mercruiser STERN DRIVES & INBOARDS

service bulletin

TO: SERVICE MANAGER ☐ MECHANICS ☐
PARTS MANAGER ☐

No. 93-25

MCM 454 Magnum EFI, MIE 454 EFI Ski GM Gen V Engine Specifications

NOTE: Generation V Engines Have the Fuel Pump Mounted on the Belt Driven Seawater Pump.

A. Tune-up Specifications
B. Electrical Specifications
C. Internal Engine Specifications
D. Torque Specifications
E. Wiring Diagram (Engine)
F. Water Flow Diagram

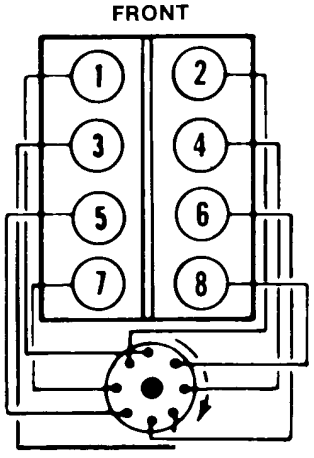
A. TUNE-UP SPECIFICATIONS

Model	454 Magnum EFI	454 EFI Ski
Propshaft Horsepower (Kilowatts)	385 (287)	395 (295)
Displacement	454 CID (7.4L)	
Engine Type and Number of Cylinders	V8	
Bore	4.25 in. (108mm)	
Stroke	4.00 in. (101.6mm)	
Compression Ratio	8.6:1	
Compression Pressure	150 psi (1035 kPa)	
Ignition	Delco EST/EFI	
Spark Plug Type	AC-MR43T	
Spark Plug Gap	.035 in. (0.9mm)	
Timing at Idle RPM	8° BTDC (Note 1)	
Maximum RPM at Wide-Open-Throttle	4600-5000	
Idle RPM in Forward Gear	550-650	
Firing Order	1-8-4-3-6-5-7-2	

Note 1: Special timing procedure. Same as 502 EFI, see Number 16 Service Manual.

Model	454 Magnum EFI	454 EFI Ski
Fuel Required	87 Octane Minimum (Average Octane Rating)	
Mechanical Fuel Pump Pressure	3-7 psi (21-48 kPa)	
Fuel Rail Pressure	34-38 psi (234-262 kPa)	
Electrical System	12V Negative (-) Ground	
Alternator Rating	65 Amps	
Minimum Battery Rating Required	650 CCA or 150 Ah	
Crankcase Oil Capacity with New Filter*	Approx. 7 U.S. Qts. (6.6L)	
Oil Pressure at 2000 RPM	30-70 psi (207-483 kPa)	
Minimum Oil Pressure @ Idle	4 psi (28 kPa)	
Valve Lash	Not Adjustable	
Thermostat	160° F (71° C)	
Cooling System Capacity	20 U.S. Qts. (18.9L)	
*Stern Drive Unit Oil Capacity (Approx.)	Bravo One-2.8 U.S. Qts. (2.6L)	N/A
*Borg-Warner Transmission 1:1	N/A	2 U.S. Qts. (1.9 L)

*Approximately, ALWAYS use dipstick to determine exact quantity of oil required.



Firing Order
1-8-4-3-6-5-7-2

Figure 1. L.H. Rotation

B. ELECTRICAL SPECIFICATIONS

Coil Specifications

Note: See “Ignition System Check”, page 5C-52 of Number 16 Service Manual.

Starter Motor Specifications

Part Number (Delco-Remy Number)	No Load Test					Brush Spring Tension
	Volts	Min. Amps	Max. Amps	Min. RPM	Max. RPM	
50-822330A_ (9000789)	10.6	60	95	2,750	3,250	83-104 oz. (2353-2948 g)

C. INTERNAL ENGINE SPECIFICATIONS

UNIT OF MEASUREMENT
in. (mm)

Cylinder Bore:

Model			MCM 454 EFI MIE 454 EFI
Diameter			4.2451-4.2525 (107.826-108.013)
Out of Round	Production		.001 (0.0254) Max.
	Service		.002 (0.05) Max.
Taper	Production	Thrust Side	.0005 (0.0127) Max.
		Relief Side	.001 (0.0254) Max.
	Service		.001 (0.02)Max.

Piston:

Clearance	Production	.0025-.0037 (0.0635-0.0939)
	Service	.0075 (0.15) Max.

Piston Ring: (1)HI Production Limit

Compression	Groove Side Clearance	Production	Top	.0017-.0032 (0.0432-0.0812)
			2nd	.0017-.0032 (0.0432-0.0812)
		Service		(1) + .001 (0.02)
	Gap	Production	Top	.010-.018 (0.2540-0.4572)
			2nd	.016-.024 (0.4064-0.6096)
		Service		(1) + .010 (0.25)
Oil	Groove Side Clearance	Production		.0050-.0065 (0.1270-0.1651)
		Service		(1) + .001 (0.02)
	Gap	Production		.020-.035 (0.508-0.889)
		Service		(1) + .010 (0.25)

Piston Pin:

Diameter		.9895-.9898 (25.1333-25.1409)
Clearance	Production	.00025-.00035 (0.0064-0.0088)
	Service	.001 (0.02) Max.
Fit in Rod		.0008-.0016 (0.0203-0.0406) Interference

Crankshaft:

Main Journal	Diameter	No. 1,2, 3, 4, 5	2.7482-2.7489 (69.8042-69.8220)
	Taper	Production	.0002 (0.0051) Max.
		Service	.001 (0.02) Max.
	Out of Round	Production	.0002 (0.0051) Max.
		Service	.001 (0.02) Max.
Main Bearing Clearance	Production	No. 1,2, 3, 4	.0017-.0030 (0.0431-0.0762)
		No. 5	.0025-.0038 (0.0635-0.0965)
	Service	No. 1, 2, 3, 4	.001-.003 (0.03-0.07)
		No. 5	.0025-.0040 (0.07-0.10)
Crankshaft End Play			.006-.010 (0.15-0.25)
Connecting Rod Journal	Diameter		2.1990-2.1996 (55.8546-55.8698)
	Taper	Production	.0005 (0.0127) Max.
		Service	.001 (0.02) Max.
	Out of Round	Production	.0005 (0.0127) Max.
		Service	.001 (0.02) Max.
Rod Bearing Clearance		Production	.0011-.0029 (0.0279-0.0736)
		Service	.003 (0.07) Max.
Rod Side Clearance			.002-.023 (0.05-0.58)
Crankshaft Runout			.0015 (0.038) Max.

Camshaft and Drive:

Model		MCM 454 EFI MIE 454 EFI
Lobe Lift ± .002 (0.051)	Intake	.300 (7.62)
	Exhaust	.300 (7.62)
Duration @ .050 in. (1.27mm) Cam Lift	Intake	224°
	Exhaust	224°
Journal Diameter		1.9482-1.9492 (49.4842-49.5096)
Journal Out-of-Round		.001 (0.025) Max.
Camshaft Run-Out		.002 (0.051) Max.
Timing Chain Deflection		3/8 (10mm) from Taut Position 3/4 (19mm) Total

Valve System:

Lifter Type			Hydraulic
Rocker Arm Ratio			1.7:1
Valve Lift	Intake		.510 (12.954)
	Exhaust		.510 (12.954)
Valve Lash (Intake & Exhaust			Fixed Lash
Face Angle (Intake & Exhaust			45°
Seat Angle (Intake & Exhaust			46°
Seat Runout (Intake & Exhaust			.002 (0.05) Max.
Seat Width	Intake		1/32-1/16 (0.8-1.6)
	Exhaust		1/16-3/32 (1.6-2.3)
Stem Clearance	Production	Intake	.0010-.0027 (0.0254-0.0685)
		Exhaust	.0012-.0029 (0.0304-0.0736)
	Service	Intake	.003 (0.09)
		Exhaust	.004 (0.012)

Model			MCM 454 EFI MIE 454 EFI
Valve Spring	Free Length		2.15 [2-5/32] (54.61)
	Pressure (NOTE 1)	Closed @ 1.88 [1-7/8] (47.8)	110 lbs. (489 N)
		Open @ 1.34 [1-3/8] (35.1)	316 lbs. (1406 N)
	Installed Height		1.88 [1-57/64] (47.75)
Damper	Free Length Approximate		1.86 [1-55/64] (47.2)
	No. of Coils		4

NOTE 1: Test spring pressure with inner & outer spring assembled.

Cylinder Head:

Gasket Surface Flatness	.003 (0.07) in 6 (152) - .007 (0.15) Overall Maximum

Flywheel:

Runout	.009 (0.22) Max.

D. TORQUE SPECIFICATIONS

Camshaft Sprocket	25 lb.ft. (34 N·m)
Conn. Rod Cap	73 lb. ft. (99 N·m)
Coupler or Drive Plate	35 lb. ft. (48 N·m)
Cylinder Head	85 lb. ft. (115 N·m)
Distributor Clamp	20 lb. ft. (27 N·m)
Exhaust Manifold (Bolts)	30 lb. ft. (41 N·m)
Flywheel	70 lb. ft. (95 N·m)
Flywheel Housing	30 lb. ft. (41 N·m)
Front Cover	120 lb. in. (14 N·m)
Intake Manifold	25 lb. ft. (34 N·m)
Main Bearing Cap	110 lb. ft. (149 N·m)
Oil Filter Adaptor Nut	40 lb. ft. (54 N·m)
Oil Pan to Crankcase	200 lb. in. (23 N·m)
Oil Pan Drain Plug	15 lb. ft. (20 N·m)
Oil Pump	70 lb. ft. (95 N·m)
Oil Pump Cover	80 lb. in. (9 N·m)
Rocker Arm Bolts	45 lb. ft (61 N·m)
Rocker Arm Cover	70 lb. in. (8 N·m)
Spark Plug	22 lb. ft. (30 N·m)
Torsional Damper	90 lb. ft. (122 N·m)
Water Pump	35 lb. ft. (48 N·m)

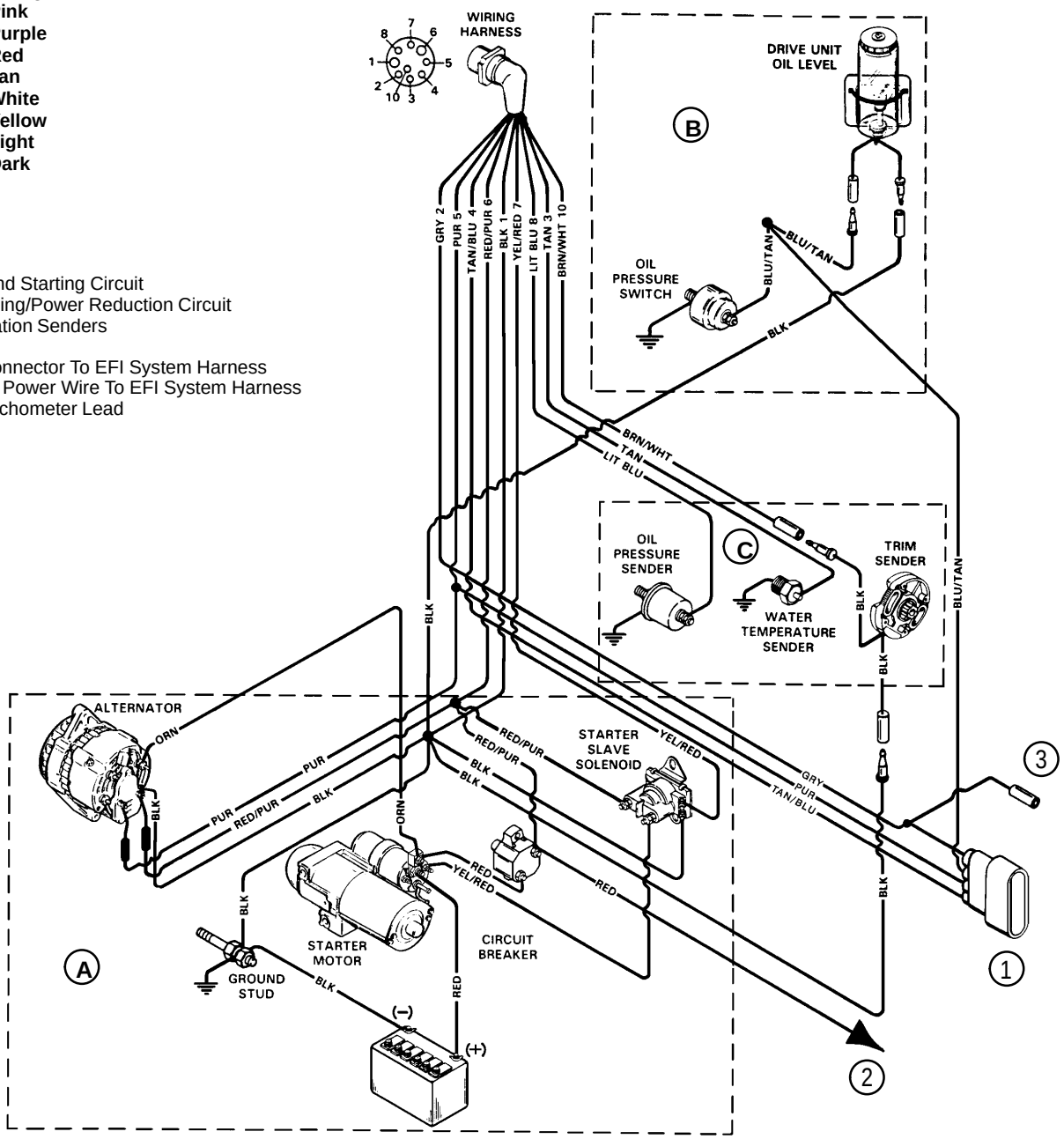
Note: Torque specifications for EFI components can be found on page 5C-94 of Number 16 Service Manual.

E. MCM 454 MAGNUM EFI STARTING AND CHARGING HARNESS

BLK = Black
BLU = Blue
BRN = Brown
GRY = Gray
GRN = Green
ORN = Orange
PNK = Pink
PUR = Purple
RED = Red
Tan = Tan
WHT = White
YEL = Yellow
LIT = Light
DRK = Dark

A - Charging and Starting Circuit
B - Audio Warning/Power Reduction Circuit
C - Instrumentation Senders

1 - Harness Connector To EFI System Harness
2 - Positive (+) Power Wire To EFI System Harness
3 - Auxiliary Tachometer Lead



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E. MIE 454 EFI SKI STARTING AND CHARGING HARNESS

BLK = Black
BLU = Blue
BRN = Brown
GRY = Gray
GRN = Green
ORN = Orange
PNK = Pink
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RED = Red
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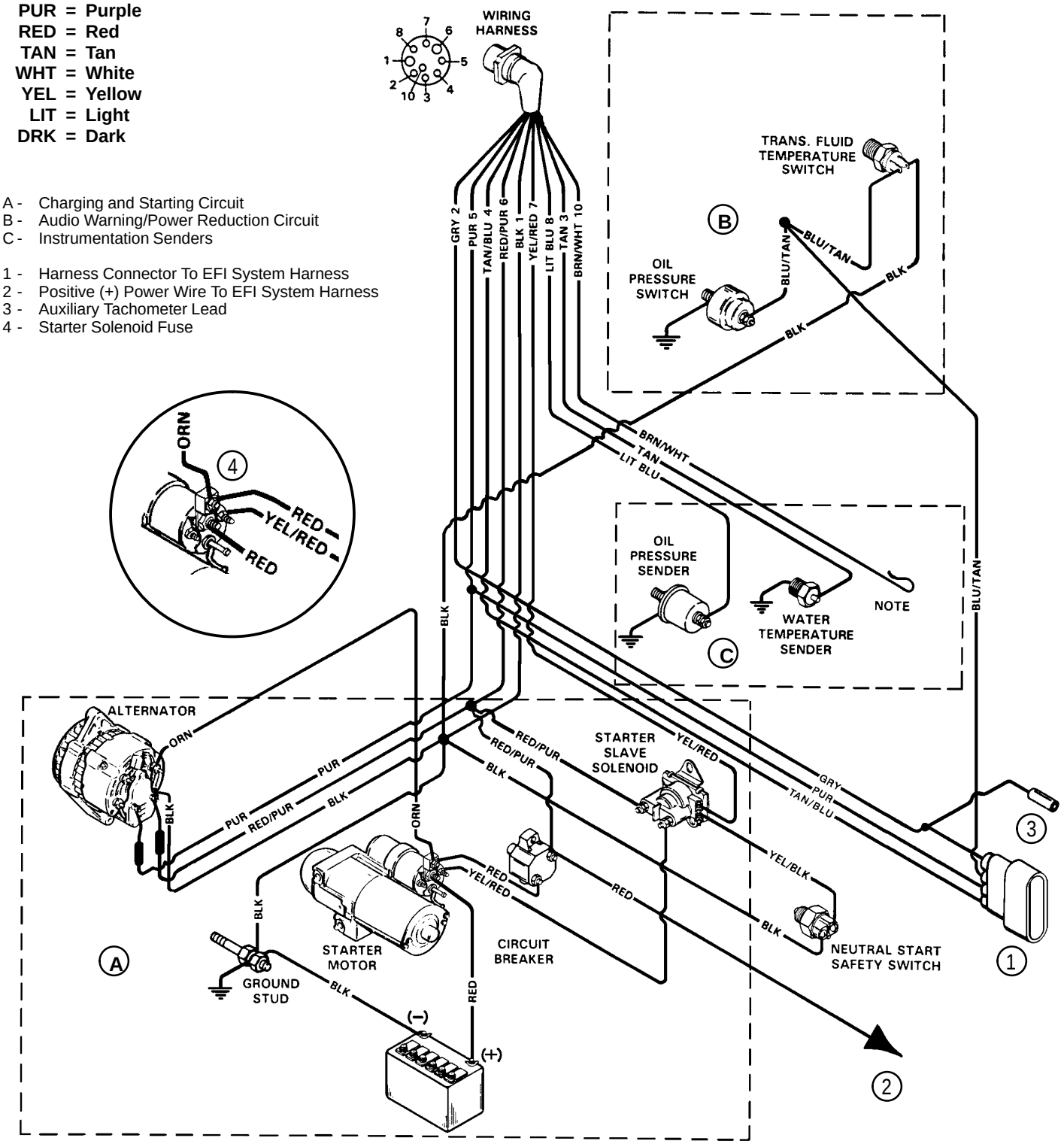
WHT = White
YEL = Yellow
LIT = Light
DRK = Dark

A - Charging and Starting Circuit
B - Audio Warning/Power Reduction Circuit
C - Instrumentation Senders

1 - Harness Connector To EFI System Harness
2 - Positive (+) Power Wire To EFI System Harness
3 - Auxiliary Tachometer Lead
4 - Starter Solenoid Fuse



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E. MCM & MIE 454 EFI HARNESS

1 - Vapor Separator Tank (VST)
2 - Throttle Body
3 - Distributor
4 - Coil
5 - Electronic Spark Control (ESC) Module
6 - Assembly Line Data Link (ALDL)
7 - Manifold Absolute Pressure (MAP) Sensor
8 - Manifold Air Temperature (MAT) Sensor
9 - Knock Sensor
10 - Idle Air Control (IAC)
11 - Throttle Position Sensor (TPS)
12 - Coolant Temperature Sensor (CTS)
13 - Electronic Control Module (ECM)
14 - Fuel Pump Relay
15 - Ignition/System Relay
16 - Fuel Pump Fuse
17 - ECM/Battery Fuse
18 - ECM/Injector Fuse
19 - Harness Connector To Starting/Charging Harness
20 - Harness Connector To Lanyard Stop Switch (Optional)
21 - Harness Connector For Dual Engine Data Link Cable
22 - Positive (+) Power Wire To Engine Circuit Breaker

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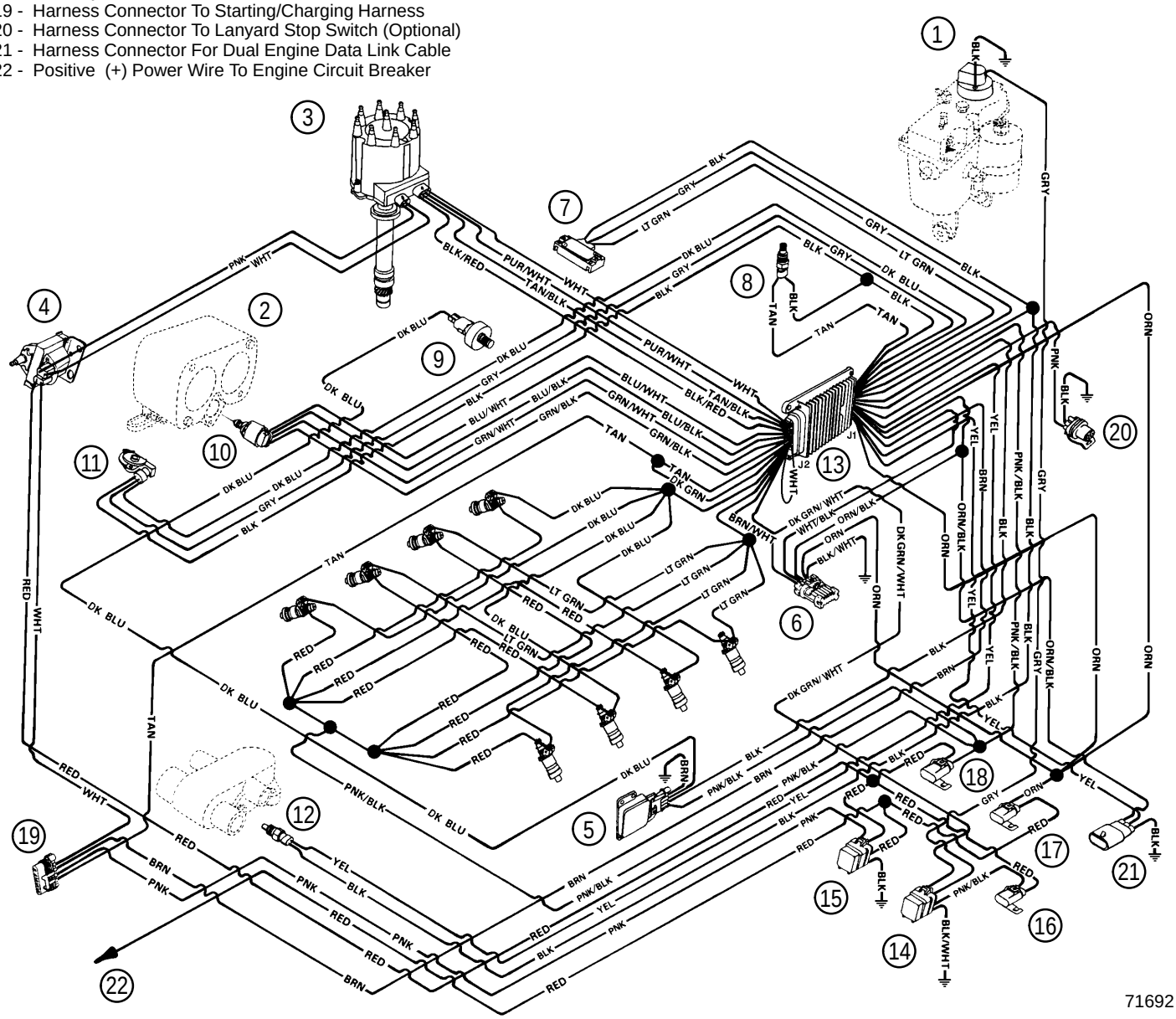
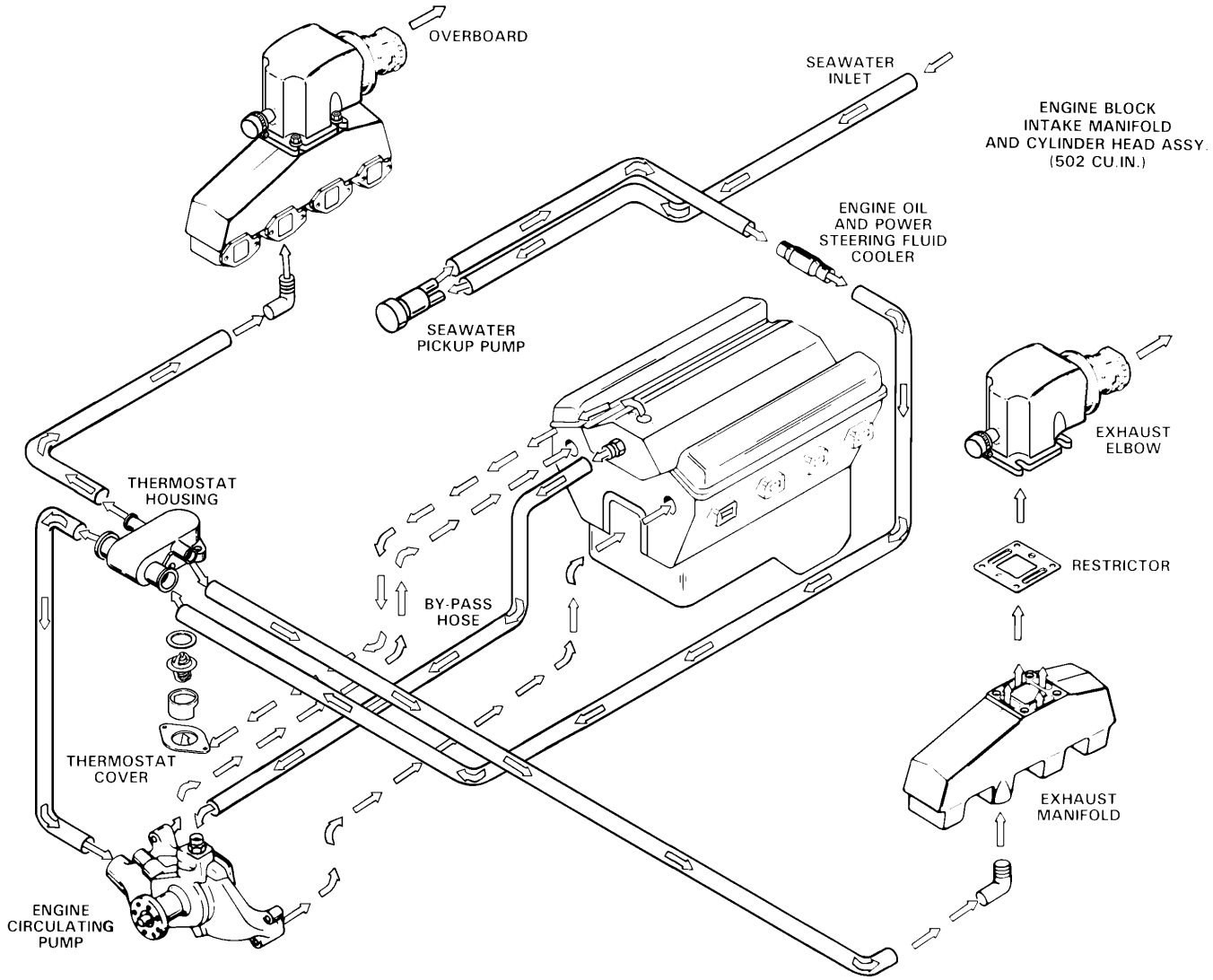


NOTE: All black wires with a ground symbol are interconnected within the E.F.I. system harness.

NOTE: Component position and orientation shown above is arranged for visual clarity and ease of circuit identification.

F. MCM 454 MAGNUM EFI WATER FLOW



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F. MIE 454 EFI SKI WATER FLOW