

Race Diagnostics Ltd

Liquid User Manual



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Safety

The setup for the *liquid* should only be carried out when the car is stationary. Under no circumstances should the controls of the unit be used by the driver while the car is in motion.

The co-driver may use the controls at any time.

Introduction

The *liquid* is a diagnostic tool which can be used to provide a range of real time information to the car driver regarding the performance of their car.

As the *liquid* uses an LCD screen to present the data to the user it creates the ability for multiple parameters to be presented on a single screen, thus removing the necessity to have multiple gauges.

In order to protect your new purchase the *liquid* is password protected by a 6 digit alphanumeric code. Every *liquid* is individually password protected to ensure that no black market is created in stolen *liquids*.

The default setting for the *liquid* is for use on Petrol engines, for use with Diesels, first go to the setup menu and then select “Engine type” and then “Diesel”.

Gauge and Graph data

The following information can be presented on one of two ways, either in a conventional gauge format or in a scrolling graph.

Engine crankshaft BHP
Engine crankshaft Torque
Turbo Boost pressure
Turbo Command pressure
Mass Air Flow
Air Fuel Ratio (Lambda)***
Air intake temperature
Exhaust temperature***
Coolant temperature
N75 position
Engine Misfire* ***
Dyno Plot*
Timing Correction* ***
Oil Temperature**

*Only available as graph.

**Only available as a gauge.

*** Not relevant for Diesel cars

7 Segment Displays

Speed digital display
RPM digital display

Each of the above is dependant upon the data being supported by the ECU in your car, not all cars provide all of the required information such as Oil temp and Exhaust temp.

BHP range select

When in the BHP gauge, hold the joystick up to scroll through the various ranges from 200 to 500bhp.

BHP & Torque Calculation mode

When in the BHP gauge, hold the joystick right to toggle between the MAF method and the ECU Torque method, the selected method is indicated by a light grey “M” or “T” in the bottom left hand corner of the screen.

For Petrol cars the default is to use the MAF method.

For Diesel cars the default is to use the ECU Torque method.

Torque Imperial or metric units select and Range select

To switch between ftlb and Nm for torque, when in the torque gauge, hold the joystick down to toggle between the options.

Hold the joystick up to scroll through the various ranges from 200 to 500ftlb.

Turbo Pressure Imperial or metric units select

To switch between BAR and PSI for pressure, when in the pressure gauge, hold the joystick down to toggle between the options.

AFR Imperial or metric units select

To switch between lambda and afr , when in the afr gauge, hold the joystick down to toggle between the options.

Temperature Imperial or metric units select

To switch between deg C and deg F , when in the air or coolant gauge, hold the joystick down to toggle between the options.

G-Force Measurement

Analysing the maximum acceleration/deceleration and lateral forces which are being applied to the car are very important in optimal tyre selection. Track conditions will

determine the optimal selection. To help with selection the *liquid* provides readout of both the maximum acceleration and deceleration forces which are being applied to the car. In addition the lateral forces applied during cornering are also recorded

Acceleration time measurement

Measuring the 0-60 and 1-100 mph times is of interest to all drivers and is easily measured on the *liquid*.

Faults and Adaptation

Understanding if any fault codes are being recorded by the Engine management ECU is critical to the ongoing maintenance and safe use of your car. The *liquid* can read engine management fault codes and display them to the user.

Ensuring that the “Throttle Body” is correctly calibrated is also essential for maximum performance so the *liquid* provides a capability to implement this function.

Multi Gauge

In this setting a number of important temperatures are displayed.

Multi-gauge 1

Air intake temp
Coolant temp
N75 Signal (turbo actuator)
Boost Pressure

Or

Multi-gauge 2

Air intake temp
Coolant temp
Exhaust temp
Oil temp

In multi gauge 2, since the first three temperatures are reported by the Engine management ECU and the last from the Dashpod ECU, the speed of the reporting of this data is restricted by the switchover of communications between the two ECUs. This switchover takes approximately 8 seconds, during this time the joystick will not be read. The fastest way to exit this mode is to push the joystick which resets the entire unit and returns the user to the main menu.

Please note that in many car platforms, Multi-gauge 2 will not perform reliably. The ECUs do not always perform predictably when switching between the two. If this is the case with your car, then use Multi-gauge 1. If your car does not offer Exhaust temp or Oil temp then you should select Multi-gauge 1.

To switch between Multi-gauge 1 and 2 use the joystick up and down positions.

Notes for using the liquid with Diesel vehicles

Communication on the OBD2 bus with diesel cars less robust than with petrol cars. For instance, when swapping between different gauges, an indeterminate time of about 5 seconds silence is required on the OBD2 bus, however in some cases a longer period of silence is required.

The liquid will automatically insert a 5 second delay when switching between gauges however in some circumstances a communications error may still occur. It is advisable to manually wait for a few seconds between selecting different displays. If persistent communication errors occur, then extend this delay between selecting gauges.

If the unit locks up then try resetting by pushing on the joystick, if this fails then unplug and replay the OBD2 connector.

On some Diesel cars the actual MAF reading is limited to a value less than the actual MAF value, for this reason, the default setting for Diesel cars is to use the Torque calculation method for BHP. On some Diesel cars the ECU Torque signal is also limited to a value less than the actual torque being generated. These limits are unlikely to be hit with mapped cars but may be hit with cars with updated turbos.

The user should experiment with both the MAF and Torque calculation methods to establish the most suitable for their vehicle.

Power on and off

The *liquid* will automatically turn on the first time it is plugged into the OBDII diagnostics port.

Powering off of the unit can only be done when the unit is in the “Main menu”, when in this menu, hold the joystick in an upward position for 1 seconds and then release, the unit will then power off.

To turn the unit on, push the joystick in a downwards direction, the unit will then turn on.

Auto power off

If the *liquid* is left in one of the main menus for 1 minute the unit will enter power down mode and dim the display.

If the engine is turned off when the unit is in one of the gauge or graph displays, the *liquid* will automatically enter power down mode.. This is not the case for the dyno plot or timing correction. When the ignition is turned off when displaying oil temperature a communications error will occur and the display will return to the main menu. The unit will then enter power down mode one minute later.

Password Protection

After the *liquid* has been installed, the user will be presented with the password screen.

The password for each unit is written on the antistatic bag that the unit is shipped in.

The user should transfer the password supplied to the *liquid*. The first alphanumeric character/digit should be entered by pushing the joystick up or down to scroll through the alphabet and digits 0 through 9. Once the first character/digit is selected push the joystick to the right to confirm, Continue in the same way with the subsequent digits. Once all eight digits have been entered then once again push the joystick to the right position. If the correct password has been entered you will be presented with the main menu.

If an incorrect password is entered then you will be allowed 3 subsequent tries, if you are unsuccessful then you have probably stolen the unit and will have no chance to make it work.

If however you are the rightful owner, then unplug the cable from the OBDII diagnostics port and then plug it in again.

Menu Navigation

Menu navigation is achieved using the joystick, highlight the desired function by pushing the joystick in either an upward or downward direction, once the desired function is highlighted, push the joystick in a right direction, this will either take you to the desired function or sub-menu.

To return to the menu or sub-menu from a previously selected function, push the joystick in a left direction.

Note, since the communication with the engines ECU have critical timing, the joystick may need to be held for up to 300ms before it is recognised when returning from the selected function. This is not a malfunction of the unit, simply its mode of operation.

In a number of the menus there are more options than can be shown on the screen at one time, in this case an up or down arrow will be shown to indicate this.

Main Menu

The main menu allows navigation to each of the *liquid*'s main features.

- Gauge data
- Graph data
- G force
- Speed timing
- Faults and adaptations
- Engine oil temperature
- Setup

Use the joystick up and down positions to select the function that is desired and then use the joystick right position to select that feature. Returning to the main menu is performed by pushing the joystick to the left position.

On software version 2.52 the following languages are supported

- English
- German
- French
- Finnish

Language selection can be found in the “Setup” menu.

Gauge Data

In this mode the user can select a number of options to be displayed on the gauge.

Use the joystick to select the desired parameter and then push the joystick to the right to start to display the data. After selection the *liquid* will initiate communication with the car which will take about 2 seconds after which the live data will be displayed.

In addition to displaying the data reading on the gauge sweep, the actual value is displayed below the gauge.

This display also indicates the maximum value that is achieved during that session, this is displayed in the top right of the screen.

Some of the displays in this mode may also show a minimum value in the top left of the screen.

Please note that if there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

If the gauge remains frozen at any time it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it will be necessary to perform a hardware reset, this is performed by pushing directly down on the joystick when it is in its central position and holding for 1 seconds.

This will perform a *liquid* hardware reset but will remember that it has previously had a password successfully entered and will return to the main menu.

To return to the previous menu, push the joystick to the left position, in some circumstances it may be necessary to hold the joystick in this position for up to 300mS due to the intensive nature of the communications with the engine management ECU.

The peak value is also shown on the gauge by a line which is left at the maximum position.

Exhaust Temp Gauge alarm

An alarm feature is present on the exhaust temp gauge, if the exhaust temperature rises above 950degrees C, the backlight will flash on and off, once the exhaust temp falls below this level the backlight will remain lit. To change the trigger temperature for the alarm, push the joystick up or down to vary the trigger from 900 to 1000 degrees. To turn the alarm feature on and off, push the joystick to the right.

Graph Data

In this mode the user can select a number of options to be displayed on the graph.

Use the joystick to select the desired parameter and then push the joystick to the right to start to display the data. After selection the *liquid* will initiate communication with the car which will take about 2 seconds after which the live data will be displayed.

In addition to displaying the data reading on the graph, the actual value is displayed to the right of the gauge.

This display also indicates the maximum value that is achieved during that session, this is displayed below the real time value.

Some of the displays in this mode may also show a minimum value above the maximum value.

Please note that if there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

If the gauge remains frozen at any time it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it will be necessary to perform a hardware reset, this is performed by pushing directly down on the joystick when it is in its central position.

This will perform a *liquid* hardware reset but will remember that it has previously had a password successfully entered and will return to the main menu.

To return to the previous menu, push the joystick to the left position, in some circumstances it may be necessary to hold the joystick in this position for up to 300mS due to the intensive nature of the communications with the engine management ECU.

Screen Freeze

To freeze the current data on the screen the co driver may push the joystick to the right, this will freeze the current data on the screen.

This mode may be toggled on and off by repeatedly pushing the joystick to the right position.

Dual Data Display

When in either the “BHP”, “Boost” or “Command” graphs a second plot line can be added to the graph which displays the command data on the boost graph or the boost data on the command graph or the torque on the BHP graph.

To select the second plot, push the joystick in an upwards direction.

To remove the second plot, push the joystick in a downwards direction.

Dyno Plot

This mode allows the user to create a plot similar to those created by a rolling road or chassis/hub dynamometer.

To use this mode scroll to the “Dyno Plot” button in the Graph Data menu.

This test should only be carried out on a private road. Ensure that the road is flat and straight. Move off in the car until in 3rd gear, then decelerate until the revs are below 1500rpm, next the co-driver should push they joystick to the right. Continue to drive at this low speed for around 2 too 3 seconds as the *liquid* initiates communication with the engine management ECU. Once comms are initiated an initial BHP and Torque value will be displayed on the screen, once this is displayed, accelerate with a wide open throttle until a maximum safe speed or engine RPM limit is reached.

After the run is complete your maximum BHP and Torque will be displayed.

Plotting of the data will cease when the engine rpm reduces unless the rpm is less than 3000 rpm.

Plotting of the data will continue until the engine revs goes above 3000 rpm.

Timing Correction

This mode allows the user to create a plot showing the timing correction for each cylinder over the full rev range in a similar way to the dyno plot.

To use this mode scroll to the “Timing Correction” option in the Graph Data menu.

This test should only be carried out on a private road. Ensure that the road is flat and straight. Move off in the car until in 3rd gear, then decelerate until the revs are below 1500rpm, next the co-driver should push they joystick to the right. Continue to drive at this low speed for around 2 too 3 seconds as the

liquid initiates communication with the engine management ECU. Once comms are initiated timing values appear in the result boxes on the screen, once this is displayed, accelerate with a wide open throttle until a maximum safe speed or engine RPM limit is reached.

After the run is complete your timing correction will be displayed.

Plotting of the data will cease when the engine rpm reduces unless the rpm is less than 3000 rpm.

Plotting of the data will continue until the engine revs goes above 3000 rpm.

To swap between cylinders 1,2,3,4 and 5,6,7,8 then enter the misfire display and select the second bank of cylinders.

Misfire Display

To swap between cylinders 1,2,3,4 and 5,6,7,8 then push down on the joystick to toggle between the two banks.

Exhaust / Catalytic Converter Temperature

When the exhaust temp graph is selected, the user can select the Cat temp to be displayed as an alternative to the exhaust temp by pushing down on the joystick.

Speed – RPM Display

This display shows either the vehicle speed or engine RPM in a 7-segment type display as well as two vertical bar graphs. Holding the joystick up in this mode will toggle the display between speed and rpm. Holding the joystick down will toggle the units between mph and km/h.

G- Force

In this feature the real time g-force is displayed in terms of acceleration, deceleration and lateral right and left cornering forces.

The g-force is represented by bar graphs for each of the above and the maximum achieved force is recorded for each session.

The maximum force that can be measured in each direction is 1.5g.

To exit from this mode, push the joystick to the left position.

Speed Timing

The feature will allow you to measure the time it takes to reach one of two preset speeds, either 60/100mph or 100/160km/h.

WARNING – THIS SHOULD NOT BE CARRIED OUT ON TH PUBLIC HIGHWAY

0-60mph / 0-100km/h Measurement

This mode should be selected when the car is stationary.

Once selected, you will be instructed to “WAIT” until the communications with the car are established. When the unit is ready the “WAIT” warning will be removed.

The car should be driven to just above 60mph. after the run is complete, approximately 15 seconds of data are collected. The *liquid* will calculate the time taken to reach 60mp/h – 100km/h the data rate from the diagnostics port is not high, data interpolation is carried out to create an accurate reading.

If you fail to reach 60mph/100km/h in the allocated time you will be invited to try again, this should only be done once the car is again stationary.

WARNING – THIS SHOULD NOT BE CARRIED OUT ON TH PUBLIC HIGHWAY

0-100mph / 0-160km/h Measurement

This mode should be selected when the car is stationary.

Once selected, you will be instructed to “WAIT” until the communications with the car are established. When the unit is ready the “WAIT” warning will be removed.

The car should be driven to just above 100mph-160km/h. after the run is complete, approximately 15 seconds of data are collected. The *liquid* will calculate the time taken to reach 100mph – 160km/h. Although the data rate from the diagnostics port is not high, data interpolation is carried out to create an accurate reading.

If you fail to reach 100mph- 160km/h in the allocated time you will be invited to try again, this should only be done once the car is again stationary.

WARNING – THIS SHOULD NOT BE CARRIED OUT ON TH PUBLIC HIGHWAY

Faults & Adaptations

Faults

Engine management fault codes can be read with this feature, simply select DTC from the sub menu, after a couple of seconds either the fault codes will be displayed or a message indicating that no faults were found will be displayed

To find out the meaning of the fault code, check the fault code list at the end of this manual.

Clear Fault Codes

Select this option to clear the recorded fault codes from the engine management ECU.

Adaptations

It has been reported that a Throttle Body Reset should be implemented periodically to maintain maximum performance,

Selecting the TBR feature will perform this function. Follow the on screen instructions.

MAF Adaptation

Some modified cars use non standard MAF housings (such as the Modshack Mofo). Because this has a larger diameter than the standard MAF housing the resultant air speed will be lower.

Since the *liquid* uses the MAF sensor reading for BHP and Torque and MAF displays, these will be incorrectly displayed unless an adaptation value is used.

This option allows the user to enter a percentage value which will be applied to the MAF signal to correct it.

To calculate the correct correction factor the internal diameter of the original and replacement MAF need to be known.

Calculate the correction factor this way,

$$\frac{100 * (\text{New Diameter}/2) * (\text{New Diameter}/2)}{(\text{Original Diameter}/2) * (\text{Original Diameter}/2)}$$

This value will be lost if power is removed from the unit.

Engine Oil Temperature

After selection the *liquid* will initiate communication with the car which will take about 2 to 8 seconds after which the live data will be displayed.

In addition to displaying the data reading on the gauge sweep, the actual value is displayed below the gauge.

This display also indicates the maximum value that is achieved during that session, this is displayed in the top right of the screen.

Please note that if there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

If the gauge remains frozen at any time it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it will be necessary to perform a hardware reset, this is performed by pushing directly down on the joystick when it is in its central position and holding for 5 seconds.

This will perform a *liquid* hardware reset but will remember that it has previously had a password successfully entered and will return to the main menu.

To return to the previous menu, push the joystick to the left position, in some circumstances it may be necessary to hold the joystick in this position for up to 300mS due to the intensive nature of the communications with the engine management ECU.

Setup

It should be noted that the setup values will be lost if power is removed from the unit.

Screen Brightness

In this mode the screen brightness can be adjusted by pushing the joystick up or down. Push the joystick to the left to exit this feature.

Language Select

This feature is used to select the language used for the user interface

Diagnostics mode

This setting is used to diagnose communication issues.

G force display calibration

Since the setup of each car is slightly different this feature has been added to allow the sensor to be calibrated to the individual car. To carry out the calibration, first ensure that the car is sitting on level ground and then select the menu item. It should be noted that this is carried out when the unit is first plugged in, however it should be redone when the car is on a flat surface to ensure correct calibration.

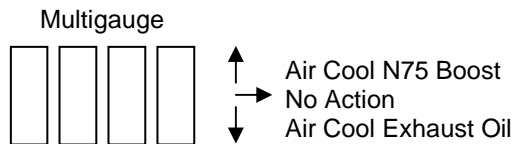
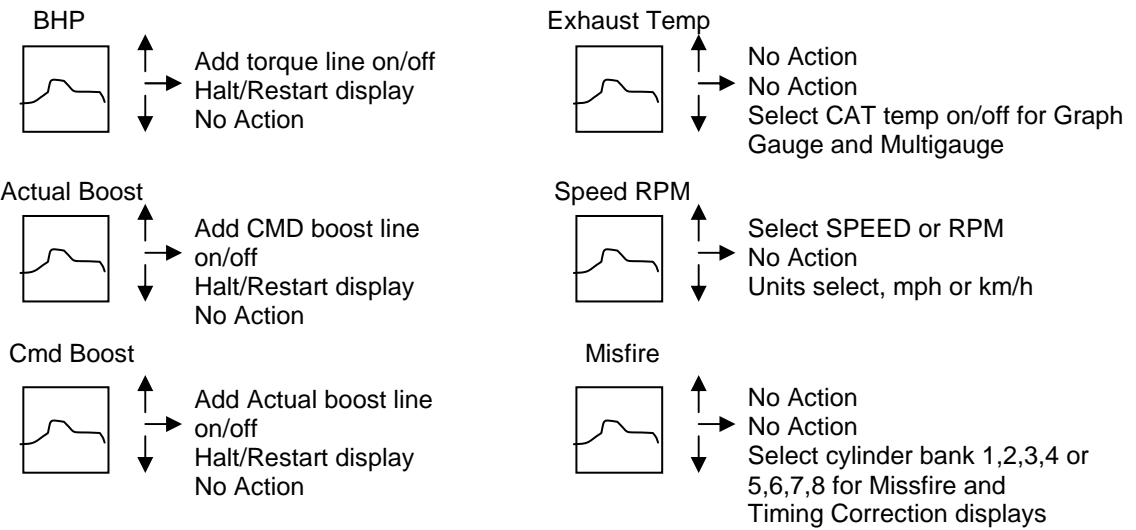
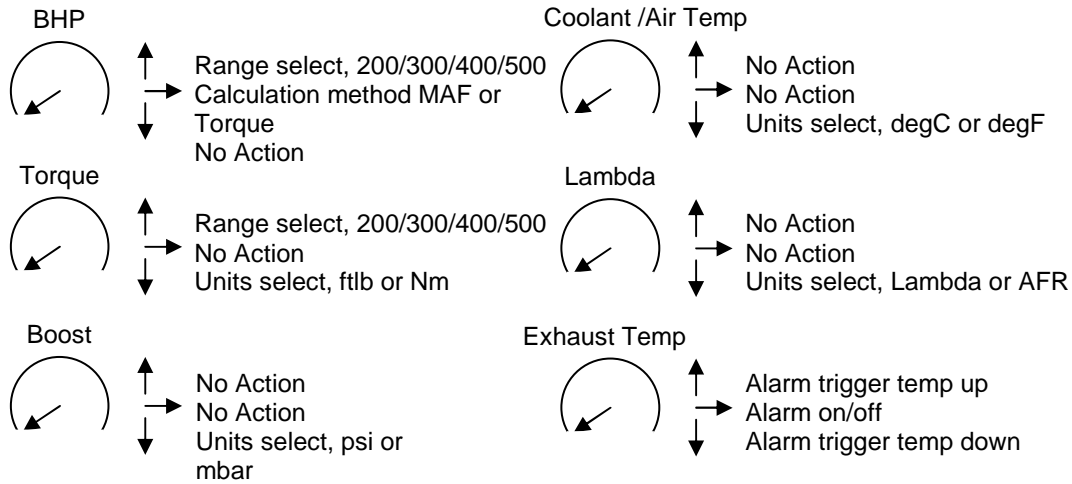
Units select

Selecting this item from the Setup menu will toggle the speed from 0-60mph / 0-100mph to 0-100km/h/0-160km/h.

Engine select

Use this menu to select use for either Petrol or Diesel engines.

Quick guide functions



Troubleshooting

From time to time the *liquid*'s display may freeze for short periods of time, this is normal behaviour.

If there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

After the unit detects a communications error, the "comms error, recovering" screen will briefly be displayed. It is normal for this to happen from time to time as the information given on the diagnostics bus is given a low priority by the engine management ECU.

If the gauge remains frozen at any time for more than 10 seconds and does not respond to the joystick, it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it may be necessary to perform a reset, this is performed by pushing directly down on the joystick when it is in its central position.

This will perform a *liquid* reset but it will remember that it has previously had a password successfully entered and will return to the main menu.

AFTER MARKET RADIO ISSUES

It should be noted that some after market radios do not handle the diagnostic bus used by the liquid correctly.

If abnormal operation is seen then the "k-line" pin should be removed from the connect in the back of the aftermarket radio.

See the racediagnostics web site for further information on this issue.

Other issues should be reported to the race diagnostics support email, support@racediagnostics.com

Upgrading

Development of the *liquid* continues and users can have their unit upgraded to the latest revision. Check on the latest release and how to get upgraded here

<http://racediagnostics.com/cms/index.php?page=upgrades>

Technical Specifications

LCD Backlight life (to 70% brightness) 5000hours
(to maximise life it is advised to turn the unit off when no needed)

Storage temperature 0-70 degC
Operating temperature 0-30 degC
Supply voltage 7-15 volts

Communications Interface K-line KW1281 & KWP2089

The accuracy of all of the reading is dependant upon the information available from the diagnostics bus. Race Diagnostics Ltd can not verify the accuracy of this information.

Power	0-200BHP to 0-500BHP
Torque	0-200ftlb to 0-500ftlb
Turbo boost pressure	0-MAP sensor limit
Turbo command pressure	0- MAP sensor limit
Mass air flow	0-200g/s to 0 -500g/s
Air intake temperature	0-150degC
Exhaust temperature	0-1000degC
Engine coolant temperature	0-150degC
Engine oil temperature	0-150degC
N75 waste gate drive	0-100%
Miss-fire	10 per cylinder
G-force acceleration	0-1.5g
G-force deceleration	0-1.5g
G-force left cornering	0-1.5g
G-force right cornering	0-1.5g

Fault code meaning list

DTC	P-code	Description
16394	P0010	-A- Camshaft Pos. Actuator Circ. Bank 1 Malfunction
16395	P0020	-A- Camshaft Pos. Actuator Circ. Bank 2 Malfunction
16449	P0065	Air Assisted Injector Control Range/Performance
16450	P0066	Air Assisted Injector Control Low Input/Short to ground
16451	P0067	Air Assisted Injector Control Input/Short to B+
16485	P0101	Mass or Volume Air Flow Circ Range/Performance
16486	P0102	Mass or Volume Air Flow Circ Low Input
16487	P0103	Mass or Volume Air Flow Circ High Input
16489	P0105	Manifold Abs.Pressure or Bar.Pressure Voltage supply
16490	P0106	Manifold Abs.Pressure or Bar.Pressure Range/Performance
16491	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input
16492	P0108	Manifold Abs.Pressure or Bar.Pressure High Input
16496	P0112	Intake Air Temp.Circ Low Input
16497	P0113	Intake Air Temp.Circ High Input
16500	P0116	Engine Coolant Temp.Circ Range/Performance
16501	P0117	Engine Coolant Temp.Circ Low Input
16502	P0118	Engine Coolant Temp.Circ High Input
16504	P0120	Throttle/Pedal Pos.Sensor A Circ Malfunction

16505	P0121	Throttle/Pedal Pos.Sensor A Circ Range/Performance
16506	P0122	Throttle/Pedal Pos.Sensor A Circ Low Input
16507	P0123	Throttle/Pedal Pos.Sensor A Circ High Input
16509	P0125	Insufficient Coolant Temp.for Closed Loop Fuel Control
16512	P0128	Coolant Thermostat/Valve Temperature below control range
16514	P0130	O2 Sensor Circ.,Bank1-Sensor1 Malfunction
16515	P0131	O2 Sensor Circ.,Bank1-Sensor1 Low Voltage
16516	P0132	O2 Sensor Circ.,Bank1-Sensor1 High Voltage
16517	P0133	O2 Sensor Circ.,Bank1-Sensor1 Slow Response
16518	P0134	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected
16519	P0135	O2 Sensor Heater Circ.,Bank1-Sensor1 Malfunction
16520	P0136	O2 Sensor Circ.,Bank1-Sensor2 Malfunction
16521	P0137	O2 Sensor Circ.,Bank1-Sensor2 Low Voltage
16522	P0138	O2 Sensor Circ.,Bank1-Sensor2 High Voltage
16523	P0139	O2 Sensor Circ.,Bank1-Sensor2 Slow Response
16524	P0140	O2 Sensor Circ.,Bank1-Sensor2 No Activity Detected
16525	P0141	O2 Sensor Heater Circ.,Bank1-Sensor2 Malfunction
16534	P0150	O2 Sensor Circ.,Bank2-Sensor1 Malfunction
16535	P0151	O2 Sensor Circ.,Bank2-Sensor1 Low Voltage
16536	P0152	O2 Sensor Circ.,Bank2-Sensor1 High Voltage
16537	P0153	O2 Sensor Circ.,Bank2-Sensor1 Slow Response
16538	P0154	O2 Sensor Circ.,Bank2-Sensor1 No Activity Detected
16539	P0155	O2 Sensor Heater Circ.,Bank2-Sensor1 Malfunction

16540	P0156	O2 Sensor Circ.,Bank2-Sensor2 Malfunction
16541	P0157	O2 Sensor Circ.,Bank2-Sensor2 Low Voltage
16542	P0158	O2 Sensor Circ.,Bank2-Sensor2 High Voltage
16543	P0159	O2 Sensor Circ.,Bank2-Sensor2 Slow Response
16544	P0160	O2 Sensor Circ.,Bank2-Sensor2 No Activity Detected
16545	P0161	O2 Sensor Heater Circ.,Bank2-Sensor2 Malfunction
16554	P0170	Fuel Trim,Bank1 Malfunction
16555	P0171	Fuel Trim,Bank1 System too Lean
16556	P0172	Fuel Trim,Bank1 System too Rich
16557	P0173	Fuel Trim,Bank2 Malfunction
16558	P0174	Fuel Trim,Bank2 System too Lean
16559	P0175	Fuel Trim,Bank2 System too Rich
16566	P0182	Fuel temperature sender-G81 Short to ground
16567	P0183	Fuel temperature sender-G81 Interruption/Short to B+
16581	P0197	Engine Oil Temperature Circuit Low Input
16582	P0198	Engine Oil Temperature Circuit High Input
16585	P0201	Cyl.1, Injector Circuit Fault in electrical circuit
16586	P0202	Cyl.2, Injector Circuit Fault in electrical circuit
16587	P0203	Cyl.3, Injector Circuit Fault in electrical circuit
16588	P0204	Cyl.4, Injector Circuit Fault in electrical circuit
16589	P0205	Cyl.5 Injector Circuit Fault in electrical circuit
16590	P0206	Cyl.6 Injector Circuit Fault in electrical circuit
16591	P0207	Cyl.7 Injector Circuit Fault in electrical circuit

16592	P0208	Cyl.8 Injector Circuit Fault in electrical circuit
16599	P0215	Engine Shut-Off Solenoid Malfunction
16600	P0216	Injector/Injection Timing Control Malfunction
16603	P0219	Engine Overspeed Condition
16605	P0221	Throttle Pos. Sensor -B- Circuit Range/Performance
16606	P0222	Throttle Pos. Sensor -B- Circuit Low Input
16607	P0223	Throttle Pos. Sensor -B- Circuit High Input
16609	P0225	Throttle Pos. Sensor -C- Circuit Voltage supply
16610	P0226	Throttle Pos. Sensor -C- Circuit Range/Performance
16611	P0227	Throttle Pos. Sensor -C- Circuit Low Input
16612	P0228	Throttle Pos. Sensor -C- Circuit High Input
16614	P0230	Fuel Pump Primary Circuit Fault in electrical circuit
16618	P0234	Turbocharger Overboost Condition Control limit exceeded
16619	P0235	Turbocharger Boost Sensor (A) Circ Control limit not reached
16620	P0236	Turbocharger Boost Sensor (A) Circ Range/Performance
16621	P0237	Turbocharger Boost Sensor (A) Circ Low Input
16622	P0238	Turbocharger Boost Sensor (A) Circ High Input
16627	P0243	Turbocharger Wastegate Solenoid (A) Open/Short Circuit to Ground
16629	P0245	Turbocharger Wastegate Solenoid (A) Low Input/Short to ground
16630	P0246	Turbocharger Wastegate Solenoid (A) High Input/Short to B+
16636	P0252	Injection Pump Metering Control (A) Range/Performance
16645	P0261	Cyl.1 Injector Circuit Low Input/Short to ground
16646	P0262	Cyl.1 Injector Circuit High Input/Short to B+

16648	P0264	Cyl.2 Injector Circuit Low Input/Short to ground
16649	P0265	Cyl.2 Injector Circuit High Input/Short to B+
16651	P0267	Cyl.3 Injector Circuit Low Input/Short to ground
16652	P0268	Cyl.3 Injector Circuit High Input/Short to B+
16654	P0270	Cyl.4 Injector Circuit Low Input/Short to ground
16655	P0271	Cyl.4 Injector Circuit High Input/Short to B+
16657	P0273	Cyl.5 Injector Circuit Low Input/Short to ground
16658	P0274	Cyl.5 Injector Circuit High Input/Short to B+
16660	P0276	Cyl.6 Injector Circuit Low Input/Short to ground
16661	P0277	Cyl.6 Injector Circuit High Input/Short to B+
16663	P0279	Cyl.7 Injector Circuit Low Input/Short to ground
16664	P0280	Cyl.7 Injector Circuit High Input/Short to B+
16666	P0282	Cyl.8 Injector Circuit Low Input/Short to ground
16667	P0283	Cyl.8 Injector Circuit High Input/Short to B+
16684	P0300	Random/Multiple Cylinder Misfire Detected
16685	P0301	Cyl.1 Misfire Detected
16686	P0302	Cyl.2 Misfire Detected
16687	P0303	Cyl.3 Misfire Detected
16688	P0304	Cyl.4 Misfire Detected
16689	P0305	Cyl.5 Misfire Detected
16690	P0306	Cyl.6 Misfire Detected
16691	P0307	Cyl.7 Misfire Detected
16692	P0308	Cyl.8 Misfire Detected

16697	P0313	Misfire Detected Low Fuel Level
16698	P0314	Single Cylinder Misfire
16705	P0321	Ign./Distributor Eng.Speed Inp.Circ Range/Performance
16706	P0322	Ign./Distributor Eng.Speed Inp.Circ No Signal
16709	P0325	Knock Sensor 1 Circuit Electrical Fault in Circuit
16710	P0326	Knock Sensor 1 Circuit Range/Performance
16711	P0327	Knock Sensor 1 Circ Low Input
16712	P0328	Knock Sensor 1 Circ High Input
16716	P0332	Knock Sensor 2 Circ Low Input
16717	P0333	Knock Sensor 2 Circ High Input
16719	P0335	Crankshaft Pos. Sensor (A) Circ Malfunction
16720	P0336	Crankshaft Pos. Sensor (A) Circ Range/Performance/Missing tooth
16721	P0337	Crankshaft Pos.Sensor (A) Circ Low Input
16724	P0340	Camshaft Pos. Sensor (A) Circ Incorrect allocation
16725	P0341	Camshaft Pos.Sensor Circ Range/Performance
16726	P0342	Camshaft Pos.Sensor Circ Low Input
16727	P0343	Camshaft Pos.Sensor Circ High Input
16735	P0351	Ignition Coil (A) Cyl.1 Prim./Sec. Circ Malfunction
16736	P0352	Ignition Coil (B) Cyl.2 Prim./Sec. Circ Malfunction
16737	P0353	Ignition Coil (C) Cyl.3 Prim./Sec. Circ Malfunction
16738	P0354	Ignition Coil (D) Cyl.4 Prim./Sec. Circ Malfunction
16739	P0355	Ignition Coil (E) Cyl.5 Prim./Sec. Circ Malfunction
16740	P0356	Ignition Coil (F) Cyl.6 Prim./Sec. Circ Malfunction

16741	P0357	Ignition Coil (G) Cyl.7 Prim./Sec. Circ Malfunction
16742	P0358	Ignition Coil (H) Cyl.8 Prim./Sec. Circ Malfunction
16764	P0380	Glow Plug/Heater Circuit (A) Electrical Fault in Circuit
16784	P0400	Exhaust Gas Recirc.Flow Malfunction
16785	P0401	Exhaust Gas Recirc.Flow Insufficient Detected
16786	P0402	Exhaust Gas Recirc.Flow Excessive Detected
16787	P0403	Exhaust Gas Recirc. Contr. Circ Malfunction
16788	P0404	Exhaust Gas Recirc. Contr. Circ Range/Performance
16789	P0405	Exhaust Gas Recirc. Sensor (A) Circ Low Input
16790	P0406	Exhaust Gas Recirc. Sensor (A) Circ High Input
16791	P0407	Exhaust Gas Recirc. Sensor (B) Circ Low Input
16792	P0408	Exhaust Gas Recirc. Sensor (B) Circ High Input
16794	P0410	Sec.Air Inj.Sys Malfunction
16795	P0411	Sec.Air Inj.Sys. Incorrect Flow Detected
16796	P0412	Sec.Air Inj.Sys.Switching Valve A Circ Malfunction
16802	P0418	Sec. Air Inj. Sys. Relay (A) Contr. Circ Malfunction
16804	P0420	Catalyst System,Bank1 Efficiency Below Threshold
16806	P0422	Main Catalyst,Bank1 Below Threshold
16811	P0427	Catalyst Temperature Sensor, Bank 1 Low Input/Short to ground
16812	P0428	Catalyst Temperature Sensor, Bank 1 High Input/Open/Short Circuit to B+
16816	P0432	Main Catalyst,Bank2 Efficiency Below Threshold
16820	P0436	Catalyst Temperature Sensor, Bank 2 Range/Performance
16821	P0437	Catalyst Temperature Sensor, Bank 2 Low Input/Short to ground

16822	P0438	Catalyst Temperature Sensor, Bank 2 High Input/Open/Short Circuit to B+
16824	P0440	EVAP Emission Contr.Sys. Malfunction
16825	P0441	EVAP Emission Contr.Sys.Incorrect Purge Flow
16826	P0442	EVAP Emission Contr.Sys.(Small Leak) Leak Detected
16827	P0443	EVAP Emiss. Contr. Sys. Purge Valve Circ Electrical Fault in Circuit
16836	P0452	EVAP Emission Contr.Sys.Press.Sensor Low Input
16837	P0453	EVAP Emission Contr.Sys.Press.Sensor High Input
16839	P0455	EVAP Emission Contr.Sys.(Gross Leak) Leak Detected
16845	P0461	Fuel Level Sensor Circ Range/Performance
16846	P0462	Fuel Level Sensor Circuit Low Input
16847	P0463	Fuel Level Sensor Circuit High Input
16885	P0501	Vehicle Speed Sensor Range/Performance
16887	P0503	Vehicle Speed Sensor Intermittent/Erratic/High Input
16889	P0505	Idle Control System Malfunction
16890	P0506	Idle Control System RPM Lower than Expected
16891	P0507	Idle Control System Higher than Expected
16894	P0510	Closed Throttle Pos.Switch Malfunction
16915	P0531	A/C Refrigerant Pressure Sensor Circuit Range/Performance
16916	P0532	A/C Refrigerant Pressure Sensor Circuit Low Input
16917	P0533	A/C Refrigerant Pressure Sensor Circuit High Input
16935	P0551	Power Steering Pressure Sensor Circuit Range/Performance
16944	P0560	System Voltage Malfunction
16946	P0562	System Voltage Low Voltage

16947	P0563	System Voltage High Voltage
16952	P0568	Cruise Control Set Signal Incorrect Signal
16955	P0571	Cruise/Brake Switch (A) Circ Malfunction
16984	P0600	Serial Comm. Link (Data Bus) Message Missing
16985	P0601	Internal Contr.Module Memory Check Sum Error
16986	P0602	Control Module Programming Error/Malfunction
16987	P0603	Internal Contr.Module (KAM) Error
16988	P0604	Internal Contr.Module Random Access Memory (RAM) Error
16989	P0605	Internal Contr.Module ROM Test Error
16990	P0606	ECM/PCM Processor
17026	P0642	Knock Control Control Module Malfunction
17029	P0645	A/C Clutch Relay Control Circuit
17034	P0650	MIL Control Circuit Electrical Fault in Circuit
17038	P0654	Engine RPM Output Circuit Electrical Fault in Circuit
17040	P0656	Fuel Level Output Circuit Electrical Fault in Circuit
17084	P0700	Transm.Contr.System Malfunction
17086	P0702	Transm.Contr.System Electrical
17087	P0703	Torque Converter/Brake Switch B Circ Malfunction
17089	P0705	Transm.Range Sensor Circ.(PRNDL Inp.) Malfunction
17090	P0706	Transm.Range Sensor Circ Range/Performance
17091	P0707	Transm.Range Sensor Circ Low Input
17092	P0708	Transm.Range Sensor Circ High Input
17094	P0710	Transm.Fluid Temp.Sensor Circ. Malfunction

17095	P0711	Transm.Fluid Temp.Sensor Circ. Range/Performance
17096	P0712	Transm.Fluid Temp.Sensor Circ. Low Input
17097	P0713	Transm.Fluid Temp.Sensor Circ. High Input
17099	P0715	Input Turbine/Speed Sensor Circ. Malfunction
17100	P0716	Input Turbine/Speed Sensor Circ. Range/Performance
17101	P0717	Input Turbine/Speed Sensor Circ. No Signal
17105	P0721	Output Speed Sensor Circ Range/Performance
17106	P0722	Output Speed Sensor Circ No Signal
17109	P0725	Engine Speed Inp.Circ. Malfunction
17110	P0726	Engine Speed Inp.Circ. Range/Performance
17111	P0727	Engine Speed Inp.Circ. No Signal
17114	P0730	Gear Incorrect Ratio
17115	P0731	Gear 1 Incorrect Ratio
17116	P0732	Gear 2 Incorrect Ratio
17117	P0733	Gear 3 Incorrect Ratio
17118	P0734	Gear 4 Incorrect Ratio
17119	P0735	Gear 5 Incorrect Ratio
17124	P0740	Torque Converter Clutch Circ Malfunction
17125	P0741	Torque Converter Clutch Circ Performance or Stuck Off
17132	P0748	Pressure Contr.Solenoid Electrical
17134	P0750	Shift Solenoid A malfunction
17135	P0751	Shift Solenoid A Performance or Stuck Off
17136	P0752	Shift Solenoid A Stuck On

17137	P0753	Shift Solenoid A Electrical
17140	P0756	Shift Solenoid B Performance or Stuck Off
17141	P0757	Shift Solenoid B Stuck On
17142	P0758	Shift Solenoid B Electrical
17145	P0761	Shift Solenoid C Performance or Stuck Off
17146	P0762	Shift Solenoid C Stuck On
17147	P0763	Shift Solenoid C Electrical
17152	P0768	Shift Solenoid D Electrical
17157	P0773	Shift Solenoid E Electrical
17174	P0790	Normal/Performance Switch Circ Malfunction
17509	P1101	O2 Sensor Circ.,Bank1-Sensor1 Voltage too Low/Air Leak
17510	P1102	O2 Sensor Heating Circ.,Bank1-Sensor1 Short to B+
17511	P1103	O2 Sensor Heating Circ.,Bank1-Sensor1 Output too Low
17512	P1104	Bank1-Sensor2 Voltage too Low/Air Leak
17513	P1105	O2 Sensor Heating Circ.,Bank1-Sensor2 Short to B+
17514	P1106	O2 Sensor Circ.,Bank2-Sensor1 Voltage too Low/Air Leak
17515	P1107	O2 Sensor Heating Circ.,Bank2-Sensor1 Short to B+
17516	P1108	O2 Sensor Heating Circ.,Bank2-Sensor1 Output too Low
17517	P1109	O2 Sensor Circ.,Bank2-Sensor2 Voltage too Low/Air Leak
17518	P1110	O2 Sensor Heating Circ.,Bank2-Sensor2 Short to B+
17519	P1111	O2 Control (Bank 1) System too lean
17520	P1112	O2 Control (Bank 1) System too rich
17521	P1113	Bank1-Sensor1 Internal Resistance too High

17522	P1114	Bank1-Sensor2 Internal Resistant too High
17523	P1115	O2 Sensor Heater Circ.,Bank1-Sensor1 Short to Ground
17524	P1116	O2 Sensor Heater Circ.,Bank1-Sensor1 Open
17525	P1117	O2 Sensor Heater Circ.,Bank1-Sensor2 Short to Ground
17526	P1118	O2 Sensor Heater Circ.,Bank1-Sensor2 Open
17527	P1119	O2 Sensor Heater Circ.,Bank2-Sensor1 Short to Ground
17528	P1120	O2 Sensor Heater Circ.,Bank2-Sensor1 Open
17529	P1121	O2 Sensor Heater Circ.,Bank2-Sensor2 Short to Ground
17530	P1122	O2 Sensor Heater Circ.,Bank2-Sensor2 Open
17531	P1123	Long Term Fuel Trim Add.Air.,Bank1 System too Rich
17532	P1124	Long Term Fuel Trim Add.Air.,Bank1 System too Lean
17533	P1125	Long Term Fuel Trim Add.Air.,Bank2 System too Rich
17534	P1126	Long Term Fuel Trim Add.Air.,Bank2 System too Lean
17535	P1127	Long Term Fuel Trim mult.,Bank1 System too Rich
17536	P1128	Long Term Fuel Trim mult.,Bank1 System too Lean
17537	P1129	Long Term Fuel Trim mult.,Bank2 System too Rich
17538	P1130	Long Term Fuel Trim mult.,Bank2 System too Lean
17539	P1131	Bank2-Sensor1 Internal Rsistance too High
17540	P1132	O2 Sensor Heating Circ.,Bank1+2-Sensor1 Short to B+
17541	P1133	O2 Sensor Heating Circ.,Bank1+2-Sensor1 Electrical Malfunction
17542	P1134	O2 Sensor Heating Circ.,Bank1+2-Sensor2 Short to B+
17543	P1135	O2 Sensor Heating Circ.,Bank1+2-Sensor2 Electrical Malfunction
17544	P1136	Long Term Fuel Trim Add.Fuel,Bank1 System too Lean

17545	P1137	Long Term Fuel Trim Add.Fuel,Bank1 System too Rich
17546	P1138	Long Term Fuel Trim Add.Fuel,Bank2 System too Lean
17547	P1139	Long Term Fuel Trim Add.Fuel,Bank2 System too Rich
17548	P1140	Bank2-Sensor2 Internal Resistance too High
17549	P1141	Load Calculation Cross Check Range/Performance
17550	P1142	Load Calculation Cross Check Lower Limit Exceeded
17551	P1143	Load Calculation Cross Check Upper Limit Exceeded
17552	P1144	Mass or Volume Air Flow Circ Open/Short to Ground
17553	P1145	Mass or Volume Air Flow Circ Short to B+
17554	P1146	Mass or Volume Air Flow Circ Supply Malfunction
17555	P1147	O2 Control (Bank 2) System too lean
17556	P1148	O2 Control (Bank 2) System too rich
17557	P1149	O2 Control (Bank 1) Out of range
17558	P1150	O2 Control (Bank 2) Out of range
17559	P1151	Bank1, Long Term Fuel Trim, Range 1 Leanness Lower Limit Exceeded
17560	P1152	Bank1, Long Term Fuel Trim, Range 2 Leanness Lower Limit Exceeded
17562	P1154	Manifold Switch Over Malfunction
17563	P1155	Manifold Abs.Pressure Sensor Circ. Short to B+
17564	P1156	Manifold Abs.Pressure Sensor Circ. Open/Short to Ground
17565	P1157	Manifold Abs.Pressure Sensor Circ. Power Supply Malfunction
17566	P1158	Manifold Abs.Pressure Sensor Circ. Range/Performance
17568	P1160	Manifold Temp.Sensor Circ. Short to Ground
17569	P1161	Manifold Temp.Sensor Circ. Open/Short to B+

17570	P1162	Fuel Temp.Sensor Circ. Short to Ground
17571	P1163	Fuel Temp.Sensor Circ. Open/Short to B+
17572	P1164	Fuel Temperature Sensor Range/Performance/Incorrect Signal
17573	P1165	Bank1, Long Term Fuel Trim, Range 1 Rich Limit Exceeded
17574	P1166	Bank1, Long Term Fuel Trim, Range 2 Rich Limit Exceeded
17579	P1171	Throttle Actuation Potentiometer Sign.2 Range/Performance
17580	P1172	Throttle Actuation Potentiometer Sign.2 Signal too Low
17581	P1173	Throttle Actuation Potentiometer Sign.2 Signal too High
17582	P1174	Fuel Trim, Bank 1 Different injection times
17584	P1176	O2 Correction Behind Catalyst,B1 Limit Attained
17585	P1177	O2 Correction Behind Catalyst,B2 Limit Attained
17586	P1178	Linear O2 Sensor / Pump Current Open Circuit
17587	P1179	Linear O2 Sensor / Pump Current Short to ground
17588	P1180	Linear O2 Sensor / Pump Current Short to B+
17589	P1181	Linear O2 Sensor / Reference Voltage Open Circuit
17590	P1182	Linear O2 Sensor / Reference Voltage Short to ground
17591	P1183	Linear O2 Sensor / Reference Voltage Short to B+
17592	P1184	Linear O2 Sensor / Common Ground Wire Open Circuit
17593	P1185	Linear O2 Sensor / Common Ground Wire Short to ground
17594	P1186	Linear O2 Sensor / Common Ground Wire Short to B+
17595	P1187	Linear O2 Sensor / Compens. Resistor Open Circuit
17596	P1188	Linear O2 Sensor / Compens. Resistor Short to ground
17597	P1189	Linear O2 Sensor / Compens. Resistor Short to B+

17598	P1190	Linear O2 Sensor / Reference Voltage Incorrect Signal
17604	P1196	O2 Sensor Heater Circ.,Bank1-Sensor1 Electrical Malfunction
17605	P1197	O2 Sensor Heater Circ.,Bank2-Sensor1 Electrical Malfunction
17606	P1198	O2 Sensor Heater Circ.,Bank1-Sensor2 Electrical Malfunction
17607	P1199	O2 Sensor Heater Circ.,Bank2-Sensor2 Electrical Malfunction
17609	P1201	Cyl.1-Fuel Inj.Circ. Electrical Malfunction
17610	P1202	Cyl.2-Fuel Inj.Circ. Electrical Malfunction
17611	P1203	Cyl.3-Fuel Inj.Circ. Electrical Malfunction
17612	P1204	Cyl.4-Fuel Inj.Circ. Electrical Malfunction
17613	P1205	Cyl.5-Fuel Inj.Circ. Electrical Malfunction
17614	P1206	Cyl.6-Fuel Inj.Circ. Electrical Malfunction
17615	P1207	Cyl.7-Fuel Inj.Circ. Electrical Malfunction
17616	P1208	Cyl.8-Fuel Inj.Circ. Electrical Malfunction
17617	P1209	Intake valves for cylinder shut-off Short circuit to ground
17618	P1210	Intake valves for cylinder shut-off Short to B+
17619	P1211	Intake valves for cylinder shut-off Open circuit
17621	P1213	Cyl.1-Fuel Inj.Circ. Short to B+
17622	P1214	Cyl.2-Fuel Inj.Circ. Short to B+
17623	P1215	Cyl.3-Fuel Inj.Circ. Short to B+
17624	P1216	Cyl.4-Fuel Inj.Circ. Short to B+
17625	P1217	Cyl.5-Fuel Inj.Circ. Short to B+
17626	P1218	Cyl.6-Fuel Inj.Circ. Short to B+
17627	P1219	Cyl.7-Fuel Inj.Circ. Short to B+

17628	P1220	Cyl.8-Fuel Inj.Circ. Short to B+
17629	P1221	Cylinder shut-off exhaust valves Short circuit to ground
17630	P1222	Cylinder shut-off exhaust valves Short to B+
17631	P1223	Cylinder shut-off exhaust valves Open circuit
17633	P1225	Cyl.1-Fuel Inj.Circ. Short to Ground
17634	P1226	Cyl.2-Fuel Inj.Circ. Short to Ground
17635	P1227	Cyl.3-Fuel Inj.Circ. Short to Ground
17636	P1228	Cyl.4-Fuel Inj.Circ. Short to Ground
17637	P1229	Cyl.5-Fuel Inj.Circ. Short to Ground
17638	P1230	Cyl.6-Fuel Inj.Circ. Short to Ground
17639	P1231	Cyl.7-Fuel Inj.Circ. Short to Ground
17640	P1232	Cyl.8-Fuel Inj.Circ. Short to Ground
17645	P1237	Cyl.1-Fuel Inj.Circ. Open Circ.
17646	P1238	Cyl.2-Fuel Inj.Circ. Open Circ.
17647	P1239	Cyl.3-Fuel Inj.Circ. Open Circ.
17648	P1240	Cyl.4-Fuel Inj.Circ. Open Circ.
17649	P1241	Cyl.5-Fuel Inj.Circ. Open Circ.
17650	P1242	Cyl.6-Fuel Inj.Circ. Open Circ.
17651	P1243	Cyl.7-Fuel Inj.Circ. Open Circ.
17652	P1244	Cyl.8-Fuel Inj.Circ. Open Circ.
17653	P1245	Needle Lift Sensor Circ. Short to Ground
17654	P1246	Needle Lift Sensor Circ. Range/Performance
17655	P1247	Needle Lift Sensor Circ. Open/Short to B+

17656	P1248	Injection Start Control Deviation
17657	P1249	Fuel consumption signal Electrical Fault in Circuit
17658	P1250	Fuel Level Too Low
17659	P1251	Start of Injection Solenoid Circ Short to B+
17660	P1252	Start of Injection Solenoid Circ Open/Short to Ground
17661	P1253	Fuel consumption signal Short to ground
17662	P1254	Fuel consumption signal Short to B+
17663	P1255	Engine Coolant Temp.Circ Short to Ground
17664	P1256	Engine Coolant Temp.Circ Open/Short to B+
17665	P1257	Engine Coolant System Valve Open
17666	P1258	Engine Coolant System Valve Short to B+
17667	P1259	Engine Coolant System Valve Short to Ground
17688	P1280	Fuel Inj.Air Contr.Valve Circ. Flow too Low
17691	P1283	Fuel Inj.Air Contr.Valve Circ. Electrical Malfunction
17692	P1284	Fuel Inj.Air Contr.Valve Circ. Open
17693	P1285	Fuel Inj.Air Contr.Valve Circ. Short to Ground
17694	P1286	Fuel Inj.Air Contr.Valve Circ. Short to B+
17695	P1287	Turbocharger bypass valve open
17696	P1288	Turbocharger bypass valve short to B+
17697	P1289	Turbocharger bypass valve short to ground
17704	P1296	Cooling system malfunction
17705	P1297	Connection turbocharger - throttle valve pressure hose
17708	P1300	Misfire detected Reason: Fuel level too low

17721	P1319	Knock Sensor 1 Circ. Short to Ground
17728	P1320	Knock Sensor 2 Circ. Short to Ground
17729	P1321	Knock Sensor 3 Circ. Low Input
17730	P1322	Knock Sensor 3 Circ. High Input
17731	P1323	Knock Sensor 4 Circ. Low Input
17732	P1324	Knock Sensor 4 Circ. High Input
17733	P1325	Cyl.1-Knock Contr. Limit Attained
17734	P1326	Cyl.2-Knock Contr. Limit Attained
17735	P1327	Cyl.3-Knock Contr. Limit Attained
17736	P1328	Cyl.4-Knock Contr. Limit Attained
17737	P1329	Cyl.5-Knock Contr. Limit Attained
17738	P1330	Cyl.6-Knock Contr. Limit Attained
17739	P1331	Cyl.7-Knock Contr. Limit Attained
17740	P1332	Cyl.8-Knock Contr. Limit Attained
17743	P1335	Engine Torque Monitoring 2 Control Limint Exceeded
17744	P1336	Engine Torque Monitoring Adaptation at limit
17745	P1337	Camshaft Pos.Sensor,Bank1 Short to Ground
17746	P1338	Camshaft Pos.Sensor,Bank1 Open Circ./Short to B+
17747	P1339	Crankshaft Pos./Engine Speed Sensor Cross Connected
17748	P1340	Crankshaft-/Camshaft Pos.Sens.Signals Out of Sequence
17749	P1341	Ignition Coil Power Output Stage 1 Short to Ground
17750	P1342	Ignition Coil Power Output Stage 1 Short to B+
17751	P1343	Ignition Coil Power Output Stage 2 Short to Ground

17752	P1344	Ignition Coil Power Output Stage 2 Short to B+
17753	P1345	Ignition Coil Power Output Stage 3 Short to Ground
17754	P1346	Ignition Coil Power Output Stage 3 Short to B+
17755	P1347	Bank2,Crankshaft-/Camshaft os.Sens.Sign. Out of Sequence
17756	P1348	Ignition Coil Power Output Stage 1 Open Circuit
17757	P1349	Ignition Coil Power Output Stage 2 Open Circuit
17758	P1350	Ignition Coil Power Output Stage 3 Open Circuit
17762	P1354	Modulation Piston Displ.Sensor Circ. Malfunction
17763	P1355	Cyl. 1, ignition circuit Open Circuit
17764	P1356	Cyl. 1, ignition circuit Short to B+
17765	P1357	Cyl. 1, ignition circuit Short to ground
17766	P1358	Cyl. 2, ignition circuit Open Circuit
17767	P1359	Cyl. 2, ignition circuit Short Circuit to B+
17768	P1360	Cyl. 2, ignition circuit Short Circuit to Ground
17769	P1361	Cyl. 3, ignition circuit Open Circuit
17770	P1362	Cyl. 3, ignition circuit Short Circuit to B+
17771	P1363	Cyl. 3, ignition circuit Short Circuit to ground
17772	P1364	Cyl. 4 ignition circuit Open Circuit
17773	P1365	Cyl. 4 ignition circuit Short circuit to B+
17774	P1366	Cyl. 4 ignition circuit Short circuit to ground
17775	P1367	Cyl. 5, ignition circuit Open Circuit
17776	P1368	Cyl. 5, ignition circuit Short Circuit to B+
17777	P1369	Cyl. 5, ignition circuit short to ground

17778	P1370	Cyl. 6, ignition circuit Open Circuit
17779	P1371	Cyl. 6, ignition circuit Short Circuit to B+
17780	P1372	Cyl. 6, ignition circuit short to ground
17781	P1373	Cyl. 7, ignition circuit Open Circuit
17782	P1374	Cyl. 7, ignition circuit Short Circuit to B+
17783	P1375	Cyl. 7, ignition circuit short to ground
17784	P1376	Cyl. 8, ignition circuit Open Circuit
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Guarantee

The *liquid* is guaranteed for one year from the date of purchase, under normal use conditions and handling, please keep your receipt as proof of purchase.

The guarantee also extends to liquid kits if they are assembled by the user using heat glue. If the units is assembled with anything other than heat glue then the no guarantee can be offered.

Contact Information

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Race Diagnostics Ltd

Liquid User Manual



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Safety

The setup for the *liquid* should only be carried out when the car is stationary. Under no circumstances should the controls of the unit be used by the driver while the car is in motion.

The co-driver may use the controls at any time.

Introduction

The *liquid* is a diagnostic tool which can be used to provide a range of real time information to the car driver regarding the performance of their car.

As the *liquid* uses an LCD screen to present the data to the user it creates the ability for multiple parameters to be presented on a single screen, thus removing the necessity to have multiple gauges.

In order to protect your new purchase the *liquid* is password protected by a 6 digit alphanumeric code. Every *liquid* is individually password protected to ensure that no black market is created in stolen *liquids*.

The default setting for the *liquid* is for use on Petrol engines, for use with Diesels, first go to the setup menu and then select “Engine type” and then “Diesel”.

Gauge and Graph data

The following information can be presented on one of two ways, either in a conventional gauge format or in a scrolling graph.

Engine crankshaft BHP
Engine crankshaft Torque
Turbo Boost pressure
Turbo Command pressure
Mass Air Flow
Air Fuel Ratio (Lambda)***
Air intake temperature
Exhaust temperature***
Coolant temperature
N75 position
Engine Misfire* ***
Dyno Plot*
Timing Correction* ***
Oil Temperature**

*Only available as graph.

**Only available as a gauge.

*** Not relevant for Diesel cars

7 Segment Displays

Speed digital display
RPM digital display

Each of the above is dependant upon the data being supported by the ECU in your car, not all cars provide all of the required information such as Oil temp and Exhaust temp.

BHP range select

When in the BHP gauge, hold the joystick up to scroll through the various ranges from 200 to 500bhp.

BHP & Torque Calculation mode

When in the BHP gauge, hold the joystick right to toggle between the MAF method and the ECU Torque method, the selected method is indicated by a light grey “M” or “T” in the bottom left hand corner of the screen.

For Petrol cars the default is to use the MAF method.

For Diesel cars the default is to use the ECU Torque method.

Torque Imperial or metric units select and Range select

To switch between ftlb and Nm for torque, when in the torque gauge, hold the joystick down to toggle between the options.

Hold the joystick up to scroll through the various ranges from 200 to 500ftlb.

Turbo Pressure Imperial or metric units select

To switch between BAR and PSI for pressure, when in the pressure gauge, hold the joystick down to toggle between the options.

AFR Imperial or metric units select

To switch between lambda and afr , when in the afr gauge, hold the joystick down to toggle between the options.

Temperature Imperial or metric units select

To switch between deg C and deg F , when in the air or coolant gauge, hold the joystick down to toggle between the options.

G-Force Measurement

Analysing the maximum acceleration/deceleration and lateral forces which are being applied to the car are very important in optimal tyre selection. Track conditions will

determine the optimal selection. To help with selection the *liquid* provides readout of both the maximum acceleration and deceleration forces which are being applied to the car. In addition the lateral forces applied during cornering are also recorded

Acceleration time measurement

Measuring the 0-60 and 1-100 mph times is of interest to all drivers and is easily measured on the *liquid*.

Faults and Adaptation

Understanding if any fault codes are being recorded by the Engine management ECU is critical to the ongoing maintenance and safe use of your car. The *liquid* can read engine management fault codes and display them to the user.

Ensuring that the “Throttle Body” is correctly calibrated is also essential for maximum performance so the *liquid* provides a capability to implement this function.

Multi Gauge

In this setting a number of important temperatures are displayed.

Multi-gauge 1

Air intake temp
Coolant temp
N75 Signal (turbo actuator)
Boost Pressure

Or

Multi-gauge 2

Air intake temp
Coolant temp
Exhaust temp
Oil temp

In multi gauge 2, since the first three temperatures are reported by the Engine management ECU and the last from the Dashpod ECU, the speed of the reporting of this data is restricted by the switchover of communications between the two ECUs. This switchover takes approximately 8 seconds, during this time the joystick will not be read. The fastest way to exit this mode is to push the joystick which resets the entire unit and returns the user to the main menu.

Please note that in many car platforms, Multi-gauge 2 will not perform reliably. The ECUs do not always perform predictably when switching between the two. If this is the case with your car, then use Multi-gauge 1. If your car does not offer Exhaust temp or Oil temp then you should select Multi-gauge 1.

To switch between Multi-gauge 1 and 2 use the joystick up and down positions.

Notes for using the liquid with Diesel vehicles

Communication on the OBD2 bus with diesel cars less robust than with petrol cars. For instance, when swapping between different gauges, an indeterminate time of about 5 seconds silence is required on the OBD2 bus, however in some cases a longer period of silence is required.

The liquid will automatically insert a 5 second delay when switching between gauges however in some circumstances a communications error may still occur. It is advisable to manually wait for a few seconds between selecting different displays. If persistent communication errors occur, then extend this delay between selecting gauges.

If the unit locks up then try resetting by pushing on the joystick, if this fails then unplug and replay the OBD2 connector.

On some Diesel cars the actual MAF reading is limited to a value less than the actual MAF value, for this reason, the default setting for Diesel cars is to use the Torque calculation method for BHP. On some Diesel cars the ECU Torque signal is also limited to a value less than the actual torque being generated. These limits are unlikely to be hit with mapped cars but may be hit with cars with updated turbos.

The user should experiment with both the MAF and Torque calculation methods to establish the most suitable for their vehicle.

Power on and off

The *liquid* will automatically turn on the first time it is plugged into the OBDII diagnostics port.

Powering off of the unit can only be done when the unit is in the “Main menu”, when in this menu, hold the joystick in an upward position for 1 seconds and then release, the unit will then power off.

To turn the unit on, push the joystick in a downwards direction, the unit will then turn on.

Auto power off

If the *liquid* is left in one of the main menus for 1 minute the unit will enter power down mode and dim the display.

If the engine is turned off when the unit is in one of the gauge or graph displays, the *liquid* will automatically enter power down mode.. This is not the case for the dyno plot or timing correction. When the ignition is turned off when displaying oil temperature a communications error will occur and the display will return to the main menu. The unit will then enter power down mode one minute later.

Password Protection

After the *liquid* has been installed, the user will be presented with the password screen.

The password for each unit is written on the antistatic bag that the unit is shipped in.

The user should transfer the password supplied to the *liquid*. The first alphanumeric character/digit should be entered by pushing the joystick up or down to scroll through the alphabet and digits 0 through 9. Once the first character/digit is selected push the joystick to the right to confirm, Continue in the same way with the subsequent digits. Once all eight digits have been entered then once again push the joystick to the right position. If the correct password has been entered you will be presented with the main menu.

If an incorrect password is entered then you will be allowed 3 subsequent tries, if you are unsuccessful then you have probably stolen the unit and will have no chance to make it work.

If however you are the rightful owner, then unplug the cable from the OBDII diagnostics port and then plug it in again.

Menu Navigation

Menu navigation is achieved using the joystick, highlight the desired function by pushing the joystick in either an upward or downward direction, once the desired function is highlighted, push the joystick in a right direction, this will either take you to the desired function or sub-menu.

To return to the menu or sub-menu from a previously selected function, push the joystick in a left direction.

Note, since the communication with the engines ECU have critical timing, the joystick may need to be held for up to 300ms before it is recognised when returning from the selected function. This is not a malfunction of the unit, simply its mode of operation.

In a number of the menus there are more options than can be shown on the screen at one time, in this case an up or down arrow will be shown to indicate this.

Main Menu

The main menu allows navigation to each of the *liquid*'s main features.

- Gauge data
- Graph data
- G force
- Speed timing
- Faults and adaptations
- Engine oil temperature
- Setup

Use the joystick up and down positions to select the function that is desired and then use the joystick right position to select that feature. Returning to the main menu is performed by pushing the joystick to the left position.

On software version 2.52 the following languages are supported

- English
- German
- French
- Finnish

Language selection can be found in the “Setup” menu.

Gauge Data

In this mode the user can select a number of options to be displayed on the gauge.

Use the joystick to select the desired parameter and then push the joystick to the right to start to display the data. After selection the *liquid* will initiate communication with the car which will take about 2 seconds after which the live data will be displayed.

In addition to displaying the data reading on the gauge sweep, the actual value is displayed below the gauge.

This display also indicates the maximum value that is achieved during that session, this is displayed in the top right of the screen.

Some of the displays in this mode may also show a minimum value in the top left of the screen.

Please note that if there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

If the gauge remains frozen at any time it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it will be necessary to perform a hardware reset, this is performed by pushing directly down on the joystick when it is in its central position and holding for 1 seconds.

This will perform a *liquid* hardware reset but will remember that it has previously had a password successfully entered and will return to the main menu.

To return to the previous menu, push the joystick to the left position, in some circumstances it may be necessary to hold the joystick in this position for up to 300mS due to the intensive nature of the communications with the engine management ECU.

The peak value is also shown on the gauge by a line which is left at the maximum position.

Exhaust Temp Gauge alarm

An alarm feature is present on the exhaust temp gauge, if the exhaust temperature rises above 950degrees C, the backlight will flash on and off, once the exhaust temp falls below this level the backlight will remain lit. To change the trigger temperature for the alarm, push the joystick up or down to vary the trigger from 900 to 1000 degrees. To turn the alarm feature on and off, push the joystick to the right.

Graph Data

In this mode the user can select a number of options to be displayed on the graph.

Use the joystick to select the desired parameter and then push the joystick to the right to start to display the data. After selection the *liquid* will initiate communication with the car which will take about 2 seconds after which the live data will be displayed.

In addition to displaying the data reading on the graph, the actual value is displayed to the right of the gauge.

This display also indicates the maximum value that is achieved during that session, this is displayed below the real time value.

Some of the displays in this mode may also show a minimum value above the maximum value.

Please note that if there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

If the gauge remains frozen at any time it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it will be necessary to perform a hardware reset, this is performed by pushing directly down on the joystick when it is in its central position.

This will perform a *liquid* hardware reset but will remember that it has previously had a password successfully entered and will return to the main menu.

To return to the previous menu, push the joystick to the left position, in some circumstances it may be necessary to hold the joystick in this position for up to 300mS due to the intensive nature of the communications with the engine management ECU.

Screen Freeze

To freeze the current data on the screen the co driver may push the joystick to the right, this will freeze the current data on the screen.

This mode may be toggled on and off by repeatedly pushing the joystick to the right position.

Dual Data Display

When in either the “BHP”, “Boost” or “Command” graphs a second plot line can be added to the graph which displays the command data on the boost graph or the boost data on the command graph or the torque on the BHP graph.

To select the second plot, push the joystick in an upwards direction.

To remove the second plot, push the joystick in a downwards direction.

Dyno Plot

This mode allows the user to create a plot similar to those created by a rolling road or chassis/hub dynamometer.

To use this mode scroll to the “Dyno Plot” button in the Graph Data menu.

This test should only be carried out on a private road. Ensure that the road is flat and straight. Move off in the car until in 3rd gear, then decelerate until the revs are below 1500rpm, next the co-driver should push they joystick to the right. Continue to drive at this low speed for around 2 too 3 seconds as the *liquid* initiates communication with the engine management ECU. Once comms are initiated an initial BHP and Torque value will be displayed on the screen, once this is displayed, accelerate with a wide open throttle until a maximum safe speed or engine RPM limit is reached.

After the run is complete your maximum BHP and Torque will be displayed.

Plotting of the data will cease when the engine rpm reduces unless the rpm is less than 3000 rpm.

Plotting of the data will continue until the engine revs goes above 3000 rpm.

Timing Correction

This mode allows the user to create a plot showing the timing correction for each cylinder over the full rev range in a similar way to the dyno plot.

To use this mode scroll to the “Timing Correction” option in the Graph Data menu.

This test should only be carried out on a private road. Ensure that the road is flat and straight. Move off in the car until in 3rd gear, then decelerate until the revs are below 1500rpm, next the co-driver should push they joystick to the right. Continue to drive at this low speed for around 2 too 3 seconds as the

liquid initiates communication with the engine management ECU. Once comms are initiated timing values appear in the result boxes on the screen, once this is displayed, accelerate with a wide open throttle until a maximum safe speed or engine RPM limit is reached.

After the run is complete your timing correction will be displayed.

Plotting of the data will cease when the engine rpm reduces unless the rpm is less than 3000 rpm.

Plotting of the data will continue until the engine revs goes above 3000 rpm.

To swap between cylinders 1,2,3,4 and 5,6,7,8 then enter the misfire display and select the second bank of cylinders.

Misfire Display

To swap between cylinders 1,2,3,4 and 5,6,7,8 then push down on the joystick to toggle between the two banks.

Exhaust / Catalytic Converter Temperature

When the exhaust temp graph is selected, the user can select the Cat temp to be displayed as an alternative to the exhaust temp by pushing down on the joystick.

Speed – RPM Display

This display shows either the vehicle speed or engine RPM in a 7-segment type display as well as two vertical bar graphs. Holding the joystick up in this mode will toggle the display between speed and rpm. Holding the joystick down will toggle the units between mph and km/h.

G- Force

In this feature the real time g-force is displayed in terms of acceleration, deceleration and lateral right and left cornering forces.

The g-force is represented by bar graphs for each of the above and the maximum achieved force is recorded for each session.

The maximum force that can be measured in each direction is 1.5g.

To exit from this mode, push the joystick to the left position.

Speed Timing

The feature will allow you to measure the time it takes to reach one of two preset speeds, either 60/100mph or 100/160km/h.

WARNING – THIS SHOULD NOT BE CARRIED OUT ON TH PUBLIC HIGHWAY

0-60mph / 0-100km/h Measurement

This mode should be selected when the car is stationary.

Once selected, you will be instructed to “WAIT” until the communications with the car are established. When the unit is ready the “WAIT” warning will be removed.

The car should be driven to just above 60mph. after the run is complete, approximately 15 seconds of data are collected. The *liquid* will calculate the time taken to reach 60mp/h – 100km/h the data rate from the diagnostics port is not high, data interpolation is carried out to create an accurate reading.

If you fail to reach 60mph/100km/h in the allocated time you will be invited to try again, this should only be done once the car is again stationary.

WARNING – THIS SHOULD NOT BE CARRIED OUT ON TH PUBLIC HIGHWAY

0-100mph / 0-160km/h Measurement

This mode should be selected when the car is stationary.

Once selected, you will be instructed to “WAIT” until the communications with the car are established. When the unit is ready the “WAIT” warning will be removed.

The car should be driven to just above 100mph-160km/h. after the run is complete, approximately 15 seconds of data are collected. The *liquid* will calculate the time taken to reach 100mph – 160km/h. Although the data rate from the diagnostics port is not high, data interpolation is carried out to create an accurate reading.

If you fail to reach 100mph- 160km/h in the allocated time you will be invited to try again, this should only be done once the car is again stationary.

WARNING – THIS SHOULD NOT BE CARRIED OUT ON TH PUBLIC HIGHWAY

Faults & Adaptations

Faults

Engine management fault codes can be read with this feature, simply select DTC from the sub menu, after a couple of seconds either the fault codes will be displayed or a message indicating that no faults were found will be displayed

To find out the meaning of the fault code, check the fault code list at the end of this manual.

Clear Fault Codes

Select this option to clear the recorded fault codes from the engine management ECU.

Adaptations

It has been reported that a Throttle Body Reset should be implemented periodically to maintain maximum performance,

Selecting the TBR feature will perform this function. Follow the on screen instructions.

MAF Adaptation

Some modified cars use non standard MAF housings (such as the Modshack Mofo). Because this has a larger diameter than the standard MAF housing the resultant air speed will be lower.

Since the *liquid* uses the MAF sensor reading for BHP and Torque and MAF displays, these will be incorrectly displayed unless an adaptation value is used.

This option allows the user to enter a percentage value which will be applied to the MAF signal to correct it.

To calculate the correct correction factor the internal diameter of the original and replacement MAF need to be known.

Calculate the correction factor this way,

$$\frac{100 * (\text{New Diameter}/2) * (\text{New Diameter}/2)}{(\text{Original Diameter}/2) * (\text{Original Diameter}/2)}$$

This value will be lost if power is removed from the unit.

Engine Oil Temperature

After selection the *liquid* will initiate communication with the car which will take about 2 to 8 seconds after which the live data will be displayed.

In addition to displaying the data reading on the gauge sweep, the actual value is displayed below the gauge.

This display also indicates the maximum value that is achieved during that session, this is displayed in the top right of the screen.

Please note that if there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

If the gauge remains frozen at any time it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it will be necessary to perform a hardware reset, this is performed by pushing directly down on the joystick when it is in its central position and holding for 5 seconds.

This will perform a *liquid* hardware reset but will remember that it has previously had a password successfully entered and will return to the main menu.

To return to the previous menu, push the joystick to the left position, in some circumstances it may be necessary to hold the joystick in this position for up to 300mS due to the intensive nature of the communications with the engine management ECU.

Setup

It should be noted that the setup values will be lost if power is removed from the unit.

Screen Brightness

In this mode the screen brightness can be adjusted by pushing the joystick up or down. Push the joystick to the left to exit this feature.

Language Select

This feature is used to select the language used for the user interface

Diagnostics mode

This setting is used to diagnose communication issues.

G force display calibration

Since the setup of each car is slightly different this feature has been added to allow the sensor to be calibrated to the individual car. To carry out the calibration, first ensure that the car is sitting on level ground and then select the menu item. It should be noted that this is carried out when the unit is first plugged in, however it should be redone when the car is on a flat surface to ensure correct calibration.

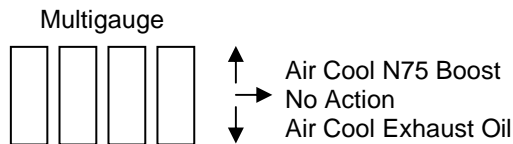
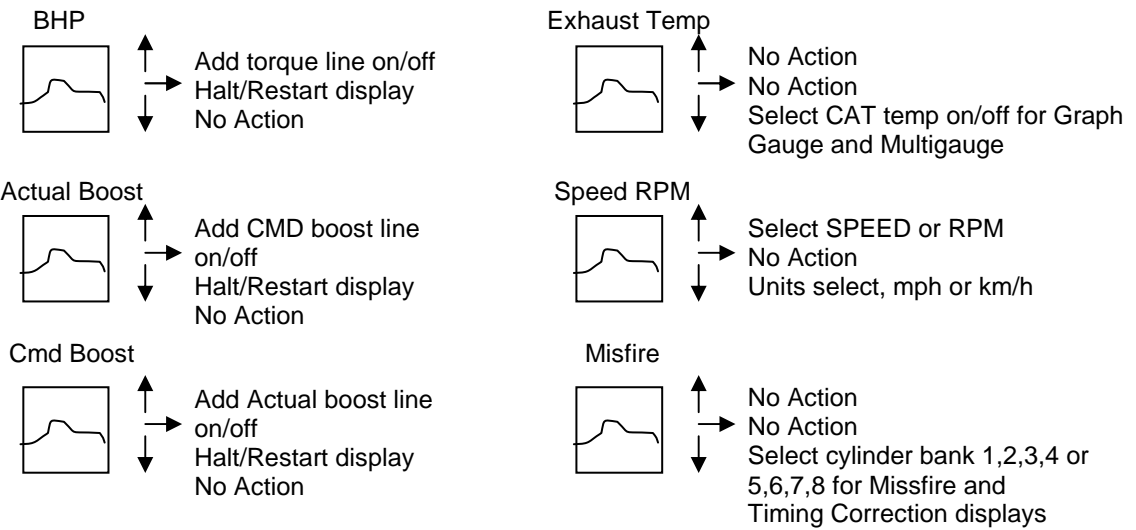
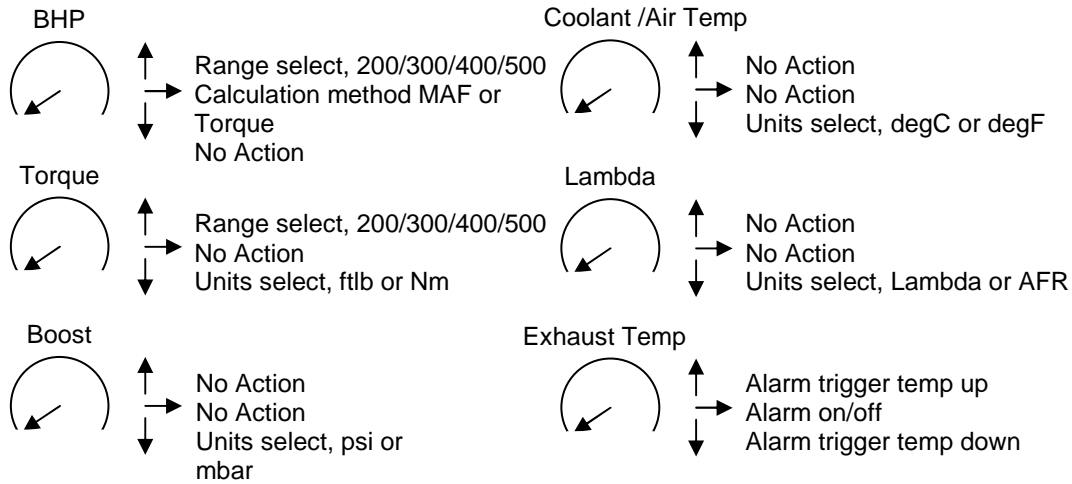
Units select

Selecting this item from the Setup menu will toggle the speed from 0-60mph / 0-100mph to 0-100km/h/0-160km/h.

Engine select

Use this menu to select use for either Petrol or Diesel engines.

Quick guide functions



Troubleshooting

From time to time the *liquid*'s display may freeze for short periods of time, this is normal behaviour.

If there is a communications error the *liquid* will continue to try to reinitiate communication with the engine management ECU, in some circumstances this may take up to 10 seconds.

After the unit detects a communications error, the "comms error, recovering" screen will briefly be displayed. It is normal for this to happen from time to time as the information given on the diagnostics bus is given a low priority by the engine management ECU.

If the gauge remains frozen at any time for more than 10 seconds and does not respond to the joystick, it means that the *liquid* can not initiate a successful communications session with the engine management ECU. In these circumstances it may be necessary to perform a reset, this is performed by pushing directly down on the joystick when it is in its central position.

This will perform a *liquid* reset but it will remember that it has previously had a password successfully entered and will return to the main menu.

AFTER MARKET RADIO ISSUES

It should be noted that some after market radios do not handle the diagnostic bus used by the liquid correctly.

If abnormal operation is seen then the "k-line" pin should be removed from the connect in the back of the aftermarket radio.

See the racediagnostics web site for further information on this issue.

Other issues should be reported to the race diagnostics support email, support@racediagnostics.com

Upgrading

Development of the *liquid* continues and users can have their unit upgraded to the latest revision. Check on the latest release and how to get upgraded here

<http://racediagnostics.com/cms/index.php?page=upgrades>

Technical Specifications

LCD Backlight life (to 70% brightness) 5000hours
(to maximise life it is advised to turn the unit off when no needed)

Storage temperature 0-70 degC
Operating temperature 0-30 degC
Supply voltage 7-15 volts

Communications Interface K-line KW1281 & KWP2089

The accuracy of all of the reading is dependant upon the information available from the diagnostics bus. Race Diagnostics Ltd can not verify the accuracy of this information.

Power	0-200BHP to 0-500BHP
Torque	0-200ftlb to 0-500ftlb
Turbo boost pressure	0-MAP sensor limit
Turbo command pressure	0- MAP sensor limit
Mass air flow	0-200g/s to 0 -500g/s
Air intake temperature	0-150degC
Exhaust temperature	0-1000degC
Engine coolant temperature	0-150degC
Engine oil temperature	0-150degC
N75 waste gate drive	0-100%
Miss-fire	10 per cylinder
G-force acceleration	0-1.5g
G-force deceleration	0-1.5g
G-force left cornering	0-1.5g
G-force right cornering	0-1.5g

Fault code meaning list

DTC	P-code	Description
16394	P0010	-A- Camshaft Pos. Actuator Circ. Bank 1 Malfunction
16395	P0020	-A- Camshaft Pos. Actuator Circ. Bank 2 Malfunction
16449	P0065	Air Assisted Injector Control Range/Performance
16450	P0066	Air Assisted Injector Control Low Input/Short to ground
16451	P0067	Air Assisted Injector Control Input/Short to B+
16485	P0101	Mass or Volume Air Flow Circ Range/Performance
16486	P0102	Mass or Volume Air Flow Circ Low Input
16487	P0103	Mass or Volume Air Flow Circ High Input
16489	P0105	Manifold Abs.Pressure or Bar.Pressure Voltage supply
16490	P0106	Manifold Abs.Pressure or Bar.Pressure Range/Performance
16491	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input
16492	P0108	Manifold Abs.Pressure or Bar.Pressure High Input
16496	P0112	Intake Air Temp.Circ Low Input
16497	P0113	Intake Air Temp.Circ High Input
16500	P0116	Engine Coolant Temp.Circ Range/Performance
16501	P0117	Engine Coolant Temp.Circ Low Input
16502	P0118	Engine Coolant Temp.Circ High Input
16504	P0120	Throttle/Pedal Pos.Sensor A Circ Malfunction

16505	P0121	Throttle/Pedal Pos.Sensor A Circ Range/Performance
16506	P0122	Throttle/Pedal Pos.Sensor A Circ Low Input
16507	P0123	Throttle/Pedal Pos.Sensor A Circ High Input
16509	P0125	Insufficient Coolant Temp.for Closed Loop Fuel Control
16512	P0128	Coolant Thermostat/Valve Temperature below control range
16514	P0130	O2 Sensor Circ.,Bank1-Sensor1 Malfunction
16515	P0131	O2 Sensor Circ.,Bank1-Sensor1 Low Voltage
16516	P0132	O2 Sensor Circ.,Bank1-Sensor1 High Voltage
16517	P0133	O2 Sensor Circ.,Bank1-Sensor1 Slow Response
16518	P0134	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected
16519	P0135	O2 Sensor Heater Circ.,Bank1-Sensor1 Malfunction
16520	P0136	O2 Sensor Circ.,Bank1-Sensor2 Malfunction
16521	P0137	O2 Sensor Circ.,Bank1-Sensor2 Low Voltage
16522	P0138	O2 Sensor Circ.,Bank1-Sensor2 High Voltage
16523	P0139	O2 Sensor Circ.,Bank1-Sensor2 Slow Response
16524	P0140	O2 Sensor Circ.,Bank1-Sensor2 No Activity Detected
16525	P0141	O2 Sensor Heater Circ.,Bank1-Sensor2 Malfunction
16534	P0150	O2 Sensor Circ.,Bank2-Sensor1 Malfunction
16535	P0151	O2 Sensor Circ.,Bank2-Sensor1 Low Voltage
16536	P0152	O2 Sensor Circ.,Bank2-Sensor1 High Voltage
16537	P0153	O2 Sensor Circ.,Bank2-Sensor1 Slow Response
16538	P0154	O2 Sensor Circ.,Bank2-Sensor1 No Activity Detected
16539	P0155	O2 Sensor Heater Circ.,Bank2-Sensor1 Malfunction

16540	P0156	O2 Sensor Circ.,Bank2-Sensor2 Malfunction
16541	P0157	O2 Sensor Circ.,Bank2-Sensor2 Low Voltage
16542	P0158	O2 Sensor Circ.,Bank2-Sensor2 High Voltage
16543	P0159	O2 Sensor Circ.,Bank2-Sensor2 Slow Response
16544	P0160	O2 Sensor Circ.,Bank2-Sensor2 No Activity Detected
16545	P0161	O2 Sensor Heater Circ.,Bank2-Sensor2 Malfunction
16554	P0170	Fuel Trim,Bank1 Malfunction
16555	P0171	Fuel Trim,Bank1 System too Lean
16556	P0172	Fuel Trim,Bank1 System too Rich
16557	P0173	Fuel Trim,Bank2 Malfunction
16558	P0174	Fuel Trim,Bank2 System too Lean
16559	P0175	Fuel Trim,Bank2 System too Rich
16566	P0182	Fuel temperature sender-G81 Short to ground
16567	P0183	Fuel temperature sender-G81 Interruption/Short to B+
16581	P0197	Engine Oil Temperature Circuit Low Input
16582	P0198	Engine Oil Temperature Circuit High Input
16585	P0201	Cyl.1, Injector Circuit Fault in electrical circuit
16586	P0202	Cyl.2, Injector Circuit Fault in electrical circuit
16587	P0203	Cyl.3, Injector Circuit Fault in electrical circuit
16588	P0204	Cyl.4, Injector Circuit Fault in electrical circuit
16589	P0205	Cyl.5 Injector Circuit Fault in electrical circuit
16590	P0206	Cyl.6 Injector Circuit Fault in electrical circuit
16591	P0207	Cyl.7 Injector Circuit Fault in electrical circuit

16592	P0208	Cyl.8 Injector Circuit Fault in electrical circuit
16599	P0215	Engine Shut-Off Solenoid Malfunction
16600	P0216	Injector/Injection Timing Control Malfunction
16603	P0219	Engine Overspeed Condition
16605	P0221	Throttle Pos. Sensor -B- Circuit Range/Performance
16606	P0222	Throttle Pos. Sensor -B- Circuit Low Input
16607	P0223	Throttle Pos. Sensor -B- Circuit High Input
16609	P0225	Throttle Pos. Sensor -C- Circuit Voltage supply
16610	P0226	Throttle Pos. Sensor -C- Circuit Range/Performance
16611	P0227	Throttle Pos. Sensor -C- Circuit Low Input
16612	P0228	Throttle Pos. Sensor -C- Circuit High Input
16614	P0230	Fuel Pump Primary Circuit Fault in electrical circuit
16618	P0234	Turbocharger Overboost Condition Control limit exceeded
16619	P0235	Turbocharger Boost Sensor (A) Circ Control limit not reached
16620	P0236	Turbocharger Boost Sensor (A) Circ Range/Performance
16621	P0237	Turbocharger Boost Sensor (A) Circ Low Input
16622	P0238	Turbocharger Boost Sensor (A) Circ High Input
16627	P0243	Turbocharger Wastegate Solenoid (A) Open/Short Circuit to Ground
16629	P0245	Turbocharger Wastegate Solenoid (A) Low Input/Short to ground
16630	P0246	Turbocharger Wastegate Solenoid (A) High Input/Short to B+
16636	P0252	Injection Pump Metering Control (A) Range/Performance
16645	P0261	Cyl.1 Injector Circuit Low Input/Short to ground
16646	P0262	Cyl.1 Injector Circuit High Input/Short to B+

16648	P0264	Cyl.2 Injector Circuit Low Input/Short to ground
16649	P0265	Cyl.2 Injector Circuit High Input/Short to B+
16651	P0267	Cyl.3 Injector Circuit Low Input/Short to ground
16652	P0268	Cyl.3 Injector Circuit High Input/Short to B+
16654	P0270	Cyl.4 Injector Circuit Low Input/Short to ground
16655	P0271	Cyl.4 Injector Circuit High Input/Short to B+
16657	P0273	Cyl.5 Injector Circuit Low Input/Short to ground
16658	P0274	Cyl.5 Injector Circuit High Input/Short to B+
16660	P0276	Cyl.6 Injector Circuit Low Input/Short to ground
16661	P0277	Cyl.6 Injector Circuit High Input/Short to B+
16663	P0279	Cyl.7 Injector Circuit Low Input/Short to ground
16664	P0280	Cyl.7 Injector Circuit High Input/Short to B+
16666	P0282	Cyl.8 Injector Circuit Low Input/Short to ground
16667	P0283	Cyl.8 Injector Circuit High Input/Short to B+
16684	P0300	Random/Multiple Cylinder Misfire Detected
16685	P0301	Cyl.1 Misfire Detected
16686	P0302	Cyl.2 Misfire Detected
16687	P0303	Cyl.3 Misfire Detected
16688	P0304	Cyl.4 Misfire Detected
16689	P0305	Cyl.5 Misfire Detected
16690	P0306	Cyl.6 Misfire Detected
16691	P0307	Cyl.7 Misfire Detected
16692	P0308	Cyl.8 Misfire Detected

16697	P0313	Misfire Detected Low Fuel Level
16698	P0314	Single Cylinder Misfire
16705	P0321	Ign./Distributor Eng.Speed Inp.Circ Range/Performance
16706	P0322	Ign./Distributor Eng.Speed Inp.Circ No Signal
16709	P0325	Knock Sensor 1 Circuit Electrical Fault in Circuit
16710	P0326	Knock Sensor 1 Circuit Range/Performance
16711	P0327	Knock Sensor 1 Circ Low Input
16712	P0328	Knock Sensor 1 Circ High Input
16716	P0332	Knock Sensor 2 Circ Low Input
16717	P0333	Knock Sensor 2 Circ High Input
16719	P0335	Crankshaft Pos. Sensor (A) Circ Malfunction
16720	P0336	Crankshaft Pos. Sensor (A) Circ Range/Performance/Missing tooth
16721	P0337	Crankshaft Pos.Sensor (A) Circ Low Input
16724	P0340	Camshaft Pos. Sensor (A) Circ Incorrect allocation
16725	P0341	Camshaft Pos.Sensor Circ Range/Performance
16726	P0342	Camshaft Pos.Sensor Circ Low Input
16727	P0343	Camshaft Pos.Sensor Circ High Input
16735	P0351	Ignition Coil (A) Cyl.1 Prim./Sec. Circ Malfunction
16736	P0352	Ignition Coil (B) Cyl.2 Prim./Sec. Circ Malfunction
16737	P0353	Ignition Coil (C) Cyl.3 Prim./Sec. Circ Malfunction
16738	P0354	Ignition Coil (D) Cyl.4 Prim./Sec. Circ Malfunction
16739	P0355	Ignition Coil (E) Cyl.5 Prim./Sec. Circ Malfunction
16740	P0356	Ignition Coil (F) Cyl.6 Prim./Sec. Circ Malfunction

16741	P0357	Ignition Coil (G) Cyl.7 Prim./Sec. Circ Malfunction
16742	P0358	Ignition Coil (H) Cyl.8 Prim./Sec. Circ Malfunction
16764	P0380	Glow Plug/Heater Circuit (A) Electrical Fault in Circuit
16784	P0400	Exhaust Gas Recirc.Flow Malfunction
16785	P0401	Exhaust Gas Recirc.Flow Insufficient Detected
16786	P0402	Exhaust Gas Recirc.Flow Excessive Detected
16787	P0403	Exhaust Gas Recirc. Contr. Circ Malfunction
16788	P0404	Exhaust Gas Recirc. Contr. Circ Range/Performance
16789	P0405	Exhaust Gas Recirc. Sensor (A) Circ Low Input
16790	P0406	Exhaust Gas Recirc. Sensor (A) Circ High Input
16791	P0407	Exhaust Gas Recirc. Sensor (B) Circ Low Input
16792	P0408	Exhaust Gas Recirc. Sensor (B) Circ High Input
16794	P0410	Sec.Air Inj.Sys Malfunction
16795	P0411	Sec.Air Inj.Sys. Incorrect Flow Detected
16796	P0412	Sec.Air Inj.Sys.Switching Valve A Circ Malfunction
16802	P0418	Sec. Air Inj. Sys. Relay (A) Contr. Circ Malfunction
16804	P0420	Catalyst System,Bank1 Efficiency Below Threshold
16806	P0422	Main Catalyst,Bank1 Below Threshold
16811	P0427	Catalyst Temperature Sensor, Bank 1 Low Input/Short to ground
16812	P0428	Catalyst Temperature Sensor, Bank 1 High Input/Open/Short Circuit to B+
16816	P0432	Main Catalyst,Bank2 Efficiency Below Threshold
16820	P0436	Catalyst Temperature Sensor, Bank 2 Range/Performance
16821	P0437	Catalyst Temperature Sensor, Bank 2 Low Input/Short to ground

16822	P0438	Catalyst Temperature Sensor, Bank 2 High Input/Open/Short Circuit to B+
16824	P0440	EVAP Emission Contr.Sys. Malfunction
16825	P0441	EVAP Emission Contr.Sys.Incorrect Purge Flow
16826	P0442	EVAP Emission Contr.Sys.(Small Leak) Leak Detected
16827	P0443	EVAP Emiss. Contr. Sys. Purge Valve Circ Electrical Fault in Circuit
16836	P0452	EVAP Emission Contr.Sys.Press.Sensor Low Input
16837	P0453	EVAP Emission Contr.Sys.Press.Sensor High Input
16839	P0455	EVAP Emission Contr.Sys.(Gross Leak) Leak Detected
16845	P0461	Fuel Level Sensor Circ Range/Performance
16846	P0462	Fuel Level Sensor Circuit Low Input
16847	P0463	Fuel Level Sensor Circuit High Input
16885	P0501	Vehicle Speed Sensor Range/Performance
16887	P0503	Vehicle Speed Sensor Intermittent/Erratic/High Input
16889	P0505	Idle Control System Malfunction
16890	P0506	Idle Control System RPM Lower than Expected
16891	P0507	Idle Control System Higher than Expected
16894	P0510	Closed Throttle Pos.Switch Malfunction
16915	P0531	A/C Refrigerant Pressure Sensor Circuit Range/Performance
16916	P0532	A/C Refrigerant Pressure Sensor Circuit Low Input
16917	P0533	A/C Refrigerant Pressure Sensor Circuit High Input
16935	P0551	Power Steering Pressure Sensor Circuit Range/Performance
16944	P0560	System Voltage Malfunction
16946	P0562	System Voltage Low Voltage

16947	P0563	System Voltage High Voltage
16952	P0568	Cruise Control Set Signal Incorrect Signal
16955	P0571	Cruise/Brake Switch (A) Circ Malfunction
16984	P0600	Serial Comm. Link (Data Bus) Message Missing
16985	P0601	Internal Contr.Module Memory Check Sum Error
16986	P0602	Control Module Programming Error/Malfunction
16987	P0603	Internal Contr.Module (KAM) Error
16988	P0604	Internal Contr.Module Random Access Memory (RAM) Error
16989	P0605	Internal Contr.Module ROM Test Error
16990	P0606	ECM/PCM Processor
17026	P0642	Knock Control Control Module Malfunction
17029	P0645	A/C Clutch Relay Control Circuit
17034	P0650	MIL Control Circuit Electrical Fault in Circuit
17038	P0654	Engine RPM Output Circuit Electrical Fault in Circuit
17040	P0656	Fuel Level Output Circuit Electrical Fault in Circuit
17084	P0700	Transm.Contr.System Malfunction
17086	P0702	Transm.Contr.System Electrical
17087	P0703	Torque Converter/Brake Switch B Circ Malfunction
17089	P0705	Transm.Range Sensor Circ.(PRNDL Inp.) Malfunction
17090	P0706	Transm.Range Sensor Circ Range/Performance
17091	P0707	Transm.Range Sensor Circ Low Input
17092	P0708	Transm.Range Sensor Circ High Input
17094	P0710	Transm.Fluid Temp.Sensor Circ. Malfunction

17095	P0711	Transm.Fluid Temp.Sensor Circ. Range/Performance
17096	P0712	Transm.Fluid Temp.Sensor Circ. Low Input
17097	P0713	Transm.Fluid Temp.Sensor Circ. High Input
17099	P0715	Input Turbine/Speed Sensor Circ. Malfunction
17100	P0716	Input Turbine/Speed Sensor Circ. Range/Performance
17101	P0717	Input Turbine/Speed Sensor Circ. No Signal
17105	P0721	Output Speed Sensor Circ Range/Performance
17106	P0722	Output Speed Sensor Circ No Signal
17109	P0725	Engine Speed Inp.Circ. Malfunction
17110	P0726	Engine Speed Inp.Circ. Range/Performance
17111	P0727	Engine Speed Inp.Circ. No Signal
17114	P0730	Gear Incorrect Ratio
17115	P0731	Gear 1 Incorrect Ratio
17116	P0732	Gear 2 Incorrect Ratio
17117	P0733	Gear 3 Incorrect Ratio
17118	P0734	Gear 4 Incorrect Ratio
17119	P0735	Gear 5 Incorrect Ratio
17124	P0740	Torque Converter Clutch Circ Malfunction
17125	P0741	Torque Converter Clutch Circ Performance or Stuck Off
17132	P0748	Pressure Contr.Solenoid Electrical
17134	P0750	Shift Solenoid A malfunction
17135	P0751	Shift Solenoid A Performance or Stuck Off
17136	P0752	Shift Solenoid A Stuck On

17137	P0753	Shift Solenoid A Electrical
17140	P0756	Shift Solenoid B Performance or Stuck Off
17141	P0757	Shift Solenoid B Stuck On
17142	P0758	Shift Solenoid B Electrical
17145	P0761	Shift Solenoid C Performance or Stuck Off
17146	P0762	Shift Solenoid C Stuck On
17147	P0763	Shift Solenoid C Electrical
17152	P0768	Shift Solenoid D Electrical
17157	P0773	Shift Solenoid E Electrical
17174	P0790	Normal/Performance Switch Circ Malfunction
17509	P1101	O2 Sensor Circ.,Bank1-Sensor1 Voltage too Low/Air Leak
17510	P1102	O2 Sensor Heating Circ.,Bank1-Sensor1 Short to B+
17511	P1103	O2 Sensor Heating Circ.,Bank1-Sensor1 Output too Low
17512	P1104	Bank1-Sensor2 Voltage too Low/Air Leak
17513	P1105	O2 Sensor Heating Circ.,Bank1-Sensor2 Short to B+
17514	P1106	O2 Sensor Circ.,Bank2-Sensor1 Voltage too Low/Air Leak
17515	P1107	O2 Sensor Heating Circ.,Bank2-Sensor1 Short to B+
17516	P1108	O2 Sensor Heating Circ.,Bank2-Sensor1 Output too Low
17517	P1109	O2 Sensor Circ.,Bank2-Sensor2 Voltage too Low/Air Leak
17518	P1110	O2 Sensor Heating Circ.,Bank2-Sensor2 Short to B+
17519	P1111	O2 Control (Bank 1) System too lean
17520	P1112	O2 Control (Bank 1) System too rich
17521	P1113	Bank1-Sensor1 Internal Resistance too High

17522	P1114	Bank1-Sensor2 Internal Resistant too High
17523	P1115	O2 Sensor Heater Circ.,Bank1-Sensor1 Short to Ground
17524	P1116	O2 Sensor Heater Circ.,Bank1-Sensor1 Open
17525	P1117	O2 Sensor Heater Circ.,Bank1-Sensor2 Short to Ground
17526	P1118	O2 Sensor Heater Circ.,Bank1-Sensor2 Open
17527	P1119	O2 Sensor Heater Circ.,Bank2-Sensor1 Short to Ground
17528	P1120	O2 Sensor Heater Circ.,Bank2-Sensor1 Open
17529	P1121	O2 Sensor Heater Circ.,Bank2-Sensor2 Short to Ground
17530	P1122	O2 Sensor Heater Circ.,Bank2-Sensor2 Open
17531	P1123	Long Term Fuel Trim Add.Air.,Bank1 System too Rich
17532	P1124	Long Term Fuel Trim Add.Air.,Bank1 System too Lean
17533	P1125	Long Term Fuel Trim Add.Air.,Bank2 System too Rich
17534	P1126	Long Term Fuel Trim Add.Air.,Bank2 System too Lean
17535	P1127	Long Term Fuel Trim mult.,Bank1 System too Rich
17536	P1128	Long Term Fuel Trim mult.,Bank1 System too Lean
17537	P1129	Long Term Fuel Trim mult.,Bank2 System too Rich
17538	P1130	Long Term Fuel Trim mult.,Bank2 System too Lean
17539	P1131	Bank2-Sensor1 Internal Rsistance too High
17540	P1132	O2 Sensor Heating Circ.,Bank1+2-Sensor1 Short to B+
17541	P1133	O2 Sensor Heating Circ.,Bank1+2-Sensor1 Electrical Malfunction
17542	P1134	O2 Sensor Heating Circ.,Bank1+2-Sensor2 Short to B+
17543	P1135	O2 Sensor Heating Circ.,Bank1+2-Sensor2 Electrical Malfunction
17544	P1136	Long Term Fuel Trim Add.Fuel,Bank1 System too Lean

17545	P1137	Long Term Fuel Trim Add.Fuel,Bank1 System too Rich
17546	P1138	Long Term Fuel Trim Add.Fuel,Bank2 System too Lean
17547	P1139	Long Term Fuel Trim Add.Fuel,Bank2 System too Rich
17548	P1140	Bank2-Sensor2 Internal Resistance too High
17549	P1141	Load Calculation Cross Check Range/Performance
17550	P1142	Load Calculation Cross Check Lower Limit Exceeded
17551	P1143	Load Calculation Cross Check Upper Limit Exceeded
17552	P1144	Mass or Volume Air Flow Circ Open/Short to Ground
17553	P1145	Mass or Volume Air Flow Circ Short to B+
17554	P1146	Mass or Volume Air Flow Circ Supply Malfunction
17555	P1147	O2 Control (Bank 2) System too lean
17556	P1148	O2 Control (Bank 2) System too rich
17557	P1149	O2 Control (Bank 1) Out of range
17558	P1150	O2 Control (Bank 2) Out of range
17559	P1151	Bank1, Long Term Fuel Trim, Range 1 Leanness Lower Limit Exceeded
17560	P1152	Bank1, Long Term Fuel Trim, Range 2 Leanness Lower Limit Exceeded
17562	P1154	Manifold Switch Over Malfunction
17563	P1155	Manifold Abs.Pressure Sensor Circ. Short to B+
17564	P1156	Manifold Abs.Pressure Sensor Circ. Open/Short to Ground
17565	P1157	Manifold Abs.Pressure Sensor Circ. Power Supply Malfunction
17566	P1158	Manifold Abs.Pressure Sensor Circ. Range/Performance
17568	P1160	Manifold Temp.Sensor Circ. Short to Ground
17569	P1161	Manifold Temp.Sensor Circ. Open/Short to B+

17570	P1162	Fuel Temp.Sensor Circ. Short to Ground
17571	P1163	Fuel Temp.Sensor Circ. Open/Short to B+
17572	P1164	Fuel Temperature Sensor Range/Performance/Incorrect Signal
17573	P1165	Bank1, Long Term Fuel Trim, Range 1 Rich Limit Exceeded
17574	P1166	Bank1, Long Term Fuel Trim, Range 2 Rich Limit Exceeded
17579	P1171	Throttle Actuation Potentiometer Sign.2 Range/Performance
17580	P1172	Throttle Actuation Potentiometer Sign.2 Signal too Low
17581	P1173	Throttle Actuation Potentiometer Sign.2 Signal too High
17582	P1174	Fuel Trim, Bank 1 Different injection times
17584	P1176	O2 Correction Behind Catalyst,B1 Limit Attained
17585	P1177	O2 Correction Behind Catalyst,B2 Limit Attained
17586	P1178	Linear O2 Sensor / Pump Current Open Circuit
17587	P1179	Linear O2 Sensor / Pump Current Short to ground
17588	P1180	Linear O2 Sensor / Pump Current Short to B+
17589	P1181	Linear O2 Sensor / Reference Voltage Open Circuit
17590	P1182	Linear O2 Sensor / Reference Voltage Short to ground
17591	P1183	Linear O2 Sensor / Reference Voltage Short to B+
17592	P1184	Linear O2 Sensor / Common Ground Wire Open Circuit
17593	P1185	Linear O2 Sensor / Common Ground Wire Short to ground
17594	P1186	Linear O2 Sensor / Common Ground Wire Short to B+
17595	P1187	Linear O2 Sensor / Compens. Resistor Open Circuit
17596	P1188	Linear O2 Sensor / Compens. Resistor Short to ground
17597	P1189	Linear O2 Sensor / Compens. Resistor Short to B+

17598	P1190	Linear O2 Sensor / Reference Voltage Incorrect Signal
17604	P1196	O2 Sensor Heater Circ.,Bank1-Sensor1 Electrical Malfunction
17605	P1197	O2 Sensor Heater Circ.,Bank2-Sensor1 Electrical Malfunction
17606	P1198	O2 Sensor Heater Circ.,Bank1-Sensor2 Electrical Malfunction
17607	P1199	O2 Sensor Heater Circ.,Bank2-Sensor2 Electrical Malfunction
17609	P1201	Cyl.1-Fuel Inj.Circ. Electrical Malfunction
17610	P1202	Cyl.2-Fuel Inj.Circ. Electrical Malfunction
17611	P1203	Cyl.3-Fuel Inj.Circ. Electrical Malfunction
17612	P1204	Cyl.4-Fuel Inj.Circ. Electrical Malfunction
17613	P1205	Cyl.5-Fuel Inj.Circ. Electrical Malfunction
17614	P1206	Cyl.6-Fuel Inj.Circ. Electrical Malfunction
17615	P1207	Cyl.7-Fuel Inj.Circ. Electrical Malfunction
17616	P1208	Cyl.8-Fuel Inj.Circ. Electrical Malfunction
17617	P1209	Intake valves for cylinder shut-off Short circuit to ground
17618	P1210	Intake valves for cylinder shut-off Short to B+
17619	P1211	Intake valves for cylinder shut-off Open circuit
17621	P1213	Cyl.1-Fuel Inj.Circ. Short to B+
17622	P1214	Cyl.2-Fuel Inj.Circ. Short to B+
17623	P1215	Cyl.3-Fuel Inj.Circ. Short to B+
17624	P1216	Cyl.4-Fuel Inj.Circ. Short to B+
17625	P1217	Cyl.5-Fuel Inj.Circ. Short to B+
17626	P1218	Cyl.6-Fuel Inj.Circ. Short to B+
17627	P1219	Cyl.7-Fuel Inj.Circ. Short to B+

17628	P1220	Cyl.8-Fuel Inj.Circ. Short to B+
17629	P1221	Cylinder shut-off exhaust valves Short circuit to ground
17630	P1222	Cylinder shut-off exhaust valves Short to B+
17631	P1223	Cylinder shut-off exhaust valves Open circuit
17633	P1225	Cyl.1-Fuel Inj.Circ. Short to Ground
17634	P1226	Cyl.2-Fuel Inj.Circ. Short to Ground
17635	P1227	Cyl.3-Fuel Inj.Circ. Short to Ground
17636	P1228	Cyl.4-Fuel Inj.Circ. Short to Ground
17637	P1229	Cyl.5-Fuel Inj.Circ. Short to Ground
17638	P1230	Cyl.6-Fuel Inj.Circ. Short to Ground
17639	P1231	Cyl.7-Fuel Inj.Circ. Short to Ground
17640	P1232	Cyl.8-Fuel Inj.Circ. Short to Ground
17645	P1237	Cyl.1-Fuel Inj.Circ. Open Circ.
17646	P1238	Cyl.2-Fuel Inj.Circ. Open Circ.
17647	P1239	Cyl.3-Fuel Inj.Circ. Open Circ.
17648	P1240	Cyl.4-Fuel Inj.Circ. Open Circ.
17649	P1241	Cyl.5-Fuel Inj.Circ. Open Circ.
17650	P1242	Cyl.6-Fuel Inj.Circ. Open Circ.
17651	P1243	Cyl.7-Fuel Inj.Circ. Open Circ.
17652	P1244	Cyl.8-Fuel Inj.Circ. Open Circ.
17653	P1245	Needle Lift Sensor Circ. Short to Ground
17654	P1246	Needle Lift Sensor Circ. Range/Performance
17655	P1247	Needle Lift Sensor Circ. Open/Short to B+

17656	P1248	Injection Start Control Deviation
17657	P1249	Fuel consumption signal Electrical Fault in Circuit
17658	P1250	Fuel Level Too Low
17659	P1251	Start of Injection Solenoid Circ Short to B+
17660	P1252	Start of Injection Solenoid Circ Open/Short to Ground
17661	P1253	Fuel consumption signal Short to ground
17662	P1254	Fuel consumption signal Short to B+
17663	P1255	Engine Coolant Temp.Circ Short to Ground
17664	P1256	Engine Coolant Temp.Circ Open/Short to B+
17665	P1257	Engine Coolant System Valve Open
17666	P1258	Engine Coolant System Valve Short to B+
17667	P1259	Engine Coolant System Valve Short to Ground
17688	P1280	Fuel Inj.Air Contr.Valve Circ. Flow too Low
17691	P1283	Fuel Inj.Air Contr.Valve Circ. Electrical Malfunction
17692	P1284	Fuel Inj.Air Contr.Valve Circ. Open
17693	P1285	Fuel Inj.Air Contr.Valve Circ. Short to Ground
17694	P1286	Fuel Inj.Air Contr.Valve Circ. Short to B+
17695	P1287	Turbocharger bypass valve open
17696	P1288	Turbocharger bypass valve short to B+
17697	P1289	Turbocharger bypass valve short to ground
17704	P1296	Cooling system malfunction
17705	P1297	Connection turbocharger - throttle valve pressure hose
17708	P1300	Misfire detected Reason: Fuel level too low

17721	P1319	Knock Sensor 1 Circ. Short to Ground
17728	P1320	Knock Sensor 2 Circ. Short to Ground
17729	P1321	Knock Sensor 3 Circ. Low Input
17730	P1322	Knock Sensor 3 Circ. High Input
17731	P1323	Knock Sensor 4 Circ. Low Input
17732	P1324	Knock Sensor 4 Circ. High Input
17733	P1325	Cyl.1-Knock Contr. Limit Attained
17734	P1326	Cyl.2-Knock Contr. Limit Attained
17735	P1327	Cyl.3-Knock Contr. Limit Attained
17736	P1328	Cyl.4-Knock Contr. Limit Attained
17737	P1329	Cyl.5-Knock Contr. Limit Attained
17738	P1330	Cyl.6-Knock Contr. Limit Attained
17739	P1331	Cyl.7-Knock Contr. Limit Attained
17740	P1332	Cyl.8-Knock Contr. Limit Attained
17743	P1335	Engine Torque Monitoring 2 Control Limint Exceeded
17744	P1336	Engine Torque Monitoring Adaptation at limit
17745	P1337	Camshaft Pos.Sensor,Bank1 Short to Ground
17746	P1338	Camshaft Pos.Sensor,Bank1 Open Circ./Short to B+
17747	P1339	Crankshaft Pos./Engine Speed Sensor Cross Connected
17748	P1340	Crankshaft-/Camshaft Pos.Sens.Signals Out of Sequence
17749	P1341	Ignition Coil Power Output Stage 1 Short to Ground
17750	P1342	Ignition Coil Power Output Stage 1 Short to B+
17751	P1343	Ignition Coil Power Output Stage 2 Short to Ground

17752	P1344	Ignition Coil Power Output Stage 2 Short to B+
17753	P1345	Ignition Coil Power Output Stage 3 Short to Ground
17754	P1346	Ignition Coil Power Output Stage 3 Short to B+
17755	P1347	Bank2,Crankshaft-/Camshaft os.Sens.Sign. Out of Sequence
17756	P1348	Ignition Coil Power Output Stage 1 Open Circuit
17757	P1349	Ignition Coil Power Output Stage 2 Open Circuit
17758	P1350	Ignition Coil Power Output Stage 3 Open Circuit
17762	P1354	Modulation Piston Displ.Sensor Circ. Malfunction
17763	P1355	Cyl. 1, ignition circuit Open Circuit
17764	P1356	Cyl. 1, ignition circuit Short to B+
17765	P1357	Cyl. 1, ignition circuit Short to ground
17766	P1358	Cyl. 2, ignition circuit Open Circuit
17767	P1359	Cyl. 2, ignition circuit Short Circuit to B+
17768	P1360	Cyl. 2, ignition circuit Short Circuit to Ground
17769	P1361	Cyl. 3, ignition circuit Open Circuit
17770	P1362	Cyl. 3, ignition circuit Short Circuit to B+
17771	P1363	Cyl. 3, ignition circuit Short Circuit to ground
17772	P1364	Cyl. 4 ignition circuit Open Circuit
17773	P1365	Cyl. 4 ignition circuit Short circuit to B+
17774	P1366	Cyl. 4 ignition circuit Short circuit to ground
17775	P1367	Cyl. 5, ignition circuit Open Circuit
17776	P1368	Cyl. 5, ignition circuit Short Circuit to B+
17777	P1369	Cyl. 5, ignition circuit short to ground

17778	P1370	Cyl. 6, ignition circuit Open Circuit
17779	P1371	Cyl. 6, ignition circuit Short Circuit to B+
17780	P1372	Cyl. 6, ignition circuit short to ground
17781	P1373	Cyl. 7, ignition circuit Open Circuit
17782	P1374	Cyl. 7, ignition circuit Short Circuit to B+
17783	P1375	Cyl. 7, ignition circuit short to ground
17784	P1376	Cyl. 8, ignition circuit Open Circuit
17785	P1377	Cyl. 8, ignition circuit Short Circuit to B+
17786	P1378	Cyl. 8, ignition circuit short to ground
17794	P1386	Internal Control Module Knock Control Circ.Error
17795	P1387	Internal Contr. Module altitude sensor error
17796	P1388	Internal Contr. Module drive by wire error
17799	P1391	Camshaft Pos.Sensor,Bank2 Short to Ground
17800	P1392	Camshaft Pos.Sensor,Bank2 Open Circ./Short to B+
17801	P1393	Ignition Coil Power Output Stage 1 Electrical Malfunction
17802	P1394	Ignition Coil Power Output Stage 2 Electrical Malfunction
17803	P1395	Ignition Coil Power Output Stage 3 Electrical Malfunction
17804	P1396	Engine Speed Sensor Missing Tooth
17805	P1397	Engine speed wheel Adaptation limit reached
17806	P1398	Engine RPM signal, TD Short to ground
17807	P1399	Engine RPM signal, TD Short Circuit to B+
17808	P1400	EGR Valve Circ Electrical Malfunction
17809	P1401	EGR Valve Circ Short to Ground

17810	P1402	EGR Valve Circ Short to B+
17811	P1403	EGR Flow Deviation
17812	P1404	EGR Flow Basic Setting not carried out
17814	P1406	EGR Temp.Sensor Range/Performance
17815	P1407	EGR Temp.Sensor Signal too Low
17816	P1408	EGR Temp.Sensor Signal too High
17817	P1409	Tank Ventilation Valve Circ. Electrical Malfunction
17818	P1410	Tank Ventilation Valve Circ. Short to B+
17819	P1411	Sec.Air Inj.Sys.,Bank2 Flow too Flow
17820	P1412	EGR Different.Pressure Sensor Signal too Low
17821	P1413	EGR Different.Pressure Sensor Signal too High
17822	P1414	Sec.Air Inj.Sys.,Bank2 Leak Detected
17825	P1417	Fuel Level Sensor Circ Signal too Low
17826	P1418	Fuel Level Sensor Circ Signal too High
17828	P1420	Sec.Air Inj.Valve Circ Electrical Malfunction
17829	P1421	Sec.Air Inj.Valve Circ Short to Ground
17830	P1422	Sec.Air Inj.Sys.Contr.Valve Circ Short to B+
17831	P1423	Sec.Air Inj.Sys.,Bank1 Flow too Low
17832	P1424	Sec.Air Inj.Sys.,Bank1 Leak Detected
17833	P1425	Tank Vent.Valve Short to Ground
17834	P1426	Tank Vent.Valve Open
17840	P1432	Sec.Air Inj.Valve Open
17841	P1433	Sec.Air Inj.Sys.Pump Relay Circ. open

17842	P1434	Sec.Air Inj.Sys.Pump Relay Circ. Short to B+
17843	P1435	Sec.Air Inj.Sys.Pump Relay Circ. Short to ground
17844	P1436	Sec.Air Inj.Sys.Pump Relay Circ. Electrical Malfunction
17847	P1439	EGR Potentiometer Error in Basic Seting
17848	P1440	EGR Valve Power Stage Open
17849	P1441	EGR Valve Circ Open/Short to Ground
17850	P1442	EGR Valve Position Sensor Signal too high
17851	P1443	EGR Valve Position Sensor Signal too low
17852	P1444	EGR Valve Position Sensor range/performance
17853	P1445	Catalyst Temp.Sensor 2 Circ. Range/Performance
17854	P1446	Catalyst Temp.Circ Short to Ground
17855	P1447	Catalyst Temp.Circ Open/Short to B+
17856	P1448	Catalyst Temp.Sensor 2 Circ. Short to Ground
17857	P1449	Catalyst Temp.Sensor 2 Circ. Open/Short to B+
17858	P1450	Sec.Air Inj.Sys.Circ Short to B+
17859	P1451	Sec.Air Inj.Sys.Circ Short to Ground
17860	P1452	Sec.Air Inj.Sys. Open Circ.
17861	P1453	Exhaust gas temperature sensor 1 open/short to B+
17862	P1454	Exhaust gas temperature sensor short 1 to ground
17863	P1455	Exhaust gas temperature sensor 1 range/performance
17864	P1456	Exhaust gas temperature control bank 1 limit attained
17865	P1457	Exhaust gas temperature sensor 2 open/short to B+
17866	P1458	Exhaust gas temperature sensor 2 short to ground

17867	P1459	Exhaust gas temperature sensor 2 range/performance
17868	P1460	Exhaust gas temperature control bank 2 limit attained
17869	P1461	Exhaust gas temperature control bank 1 Range/Performance
17870	P1462	Exhaust gas temperature control bank 2 Range/Performance
17873	P1465	Additive Pump Short Circuit to B+
17874	P1466	Additive Pump Open/Short to Ground
17875	P1467	EVAP Canister Purge Solenoid Valve Short Circuit to B+
17876	P1468	EVAP Canister Purge Solenoid Valve Short Circuit to Ground
17877	P1469	EVAP Canister Purge Solenoid Valve Open Circuit
17878	P1470	EVAP Emission Contr.LDP Circ Electrical Malfunction
17879	P1471	EVAP Emission Contr.LDP Circ Short to B+
17880	P1472	EVAP Emission Contr.LDP Circ Short to Ground
17881	P1473	EVAP Emission Contr.LDP Circ Open Circ.
17882	P1474	EVAP Canister Purge Solenoid Valve electrical malfunction
17883	P1475	EVAP Emission Contr.LDP Circ Malfunction/Signal Circ.Open
17884	P1476	EVAP Emission Contr.LDP Circ Malfunction/Insufficient Vacuum
17885	P1477	EVAP Emission Contr.LDP Circ Malfunction
17886	P1478	EVAP Emission Contr.LDP Circ Clamped Tube Detected
17908	P1500	Fuel Pump Relay Circ. Electrical Malfunction
17909	P1501	Fuel Pump Relay Circ. Short to Ground
17910	P1502	Fuel Pump Relay Circ. Short to B+
17911	P1503	Load signal from Alternator Term. DF Range/performance/Incorrect Signal
17912	P1504	Intake Air Sys.Bypass Leak Detected

17913	P1505	Closed Throttle Pos. Does Not Close/Open Circ
17914	P1506	Closed Throttle Pos.Switch Does Not Open/Short to Ground
17915	P1507	Idle Sys.Learned Value Lower Limit Attained
17916	P1508	Idle Sys.Learned Value Upper Limit Attained
17917	P1509	Idle Air Control Circ. Electrical Malfunction
17918	P1510	Idle Air Control Circ. Short to B+
17919	P1511	Intake Manifold Changeover Valve circuit electrical malfunction
17920	P1512	Intake Manifold Changeover Valve circuit Short to B+
17921	P1513	Intake Manifold Changeover Valve2 circuit Short to B+
17922	P1514	Intake Manifold Changeover Valve2 circuit Short to ground
17923	P1515	Intake Manifold Changeover Valve circuit Short to Ground
17924	P1516	Intake Manifold Changeover Valve circuit Open
17925	P1517	Main Relay Circ. Electrical Malfunction
17926	P1518	Main Relay Circ. Short to B+
17927	P1519	Intake Camshaft Contr.,Bank1 Malfunction
17928	P1520	Intake Manifold Changeover Valve2 circuit Open
17929	P1521	Intake Manifold Changeover Valve2 circuit electrical malfunction
17930	P1522	Intake Camshaft Contr.,Bank2 Malfunction
17931	P1523	Crash Signal from Airbag Control Unit range/performance
17933	P1525	Intake Camshaft Contr.Circ.,Bank1 Electrical Malfunction
17934	P1526	Intake Camshaft Contr.Circ.,Bank1 Short to B+
17935	P1527	Intake Camshaft Contr.Circ.,Bank1 Short to Ground
17936	P1528	Intake Camshaft Contr.Circ.,Bank1 Open

17937	P1529	Camshaft Control Circuit Short to B+
17938	P1530	Camshaft Control Circuit Short to ground
17939	P1531	Camshaft Control Circuit open
17941	P1533	Intake Camshaft Contr.Circ.,Bank2 Electrical Malfunction
17942	P1534	Intake Camshaft Contr.Circ.,Bank2 Short to B+
17943	P1535	Intake Camshaft Contr.Circ.,Bank2 Short to Ground
17944	P1536	Intake Camshaft Contr.Circ.,Bank2 Open
17945	P1537	Engine Shutoff Solenoid Malfunction
17946	P1538	Engine Shutoff Solenoid Open/Short to Ground
17947	P1539	Clutch Vacuum Vent Valve Switch Incorrect signal
17948	P1540	Vehicle Speed Sensor High Input
17949	P1541	Fuel Pump Relay Circ Open
17950	P1542	Throttle Actuation Potentiometer Range/Performance
17951	P1543	Throttle Actuation Potentiometer Signal too Low
17952	P1544	Throttle Actuation Potentiometer Signal too High
17953	P1545	Throttle Pos.Contr Malfunction
17954	P1546	Boost Pressure Contr.Valve Short to B+
17955	P1547	Boost Pressure Contr.Valve Short to Ground
17956	P1548	Boost Pressure Contr.Valve Open
17957	P1549	Boost Pressure Contr.Valve Short to Ground
17958	P1550	Charge Pressure Deviation
17959	P1551	Barometric Pressure Sensor Circ. Short to B+
17960	P1552	Barometric Pressure Sensor Circ. Open/Short to Ground

17961	P1553	Barometric/manifold pressure signal ratio out of range
17962	P1554	Idle Speed Contr.Throttle Pos. Basic Setting Conditions not met
17963	P1555	Charge Pressure Upper Limit exceeded
17964	P1556	Charge Pressure Contr. Negative Deviation
17965	P1557	Charge Pressure Contr. Positive Deviation
17966	P1558	Throttle Actuator Electrical Malfunction
17967	P1559	Idle Speed Contr.Throttle Pos. Adaptation Malfunction
17968	P1560	Maximum Engine Speed Exceeded
17969	P1561	Quantity Adjuster Deviation
17970	P1562	Quantity Adjuster Upper Limit Attained
17971	P1563	Quantity Adjuster Lower Limit Attained
17972	P1564	Idle Speed Contr.Throttle Pos. Low Voltage During Adaptation
17973	P1565	Idle Speed Control Throttle Position lower limit not attained
17974	P1566	Load signal from A/C compressor range/performance
17975	P1567	Load signal from A/C compressor no signal
17976	P1568	Idle Speed Contr.Throttle Pos. mechanical Malfunction
17977	P1569	Cruise control switch Incorrect signal
17978	P1570	Contr.Module Locked
17979	P1571	Left Eng. Mount Solenoid Valve Short to B+
17980	P1572	Left Eng. Mount Solenoid Valve Short to ground
17981	P1573	Left Eng. Mount Solenoid Valve Open circuit
17982	P1574	Left Eng. Mount Solenoid Valve Electrical fault in circuit
17983	P1575	Right Eng. Mount Solenoid Valve Short to B+

17984	P1576	Right Eng. Mount Solenoid Valve Short to ground
17985	P1577	Right Eng. Mount Solenoid Valve Open circuit
17986	P1578	Right Eng. Mount Solenoid Valve Electrical fault in circuit
17987	P1579	Idle Speed Contr.Throttle Pos. Adaptation not started
17988	P1580	Throttle Actuator B1 Malfunction
17989	P1581	Idle Speed Contr.Throttle Pos. Basic Setting Not Carried Out
17990	P1582	Idle Adaptation at Limit
17991	P1583	Transmission mount valves Short to B+
17992	P1584	Transmission mount valves Short to ground
17993	P1585	Transmission mount valves Open circuit
17994	P1586	Engine mount solenoid valves Short to B+
17995	P1587	Engine mount solenoid valves Short to ground
17996	P1588	Engine mount solenoid valves Open circuit
18008	P1600	Power Supply (B+) Terminal 15 Low Voltage
18010	P1602	Power Supply (B+) Terminal 30 Low Voltage
18011	P1603	Internal Control Module Malfunction
18012	P1604	Internal Control Module Driver Error
18013	P1605	Rough Road/Acceleration Sensor Electrical Malfunction
18014	P1606	Rough Road Spec Engine Torque ABS-ECU Electrical Malfunction
18015	P1607	Vehicle speed signal Error message from instrument cluster
18016	P1608	Steering angle signal Error message from steering angle sensor
18017	P1609	Crash shut-down activated
18019	P1611	MIL Call-up Circ./Transm.Contr.Module Short to Ground

18020	P1612	Electronic Control Module Incorrect Coding
18021	P1613	MIL Call-up Circ Open/Short to B+
18022	P1614	MIL Call-up Circ./Transm.Contr.Module Range/Performance
18023	P1615	Engine Oil Temperature Sensor Circuit range/performance
18024	P1616	Glow Plug/Heater Indicator Circ. Short to B+
18025	P1617	Glow Plug/Heater Indicator Circ. Open/Short to Ground
18026	P1618	Glow Plug/Heater Relay Circ. Short to B+
18027	P1619	Glow Plug/Heater Relay Circ. Open/Short to Ground
18028	P1620	Engine coolant temperature signal open/short to B+
18029	P1621	Engine coolant temperature signal short to ground
18030	P1622	Engine coolant temperature signal range/performance
18031	P1623	Data Bus Powertrain No Communication
18032	P1624	MIL Request Sign.active
18033	P1625	Data-Bus Powertrain Unplausible Message from Transm.Contr.
18034	P1626	Data-Bus Powertrain Missing Message from Transm.Contr.
18035	P1627	Data-Bus Powertrain missing message from fuel injection pump
18036	P1628	Data-Bus Powertrain missing message from steering sensor
18037	P1629	Data-Bus Powertrain missing message from distance control
18038	P1630	Accelera.Pedal Pos.Sensor 1 Signal too Low
18039	P1631	Accelera.Pedal Pos.Sensor 1 Signal too High
18040	P1632	Accelera.Pedal Pos.Sensor 1 Power Supply Malfunction
18041	P1633	Accelera.Pedal Pos.Sensor 2 Signal too Low
18042	P1634	Accelera.Pedal Pos.Sensor 2 Signal too High

18043	P1635	Data Bus Powertrain missing message f.air condition control
18044	P1636	Data Bus Powertrain missing message from Airbag control
18045	P1637	Data Bus Powertrain missing message f.central electr.control
18046	P1638	Data Bus Powertrain missing message from clutch control
18047	P1639	Accelera.Pedal Pos.Sensor 1+2 Range/Performance
18048	P1640	Internal Contr.Module (EEPROM) Error
18049	P1641	Please check DTC Memory of Air Condition ECU
18050	P1642	Please check DTC Memory of Airbag ECU
18051	P1643	Please check DTC Memory of central electric ECU
18052	P1644	Please check DTC Memory of clutch ECU
18053	P1645	Data Bus Powertrain missing message f.all wheel drive contr.
18054	P1646	Please Check DTC Memory of all wheel drive ECU
18055	P1647	Please check coding of ECUs in Data Bus Powertrain
18056	P1648	Data Bus Powertrain Malfunction
18057	P1649	Data Bus Powertrain Missing message from ABS Control Module
18058	P1650	Data Bus Powertrain Missing message fr.instrument panel ECU
18059	P1651	Data Bus Powertrain missing messages
18060	P1652	Please check DTC Memory of transmission ECU
18061	P1653	Please check DTC Memory of ABS Control Module
18062	P1654	Please check DTC Memory of control panel ECU
18063	P1655	Please check DTC Memory of ADR Control Module
18064	P1656	A/C clutch relay circuit short to ground
18065	P1657	A/C clutch relay circuit short to B+

18066	P1658	Data Bus Powertrain Incorrect signal from ADR Control Module
18084	P1676	Drive by Wire-MIL Circ. Electrical Malfunction
18085	P1677	Drive by Wire-MIL Circ. Short to B+
18086	P1678	Drive by Wire-MIL Circ. Short to Ground
18087	P1679	Drive by Wire-MIL Circ. Open
18089	P1681	Contr.Unit Programming, Programming not Finished
18092	P1684	Contr.Unit Programming Communication Error
18094	P1686	Contr.Unit Error Programming Error
18098	P1690	Malfunction Indication Light Malfunction
18099	P1691	Malfunction Indication Light Open
18100	P1692	Malfunction Indication Light Short to Ground
18101	P1693	Malfunction Indication Light Short to B+
18102	P1694	Malfunction Indication Light Open/Short to Ground
18112	P1704	Kick Down Switch Malfunction
18113	P1705	Gear/Ratio Monitoring Adaptation limit reached
18119	P1711	Wheel Speed Signal 1 Range/Performance
18124	P1716	Wheel Speed Signal 2 Range/Performance
18129	P1721	Wheel Speed Signal 3 Range/Performance
18131	P1723	Starter Interlock Circ. Open
18132	P1724	Starter Interlock Circ. Short to Ground
18134	P1726	Wheel Speed Signal 4 Range/Performance
18136	P1728	Different Wheel Speed Signals Range/Performance
18137	P1729	Starter Interlock Circ. Short to B+

18141	P1733	Tiptronic Switch Down Circ. Short to Ground
18147	P1739	Tiptronic Switch up Circ. Short to Ground
18148	P1740	Clutch temperature control
18149	P1741	Clutch pressure adaptation at limit
18150	P1742	Clutch torque adaptation at limit
18151	P1743	Clutch slip control signal too high
18152	P1744	Tiptronic Switch Recognition Circ. Short to Ground
18153	P1745	Transm.Contr.Unit Relay Short to B+
18154	P1746	Transm.Contr.Unit Relay Malfunction
18155	P1747	Transm.Contr.Unit Relay Open/Short to Ground
18156	P1748	Transm.Contr.Unit Self-Check
18157	P1749	Transm.Contr.Unit Incorrect Coded
18158	P1750	Power Supply Voltage Low Voltage
18159	P1751	Power Supply Voltage High Voltage
18160	P1752	Power Supply Malfunction
18168	P1760	Shift Lock Malfunction
18169	P1761	Shift Lock Short to Ground
18170	P1762	Shift Lock Short to B+
18171	P1763	Shift Lock Open
18172	P1764	Transmission temperature control
18173	P1765	Hydraulic Pressure Sensor 2 adaptation at limit
18174	P1766	Throttle Angle Signal Stuck Off
18175	P1767	Throttle Angle Signal Stuck On

18176	P1768	Hydraulic Pressure Sensor 2 Too High
18177	P1769	Hydraulic Pressure Sensor 2 Too Low
18178	P1770	Load Signal Range/Performance
18179	P1771	Load Signal Stuck Off
18180	P1772	Load Signal Stuck On
18181	P1773	Hydraulic Pressure Sensor 1 Too High
18182	P1774	Hydraulic Pressure Sensor 1 Too Low
18183	P1775	Hydraulic Pressure Sensor 1 adaptation at limit
18184	P1776	Hydraulic Pressure Sensor 1 range/performance
18185	P1777	Hydraulic Pressure Sensor 2 range/performance
18186	P1778	Solenoid EV7 Electrical Malfunction
18189	P1781	Engine Torque Reduction Open/Short to Ground
18190	P1782	Engine Torque Reduction Short to B+
18192	P1784	Shift up/down Wire Open/Short to Ground
18193	P1785	Shift up/down Wire Short to B+
18194	P1786	Reversing Light Circ. Open
18195	P1787	Reversing Light Circ. Short to Ground
18196	P1788	Reversing Light Circ. Short to B+
18197	P1789	Idle Speed Intervention Circ. Error Message from Engine Contr.
18198	P1790	Transmission Range Display Circ. Open
18199	P1791	Transmission Range Display Circ. Short to Ground
18200	P1792	Transmission Range Display Circ. Short to B+
18201	P1793	Output Speed Sensor 2 Circ. No Signal

18203	P1795	Vehicle Speed Signal Circ. Open
18204	P1796	Vehicle Speed Signal Circ. Short to Ground
18205	P1797	Vehicle Speed Signal Circ. Short to B+
18206	P1798	Output Speed Sensor 2 Circ. Range/Performance
18207	P1799	Output Speed Sensor 2 Circ. Rpm too High
18221	P1813	Pressure Contr.Solenoid 1 Electrical
18222	P1814	Pressure Contr.Solenoid 1 Open/Short to Ground
18223	P1815	Pressure Contr.Solenoid 1 Short to B+
18226	P1818	Pressure Contr.Solenoid 2 Electrical
18227	P1819	Pressure Contr.Solenoid 2 Open/Short to Ground
18228	P1820	Pressure Contr.Solenoid 2 Short to B+
18231	P1823	Pressure Contr.Solenoid 3 Electrical
18232	P1824	Pressure Contr.Solenoid 3 Open/Short to Ground
18233	P1825	Pressure Contr.Solenoid 3 Short to B+
18236	P1828	Pressure Contr.Solenoid 4 Electrical
18237	P1829	Pressure Contr.Solenoid 4 Open/Short to Ground
18238	P1830	Pressure Contr.Solenoid 4 Short to B+
18242	P1834	Pressure Contr.Solenoid 5 Open/Short to Ground
18243	P1835	Pressure Contr.Solenoid 5 Short to B+
18249	P1841	Engine/Transmission Control Modules Versions do not match
18250	P1842	Please check DTC Memory of instrument panel ECU
18251	P1843	Please check DTC Memory of ADR Control Module
18252	P1844	Please check DTC Memory of central electric control ECU

18255	P1847	Please check DTC Memory of brake system ECU
18256	P1848	Please check DTC Memory of engine ECU
18257	P1849	Please check DTC Memory of transmission ECU
18258	P1850	Data-Bus Powertrain Missing Message from Engine Contr.
18259	P1851	Data-Bus Powertrain Missing Message from Brake Contr.
18260	P1852	Data-Bus Powertrain Unplausible Message from Engine Contr.
18261	P1853	Data-Bus Powertrain Unplausible Message from Brake Contr.
18262	P1854	Data-Bus Powertrain Hardware Defective
18263	P1855	Data-Bus Powertrain Software version Contr.
18264	P1856	Throttle/Pedal Pos.Sensor A Circ. Error Message from Engine Contr.
18265	P1857	Load Signal Error Message from Engine Contr.
18266	P1858	Engine Speed Input Circ. Error Message from Engine Contr.
18267	P1859	Brake Switch Circ. Error Message from Engine Contr.
18268	P1860	Kick Down Switch Error Message from Engine Contr.
18269	P1861	Throttle Position (TP) sensor Error Message from ECM
18270	P1862	Data Bus Powertrain Missing message from instr. panel ECU
18271	P1863	Data Bus Powertrain Missing Message from St. Angle Sensor
18272	P1864	Data Bus Powertrain Missing message from ADR control module
18273	P1865	Data Bus Powertrain Missing message from central electronics
18274	P1866	Data Bus Powertrain Missing messages

Guarantee

The *liquid* is guaranteed for one year from the date of purchase, under normal use conditions and handling, please keep your receipt as proof of purchase.

The guarantee also extends to liquid kits if they are assembled by the user using heat glue. If the units is assembled with anything other than heat glue then the no guarantee can be offered.

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