

TABLE OF CONTENTS

1 SAFETY

INTRODUCTION	1-1
CLEANING, WAXING, & POLISHING	1-1
CONTROLLING CORROSION	1-2
PROPELLERS	1-2
FUEL SYSTEM	1-7
LOADING	1-9
HORSEPOWER	1-10
FLOTATION	1-10
EMERGENCY EQUIPMENT	1-12
COMPASS	1-14
ANCHORS	1-16
MISCELLANEOUS EQUIPMENT	1-17
BOATING ACCIDENT REPORTS	1-18
NAVIGATION	1-18

2 TUNING

INTRODUCTION	2-1
TUNE-UP SEQUENCE	2-2
COMPRESSION CHECK	2-2
SPARK PLUG INSPECTION	2-3
IGNITION SYSTEM	2-4
TIMING AND SYNCHRONIZING	2-4
ELECTRICAL POWER SUPPLY	2-5
CARBURETOR ADJUSTMENT	2-6
ELECTRONIC FUEL INJECTION	2-9
FUEL PUMPS	2-9
OIL INJECTION	2-10
CRANKING MOTOR AND SOLENOID	2-10
INTERNAL WIRING HARNESS	2-11
WATER PUMP CHECK	2-11
PROPELLER	2-12
LOWER UNIT	2-13
BOAT TESTING	2-14

3 MAINTENANCE

INTRODUCTION	3-1
OUTBOARD SERIAL NUMBERS	3-2
LUBRICATION - COMPLETE UNIT	3-2
PRE-SEASON PREPARATION	3-4
FIBERGLASS HULLS	3-8
BELOW WATERLINE SERVICE	3-9
SUBMERGED ENGINE SERVICE	3-9
PROPELLER SERVICE	3-12
POWER TRIM/TILT	3-13
INSIDE THE BOAT	3-15

LOWER UNIT	3-15
WINTER STORAGE	3-16

4 FUEL

INTRODUCTION	4-1
GENERAL CARBURETION INFORMATION	4-2
CARBURETOR IDENTIFICATION	4-4
FUEL SYSTEM	4-5
Leaded Gasoline & Gasohol	4-6
Removing Fuel From System	4-6
TROUBLESHOOTING	
MODELS W/O EFI	4-7
"Sour" Fuel	4-7
Fuel Pump Test	4-9
Fuel Line Test	4-11
Rough Engine Idle	4-11
Excessive Fuel Consumption	4-11
Engine Surge	4-12
Anti-Syphon Valve	4-12
ENRICHENER SYSTEM	4-12
"2+2" SYSTEM	4-13
CARBURETOR "A" - "MERCARB" WITH OR WITHOUT INTEGRAL FUEL PUMP	4-14
Removal & Disassembling	4-15
Cleaning & Inspecting	4-18
Assembling & Installation	4-20
Adjustments	4-23
CARBURETOR "B" CENTER SQUARE BOWL	4-23
Removal & Disassembling	4-23
Cleaning & Inspecting	4-26
Assembling & Installation	4-28
Adjustments	4-32
CARBURETOR "C" - WME SERIES	4-33
Removal & Disassembling	4-33
Cleaning & Inspecting	4-36
Assembling & Installation	4-37
Adjustments	4-39
CARBURETOR "D" SIDE BOWL AND BACK DRAG	4-39
Removal & Disassembling	4-39
Cleaning & Inspecting	4-42
Assembling & Installation	4-44
Adjustments	4-48

4 FUEL (Continued)

CARBURETOR "E" V6 POWERHEADS	
DUAL FLOAT CENTER BOWL	4-49
Removal & Disassembling	4-49
Cleaning & Inspecting	4-51
Assembling & Installation	4-53
Adjustments	4-57

FUEL PUMP

Theory of Operation	4-57
Pump Pressure Check	4-58
Pump Removal	4-58
Cleaning & Inspecting	4-59
Assembling	4-59

ELECTRONIC FUEL INJECTION

EFI SYSTEM DESCRIPTION

TRUBLESHOOTING EFI

MAINTENANCE -- EFI FUEL SYS.

Leaded Gasoline & Gasohol

Removing Fuel From System

SERVICING EFI

Intake Manifold and

Fuel Injectors

Secondary Fuel Filter

Fuel Pressure Regulator

and Vapor Separator

Throttle Sensor

5 OIL INJECTION

INTRODUCTION

AUTO BLEND

Description

Operation

Troubleshooting

System Storage

Preparation for Use

ADVANCED OIL INJECTION

Description

Operation

Filling System

Bleeding System

Oil Pump Adjustment

Troubleshooting

Servicing

Removal

Disassembling

Cleaning and Inspecting

Assembling

Installation

6 IGNITION

INTRODUCTION

SPARK PLUG EVALUATION

THUNDERBOLT -- DISTRIBUTOR

CD -- POINTLESS	
Description	6-3
Troubleshooting	6-2
Servicing	6-7
Distributor Removal	6-7
Cleaning & Inspecting	6-8
Distributor Assembling	6-8

THUNDERBOLT -- FLYWHEEL --

CD -- COIL PER CYLINDER	
Description	6-11
Troubleshooting	6-11
Servicing	6-19
Removal	6-19
Cleaning and Inspecting	6-21
Assembling	6-22

IDLE STABILIZER AND SPARK

ADVANCE MODULES

Operation

Troubleshooting

7 TIMING AND SYNCHRONIZING

INTRODUCTION & PREPARATION

IGNITION TIMING & CARB. SYNCH.

IDLE STABILIZER AND SPARK

ADVANCE MODULES

4-CYLINDER POWERHEADS

MODEL 50HP - 1982-85

MODEL 45HP - SINCE 1986

3-CYLINDER POWERHEADS

MODEL 50HP - SINCE 1986

MODEL 60HP - SINCE 1984

MODEL 70HP - 1980-83

4-CYLINDER POWERHEADS

MODEL 75HP - 1984-86

MODEL 80HP - 1978-83

MODEL 85HP - 1977 Only

3-CYLINDER POWERHEADS

MODEL 75HP - SINCE 1987

MODEL 90HP - SINCE 1987

4-CYLINDER POWERHEADS

MODEL 100HP - SINCE 1988

MODEL 115HP - SINCE 1989

6-CYLINDER IN-LINE

POWERHEADS WITH

DISTRIBUTOR

MODEL 90HP

MODEL 115HP

MODEL 140HP

6-CYLINDER IN-LINE POWERHEADS WITHOUT DISTRIBUTOR MODEL 90HP MODEL 115HP MODEL 140HP	7-18
V6 POWERHEADS WITHOUT EFI MODEL 175HP S/N 4838074 to 6618750	7-21
MODEL 150HP S/N 5203428 AND BELOW MODEL 200HP S/N 5363917 AND BELOW	7-24
MODEL 135HP MODEL 150HP S/N 5203429 AND ABOVE MODEL 175 HP S/N 6618751 AND ABOVE MODEL 200HP S/N 5363918 TO 6073191	7-27
MODEL 200HP S/N 6073192 AND ABOVE	7-30
V6 POWERHEADS WITH EFI	7-33

8 POWERHEAD

CHAPTER ORGANIZATION	8-1
GENERAL POWERHEAD INFORMATION	8-2
COOLING LECTURE	8-4
CYLINDER DRAIN SYSTEM	8-6
REMOVAL AND DISASSEMBLING ORIGINAL DESIGN IN-LINE POWERHEADS MODEL 45 4-CYL. 1986 & ON MODEL 50 4-CYL. 1982-85 MODEL 50 3-CYL. 1986 & ON MODEL 60 3-CYL. 1984 & ON MODEL 70 3-CYL. 1980-83 MODEL 75 4-CYL. 1984-86 MODEL 80 4-CYL. 1978-83 MODEL 85 4-CYL. 1977 MODEL 90 L6 1978-86 MODEL 115 L6 1978-88 MODEL 140 L6 1978-80	8-8
Removal	8-9
Disassembling	8-10
Assembling	8-14
Installation	8-27

REDESIGNED IN-LINE POWERHEADS MODEL 75 3-CYL. 1988 & ON MODEL 90 3-CYL. 1988 & ON MODEL 100 4-CYL. 1988 & ON MODEL 115 4-CYL. 1989 & ON	8-29
Removal	8-29
Disassembling	8-32
Assembling	8-46
Installation	8-58
V6 POWERHEAD Removal	8-62
Disassembling	8-63
Assembling	8-74
Installation	8-90
CLEANING AND INSPECTING ALL MODELS	8-95
Thermostat Service	8-95
Reed Block Service	8-96
Crankshaft Service	8-98
End Cap Bearings	8-99
Connecting Rod Service	8-100
Piston Service	8-102
Ring End Gap	8-103
Cylinder Block Service	8-104
Honing Procedures	8-105

9 ELECTRICAL

INTRODUCTION	9-1
BATTERIES	9-1
JUMPER CABLES	9-5
GAUGES AND HORNS	9-7
Temperature Gauges	9-8
Warning Lights	9-8
Fuel Gauges	9-9
Tachometer	9-11
Horns	9-11
ELECTRICAL SYSTEM GENERAL INFORMATION	9-12
CHARGING CIRCUIT SERVICE	9-13
Troubleshooting	9-14
Rectifier Removal	9-15
Rectifier Installation	9-17
STATOR SERVICE	9-17
Removal	9-18
Installation	9-18
CHOKE CIRCUIT	9-19
ENRICHENER SYSTEM	9-20
CRANKING MOTOR CIRCUIT Description & Operation	9-22
Troubleshooting	9-23
Removal	9-27

9 ELECTRICAL (Continued)

Disassembling - Pinion Gear with Rubber Cushion	9-28
Assembling	9-28
Disassembling - Pinion Gear with Snap Ring or Nut	9-29
Assembling	9-30
Disassembling - Pinion Gear with Top Spring	9-31
Assembling	9-32
CRANKING MOTOR REPAIR	9-32
Disassembling	9-33
Testing Parts	9-34
Cleaning & Inspecting	9-36
Assembling a Bosch	9-41
Assembling a Delco Remy	9-41
Assembling a Prestolite	9-46

10 TRIM/TILT

INTRODUCTION	10-1
CHAPTER ORGANIZATION	10-2
MECHANICAL TILT PIN	10-2
SYSTEM "A" -- TWO TRIM/TILT CYLINDERS	
Description and Operation	10-3
Special Instructions	10-5
Bleeding System "A"	10-6
Troubleshooting	10-7
Cleaning and Inspecting	10-9
System "A" Service	10-12
Pump Service	10-14
Electric Motor Service	10-17
SYSTEM "B" -- TWO TRIM CYLINDERS -- ONE TILT CYLINDER	
Description and Operation	10-21
Bleeding System "B"	10-22
Flushing	10-23
Troubleshooting	10-24
System "B" Service	10-31
Preliminary Tasks	10-31
Removal	10-33
Component Service	10-34
Manual Release Valve	10-34
Oil Reservoir Cover	10-35
Trim Cylinder	10-35
Tilt Cylinder	10-36
Electric Motor	10-36
Cleaning and Inspecting	10-37
Assembling & Installation	10-38

SYSTEM "C" -- ONE TRIM/TILT CYLINDER

Description and Operation	10-53
Bleeding System "C"	10-54
Troubleshooting	10-54
System "C" Service	10-55
Pump Removal & Service	10-55
Cylinder Service	10-55

11 LOWER UNIT

DESCRIPTION	11-1
CHAPTER COVERAGE	11-1
TROUBLESHOOTING	11-5
LOWER UNIT REMOVAL	
ALL UNITS	11-6
Propeller Removal	11-7
WATER PUMP SERVICE	
Removal and Disassembling	
High Pressure Type Pump	11-9
High Volume Type Pump	11-10

SERVICING CAM-SHIFT TYPE I UNITS MATCHED WITH EARLY 3-, 4-CYLINDER, L6 AND V6 POWERHEADS TO ABOUT 1979

Removal	11-12
Bearing Carrier and Propeller Shaft	11-13
Driveshaft & Bearing	11-14
Forward Gear & Bearing	11-16
Disassembling	
Bearing Carrier	11-17
Propeller Shaft	11-18
Driveshaft	11-18
Assembling	
Lower Driveshaft Bearing	11-23
Shift Shaft	11-23
Bearing Carrier	11-24
Forward Gear & Bearing	11-25
Forward Bearing Race	11-26
Driveshaft	11-27
Shimming & Backlash	
Pinion Gear Depth	11-29
Forward Gear Backlash	11-30
Reverse Gear Backlash	11-34
Assembling & Installation	
Bearing Carrier	11-33

SERVICING CAM-SHIFT TYPE II UNITS MATCHED WITH LATE 3-, 4-CYLINDER, AND L6 POWERHEADS FROM ABOUT 1980

11-35

Removal and Disassembling		CLEANING AND INSPECTING	
Bearing Carrier	11-36	ALL UNITS	11-86
Propeller Shaft	11-37		
Shift Shaft	11-38	LOWER UNIT INSTALLATION	
Pinion Gear	11-39	Filling Lower Unit	11-88
Driveshaft	11-39	Assembling & Installation	11-89
Forward Gear	11-40	Propeller Installation	11-92
Pinion Gear Bearing Race	11-41		
Forward Bearing Race	11-41		
Driveshaft Bearing	11-41		
Assembling and Installation		12 REMOTE CONTROLS	
Driveshaft Bearing	11-44	INTRODUCTION	12-1
Pinion Gear Bearing Race	11-45	COMMANDER CONTROL BOX	
Forward Bearing Race	11-45	Removal & Disassembling	12-2
Shift Shaft	11-46	Cleaning & Inspecting	12-9
Forward Gear	11-46	Assembling & Installation	12-11
Driveshaft	11-47		
Pinion Gear	11-47		
Propeller Shaft	11-48		
Bearing Carrier	11-49		
Pinion Gear Depth	11-50	13 HAND REWIND STARTER	
Forward Gear Backlash	11-51	INTRODUCTION	13-1
SERVICING E-Z SHIFT		TYPE "A" (See Introduction)	13-2
MODELS SINCE ABOUT 1979		Removal and Disassembling	13-2
Special Words	11-53	Cleaning and Inspecting	13-4
Removal		Assembling and Installation	13-6
Bearing Carrier	11-53	TYPE "B" (See Introduction)	13-6
Propeller Shaft	11-55	Removal and Disassembling	13-13
Driveshaft & Bearing	11-56	Cleaning and Inspecting	13-16
Separate Forward Gear		Assembling and Installation	13-17
from Bearing	11-60		
Disassembling			
Driveshaft	11-60		
Separate Reverse Gear			
from Bearing Carrier	11-61		
Assembling & Installation		APPENDIX	
Lower Driveshaft Bearing	11-61	METRIC CONVERSION CHART	A-1
Bearing Carrier	11-61	ENGINE SPECIFICATIONS	
Forward Gear & Bearing	11-64	AND TUNE-UP ADJUSTMENTS	A-2
Forward Bearing Race	11-65	REED STOP OPENING	A-10
Propeller Shaft	11-66	PISTON AND CYLINDER SPECS.	A-11
Driveshaft	11-71	LOWER UNIT BACKLASH TABLE	A-12
Shimming		LOWER UNIT OIL CAPACITY	
Pinion Gear Depth	11-75	AND GEAR CHART	A-13
Forward Gear Backlash	11-76	CARBURETOR JET SIZE/	
Alpha Drive	11-78	ELEVATION CHARTS	A-14
WATER PUMP ASSEMBLING AND		WIRE IDENTIFICATION DWGS.	
INSTALLATION	11-81	Ignition Systems	A-17 thru A-24
High Pressure Type Pump	11-81	Type "B" Trim/Tilt	A-25
Shimming (Certain Units)	11-81	Type "C" Trim/Tilt	A-26
High Volume Type Pump	11-85	Commander Control Box	A-27