



# RAIDER Outboards

**Raider Outboard Motor 50HP**

**Field Service Technician**

**Course of Instruction Syllabus**



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## Forward

The Raider Outboard Motor Field Service Technician Course of Instruction provides participants with the necessary skills and knowledge to successfully maintain, service, and operate the Raider Outboard Motor in today's highly demanding dynamic Maritime Environment. The course of instruction focuses Field Service requirements and also details the importance of preventative and periodic maintenance by utilizing both classroom instruction and practical exercises evaluating performance to ensure that each participant adequately displays knowledge of materials, methods, and the tools involved in field service, periodic maintenance, troubleshooting and the conduct of motor repairs. Practical's will also include Pre and Post Operations checks, operation on multi-fuels, full submersion – without bagging, dewatering, troubleshooting and field service maintenance actions.

## Course Title

Raider Outboard Motor Field Service Technician Course of Instruction

## Course Mission Statement

This course is not a pass/fail course of instruction. The basis of this course is to provide participants with the baseline knowledge and understanding of Raider Outboard Motor in order to conduct Field Service Maintenance Actions, Periodic Maintenance, pre/post operation procedures, and troubleshooting.

## Course Overview

The Raider Outboard Field Service Technician Course of Instruction can be taught at any training location. It is designed to provide participants with an overview of the Raider Outboard Motor, Field Service Maintenance Actions, Periodic Maintenance, pre/post operation procedures, and troubleshooting.

Training focuses on the skills needed to properly perform Field Service Technician maintenance requirements, prepare the Raider Outboard Motor to operate in various operational environments. Knowledge and performance skill sets are developed for a broad array of topics that provide participants exposure to both scheduled and unforeseen maintenance requirements.

Participants will also be introduced to a wide range of practical evolutions that combine the knowledge and skill sets learned throughout Raider Outboard Field Service Technician Course of Instruction.

Classroom lessons, laboratory training, and performance evolutions work hand-in-hand across the curriculum to further develop; personal mastery, and problem-solving techniques. Training evolutions emphasize and reiterate classroom presentations, discipline, attention to detail, while always focusing on overall mission accomplishment and the safety of personnel.

## Academic Training Overview

- 1.1 Introduction and Administration
- 1.2 Motor Overview
- 1.3 Principles of Operation
- 2.1 Pre and Post Operations
- 2.2 Submersion and Dewatering
- 2.3 Troubleshooting
- 2.4 Safety Jet
- 2.5 Twin Motor Mount System
- 3.1 Intake and Exhaust System
- 3.2 Fuel System
- 3.3 Electrical System
- 3.4 Drive System
- 3.5 Cooling System
- 3.6 Dewatering System
- 4.1 Recoil Starter Remove/Replace
- 4.2 Flywheel Magneto Remove/Replace
- 4.3 Coil Plate/Stator Remove/Replace
- 4.4 Starter and Starter Solenoid Remove/Replace
- 4.5 Carburetor Remove/Replace
- 4.6 Reed Valve Remove/Replace
- 4.7 Fuel Filter and Fuel Pump Remove/Replace
- 4.8 Ignition Coil Remove/Replace
- 4.9 Thermostat Remove/Replace
- 4.10 Gear Oil Change
- 4.11 Lower Unit Remove/Replace
- 4.12 Water Pump Remove/Replace
- 4.13 Propeller Remove/Replace
- 4.14 Shaft Seal Remove/Replace
- 4.15 Zinc Anodes Remove/Replace

## Performance/Laboratory Evolutions

- 2.1 Pre and Post Operations
- 2.2 Submersion and Dewatering
- 4.1 Recoil Starter Remove/Replace
- 4.2 Flywheel Magneto Remove/Replace
- 4.3 Coil Plate/Stator Remove/Replace (Charging System Test, Setting Timing)
- 4.4 Starter and Starter Solenoid Remove/Replace
- 4.5 Carburetor Remove/Replace (Carburetor Tuning)
- 4.6 Reed Valve Remove/Replace
- 4.7 Fuel Filter and Fuel Pump Remove/Replace
- 4.8 Ignition Coil Remove/Replace (Spark Test, Cylinder Compression Test)
- 4.9 Thermostat Remove/Replace
- 4.10 Gear Oil Change (Gearcase Vacuum/Pressure Test)
- 4.11 Lower Unit Remove/Replace
- 4.12 Water Pump Remove/Replace
- 4.13 Propeller Remove/Replace
- 4.14 Shaft Seal Remove/Replace
- 4.15 Zinc Anodes Remove/Replace

## Course Design & Structure:

The Course Master Schedule will comprise the following blocks of activities: Basic: (one day)

- 18 hours academic training or professional development
- 17 hours of practical evolutions

LESSON NUMBER	TITLE	CLASS PERIODS	LAB PERIODS	TOTAL PERIODS
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### Unit 1.0 General information

1.1	Introduction and Administration	.5	0	.5
1.2	Motor Overview	1.0	0	1.0
1.3	Principles of Operation	1.0	0	1.0

LESSON NUMBER	TITLE	CLASS PERIODS	LAB PERIODS	TOTAL PERIODS
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### Unit 2.0 Standard Operating Procedures

2.1	Pre and Post Operations Checks	1.0	4.0	5.0
2.2	Submersion and Dewatering	1.0	2.0	3.0
2.3	Troubleshooting	1.0	0	1.0
2.4	Safety Jet*	.5	.5	1.0
2.5	Twin Motor Mount System*	.5	.5	1.0

LESSON NUMBER	TITLE	CLASS PERIODS	LAB PERIODS	TOTAL PERIODS
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### Unit 3.0 Systems

3.1	Intake and Exhaust System	1.0	0	1.0
3.2	Fuel System	1.0	0	1.0
3.3	Electrical System	1.0	0	1.0
3.4	Drive System	1.0	0	1.0
3.4	Cooling System	1.0	0	1.0
3.5	Dewatering System	1.0	0	1.0



LESSON NUMBER	TITLE	CLASS PERIODS	LAB PERIODS	TOTAL PERIODS
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Unit 4.0 Service and Repair Actions

4.1	Recoil Starter Remove/Replace	.5	.5	1.0
4.2	Flywheel Magneto Remove/Replace	.5	.5	1.0
4.3	Coil Plate/Stator Remove/Replace	.5	1.0	1.0
4.4	Starter and Starter Solenoid Remove/Replace	.5	.5	1.0
4.5	Carburetor Remove/Replace	1.0	1.0	1.0
4.6	Reed Valve Remove/Replace	.5	.5	1.0
4.7	Fuel Filter and Fuel Pump Remove/Replace	.5	.5	1.0
4.8	Ignition Coil Remove/Replace	.5	1.0	1.0
4.9	Thermostat Remove/Replace	.5	.5	1.0
4.10	Gear Oil Change	.5	1.0	1.0
4.11	Lower Unit Remove/Replace	.5	.5	1.0
4.12	Water Pump Remove/Replace	.5	.5	1.0
4.13	Propeller Remove/Replace	.5	.5	1.0
4.14	Shaft Seal Remove/Replace	.5	.5	1.0
4.15	Zinc Anodes Remove/Replace	.5	.5	1.0

Title Of Course	Total Class Periods	Total Lab Periods	Total Periods
Raider 50 FST	20.5	16.5	37

# Terminal and Enabling Objectives

## Unit 1.0 General Information

### Terminal Objective(s):

Upon completion of this unit of instruction, the participant will demonstrate thorough understanding of the course goals and objectives. Demonstrate and implement proper safety requirements pertaining to both operations, maintenance, stowage, use, and disposal of hazardous materials. Be familiar with the Characteristics, Capabilities, and Limitations of the Raider Outboards 50HP and the unique and innovative design features. Further demonstrate, basic operating procedures for the Raider Outboards 50HP. This includes the proper mixtures of fuel and oil, motor mounting, starting and securing and underway operations.

### Lesson 1.1 Introduction and Administration

#### Enabling Objectives(s):

- 1.1.1        **DISCUSS** Raider Outboards 50HP Course Overview.
- 1.1.2        **DISCUSS** Raider Outboards Inc.
- 1.1.3        **DISCUSS** Class Material and Schedule.
- 1.1.4        **DISCUSS** the Course Critique Form and methods for delivering course input.
- 1.1.5        **DISCUSS** Class Safety and MISHAP plans/procedures.

### Lesson 1.2 50HP Overview

#### Enabling Objectives(s):

- 1.2.1        **DISCUSS** the capabilities and specifications of the Raider Outboards 50HP.
- 1.2.2        **STATE** and **DESCRIBE** the different sections of and the Raider Outboards 50HP.
- 1.2.3        **STATE** and **DESCRIBE** the purpose of the Components and Controls of the Raider Outboards 50HP.
- 1.2.4        **DISCUSS** the Raider Outboard Motor Owner's, Parts and Assembly, and Service Manuals.
- 1.2.5        **DESCRIBE** the procedures for contacting Raider Outboards Technical Support

## **Lesson 1.3 50HP Principles of Operation**

### **Enabling Objectives(s):**

- 1.3.1**        **DESCRIBE** the Principles of Operation of the Raider Outboards 50HP.
- 1.3.2**        **STATE** the proper fuel-oil mixture ratios for normal operations with the Raider Outboards 50HP.
- 1.3.3**        **DESCRIBE** the proper procedures for mounting the Raider Outboards 50HP.
- 1.3.4**        **DESCRIBE** and **DEMONSTRATE** the proper procedures for starting the Raider Outboards 50HP.
- 1.3.5**        **DESCRIBE** and **DEMONSTRATE** the proper procedures for adjusting the trim of the Raider Outboards 50HP.
- 1.3.6**        **DESCRIBE** and **DEMONSTRATE** the proper procedures for Shallow Water Running with the Raider Outboards 50HP.
- 1.3.7**        **DISCUSS** the general safety precautions that should be implemented for operating the Raider Outboards 50HP.

## Unit 2.0 Standard Operating Procedures

### Terminal Objective(s):

Upon completion of this unit of instruction, the participant will be able to demonstrate the standard operating procedures for the Raider Outboard Motor for maritime operations to include Pre/Post Operations Checks, Submersion and Dewatering, troubleshooting, Safety Jet installation/operation and Twin Motor Mount System installation/operation.

### Lesson 2.1 50HP Rep and Post Operations Checks

#### Enabling Objectives(s):

- 2.1.1        **DISCUSS** the importance of Raider Outboard Motor Pre-Operation Checks as they relate to operational reliability, mission success, and trend analysis.
- 2.1.2        **DISCUSS** the importance of Raider Outboard Motor Post-Operation Checks as they relate to operational reliability, mission success, and trend analysis.
- 2.1.3        **DESCRIBE** the procedures for conducting Pre-Operation Checks, identifying each key factor in preparing the Raider Outboard Motor for maritime operations.
- 2.1.4        **DEMONSTRATE** using the Raider Outboard Motor Pre-/Post-Operation Check List and the procedures for conducting Pre/Post Operations Checks.
- 2.1.5        **EXPLAIN** the relationship between Pre-/Post- Operations Checks and their effects upon operational reliability, mission success, trend analysis, and operational life cycle.

### Lesson 2.2 50HP Submersion and Dewatering

#### Enabling Objectives(s):

- 2.2.1        **DESCRIBE** the proper procedure for Pre-Submersion, Submersion, and Dewatering for the Raider Outboards 50HP.
- 2.2.2        **STATE** the purpose of the Raider Outboards 50HP Dewatering System and the function of the individual components.
- 2.2.3        **DEMONSTRATE** when directed identify the Raider Outboards 50HP Dewatering System individual components.
- 2.2.4        **PERFORM** the Pre-Submersion procedure in accordance with the Raider Outboards 50HP Owner's Manual.
- 2.2.5        **PERFORM** the Submersion procedure in accordance with the Raider Outboards 50HP Owner's Manual.

**2.2.6**            **PERFORM** the Dewatering procedure in accordance with the Raider Outboards 50HP Owner’s Manual.

**2.2.7**            **PERFORM** the Post-Submersion procedure in accordance with the Raider Outboards 50HP Owner’s Manual.

### **Lesson 2.3 50HP Troubleshooting**

#### **Enabling Objectives(s):**

**2.3.1**            **DISCUSS** the procedure for troubleshooting the Raider Outboards 50HP.

**2.3.2**            **STATE** the purpose of the Raider Outboards 50HP Troubleshooting Matrix.

**2.3.3**            **IDENTIFY** the most common causes of motor malfunctions.

**2.3.4**            **PERFORM** when given a troubleshooting scenario, use the Troubleshooting Matrix to determine the appropriate corrective action.

### **Lesson 2.4 50HP Safety Jet Installation**

#### **Enabling Objectives(s):**

**2.4.1**            **STATE** the purpose of the Raider Outboards 50HP Safety Jet and the function of the individual components.

**2.4.2**            **IDENTIFY** the individual components of the Raider Outboards 50HP Safety Jet.

**2.4.3**            **PERFORM** the installation of the Raider Outboards 50HP Safety Jet.

**2.4.4**            **DISCUSS** the Safety and Performance considerations when operating the Raider Outboards 50HP Safety Jet.

### **Lesson 2.5 50HP Twin Motor Mount System**

#### **Enabling Objectives(s):**

**2.5.1**

**2.5.2**

**2.5.3**

## Unit 3.0 50HP Systems

### Terminal Objective(s):

Upon completion of this unit of instruction, the participant will be able to state the purpose of each Raider Outboard Motor Systems to include system components and the functions of connections controls and indicators.

### Lesson 3.1 50HP Intake and Exhaust

#### Enabling Objectives(s):

- 3.1.1        **DISCUSS** the Raider Outboards 50HP Intake and Exhaust System.
- 3.1.2        **STATE** the purpose of the Raider Outboards 50HP Intake and Exhaust System.
- 3.1.3        **STATE** the function of the individual components of the Intake and Exhaust System.
- 3.1.4        **DEMONSTRATE** the ability to trace the path of air and exhaust gas as it travels through the Raider Outboards 50HP Intake and Exhaust System.

### Lesson 3.2 50HP Fuel System

#### Enabling Objectives(s):

- 3.2.1        **DISCUSS** the Raider Outboards 50HP Fuel System.
- 3.2.2        **STATE** the purpose of the Raider Outboards 50HP Fuel System.
- 3.2.3        **STATE** the function of the individual components of the Fuel System.
- 3.2.4        **DEMONSTRATE** the ability to trace the path of fuel as it travels through the Fuel System.

### Lesson 3.3 50HP Electrical System

#### Enabling Objectives(s):

- 3.3.1        **DISCUSS** the Raider Outboards 50HP Electrical System.
- 3.3.2        **STATE** the purpose of the Raider Outboards 50HP Electrical System.
- 3.3.3        **STATE** the function of subsystems of the Electrical System.
- 3.3.4        **DEMONSTRATE** the ability to trace out and identify the individual components of the Raider Outboards 50HP Electrical System.

### Lesson 3.4 50HP Intake and Exhaust

#### Enabling Objectives(s):

- 3.4.1**        **DISCUSS** the Raider Outboards 50HP Intake and Exhaust System.
- 3.4.2**        **STATE** the purpose of the Raider Outboards 50HP Intake and Exhaust System.
- 3.4.3**        **STATE** the function of the individual components of the Intake and Exhaust System.
- 3.4.4**        **DEMONSTRATE** the ability to trace the path of air and exhaust gas as it travels through the Raider Outboards 50HP Intake and Exhaust System.

### **Lesson 3.5 50HP Cooling System**

#### **Enabling Objectives(s):**

- 3.5.1**        **DISCUSS** the Raider Outboards 50HP Cooling System.
- 3.5.2**        **STATE** the purpose of the Raider Outboards 50HP Cooling System.
- 3.5.3**        **STATE** the function of the individual components of the Cooling System.
- 3.5.4**        **DEMONSTRATE** the ability to trace the path of water as it travels through the Raider Outboards 50HP Cooling System.

### **Lesson 3.6 50HP Dewatering System**

#### **Enabling Objectives(s):**

- 3.6.1**        **DISCUSS** the Raider Outboards 50HP Dewatering System.
- 3.6.2**        **STATE** the purpose of the Raider Outboards 50HP Dewatering System.
- 3.6.3**        **STATE** the function of the individual components of the Dewatering System.

## Unit 4.0 Service and Repair Actions

### Terminal Objective(s):

Upon completion of this unit of instruction, the participant will learn to diagnose engine problems, inspect, repair, and replace engine components. Perform tune up procedures. Schedule and document maintenance requirements and record unforeseen maintenance actions.

### Lesson 4.1 Recoil Starter Remove/Replace

#### Enabling Objectives(s):

- 4.1.1        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Recoil Starter.
- 4.1.2        **PERFORM** inspections of the mechanical components of the Recoil Starter to identify problems.
- 4.1.3        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Recoil Starter.
- 4.1.4        **PERFORM** function test of the Recoil Starter after removal and or replacement.
- 4.1.5        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

### Lesson 4.2 Flywheel Magneto Remove/Replace

#### Enabling Objectives(s):

- 4.2.1        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Flywheel Magneto.
- 4.2.2        **PERFORM** inspections of the mechanical components of the Flywheel Magneto to identify problems.
- 4.2.3        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Flywheel Magneto.
- 4.2.4        **PERFORM** reassembly and or reinstallation of the Flywheel Magneto after maintenance, inspection, repair, or replacement.
- 4.2.5        **PERFORM** function test of the Flywheel Magneto after removal and or replacement.
- 4.2.6        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.



### **Lesson 4.3 Coil Plate Remove/Replace**

#### **Enabling Objectives(s):**

- 4.3.1**        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Coil Plate.
- 4.3.2**        **PERFORM** inspections of the mechanical components of the Coil Plate to identify problems.
- 4.3.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Coil Plate.
- 4.3.4**        **PERFORM** function test of the Coil Plate after removal and or replacement.
- 4.3.5**        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

### **Lesson 4.4 Starter and Starter Solenoid Remove/Replace**

#### **Enabling Objectives(s):**

- 4.4.1**        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Starter and Starter Solenoid.
- 4.4.2**        **PERFORM** inspections of the mechanical components of the Starter and Starter Solenoid to identify problems.
- 4.4.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Starter and Starter Solenoid.
- 4.4.4**        **PERFORM** function test of the Starter and Starter Solenoid after removal and or replacement.
- 4.4.5**        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

### **Lesson 4.5 Carburetor Remove/Replace**

#### **Enabling Objectives(s):**

- 4.5.1**        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Carburetor.
- 4.5.2**        **PERFORM** inspections of the mechanical components of the Carburetor to identify problems.
- 4.5.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Carburetor.

**4.5.4**            **PERFORM** function test of the Carburetor after removal and or replacement.

**4.5.5**            **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.6 Reed Valves Remove/Replace**

##### **Enabling Objectives(s):**

**4.6.1**            **DISCUSS** the equipment, parts, and tools required to remove and or replace the Reed Valves.

**4.6.2**            **PERFORM** inspections of the mechanical components of the Reed Valves to identify problems.

**4.6.3**            **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Reed Valves.

**4.6.4**            **PERFORM** function test of the Reed Valves after removal and or replacement.

**4.6.5**            **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.7 Fuel Filter and Fuel Pump Remove/Replace**

##### **Enabling Objectives(s):**

**4.7.1**            **DISCUSS** the equipment, parts, and tools required to remove and or replace the Fuel Filter and Fuel Pump.

**4.7.2**            **PERFORM** inspections of the mechanical components of the Fuel Filter and Fuel Pump to identify problems.

**4.7.3**            **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Fuel Filter and Fuel Pump.

**4.7.4**            **PERFORM** function test of the Fuel Filter and Fuel Pump after removal and or replacement.

**4.7.5**            **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.8 Ignition Coil Replace**

##### **Enabling Objectives(s):**

**4.8.1**            **DISCUSS** the equipment, parts, and tools required to remove and or replace the Ignition Coil.

- 4.8.2**        **PERFORM** inspections of the mechanical components of the Ignition Coil to identify problems.
- 4.8.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Ignition Coil.
- 4.8.4**        **PERFORM** function test of the Ignition Coil after removal and or replacement.
- 4.8.5**        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.9 Thermostat Remove/Replace**

##### **Enabling Objectives(s):**

- 4.9.1**        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Thermostat.
- 4.9.2**        **PERFORM** inspections of the mechanical components of the Thermostat to identify problems.
- 4.9.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Thermostat.
- 4.9.4**        **PERFORM** function test of the Thermostat after removal and or replacement.
- 4.9.5**        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.10 Gear Oil Change**

##### **Enabling Objectives(s):**

- 4.10.1**       **DISCUSS** the equipment, parts, and tools required to remove and or replace the Gear Oil.
- 4.10.2**       **PERFORM** inspections of the gear oil to identify problems.
- 4.10.3**       **PERFORM** replacement of worn, damaged, or defective mechanical parts during the Gear Oil.
- 4.10.4**       **PERFORM** function test of the lower unit after removal and or replacement of the gear oil.
- 4.10.5**       **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.11 Lower Unit Remove/Replace**

##### **Enabling Objectives(s):**

- 4.11.1 **DISCUSS** the equipment, parts, and tools required to remove and or replace the Lower Unit.
- 4.11.2 **PERFORM** inspections of the mechanical components of the Lower Unit to identify problems.
- 4.11.3 **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Lower Unit.
- 4.11.4 **PERFORM** function test of the Lower Unit after removal and or replacement.
- 4.11.5 **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.12 Water Pump Remove/Replace**

##### **Enabling Objectives(s):**

- 4.12.1 **DISCUSS** the equipment, parts, and tools required to remove and or replace the Water Pump.
- 4.12.2 **PERFORM** inspections of the mechanical components of the Water Pump to identify problems.
- 4.12.3 **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Water Pump.
- 4.12.4 **PERFORM** function test of the Water Pump after removal and or replacement.
- 4.12.5 **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.13 Propeller Remove/Replace**

##### **Enabling Objectives(s):**

- 4.13.1 **DISCUSS** the equipment, parts, and tools required to remove and or replace the Shaft Seal.
- 4.13.2 **PERFORM** inspections of the mechanical components of the Shaft Seal to identify problems.
- 4.13.3 **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Shaft Seal.
- 4.13.4 **PERFORM** function test of the Shaft Seal after removal and or replacement.
- 4.13.5 **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.14 Shaft Seal Remove/Replace**

##### **Enabling Objectives(s):**

- 4.14.1**        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Shaft Seal.
- 4.14.2**        **PERFORM** inspections of the mechanical components of the Shaft Seal to identify problems.
- 4.14.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Shaft Seal.
- 4.14.4**        **PERFORM** function test of the Shaft Seal after removal and or replacement.
- 4.14.5**        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

#### **Lesson 4.15 Zinc Anodes Remove/Replace**

##### **Enabling Objectives(s):**

- 4.15.1**        **DISCUSS** the equipment, parts, and tools required to remove and or replace the Zinc Anodes.
- 4.15.2**        **PERFORM** inspections of the mechanical components of the Zinc Anodes to identify problems.
- 4.15.3**        **PERFORM** replacement of worn, damaged, or defective mechanical parts of the Zinc Anodes.
- 4.15.4**        **PERFORM** function test of the Zinc Anodes after removal and or replacement.
- 4.15.5**        **DISCUSS** the documentation procedures used to record maintenance, repairs, or inspections.

## Course Master Schedule

### Day 1:

<b>Topic Title</b>	<b>Length</b>
Introduction and Administration	25
Raider OBM Overview	50
Principles of Operation	50
Pre and Post Operations Checks	50
Pre and Post Operations Check (LAB)	100
Troubleshooting	50

### Day 2:

<b>Topic Title</b>	<b>Length</b>
Dewatering System	50
Submersion and Dewatering	50
Pre Operations Checks (PRACTICAL)	50
Submersion and Dewatering (LAB)	50
Submersion and Dewatering (PRACTICAL)	50
Post Operations Checks (PRACTICAL)	50

### Day 3:

<b>Topic Title</b>	<b>Length</b>
Intake and Exhaust System	50
Fuel System	50
Electrical System	50
Drive System	50
Cooling System	50
Recoil Starter Remove/Replace (CLASSROOM/LAB)	50
Flywheel Magneto Remove/Replace (CLASSROOM/LAB)	50

### Day 4:

<b>Topic Title</b>	<b>Length</b>
Coil Plate Remove/Replace (CLASSROOM/LAB)	50
Carburetor Remove/Replace (CLASSROOM/LAB)	50
Reed Valves Remove/Replace (CLASSROOM/LAB)	50
Fuel Filter and Fuel Pump Remove/Replace (CLASSROOM/LAB)	50
Ignition Coil Remove/Replace (CLASSROOM/LAB)	50
Thermostat Remove/Replace (CLASSROOM/LAB)	50

**Day 5:**

<b>Topic Title</b>	<b>Length</b>
Gear Oil Change (CLASSROOM/LAB)	50
Lower Unit Remove/Replace (CLASSROOM/LAB)	50
Water Pump Remove/Replace (CLASSROOM/LAB)	50
Shaft Seal Remove/Replace (CLASSROOM/LAB)	50
Propeller Remove/Replace (CLASSROOM/LAB)	25
Zinc Anode Remove/Replace (CLASSROOM/LAB)	25
Function Test Motors	50
Course Critique and Certificate Presentation	30

## Resource Requirement Listing

### Audiovisual Equipment

1. PC Laptop
2. Projector with Screen or Widescreen TV
3. VAP Board

### Tools Required

Item	Part #	QTY
3/4-7/8 COMBO SLIM WRENCH	LTA2428	1
1/4 MIDGET COMBO WRENCH	OXI8B	1
2MM T HANDLE	AWBMCG1602	1
12 INCH ADJUSTABLE WRENCH	009-44605	1
9/32 MIDGET COMBO WRENCH	OX19B	1
8 MM COMBO WRENCH	SOEXM8	1
9/16 COMBO WRENCH	SOEX18	1
1/8 INCH T HANDLE	AWBCG1608	1
5/32 INCH T HANDLE	AWBCG1610	1
3/16 INCH T HANDLE	AWBCG1612	1
10MM COMBO WRENCH	SOEXM10	1
9/32 COMBO WRENCH	OEX090B	1
13 MM COMBO WRENCH	SOEXM13	1
1/4 INCH T HANDLE	AWBCG1616	1
3/32 INCH T HANDLE	AWBCG1606	1
17 MM COMBO WRENCH	SOEXM17	1
14 MM COMBO WRENCH	SOEXM14	1
3/8 DRIVE 1/2" ADAPTER	A2A	1
3/8 DRIVE 15/16 SHALLOW SOCKET	FS301	1
1/2 DRIVE 27MM SHALLOW SOCKET	TWM27	1
1/4 DRIVE 4 INCH EXTENTION	TMXK4	1
3/8 DRIVE 21 MM SHALLOW SOCKET	FSM211	1
1/4 DRIVE 8MM SHALLOW SOCKET	TMM8	1
1/4 DRIVE 13MM SHALLOW SOCKET	TMM13	1
1/4 DRIVE 10 MM SHALLOW SOCKET	TMM10	1
3/8 DRIVE 5/8 SPARK PLUG SOCKET	S9706KA	1
3/8 DRIVE 8MM SHALLOW SOCKET	FSM81	1
3/8 DRIVE 10 MM SHALLOW SOCKET	FSM101	1
3/8 DRIVE 13 MM SHALLOW SOCKET	FSM131	1
3/8 DRIVE 13MM DEEPWELL SOCKET	BLPLM3813	1
3/8 DRIVE 22MM SHALLOW SOCKET	FSM221	1



3/8 DRIVE 3 INCH BALL EXTENSION	FXK3	1
18 INCH PRY BAR RED	SPBS18AR	1
SEAL PULLER	YA105	1
3/8 DRIVE EXTRA LONG 17.5 BREAKER BAR	FHBB18A	1
ROLL PIN PUNCH KIT	PPR708BK	1
FUEL HOSE CLAMP CRIMPERS	ASTCP2015	1
8-INCH-LONG NOSE PLIERS	97ACF	1
KNIPEX 10 INCH STRAIGHT SIDE CUTTERS	KNX7401250	1
1/4 DRIVE 72 TOOTH RATCHET	T72	1
3/8 DRIVE 80 TOOTH RATCHET	F80	1
8-3/4 RATCHETING MAGNETIC SCREWDRIVER	SSDMR4BR	1
7 INCH WIRE STRIPPERS/CRIMPERS/CUTTERS	PWCSS7ACF	1
PRESSURE/VACCUUM TESTER	25136	1
32 OZ SOFT DEADBLOW	HBFE32	1
PELICAN CASE	IM2875-00000	1
COMPRESSION GAUGE KIT	20250	1
KLIEN DIGITAL MULTI-METER	MM400	1
QUIKSILVER HAND GEAR LUBE PUMP	8M0072133	1
MOTOR FLUSHER	552855515	1
HAND HELD TACHOMETER	ESP328	1
FLYWHEEL PULLER	27187	1
8MM-1/4 ID HOSE FITTING ADAPTER		1
RAIDER FLYWHEEL HOLDER	RFH4050	1
AUTOCRAFT SPARK TESTER	AC664	1
3/8 DRIVE 1 1/2 FRICTION BALL EXTENSION	FX1	1

#### Parts Required

Item	Part #	QTY
Flywheel, Key	334-00131-0	5
Fuel Filter ASSY	3AD-02230-0	5
Carburetor Gasket	3E3-02011-0	15
Filter W/O-Ring	R-FFE50	5
CD Unit	3C8-06160-1	1
Coil Plate ASSY	3C8-06103-3	1
Decompression Valve	R-3642	1
Dewatering Valve ASSY	R-RRDV-3A	1
Emergency Stop/Kill Switch	3C8-06820-0	1
Flywheel	3C8-06101-1	1
Fuel Line, Retention Bands	R-6705K35	100
Fuel Pump, Mikuni	R-DF52-73	1

Fuse, 20 AMP	353-76213-0	5
Gasket, Heavy Fuel Plate	R-HFPG50	5
Gasket, Intake Manifold	3C8-02104-2	15
Ignition Coil ASSY	R-3C1-06048-0	1
Oetiker Clamp, Fuel Line	R-5435K13	20
Oil Fill/Drain, Gasket	332-60006-1	10
Primer	R-11305	1
Propeller	R-5013P	1
Propeller Shaft ASSY, O-Ring	345-60103-0	5
Propeller Shaft Housing ASSY	3C8Q60100-1	1
Propeller, Split Pin	951503-0325	5
Recoil Starter ASSY	3TW-05000-0	1
Rectifier	3B7-76065-5	1
Reed Valve ASSY	3T5-02100-1	1
Rod Snap 3.5-4	3C8-05223-0	5
Rod Snap 3-B	346-67196-1	5
Rod Snap 5-3	3C8-63733-0	5
Spark Plugs	R-SBE110	3
Spring Pin	951403-0312	10
Start Battery	R-EB12B-4-1	1
Starter Motor ASSY	3GF-76010-0	1
Starter Solenoid	346-76040-0	1
Tach/Hour Meter	R-RL-HM026	1
Thermostat	353-01030-0	5
Thermostat Cap, Gasket	353-01032-0	5
Trim Tab	3C8-60217-1	1
Water Pump Case Lower	3KY-65002-1	1
Water Pump Case Upper	3T5-65016-0	1
Water Pump Impeller	3C8-65021-2	5
Water Pump Repair Kit	3T5-87322-3	1
Water Pump, O-Ring	345-65015-0	5
Water Strainer Set	3C8-60205-1	1
Dewatering Decal	R-RFS000002152	10

## Consumables Required

<b>Item</b>	<b>Part #</b>	<b>QTY</b>
Carb/Throttle Cleaner 13.5oz	79567300137	1
CORROSION ZERO 16oz	2596427	1
CRC Marine Premium Dielectric Grease 3.8oz	6113	1
Friction Surface Marine Grease	300417	1
Liquid Electrical Tape 4oz	7315001126	1
Loctite Paste Anti-Seize Lubricant 8oz	299175	1
NMMA certified TC-W3 oil 1GA	773735	1
SALT-A-WAY 1GA	B0000AXVG9	1
Sta-Bil® 360°™ Marine™ 8oz	22239-AD	1
WD-40 12oz	79567490050	1
White Lithium Grease 10oz	79567300243	1

# Instructional Management Plan

## Instructor to Student Ratios

1. Instructor Led Classroom Training: 1:10
2. Instructor Led Laboratory Training: 1.10
3. Student Practical/Performance Evolution: 1:1

## TTO PROCEDURES

A Training Time Out (TTO) may be called by any student or instructor in any training situation where they are concerned for their own or another's safety, or they request clarification of it, procedures or requirements. TTO is also an appropriate means for a student to obtain relief if he or she is experiencing pain, heat stress, or other serious physical discomfort. The purpose of the TTO is to correct the situation of concern, provide clarifying information, or remove the student or instructor from the possible hazardous environment. A TTO may be signaled with the abbreviation TTO, the words Training Time Out, crossed hands in a (T), a raised clenched fist, or other specific signals which will be briefed prior to a specific lab, test, or exercise. If the TTO signal is not acknowledged, the signaler shall shout "Time Out" (or other action as required by the training activity). The instructor shall attempt to relieve and remove the student from the possible hazardous environment. If an adequate number of instructors are available to allow training to continue safely, the lead instructor may elect to do so. However, if this is not practical, training will be stopped until the situation is corrected.

