

# CONTENTS

---

## 1

### GENERAL INFORMATION, SAFETY AND TOOLS

HOW TO USE THIS MANUAL	1-2
BOATING SAFETY	1-4
BOATING EQUIPMENT (NOT REQUIRED BUT RECOMMENDED)	1-10
SAFETY IN SERVICE	1-13
TROUBLESHOOTING	1-13
SHOP EQUIPMENT	1-17
TOOLS	1-19
FASTENERS, MEASUREMENT, AND CONVERSIONS	1-27
SPECIFICATIONS	1-28

---

## 2

### MAINTENANCE & TUNE-UP

GENERAL INFORMATION (WHAT EVERYONE SHOULD KNOW ABOUT MAINTENANCE)	2-2
LUBRICATION SERVICE	2-5
ENGINE MAINTENANCE	2-9
BOAT MAINTENANCE	2-30
TUNE-UP	2-33
TIMING AND SYNCHRONIZATION	2-42
STORAGE (WHAT TO DO BEFORE & AFTER)	2-50
CLEARING A SUBMERGED MOTOR	2-54
SPECIFICATIONS	2-55

---

## 3

### FUEL & IGNITION SYSTEMS

FUEL SYSTEM BASICS	3-2
FUEL TANK & LINES	3-6
FICHT FUEL INJECTION (DI/FFI) & IGNITION SYSTEM	3-58
E-TEC FUEL INJECTION & IGNITION SYSTEM	3-58
SPECIFICATIONS	3-115

---

## 4

### ELECTRICAL SYSTEMS

ELECTRICAL SYSTEMS	4-2
CHARGING CIRCUIT	4-8
STARTING CIRCUIT	4-19
WARNING SYSTEM	4-38
WIRING DIAGRAMS	4-40
SPECIFICATIONS	4-89

# CONTENTS

OIL INJECTION SYSTEM - DI/FICHT MOTORS	5-2	<b>LUBRICATION &amp; COOLING</b>	<b>5</b>
OIL INJECTION SYSTEM - E-TEC MOTORS	5-11		
COOLING SYSTEM	5-38		
SPECIFICATIONS	5-59		
POWERHEAD	6-2	<b>POWERHEAD</b>	<b>6</b>
POWERHEAD BREAK-IN	6-35		
POWERHEAD EXPLODED VIEWS	6-37		
SPECIFICATIONS	6-49		
GEARCASE	7-2	<b>LOWER UNIT</b>	<b>7</b>
TRIM/TILT SYSTEMS	8-2	<b>TRIM &amp; TILT</b>	<b>8</b>
MECHANICAL REMOTE CONTROLS	9-2	<b>REMOTE CONTROLS</b>	<b>9</b>
CONTROL CABLES	9-16		
ELECTRONIC REMOTE CONTROLS	9-16		
TILLER HANDLE	9-20		
HAND REWIND STARTER	10-2		<b>10</b>
MASTER INDEX	10-11	<b>MASTER INDEX</b>	

<p>AIR INTAKE SILENCER . . . . . 2-20</p> <p>E-TEC . . . . . 3-90</p> <p>FICHT . . . . . 3-35</p> <p>GENERAL INFORMATION . . . . . 2-20</p> <p>SERVICE . . . . . 2-20</p> <p>ANODES (ZINCS) . . . . . 2-28</p> <p>GENERAL INFORMATION . . . . . 2-28</p> <p>INSPECTION . . . . . 2-28</p> <p>SERVICE . . . . . 2-28</p> <p>ANTI-SIPHON VALVE</p> <p>E-TEC . . . . . 3-113</p> <p>FICHT . . . . . 3-55</p> <p>BASIC ELECTRICAL THEORY . . . . . 4-2</p> <p>GENERAL INFORMATION . . . . . 4-2</p> <p>HOW DOES ELECTRICITY WORK . . . . . 4-2</p> <p>OHM'S LAW . . . . . 4-2</p> <p>BATTERY</p> <p>BATTERY LOCATION . . . . . 4-18</p> <p>BATTERY RATINGS . . . . . 4-17</p> <p>CHARGERS . . . . . 4-18</p> <p>CONSTRUCTION . . . . . 4-17</p> <p>GENERAL INFORMATION . . . . . 2-30, 4-17</p> <p>MAINTENANCE . . . . . 2-30</p> <p>MARINE BATTERIES . . . . . 4-17</p> <p>REPLACING CABLES . . . . . 4-18</p> <p>SAFETY PRECAUTIONS . . . . . 4-18</p> <p>SERVICE . . . . . 4-19</p> <p>STORAGE . . . . . 2-32</p> <p>TESTING . . . . . 2-31</p> <p>BEFORE/AFTER EACH USE . . . . . 2-4</p> <p>GENERAL INFORMATION . . . . . 2-4</p> <p>VISUALLY INSPECTING THE BOAT AND MOTOR . . . . . 2-4</p> <p><b>BOAT MAINTENANCE . . . . . 2-30</b></p> <p>BATTERIES . . . . . 2-30</p> <p>FIBERGLASS HULL . . . . . 2-32</p> <p><b>BOATING EQUIPMENT (NOT REQUIRED BUT RECOMMENDED) . . . 1-10</b></p> <p>ANCHORS . . . . . 1-10</p> <p>BAILING DEVICES . . . . . 1-10</p> <p>COMPASS . . . . . 1-11</p> <p>FIRST AID KIT . . . . . 1-10</p> <p>OAR/PADDLE (SECOND MEANS OF PROPULSION) . . . . . 1-10</p> <p>TOOLS AND SPARE PARTS . . . . . 1-12</p> <p>VHF-FM RADIO . . . . . 1-10</p> <p><b>BOATING SAFETY . . . . . 1-4</b></p> <p>COURTESY MARINE EXAMINATIONS . . . . . 1-10</p> <p>REGULATIONS FOR YOUR BOAT . . . . . 1-4</p> <p>REQUIRED SAFETY EQUIPMENT . . . . . 1-5</p> <p>CAPACITOR</p> <p>E-TEC . . . . . 3-114</p> <p>FICHT . . . . . 3-56</p> <p><b>CHARGING CIRCUIT . . . . . 4-8</b></p> <p>BATTERY . . . . . 4-17</p> <p>GENERAL INFORMATION . . . . . 4-8</p> <p>SERVICE PRECAUTIONS . . . . . 4-8</p> <p>STATOR/BATTERY CHARGE COIL . . . . . 4-13</p> <p>TROUBLESHOOTING . . . . . 4-9</p> <p><b>CLEARING A SUBMERGED MOTOR . . . . . 2-54</b></p> <p>COMPRESSION CHECK . . . . . 2-35</p> <p>GENERAL INFORMATION . . . . . 2-35</p> <p>PERFORMING A TUNE-UP COMPRESSION CHECK . . . . . 2-35</p> <p>CONCEALED SIDE MOUNT REMOTE UNITS . . . . . 9-8</p> <p>OVERHAUL . . . . . 9-8</p> <p>DISASSEMBLING &amp; ASSEMBLING THE HOUSING . . . . . 9-11</p> <p>REPLACING THE TRIM/TILT SWITCH . . . . . 9-8</p>	<p>CONTROL CABLE ADJUSTMENT . . . . . 2-44</p> <p>15-30 HP E-TEC (INLINE MOTORS) . . . . . 2-44</p> <p>40-90 HP E-TEC (INLINE MOTORS) . . . . . 2-44</p> <p>75-175 HP V4 &amp; V6 DI/FICHT MOTORS (60°) . . . . . 2-45</p> <p>115-200 HP V4 &amp; V6 E-TEC MOTORS (60°) . . . . . 2-46</p> <p>200-300 HP V6 DI/FICHT &amp; E-TEC MOTORS (90°) . . . . . 2-46</p> <p><b>CONTROL CABLES . . . . . 9-16</b></p> <p>RIGGING . . . . . 9-16</p> <p><b>COOLING SYSTEM . . . . . 5-38</b></p> <p>COOLING SYSTEM SCHEMATICS . . . . . 5-52</p> <p>DESCRIPTION &amp; OPERATION . . . . . 5-38</p> <p>EXHAUST WATER VALVE . . . . . 5-51</p> <p>FLUSHING THE COOLING SYSTEM . . . . . 2-15</p> <p>GENERAL INFORMATION . . . . . 5-38</p> <p>PRESSURE RELIEF VALVE . . . . . 5-45</p> <p>THERMOSTAT . . . . . 5-42</p> <p>TROUBLESHOOTING . . . . . 5-40</p> <p>WATER PRESSURE CONNECTION (INLINE E-TEC MODELS) . . . . . 5-46</p> <p>WATER PUMP AND IMPELLER . . . . . 5-46</p> <p>COOLING SYSTEM SCHEMATICS . . . . . 5-52</p> <p>CRANKSHAFT POSITION (CP) SENSOR</p> <p>AIR GAP ADJUSTMENT . . . . . 2-47</p> <p>E-TEC . . . . . 3-103</p> <p>FICHT . . . . . 3-44</p> <p>DE-CARBONING THE PISTONS . . . . . 2-34</p> <p>DESCRIPTION &amp; OPERATION</p> <p>COOLING SYSTEM . . . . . 5-38</p> <p>E-TEC . . . . . 3-58</p> <p>E-TEC . . . . . 5-11</p> <p>FICHT . . . . . 3-12</p> <p>GEARCASE . . . . . 7-2</p> <p>IGNITION COILS . . . . . 3-49</p> <p>LUBRICATION SYSTEM - E-TEC . . . . . 5-11</p> <p>LUBRICATION SYSTEM - FICHT . . . . . 5-2</p> <p>MECHANICAL REMOTE CONTROLS . . . . . 9-2</p> <p>ICON REMOTE SYSTEM . . . . . 9-16</p> <p>TILLER HANDLE . . . . . 9-20</p> <p>1-RAM TRIM/TILT SYSTEMS . . . . . 8-3</p> <p>3-RAM TRIM/TILT SYSTEM . . . . . 8-5</p> <p>DIAGNOSTIC CHARTS</p> <p>E-TEC . . . . . 3-76</p> <p>FICHT . . . . . 3-20</p> <p>DI/FICHT STARTER CIRCUIT . . . . . 4-19</p> <p>CIRCUIT DESCRIPTION . . . . . 4-19</p> <p>TROUBLESHOOTING . . . . . 4-20</p> <p>DUAL HANDLE SURFACE MOUNT REMOTE UNITS</p> <p>FOR SINGLE MOTORS . . . . . 9-8</p> <p>OVERHAUL . . . . . 9-8</p> <p>E-TEC STARTER CIRCUIT . . . . . 4-20</p> <p>CIRCUIT DESCRIPTION . . . . . 4-20</p> <p>TROUBLESHOOTING . . . . . 4-24</p> <p><b>E-TEC FUEL INJECTION &amp; IGNITION SYSTEM . . . . . 3-58</b></p> <p>AIR INTAKE SILENCER/FLAME ARRESTER . . . . . 3-90</p> <p>ANTI-SIPHON VALVE . . . . . 3-113</p> <p>CAPACITOR . . . . . 3-114</p> <p>CRANKSHAFT POSITION (CP) SENSOR . . . . . 3-103</p> <p>DESCRIPTION &amp; OPERATION . . . . . 3-58</p> <p>E-TEC COMPONENT TESTING . . . . . 3-84</p> <p>EMM PIN-OUTS/CIRCUIT CHECKS . . . . . 3-79</p> <p>ENGINE MANAGEMENT MODULE (EMM) . . . . . 3-112</p> <p>ENGINE SYMPTOM DIAGNOSTIC CHARTS . . . . . 3-76</p> <p>EXHAUST VALVE . . . . . 3-114</p> <p>FUEL FILTER WATER SENSOR . . . . . 3-113</p> <p>FUEL INJECTORS . . . . . 3-99</p>
---	---

# 10-12 MASTER INDEX

FUEL PRESSURE REGULATOR	3-113	2-STROKE ENGINE OIL	2-17
FUEL RAILS	3-103	ENGINE MANAGEMENT MODULE (EMM)	
GENERAL INFORMATION	3-58	E-TEC	3-112
HIGH PRESSURE FUEL PUMP & VST ASSEMBLY	3-97	FICT	3-53
IGNITION COILS	3-108	EXHAUST PRESSURE FITTING	2-30
ISOLATING PROBLEMS WITH THE E-TEC SYSTEM	3-65	GENERAL INFORMATION	2-30
KNOCK SENSOR	3-111	INSPECTON & SERVICE	2-30
LOW PRESSURE FUEL PUMP	3-93	ENGINE TEMPERATURE SENSORS/SWITCHES	4-40
PRESSURE SENSORS	3-112	EXHAUST VALVE	3-114
SELF-DIAGNOSTIC SYSTEM	3-65	GENERAL INFORMATION & TESTING	3-114
SHIFT INTERRUPT SWITCH	3-111	EXHAUST WATER VALVE	5-51
TEMPERATURE SENSORS/SWITCHES	3-104	SERVICE	5-51
THROTTLE BODY	3-91	<b>FASTENERS, MEASUREMENTS AND CONVERSIONS</b>	<b>1-27</b>
THROTTLE POSITION (TP) SENSOR	3-107	BOLTS, NUTS AND OTHER THREADED RETAINERS	1-27
TROUBLESHOOTING	3-63	STANDARD AND METRIC MEASUREMENTS	1-27
ELECTRIC STARTER BASICS	4-19	TORQUE	1-27
ELECTRIC STARTER MOTOR PINION	2-5	FFI MAIN SYSTEM RELAY	3-56
LUBRICATION	2-5	GENERAL INFORMATION	3-56
RECOMMENDED LUBRICANT	2-5	TESTING & SERVICE	3-56
ELECTRICAL COMPONENTS	4-2	FIBERGLASS HULL	2-32
GROUND	4-3	INSPECTION & CARE	2-32
LOAD	4-4	<b>FICHT FUEL INJECTION (DI/FFI) &amp; IGNITION SYSTEM</b>	<b>3-12</b>
POWER SOURCE	4-2	AIR INTAKE SILENCER/FLAME ARRESTER	3-35
PROTECTIVE DEVICES	4-3	ANTI-SIPHON VALVE	3-55
SWITCHES & RELAYS	4-4	CAPACITOR	3-56
WIRING & HARNESSSES	4-4	CRANKSHAFT POSITION (CP) SENSOR	3-44
ELECTRICAL SYSTEM PRECAUTIONS	4-8	DESCRIPTION & OPERATION	3-12
<b>ELECTRICAL SYSTEMS</b>	<b>4-2</b>	EMM PIN-OUTS/CIRCUIT CHECKS	3-24
BASIC ELECTRICAL THEORY	4-2	ENGINE MANAGEMENT MODULE (EMM)	3-53
ELECTRICAL COMPONENTS	4-2	ENGINE SYMPTOM DIAGNOSTIC CHARTS	3-20
ELECTRICAL TESTING	4-6	FFI MAIN SYSTEM RELAY	3-56
PRECAUTIONS	4-8	FICHT COMPONENT TESTING	3-27
TEST EQUIPMENT	4-4	FILTER MODULE	3-56
TROUBLESHOOTING	4-6	FUEL FILTER WATER SENSOR	3-55
WIRE & CONNECTOR REPAIR	4-7	FUEL INJECTORS	3-41
ELECTRICAL TESTING	4-6	FUEL MANIFOLDS & FUEL LINES	3-43
OPEN CIRCUITS	4-7	FUEL PRESSURE REGULATOR	3-54
RESISTANCE	4-7	GENERAL INFORMATION	3-12
SHORT CIRCUITS	4-7	HIGH PRESSURE FUEL PUMP & VST ASSEMBLY	3-39
VOLTAGE	4-6	IGNITION COILS	3-49
VOLTAGE DROP	4-6	ISOLATING PROBLEMS WITH THE FICHT SYSTEM	3-17
<b>ELECTRONIC REMOTE CONTROLS</b>	<b>9-16</b>	LOW PRESSURE FUEL PUMP	3-36
ICON REMOTE SYSTEM	9-16	PRESSURE SENSOR	3-53
EMM PIN-OUTS/CIRCUIT CHECKS		SELF-DIAGNOSTIC SYSTEM	3-18
E-TEC	3-79	SHIFT INTERRUPT SWITCH	3-53
FICHT	3-24	SYSTEM IDENTIFICATION	3-12
ENGINE COVER LATCHES	2-6	TEMPERATURE SENSORS/SWITCHES	3-45
LUBRICATION	2-6	THROTTLE BODY	3-36
RECOMMENDED LUBRICANT	2-6	TROUBLESHOOTING	3-15
ENGINE COVERS (TOP & LOWER CASES)	2-9	40-AMP RELAYS	3-57
REMOVAL & INSTALLATION	2-9	FICHT STARTER CIRCUIT	4-19
ENGINE IDENTIFICATION	2-2	CIRCUIT DESCRIPTION	4-19
ENGINE MODEL NUMBERS	2-3	TROUBLESHOOTING	4-20
GENERAL INFORMATION	2-2	FILTER MODULE	3-56
<b>ENGINE MAINTENANCE</b>	<b>2-9</b>	GENERAL INFORMATION & TESTING	3-56
AIR INTAKE SILENCER	2-20	FLAME ARRESTER	
ANODES (ZINCS)	2-28	E-TEC	3-90
COOLING SYSTEM	2-15	FICHT	3-35
ENGINE COVERS (TOP & LOWER CASES)	2-9	FLYWHEEL	6-3
EXHAUST PRESSURE FITTING	2-30	REMOVAL & INSTALLATION	6-3
FUEL FILTER	2-20	FLYWHEEL COVER	6-2
LOWER UNIT (GEARCASE) OIL	2-18	REMOVAL & INSTALLATION	6-2
OIL FILTER	2-29	FUEL	3-2
PROPELLER	2-24	ALCOHOL-BLENDED FUELS	3-3

CHECKING FOR STALE/CONTAMINATED FUEL	3-4	PRESSURE TESTING THE GEARCASE	7-29
GENERAL	3-2	PROPELLER SHAFT BEARING HOUSING SERVICE	7-23
HIGH ALTITUDE OPERATION	3-3	REMOVAL & INSTALLATION	7-17
OCTANE RATING	3-3	SHIFT ROD HEIGHT ADJUSTMENT	7-29
RECOMMENDATIONS	3-3		
VAPOR PRESSURE	3-3		
FUEL FILTER	2-20	<b>GEARCASE ASSEMBLY - 75 HP AND LARGER</b>	
FUEL FILTER REPLACEMENT	2-21	(L3, V4 & V6) MODELS	7-30
FUEL SYSTEM PRESSURE	2-21	ASSEMBLY	7-48
GENERAL INFORMATION	2-20	DRIVESHAFT - INSTALLATION (ALL EXC. S2 GEARCASES)	7-54
FUEL FILTER WATER SENSOR		DRIVESHAFT - INSTALLATION ON S2 GEARCASES	7-55
E-TEC	3-113	DRIVESHAFT BEARING HOUSING - ASSEMBLY	7-53
FICHT	3-55	GENERAL	7-48
FUEL INJECTORS		LOWER DRIVESHAFT PINION BEARING - INSTALLATION	7-48
E-TEC	3-99	PRESSURE TESTING THE GEARCASE	7-59
FICHT	3-41	PROPELLER SHAFT (NOSE CONE GEAR BEARING HOUSING & SHIFT UNIT) - ASSEMBLY	7-49
FUEL LINES & FITTINGS	3-8	PROPELLER SHAFT, SHIFT ROD & COVER - INSTALLATION	7-51
GENERAL INFORMATION	3-8	PROPELLER SHAFT BEARING HOUSING - INSTALLATION	7-58
SERVICE	3-10	PROPELLER SHAFT GEAR & BEARING CARRIER - ASSEMBLY	7-56
TESTING	3-9	SHIFT ROD HEIGHT ADJUSTMENT	7-59
FUEL MANIFOLDS & FUEL LINES	3-43	SHIMMING THE DRIVESHAFT	7-52
REMOVAL & INSTALLATION	3-43	CASE IDENTIFICATION	7-33
FUEL PRESSURE REGULATOR		CLEANING & INSPECTION	7-48
E-TEC	3-113	DISASSEMBLY	7-35
FICHT	3-54	DRIVESHAFT - REMOVAL (ALL EXC. S2 GEARCASES)	7-42
FUEL RAILS	3-103	GENERAL OVERHAUL & EXPLODED VIEWS	7-35
REMOVAL & INSTALLATION	3-103	LOWER DRIVESHAFT PINION BEARING - REMOVAL	7-46
<b>FUEL SYSTEM BASICS</b>	<b>3-2</b>	PINION GEAR & DRIVESHAFT BEARING HOUSING - REMOVAL (ALL EXC. S2 GEARCASES)	7-42
FUEL	3-2	PINION GEAR, DRIVESHAFT BEARING HOUSING & DRIVESHAFT - REMOVAL ON S2 GEARCASES	7-41
FUEL SYSTEM PRESSURIZATION	3-5	PROPELLER SHAFT BEARING CARRIER - REMOVAL	7-36
FUEL SYSTEM SERVICE CAUTIONS	3-2	PROPELLER SHAFT & SHIFT UNIT - REMOVAL	7-44
GENERAL INFORMATION	3-2	PROPELLER SHAFT (GEAR BEARING HOUSING & SHIFT UNIT) - DISASSEMBLY	7-44
FUEL SYSTEM PRESSURIZATION	3-5	WATER INTAKE SCREEN	7-46
GENERAL	3-5	FUNCTIONAL CHECK	5-59
PRESSURIZING THE FUEL SYSTEM	3-6	REMOVAL & INSTALLATION	7-30
RELIEVING PRESSURE	3-5		
FUEL SYSTEM SERVICE CAUTIONS	3-2	<b>GEARCASE OIL</b>	2-18
FUEL TANK	3-7	CHECKING LOWER UNIT OIL LEVEL & CONDITION	2-19
GENERAL INFORMATION	3-7	DRAINING & FILLING	2-19
SERVICE	3-7	GENERAL INFORMATION	2-18
<b>FUEL TANK &amp; LINES</b>	<b>3-6</b>	OIL RECOMMENDATIONS	2-18
FUEL LINES & FITTINGS	3-8		
FUEL TANK	3-7	<b>GENERAL INFORMATION</b>	
GENERAL INFORMATION	3-6	(WHAT EVERYONE SHOULD KNOW ABOUT MAINTENANCE)	2-2
<b>GEARCASE</b>	<b>7-2</b>	BEFORE/AFTER EACH USE	2-4
DESCRIPTION & OPERATION	7-2	ENGINE IDENTIFICATION	2-2
GEARCASE ASSEMBLY - 15-30 HP (2-CYL) MODELS	7-5	EXPLODED VIEWS	2-2
GEARCASE ASSEMBLY - 40-70 HP (2-CYL) MODELS	7-17	GENERAL INFORMATION	2-2
GEARCASE ASSEMBLY - 75 HP AND LARGER (L3, V4 & V6) MODELS	7-30	MAINTENANCE COVERAGE	2-2
GENERAL INFORMATION	7-2	MAINTENANCE EQUALS SAFETY	2-2
TROUBLESHOOTING	7-3		
GEARCASE ASSEMBLY - 15-30 HP (2-CYL) MODELS	7-5	<b>HAND REWIND STARTER</b>	<b>10-2</b>
ASSEMBLY	7-11	MANUAL STARTER ASSEMBLY	10-2
CLEANING & INSPECTION	7-10		
DISASSEMBLY	7-7	<b>HIGH PRESSURE FUEL PUMP &amp; VST ASSEMBLY</b>	
PRESSURE TESTING THE GEARCASE	7-17	E-TEC	3-97
REMOVAL & INSTALLATION	7-5	FICHT	3-39
GEARCASE ASSEMBLY - 40-70 HP (2-CYL) MODELS	7-17		
ASSEMBLY	7-27	<b>HOW TO USE THIS MANUAL</b>	<b>1-2</b>
CLEANING & INSPECTION	7-25	AVOIDING THE MOST COMMON MISTAKES	1-3
DISASSEMBLY	7-20	AVOIDING TROUBLE	1-2
DRIVESHAFT BEARING HOUSING SERVICE	7-24	CAN YOU DO IT?	1-2
DRIVESHAFT SHIMMING	7-25	DIRECTIONS AND LOCATIONS	1-2
		MAINTENANCE OR REPAIR?	1-2

# 10-14 MASTER INDEX

PROFESSIONAL HELP .....	1-3	GENERAL INFORMATION .....	2-29
PURCHASING PARTS .....	1-3	INSPECTOR & SERVICE .....	2-29
WHERE TO BEGIN .....	1-2	<b>OIL INJECTION SYSTEM - DI/FICHT MOTORS .....</b>	<b>5-2</b>
ICON REMOTE SYSTEM .....	9-16	DESCRIPTION & OPERATION .....	5-2
CALIBRATING ACTUATOR STROKE .....	9-16	GENERAL INFORMATION .....	5-2
DESCRIPTION & OPERATION .....	9-16	TROUBLESHOOTING .....	5-4
TROUBLESHOOTING .....	9-18	<b>OIL INJECTION SYSTEM - E-TEC MOTORS .....</b>	<b>5-11</b>
IGNITION & ELECTRICAL COMPONENT MAINTENANCE .....	2-41	DESCRIPTION & OPERATION .....	5-11
GREASING ELECTRICAL CONNECTORS .....	2-42	GENERAL INFORMATION .....	5-11
INSPECTION .....	2-41	OIL INJECTION SYSTEM DIAGRAMS .....	5-22
IGNITION COILS .....		OIL RECIRCULATION SYSTEM DIAGRAMS .....	5-32
E-TEC .....	3-108	TROUBLESHOOTING .....	5-12
FICHT .....	3-49	OIL INJECTION SYSTEM DIAGRAMS - E-TEC .....	5-22
INTAKE MANIFOLD & LEAF VALVE ASSEMBLIES .....	6-33	OIL RECIRCULATION SYSTEM DIAGRAMS .....	
REMOVAL, INSPECTION & INSTALLATION .....	6-33	E-TEC .....	5-32
KNOCK SENSOR .....	3-111	FICHT .....	5-10
GENERAL INFORMATION .....	3-111	PRE-WIRED BINNACLE MOUNT REMOTE UNITS .....	9-12
TESTING & SERVICE .....	3-111	OVERHAUL .....	9-12
LINKAGE, CABLES & SHAFTS .....	2-7	PRESSURE SENSOR .....	
LUBRICATION .....	2-7	E-TEC .....	3-112
RECOMMENDED LUBRICANT .....	2-7	FICHT .....	3-53
LOW PRESSURE FUEL PUMP .....		POWER TRIM/TILT RESERVOIR .....	2-6
E-TEC .....	3-93	CHECKING FLUID LEVEL/CONDITION .....	2-7
FICHT .....	3-36	RECOMMENDED LUBRICANT .....	2-6
LOWER UNIT OIL .....	2-18	POWERHEAD .....	6-2
CHECKING LOWER UNIT OIL LEVEL & CONDITION .....	2-19	FLYWHEEL .....	6-3
DRAINING & FILLING .....	2-19	FLYWHEEL COVER .....	6-2
GENERAL INFORMATION .....	2-18	GENERAL INFORMATION .....	6-2
OIL RECOMMENDATIONS .....	2-18	INTAKE MANIFOLD & LEAF VALVE ASSEMBLIES .....	6-33
<b>LUBRICATION SERVICE .....</b>	<b>2-5</b>	POWERHEAD .....	6-5
ELECTRIC STARTER MOTOR PINION .....	2-5	<b>POWERHEAD .....</b>	<b>6-5</b>
ENGINE COVER LATCHES .....	2-6	ASSEMBLY .....	6-29
GENERAL INFORMATION .....	2-5	CLEANING & INSPECTION .....	6-25
LINKAGE, CABLES & SHAFTS .....	2-7	DISASSEMBLY .....	6-14
POWER TRIM/TILT RESERVOIR .....	2-6	REMOVAL & INSTALLATION .....	6-6
STEERING ARM (CABLE RAM/TILLER ARM) .....	2-8	<b>POWERHEAD BREAK-IN .....</b>	<b>6-35</b>
SWIVEL BRACKET & TILT SUPPORT .....	2-8	GENERAL INFORMATION .....	6-35
TILT TUBE ASSEMBLY .....	2-9	<b>POWERHEAD EXPLODED VIEWS .....</b>	<b>6-37</b>
MAINTENANCE EQUALS SAFETY .....	2-2	PRESSURE RELIEF VALVE .....	5-45
MAINTENANCE COVERAGE .....	2-2	REMOVAL & INSTALLATION .....	5-45
MANUAL STARTER ASSEMBLY .....	10-2	PROPELLER .....	2-24
DISASSEMBLY & ASSEMBLY .....	10-5	GENERAL INFORMATION .....	2-24
15/25/30 HP MODELS .....	10-5	INSPECTION .....	2-25
40/50/55/60/65/70 HP MODELS .....	10-7	REMOVAL & INSTALLATION .....	2-26
GENERAL INFORMATION .....	10-2	RE-COMMISSIONING .....	2-53
MANUAL STARTER SERVICE .....	10-2	RIGGING .....	9-16
REMOVAL & INSTALLATION .....	10-2	<b>SAFETY IN SERVICE .....</b>	<b>1-13</b>
15/25/30 HP MODELS .....	10-2	DO'S .....	1-13
40/50/55/60/65/70 HP MODELS .....	10-4	DON'TS .....	1-13
MANUAL STARTER SERVICE .....	10-2	SELF-DIAGNOSTIC SYSTEM .....	
<b>MECHANICAL REMOTE CONTROLS .....</b>	<b>9-2</b>	E-TEC .....	3-65
CONCEALED SIDE MOUNT REMOTE UNITS .....	9-8	FICHT .....	3-18
DESCRIPTION & OPERATION .....	9-2	SHIFT INTERRUPT SWITCH .....	
DUAL HANDLE SURFACE MOUNT REMOTE UNITS FOR SINGLE .....		E-TEC .....	3-111
MOTORS .....	9-8	FICHT .....	3-53
INTRODUCTION .....	9-2	<b>SHOP EQUIPMENT .....</b>	<b>1-17</b>
PRE-WIRED BINNACLE MOUNT REMOTE UNITS .....	9-12	CHEMICALS .....	1-17
SMALL MOTOR STANDARD SURFACE REMOTE UNITS .....	9-6	SAFETY TOOLS .....	1-17
STANDARD SURFACE MOUNT REMOTE UNITS .....	9-3	SMALL MOTOR STANDARD SURFACE REMOTE UNITS .....	9-6
OIL COMPONENT ASSEMBLY - E-TEC .....	5-17	OVERHAUL .....	9-6
REMOVAL & INSTALLATION .....	5-17	SPARK PLUG WIRES .....	2-41
OIL COMPONENT ASSEMBLY - FICHT .....	5-8	REMOVAL & INSTALLATION .....	2-41
REMOVAL & INSTALLATION .....	5-8	TESTING .....	2-41
OIL FILTER .....	2-29	SPARK PLUGS .....	2-36

GENERAL INFORMATION.....	2-36	RECOMMENDED LUBRICANT.....	2-8
INSPECTION & GAPPING.....	2-40	TEMPERATURE SENSORS/SWITCHES	
READING SPARK PLUGS.....	2-39	E-TEC.....	3-104
REMOVAL & INSTALLATION.....	2-37	FICHT.....	3-45
SPARK PLUG HEAT RANGE.....	2-36	TEST EQUIPMENT.....	4-4
<b>SPECIFICATIONS.....</b>	<b>1-28</b>	GENERAL INFORMATION.....	4-4
CAPACITIES.....	2-60	JUMPER WIRES.....	4-5
CONVERSION FACTORS.....	1-28	MULTI-METERS.....	4-5
COOLING SYSTEM SPECIFICATIONS CHART - 15-130 HP.....	5-59	TEST LIGHTS.....	4-5
COOLING SYSTEM SPECIFICATIONS CHART - 135-300 HP		THERMOSTAT.....	5-42
(AND FOOTNOTES).....	5-60	GENERAL INFORMATION.....	5-42
ENGINE.....	6-49	REMOVAL & INSTALLATION.....	5-43
GENERAL ENGINE.....	2-55	THROTTLE BODY	
GENERAL ENGINE SYSTEM.....	2-56	E-TEC.....	3-91
IGNITION COMPONENTS & FUEL INJECTOR SENSOR TESTING.....	3-115	FICHT.....	3-36
LUBRICATION SERVICES.....	2-59	THROTTLE POSITION (TP) SENSOR	
MAINTENANCE INTERVALS - FICHT.....	2-57	CALIBRATION.....	2-47
MAINTENANCE INTERVALS - E-TEC.....	2-58	E-TEC.....	3-107
METRIC BOLTS - TYPICAL TORQUE VALUES.....	1-30	FICHT.....	3-48
SPARK PLUG DIAGNOSIS.....	2-62	THROTTLE PLATE SYNCHRONIZATION (DI/FICHT ONLY).....	2-43
STATOR TESTING.....	4-89	<b>TILLER HANDLE.....</b>	<b>9-20</b>
TUNE-UP.....	2-61	REMOVAL & INSTALLATION.....	9-20
U.S. STANDARD BOLTS - TYPICAL TORQUE VALUES.....	1-29	15/25/30 HP MODELS.....	9-20
2-STROKE MOTOR FUEL:OIL RATIO.....	2-59	40/50/55/60/65/70 HP MODELS.....	9-22
STANDARD SURFACE MOUNT REMOTE UNITS.....	9-3	TILT LIMIT SWITCH.....	8-11
OVERHAUL.....	9-3	ADJUSTMENT.....	8-12
START CIRCUIT SWITCHES.....	4-24	GENERAL INFORMATION.....	8-11
KEYSWITCH CIRCUIT TEST.....	4-24	TILT TUBE ASSEMBLY.....	2-9
KEYSWITCH TEST.....	4-25	LUBRICATION.....	2-9
NEUTRAL SAFETY SWITCH & CIRCUIT TEST.....	4-25	RECOMMENDED LUBRICANT.....	2-9
STARTER MOTOR.....	4-26	<b>TIMING &amp; SYNCHRONIZATION.....</b>	<b>2-42</b>
CLEANING & INSPECTION.....	4-35	DI (FICHT) & E-TEC MOTORS.....	2-42
GENERAL INFORMATION.....	4-36	GENERAL INFORMATION.....	2-42
OVERHAUL.....	4-29	<b>TOOLS.....</b>	<b>1-19</b>
15-90 HP INLINE MOTORS.....	4-29	ELECTRONIC TOOLS.....	1-24
75-175 HP DI/FICHT V4/V6 MODELS.....	4-31	HAND TOOLS.....	1-19
115-175 HP E-TEC AND ALL 200-300 HP MOTORS.....	4-33	MEASURING TOOLS.....	1-25
REMOVAL & INSTALLATION.....	4-28	OTHER COMMON TOOLS.....	1-23
STARTER NO LOAD CURRENT DRAW TEST.....	4-27	SPECIAL TOOLS.....	1-23
STARTER MOTOR SOLENOID/RELAY SWITCH.....	4-36	TRIM SENDING UNIT.....	8-12
GENERAL INFORMATION.....	4-36	ADJUSTMENT.....	8-12
REMOVAL & INSTALLATION.....	4-37	15-70 HP 2-CYL MOTORS.....	8-12
TESTING THE SOLENOID.....	4-36	75 HP & LARGER MOTORS.....	8-13
<b>STARTING CIRCUIT.....</b>	<b>4-19</b>	TRIM/TILT ASSEMBLY - 1-RAM SYSTEMS.....	8-14
DI/FICHT STARTER CIRCUIT.....	4-19	REMOVAL & INSTALLATION.....	8-14
E-TEC STARTER CIRCUIT.....	4-20	15-60 HP 2-CYL POWERHEADS.....	8-14
ELECTRIC STARTER BASICS.....	4-19	75/90 HP 3-CYL & 20" SHAFT 115 HP V4 E-TEC POWERHEADS.....	8-15
START CIRCUIT SWITCHES.....	4-24	TRIM/TILT ASSEMBLY - 3-RAM SYSTEMS.....	8-16
STARTER MOTOR.....	4-26	ASSEMBLY.....	8-20
STARTER MOTOR SOLENOID/RELAY SWITCH.....	4-36	CLEANING & INSPECTION.....	8-20
STATOR/BATTERY CHARGE COIL.....	4-13	DISASSEMBLY.....	8-17
GENERAL INFORMATION.....	4-13	REMOVAL & INSTALLATION.....	8-16
REMOVING & INSTALLATION.....	4-16	TRIM/TILT SYSTEM IDENTIFICATION.....	8-2
TESTING - DI/FICHT MOTORS.....	4-14	1-RAM SYSTEMS.....	8-3
TESTING - E-TEC MOTORS.....	4-15	3-RAM SYSTEMS.....	8-3
TESTING - GENERAL.....	4-13	<b>TRIM/TILT SYSTEMS.....</b>	<b>8-2</b>
STEERING ARM.....	2-8	DESCRIPTION, OPERATION & MANUAL TILTING.....	8-3
LUBRICATION.....	2-8	INTRODUCTION.....	8-2
RECOMMENDED LUBRICANT.....	2-8	SYSTEM IDENTIFICATION.....	8-2
<b>STORAGE (WHAT TO DO BEFORE &amp; AFTER).....</b>	<b>2-50</b>	TILT LIMIT SWITCH.....	8-11
RE-COMMISSIONING.....	2-53	TRIM SENDING UNIT.....	8-12
WINTERIZATION.....	2-50	TRIM/TILT ASSEMBLY - 1-RAM SYSTEMS.....	8-14
SWIVEL BRACKET & TILT SUPPORT.....	2-8	TRIM/TILT ASSEMBLY - 3-RAM SYSTEMS.....	8-16
LUBRICATION.....	2-8	TROUBLESHOOTING.....	8-6

# 10-16 HAND REWIND STARTER

<b>TROUBLESHOOTING</b>	
BASIC OPERATING PRINCIPLES	1-13
CHARGING SYSTEM	4-9
COOLING SYSTEM	5-40
DI/FICHT STARTER CIRCUIT	4-19
E-TEC	3-63
E-TEC STARTER CIRCUIT	4-20
ELECTRICAL SYSTEMS	4-6
FICHT	3-15
GEARCASE	7-3
ICON REMOTE SYSTEM	9-16
LUBRICATION SYSTEM - E-TEC	5-12
LUBRICATION SYSTEM - FICHT	5-4
TILLER HANDLE	9-20
TRIM/TILT SYSTEMS	8-6
WARNING SYSTEM	4-38
<b>TROUBLESHOOTING THE CHARGING SYSTEM</b>	4-9
AUXILIARY BATTERY CHARGE WIRE TEST	4-13
GENERAL	4-9
RUNNING OUTPUT TEST - 12 V BATTERY CHARGE CIRCUIT	4-10
RUNNING OUTPUT TEST - 40 V OR 55 V CIRCUIT	4-12
QUICK TEST	4-10
<b>TROUBLESHOOTING THE WARNING SYSTEM</b>	4-39
SYSTEM CHECK GAUGE - CIRCUIT TESTS	4-40
SYSTEM CHECK GAUGE - OPERATIONAL MODE	4-39
SYSTEM CHECK GAUGE - SELF TEST MODE	4-39
<b>TUNE-UP</b>	<b>2-33</b>
COMPRESSION CHECK	2-35
DE-CARBONING THE PISTONS	2-34
IGNITION & ELECTRICAL COMPONENT MAINTENANCE	2-41
INTRODUCTION	2-33
SPARK PLUG WIRES	2-41
SPARK PLUGS	2-36
TUNE-UP SEQUENCE	2-33
TUNE-UP SEQUENCE	2-33
<b>WARNING SYSTEM</b>	<b>4-38</b>
DESCRIPTION & OPERATION	4-38
ENGINE TEMPERATURE SENSORS/SWITCHES	4-40
TROUBLESHOOTING	4-39
WATER PRESSURE CONNECTION	5-46
WATER PUMP & IMPELLER	5-46
GENERAL INFORMATION	5-46
INSPECTION & OVERHAUL	5-51
REMOVAL & INSTALLATION	5-46
WINTERIZATION	2-50
GENERAL INFORMATION	2-50
PREPPING FOR STORAGE	2-50
STORAGE CHECKLIST	2-50
WHERE TO STORE YOUR BOAT AND MOTOR	2-50
WIRE & CONNECTOR REPAIR	4-7
<b>WIRING DIAGRAMS</b>	<b>4-40</b>
INLINE E-TEC ENGINES	4-41
V4/V6 60° & 90° DI/FICHT ENGINES	4-62
V4/V6 60° E-TEC ENGINES	4-70
V6 90° E-TEC ENGINES	4-78
RIGGING (SWITCHES & INSTRUMENTS)	4-86
2-STROKE ENGINE OIL	2-17
FILLING	2-17
FUEL:OIL RATIO	2-17
OIL RECOMMENDATIONS	2-17
PRE-MIX	2-17
40-AMP RELAYS	3-57
TESTING & SERVICE	3-57