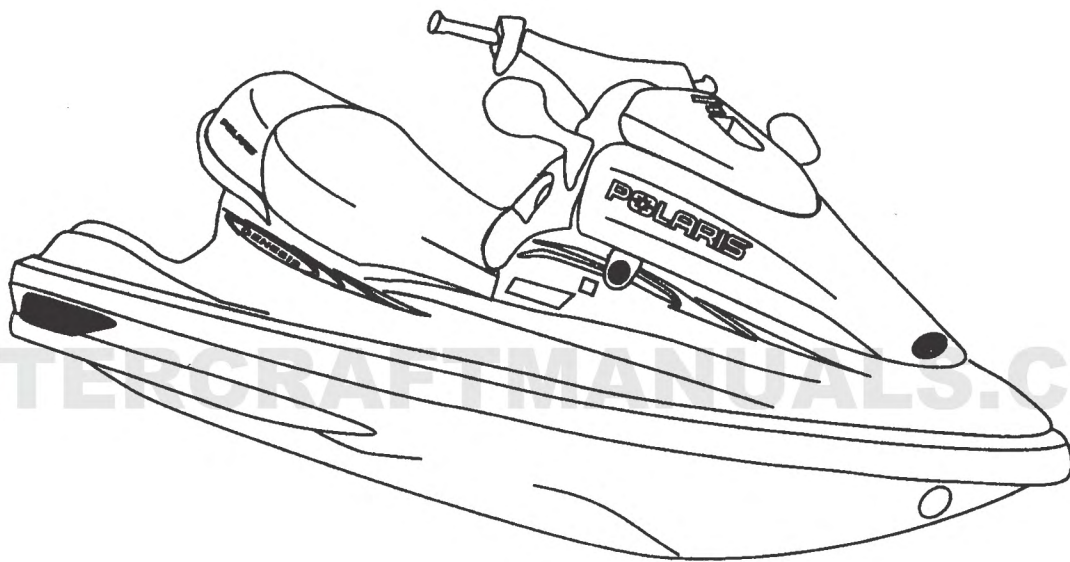




POLARIS[®]
The Way Out.

SERVICE PUBLICATIONS



FICHT[®] Fuel Injection Diagnostic Guide

PN 9916771

Introduction

The Polaris Diagnostic Software (PN 2873377) or **PODIAG** is intended to be used with a FFI™ Fuel Injection service manual to aid a technician in solving FFI™ service problems. It is important to remember that although computer diagnostics is a useful tool, the basics of 2-stroke technology applies to FFI™ watercraft.

NOTE: The 2000 FFI™ software (PN 2873377) is compatible with 1999 and 2000 Polaris Genesis FFI™ watercraft.

Hardware Requirements

⚠ WARNING

This software is intended to be used on a battery powered laptop computer. **To minimize electric shock hazard, DO NOT connect A.C. powered computers to the watercraft.**

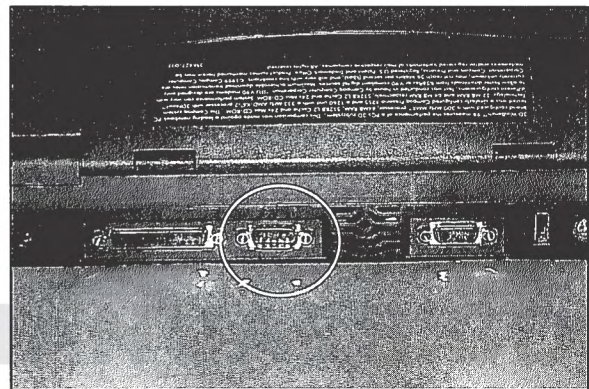
The Polaris Diagnostic Software will operate on a wide range of laptop computers. It has been tested on laptops using 286, 386, 486, Celeron™ and Pentium™-class processors, including AMD®. At least 400 kilobytes (K) of DOS memory must be available for the program to run. Polaris used a Compaq® Presario™ and a IBM® Thinkpad™ during the writing of this manual. Polaris recommends that either of these laptops be used since no hardware or software conflicts or problems arose during our testing and use.

Getting Started

In order for your laptop to be able to “Communicate” with the EMM on any Polaris FFI™ watercraft, your laptop **MUST** have a 9-PIN serial connector. A serial connector connects the processor inside your laptop to the processor inside the EMM.

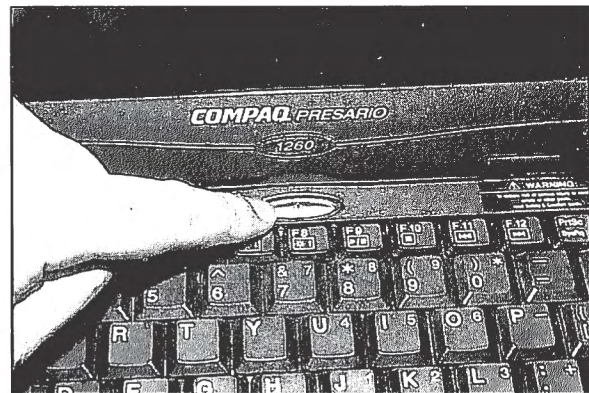
The picture to the right displays the back of a common laptop. The 9-PIN serial connector is circled.

Once you have identified these features on your laptop, you can begin to use your laptop to troubleshoot problems with a Polaris Genesis FFI™ watercraft.

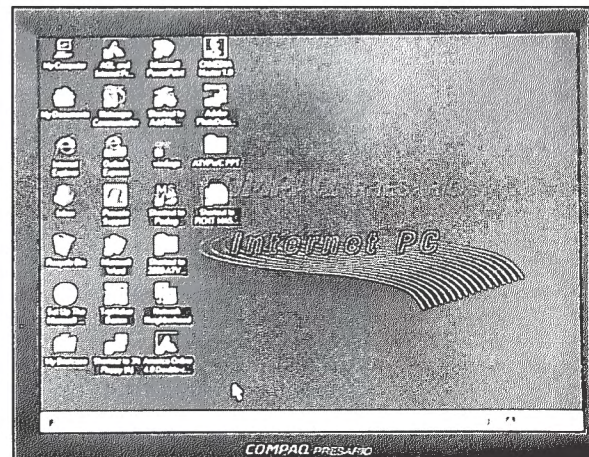


1. To begin with, first open the LCD screen on your laptop. There are usually two slide-latches on the back of the LCD screen that unlock the screen from the base of the laptop.
2. Turn on your laptop. This is usually done by pressing a power-on, power-off button. Be aware that some laptops will automatically turn on when the screen is opened.

NOTE: Be aware that while very few laptops will turn on when the screen is opened, many laptops will turn off if the LCD screen is closed. It is important to remember not to close the screen while running the FFI™ Diagnostic Software.

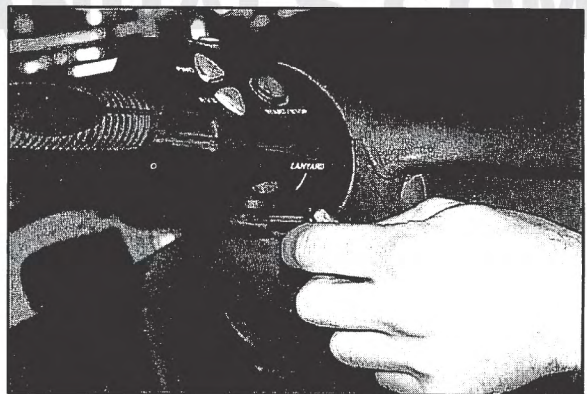
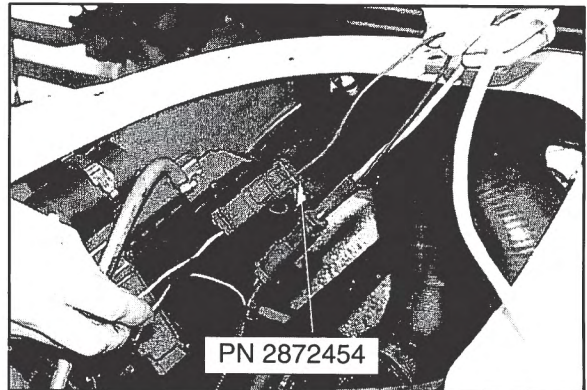
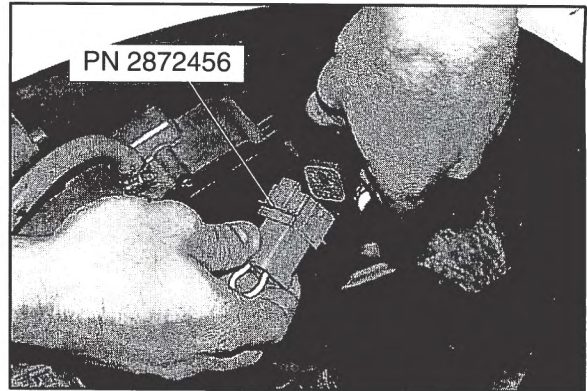


3. Allow the processor and hardrive to come “online” after turning your laptop on. Doing so ensures that all systems within the laptop are running correctly. You will know when your laptop is finished running its system checks when the pointer’s hourglass or Window’s™ flag disappears.



Connecting the Laptop to the EMM

1. Disconnect the 8 pin connector from the EMM. With the connector disconnected, connect the EMM Service Power Jumper, PN 2872456.
2. Separate the diagnostic harness. With the diagnostic harness separated, connect the EMM Lap Top Com Cord, PN 2872454, to the diagnostic harness.
3. The final step is to verify that the tether cord is inserted on the lanyard post. Without inserting the lanyard, the EMM will not be able to communicate with the laptop.



Verifying a Proper Connection

The Polaris Diagnostic software will prompt the user with the screen to the right if the laptop is not communicating with the EMM. If you receive this message, verify that all communication cords are connected, the jumper is installed on the 8 pin connector and that the lanyard is inserted in the stop switch. If these connections check out, disconnect everything, and restart the process.

The computer is having trouble communicating with the engine EMM.

Please check the following:

- Tether cord is connected to stop switch
- EMM service power connector is installed
- Battery connections are clean and tight
- Battery is charged
- All fuses and relays are good
- EMM electrical connections are clean and tight
- Communication cable connections are clean and tight

COMMUNICATION WILL CONTINUE
WHEN CONNECTION IS CORRECTED

DIAGNOSTICS

Polaris EMM Service Code Chart

CODE	DESCRIPTION
11	System Okay - No Fault
12	Throttle Position Sensor Circuit Malfunction
14	Throttle Position Sensor Above Expected Range
15	ROM Checksum Error
17	Alternator Voltage Below Expected Range
18	Alternator Voltage Above Expected Range
23	EMM Temperature Sensor Circuit Malfunction
24	EMM Temperature Sensor Below Expected Range
25	EMM Temperature Sensor Above Expected Range
39	Fuel Pump Open Load
41	Coolant Temperature Sensor Circuit Malfunction
42	Coolant Temperature Sensor Below Expected Range
43	Coolant Temperature Sensor Above Expected Range
44	Barometric Pressure Sensor Circuit Malfunction
45	Barometric Pressure Sensor Below Expected Range
46	Barometric Pressure Sensor Above Expected Range
47	Air Temperature Sensor Circuit Malfunction
48	Air Temperature Sensor Below Expected Range
49	Air Temperature Sensor Above Expected Range
51	#1 (MAG) Fuel Injector Open Load
52	#3 (PTO) Fuel Injector Open Load
53	#2 (CENTER) Fuel Injector Open Load
59	Fuel Pump Driver Overheated
81	#1 (MAG) Ignition Coil Open Primary
82	#3 (PTO) Ignition Coil Open Primary
83	#2 (CENTER) Ignition Coil Open Primary

NOTE: Bold service codes are "hard codes" that will initiate S.L.O.W.™

NOTE: A disconnected Throttle Position Sensor (TPS) WILL NOT display service code.

Ficht® Fuel Injection Troubleshooting Chart

SYMPTOM	POSSIBLE PROBLEM	ACTIONS
Will Not Turn Over	Tether Connection	Connect Tether
	Start/Stop Switch	Check start/stop switch with multi-meter. Replace as needed.
	Circuit from Start/Stop Switch to Solenoid	Check voltage at solenoid when start/stop switch is depressed. Correct as needed.
	Battery-to-Solenoid Circuit	Clean and re-torque battery terminals. Check voltage from battery lead at solenoid to engine ground. Correct as needed.
	Solenoid	Check voltage from solenoid terminal to engine ground. If needed, clean and re-torque connections. If correct voltage is still not present, replace solenoid.
	Solenoid-to-Starter Cable	Check for continuity. Clean and re-torque terminals.
	Starter	Remove starter and test. Reference service manual for starter diagnostics and service.
	Battery Condition	Remove battery and charge (See charging procedures in manual). If battery tests bad, replace.
	Circuit Breaker	Check voltage at output of circuit breaker. If not correct, replace.
	LR-503 Failure	Symptoms: Engine quits, no spark, no fuel pump operation, EMM won't wake up, bilge pump works, reverse works when pressing bilge switch and reverse switch simultaneously. If disconnecting the black/yellow on the LR-503 allows the engine to start, the LR module is bad. For 1999 models, if LR-503 fails, verify Bulletin PWC-99-07 has been completed.
	Ground Plate Contacts Bottom Side of Terminal Board	Correct Condition (See PWC-99-06 Service Bulletin)
Corrosion in Wire Harness Near Splices	Check harness and replace as needed.	
Seized Engine or Pump, Hydrolocked Engine	Visually inspect. Visually inspect inside of hull for signs of water.	

Starter Turns but Engine Will Not Start	12-pin Connector at the Rear of the EMM Not Properly Connected	Pull connector, make sure that all pins are secured in the body of the connector. Push connector in EMM until the connector "clicks".
	Stator Not Supplying Sufficient Current	Check voltage during cranking between stator wires 1-12, 2-11, 3-10, 4-9, 5-8.
	Fuel Level	Add known good fuel.
	Restricted or Leaking Fuel Delivery System	Check for damaged fuel lines. Pressure test fuel lines.
	Injector Current Supply	Test each injector with PODIAG. Also test each injector with a volt meter or timing light on individual injector leads while cranking engine.
	Ignition Coil Current Supply	Test each injector with PODIAG. Also test each injector with a volt meter or timing light on individual injector leads while cranking engine.
	Fuel Pump	Check fuel pump circuit. If OK, jump fuel pump to battery. If fuel pump fails to operate, replace pump. Check crankshaft position sensor (CPS) and the CPS circuit. Replace CPS if necessary. If CPS circuit is OK, replace EMM.
	MFI Failure	Jump P/W to Black at the LR-503 in electrical box. If engine starts, connection to MFI is bad. Correct connection. If problem persists, replace MFI.
	Main Wire Harness Failure	Test harness for continuity
	Starter	Check starter load. Reference service manual for starter diagnostics and service.
	Stop Switch Circuit	Check start/stop switch with multi-meter. Replace as needed.
	Crankshaft Position Sensor	Measure resistance of sensor. Should be 100-200 ohms.
	EMM	Rule out all other possibilities before replacing EMM.
Battery Condition	Inspect battery for low voltage. Charge or replace.	
Will Not Run at Certain Throttle Positions	Throttle Position Sensor (TPS)	Check resistance between red and black wire sensor pins should read greater than 3000 ohms. Move one meter lead to green wire pin and move sensor arm smoothly. Meter reading should change evenly with arm movement. Retain meter lead on green wire pin and alternate the other lead to the other sensor pin. Repeat procedure. Any erratic meter reading change indicates a TPS problem.
	EMM	Rule out all other possibilities before replacing EMM.
	Battery Condition	Inspect battery for low voltage. Charge or replace.
Engine Runs, Will Not Stop When Start/Stop Button is Depressed, but Will When Tether is Pulled	Tachometer Signal Not Communicating to LR-503	Check 40-pin connector at EMM. Check continuity of yellow wire from 40-pin connector to termination and termination to LR-503.
Bilge Pump Runs By Itself When Engine Is Off	LR-503	Replace. Verify jumper wire is installed on 1999 models (See Service Bulletin PWC-99-07). Check reverse motor for possible contact with motor.

Engine Starts and Dies	Battery Connections/Battery Condition	Clean and re-torque. Check battery for proper voltage. Charge or replace battery.
	Stop Switch Circuit	Check start/stop switch with multi-meter. Replace as needed.
	Fuel Pump	If fuel pressure is below specification, replace pump.
	Check Ground Connections in Electrical Box	Clean and re-attach terminations as required.
	Check Integrity of Pin Connections in Wiring Harness	Repair pin connections as required.
	One or More Injectors Not Working	Test each injector with PODIAG. Also test each injector with a volt meter or timing light on individual injector leads while cranking engine.
	One or More Ignition Coils Not Working	Test each injector with PODIAG. Also test each injector with a volt meter or timing light on individual injector leads while cranking engine.
	Low Power from Stator	Check voltage during cranking between stator wires 1-12, 2-11, 3-10, 4-9, 5-8.
	LR-503	If disconnecting the black/yellow on the LR-503 allows the engine to start, the LR-503 is bad. If the LR-503 fails on a 1999 model, verify Service Bulletin S-99-07 has been completed.
	Ground Plate Contacts Bottom Side of Terminal Board	Correct Condition (See PWC-99-06 Service Bulletin)
Engine Starts but Runs Rough	Current Supply to Individual Coil or Coil Itself	Test each injector with PODIAG. Also test each injector with a volt meter or timing light on individual injector leads while running engine.
	Current Supply to Individual Injector or Injector Itself	Test each injector with PODIAG. Also test each injector with a volt meter or timing light on individual injector leads while running engine.
	Stator Coils	Check voltage during cranking between stator wires 1-12, 2-11, 3-10, 4-9, 5-8.
	Fuel System	Check fuel lines/connections for kinks or leaks
	EMM	Rule out all other possibilities before replacing EMM.
	Exhaust Hose Between Log Manifold and Pipe	Check hose and clamps. Tighten clamps and replace hose as needed.
	Battery Condition	Inspect Battery for proper voltage. Charge or replace.
Engine Starts, Runs, Cuts Out Above 2500 RPM	Current Supply to Individual Coil or Coil Itself	Test each injector with a volt meter or timing light on individual injector leads while running engine.
	Current Supply to Individual Injector or Injector Itself	Test each injector with a volt meter or timing light on individual injector leads while running engine.
	S.L.O.W. Activated	Check for overheat condition
	Stator Switching Failure	Replace stator
	EMM	Rule out all other possibilities before replacing EMM.
	Battery Condition	Inspect Battery for proper voltage. Charge or replace.

This guide is to be used in conjunction with the appropriate Genesis FFI™ service manual.