

# MerCruiser / TechMate SCAN TOOL



## Outboard Engine Supplement

Version 6 Software

***Rinda Technologies, Inc.***

[www.rinda.com](http://www.rinda.com)



# **MerCruiser / TechMate**

## **SCAN TOOL**

### **Outboard Engine Supplement**

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# Safety Precautions

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**Before attempting to use the Scan Tool please read and observe the following safety precautions:**

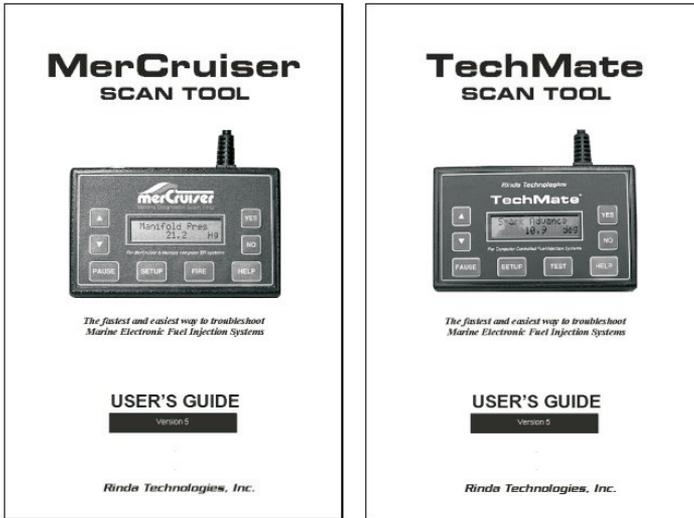
- Always refer to and follow the engine and boat manufacturer's safety and service procedures to prevent personal injury and equipment damage.
- Never connect or disconnect the scan tool with the vehicle's ignition turned ON or while the engine is running.
- Always stay clear of any moving or movable engine components when connecting and using the scan tool.
- When working near marine batteries never use any device that is capable of producing a spark, high temperature or open flame. Marine batteries contain sulfuric acid and produce highly explosive gasses that may ignite. To prevent serious injury always observe this precaution along with the safety precautions provided by the engine, boat and battery manufacturers.
- Always test and service a running engine in a well ventilated area.
- Always wear approved eye protection.

## **IMPORTANT**

- This scan tool is a sensitive electronic instrument. Handle the tool with extreme care.
- DO NOT subject the scan tool to excessive water spray or expose it to rain. The scan tool is water resistant but **not water proof**.
- DO NOT leave the scan tool in direct sunlight for extended periods of time or subject it to extreme temperatures (hot or cold).
- ALWAYS store the scan tool in its protective carrying case (# 94015) when not in use. If you do not have a carrying case, store the scanner in its original packaging.

## About this supplemental publication

This publication is intended as a supplement to the main scan tool User Guide. Please refer to the MerCruiser or TechMate Scan Tool User Guide (Fig 1) that was supplied with your tool for important fundamental information on features and operation.



**Figure 1 Main Scan Tool User Guides**

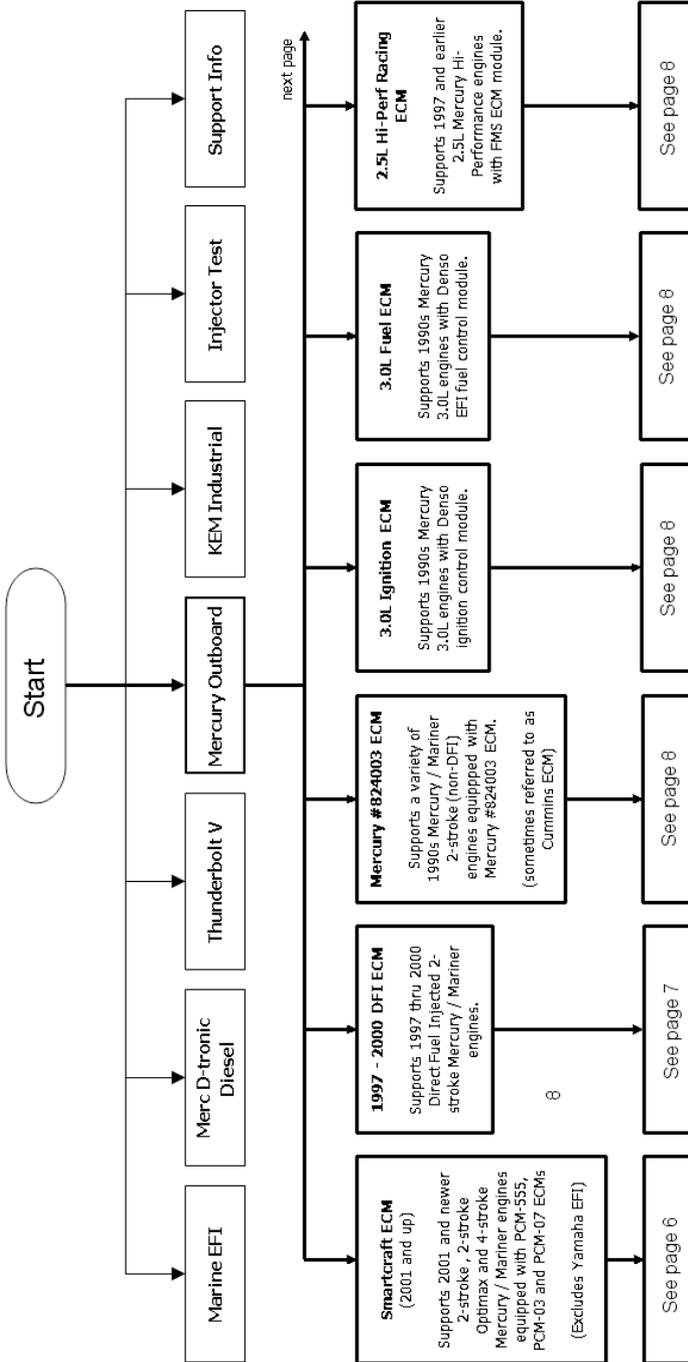
## Outboard System Support

The MerCruiser and TechMate scan tools support a variety of Mercury outboard electronic engine control systems. Following is a general summary of supported system types. For specific details, please refer to the appropriate section of this manual based upon the type of engine control module (ECM) you are working with.

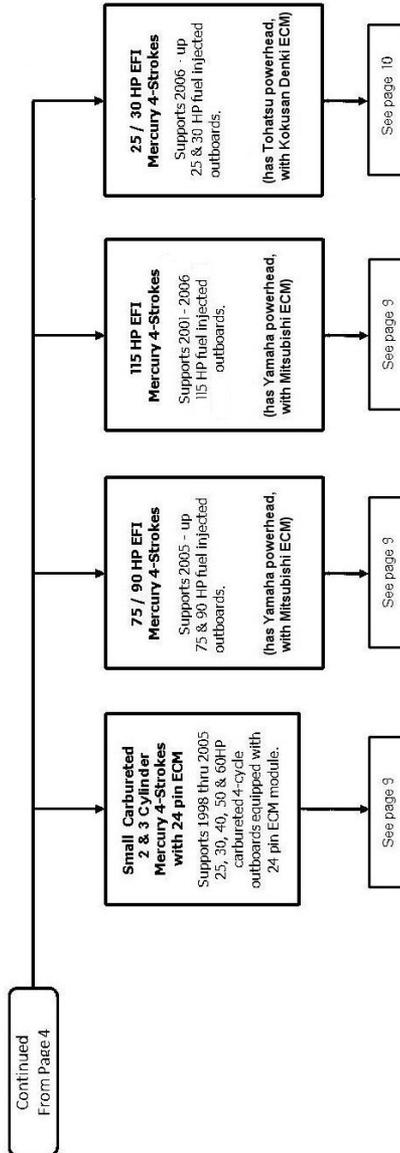
### ***Outboard control systems supported:***

- Mercury PCM-555 / ECM-555 equipped (Smartcraft) ECMs
- Mercury 1997-2000 DFI ECMs
- Mercury #824003 Fuel ECM
- Mercury 3.0L Ignition ECM
- Mercury 3.0L Fuel ECM
- Mercury Racing 2.5L hi-perf (FMS ECM)
- Mercury 25, 30, 40, 50, 60 HP 4-strokes (24 pin Motorola ECM)
- Mercury 25 / 30 HP EFI 4-strokes (with Tohatsu powerheads)
- Mercury 75 / 90 / 115 HP EFI 4-strokes (with Yamaha powerheads)

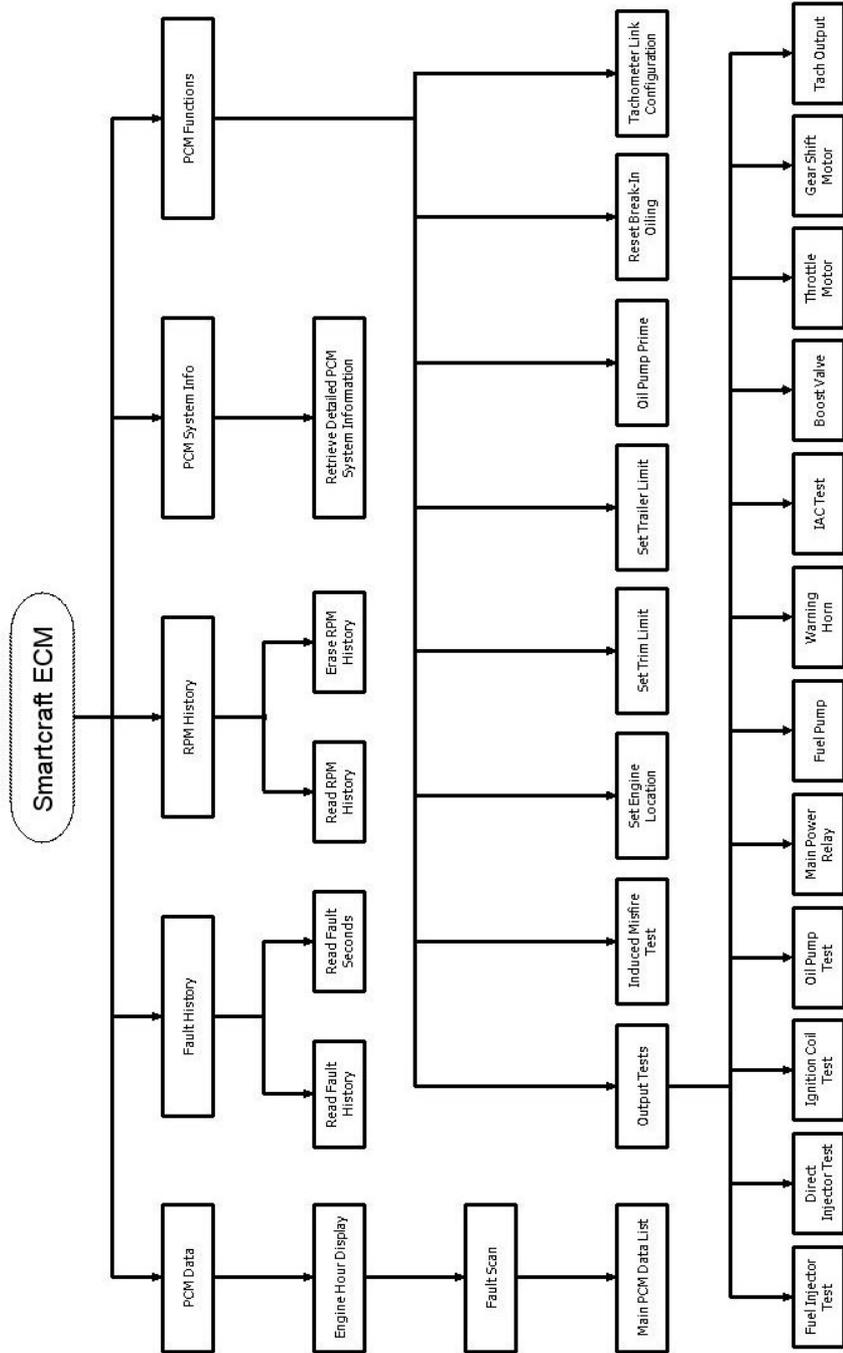
# Function Flowcharts



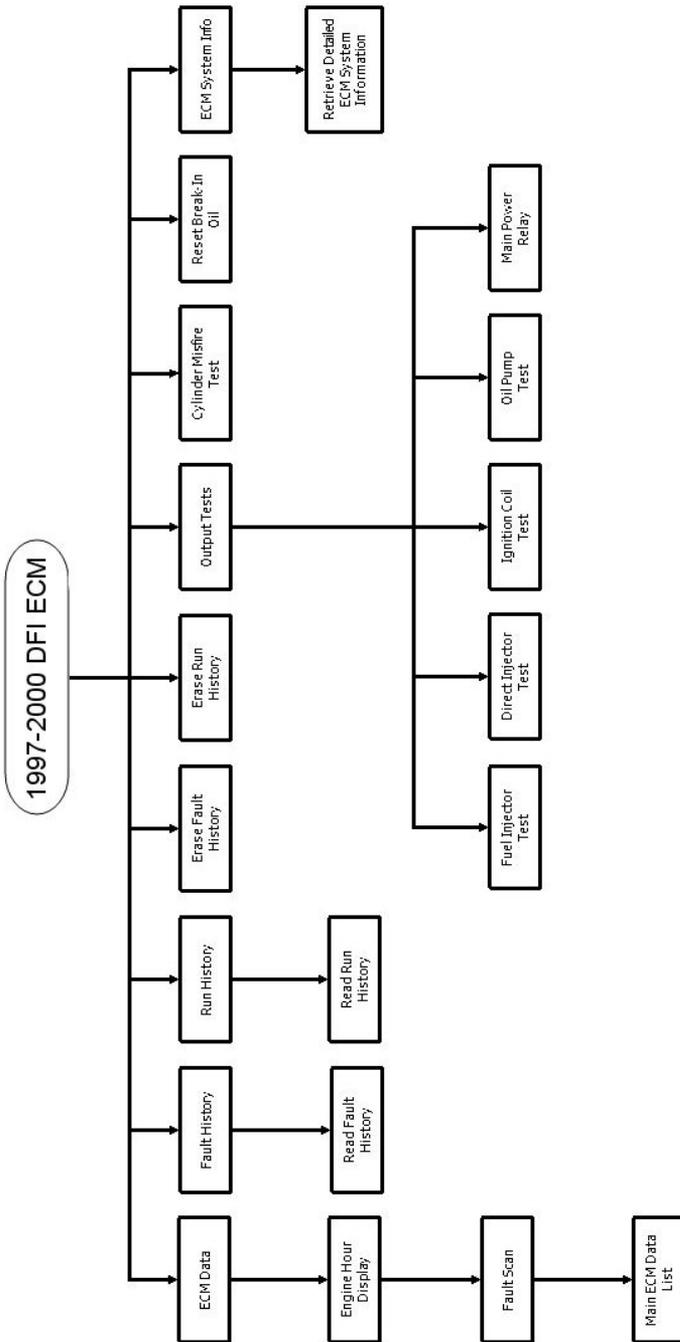
# Function Flowcharts



# Function Flowcharts

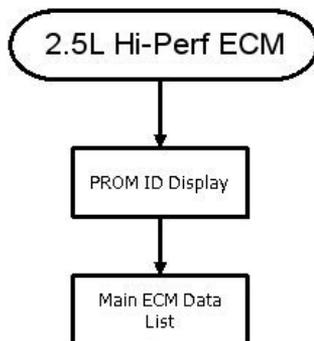
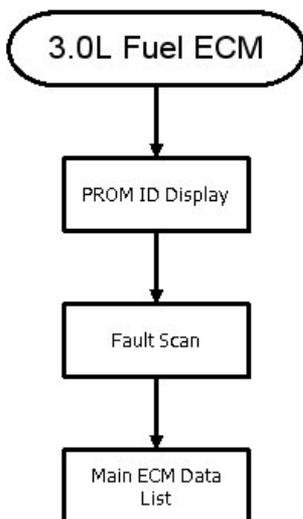
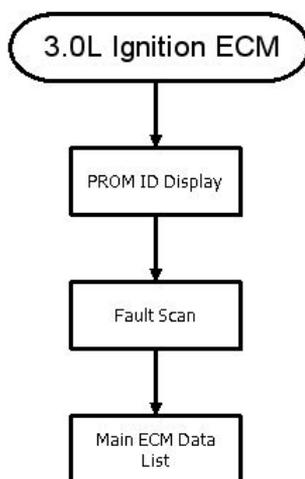
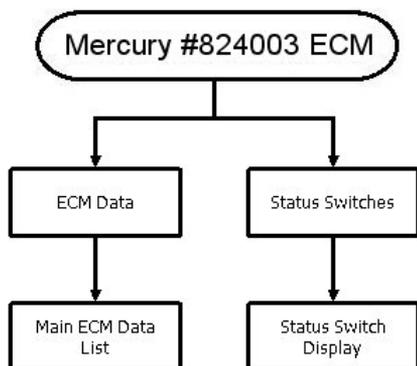


# Function Flowcharts



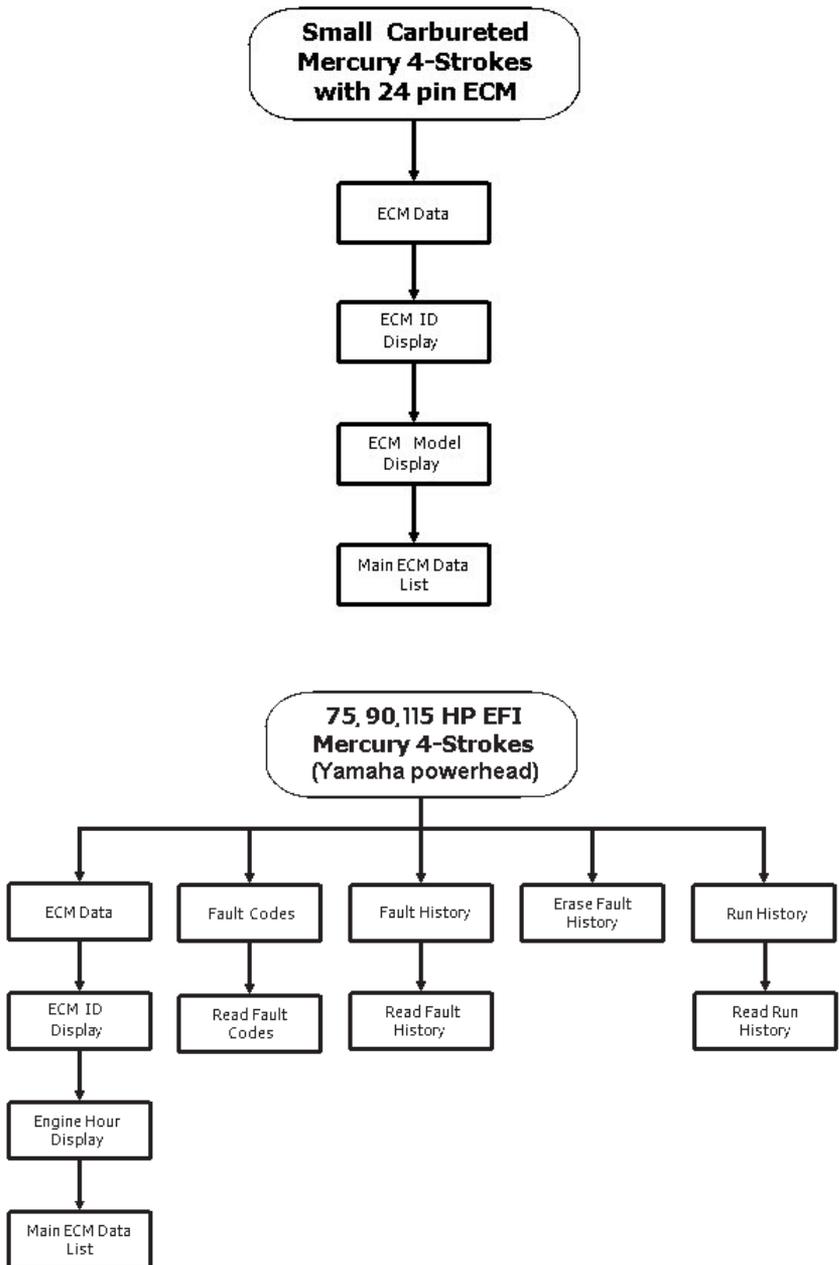
# Function Flowcharts

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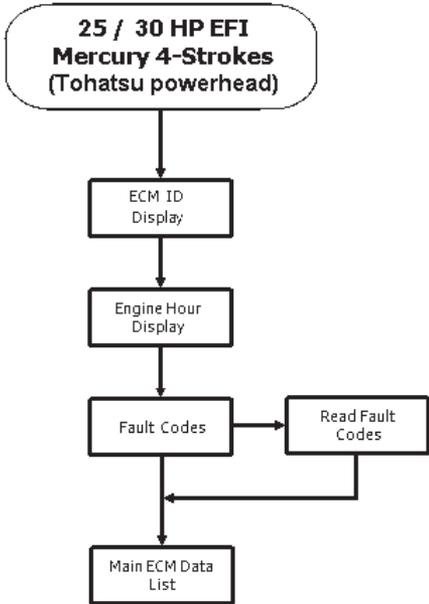
# Function Flowcharts

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# Function Flowcharts

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**PCM-555**



**ECM-555**

This section describes scan tool functions related to Mercury outboard engines equipped with **Mercury PCM-555** or **ECM-555** SmartCraft compatible EFI modules. This system type was introduced on a variety of Mercury outboard engines in 2001. We will use the term "**PCM**" to refer to both styles of modules.

## Connecting to a PCM equipped engine.

The scan tool provides an extensive set of diagnostic and support functions for troubleshooting engines equipped with the PCM SmartCraft engine control system. Connection and operation of the tool is simple and straight forward.

- 1) Locate the engine's 4 pin (or 2-pin on some models) diagnostic link connector (DLC). The location of this connector is specified in the engine's service manual and may vary depending upon the engine type.



**Adapter 94006**



**Adapter 94028**

- 2) With the engine's ignition switch in the OFF position, plug the scan tool's communication cable into the diagnostic connector. Scan tool adapter **#94006** is required for 4 pin applications, adapter **#94028** is required for 2-pin applications.
- 3) Once the tool is connected, turn the ignition switch ON and start the engine if necessary. Note the **#94028 adapter** requires a separate battery connection: **Red** to +12vdc and **Black** to engine ground to provide power to the scan tool.

# SmartCraft PCM

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- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the “**Mercury Outboard**” operating mode from the main menu, then press the **YES** key to select it. Next, select “**Smartcraft PCM**”.

## Obtaining Data

After selecting the “**Smartcraft PCM**” function the scan tool will attempt to communicate with the engine’s fuel injection computer and automatically identify it. After an identification is made you will be presented with several menu choices as follows:

- PCM Data**
- Fault History**
- RPM History**
- PCM System Info**
- PCM Functions**

To obtain diagnostic data and system trouble codes, select the “**PCM Data**” function. This menu choice causes the scanner to begin reading information from the PCM module. The scanner will prompt for your input as follows:

- 1) Selecting the “**PCM Data**“ function causes the scanner to communicate with the engine’s PCM control module and automatically provide you with the number of **Operating Hours** the engine has logged.
- 2) Once the engine operating hours have been displayed the scanner will prompt you to display any currently stored system faults. Selecting **YES** will cause the scanner to interrogate the PCM’s “**Fault Memory**”. If any faults are present, their descriptions will be displayed.

### *Important Note on PCM Faults:*

The PCM-555 engine control module stores faults concurrently in two different areas of it’s internal memory. One area, called the “**Fault Memory**”, only stores faults that have been detected during the engine’s current Ignition-On cycle. These faults **will not** be retained after the ignition switch is turned OFF.

The second fault storage area is referred to as the “**Freeze Frame Memory**”. The Freeze Frame Memory retains the last 10 faults that the PCM has detected regardless of when they occurred and even if ignition power has been turned OFF. The Freeze Frame Memory also contains a snapshot of several critical engine parameters, such as the engine’s speed and temperature, for each fault that is stored. This information is helpful in making an accurate diagnosis and also useful for understanding why the fault occurred. See “**Fault History**” for additional details.

- 3) After the scanner displays a fault description it will give you the option to access the fault's associated "**Freeze Frame**" engine data. This data represents a snapshot of various engine parameters at the time the fault was detected. Use the ▲ and ▼ keys to recall and scroll through the fault's Freeze Frame data. After viewing the Freeze Frame data, press the **NO** key to return to the Fault Memory access mode.

*Note: While displaying Freeze Frame data a "ff:" will appear on the left side of the second line of the scanner's display.*

- 4) When all faults from the PCM's Fault Memory have been displayed, the scanner will provide you with the option of reviewing the faults or erasing them. The erase function will clear the PCM's "**Fault Memory**" to eradicate the faults that were stored during the present Ignition ON cycle. The faults and associated snapshot engine data stored in the PCM's "**Freeze Frame Memory**" will **not** be erased.
- 5) After the scanner has exited its fault access mode the tool will enter its "**Scanner**" mode. This mode allows you to select and display a wide variety of engine sensor and operating information. The displayed data is updated several times per second. Use the ▲ and ▼ keys to scroll through the available data. Use the **NO** key to exit the "Scanner" mode and return to the main menu.

## Fault History

The PCM-555 control module contains a non-volatile memory that is used to retain fault and operating history information. This information is retained in the PCM even if power is removed from the system and allows historical operating information to be recalled. This information is designed to aid a technician in diagnosing intermittent and past events. To view "**Fault History**" information, perform the following steps:

- 1) After selecting the "**Fault History**" function from the scanner's SmartCraft PCM menu you will be presented with a sub-menu containing the following choices:

### **Read Fault Hist**

### **Read Fault Sec**

- 2) Select the "**Read Fault Hist**" menu item then press **YES**. The scanner will now interrogate the PCM's "**Freeze Frame Memory**" to determine if any faults have occurred in the past. If any faults are found, their descriptions will be displayed.
- 3) After the scanner displays a fault description it will give you the option to access the fault's associated **Freeze Frame** engine data. This data represents a snapshot of various engine parameters at the time the fault was detected. Use the ▲ and ▼ keys to recall and scroll through the fault's Freeze Frame data. After viewing the Freeze Frame data press **NO** to return to the Fault History access mode.

# SmartCraft PCM

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*Note: While displaying Freeze Frame data a “ff:” will appear on the left side of the second line of the scanner’s display.*

- 4) When all faults from the PCM’s Freeze Frame Memory have been displayed the scanner will provide you with the option of reviewing the faults or erasing them. The erase function will clear the PCM’s “**Freeze Frame Memory**” to eradicate the PCM’s fault history data . The faults and associated snapshot engine data stored in the PCM’s “**Freeze Frame Memory**” (including Fault Seconds, described in the next paragraph) will be completely erased.

## Fault Seconds

When critical faults occur and remain active the PCM keeps track of how many seconds the fault has persisted during engine operation. The type and number of critical faults this function keeps track of is pre-selected by the engine manufacturer. All PCM faults **do not** have an associated “Fault Second” counter assigned to them, only a select number of fault types are kept track of. To view “**Fault Seconds**” information perform the following steps:

- 1) After selecting the “**Fault History**“ function from the scanner’s Smartcraft PCM menu you will be presented with a sub-menu having two choices:

**Read Fault Hist**

**Read Fault Sec**

- 2) Select the **Read Fault Sec** menu item then press **YES**. The scanner will now read the PCM’s “**Fault Second Memory**” and display the number of seconds each critical fault has persisted. Use the ▲ and ▼ keys to recall and scroll through the Fault Second data. After viewing the Fault Second data, press the **NO** key to return to the Fault History access mode.

*Note: The **Fault Seconds** information is erased when the Fault History’s “**Freeze Frame Memory**” is cleared. See the prior section describing Fault History for details.*

## RPM History

PCM control modules have the ability to record the number of hours an engine has been operated within a predetermined set of RPM ranges. These ranges are set at the factory and allow a service technician to view a profile of how a particular engine has been operated. To view “**RPM History**” information perform the following steps:

- 1) After selecting the “**RPM History**“ function from the scanner’s Smartcraft PCM menu you will be presented with a sub-menu containing the following choices:

## **Read RPM History**

### **Erase RPM Hist**

- 2) Select the **Read RPM History** menu item then press **YES**. The scanner will now read the PCM’s “**RPM History Memory**” and display the number of hours the engine has operated in 9 sets of RPM ranges. Use the **▲** and **▼** keys to scroll through the RPM History data. After viewing the RPM History data press the **NO** key to return to the RPM History menu.

## **Erase RPM History**

This function clears the RPM History memory. The accumulated hours recorded for each of the nine RPM ranges will be reset to zero after this function is executed. Please note that the **Total Operating Hours** will **not** be cleared. This value is not erasable.

## **PCM System Info**

The PCM control module contains an area of memory that is used to store helpful text information for the service technician. This information consists of many lines of text which describe basic engine settings, capacities, etc, as well as PCM software revision information. The **System Info** data is entered into the PCM’s memory at the factory and may be read by performing the following steps :

- 1) After selecting the “**PCM System Info**“ function from the main Smartcraft PCM menu the scanner will begin to display the first line of **System Info** text from the PCM’s memory. Use the following keys to navigate through the multiple lines of **System Info** text information:

### **Keys to control System Info display:**

Use the **▲** key to repeat the line of information currently scrolling across the scanner’s display screen.

Use the **▼** key to skip to the next available line of system information.

Use the **PAUSE** key to momentarily pause the scrolling display.

Use the **NO** key to abort the System Info function and return to the main SmartCraft PCM menu.

- 2) After the scanner displays the last line of system information it will automatically return to the main Smartcraft PCM menu.

# SmartCraft PCM

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## PCM Functions

The **PCM Functions** menu option allows a technician to access a variety of PCM functional tests and settings. To access the PCM Functions menu perform the following steps:

- 1) After selecting “**PCM Functions**“ from the scanner’s Smartcraft PCM menu you will be presented with a sub-menu containing the following choices:

- Output Tests**
- Induced Misfire**
- Set Engine Loc**
- Set Trim Limit**
- Trailer Limit**
- Oil Pump Prime**
- Reset Brk-In Oil**
- Tach Link Config**

- 2) Use the ▲ and ▼ keys to select the desired menu item then press **YES**.

## PCM Function - Output Tests

The Output Test menu provides a technician with the ability to exercise various PCM actuators and controls in order to verify correct operation. Available output tests are:

- Fuel Inj Test**
- Direct Inj Test**
- Ign Coil Test**
- Oil Pump Test**
- Main Power Relay**
- Fuel Pump**
- Ignition Coils**
- Warning Horn**
- IAC Test**
- Boost Valve**
- Throttle Motor**
- Gear Shift Motor**
- Tach Output**

The sections presented on the following pages will provide specific details on each output test. **Note: All output tests are NOT available on all engines.**

## Fuel Injector Output Test

The Fuel Injector output test allows individual fuel injectors to be actuated to verify their operation. The fuel injector under test will be fired at a rate equivalent to 1600 rpm. This test helps a technician verify that a particular fuel injector is receiving a command signal from the PCM. This test **will not** reveal if an injector is clogged, internally leaking or mechanically worn.

- **IMPORTANT: Before performing this test the engine's electric fuel pump should be disabled. Disabling of the fuel pump may be accomplished by removing the fuel pump fuse or disconnecting the pump's electrical connector.**
  - **This test should be performed with Key-On and Engine Off.**
- 1) Review the warnings stated above and be sure the engine is not running when attempting to perform this test.
  - 2) After selecting the **"Fuel Inj Test"** function from the PCM Output Test menu the scanner will begin to display several warning messages. Review these messages and be certain their instructions are followed.
  - 3) When the warning messages have been displayed, you may select the fuel injector you wish to test by using the ▲ and ▼ keys. To begin firing the selected injector press the **FIRE / TEST** key. This action will begin actuating the fuel injector at a speed equivalent to 1600 rpm for a period of approximately 10 seconds.
    - **To abort the Fuel Injector test at any time, press and hold the scanner's NO key.**
  - 4) After the test is complete you may return to step #3 to test another injector or press the **NO** key to return to the scanner's Output Test menu.

## Direct Injector Output Test

Available on direct injected OptiMax engines, This test allows individual direct injectors to be actuated to verify their operation. This test helps a technician verify that a particular direct injector is receiving a command signal from the PCM.

- **IMPORTANT: Before performing this test the engine's electric fuel pump should be disabled. Disabling of the fuel pump may be accomplished by removing the fuel pump fuse or disconnecting the pump's electrical connector.**
-

# SmartCraft PCM

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- **This test should be performed with Key-On and Engine Off.**
- 1) Review the warnings stated above and be sure the engine is not running when attempting to perform this test.
  - 2) After selecting the “**Direct Inj Test**” function from the PCM Output Test menu the scanner will begin to display several warning messages. Review these messages and be certain their instructions are followed.
  - 3) When the warning messages have been displayed, you may select the direct injector you wish to test by using the ▲ and ▼ keys. To begin firing the selected injector press the **FIRE / TEST** key. This action will be actuating the direct injector for a period of approximately 10 seconds.
- **To abort the Fuel Injector test at any time, press and hold the scanner’s NO key.**
- 4) After the test is complete you may return to step #3 to test another injector or press the **NO** key to return to the scanner’s Output Test menu.

## Ignition Coil Output Test

The Ignition Coil output test allows individual coils and their associated spark outputs to be fired to verify their operation. This test requires that a **spark gap tester** be used to verify proper ignition coil operation. The ignition coil under test will be fired at a rate equivalent to 1600 rpm. This test helps a technician verify that a particular ignition coil is receiving a command signal from the PCM and that the coil’s high voltage output is sufficient to generate a spark discharge.

- **WARNING: Use of spark gap tester is required for this test. Do not perform this test with the ignition wires attached to the engine’s spark plugs while they are installed in the cylinders. Engine backfire and external flame can occur. As a safety precaution, purge fuel vapors from the engine before proceeding.**
  - **An approved spark gap tester must be attached to the spark output under test. See the spark gap tester’s instructions for proper installation, adjustment and use.**
  - **IMPORTANT: Before performing this test the engine’s electric fuel pump should be disabled. Disabling of the fuel pump may be accomplished by removing the fuel pump fuse or disconnecting the pump’s electrical connector.**
  - **This test should be performed with Key-On and Engine Off.**
-

- 1) Review the warnings stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the “**Ignition Coil**“ function from the PCM Output Test menu the scanner will begin to display several warning messages. Review these messages and be certain their instructions are followed.
- 3) When the warning messages have been displayed, you may select the ignition coil you wish to test by using the ▲ and ▼ keys. To begin firing the selected coil press the **FIRE / TEST** key. This action will begin firing the ignition coil at a speed equivalent to 1600 rpm for a period of approximately 10 seconds.
  - **To abort the Ignition Coil test at any time, press and hold the scanner’s NO key.**
- 4) After the test is complete you may return to step #3 to test another ignition coil or press the **NO** key to return to the scanner’s Output Test menu.

## Oil Pump Output Test

Applicable to two-stroke engines, this test will cause the PCM to energize the oil pump. Upon executing this test the technician should listen for oil pump mechanical activity. The oil pump will be activated for a period of five seconds.

- **This test should be performed with Key-On and Engine Off.**
- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
  - 2) After selecting the “**Oil Pump Test**“ test from the PCM Output Test menu the scanner will prompt you to begin the test. To initiate the test press the **FIRE / TEST** key. The fuel pump relay will be activated for approximately one second.
  - 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Test menu.

## Main Power Relay Output Test

This test will cause the PCM to energize the engine's main power relay. Upon executing this test the technician should listen for relay mechanical activity. The main power relay will be activated for a period of one second.

- **This test should be performed with Key-On and Engine Off.**

# SmartCraft PCM

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- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the “**Main Power Relay**“ test from the PCM Output Test menu the scanner will prompt you to begin the test. To initiate the test press the **FIRE / TEST** key. The main power relay will be activated for approximately one second.
- 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Test menu.

## Fuel Pump Output Test

This test will cause the PCM to energize the engine's electric fuel pump relay. Upon executing this test the technician should listen for fuel pump and relay mechanical activity. The pump will be activated for a period of one second.

- **This test should be performed with Key-On and Engine Off.**

- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the “**Fuel Pump Relay**“ test from the PCM Output Test menu the scanner will prompt you to begin the test. To initiate the test press the **FIRE / TEST** key. The fuel pump relay will be activated for approximately one second.
- 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Test menu.

## Warning Horn Output Test

This test will cause the PCM to energize the engine warning horn on **non-DTS** engines.. Upon executing this test the technician should listen for warning horn activity. The warning horn will be activated for a period of one second.

- **This test should be performed with Key-On and Engine Off.**

- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the “**Warning Horn**“ test from the PCM Output Test menu the scanner will prompt you to begin the test To initiate the test press the **FIRE / TEST** key. The warning horn will be activated for approximately one second.

- 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Test menu.

## PCM Function - IAC Test

The IAC Test allows the functionality of the engine's Idle Air Control system to be tested. This test commands the PCM module to change the IAC valve's position thereby changing the engine's idle speed. Perform the following steps to conduct the IAC test.

- **IMPORTANT: This test should be performed in Neutral with the engine idling and at normal operating temperature.**
  - **Do not attempt to drive the boat while performing this test.**
  - **Follow all engine and boat manufacturer's safety precautions and stay clear of all moving engine components.**
- 1) Review the warnings stated above prior to conducting this test. For best results the engine should be idling at normal operating temperature.
  - 2) After selecting the "**IAC Test**" function from the PCM Output Test menu the scanner will begin to display one or more advisory messages. Review these messages and be certain their instructions are followed.
  - 3) When the advisory messages have been displayed, you may begin the test by pressing the **YES** key. While the test is in progress the scanner will display the current engine RPM as well as the IAC valve's position. Use the **▲** and **▼** keys to change the IAC's position in 10% increments. The IAC position range is from -100% to +100%. While changing the IAC position you should hear a noticeable change in engine speed.
  - 4) To exit the IAC test, press the **NO** key. You will be returned to the scanner's PCM Output Test menu.

## PCM Function - Boost Valve Test (Verado Only)

This test allows a technician to check the functionality of the engine's boost valve.. The test allows the boost valve duty cycle to varied in 5% increments using the scan tool's **▲** and **▼** keys.

- **This test must be performed with Key-On, Engine Off**

Follow the scan tool's on screen prompts to proceed with the test.

**Press and hold the NO key on the scan tool's keypad to stop the test at any time.**

# SmartCraft PCM

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## PCM Function - Throttle Motor Test (DTS systems only)

This test allows a technician to check the functionality of the engine's electronic throttle actuator motor. The test allows the throttle blade to be moved in 5 degree increments using the scan tool's ▲ and ▼ keys and also displays the current TPS voltages in real-time.

- **This test must be performed with Key-On, Engine Off**

Follow the scan tool's on screen prompts to proceed with the test.

**Press and hold the NO key on the scan tool's keypad to stop the test at any time.**

## PCM Function - Gear Shift Motor Test (DTS systems only)

This test allows the technician to test the functionality of the gear shift actuator mechanism by commanding it to move into the Forward and Reverse positions.

- **WARNING: This test causes the vessel's sterndrive to shift into forward and reverse, thereby causing the vessel to move.**
- **This test must be performed in NEUTRAL with the engine IDLING.**
- **Refer to the engine manufacturer's safety instructions PRIOR to performing this test.**
- **Vessel should be secured to prevent movement.**

After referring to the manufacturer's instructions and safety procedures for this procedure, follow the scan tool's on screen prompts to proceed with the test.

**Press and hold the NO key on the scan tool's keypad to stop the test at any time.**

## Tachometer Output Test

The Tachometer Output test is primarily used to verify the operation of an external, dash mounted, analog engine tachometer. This test will command the PCM to output a tach signal that is equivalent to 3000 rpm.

- **This test should be performed with Key-On and Engine Off.**
- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
  - 2) After selecting the “**Tach Output**” test from the PCM Output Test menu the scanner will prompt you to begin the test. To initiate the test press the **FIRE / TEST** key. The PCM's tachometer output will begin sending a signal equivalent to 3000 rpm to an externally attached (usually dashboard mounted) analog tachometer gauge. The tach signal test will run for approximately 10 seconds.

- 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Test menu.

## PCM Function - Induced Misfire Test

The Induced Misfire Test is designed to assist a technician in finding a problematic cylinder. This test commands the PCM module to disable the fuel injector on a selected cylinder thereby causing that cylinder to misfire (not produce power). Perform the following steps to conduct the induced misfire test.

- **IMPORTANT: This test should be performed with the engine running at approximately 1500 rpm, at normal operating temperature and under moderate load.**
  - **Do not attempt to drive the boat while performing this test.**
  - **Follow all engine and boat manufacturer's safety precautions and stay clear of all moving engine components.**
- 1) Review the warnings stated above prior to conducting this test. For best results the engine should be running at approximately 1500 rpm and under a moderate load.
  - 2) After selecting the "**Induced Misfire**" function from the PCM Functions menu the scanner will begin to display one or more advisory messages. Review these messages and be certain their instructions are followed.
  - 3) When the advisory messages have been displayed, you may select the cylinder you wish to disable by using the ▲ and ▼ keys. To begin the test press the **FIRE / TEST** key. This action will command the PCM to disable the fuel injector on the selected cylinder for approximately 10 seconds. During this time you should hear a noticeable decrease in engine speed. This decrease indicates that the selected cylinder was contributing power to the system.

If a decrease in engine speed is not heard during the course of this test it may indicate a problem with one or more cylinder components including the fuel injector, ignition coil, spark plug, or other component. Refer to the engine manufacturer's troubleshooting procedures to isolate the problem component.

- **To Abort the Induced Misfire Test at any time, press and hold the scanner's NO key.**
- 4) After the test is complete you may return to step #3 to test another cylinder or press the **NO** key to return to the scanner's PCM Functions menu.

# SmartCraft PCM

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## PCM Function - Set Engine Location

This function allows the technician to read and modify the PCM's engine location setting. All engines shipped from the factory are configured as STARBOARD. Multi-engine installations may require an alternate setting when used within a SmartCraft system. Refer to the engine and boat manufacturer's installation procedures for the correct setting.

Available PCM engine location settings are as follows:

**STARBOARD**  
**PORT**  
**STARBRD 2 INSIDE**  
**PORT 2 INSIDE**

Perform the following steps to read and change the Engine Location setting.

- **This test should be performed with Key-On and Engine Off.**
- 1) Review the advisory message stated above prior to performing this function.
  - 2) After selecting the “**Set Engine Loc**“ function from the PCM Functions menu the scanner will automatically read and display the current Engine Location setting. After displaying the setting you may choose to proceed to alter the location setting by pressing the **YES** key. Use the ▲ and ▼ keys to scroll through the available location settings.
  - 3) When you have selected the correct Engine Location Setting, press the **YES** key to make the new setting permanent. The scanner will program the new location setting into the PCM's memory and you will be returned to the scanner's PCM Functions menu.

*Note: The new Engine Location setting will **not** become active until the ignition has been cycled OFF and then back ON.*

## PCM Function - Set Trim Limit

The Trim Limit Setpoint function allows the technician to limit the range of the propeller mechanism's trim movement. This setting has a range of 0% to 100%. When the trim position reaches the Trim Limit Setpoint the PCM will disable the trim limit relay in order to restrain the propeller mechanism from further advancement. Perform the following steps to read and change the Trim Limit Setpoint.

- **This function should be performed with Key-On and Engine Off.**

- 1) Review the advisory message stated above prior to performing this function.
- 2) After selecting the “**Set Trim Limit**” function from the PCM Functions menu the scanner will communicate with the PCM and display the current Trim Limit setting.
- 3) After displaying the current setting you may choose to alter the setpoint by pressing the **YES** key. Use the **▲** and **▼** keys to change the setpoint in 1% increments. The Trim Limit Setpoint range is from 0% to 100%. You may press the **NO** key at any time to abort the Trim Limit setpoint procedure.
- 4) To make the currently displayed setpoint permanent press the **YES** key. The scanner will program the new setpoint into the PCM’s memory and you will be returned to the scanner’s PCM Functions menu.

## **PCM Function - Set Trailer Limit**

Similar to the Set Trim Limit function described above, some Mercury systems allow the trailering position of the propeller mechanism to be set. This position is above the Trim Limit setpoint and is the upper limit of the propeller mechanism for trailering situations. Follow the scan tool’s on screen prompts to set the Trailer Limit.

## **PCM Function - Oil Pump Prime**

This function commands the PCM to begin it's two-stroke oil pump priming sequence. Please refer to appropriate engine service documentation for the recommended use of this PCM function.

## **PCM Function - Reset Break-in Oiling**

This function resets the PCM's engine break-in timer to provide increased oil needed to break in a new or newly rebuilt engine. Please refer to appropriate engine service documentation for the recommended use of this PCM function.

## **PCM Function - Tachometer Link Configuration**

This function allows the technician to configure the PCM for compatibility with two types of engine tachometers. After selecting this function the scan tool will prompt the user to select either a System Link Tach or an Analog Tach. Please refer to the tachometer's installation instructions for further assistance on selecting the correct setting.

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# 1997 - 2000 DFI ECM

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## Non-SmartCraft Mercury DFI ECM

This section describes scan tool functions related to Mercury DFI (pre-2001) outboard engines. These engines were equipped with ECM modules that pre-dated the introduction of SmartCraft. *Please note however that these ECMs look nearly identical to SmartCraft compatible PCM-555 modules used on 2001 and later engines.* They are not functionally the same and have different diagnostic capabilities.

### Connecting to a DFI engine.

The scan tool provides a variety of diagnostic and support functions for troubleshooting engines equipped with the DFI engine control system. Connection and operation of the tool is simple and straight forward.

- 1) Locate the engine's 2-pin diagnostic connector (DLC). The location of this connector is specified in the engine's service manual and may vary depending upon the engine type.



### Adapter 94028

- 2) With the engine's ignition switch in the OFF position, plug the scan tool's communication cable into the diagnostic connector. Scan tool adapter #94028 is required. Note that the #94028 adapter has a separate battery and ground clips that must be connected: **Red** to +12vdc and **Black** to engine ground.
- 3) Once connected, turn the ignition switch ON and start the engine if necessary.

# 1997 - 2000 DFI ECM

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- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the “**Mercury Outboard**” operating mode from the main menu, then press the **YES** key to select it. Next, select “**97-2000 DFI ECM**”.

## DFI Main Menu

After selecting the “**97-2000 DFI ECM**” system type you will be presented with several menu choices as follows.

**ECM Data**  
**Fault History**  
**Run History**  
**Erase Fault History**  
**Erase Run History**  
**Output Tests**  
**Cylinder Misfire**  
**Rest Break-In Oiling**  
**PCM System Info**

Use the ▲ and ▼ keys to select the desired menu item then press **YES**. The menu items are described in the following sections

## ECM Data

To obtain diagnostic data and system fault codes, select the “**ECM Data**” function. The scanner will prompt for your input as follows:

- 1) After selecting the “**ECM Data**” function the scanner will prompt you to display any currently stored system faults. Selecting **YES** will cause the scanner to interrogate the ECM’s “**Fault Memory**”. If any faults are present their descriptions will be displayed.
- 2) When all faults from the ECM’s Fault Memory have been displayed, the scanner will provide you with the option of reviewing the faults or erasing them. The erase function will clear the ECM’s “**Fault Memory**” to eradicate the faults.
- 3) After the scanner has exited it’s fault access mode the tool will enter its “**Scanner**” mode. This mode allows you to select and display a wide variety of engine sensor and operating information. The displayed data is updated several times per second. Use the ▲ and ▼ keys to scroll through the available data. Use the **NO** key to exit the this mode and return to the main DFI menu.

## Fault History

The DFI's engine control module contains a non-volatile memory that is used to retain the number of times a fault has occurred. To view “**Fault History**” information, perform the following steps:

- 1) Select the “**Fault History**“ function from the scanner’s DFI system menu..
- 2) Use the ▲ and ▼ keys to recall and scroll through the Fault History occurrence counters. Press **NO** to return to the main DFI system menu.

## Run History

The DFI control modules have the ability to record the number of hours an engine has been operated within a predetermined set of RPM ranges. The Run History feature also includes additional data related to the length of time particular engine conditions have been present (such as over-temperature or RPM limit).

To view “**Run History**” information select the **Run History** menu item then press **YES**. The scanner will display the total number of hours the engine has operated as well as the number of hours it has operated in various RPM ranges. Engine fault timers will also be displayed. Use the ▲ and ▼ keys to scroll through the Run History data. After viewing the Run History data press the **NO** key to return to the main DFI system menu.

## Erase Fault History

This function clears the Fault History memory. The Fault history counters will be reset to zero after this function is executed.

*Note: On pre-1998 DFI engines the fault history cannot be erased.*

## Erase Run History

This function clears the Run History memory. The all accumulated Run History data will be reset to zero after this function is executed. Please note that **ECM Run Time** will **not** be cleared. This value is not erasable.

## Output Tests

The Output Test menu provides a technician with the ability to exercise various ECM actuators and controls in order to verify correct operation. Available output tests are:

**Fuel Injector Test**  
**Direct Injector Test**  
**Ignition Coil Test**  
**Oil Pump Test**  
**Main Power Relay**

# 1997 - 2000 DFI ECM

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## Fuel Injector Output Test

The Fuel Injector output test allows individual fuel injectors to be actuated to verify their operation. This test helps a technician verify that a particular fuel injector is receiving a command signal from the ECM. This test **will not** reveal if an injector is clogged, internally leaking or mechanically worn.

- **IMPORTANT: Before performing this test the engine's electric fuel pump should be disabled. Disabling of the fuel pump may be accomplished by removing the fuel pump fuse or disconnecting the pump's electrical connector.**
  - **This test should be performed with Key-On and Engine Off.**
- 1) Review the warnings stated above and be sure the engine is not running when attempting to perform this test.
  - 2) After selecting the "**Fuel Inj Test**" function from the Output Tests menu the scanner will begin to display several warning messages. Review these messages and be certain their instructions are followed.
  - 3) When the warning messages have been displayed, you may select the fuel injector you wish to test by using the ▲ and ▼ keys. To begin firing the selected injector press the **FIRE / TEST** key. This action will actuate the fuel injector for a few seconds.
    - **To abort the Fuel Injector test at any time, press and hold the scanner's NO key.**
  - 4) After the test is complete you may return to step #3 to test another injector or press the **NO** key to return to the Output Tests menu.

## Direct Injector Output Test

This test allows individual direct injectors to be actuated to verify their operation. This test helps a technician verify that a particular direct injector is receiving a command signal from the ECM.

- **IMPORTANT: Before performing this test the engine's electric fuel pump should be disabled. Disabling of the fuel pump may be accomplished by removing the fuel pump fuse or disconnecting the pump's electrical connector.**
- **This test should be performed with Key-On and Engine Off.**

- 1) Review the warnings stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the “**Direct Inj Test**“ function from the Output Tests menu the scanner will begin to display several warning messages. Review these messages and be certain their instructions are followed.
- 3) When the warning messages have been displayed, you may select the direct injector you wish to test by using the ▲ and ▼ keys. To begin firing the selected injector press the **FIRE / TEST** key. This action will be actuating the direct injector for a few seconds.
  - **To abort the Fuel Injector test at any time, press and hold the scanner’s NO key.**
- 4) After the test is complete you may return to step #3 to test another injector or press the **NO** key to return to the Output Tests menu.

## Ignition Coil Output Test

The Ignition Coil output test allows individual coils and their associated spark outputs to be fired to verify their operation. This test requires that a **spark gap tester** be used to verify proper ignition coil operation. This test helps a technician verify that a particular ignition coil is receiving a command signal from the ECM and that the coil’s high voltage output is sufficient to generate a spark discharge.

- **WARNING: Use of spark gap tester is required for this test. Do not perform this test with the ignition wires attached to the engine’s spark plugs while they are installed in the cylinders. Engine backfire and external flame can occur. As a safety precaution, purge fuel vapors from the engine before proceeding.**
- **An approved spark gap tester must be attached to the spark output under test. See the spark gap tester’s instructions for proper installation, adjustment and use.**
- **IMPORTANT: Before performing this test the engine’s electric fuel pump should be disabled. Disabling of the fuel pump may be accomplished by removing the fuel pump fuse or disconnecting the pump’s electrical connector.**
- **This test should be performed with Key-On and Engine Off.**

# 1997 - 2000 DFI ECM

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- 1) Review the warnings stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the “**Ignition Coil**“ function from the Output Tests menu the scanner will begin to display several warning messages. Review these messages and be certain their instructions are followed.
- 3) When the warning messages have been displayed, you may select the ignition coil you wish to test by using the ▲ and ▼ keys. To begin firing the selected coil press the **FIRE / TEST** key. This action will begin firing the ignition coil for a few seconds.
  - **To abort the Ignition Coil test at any time, press and hold the scanner’s NO key.**
- 4) After the test is complete you may return to step #3 to test another ignition coil or press the **NO** key to return to the Output Tests menu.

## Oil Pump Output Test

This test will cause the ECM to energize the oil pump. Upon executing this test the technician should listen for oil pump mechanical activity. The oil pump will be activated for a period of five seconds.

- **This test should be performed with Key-On and Engine Off.**
- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
  - 2) After selecting the “**Oil Pump Test**“ test from the Output Tests menu the scanner will prompt you to begin the test. To initiate the test press the **FIRE / TEST** key. The fuel pump relay will be activated for approximately one second.
  - 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Tests menu.

## Main Power Relay Output Test

This test will cause the ECM to energize the engine's main power relay. Upon executing this test the technician should listen for relay mechanical activity. The main power relay will be momentarily activated.

- **This test should be performed with Key-On and Engine Off.**

- 1) Review the advisory message stated above and be sure the engine is not running when attempting to perform this test.
- 2) After selecting the **“Main Power Relay“** test from the Output Tests menu the scanner will prompt you to begin the test. To initiate the test press the **FIRE / TEST** key. The main power relay will be momentarily activated..
- 3) You may press the **FIRE / TEST** key again to repeat the test or press the **NO** key to return to the Output Tests menu.

## Cylinder Misfire Test

The Induced Misfire Test is designed to assist a technician in finding a problematic cylinder. This test commands the ECM module to disable the fuel injector on a selected cylinder thereby causing that cylinder to misfire (not produce power). Perform the following steps to conduct the induced misfire test.

- **Do not attempt to drive the boat while performing this test.**
  - **Follow all engine and boat manufacturer’s safety precautions and stay clear of all moving engine components.**
- 1) Review the warnings stated above prior to conducting this test. For best results the engine should be running at approximately 1500 rpm and under a moderate load.
  - 2) After selecting the **“Induced Misfire”** function from the ECM Functions menu the scanner will begin to display one or more advisory messages. Review these messages and be certain their instructions are followed.
  - 3) When the advisory messages have been displayed, you may select the cylinder you wish to disable by using the **▲** and **▼** keys. To begin the test press the **FIRE / TEST** key. This action will command the ECM to disable the fuel injector on the selected cylinder for approximately 10 seconds. During this time you should hear a noticeable decrease in engine speed. This decrease indicates that the selected cylinder was contributing power to the system.

If a decrease in engine speed is not heard during the course of this test it may indicate a problem with one or more cylinder components including the fuel injector, ignition coil, spark plug, or other component. Refer to the engine manufacturer’s troubleshooting procedures to isolate the problem component.

- **To Abort the Induced Misfire Test at any time, press and hold the scanner’s NO key.**
- 4) After the test is complete you may return to step #3 to test another cylinder or press the **NO** key to return to the main DFI system menu.

# 1997 - 2000 DFI ECM

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## Reset Break-in Oiling

This function resets the ECM's engine break-in timer to provide increased oil needed to break in a new or newly rebuilt engine. Please refer to appropriate engine service documentation for the recommended use of this ECM function.

## ECM System Info

The DFI electronic control module contains an area of memory that is used to store helpful text information for the service technician. This information consists of many lines of text which describe basic engine settings, capacities, etc, as well as ECM software revision information. The **System Info** data is entered into the ECM's memory at the factory and may be read by performing the following steps :

- 1) After selecting the "**ECM System Info**" function from the main DFI menu the scanner will begin to display the first line of **System Info** text from the ECM's memory. Use the following keys to navigate through the multiple lines of **System Info** text information:

### Keys to control System Info display:

Use the ▲ key to repeat the line of information currently scrolling across the scanner's display screen.

Use the ▼ key to skip to the next available line of system information.

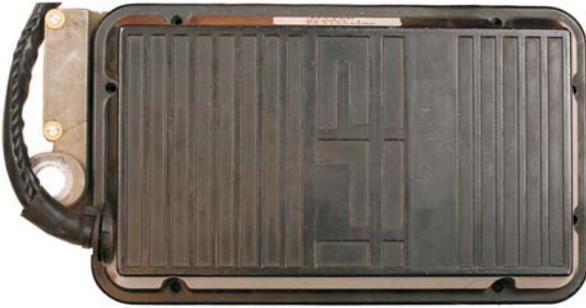
Use the **PAUSE** key to momentarily pause the scrolling display.

Use the **NO** key to abort the System Info function and return to the main DFI system menu.

- 2) After the scanner displays the last line of system information it will automatically return to the main DFI system menu.

# Mercury #824003 Fuel ECM

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**Mercury #824003 Fuel ECM**

This section describes scan tool functions related to Mercury's 824004 Fuel ECM. This engine control module was used on a variety of 2-stroke Mercury and Mariner outboard EFI engines in the 1990s.

## **Connecting to the engine.**

Engines equipped with the #824003 electronic control module have a 2 pin diagnostic connector which requires scan tool adapter #94028. .

- 1) Locate the engine's 2-pin diagnostic connector (DLC). This connector is typically on the bottom side of the ECM near the large umbilical harness that exits the ECM casing.
- 2) With the engine's ignition switch in the OFF position, plug the scan tool's communication cable into the diagnostic connector. Scan tool adapter #94028 is required. Note that the **94028** adapter has as separate battery and ground clips that must be connected: **Red** to +12vdc and **Black** to engine ground.



**Adapter 94028**

- 3) Once connected, turn the ignition switch ON and start the engine if necessary.

# Mercury #824003 Fuel ECM

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- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the “**Mercury Outboard**” operating mode from the main menu, then press the **YES** key to select it. Next, select “**#824003 Fuel ECM**”.

## #824003 ECM Main Menu

After selecting the “**824003 Fuel ECM**” system type you will be presented with two menu choices.

### **ECM Data** **Status Switches**

Use the ▲ and ▼ keys to select the desired menu item then press **YES**. The menu items are described in the following sections

#### **ECM Data**

To obtain diagnostic data select the “**ECM Data**” function. This mode allows you to select and display a variety of engine sensor and operating information. The displayed data is updated several times per second. Use the ▲ and ▼ keys to scroll through the available data. Use the **NO** key to exit this mode and return to the main ECM menu.

#### **Status Switches**

To obtain status information select the “**Status Switches**” function.. This mode displays the real-time status of engine sensors and switches. The displayed data is updated several times per second. Use the ▲ and ▼ keys to scroll through the available data. Use the **NO** key to exit the “Status Switches” mode and return to the main ECM menu.

# 3.0L Carbureted Ignition ECM

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## 3.0L Ignition ECM

The Scan tool is equipped with the ability to diagnose Mercury's 3.0L outboard ignition system. This system incorporates a Denso electronic ignition control module and was used on 1994 and later 3.0L (185c.i. / 225 HP) carbureted outboard motors.

### Connecting to the 3.0L Carbureted Outboard

Connection of the scan tool to the Mercury outboard ignition system requires the use of a special adapter. Presently there are two adapters available for this system as shown below.

The 1994 model year 3.0L ignition modules were not equipped with a diagnostic connector and require the use of a T-Adapter harness **#94012**. The 1995 and later 3.0L ignition modules were equipped with a 4 pin diagnostic connector and require scan tool adapter **#94011**.



**#94012**

**T-Adapter**



**#94011**

**4-pin Adapter**

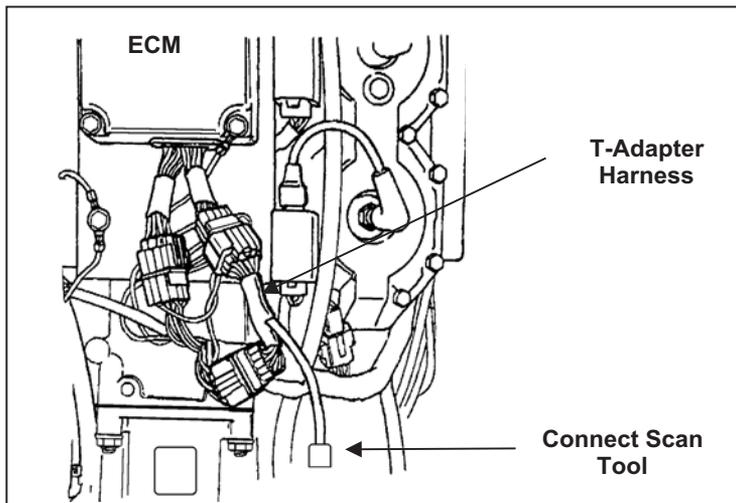
**Be sure the Engine's Ignition Switch is in the OFF position before connecting the scan tool to the ignition system.**

# 3.0L Carbureted Ignition ECM

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## If you are using the #94012 T-Adapter Harness

- 1) Be sure the engine is turned OFF.
- 2) Remove the 3.0L engine cover per Mercury's recommended procedure.
- 3) Locate the ECM module as shown below.
- 4) Disconnect the ECM's starboard engine harness connector.
- 5) Connect the T-Adapter into the ECM's starboard wiring harness as shown below..
- 6) Connect the scan tool to the T-Adapter's round DIN connector.
- 7) Standing clear of all engine components, you may now turn the engine's ignition switch ON.



**T-Adapter Harness Installation**

## If you are using the 94011 adapter

- 1) Be sure the engine is turned OFF.
- 2) Remove the 3.0L engine cover per Mercury's recommended procedure.
- 3) Locate the ECM's 4 pin diagnostic connector.
- 4) Connect the 94011 adapter to the engine's diagnostic connector.
- 5) Connect the scan tool to the adapter's round DIN connector.
- 6) Standing clear of all engine components, you may now turn the engine's ignition switch ON.

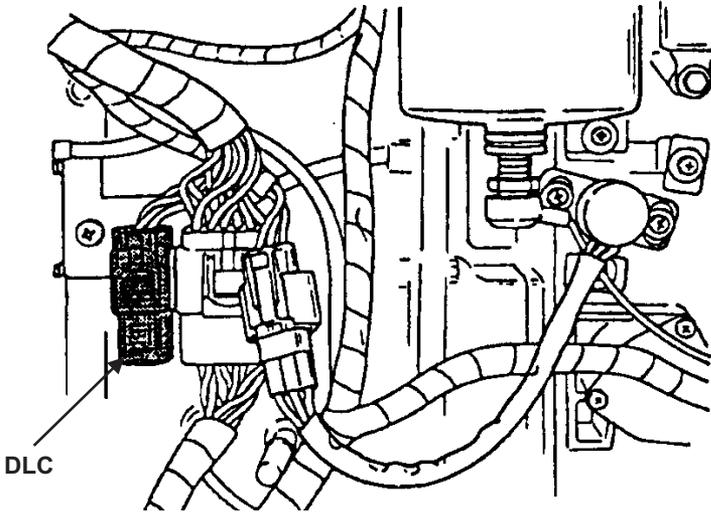
# 3.0L Carbureted Ignition ECM

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## Obtaining Data

After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the **"Mercury Outboard"** operating mode from the main menu, then press the **YES** key to select it.

Next, select **"3.0L IGNIT ECM"** to begin reading the ECM's data. The scan tool will automatically provide the ECM's software revision number, search for stored fault codes and then proceed to the live data scanning mode.



**Diagnostic Link Connector**

## Disconnecting the Scan Tool

**Be sure the engine's ignition switch is in the OFF position before disconnecting the scan tool or T-harness adapter.** Disconnect the scan tool and adapter from the engine. Reconnect the ECM's starboard harness if the #94012 T-adaptor was used. Replace engine cover per Mercury's recommended procedures.

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# Mercury Outboard 3.0L Fuel ECM

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**3.0L EFI Fuel ECM**

The scan tool is equipped with the ability to diagnose Mercury's 3.0L outboard EFI system. This system incorporates a Denso Fuel ECM which is capable of providing a variety of diagnostic information to the scan tool.

## **Connecting to the 3.0L Fuel ECM**

Connection of the scan tool to the 3.0L Fuel ECM requires the use of adapter #94011 as shown below.



**#94011 4-pin Adapter**

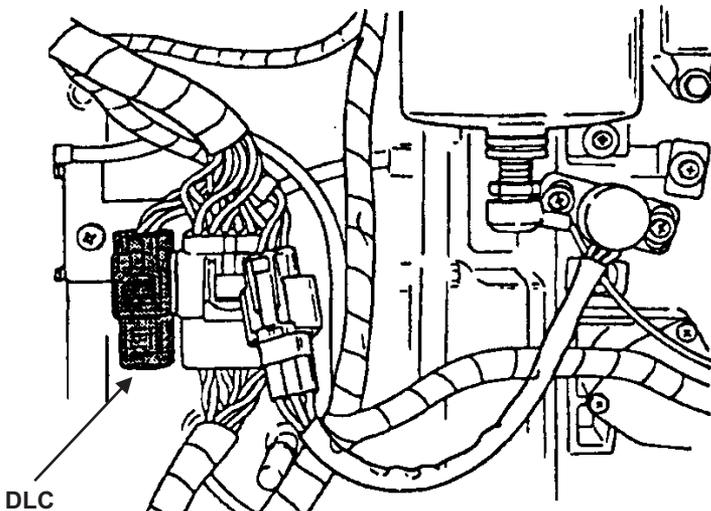
**Be sure the Engine's Ignition Switch is in the OFF position before proceeding with the following steps.**

- 1) Be sure the engine is turned OFF.
- 2) Remove the 3.0L engine cover per Mercury's recommended procedure

# Mercury Outboard 3.0L Fuel ECM

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- 3) Locate the ECM's 4 pin diagnostic connector.
- 4) Connect the 94011 adapter to the engine's diagnostic connector as shown below.
- 5) Connect the scan tool to the adapter's round DIN connector.
- 6) Standing clear of all engine components, you may now turn the engine's ignition switch ON.



**Diagnostic Link Connector**

## Obtaining Data

Select the **"3.0L Fuel ECM"** option from the scan tool's **"Mercury Outboard"** menu to begin reading the ECM's data. Follow the prompts to read live data, status switches and sensor history data. Sensor history data is not retained by the Fuel ECM after it has been powered OFF. The history data pertains to the engine's current operating period since it has been powered ON. Turning the ignition switch OFF then ON will clear the Pass / Fail sensor history data.

## Disconnecting the Scan Tool

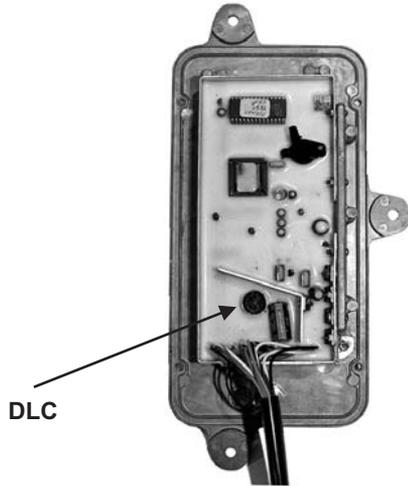
Shut the engine's ignition switch OFF. Disconnect the scan tool adapter from the data connector. Replace engine cover per Mercury's recommended procedures.

# Mercury Racing 2.5L ECM

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Mercury Racing 2.5L ECM



Shown with cover removed

The scan tool is equipped with the ability to diagnose Mercury Racing's 2.5L EFI system. This system incorporates an ECM produced by Fuel Management Systems, (FMS) and is capable of providing a variety of diagnostic information to the scan tool.

## Connecting to the 2.5L Hi Performance ECM

Connection of the scan tool to the Hi Performance ECM requires the use of adapter #94013 as shown below.

**Be sure the Engine's Ignition Switch is in the OFF position before proceeding with the following steps.**



#94013 5-pin Adapter

- 1) Be sure the engine is turned OFF.
- 2) Locate the data link connector as shown above. (ECM is shown with cover removed, data link connector is accessible without removing cover.)

# Mercury Racing 2.5L ECM

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- 3) Connect the 94013 adapter to the data connector.
- 4) Connect the scan tool to the adapter's round DIN connector.
- 5) Standing clear of all engine components, turn the engine's ignition switch ON.

## Obtaining Data

Select the **"2.5L Hi Perf ECM"** option from the scan tool's **"Mercury Outboard"** menu to begin reading the ECM's data. Follow the scan tool's prompts to read ECM data and status information.

## Disconnecting the Scan Tool

Shut the engine's ignition switch OFF. Disconnect the scan tool adapter from the ECM's data link connector.

# 1998-2005 2 & 3 Cylinder Carb 4-Cycle

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## Mercury 24-Pin Carbureted 4-Stroke ECM

This system type applies to two and three cylinder **25HP, 30HP, 40HP, 50HP and 60HP carbureted 4-stroke engines** produced by Mercury between 1998 and 2005. Many of these models were equipped with a 24 pin ECM module that provided spark control and automatic fuel enrichment functions. This system was equipped with a coolant temperature sensor, crank position sensor, oil pressure switch as well as a small number of output devices (solenoids, etc...).

The scan tool provides access to the ECM's sensor and status data, no fault codes are used with this system type.

### Connecting to the Engine: (2 adapters are required as shown below)



Adapter 94011



94037 In-Line Power Adapter

# 1998-2005 2 & 3 Cylinder Carb 4-Cycle

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Engines equipped with this ECM type do not have battery power available from the engine diagnostic connector, as a result a second intermediate adapter must be used to provide battery power to the scan tool. To connect use the following steps:

- 1) Locate the engine's 4-pin diagnostic link connector (DLC).
- 2) Plug adapter **#94028** into the engine's DLC. The **#94037 In-Line Power Adapter** must then be inserted between the **#94028** adapter and the scan tool's round 6-pin DIN connector.

After the connections are made, attach the #94037 adapter's **Red and Black power wires** to a suitable **12 vdc power source**. Attach the Red clip to +12vdc and the Black clip to the power source ground. These connections are necessary in order to provide power to the scan tool.

- 3) Once connected, **start the engine**. This is a requirement since **the ECM will not be powered unless the engine is running**.
- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the **"Mercury Outboard"** operating mode from the main menu, then press the **YES** key to select it. Next, select **"98-05 Small 4 Cyc"**.

After selecting the **"98-05 Small 4 Cyc"** system the scan tool will automatically provide the ECM's software revision number and model number, then it will proceed to the live data scanning mode.

## Disconnecting the Scan Tool

**Be sure the engine's ignition switch is in the OFF position before disconnecting the scan tool or in-line power adapter.**

Disconnect the #94037 adapter's Red and Black alligator clips from the 12vdc power source then remove the #94028 adapter from the engine's diagnostic link connector (DLC).

# 2006-Up 25 / 30hp 4-Cycle

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**2006 - Up 25hp & 30hp EFI 4-Stroke ECM**

Mercury's 2006 and newer 25hp and 30hp EFI 4-cycle engines with Tohatsu powerheads are supported by the scan tool. These engines are equipped with a 2-connector Kokusan Denki electronic control module as shown in the photo above.

Engines equipped with this ECM type do not have battery power available from the engine diagnostic connector. The engine must be started to power up the ECM and subsequently obtain live data. To connect to this system use the following steps:



**Adapter 94039**

- 1) Locate the engine's 18-pin diagnostic link connector (DLC). This connector is built into the ECM module as shown in the photo at the top of this page.
- 2) Plug adapter #94039 into the engine's DLC. Afterward attach the adapter's **Red and Black power wires** to a suitable **12 vdc power source**. Attach the Red clip to +12vdc and the Black clip to the power source ground. These connections are necessary in order to provide power to the scan tool.

# 2006-Up 25 / 30hp 4-Cycle

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- 3) Once connected, **start the engine**. This is a requirement since **the ECM will not provide data unless the engine is running**.
- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the **“Mercury Outboard”** operating mode from the main menu, then press the **YES** key to select it. Next, select **“06-Up 25/30 4 Cyc”**.

After selecting the **“06-Up 25/30 4 Cyc”** system the scan tool will automatically provide the ECM’s version number, then it will proceed to the live data scanning mode.

## **Disconnecting the Scan Tool**

**Be sure the engine's ignition switch is in the OFF position before disconnecting the scan tool or in-line power adapter.**

Disconnect the #94039 adapter's Red and Black alligator clips from the 12vdc power source then remove the adapter from the engine's diagnostic link connector (DLC).

# 2005 - Up 75 / 90hp EFI 4-Cycle

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## 2005 - Up 75hp & 90hp EFI 4-Stroke ECM

Mercury's 2005 and newer 75hp and 90hp EFI 4-cycle engines with Yamaha powerheads are supported by the scan tool. This system is equipped with a 2-connector Mitsubishi-designed control module as shown in the photo above.

Connecting to the engine.

The scan tool provides an variety of diagnostic and support functions for troubleshooting engines equipped with this EFI system. Connection and operation of the tool is simple and straight forward.



## Adapter 94038

- 1) Locate the engine's 3-pin diagnostic link connector (DLC).
- 2) With the engine's ignition switch in the OFF position, plug the scan tool's communication cable into the diagnostic connector. Scan tool adapter #94038 is required for this application.
- 3) Once connected, turn the ignition switch ON and start the engine if necessary.

# 2005 - Up 75 / 90hp EFI 4-Cycle

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- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the “**Mercury Outboard**” operating mode from the main menu, then press the **YES** key to select it. Next, select “**05-Up 75/90 4 Cyc**”.

## 75/90 HP 4-Stroke Main Menu

After selecting the “**05-Up 75/90 4 Cyc**” system type the scan tool will attempt to communicate with the ECM and automatically identify it. The ECMs' Hardware ID" will be briefly displayed followed by the total number of operating hours the engine has logged. After the initial info is displayed you will be presented with the following menu choices.

**ECM Data**  
**Fault Codes**  
**Fault History**  
**Erase Fault History**  
**Run History**

Use the ▲ and ▼ keys to select the desired menu item then press **YES**. The menu items are described in the following sections

### ECM Data

To obtain diagnostic data select the “**ECM Data**” function.. This mode allows you to select and display a variety of engine sensor and operating information. The displayed data is updated several times per second. Use the ▲ and ▼ keys to scroll through the available data. Use the **NO** key to exit this mode and return to the main ECM system menu.

### Fault Codes

Use this function to view any currently active faults. Upon selecting this function the scan tool will query the ECM for its stored faults and display both the fault code number as well as a description of the fault. After all faults are displayed the scan tool will prompt you to either review the faults or exit to the main ECM system menu.

### Fault History

The engine control module contains a non-volatile memory that is used to retain historic fault information. The ECM is capable of retaining up to 5 historic faults along with the specific time (in engine operating hours) that the fault occurred . Upon selecting the "Fault History" function the scan tool will display each historic fault that the ECM has logged followed by the time of occurrence. After all historic faults are displayed the scan tool will prompt you to either review the faults or exit to the main ECM system menu

# 2005 - Up 75 / 90hp EFI 4-Cycle

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## Erase Fault History

This function clears the Fault History memory. All historic faults along with their occurrence times will be erased.

## Run History

The electronic control module has the ability to record the number of hours an engine has been operated within a predetermined set of RPM ranges. This information provides the technician with a profile of how the engine has been operated. The RPM ranges are shown below.

**Under 1000 RPM**  
**1000-1999 RPM**  
**2000-2999 RPM**  
**3000-3999 RPM**  
**4000-4999 RPM**  
**5000-5999 RPM**  
**6000-6999 RPM**  
**Total Run Time**

To view “**Run History**” information select the **Run History** menu item then press **YES**. The scanner will display the number of hours the engine has operated in various RPM ranges as well as the total number of hours the engine has logged. After viewing the Run History data press the **NO** key to return to the main ECM system menu.

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# 2001 - 2006 115hp EFI 4-Cycle

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## 2001 - 2006 115hp EFI 4-Stroke ECM

Mercury's 2001 thru 2006 115hp EFI 4-cycle engines with Yamaha powerheads are supported by the scan tool. This system is equipped with a 2-connector Mitsubishi-designed control module as shown in the photo above.

Connecting to the engine.

The scan tool provides an variety of diagnostic and support functions for troubleshooting engines equipped with this EFI system. Connection and operation of the tool is simple and straight forward.



## Adapter 94038

- 1) Locate the engine's 3-pin diagnostic link connector (DLC).
- 2) With the engine's ignition switch in the OFF position, plug the scan tool's communication cable into the diagnostic connector. Scan tool adapter #**94038** is required for this application.
- 3) Once connected, turn the ignition switch ON and start the engine if necessary.

# 2001 - 2006 115hp EFI 4-Cycle

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- 4) After the scan tool displays its initial opening messages, use the ▲ and ▼ keys to display the “**Mercury Outboard**” operating mode from the main menu, then press the **YES** key to select it. Next, select “**01-06 115 4 Cyc**”.

## 115 HP 4-Stroke Main Menu

After selecting the “**01-06 115 4 Cyc**” system type the scan tool will attempt to communicate with the ECM and automatically identify it. The ECMs' Hardware ID" will be briefly displayed followed by the total number of operating hours the engine has logged. After the initial info is displayed you will be presented with the following menu choices.

**ECM Data**  
**Fault Codes**  
**Fault History**  
**Erase Fault History**  
**Run History**

Use the ▲ and ▼ keys to select the desired menu item then press **YES**. The menu items are described in the following sections

### ECM Data

To obtain diagnostic data select the “**ECM Data**” function.. This mode allows you to select and display a variety of engine sensor and operating information. The displayed data is updated several times per second. Use the ▲ and ▼ keys to scroll through the available data. Use the **NO** key to exit this mode and return to the main ECM system menu.

### Fault Codes

Use this function to view any currently active faults. Upon selecting this function the scan tool will query the ECM for its stored faults and display both the fault code number as well as a description of the fault. After all faults are displayed the scan tool will prompt you to either review the faults or exit to the main ECM system menu.

### Fault History

The engine control module contains a non-volatile memory that is used to retain historic fault information. The ECM is capable of retaining up to 5 historic faults along with the specific time (in engine operating hours) that the fault occurred . Upon selecting the "Fault History" function the scan tool will display each historic fault that the ECM has logged followed by the time of occurrence. After all historic faults are displayed the scan tool will prompt you to either review the faults or exit to the main ECM system menu

# 2001 - 2006 115hp EFI 4-Cycle

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## Erase Fault History

This function clears the Fault History memory. All historic faults along with their occurrence times will be erased.

## Run History

The electronic control module has the ability to record the number of hours an engine has been operated within a predetermined set of RPM ranges. This information provides the technician with a profile of how the engine has been operated. The RPM ranges are shown below.

**Under 1000 RPM**  
**1000-1999 RPM**  
**2000-2999 RPM**  
**3000-3999 RPM**  
**4000-4999 RPM**  
**5000-5999 RPM**  
**6000-6999 RPM**  
**Total Run Time**

To view “**Run History**” information select the **Run History** menu item then press **YES**. The scanner will display the number of hours the engine has operated in various RPM ranges as well as the total number of hours the engine has logged. After viewing the Run History data press the **NO** key to return to the main ECM system menu.

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# Outboard Engine Adapter Reference

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## Adapter #94006

Used on most 2003 and up Mercury outboards with PCM-555 / ECM-555 control modules.  
(See page 11)



## Adapter #94011

Used on 1995-99 Mercury 3.0L Carbureted and 3.0L EFI engines with Denso ECMs.  
Also used on 1998-05 2 & 3 cylinder carbureted 4-stroke engines with 24 pin ECM.  
(See pages 37, 41 and 45)

# Outboard Engine Adapter Reference

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## Adapter #94012

Legacy adapter used on 1994 Mercury 3.0L Carbureted engines with Denso ECMs.  
*(Adapter is shown for reference only, no longer in production.)*  
(See page 37)



## Adapter #94013

Used on 1990s Mercury Racing 2.5L outboards with FMS ECM  
(See page 43)

# Outboard Engine Adapter Reference

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## Adapter #94028

Used on many 1990s Mercury 2-stroke EFI outboards equipped with #824003 ECM.  
Also used on late 1990s DFI engines and early Smartcraft compatible outboards  
equipped with PCM-555 control module.  
(See pages 11, 27 and 35)

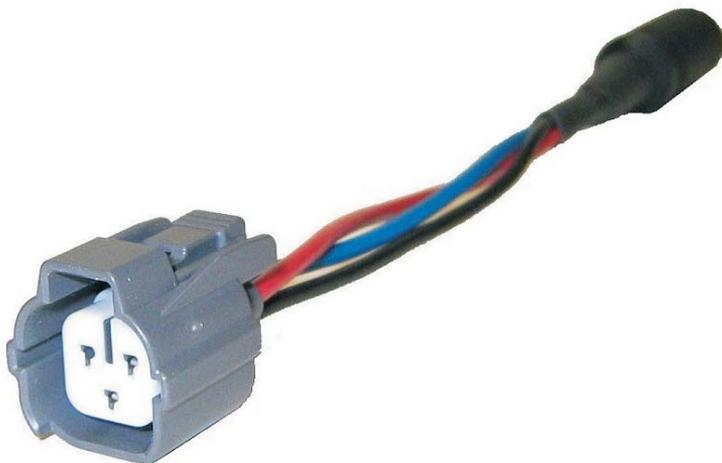


## Adapter #94037

In-Line power adapter used in conjunction with #94011 adapter on 1998-05  
2 & 3 cylinder carbureted 4-stroke engines with 24 pin ECM.  
(See page 45)

# Outboard Engine Adapter Reference

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## Adapter #94038

Used on 2005 - Up Mercury 75hp, 90hp EFI 4-stroke engines equipped with 2-connector (Mitsubishi) ECM. Also used on 2001 - 2006 Mercury 115hp 4-stroke engines equipped with 2 connector (Mitsubishi) ECM.

These engines have Yamaha powerheads.

(See pages 49 and 53)



## Adapter #94039

Used on 2006-Up Mercury 25hp and 30hp fuel injected 4-stroke engines with Tohatsu powerheads.

(See page 47)

**Notes:**





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