DIAGNOSTIC PROCEDURES

GENERAL

Here is the basic order suggested to diagnose a suspected fuel injection related problem:

– Check the chart in TROUBLESHOOTING section to have an overview of problems and suggested solutions.
– Check if there is a MAINT signal reported by the vehicle information center. If so, use the VCK (Vehicle Communication Kit) and look for fault codes to diagnose the trouble.
– Check all fuses.
– Check air/fuel rail pressure.
– Check spark plugs condition.
– Check if the RAVE valves are stuck.
– Check fuel pump pressure.
– Check air compressor pressure.

Self-Diagnostic Mode

It is self-activated when the safety lanyard cap is being installed on the watercraft post. It gives immediate monitoring. Refer to the following chart.

SIGNAL	CAUSE	REMEDY
2 short beeps (when installing safety lanyard on watercraft post).	• Safety lanyard is recognized by the MPEM. • Good contact between safety lanyard cap and DESS post.	• Engine can be started normally.
1 long beep (when installing safety lanyard on watercraft post or when pressing start/stop button).	• Bad connection between safety lanyard cap.	• Remove and replace the safety lanyard on the post until 2 short beeps are heard to indicate the system is ready to allow engine starting.
	• Unprogrammed or defective safety lanyard.	• Use the safety lanyard that has been programmed for the watercraft. If it does not work, check safety lanyard condition with the programmer. Replace safety lanyard if reported defective.
	• Dried salt water or dirt in safety lanyard cap.	• Clean safety lanyard cap to remove dried salt water or dirt.
	• Improper operation of MPEM or defective wiring harness.	• Refer to ENGINE MANAGEMENT.
1 second beep every second intervals.	• Drowned mode is active.	• Release throttle to cancel this mode.
4 short beeps every 3 seconds interval for 2 hours.	• Safety lanyard has been left on its post without starting engine or after engine was stopped.	• To prevent battery discharge, remove the safety lanyard from its post.

SIGNAL	CAUSE	REMEDY
A **2 seconds beep** every 2 seconds intervals.	• Exhaust system overheat.	• Refer to COOLING SYSTEM.
A **2 seconds beep** every minutes intervals.	• Fuel tank level is low.	• Refill as soon as possible.
	• Very low battery voltage.	• Refer to CHARGING SYSTEM.
	• Coolant and exhaust gas temperature sensors or TPS (Throttle Position Sensor) or CPS (Crankshaft Position Sensor) malfunction.	• Refer to ENGINE MANAGEMENT.
	• MPEM malfunction.	• Refer to ENGINE MANAGEMENT.
A **2 seconds beep** every 15 minutes intervals.	• Oil injection reservoir level is low.	• Refill.
Continuous beep.	• Engine overheats.	• Refer to COOLING SYSTEM.

FAULT DETECTION AND COMPENSATORY ACTIONS

For a basic overview of the monitoring system and the limp home modes, see OVERVIEW section.

COMPONENT FAILURE WARNING SYSTEM

Sensor Failures

Refers to open or short circuit failures on sensors, drivers, injectors or ignition.

PROBLEM	INFO CENTER	RED LED	BUZZER	BUZZER CODE	LIMP HOME MODE ①
Manifold air pressure sensor (MAPS)	"MAINT"	ON	OFF	7	Limited RPM
Manifold air temperature sensor (MATS)	"MAINT"	ON	OFF	7	Limited RPM
Throttle position sensor (single TPS)	"MAINT"	ON	ON	5	Limited RPM (idle speed if both TPS's fail)
Water temperature sensor (WTS)	"MAINT"	ON	OFF/(ON)	7/(5)	Limited RPM (code 5 if EGTS also fails)
Direct injector (single injector)	"MAINT"	ON	OFF	7	Limited RPM
Fuel injector (single injector)	"MAINT"	ON	OFF	7	Limited RPM
Ignition (no firing on one cylinder)	"MAINT"	ON	OFF	7	Limited RPM
RAVE solenoid	"MAINT"	ON	OFF	7	Limited RPM
Starter solenoid	"MAINT"	ON	OFF	7	Engine may not start.
Fuel pump	"MAINT"	ON	OFF	7	Limited RPM
Exhaust gas temperature sensor (EGTS)	"MAINT"	ON	OFF/(ON)	7/(5)	Limited RPM (code 5 if WTS also fails)
Fuel level sensor	"MAINT"	ON	OFF	7	None
Diagnostic cap fault	"MAINT"	ON	OFF	7	None
Knock sensor	"MAINT"	ON	OFF	7	Limited RPM
Engine drowned mode activated (it is not a fault)	None	None	ON	2	Engine will not run. Release throttle

① To see how the normal operation is recovered from the limp home mode, see the DI FAULT CODES CHART elsewhere in this section. Look in column **"Normal operation resumes if fault removed and..."**.

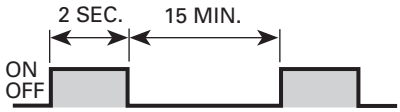
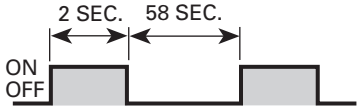
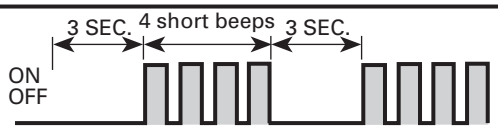
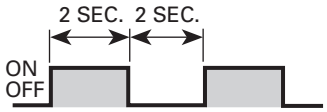
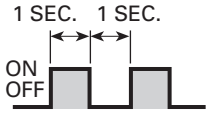
System Failures

Refers to operating conditions outside normal and/or safe ranges such as demand system failures, extreme voltages, over temperature conditions or low fuel/oil levels.

PROBLEM	INFO CENTER	RED LED	BUZZER	BUZZER CODE	LIMP HOME MODE ①
Manifold air pressure sensor (MAPS), ATM fault (bad atmospheric pressure reading)	"MAINT"	ON	OFF	7	Limited RPM
Throttle "MAINT" position sensor (single TPS)	"MAINT"	ON	ON	3	Limited RPM
Throttle position sensor (dual TPS)	"MAINT"	ON	ON	5	Idle RPM
Throttle position sensor (single adaption fault)	None	OFF	OFF	7	None
Throttle position sensor (dual adaption fault)	"MAINT"	ON	OFF	7	Limited RPM
Sensor supply fault (TPS and MAPS)	"MAINT"	ON	ON/OFF	5/(7)	Limited RPM (code 7 and idle RPM if both in fault)
Encoder (CPS) fault (bad pattern)	"MAINT"	ON	OFF	7	Limited RPM
Low battery voltage	"12 V LOW"	ON	OFF	7	None
Very low battery voltage	"12 V LOW" "MAINT"	ON	ON	5	Limited RPM
High battery voltage	"MAINT"	ON	OFF	7	None
Very high battery voltage	"MAINT"	ON	OFF	7	Idle RPM
High water temperature	"HI-TEMP"	ON	ON	1	None
Exhaust over temperature	"HI-TEMP"	ON	ON	3	None
Low oil level	"OIL-LOW"	ON	ON	6	None
Low fuel level	"FUEL-LO"	ON	ON	5	None
Setup fault (TDC or TPS not set on a new MPEM)	"MAINT"	ON	OFF	7	Idle RPM
MPEM fault	"MAINT"	ON	OFF	7	Engine will not start

① To see how the normal operation is recovered from the limp home mode, see the DI FAULT CODES CHART elsewhere in this section. Look in column **"Normal operation resumes if fault removed and..."**.

Buzzer Code

BUZZER CODE	BUZZER PATTERN	NOTE
7		Always OFF
6		2 second beep every 15 minutes
5		2 second beep every 58 seconds
4		4 short beeps every 3 seconds
3		2 second beep every 2 seconds
2		1 second beep every second
1		Always ON (continuously beep)

F18R0BS

VCK (VEHICLE COMMUNICATION KIT)

The VCK (Vehicle Communication Kit) (P/N 529 035 981) is the primary tool to diagnose fuel injection related problems.

B.U.D.S. is designed to allow, among other things, the programming of safety lanyard(s), entering customer information, engine monitoring, sensor inspection, diagnostic options and adjustment such as the Throttle Position Sensor (TPS) and the ignition timing setting.

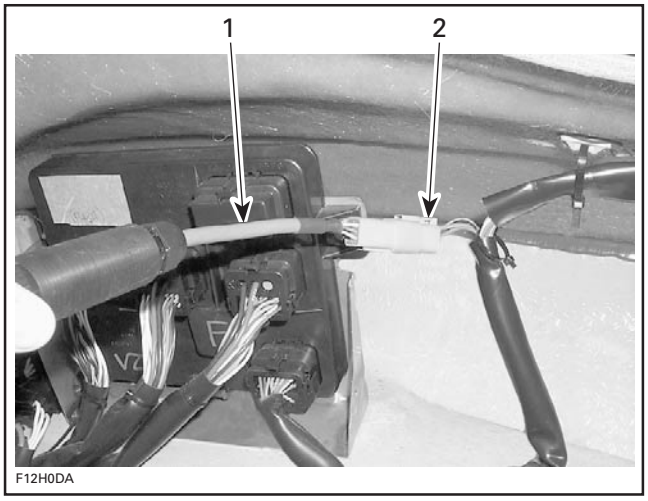
For more information pertaining to the use of the software B.U.D.S., use its help which contains detailed information on its functions.

⚠ WARNING

If the computer you are using is connected to the 110 Vac power outlet, there is a potential risk of electrocution when working in contact with water. Be careful not to touch water while working with the VCK.

Electrical Connections

DI Models Through the 6-Pin Connector



1. 6-pin adapter
2. Connector close to MPEM

After all connections are done, connect the safety lanyard to the DESS post to activate the communication.

IMPORTANT: When using the software B.U.D.S., ensure that the protocol matching the connection used is properly selected in "**MPI**" under "**Choose protocol**" as per the following chart.

TYPE OF CONNECTION	ADAPTER TO USE	PROTOCOL TO CHOOSE
DI models through the 6-pin connector	6-pin	947-DI

IMPORTANT: When using the software B.U.D.S., with the DI engines, ensure that the protocol "947 DI" is properly selected in "**MPI**" under "**Choose protocol**".

Refer to the tables below for the fault codes you will find in the B.U.D.S.

DI SYSTEM FAULT CODES

General

The faults registered in the MPEM are kept when the battery is disconnected.

Be aware that a red light blinking with the **MAINT** message may not be for a fault code. It may be a maintenance inspection reminder. Press and hold the **SET** button of the information center for 2 seconds. If the blinking continues, it is a fault code. Use the VCK (Vehicle Communication Kit) to see it. Otherwise, it was a maintenance reminder.

IMPORTANT: After a problem has been solved, ensure to clear the fault(s) in the MPEM using the VCK. This will properly reset the appropriate counter(s). This will also records that the problem has been fixed in the MPEM memory.

Many fault codes at the same time is likely to be burnt fuse(s).

For more information pertaining to the code faults (state, count, first etc.) and report, refer to B.U.D.S. online help.

Supplemental Information for Some Specific Faults

ECU fault code P0606: This code may occur in the following situations:

– Electrical noise is picked up by the MPEM. Ensure that all connections are in good condition, also grounds (battery, MPEM, engine and ignition system), they are clean and well tightened and that all electronic components are genuine – particularly in the ignition system. Installing resistive caps, non-resistive spark plug cables (or modified length), non-resistive spark plugs or improper knock sensor wiring/routing may lead to generate this fault code.
– Electrical noise might also lead engine to occasional cutout without generating a fault code when engine is restarted. When looking at the fault code, pay attention to the "count" value in the software B.U.D.S. A value between 1 and 9 confirms an electrical noise problem. A value of 10 and above will generate a fault code.
– When installing a new MPEM. It is not properly programmed from the factory. The MPEM must be returned to be properly "activated".
– If everything is in good condition, replace the MPEM.

When using the service action suggested in the Fault section of B.U.D.S., the system circuits are referred as 4-23 for instance. It means AMP connector no. 4 and the circuit wire no. 23 as found in the wiring diagram.

TPS (Throttle Position Sensor) Faults

Faults which are reported in B.U.D.S. fall into two groups TPS faults and adaption faults. These are displayed on the B.U.D.S. system as TPS OUT OF RANGE and TPS ADAPTION FAILURE.

TPS "OUT OF RANGE" Fault

It is caused by the sensor reading going out of its allowable range. This fault can occur during the whole range of movement of the throttle.

To diagnose this fully, it is recommended to operate the throttle through its full range. It is also recommended to release the throttle quickly as this may also show up a fault that is intermittent.

POSSIBLE CAUSES	RESULT	ACTION
Check if wrong connector is connected to TPS.	Yes	• Fix.
Check if sensor is loose.	Yes	• Fix and reset closed TPS.
Inspect sensor for damage or corrosion.	Yes	• Replace and reset closed TPS.
Inspect wiring (voltage test).	Failed	• Repair.
Inspect wiring and sensor (resistance test).	Failed	• If bad wiring, repair. • If bad TPS, replace and reset closed TPS.
Test sensor operation (wear test).	Failed	• Replace and reset closed TPS.

TPS "ADAPTATION FAILURE" Fault

It is caused by the idle position moving out of an acceptable range.

POSSIBLE CAUSES	RESULT	ACTION
Sensor has been replaced and TPS closed position not reset.	Yes	• Reset closed TPS.
Throttle body has been replaced and TPS closed position not reset.	Yes	• Reset closed TPS.
MPEM has been replaced and TPS closed position not reset.	Yes	• Reset closed TPS.
Throttle cable too tight.	Yes	• Fix and reset closed TPS.
Sensor is loose.	Yes	• Fix and reset closed TPS.
Sensor is loose.	Yes	• Fix and reset closed TPS.
Throttle bracket is loose.	Yes	• Fix and reset closed TPS.
Idle screw or synchronization screw worn or loose.	Yes	• Fix and reset closed TPS.

DI System Fault Code Chart

FAULT CODE	DIAGNOSED COMPONENT/ SENSOR/CIRCUIT	ECU INTERNAL NAME	FAULT DETECTED	FAULT DETECTED WHILE ENGINE RUNNING	FAULT DETECTED WHILE ENGINE NOT RUNNING	NORMAL OPERATION RESUMES IF FAULT REMOVED AND...
P1100	Direct injector MAG	AIR _ INJ_1	Open or short circuit	Yes	No	Return to idle
Possible causes: Damaged injector, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for 1 - 1.6 ohm resistance between system circuits 4-15 and 4-5. Check for + 12 volts on pin A of injector connector (color).						
P1101	Direct injector PTO	AIR _INJ_2	Open or short circuit	Yes	No	Return to idle
Possible causes: Damaged injector, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for 1 - 1.6 ohm resistance between system circuits 4-21 and 4-6. Check for + 12 volts on pin A of injector connector (color).						
P0201	Fuel injector MAG	FUEL_ INJ_1	Open or short circuit	Yes	No	Return to idle
Possible causes: Damaged injector, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for 1.7 - 1.9 ohm resistance between system circuits 4-13 and 4-7. Check for + 12 volts on pin A of injector connector (color).						
P0202	Fuel injector PTO	FUEL_ INJ_2	Open or short circuit	Yes	No	Return to idle
Possible causes: Damaged injector, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for 1.7 - 1.9 ohm resistance between 4-14 and 4-8. Check for + 12 volts on pin A of injector connector (color).						
P0351	Ignition coil, primary winding MAG	IGN_CYL_1	Open or short circuit on ignition primary circuit	Yes	No	Return to idle
Possible causes: Damaged coil, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for .45 - .55 ohm resistance between system circuits 3-21 and 3-22. Check for + 12 volts on pin A of coil connector (color).						
P0352	Ignition coil, primary winding PTO	IGN_CYL_2	Open or short circuit on ignition primary circuit	Yes	No	Return to idle
Possible causes: Damaged coil, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for .45 - .55 ohm resistance between system circuits 3-20 and 3-23. Check for + 12 volts on pin A of coil connector (color).						

FAULT CODE	DIAGNOSED COMPONENT/ SENSOR/CIRCUIT	ECU INTERNAL NAME	FAULT DETECTED	FAULT DETECTED WHILE ENGINE RUNNING	FAULT DETECTED WHILE ENGINE NOT RUNNING	NORMAL OPERATION RESUMES IF FAULT REMOVED AND...
P0335	Encoder (CPS)	Encoder	Wrong pattern sensed	Yes	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. Damaged tooth wheel. Check correct rectifier regulator operation. **Service action:** Check for 12 volts on pin 5 and 5 volts on 6 and 0 volts on pin 4 of encoder harness connector. Check system circuits 2-6, 2-7, 2-14.						
P0120	TPS, PTO	TPI_1	Sensor out of range	Yes	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins, ECU failure, damaged or out of alignment throttle bodies or sensor. **Service action:** Check for 5 volts on pin 1 and 0-0.5 volts on pin 3 and 0 volts on pin 2. Check system circuits 4-1, 4-2, 4-18. Check with throttle closed the resistance between 1 and 2 is 2000 ohms and between 2 and 3 is 1000 ohms and between 1 and 3 2500 ohms. Check for linear resistance rise when opening throttles. Check physical stops for wear.						
P0220	TPS, MAG	TPI_2	Sensor out of range	Yes	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins, ECU failure, damaged or out of alignment throttle bodies or sensor. **Service action:** Check for 5 volts on pin 1 and 4.75-5.0 volts on 3 and 0 volts on pin 2. Check system circuits 3-5, 3-10, 3-14. Check with throttle closed the resistance between 1 and 2 is 2500 ohms and between 2 and 3 is 2500 ohms and between 1 and 3 1200 ohms. Check for linear resistance rise when opening throttles. Check physical stops for wear.						
P1102	TPS, PTO	TPI_1_ADAP	Throttle position adaption failure	Yes	No	Full reset. Key off and on
Possible causes: No initialization after throttle body or ECU changes throttle idle. Stop drifted. **Service action:** Check cable adjustment. Check Idle stop for wear. Check throttle angles at idle.						
P1103	TPS, MAG	TPI_2_ADAP	Throttle position adaption failure	Yes	No	Full reset. Key off and on
Possible causes: No initialization after throttle body or ECU changes throttle idle. Stop drifted. **Service action:** Check cable adjustment. Check Idle stop for wear. Check throttle angles at idle.						

FAULT CODE	DIAGNOSED COMPONENT/ SENSOR/CIRCUIT	ECU INTERNAL NAME	FAULT DETECTED	FAULT DETECTED WHILE ENGINE RUNNING	FAULT DETECTED WHILE ENGINE NOT RUNNING	NORMAL OPERATION RESUMES IF FAULT REMOVED AND...
P0116	WTS	COOL _SENS	Sensor out of range	Yes	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. **Service action:** Check for resistance approx. 2280 ohms to 2736 ohms at temperature of 19 to 21°C (66 to 70°F) between system circuits 4-9 and 4-11.						
P0217	WTS	COOL_RED	Overheat warning	Yes	No	As soon as fault is not present
Possible causes: Engine overheated, damaged sensor. **Service action:** Check for debris or blockage in cooling system. Check for resistance approx. 2280 ohms to 2736 ohms at temperature of 19 to 21°C (66 to 70°F) between system circuits 4-9 and 4-11.						
P0110	MATS	MCT_SENS	Sensor out of range	Yes	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. **Service action:** Check for resistance approx. 2280 ohms to 2736 ohms at temperature of 19 to 21°C (66 to 70°F) between system circuits 4-16 and 4-19.						
P0106	MAPS	MAP	Sensor out of range	Yes	No	Return to idle
Possible causes: Check sensing port for dirt or blockage. Sensor failure, unexpected reading at idle. Sensor fallen out of housing. Leaking Inlet system, ECU failure. **Service action:** Check system circuits 3-3, 3-6, 3-7. Check sensor connector for 5 volts on pin 1 and 0 volts on pin 3 and 0 volts on pin 2. Check sensor housing is correctly inserted into manifold.						
P0105	MAPS	MAP_ATM	Bad atmospheric reading	Yes	No	Full reset. Key off and on
Possible causes: Check sensing port for dirt or blockage, damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. **Service action:** Check system circuits 3-3, 3-6, 3-7. Check sensor connector for 5 volts on pin 1 and 0 volts on pin 3 and 0 volts on pin 2.						
P1400	EGTS	EXH_SENS	Sensor out of range	Yes	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. **Service action:** Check for resistance approx. 2280 ohms to 2736 ohms at temperature of 19 to 21°C (66 to 70°F) between system circuits 4-10 and 4-12.						

FAULT CODE	DIAGNOSED COMPONENT/ SENSOR/CIRCUIT	ECU INTERNAL NAME	FAULT DETECTED	FAULT DETECTED WHILE ENGINE RUNNING	FAULT DETECTED WHILE ENGINE NOT RUNNING	NORMAL OPERATION RESUMES IF FAULT REMOVED AND...
P1401	EGTS	EXH_RED	Overheat warning	Yes	No	As soon as fault is not present
Possible causes: Exhaust system overheated, damaged sensor damaged circuit wires. **Service action:** Check for debris or blockage in cooling system. Check tune pipe injection valve.						
P0460	Fuel level sensor	FUEL_SENS	Sensor out of range	Yes	No	As soon as fault is not present
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. **Service action:** Check system circuits 2-4 and 2-18.						
P0230	Fuel pump	FUEL_PUMP	Open or short circuit	Yes, short circuit	Yes, open circuit	Return to idle
Possible causes: Damaged pump, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for resistance of 6-8 ohms between system circuits 4-24 and 4-26.						
P0475	RAVE solenoid	RAVE	Open or short circuit	Yes, open and short circuit	Yes, open circuit	Return to idle
Possible causes: Damaged solenoid, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for resistance of 30 ohms between system circuits 4-23 and 4-20.						
P1300	Starting system solenoid (winding)	CRANK	Open or short circuit	Yes, open and short circuit	Yes, open circuit	As soon as fault is not present
Possible causes: Damaged solenoid, damaged circuit wires, damaged connector, damaged ECU output pins. ECU failure. **Service action:** Check for resistance of 6 ohms between system circuits 3-19 and 3-15.						
P0563	Battery voltage	BV_HI_WARN	Battery voltage high	Yes	Yes	As soon as fault is not present
Possible causes: Battery failure, rectifier failure, battery terminal connection.						
P1500	Battery voltage	BV_HI_RED	Battery voltage very high	Yes	Yes	Full reset. Key off and on
Possible causes: Battery failure, rectifier failure, battery terminal connection.						

FAULT CODE	DIAGNOSED COMPONENT/ SENSOR/CIRCUIT	ECU INTERNAL NAME	FAULT DETECTED	FAULT DETECTED WHILE ENGINE RUNNING	FAULT DETECTED WHILE ENGINE NOT RUNNING	NORMAL OPERATION RESUMES IF FAULT REMOVED AND...
P0562	Battery voltage	BV_LO_WARN	Battery voltage low	Yes	Yes	As soon as fault is not present
Possible causes: Battery failure, rectifier failure, damaged circuit wires, battery terminal connection, damaged magneto, damaged connectors. **Service action:** Check fuse. Check system circuits 3-25 to battery + terminal, 2-26 to regulator 2 pin connector pin A, 2-25 to regulator 2 pin connector pin B.						
P1501	Battery voltage	BV_LO_RED	Battery voltage very low	Yes	Yes	Return to idle
Possible causes: Battery failure, rectifier failure, damaged circuit wires, battery terminal connection, damaged magneto, damaged connectors. **Service action:** Check fuse, check system circuits 3-25 to battery + terminal, 2-26 to regulator 2 pin connector pin A, 2-25 to regulator 2 pin connector pin B.						
P0122	Sensor supply (TPS, MAG and MAPS)	XDRP_1	Sensor 5 volt supply failure	Yes	Yes	Return to idle
Possible causes: Damaged circuit wires, associated sensor failure (TPI 2 or MAP), ECU fault. **Service action:** Check for shorts to ground or corrosion on the following system circuits 3-10 or 3-3.						
P0222	Sensor supply (TPS, PTO)	XDRP_2	Sensor 5 volt supply failure	Yes	Yes	Return to idle
Possible causes: Damaged circuit wires, associated sensor failure (TPI 1), ECU fault. **Service action:** Check for shorts to ground or corrosion on system circuit 4-18.						
P1600	ECU	SETUP	TDC and ECU not initialised	Yes	Yes	Reinitialise from B.U.D.S.
Possible causes: ECU not initialized, TDC not setup, throttle sensors not initialized. **Service action:** Initialize ECU.						
P0606	ECU	ECU_FAULT	Internal ECU faults	Yes	Yes	Full reset. Key off and on
Possible causes: Incorrect software, ignition noise causing errors, internal EE-PROM failure. **Service action:** Check ignition leads, coils and correct spark plugs, replace ECU.						

FAULT CODE	DIAGNOSED COMPONENT/ SENSOR/CIRCUIT	ECU INTERNAL NAME	FAULT DETECTED	FAULT DETECTED WHILE ENGINE RUNNING	FAULT DETECTED WHILE ENGINE NOT RUNNING	NORMAL OPERATION RESUMES IF FAULT REMOVED AND...
P0325	Knock sensor	KNOCK_SENS	Knock sensor failure	Yes, over 4500	No	Return to idle
Possible causes: Damaged sensor, damaged circuit wires, damaged connector, damaged ECU pins. ECU failure. **Service action:** Bring engine to 4500 RPM. If fault code appears, check for resistance approx. 4.8 ohms between system circuits 4-2 and 4-17.						
P1601	Diagnostic cap	COMMS_CAP	Diagnostic cap is not installed on wiring harness	Yes	Yes	As soon as fault is not present
Possible causes: Cap is not installed on wiring harness. **Service action:** Reinstall cap on wiring harness.						