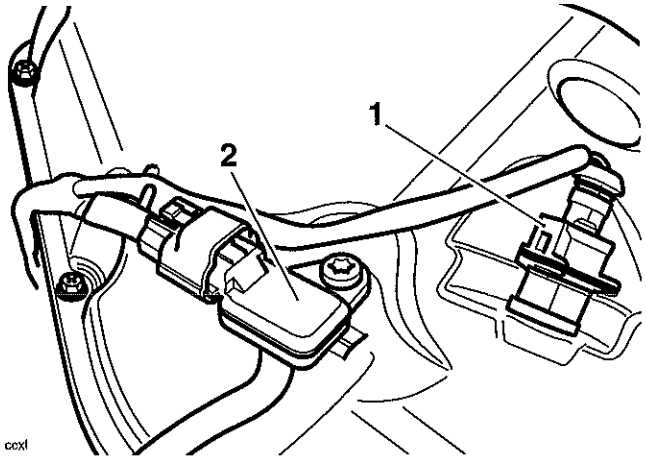
Removal

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 secondary air injection hose at the aixbox.



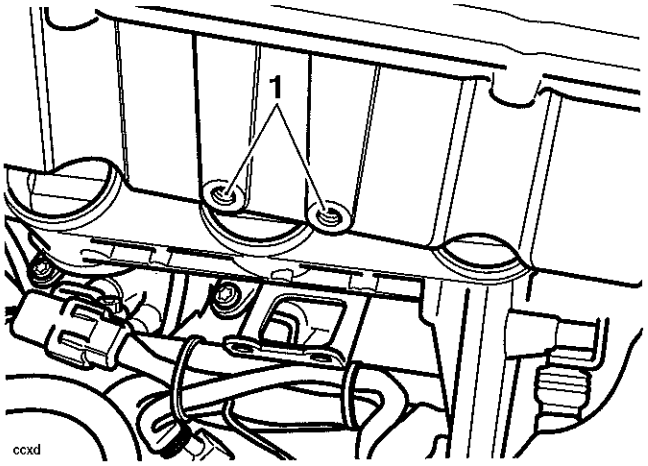
1. Secondary air injection control valve
2. Valve retainer
3. Hoses

5. Disconnect the air temperature and map sensor connectors.



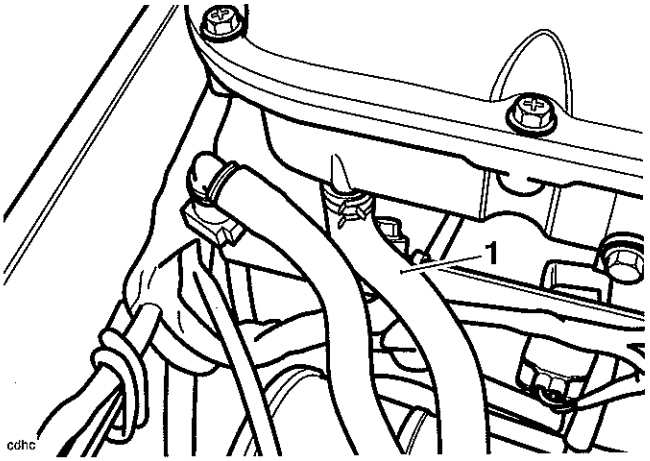
1. Intake air temperature connector
2. Map sensor connector

6. Release the fixings securing the airbox to its bracket.



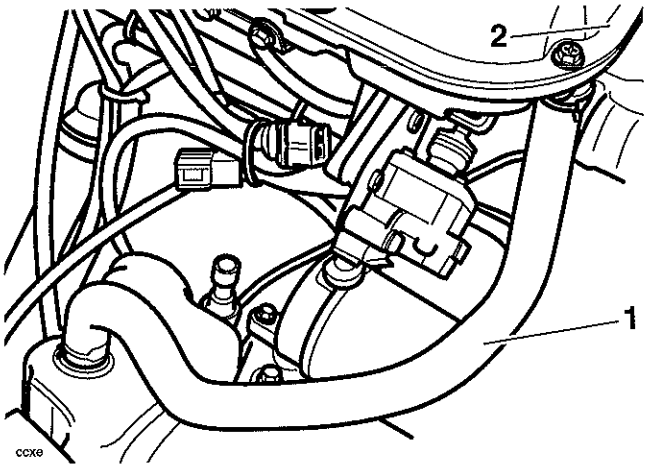
1. Airbox fixing locations

7. Disconnect the drain tube from the rear of the airbox.



1. Drain tube

8. Disconnect the breather hose from the rear of the airbox.



1. Breather hose
2. Airbox

9. Gently lift the rear of the airbox to release it from the throttle bodies.

10. Once the airbox has cleared the throttle bodies, slide it rearwards to release it from its forward locating peg.

1. Airbox
2. Throttle bodies
3. Forward locating peg

Inspection

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

Installation

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

Caution

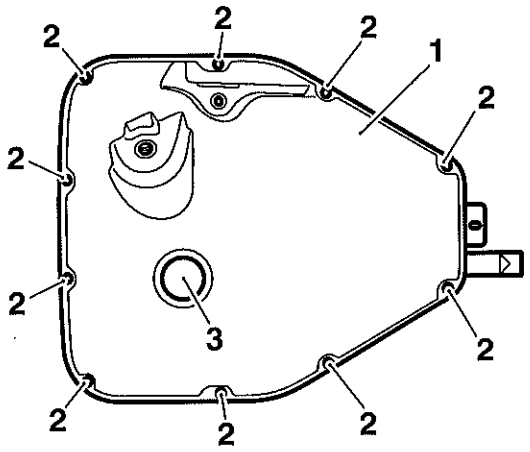
Always ensure that all 3 intake rubbers seal to the throttles through 360° as poor performance and lack of power can result from incorrect sealing.

3. Fit and tighten the airbox fixings to **5 Nm.**
4. Reconnect the air temperature and map sensor connectors.
5. Reconnect and secure the secondary air injection hose.
6. Reconnect the airbox breather hose.
7. Reconnect the airbox drain tube.
8. Refit the fuel tank (see page *10-88*).
9. Reconnect the battery, positive (red) lead first.
10. Refit the seat (see page *16-8*).

Air Filter Element

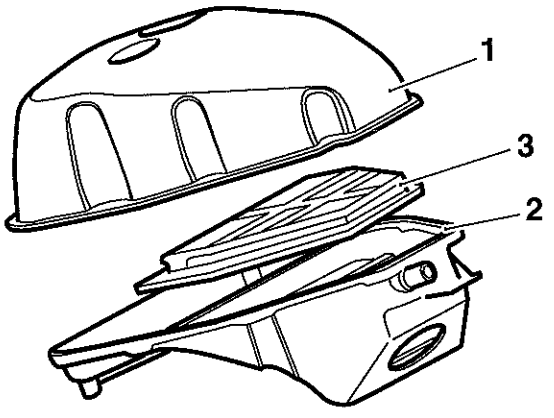
Removal

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. Remove the airbox (see page *10-92*).
5. Release the ring of bolts securing the upper half of the airbox to its corresponding lower section.
6. Release the airbox centre fixing which is accessed through the centre hole in the airbox upper section.



1. Airbox
2. Ring of bolts
3. Centre fixing location

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



1. Airbox upper section
2. Airbox lower section
3. Air filter element

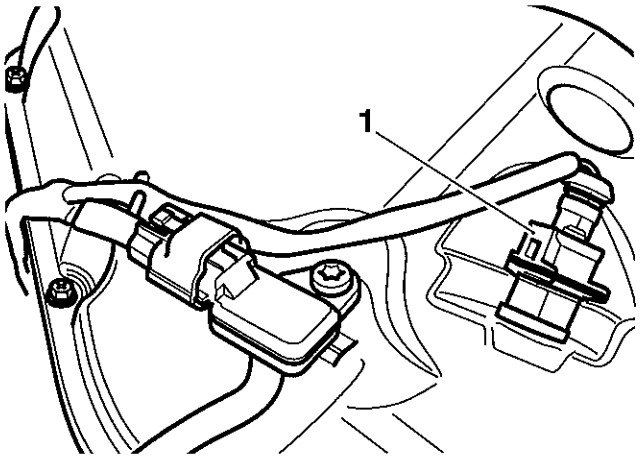
Installation

1. Thoroughly clean the inside and outside of the airbox.
2. Seat the air filter element in the lower section.
3. Locate the upper section to the lower and secure with the fixings. Tighten to **4 Nm.**
4. Refit the airbox (see page *10-93*).
5. Refit the fuel tank (see page *10-88*).
6. Reconnect the battery, positive (red) lead first
7. Refit the seat (see page *16-8*).

Intake Air Temperature 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 multiplug from the air temperature sensor.



1. Intake air temperature connector

Note:

- **The intake air temperature sensor has a threaded base.**

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

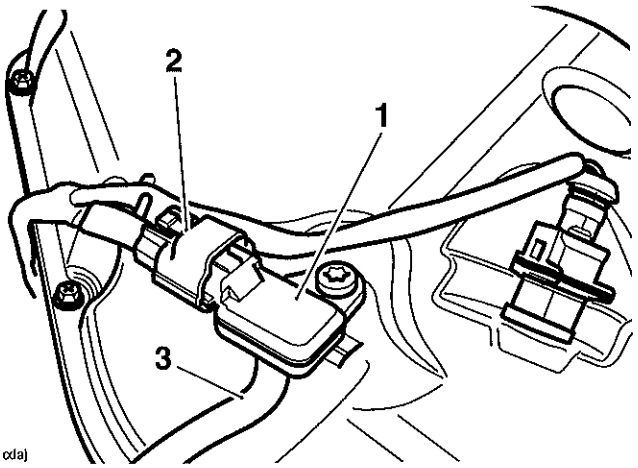
Assembly

1. Fit the air temperature sensor to the airbox taking care not to overtighten.
2. Reconnect the air temperature sensor.
3. Refit the fuel tank (see page *10-88*).
4. Reconnect the battery, positive (red) lead first.
5. Refit the seat (see page *16-8*).

Map 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 multiplug from the map sensor.



1. Map sensor
2. Multi-plug
3. Air hose

5. Disconnect the air hose from the sensor.
6. Release the fixing screw securing the sensor to the airbox.
7. Raise the sensor to remove it from the airbox and collect the O-ring.

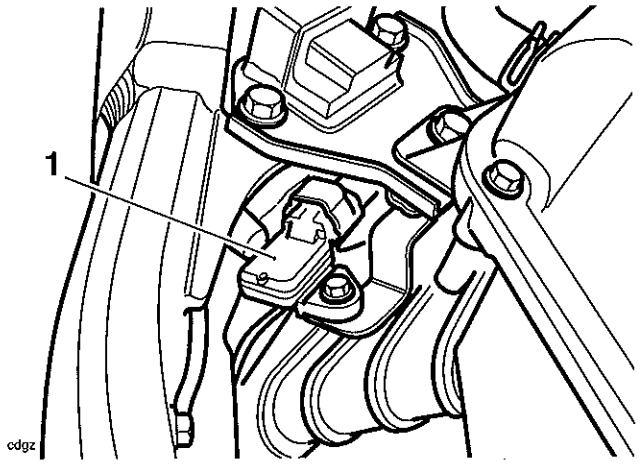
Installation

1. Take a new O-ring and lubricate it with a smear of petroleum jelly. Fit the O-ring to the sensor, then fit the sensor to the airbox, tightening the screw to **3 Nm.**
2. Refit the air hose.
3. Reconnect the multi-plug.
4. Refit the fuel tank (see page *10-88*).
5. Reconnect the battery, positive (red) lead first.
6. Refit the seat (see page *16-8*).

Barometric Pressure Sensor

Removal

1. Remove the fuel tank (see page *10-87*)
2. Disconnect the barometric pressure sensor multiplug.
3. Release the fixing screw securing the sensor to the mounting bracket and remove the barometric pressure sensor.



1. Barometric Pressure Sensor

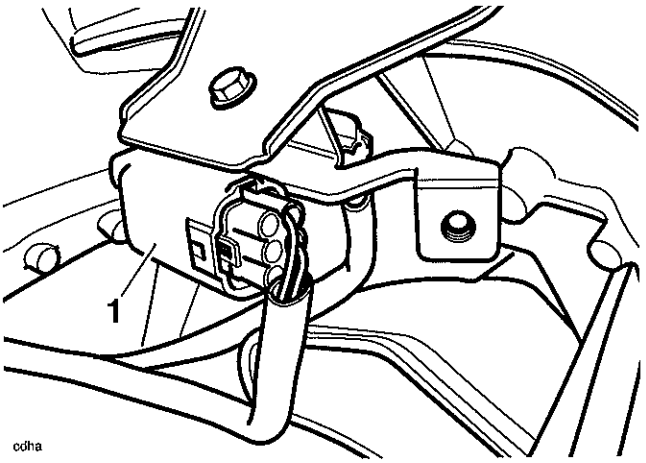
Installation

1. Fit the barometric pressure sensor to the mounting bracket, tightening the fixing screw to **3 Nm.**
2. Connect the barometric pressure sensor multiplug.
3. Fit the fuel tank (See page *10-88*).

Fall Detection Switch

Removal

1. Remove the airbox (See page *10-92*).
2. Disconnect the fall detection switch multiplug.
3. Release and discard the fixing screws securing the switch to the mounting bracket and remove the switch.



1. Fall Detection Switch

Installation

1. Fit the fall detection switch to the mounting bracket, fit new fixing screws and tighten to **4 Nm.**
2. Connect the fall detection switch multiplug.
3. Fit the airbox (See page *10-93*).

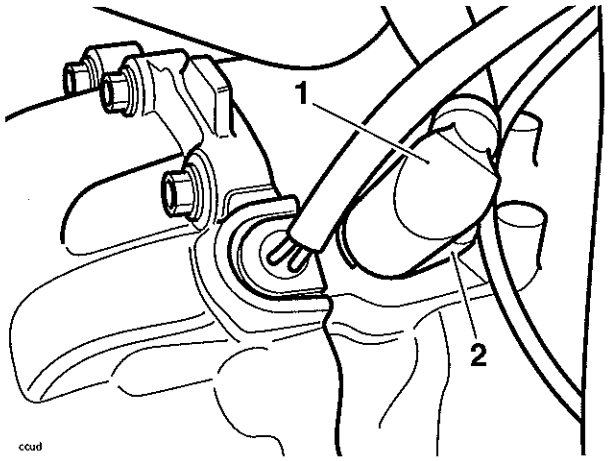
Crankshaft position sensor

Note:

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

Removal

1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Remove the fixing securing the sensor bracket to the crankcase. Ease the sensor from the crankcase.

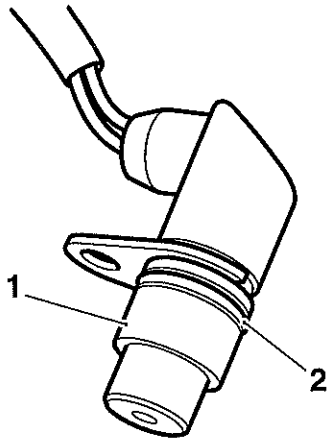


1. Sensor
2. Sensor bracket

4. Disconnect the sensor multi-plug.

Installation

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



1. Sensor
2. O ring

1. Apply a smear of oil to the sensor O ring to aid assembly.
2. Refit the sensor taking care not to damage the O ring.
3. Refit the sensor bracket. Fit and tighten the fixing to **10 Nm.**
4. Reconnect the sensor multi-plug.
5. Reconnect the battery, positive (red) lead first.
6. Refit the seat (see page *16-8*).

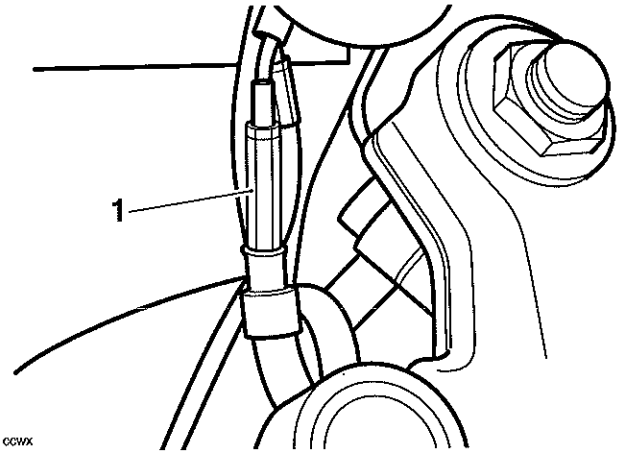
Throttle Cable

Adjustment

Note:

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

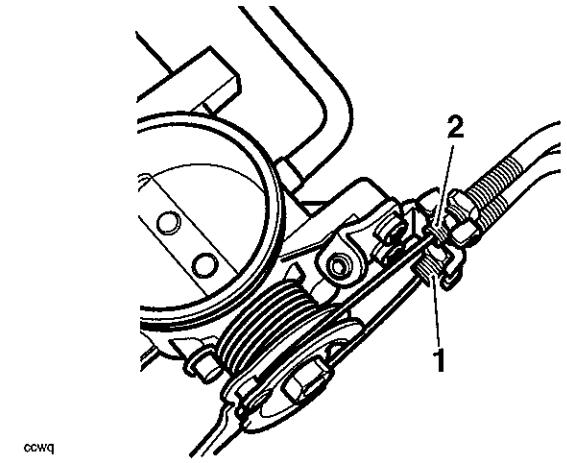
1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Set the 'opening' cable adjuster at the twist grip end such that it has an equal amount of adjustment in each direction. Tighten the locknut.



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

4. Remove the fuel tank (see page *10-87*).
5. Remove the airbox (see page *10-92*).

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



ccwq

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

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

Warning

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

Warning

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

Warning

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

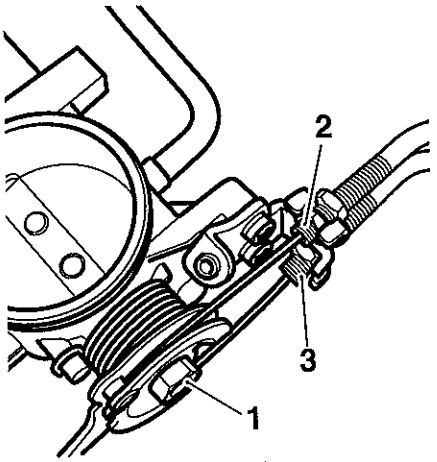
8. Refit the airbox (see page *10-93*).
9. Refit the fuel tank (see page *10-88*).
10. Reconnect the battery, positive (red) lead first.
11. Refit the seat (see page *16-8*).

Removal

Note:

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

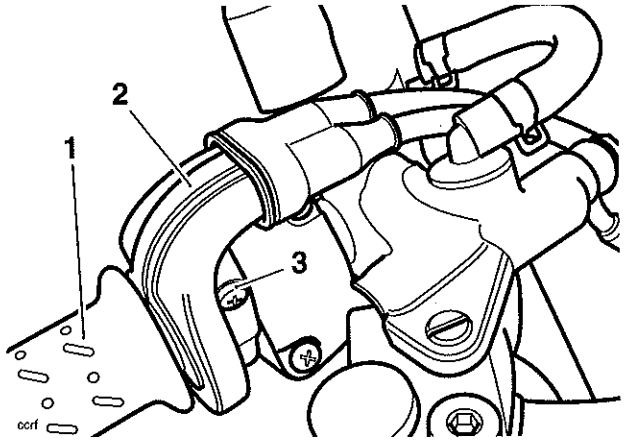
1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first. (see page *17-8*).
3. Remove the fuel tank (see page *10-87*).
4. Remove the airbox (see page *10-92*).
5. Slacken the adjuster locknuts at the throttle body end of the cables such that they will allow the outer cables to be detached from the cable bracket.
6. Detach the inner portion of the cables from the throttle cam.



ccwr

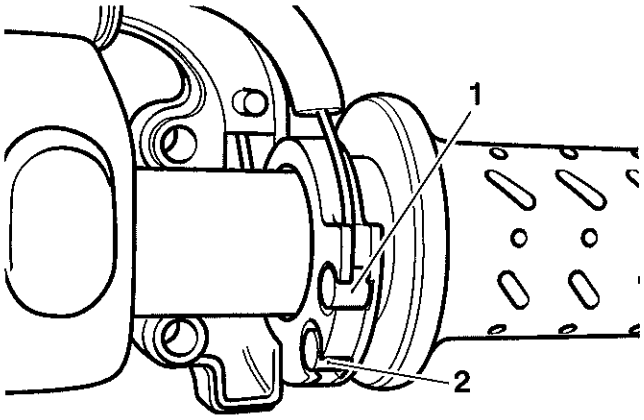
1. Throttle cam
2. Closing cable
3. Opening cable

7. At the twist grip end, slide off the rubber boot and release the screws which secure the two halves of the twist grip guide to each other.



1. Twist grip
2. Twist grip guide
3. Screws

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



1. Opening cable
2. Closing cable

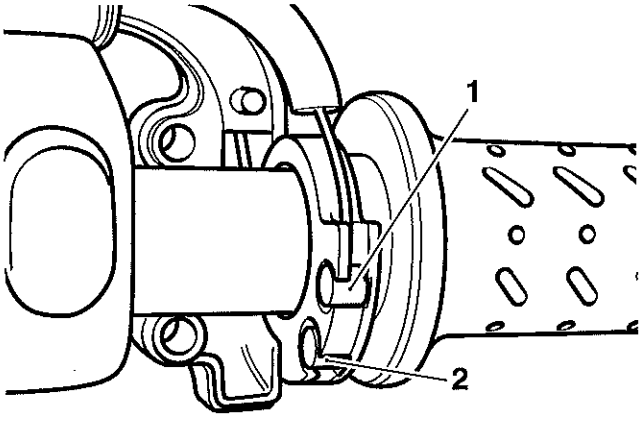
9. Detach the cables from the motorcycle.

Examination

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

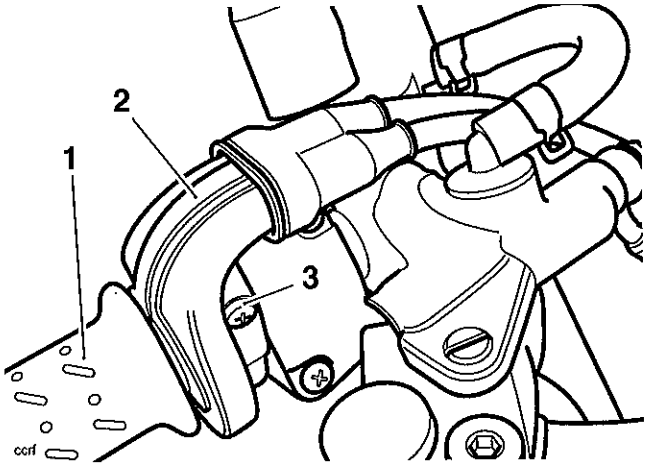
Installation

1. Locate the cables to the frame following the routing noted during removal.
2. Engage the inner cable nipples to the twist grip.



1. Opening cable
2. Closing cable

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



1. Twist grip
2. Twist grip guide
3. Screws

4. Refit the boot.
5. Attach the other end of the inner cables to the throttle cam ensuring the opening cable is fitted to the bottom of the throttle cam and the closing cable to the top.
6. Locate the outer cables to the bracket and secure with the adjuster and locknuts.
7. Set the cable adjustment (see page *10-96*).
8. Refit the airbox (see page *10-93*).
9. Refit the fuel tank (see page *10-88*).
10. Reconnect the battery, positive (red) lead first
11. Refit the seat (see page *16-8*).

Throttle Bodies/Injectors

Removal

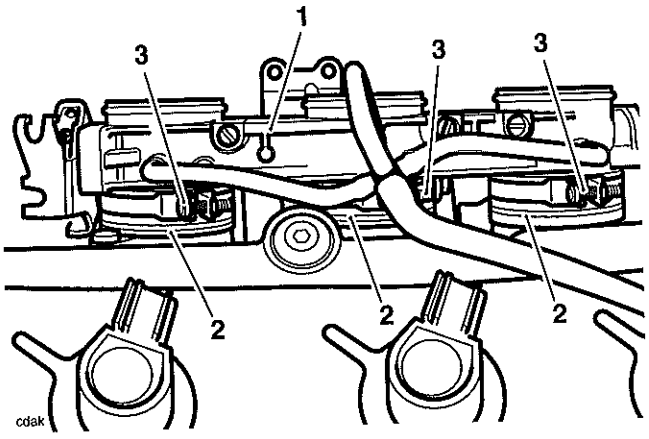
Note:

- **Because fuel stored in the fuel rail will be at 3 bar pressure, it is essential that the fuel pressure is reduced before any dismantling of the fuel rail takes place. To reduce pressure, briefly crank the engine with the fuel pump disconnected.**

Warning

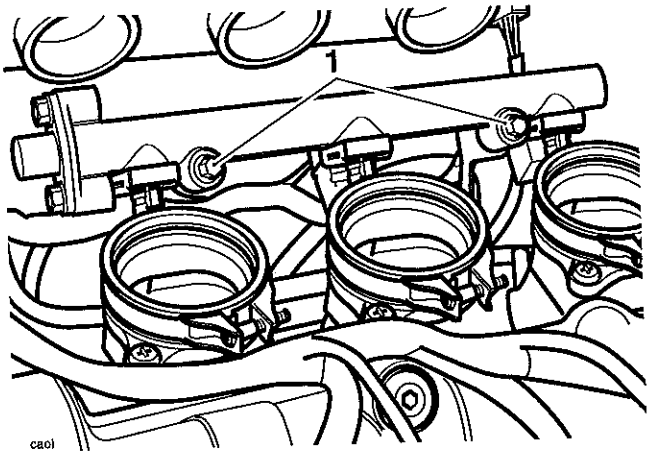
If the fuel rail is dismantled without first reducing pressure fuel may escape causing clothing and components to be coated with fuel. This would represent a serious fire hazard which could lead to burn injuries and damage to property.

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. Remove the airbox (see page *10-92*).
5. Remove the side panels (see page *16-9*).
6. Disconnect the throttle position sensor.
7. Release both throttle cables from the throttle cam (see page *10-96*).
8. Release the clips securing the throttle bodies to the transition pieces.



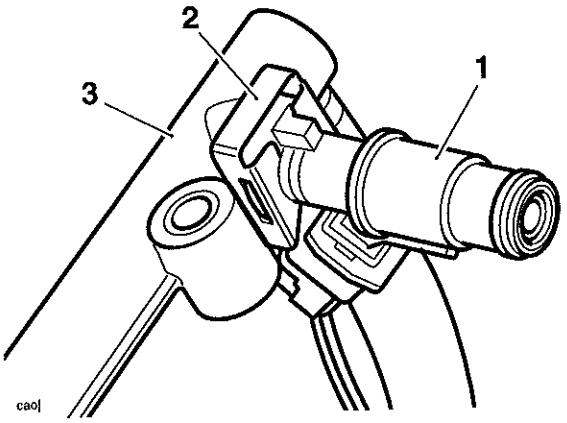
1. Throttle body
2. Transition piece (one per cylinder)
3. Clip (one per cylinder)

9. Ease the throttle bodies from the transition pieces and lay the assembly on the crankcase.
10. Release the bolts securing the fuel rail to its bracket.



1. Fuel rail bolts

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



1. Injector
2. Clip
3. Fuel rail

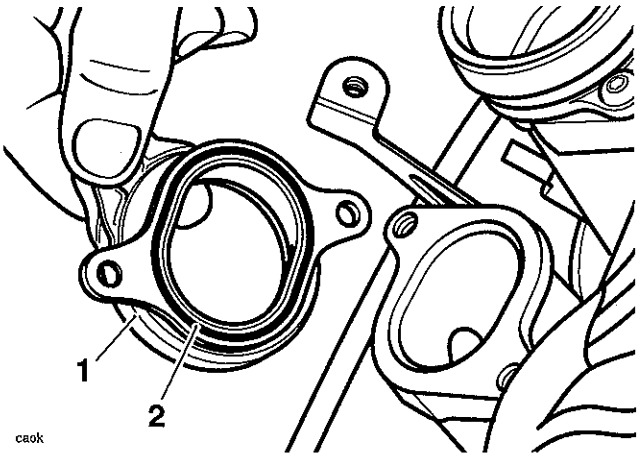
13. To detach the transition pieces from the head, release the screws, raise the transition pieces and collect the O rings.

Inspection

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

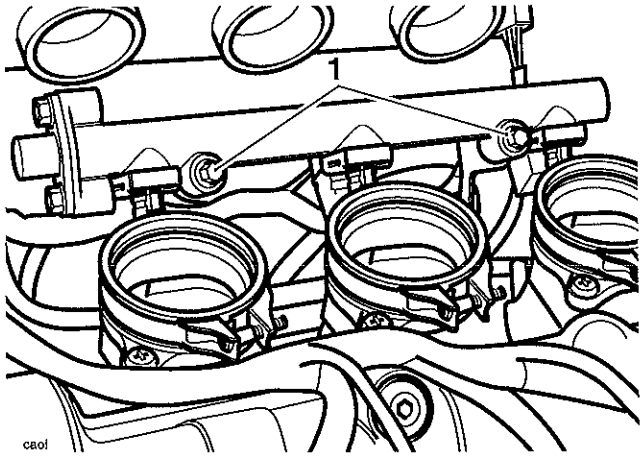
Installation

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



1. Transition piece
2. O ring

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



1. Fuel rail bolts

6. Refit the throttle bodies to the transition pieces and secure with clips.
7. Re-attach and adjust the throttle cables (see page *10-96*).
8. Refit the airbox (see page *10-93*).
9. Refit the fuel tank (see page *10-88*).
10. Refit all bodywork.
11. Reconnect the battery, positive (red) lead first.
12. Refit the seat (see page *16-8*).

Throttle Body Balancing

Note:

- **The throttles cannot be balanced using equipment to measure vacuum in each throttle. Instead, the Triumph diagnostic tool must be used.**

1. Remove the fuel tank (see page *10-87*).
2. Remove the airbox (see page *10-92*).

⚠ Warning

If the engine has recently been running, the components beneath the fuel tank may be hot to the touch.

3. Connect the diagnostic tool.
4. Temporarily refit the fuel tank and reconnect the hoses and fuel pump connection.
5. Attach exhaust extraction hoses to the silencers.
6. Start the engine.
7. On the diagnostic tool navigate to 'ADJUSTMENTS' (see page *10-22*).
8. Select 'balance throttles'.

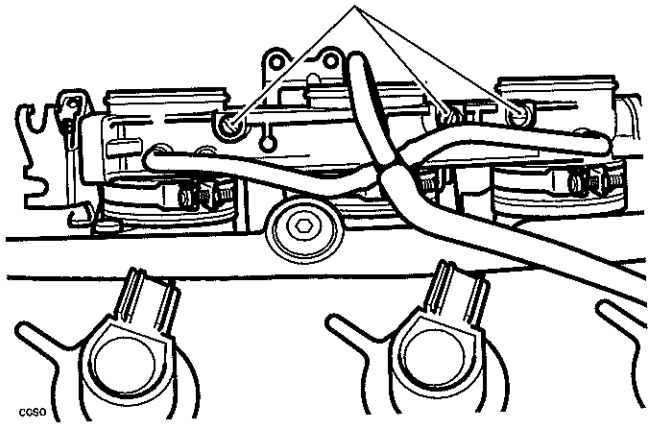
T	H	R	O	T	T	L	E	S		B	A	L	A	N	C	E	D		
T	H	R	O	T	T	L	E		1		1	2	3	4	M	M	/	H	G
T	H	R	O	T	T	L	E		2		1	2	3	4	M	M	/	H	G
T	H	R	O	T	T	L	E		3		1	2	3	4	M	M	/	H	G

Balance throttles screen

Note:

- **The balance throttle screens show the vacuum valve of each throttle in mm/hg. In addition, when the throttles are balanced to an acceptable range of each other the word 'balanced' will appear in the top right hand corner of the screen. At this point, no further adjustment is necessary or productive.**

9. Using the throttle adjusters, make adjustments until the word 'BALANCED' appears



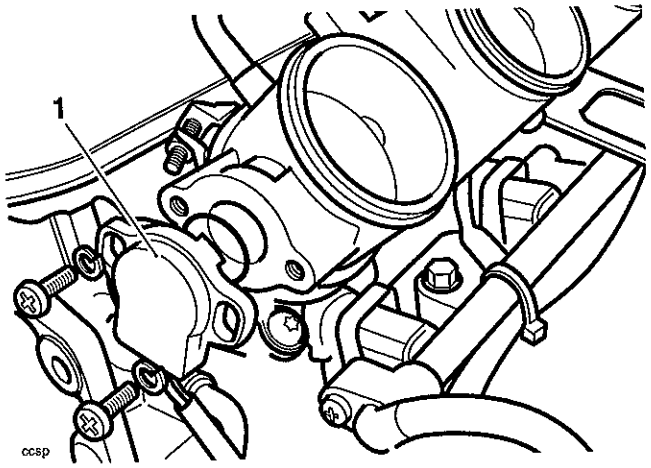
1. Adjusters

10. When balanced, stop the engine and disconnect the diagnostic tool.
11. Refit the airbox (see page *10-93*).
12. Refit the fuel tank (see page *10-88*).
13. Reconnect the battery, positive (red) lead first.
14. Refit the seat (see page *16-8*).

Throttle Position 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. Remove the airbox (see page *10-92*).
5. Remove the throttle body assembly (see page *10-99*).
6. Remove the throttle position sensor from the left hand end of the throttle body. Collect the O ring on disassembly.



1. Throttle position sensor

Installation

1. Fit the replacement throttle position sensor ensuring the O ring is positioned correctly between the sensor and throttle body.
2. Engage the new screws and washers supplied and part tighten such that the sensor can still be rotated.
3. Position the throttle body assembly near to its fitted position and reconnect the sensor.
4. Reconnect the battery, positive (red) lead first.
5. Attach the Triumph service diagnostic tool to the dedicated plug
6. Turn the ignition to the on position.
7. Connect the diagnostic tool and scroll through to, and select the 'ADJUST TUNE' option.
8. At the next screen, align the cursor with THR0TTLE POT RENEW (see below) then press the validation key which is marked '*'.

									A	D	J	U	S	T		T	U	N	E
	R	E	S	E	T		A	D	A	P	T	I	O	N	S				
▶	T	H	R	O	T	T	L	E		P	O	T		R	E	N	E	W	
	I	S	C		S	T	E	P	P	E	R		R	E	N	E	W		

9. On pressing the validation key, the diagnostic tool will send a command, which drives the primary throttle to the fully closed position. The tool will also display the voltage reading coming from the throttle position sensor.

	R	E	P	L	A	C	E		P	R	I	M	A	R	Y		T	P	S
					T	H	R	O	T	T	L	E		C	L	O	S	E	D
C	U	R	R	E	N	T		V	O	L	T	S		O	.	5	6	V	

10. Gently rotate the new throttle position sensor until the voltage reading on the tool shows 0.6 volts +/- 0.02 volts.

Note:

- **This is a setting voltage only. Because of the adaptive nature of the engine management system, in-service voltage may vary from this setting figure.**

11. Tighten the sensor retaining screw to **3.5 Nm** and recheck the voltage reading shown on the tool. Repeat the adjustment if the reading is outside the specified range.
12. Press the validation key marked '*' to return the throttle to normal control and return the diagnostic tool to the ADJUST TUNE menu.

13. Disconnect the diagnostic tool.
14. Disconnect the battery negative (black) lead first.
15. Check that the throttle opens and closes without obstruction/sticking and has a smooth action throughout the full range of its movement. Rectify as necessary.

Warning

Operation of the motorcycle with an incorrectly adjusted throttle position sensor, or a throttle position sensor that causes the throttle to stick could result in loss of throttle control. Loss of throttle control could result in loss of control of the motorcycle and an accident.

Warning

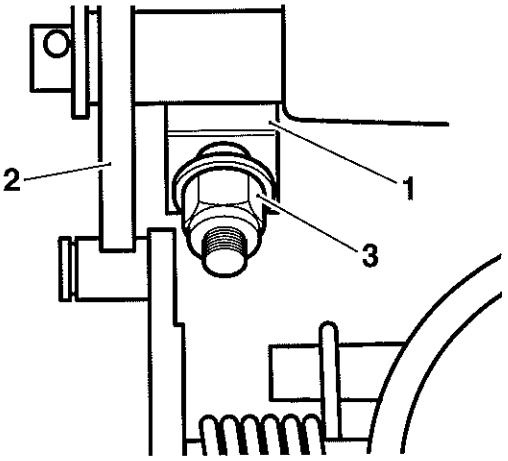
Operation of the motorcycle with an incorrectly adjusted, incorrectly routed or damaged throttle cable could interfere with the operation of the brakes, clutch or the throttle itself. Any of these conditions could result in loss of control of the motorcycle and an accident.

16. Disconnect the battery negative (black) lead first.
17. Refit the throttle body assembly (see page *10-100*).
18. Refit the airbox (see page *10-93*).
19. Refit the fuel tank (see page *10-88*).
20. Reconnect the battery, positive (red) lead first.
21. Check and clear any stored faults using the same tool.
22. Refit the seat (see page *16-8*).

Idle Speed Control Stepper Motor

Removal

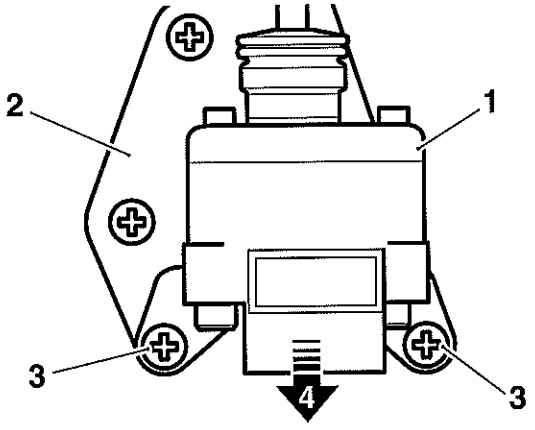
1. Remove the seat (see page *16-8*).
2. Disconnect the battery negative (black) lead first.
3. Remove the fuel tank (see page *10-87*).
4. Remove the airbox (see page *10-92*).
5. Remove the throttle bodies (see page *10-99*).
6. Remove the nylon nut, metal washer and plastic washer attaching the idle control stepper arm to the idle speed control lever



cdav

1. Idle control stepper arm
2. Idle speed control lever
3. Nut etc.

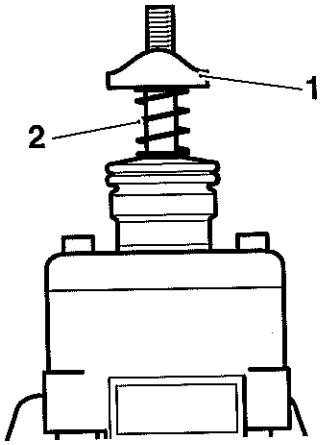
7. Remove the two screws securing the idle speed control stepper motor to its bracket, then remove the stepper motor in the direction shown.



cdaw

1. Idle speed control stepper motor
2. Bracket
3. Fixings
4. Direction of removal

8. Leave the plastic collar and spring on the control stepper arm.

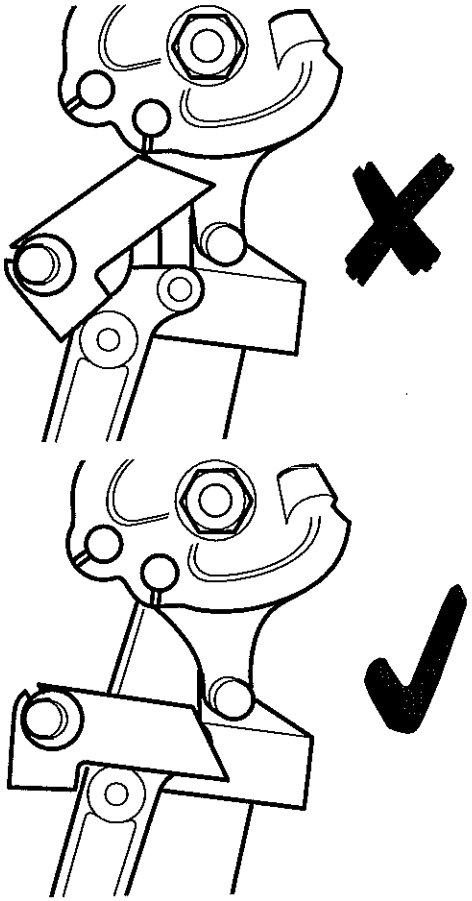


cdax

1. Collar
2. Spring

Installation

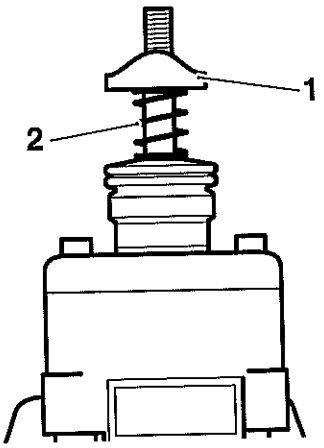
1. Ensure the Idle speed control lever is correctly positioned in relation to the throttle cam as shown below.



cdgr

cdgs

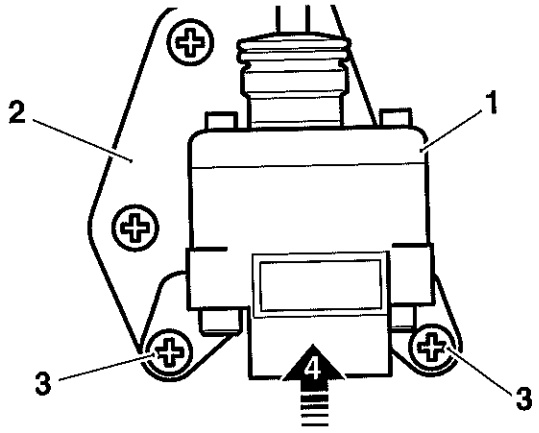
2. Loosley fit the spring and collar on the stepper arm.



cdax

1. Collar
2. Spring

3. Locate the stepper motor to its bracket and tighten the fixings to **3.5 Nm.**



cday

1. Idle speed control stepper motor
2. Bracket
3. Fixings
4. Direction of fitting

4. Fit the plastic washer through the lever then fit the metal washer and nut.
5. Mount the throttle body onto the engine.
6. Temporarily reconnect the battery, positive (red) lead first.
7. Turn the ignition to the ON position.
8. Connect the service diagnostic tool and scroll through to, and select the 'ADJUST TUNE' option.
9. At the next screen, align the cursor with ISC* STEPPER RENEW then press the validation key which is marked '*'.

*ISC = Idle Speed Control

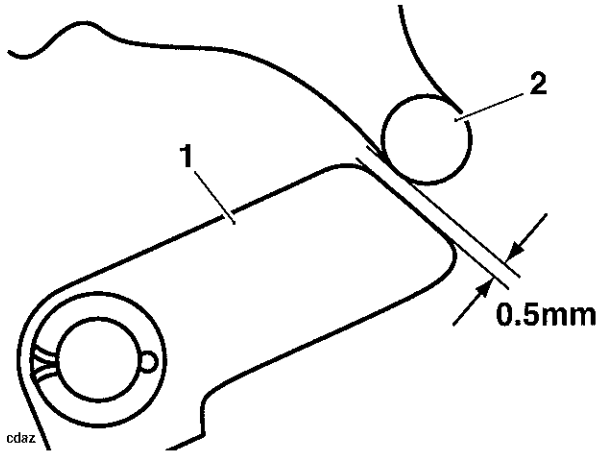
								A	D	J	U	S	T		T	U	N	E
	R	E	S	E	T		A	D	A	P	T	I	O	N	S			
	T	H	R	O	T	T	L	E		P	O	T		R	E	N	E	W	

▶	I	S	C		S	T	E	P	P	E	R		R	E	N	E	W		

10. On pressing the validation key, the diagnostic tool will send a command that drives the throttle to the fully closed position. The tool will also display the voltage reading coming from the throttle position sensor which will be needed for a check/adjustment made later in the process.

	R	E	P	L	A	C	E		I	S	C		S	T	E	P	P	E	R
					T	H	R	O	T	T	L	E		C	L	O	S	E	D
C	U	R	R	E	N	T		V	O	L	T	S			O	.	5	8	V

11. Tighten the stepper arm until a clearance of 0.5 mm can be measured between the idle speed control cam and the throttle roller.

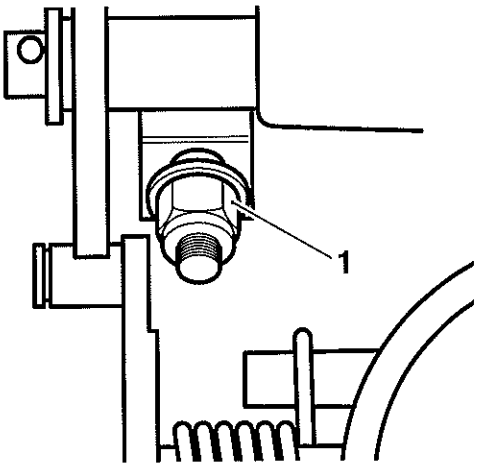


1. Idle speed control lever
2. Throttle roller

12. Check the voltage reading on the tool. If the reading is 0.6 volts +/- 0.02 volts, MAKE A NOTE OF THE EXACT VOLTAGE READING then proceed to step 18. If the reading is not within this tolerance band, adjustment must be made as described in paragraphs 13 to 15.
13. Slacken the screws on the throttle position sensor.
14. Gently turn the throttle position sensor until the voltage reading on the tool shows 0.6 volts +/- 0.02 volts. MAKE A NOTE OF THE EXACT VOLTAGE READING.
15. Tighten the sensor retaining screw to **3.5 Nm** and recheck the voltage reading shown on the tool. Repeat the adjustment if the reading is outside the specified range, NOTING THE FINAL VOLTAGE READING IF ADJUSTMENT IS MADE.
16. Press the validation key marked '*' to progress to the next adjustment.
17. On pressing the validation key, the diagnostic tool will send a command that drives the throttle to the fully open position. The tool will also display the voltage reading coming from the throttle position sensor.

	R	E	P	L	A	C	E		I	S	C		S	T	E	P	P	E	R
					T	H	R	O	T	T	L	E		O	P	E	N		
C	U	R	R	E	N	T		V	O	L	T	S			O	.	7	2	V

18. With the stepper fully opened, check the voltage shown on the tool and adjust the nut on the top of the stepper arm until the tool shows a voltage equivalent to X+0.15 (+/- 0.05V) where X= the voltage measured in step 12 (or 14 if re-adjusted).
For example, if the voltage measured was 0.6 volts, then the correct setting would be 0.70-0.80 volts.



1. Adjustment nut

19. Press the validation key marked '*' to fully close the idle speed control stepper motor. After a minimum of 15 seconds (the tool will not allow further actions to take place during this period), press the validation key again to return the ECM to normal control.

⚠ Caution

Do not operate the throttle while the stepper motor is being adjusted, otherwise the incorrect value will be adapted and the engine will not start.

20. Turn the ignition to the OFF position.
21. Disconnect the battery, negative (black) lead first.
22. Check and adjust the throttle cable settings (see page *10-96*).

Warning

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

23. Refit the airbox (see page *10-93*).
24. Refit the fuel tank (see page *10-88*).
25. Reconnect the battery, positive (red) lead first.
26. Refit the seat (see page *16-8*).

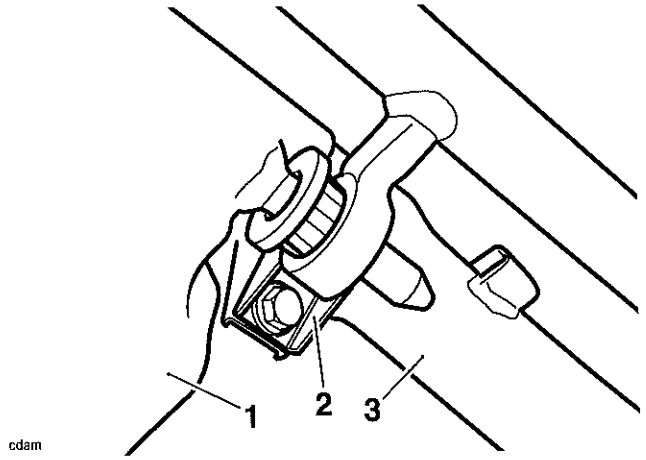
Exhaust System

Removal

Warning

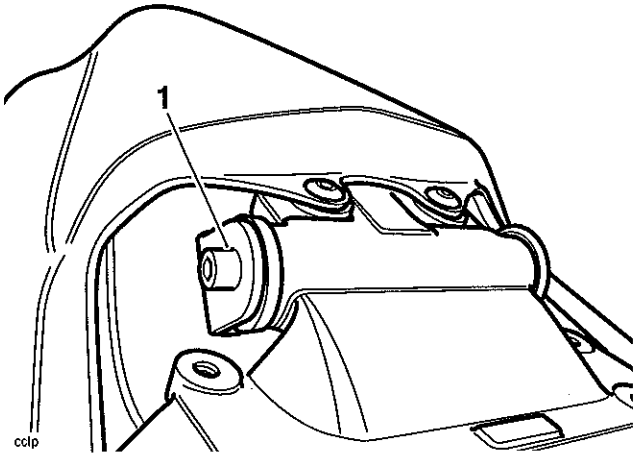
If the engine has recently been running, the exhaust system will be hot. Before working on or near the exhaust system, allow sufficient time for the exhaust system to cool as touching any part of a hot exhaust system could cause burn injuries.

1. Remove the seat (see page *16-8*).
2. Disconnect the battery, negative (black) lead first.
3. Remove the rear bodywork (see page *16-9*).
4. Release the clamp securing the silencer to the exhaust pipe.
5. Release the rear light mounting bracket (see page *17-13*).



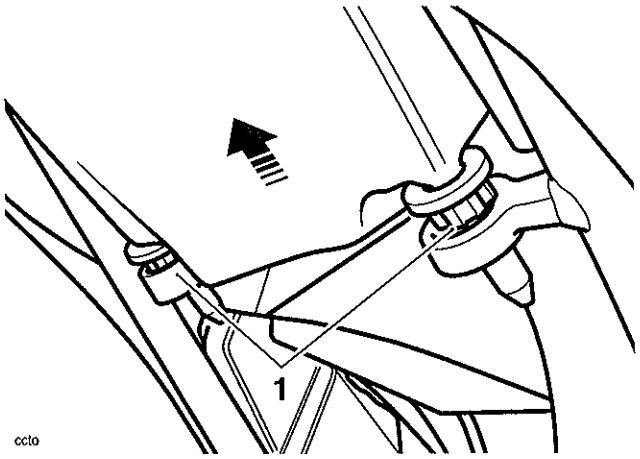
1. Silencer
2. Clamp
3. Exhaust pipe

6. Support the silencer and release the bolts securing the silencer mounting bracket to the rear frame



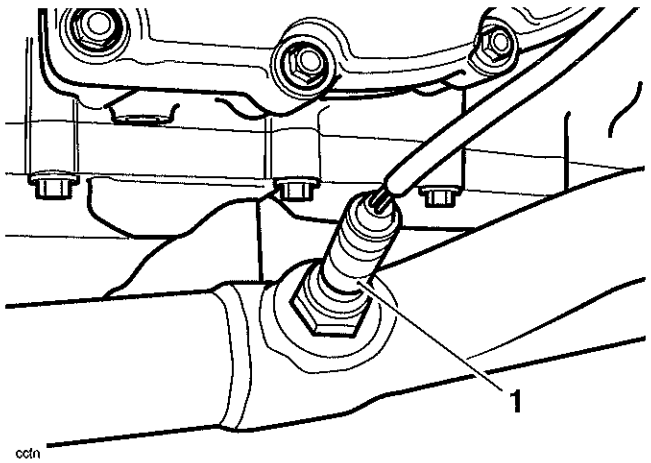
1. Silencer mounting bracket/fixing

7. Move the silencer rearwards to disengage its front mountings and remove.



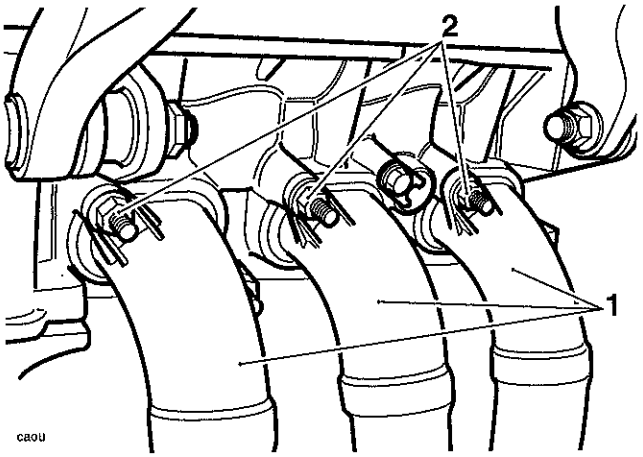
1. Silencer mounting points

8. Disconnect the oxygen sensor.



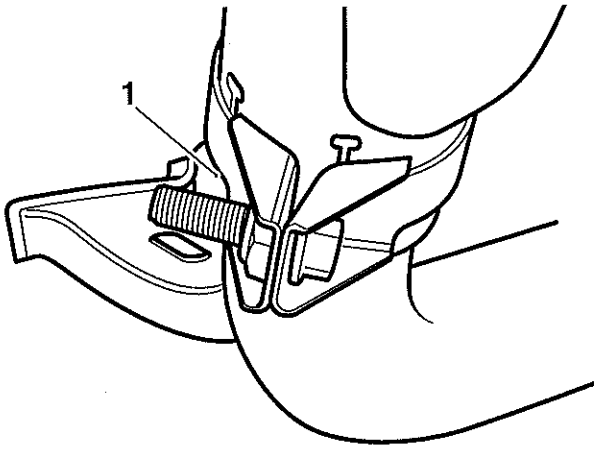
1. Oxygen sensor

9. Remove the oil cooler (see page *8-13*).
10. Remove the radiator (see page *11-8*).
11. Release the fixings securing the exhaust pipe joints to the cylinder head.



1. Down pipes
2. Fixings (upper fixings shown)

12. Remove the bolt from the exhaust pipe rear mounting point.



1. Exhaust pipe rear mounting point

13. Detach the exhaust pipe assembly and collect the seals from the head ports.

Note:

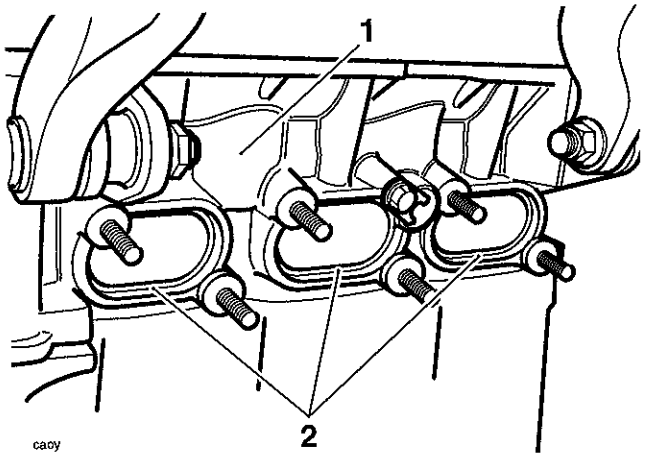
- **The intermediate pipe and cover may be removed prior to, or after removal of the downpipes.**

Assembly

1. Fit new seals to the cylinder head.

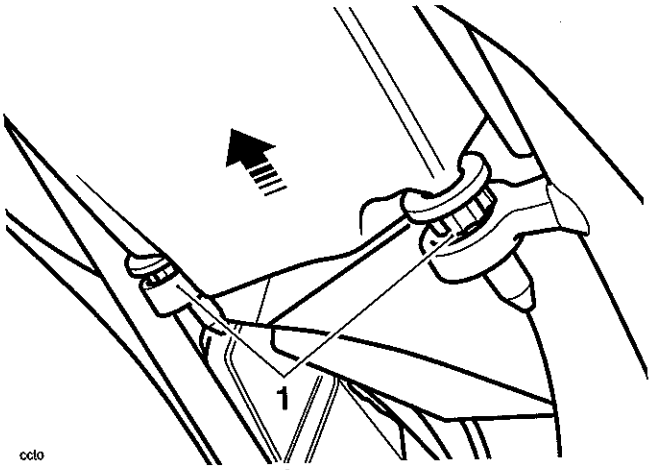
Note:

- **A smear of grease may be used to retain the seals in the cylinder head during assembly**



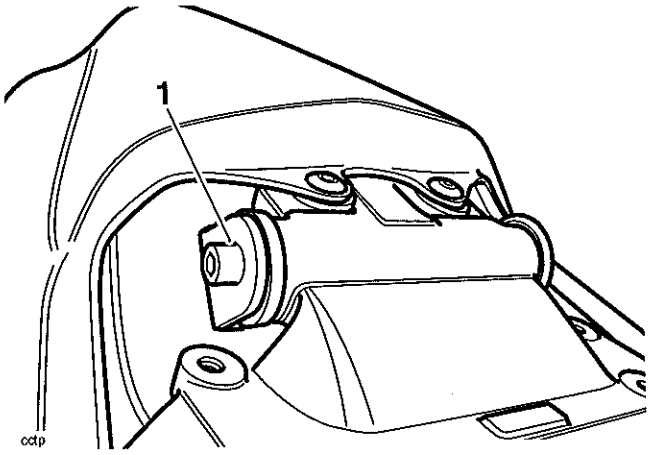
1. Cylinder head
2. Seals

2. Locate the exhaust pipes and align the exhaust pipe flanges to the fixing points.
3. Assemble the rear mounting points fixings but do not tighten at this stage.
4. Tighten the exhaust pipe to cylinder head fixings in the following sequence:
   a) Working from left to right, tighten the upper row of nuts to **19 Nm.**
   b) Working from left to right, tighten the lower row of nuts to **19 Nm.**
   c) Working from left to right, re-tighten the upper row of nuts to **19 Nm.**
5. Tighten the rear mounting point fixing to **15 Nm.**
6. Refit the radiator and refill the cooling system (see page *11-9*).
7. Refit the oil cooler (see page *8-14*).
8. Position and engage the silencer to its front mountings.



1. Silencer mounting points

9. Position and engage the silencer to the exhaust pipe.
10. Align the silencer mounting brackets to the frame



1. Silencer mounting bolt

11. Align the clamp to the silencer to exhaust pipe joint and tighten to **27 Nm.**
12. Refit the rear light bracket (see page *17-13*).
13. Reconnect the battery, positive (red) lead first.
14. Refit the seat (see page *16-8*).

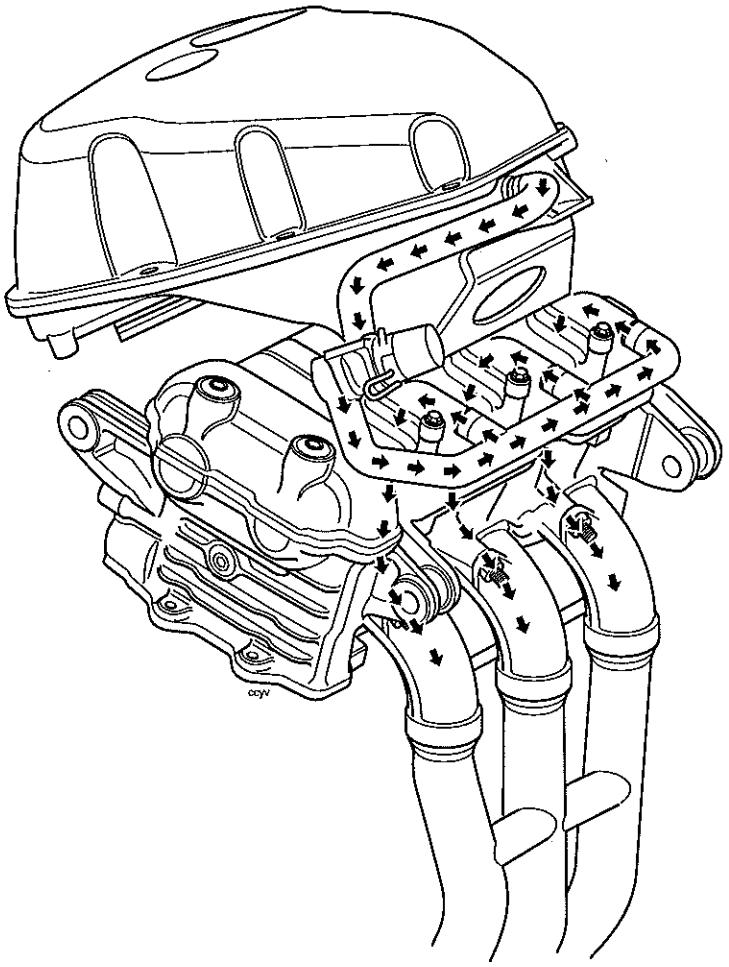
⚠ Caution

Do not install the exhaust system or run the engine without the exhaust heatshields fitted. Components protected by the exhaust heatshields may suffer severe damage or a fire if the motorcycle is operated without the heatshields being fitted.

15. Start the engine and check for exhaust gas leaks. Rectify if necessary.

Secondary Air Injection

System Purpose and Operation



The secondary air injection system is an aid to reducing levels of pollutants in the exhaust gases. It does this by introducing a small amount of air into each exhaust port as the exhaust valve opens. The introduced air helps promote further combustion of the fuel mixture in the exhaust system after it has left the combustion chamber.

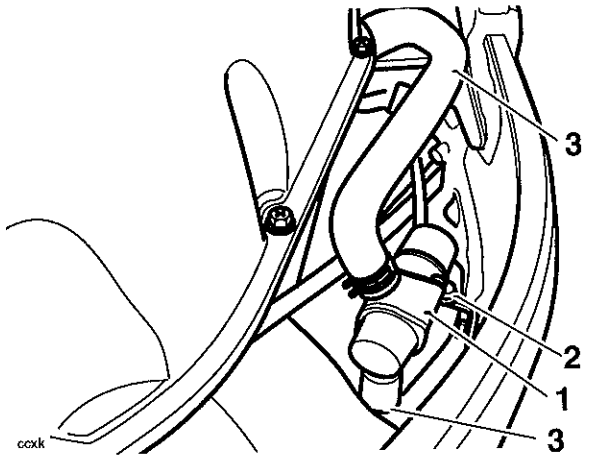
At certain specific engine speeds above idle (determined by the factory programming of engine management system), the secondary air injection control valve is opened by the ECM and allows an air feed into the secondary air system where, each time a pair of exhaust valves open, the exhaust gases in the exhaust port create a depression which causes reed valves in the secondary air injection system to open. When open, the depression in the exhaust port draws air from the control valve, through the open reed valves, into the exhaust port. This air promotes secondary combustion of the exhaust gases in the ports and the header system.

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

Secondary Air Injection Solenoid Valve

Removal

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



1. Solenoid valve
2. Retainer
3. Hoses

5. Tilt the valve to detach from the retainer.

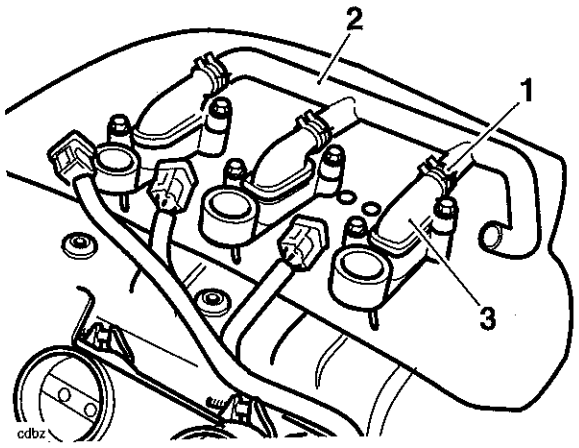
Installation

1. Refit the hoses to the valve.
2. Locate the valve to the retainer.
3. Refit the fuel tank (see page *10-88*).
4. Reconnect the battery, positive (red) lead first.
5. Refit the seat (see page *16-8*).

Secondary Air Injection Reed Valves

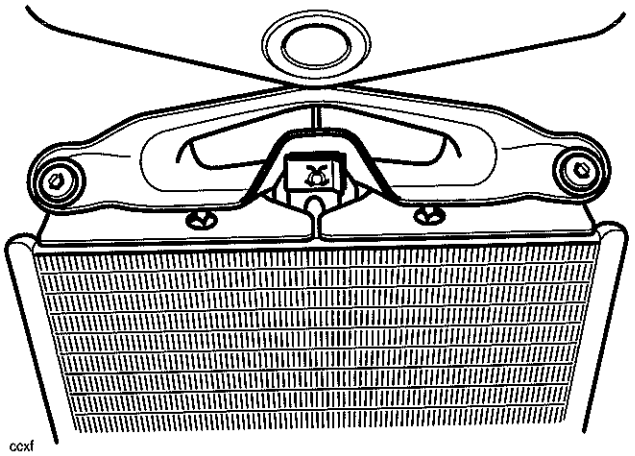
Removal

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. Remove the airbox (see page *10-92*).
5. Disconnect the electrical connectons to the ignition coils, then remove the coils from the cam cover.
6. Detach the secondary air injection feed hoses from the reed valves on the cam cover.



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

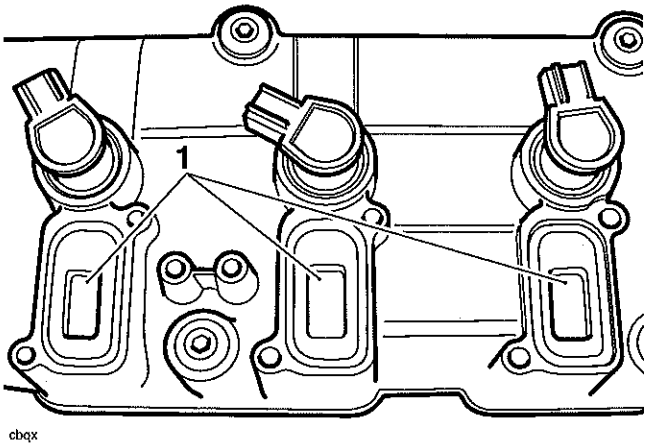
7. Remove the airbox front bracket from the cam cover.
8. Release the clips from the air deflector shield above the cam cover.



1. Air deflector shield
2. Clip locations

9. Release the clutch cable at the clutch end and pass the loose end through the air deflector shield, then remove the shield.

10. Release the bolts securing the valve covers to the cam cover.
11. Ease the valve covers from the valves.
12. Detach the valves from the cam cover.



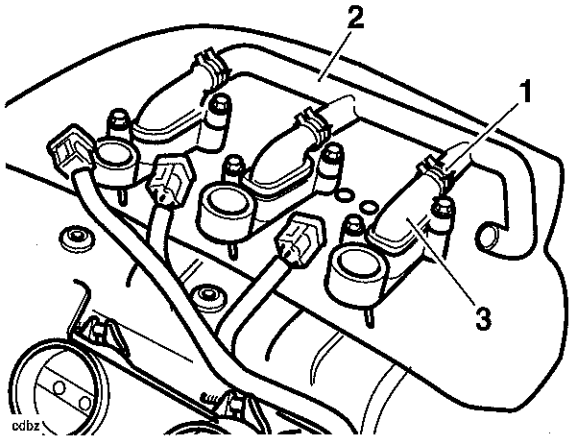
1. Valves

Inspection

1. Check for cracks, bending or other damage to the valve flaps. Replace as necessary.
2. Check for damage to the seal areas. Replace as necessary.
3. Check the valve body to cylinder head seal for damage.

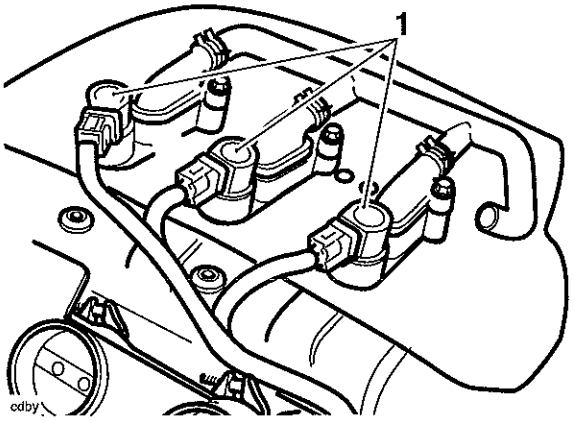
Installation

1. Fit the reed valves to the cam cover.
2. Refit the valve covers and tighten the fixings to **9 Nm.**
3. Refit the the air deflector shield to the cam cover and retain with clips.
4. Pass the clutch cable through the hole provided in the air deflector shield.
5. Refit the air hoses to the reed valves.



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

6. Fit the ignition coils and reconnect.



1. Coils

7. Refit the airbox (see page *10-93*).
8. Refit the fuel tank (see page *10-88*).
9. Reconnect the battery, positive (red) lead first
10. Refit the seat (see page *16-8*).

Evaporative Emissions Control System

California Models Only

All California models are fitted with a system to control the evaporation of fuel vapour to the atmosphere.

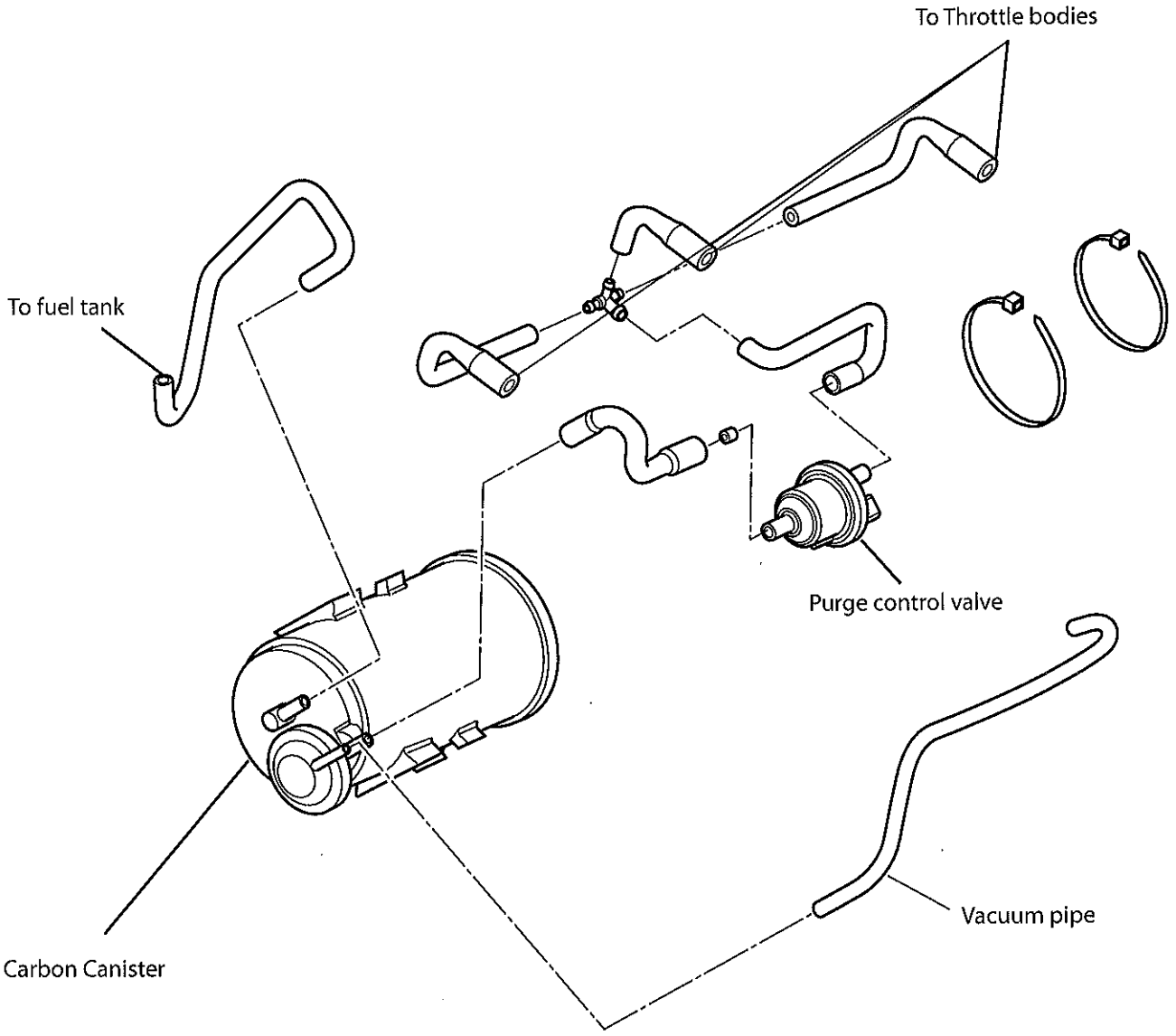
A carbon canister absorbs vapour while the engine is not running. When the engine is started, the vapour is returned to the engine and burnt.

There are two distinct phases to the system's operation, engine off and engine running. These two conditions are explained overleaf.

Component Locations

Carbon Canister - behind the throttle bodies

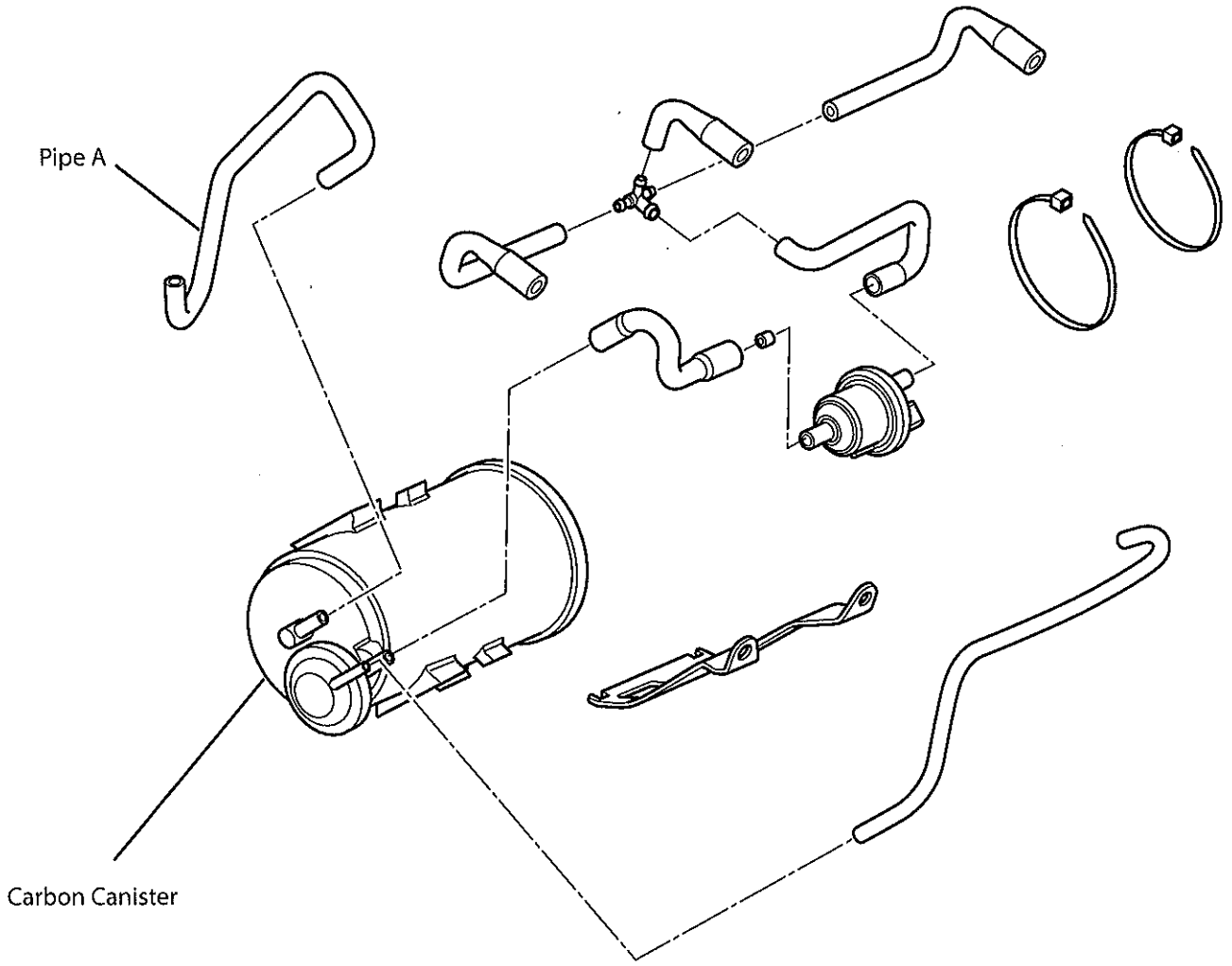
Purge Control Valve - adjacent to frame, left hand side (electronically controlled by the ECM)



Evaporative Control System - Engine Off

When the engine is stationary any pressure increase in the fuel tank due to a rise in ambient temperature will cause the fuel vapour to pass down the breather pipe A to a carbon filled canister which stores the vapour.

Once in the canister, vapour cannot return to the fuel tank because of a one-way valve in the canister.

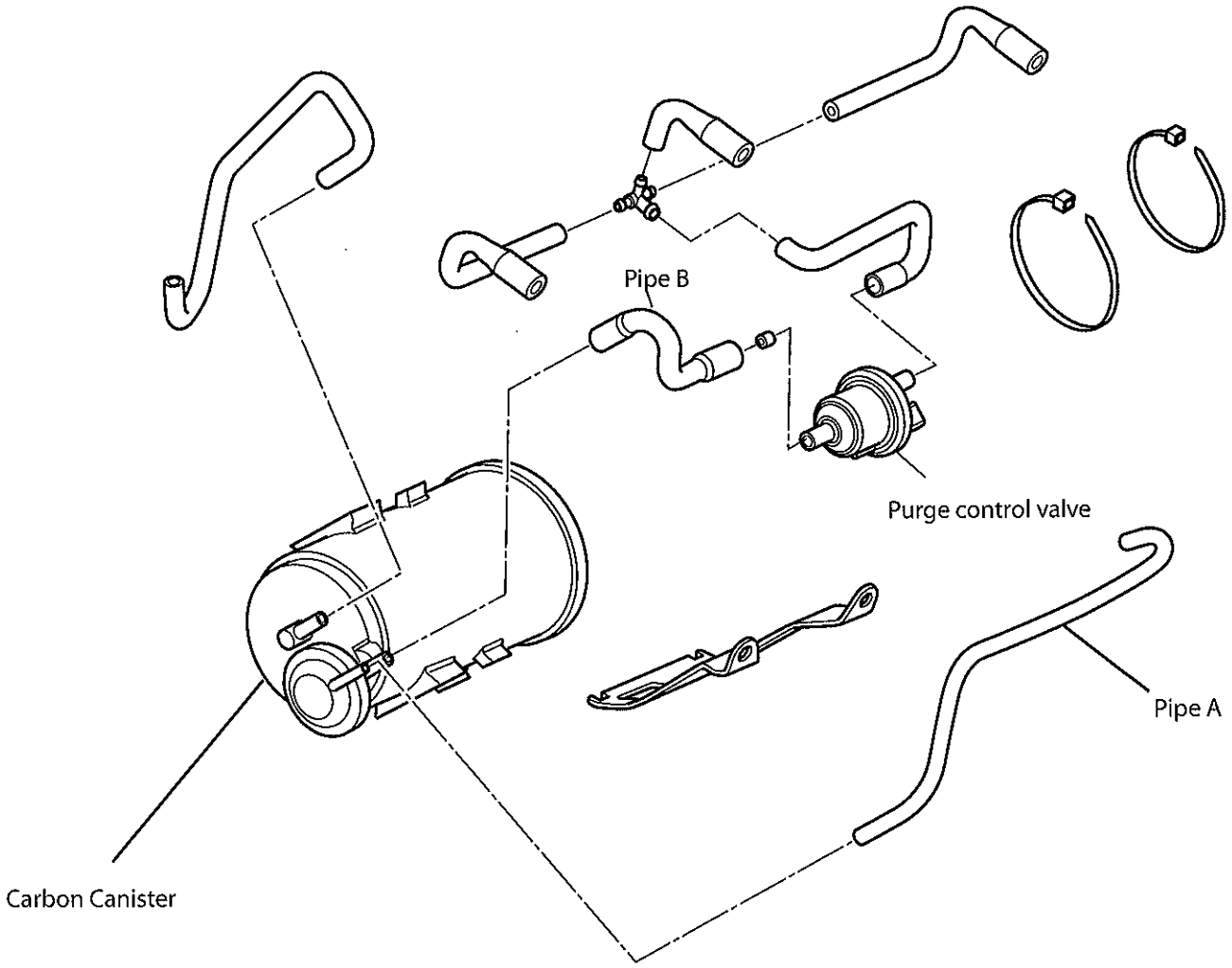


Evaporative Control System - Engine Running

When the engine is started, a vacuum is applied via pipe A to a vent valve on the canister, causing it to open. Simultaneously, vacuum is applied along pipe B, via the purge control valve to the canister vent port.

Because the vent valve has been opened, the vacuum applied at point B begins to draw stored vapour from the carbon filled area of the canister via the vent port and returns it to the throttle bodies for burning in the engine.

In order to control the speed at which vapour is purged from the canister, the engine management system regularly shuttles the purge control valve between open and closed positions.



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