

TO: SERVICE MANAGER  MECHANICS   
PARTS MANAGER

No. 86-25

- A. MerCruiser Service Manual Package
- B. Discharged Cooling Water with New 4" Exhaust System
- C. 454 Magnum Partial Engine Part Number
- D. 320 EFI Throttle Sensor Setting
- E. Timing Procedure for 320 EFI Engine
- F. EFI Test - 320 EFI

## A. MERCUISER SERVICE MANUAL PACKAGE

A new MerCruiser Service Manual is now available for dealer use under a single part number (90-16470A1). The package consists of one each of the following.

90-68648	Engines and Drives	1963-1973 (2 Books)
90-71707	Engines, Drives and Inboards	1974-1977
90-95693	Engines and Transmissions	1978-1984 (2 Books)
90-44553	Mercury Marine 4 Cylinder Engines	1985 and Newer
90-12410	G.M. V-6 Engines	All Models
90-14499	G.M. V-8 Engines	1985 and Newer
90-14693	G.M. 4 Cylinder Engines	1985 and Newer
90-86137	MC-1 Stern Drives	1978-1982
90-12934	MC-1R, MC-1MR, MC Alpha One Stern Drives	1983 and Newer
90-12935	TR and TRS Stern Drives	1978 and Newer

Service manuals for new dealers should be ordered under this new part number, as it eliminates the need to order individual manuals. Dealers can save money by ordering the package instead of individual manuals. Anyone wishing to order individual manuals can use the part numbers listed above.

## B. DISCHARGED COOLING WATER - 4" EXHAUST SYSTEM

The MerCruiser service department has been receiving questions about cooling water exiting the drive unit with the new 4" exhaust systems. The questions arise when a dealer or customer is running the unit on a flushing attachment.

The new 4" exhaust system is designed to separate the water from the exhaust in the exhaust separator. This separation causes a great decrease in exhaust back pressure. When running these engines on a flushing attachment it will be normal for 75 percent of the cooling water to exit thru the exhaust idle relief ports. Very little water will exit thru the drive. This differs from the earlier systems where only 10 percent of the water exits thru the exhaust idle relief ports.

## C. 454 MAGNUM PARTIAL ENGINE

The 454 Magnum parts card contains the wrong part number for a replacement partial engine. The partial engine listed (87989A1) will not work as a direct replacement. The part number for the 454 Magnum partial engine is 15891A1. Please make this change.

## D. 320 EFI THROTTLE SENSOR SETTING

To set the throttle sensor on a 320 EFI engine, connect an ohms meter between the black and green wires or the brown and blue wires (wire colors depend on which throttle sensor is used on engine). Loosen attaching screws and set sensor to obtain an ohms reading of 150+ or -50 ohms with the throttle plate closed.

## E. TIMING PROCEDURE - 320 EFI ENGINE

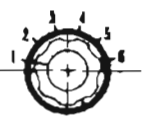
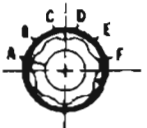


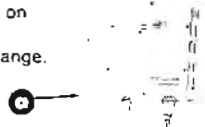
When timing a 320 EFI engine the red/yellow wire located near the front of the engine must be grounded. If an attempt is made to time the engine without grounding the red/yellow wire the timing will not be set accurately which in turn will harm engine performance. The red/yellow wire is connected to the idle stabilization circuit in the E.C.U. box. Timing should be set to 12 degrees B.T.D.C.

## F. EFI TEST - 320 EFI

# 320 EFI 4 Cycle

- ECU Test
- Throttle Sensor
- Air Temperature Sensor Test
- Cold Start Enrichment Test
- Ignition Kill Test
- Pressure Transducer Test

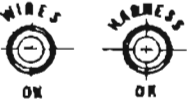
**IMPORTANT:** The original EFI Testers housed in an aluminum carrying case **MUST NOT** be used on a 320 EFI as ECU damage may result.



		Switch Position  E C U P A R A M E T E R S	Switch Position  S Y S T E M P A R A M E T E R S	Normalizing the E F I System  E C U N O R M A L I Z E	1. Set ECU Parameters switch to position 2 2. Set System Parameters switch to Position A. 3. Rotate ECU Normalize knob to obtain reading of 1.10 on tester meter. Do not move ECU Normalize knob once 1.10 reading is obtained. The system is now normalized. 4. If you can not obtain 1.10 meter reading the EFI box is faulty
Test Steps	Set ECU PARAMETERS Switch to each of the following positions	Set SYSTEM PARAMETERS switch to each of the following positions	Specified Reading	CORRECTIVE ACTION if you cannot match specified reading.	
ECU TEST	1	NORMALIZE THE EFI SYSTEM. REFER TO INSTRUCTIONS IN UPPER RIGHT HAND CORNER			
	2	3	A	.73 ± .02	Faulty EFI Box
	3	4	A	.73 ± .02	Faulty EFI Box
	4	5	A	.47 ± .02	Faulty EFI Box
	5	6	A	.28 ± .02	Faulty EFI Box
EFI COMPONENTS TEST	THROTTLE SENSOR TEST	1	NORMALIZE THE EFI SYSTEM. REFER TO INSTRUCTIONS IN UPPER RIGHT HAND CORNER		
		2	4	B	Closed Throttle Low .74 Wide Open Throttle High 1.40
	AIR TEMPERATURE SENSOR TEST	1	NORMALIZE THE EFI SYSTEM. REFER TO INSTRUCTIONS IN UPPER RIGHT HAND CORNER		
		2	2	C	Low 1.02 High 1.17
	COLD START ENRICHMENT TEST	1	NORMALIZE THE EFI SYSTEM. REFER TO INSTRUCTIONS IN UPPER RIGHT HAND CORNER		
2		6	A	Press cold start enrichment button. Meter reading should be .28 - 1.50. If meter reading is not .28 - 1.50 the EFI Box or harness is faulty.	
IGNITION KILL TEST	1	NORMALIZE THE EFI SYSTEM. REFER TO INSTRUCTIONS IN UPPER RIGHT HAND CORNER			
	2	2	A	Press Ignition Kill button. Meter reading should decrease 2 to 3 times, then fall to 0.01  Example: 1.10 0.40 0.01	
PRESSURE TRANSDUCER TEST	1	NORMALIZE THE EFI SYSTEM. REFER TO INSTRUCTIONS IN UPPER RIGHT HAND CORNER			
	2	2	A	Disconnect EFI Box transducer tube (a) from fitting on engine. Draw air from tube. Meter reading should decrease as air is drawn from tube. If no number change, the EFI Box is Faulty	

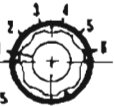

NOTES: (1) The Wide Open Throttle reading will appear momentarily with a rapid or quick change in throttle movement.

# For 320 EFI Models

## EFI Harness and EFI Wire Continuity Test Fuel Injector Test

EFI HARNESS TEST	<p><u>Testing EFI Harness if Engine is on Boat</u> 1. One test lamp should light which indicates harness is good.</p> <p><u>Testing EFI Harness if Engine is Removed from Boat</u> 1. Connect engine battery leads to a 12 volt battery.</p>		<p>Corrective Action if Test Lamps do not Light</p> <p>Refer to EFI wire continuity check below to independently check each wire in the harness to locate the defective wire(s).</p>
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EFI WIRE CONTINUITY TEST	<p><u>Testing EFI Wires if Engine is on Boat</u> 1. Turn ignition key to "ON" position. 2. Turn continuity check switch to each of the following wire check position.</p> <p><u>Testing EFI Wires if Engine is Removed from Boat</u> 1. Connect engine battery leads to a 12 volt battery. 2. Turn continuity check switch to each of the following wire check position.</p>		 <p>Locating Faulty Wire(s)</p> <p>If test lamp lights, wire indicated in chart below is good</p> <p>If test lamp does not light, the problem is in the indicated wire</p>
	H1		circuit between No. 1, 4, 6, 7 injectors and ECU
	H3		circuit between No. 2, 3, 5, 8 injectors and ECU
	H4		12V wire to ECU
	H5		12V wire to ECU
	H10		Ground to ECU Box wire(s)

FUEL INJECTOR TEST	<p>Switch Position E C U PARAMETERS</p> 	<p>Switch Position SYSTEM PARAMETERS</p> 	<p>Testing Injectors</p> <p>Place your finger on the terminal part of the injectors being tested. If injector is good, you will feel the injector pulsating.</p>
Test Steps	Set ECU PARAMETERS Switch to each of the following positions.	Set SYSTEM PARAMETERS switch to each of the following position.	
1	6	D	Operates No. 1, 4, 6, 7 injectors.
2	6	F	Operates No. 2, 3, 5, 8 injectors.