

# 2016

## Raider 50 Owner's Manual



***Two stroke - Multi-Fuel - Submersible – Air Drop***

***Outboard Motor***

***Owner's Manual R50-001***

This manual has been prepared for the United States military for Operator knowledge of the Multi-fuel, Submersible Outboard motor designed and manufactured Under Contract No. N61331•11•C-0008, dated 3/4/11. The data presented in this Manual was revised as of January 2016 representing the latest revision. Raider Outboards are not sold to the public.



Serial Number Location: **Found on top of block – three digits**

The Raider R50-001 is a specially manufactured outboard motor for the military for use on Rubber Inflatable Boats. This motor can be submerged for long periods of time and quickly restarted; operated on multiple fuels; contains electric start with the battery located under the cowling.

We would like to point out that usage can only be assured on condition that this manual is read through in its entirety and the maintenance routines described later in this manual are followed carefully. Should difficulty arise with the engine, please follow the troubleshooting procedures listed at the end of this manual. For any issues, contact **[www.raideroutboards.com](http://www.raideroutboards.com)**.

**NOTICE: DANGER/WARNING/CAUTION/Note**

Before operating your outboard motor, be sure to thoroughly read and understand this Owner's Manual and follow all of the instructions shown. Of particular importance is information preceded by the words "DANGER," "WARNING," "CAUTION," and "Note." Always pay special attention to such information to ensure safer and trouble-free operation at all times.

**▲ DANGER**

Failure to observe could result in serious injury or death.

**▲ WARNING**

Failure to observe could result in serious injury or death.

**YOUR RAIDER OUTBOARD MOTOR**

**OWNER REGISTRATION AND IDENTIFICATION**

This Raider outboard has been purchased by the U.S. Military. Every motor has been delivered under Form DD-250 which contains individual Serial Nos. [www.raideroutboards.com](http://www.raideroutboards.com) has a record of every motor delivered.

**PRE-DELIVERY CHECK**

Inspect all physical aspects of the Raider Outboard looks undamaged.

**Limited Warranty**

Raider Outboards are fully guaranteed against defective materials and workmanship for the period from the date of the Form DD-250 for one year. The limited warranty will not apply to the normal wear and tear of parts, adjustments, tune-ups, or to any damage caused by:

- 1) Use or operation NOT conforming to the instructions described in this owner's manual,
- 2) Parachutes not opening
- 3) Improper dewatering – Raider must be flushed with fresh water; washed down with soap/water.
- 4) Damage of an accidents, collisions, contact with foreign materials, or submersion without cleaning.
- 5) Growth of marine organisms on motor surfaces that exceeds Submersibility times
- 6) Any other careless use or operation issues (Battery unplugged when not in use)
- 7) Normal deterioration.



The limited warranty does not cover maintenance items. The following items are some examples not covered by the limited warranty.

Spark plugs, anode, trim-tub, propeller, fuel filter, oil filter. Carbon brush. Starter rope, shear-pin, split-pin, bolt/nut washer, wire cable. Rubber goods: pump impeller. Oil seal, "O"-ring, fuel pipe, primer bulb, etc., vinyl tube.

The limited warranty will cover only your Raider Outboard and will not cover the boat/RIB the Raider is mounted on, the trailer, equipment, or accessories associated with the product.

## **A CAUTION**

Failure to observe could result in minor personal injury or product or property damage.

### **EMERGENCY STOP SWITCH**

The stop switch will cut off the engine when the stop switch line is pulled out. This line can be attached to the body of the operator, effectively preventing injuries from the propeller in case he/she falls overboard.

We **highly** recommend use of stop switch line because it can save the life of the operator if something bad happens. However, we would also like to point out the drawbacks of the switch. Accidental activation of the switch (such as the line being pulled out in heavy seas) could cause passengers to lose their balance and even fall overboard, or it could result in loss of power in heavy seas, strong currents, or high winds. Loss of control while mooring is another potential hazard. To prevent such hazardous situations, the 500 mm line is coiled and can be extended to a full 1,300mm.

### **WARNINGS**

As the operator/driver of the boat, you are responsible for the safety of those aboard and those in other crafts around yours. Therefore you should possess thorough knowledge of correct operation of the Rubber Inflatable Boat (Wing/Zodiac), its accessories, and the Raider engine. To learn about the correct operation and maintenance of the engine, please read through this manual carefully.

It is very difficult for a soldier standing or floating in the water to take evasive action should he or she see a power boat heading in his/her direction, even at a slow speed. Therefore, when your boat is in the immediate vicinity of people in the water to be picked up care should be used. A Safety Jet option (jet pump) from Raider is available and especially useful for training purposes.

### **SERIOUS INJURY IS LIKELY IF A PERSON IN THE WATER MAKES CONTACT WITH A MOVING BOAT, GEAR HOUSING, PROPELLER, OR ANY SOLID DEVICE RIGIDLY ATTACHED TO A BOAT OR GEAR HOUSING.**

Prior to any mission some individual must be assigned to perform all safety checks and to ensure that all lubrication and maintenance instructions are complied with for safe operation. Periodic maintenance should be performed. Correct periodic maintenance and good care of this outboard engine will lessen the chance of problems and keep overall performance of missions successful.



## **SERVICING, REPLACEMENT PARTS & LUBRICANTS**

Only qualified personnel should perform maintenance on the Raider. Training classes can be given or questions answered by contacting [www.raideroutboards.com](http://www.raideroutboards.com). Be sure to use genuine Raider parts and genuine Raider lubricants or recommended lubricants. 50:1 mix should be synthetic TC-W3 2-cycle oil.

## **MAINTENANCE**

Periodic inspection at the prescribed intervals is critical. The Raider motors will be subjected to drops, submersion and other abuse typical outboards will never receive. The most critical maintenance, after missions, is to wash down the motor with water and dry. When in salt water it is important to run fresh water through the system. For long period of time storage a fogging spray can be used. Trouble free operation cannot be expended unless the engine receives adequate periodic maintenance. If maintenance is performed periodically, it is not likely that a costly overhaul will ever be required.

A maintenance program is outlined later in this User's Manual.

## **SUBMERSIBLE - DEWATERING INSTRUCTIONS**

Instructions on how to dewater the Raider 50 is located on the top of the cowling. The steps to dewater after submersion are as follows:

1. Initiate dewatering valve. This opens valve that releases the water trapped between the pistons and the heads.
2. Pull rope starter slowly 8 – 10 times. The pistons will displace water out of engine.
3. Keeping dewatering valve open; press "start" button. The pistons displace final water and engine begins to start.
4. If pull start is used, close valve, pull until starts. Primer valve can be pushed to assist starting.
5. Close dewatering valve. Engine starts.
6. If operator detects water in Fuel system; press dewatering valve all the way in, press rubber bulb on fuel line three times to eliminate fuel which is replaced by new fuel.
7. Spark plugs rarely need changing; they are designed to operate in wet environment.

## **EPA LABEL**

A label has been applied indicating the Raider 50 does not comply with EPA standards due to Burning JP-5/JP-8 fuels.

## **USERS**

Raider outboards are designed and built exclusively for the military under National Security Exemption.

## **MULTIPLE FUELS**

Raider 50 has been designed to operate with multiple fuels: JP-5/JP-8; jet A; kerosene; diesel and bio-fuels as secondary fuels. Gasoline (minimum 87 octane) is primary fuel. To run heavy fuels each Fuel Induction System (FIS) has two valves that must be turned to open position. When not using heavy fuels close valves.



## CONTENTS

	Page
<b>1. Specifications.....</b>	<b>6</b>
<b>2. Names of parts .....</b>	<b>7</b>
<b>3. Engine Installation on Rubber Inflatable Boat (RIB) .....</b>	<b>8</b>
3-1 Installation- Single Raider .....	9
3-2 Installation – Dual Raiders.....	9
3-3 RIB Transom height .....	9
3-4 Transom matching with Raider 50 .....	10
3-5 Attaching the Stern Bracket .....	10
3-6 Propeller Selection.....	11
3-7 Cowling rear latching .....	11
3-8 Battery.....	11
<b>4. Fuel and Engine Oil .....</b>	<b>12</b>
4-1 Raider Fuels.....	12
4-2 Raider 50 Fuel mix ratios .....	13
4-3 Heavy Fuel mix ratios .....	13
<b>5. Running the Raider 50 .....</b>	<b>13</b>
5-1 Break-in .....	13
5-2 Starting.....	14
5-3 Manual Rope Start .....	14
5-4 Motor Operation Steps .....	15
<b>6. Operation .....</b>	<b>20</b>
6-1 Forward/Reverse Running .....	20
6-2 Shallow Water Running .....	20
6-3 Stopping the Engine .....	21
<b>7. Trim Adjustment .....</b>	<b>22</b>
<b>8. Removing and Carrying the Outboard Motor .....</b>	<b>24</b>
8-1 Removing the motor for the RIB .....	24
8-2 Carrying the motor .....	24
8-3 Storing the Raider Outboard .....	25
8-4 Trailering the Outboard .....	25
8-5 Trim Tab Adjustment .....	26
8-6 Steering Load Adjustment .....	26
8-7 Throttle Grip Turning Load Adjustment .....	27
<b>9. Inspection and Maintenance .....</b>	<b>27</b>
9-1 Pre-mission Inspection Checklist .....	27
9-2 Post Mission maintenance .....	29
9-3 Replacing the propeller .....	30
9-4 Replacing the Spark Plugs (Pulstar Model SBE 1/10) .....	31



<b>10. Raider Periodic Inspection .....</b>	<b>30</b>
10-1 Periodic Inspection Checklist .....	31
10-2 Periodic dewatering system maintenance .....	31
10-3 Battery Maintenance .....	31
10-4 Grab Rail Maintenance .....	32
10-5 Emergency Kit Maintenance .....	32
10-6 Maintenance Chart .....	32
10-7 Changing Gear Oil .....	33
10-8 Long term storage .....	34
10-9 Battery long term storage .....	35
10-10 Electric Starter motor maintenance .....	35
<b>11. Checking after striking underwater object .....</b>	<b>35</b>
<b>12. When Raider becomes submerged .....</b>	<b>35</b>
<b>13. Cold Weather Operation .....</b>	<b>36</b>
<b>14. Troubleshooting .....</b>	<b>36</b>
<b>15. Emergency Tool Kit .....</b>	<b>37</b>
<b>16. EPA Emission Regulations .....</b>	<b>37</b>



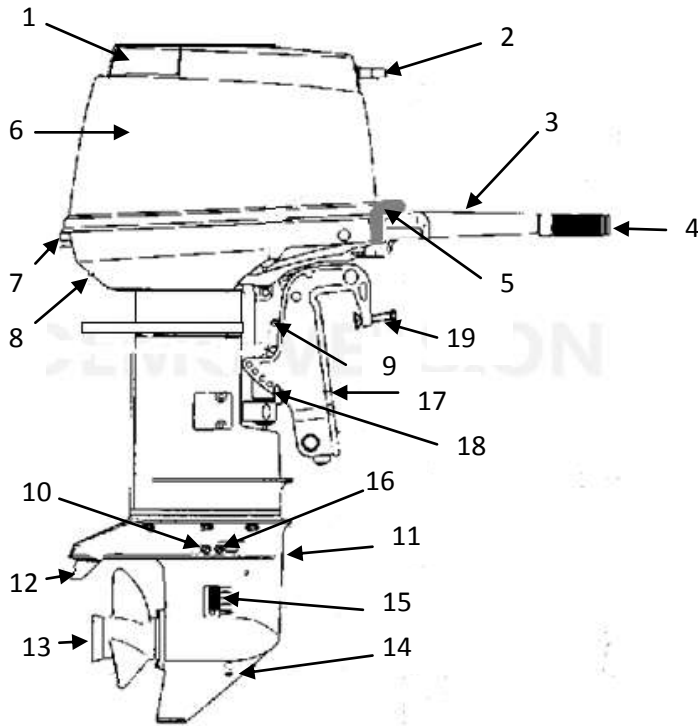
## 1. SPECIFICATIONS – RAIDER 50

ITEM	RAIDER 50 HP
Overall length	45.1 inches (1145 mm)
Overall width	13 inches (330.2 mm)
Overall height	55.6 inches (1413 mm) (Long Shaft)
Weight	178 lbs. (80.7 kg)
Transom length	550 mm (21.7 in.)
Engine type	2-Stroke Fuel Induction System
Piston Displacement	697 (42.5)
Bore and Stroke	68 x 64 (2.68 mm x 2.52 mm)
Number of cylinders	3
W.O.T.	5000 – 5800 rpm
Exhaust System	Through Hub
Cooling System	Water cooling (Rotary rubber impeller)
Ignition System	C.D. ignition
Starting System	Pull Start; Battery; emergency rope start
Intake System	Reed Valve
Scavenging system	5-port loop Charge
Exhaust silence system	Add on feature –
Lubrication system	Fuels pre-mixed with additives
Cooling system	Forced Water-cooling
Water temperature control	Thermostat (with pressure relief valve)
Ignition System	Flywheel Magneto C.D. Ignition
Gear Reduction	12 : 23
Gear Ratio	1.92
Firing Order	1-2-3
Spark Plug	NBE1H/10 (stainless steel)
Alternator	12V 280W (Maximum) (13.6 volts regulated)
Battery	Lithium Ion – fully sealed 12 VDC 270 CA
Trim Angle	4-24 degrees
Trim Angle settings	6 degrees
Maximum tilt-up angle	75 degrees
Transom board thickness	31-70 mm (1.22 – 2.76 in.)
Maximum steering angle	80 degrees
Gear shift	Dog clutch (F-N-R) – front location
Electric Start	Push button with safety ring
Throttle Control	Tiller Handle
Fuel Bladder/Tank	Furnished by customer – Mercury connector
JA-8 & heavy Fuels	Additive required-Add to Heavy Fuel Bladder
Gasoline	50: 1 mix. Add prior to mission in bladder
Engine Oil	Raider provided (synthetic)
Gear Oil – Synthetic recommended	API GL5, SAE#80 to #90 500 ml (16.89 fl. Oz.)
Submersibility parameters	66 ft/18 hours; 50 ft./24 hours
Grab Handle	RAMZ and T-Duck Compatible
Dewatering Lever	Push back to open cylinder outlets; hold back to dewater fuel system
Primer pump	Located in front of Raider



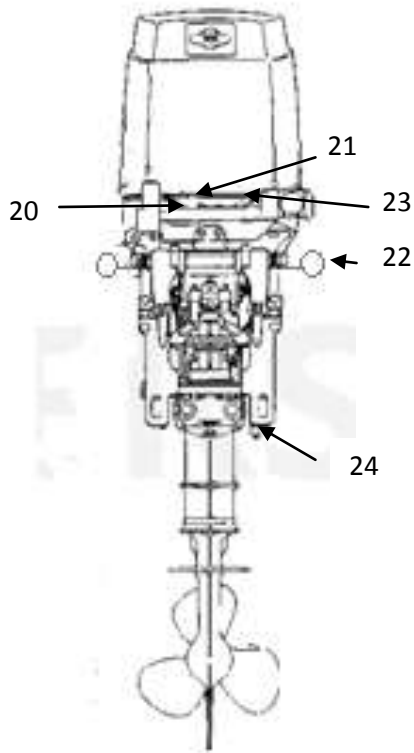
## 2. NAMES OF PARTS – RAIDER 50

### *RAIDER 50*



1. Tilt Handle
2. Pull Start (Primary)
3. Tiller
4. Throttle Grip Speed Control
5. Shifter
6. Upper Motor Cover
7. Rear Cowling Hook Lever
8. Water Check Port
9. Tilt Stopper
10. Water Plug
11. Anti-ventilation Plate
12. Trim Tab
13. Propeller
14. Oil Plug (lower)
15. Water Strainer
16. Oil Plug (upper)
17. Stern Bracket
18. Thrust Rod
19. Clamp Screw



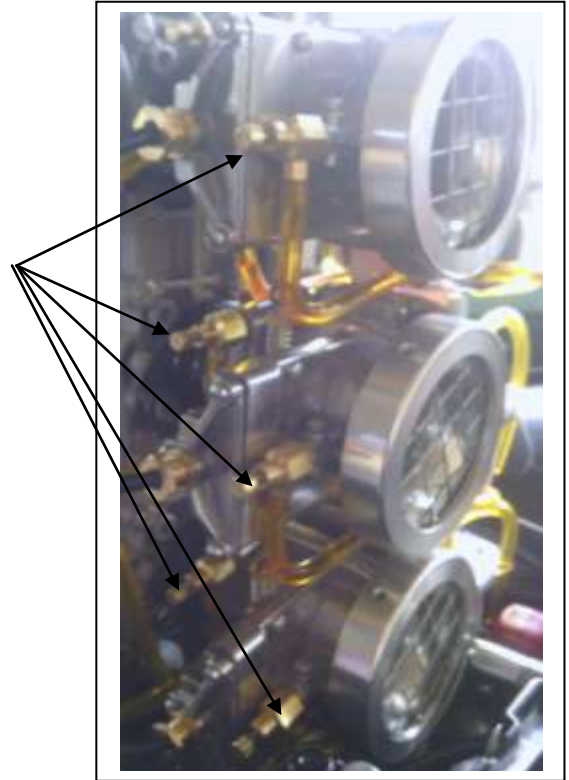


- 20. Dewatering
- 21. Emergency stop lanyard
- 22. Grab Rail
- 23. Starter Button (Secondary start)
- 24. Anode

**CHANGE FROM GASOLINE TO  
HEAVY FUELS**

Turn six valves to Open  
(Turn counter clockwise until  
open)

To return to gasoline; close  
valves.





### 3. RAIDER INSTALLATION ON RUBBER INFLATABLE BOATS (RIBS)

#### **⚠ WARNING**

Most Rubber Inflatable Boats are rated and certified in terms of their maximum horsepower and weight of outboard, and this is shown on the boat's certification plate. Do not equip your RIB with an outboard that exceeds this limit.

Do not operate the engine until it has been securely mounted on the boat in accordance with the instructions.

#### 4.7 RIB's may have weight/horsepower limitations –

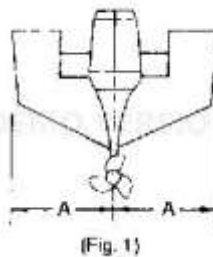
**Raider 40 weight is 148 pounds for single Outboard – without Safety Jet Drive**

**Raider 50 weight is 178 pounds for single Outboard – without Safety Jet Drive**

**Check transom tag on RIB prior to installation. Install motor(s) as close to center as possible.**

#### 3.1 Installation - Single Raider

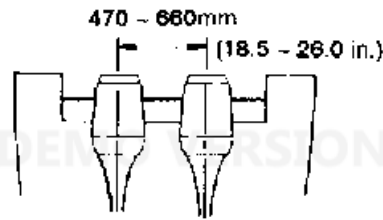
Position the outboard engine at the exact center of the stem (Fig. 1) of RIB.



#### 3.2 Dual Raiders Configuration

Position the outboard engines 470- 660mm (**18.5 – 26.0 in.**) apart, measured from an imagined center line of each engine, in the exact center of the stem. (Fig. 2). After centering the engines, insure the control rod reaches both engines. Twin engine configurations have an extended motor rod where the control arm attaches. Remove cowling and insert dual-control throttle cable.

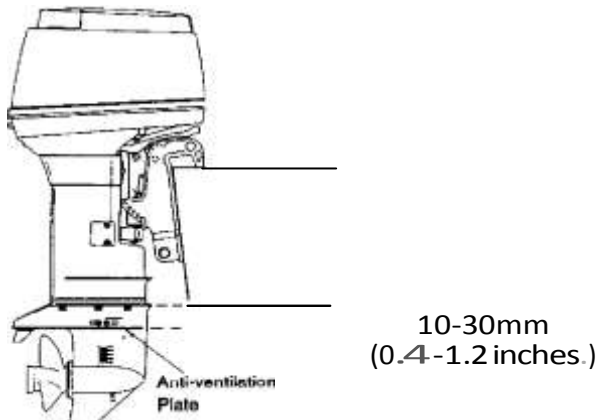
Every Raider can be made to become “dual” operated. Order the optional kit which contains Cable; connecting rod; and motor adapter. The connecting rod controls both Raiders; the throttle cable quickly integrates both fuel controls. Either tiller can be used.



(Fig. 2)

### 3-3 RIB TRANSOM HEIGHT

Install the engine with the Anti-ventilation Plate at a level 10–30mm below the bottom of the boat (Fig. 3).



(Fig.3)

### 3-4 Transom Matching with RAIDER 50.

Be sure that the anti-ventilation plate of the outboard is below the water surface when running with wide open throttle. If the Raider pushes water into the RIB; raise the motor on the transom by adding a shim on top of transom to achieve proper Raider motor height.

## CAUTION

Overheating may occur if the Anti-ventilation Plate is at a level higher than the bottom of the RIB, as a result of air sucking rather than water.

**Note:** If the height difference exceeds 10 — 30 mm engine power performance is likely to be reduced as a result of increased water resistance to the gear case assembly.

### 3.5 Attaching the Stern Bracket

Both Zodiac and Wing inflatable's come with bracket attached. The Raider is a long shaft (20 inches) and should attach simply by centering the Raider 50 in the center and tighten Raider clamps. For dual Raiders position motors as described above to allow connecting rod to be attached.



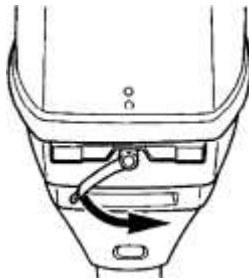
### 3.6 Propeller Selection

The propeller supplied with the Raider is an “all around” propeller. Whatever propeller you ultimately decide to use must be selected so that the engine rpm measured at wide open throttle while cruising is within the recommended range between 5000 to 5700 rpm. The Raider 50 can be made faster or push more weight by changing propellers.

A Safety Jet option is available that encloses the propeller for safety purposes such as training or operating in a heavy debris area.

### 3.7 Cowling rear latching

When removing cowling/top cover unlatch as shown; bring cowling forward to clear the pull start. When returning cowling to operating position; first clear pull start; center the front over the extended edge; then place cover in place. This is a tight fit, you may have to push cowling toward rear and latch the cowling to the base Raider.



### 3-8 Battery

The battery is located under the cowling; it is a sealed lithium iron battery providing 270 Cranking Amps. The battery is held by a holder with a bottom cut out; the battery case has an extended case that fits into the cut out (slot). To remove unscrew single screw; remove connector from Raider; and remove battery. To reinstall; place battery in holder; tighten screw; connect to other end of connector and you are ready to go.

Note: Always unplug battery after mission. A battery tender has been supplied to maintain battery. DO NOT USE FAST CHARGER ON BATTERY. If battery is dead; upon starting engine with primary pull start it will recharge.

Maintenance on the battery is clean connections on wiring; clean exterior of battery; apply grease to connectors; store in dry place. Use maintainer to maintain while not in Raider. Disconnect for long periods of time.



Shown is battery integrated with Raider 50. Power plug is red/black and is easily disconnected.

To remove a single “screw” is holding the battery into the assembly.



#### **4. FUEL & ENGINE OIL - TC-W3 OR RAIDER OIL MUST BE ADDED TO BLADDER for operation of Raider 50 on any fuels.**

##### **4-1 Fuels: Gasoline (Primary) other fuels JP-5/8; kerosene; Diesel**

**Notes:**

**Gasoline**

Unleaded regular gasoline minimum of 87 Octane is highly recommended for the Raider outboard. (91 by research octane rating).

JP-5/8: YOU MUST PLACE RAIDER ADDITIVE IN BLADDER AND ALONG WITH TC-W3. BOTH MUST BE USED WHEN USING HEAVY FUELS.

Additive will reduce smoke and carbons build up during idle.

#### **DANGER**

When fuel vapors are present, they could cause an explosion or fire.

- Do not smoke near gasoline and other fuels.
  - Do not overfill fuels and additives when filling bladders.
- Any fuel spilt should be wiped up immediately.**

#### **A CAUTION**

**DO NOT** mix different brands of oil.

Using different brands of oil, or different type of oil even if the brand is the same, may cause gelling, resulting in possible filter screen blockage. This could result in serious engine damage because of impaired lubrication performance. Synthetic TC-W3.



#### 4-2 Raider 50 Fuel Mix ratio (50:1)

Add engine oil into fuel oil tank. The mixing ratio with gasoline is 50:1 (one part oil and 50 parts gasoline). Mix well by hand. The mixing ratio during break-in running is 1:25.

Mixing Ratio

	Engine Oil	Gasoline
<i>During break-in</i>	<i>1</i>	<i>25</i>
After break-in	1	50

#### 4-3 Heavy Fuel Ratio (JP-5/8; kerosene; diesel) (50:1 Raider Oil + Additive)

The required amount of engine oil is same as gasoline. ALSO required is Raider Additive to reduce smoke/carbon buildup. One container treats A 6-gallon bladder.

### A CAUTION

During break-in of the engine, additional engine oil must be added to the fuel gasoline to maintain a 25:1 ratio.

## 5. RUNNING THE RAIDER

### 5-1. Break in (minimum) -----10 hours

The most critical time in the life of your engine is the first 10 hours of operation. Correct operation during this break-in period will prolong the life of the engine and ensure optimum performance. Follow the procedures shown below carefully.

Time	Break-in method	Running Conditions
0 min –	Trolling or idling speed	Cruising at minimum speed
10 min –	Throttle opening ( 1/2 about 3,000rpm	–
1 hr –	Throttle opening ( 3/4 about 4,000rpm	Run with full throttle for 1 min-10 min.
2 hrs –	Throttle opening 3/4 about 4,000 rpm	Run with full throttle for short time
10 hours	Normal running	–

### A CAUTION

Severe engine damage may be caused if the break in procedures described above is not observed.

Change new gear oil after 10 hours break-in.



## 5-2. Starting

The Raider 50 has three starting capabilities.

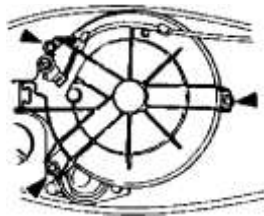
- a) Primary is manual pull start. This method simply uses the pull start located at the top of the Raider.
- b) Secondary starting is the “push button” which engages the battery. If the battery is dead if you start the Raider it will recharge in minutes.
- c) Third method is emergency only. In the tool kit (BII) are tools that allow the pull starter (a) to be removed. In the BII you will find a rope that can be wound around fly wheel to manually start the Raider 50.

### CAUTION

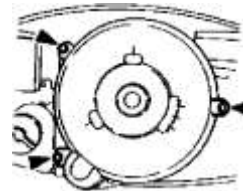
Prior to mission insure battery is fully charged and connected. The battery will last 90 days (without connection) when used in RAMZ or T-Duck configurations.

## 5.3. Manual Rope Start (Last resort for starting)

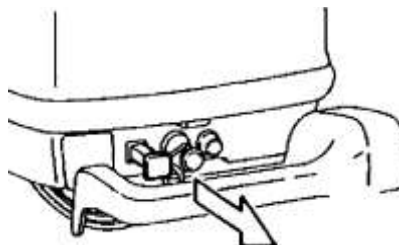
- a. Set the Shift Lever to Neutral.
- (2) Remove the Upper Engine Cover. Then,
- b. Remove the “Emergency Kit.” Remove the Recoil Starter Assembly using the tools in the BII (Emergency Tool Kit). Three bolts need to be removed (10 mm and 13 mm). Remove snap on side of starter assembly. Remove. Rope pull starter is located inside BII – Tool Kit.



Top Down View

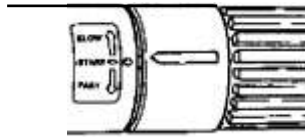


- c. Prime engine (3 pumps)

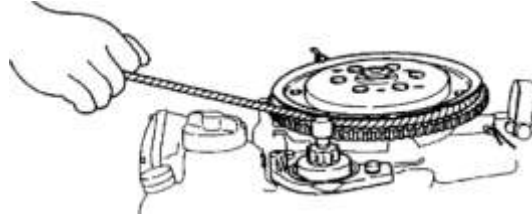




- d. Turn the throttle grip so that the indicator line meets the "START" mark.



- e. Wind the starter rope around the flywheel a few turns. Give it a sharp tug to start the engine. Use a socket wrench or similar to get a firm grip on the end of the rope.



### A CAUTION

Be careful that your clothes or other items do not get caught in the rope or other engine parts.

To prevent your clothes and other items from getting caught in the engine, do not install the flywheel cover nor is the Upper Engine Cover after the engine started with the starter rope. In this case be sure nobody sits in the vicinity of the engine, and run carefully.

#### f. Warm-up

Before driving the boat, let the engine run at low speed for approximately three minutes to let it warm and allow the oil to circulate through the machine. If the engine is not warmed up beforehand, the engine life will shorten greatly. During the warm-up operation, confirm that cooling water is discharged from the check port and idle port.

#### 5.4 Motor Operation Steps

##### 5-54

- a) Connect the fuel connector to the engine (Figure below 5-1).

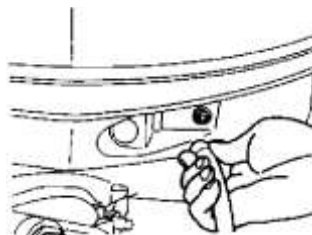
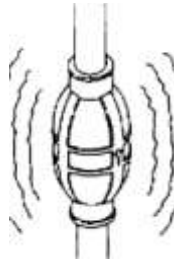


Figure 5-1. Installing hose from bladder to Raider 50.

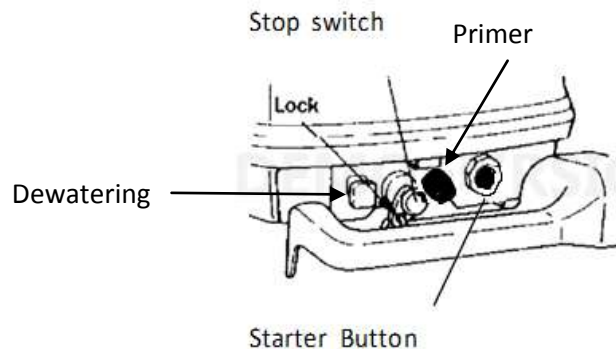




- b) Feed fuel to the carburetor by squeezing the primer bulb until firm.



- a. Install the safety lock in the stopswitch (lanyard).



## A CAUTION

Be sure to connect the emergency stop line to your wrist. The engine will shut down if the stop line switch is disconnected. This is a safety measure, designed to protect the driver if thrown overboard. A spare connector can be found in emergency kit.

- b. Set the shift lever to Neutral

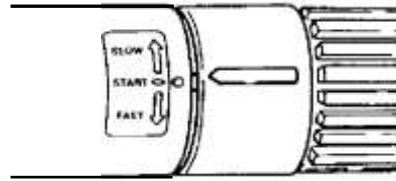
Note: Be sure that the shift is at neutral when starting the engine. The Raider is provided with in gear protection when using pull start. When using electric start it will start when in forward.

## CAUTION

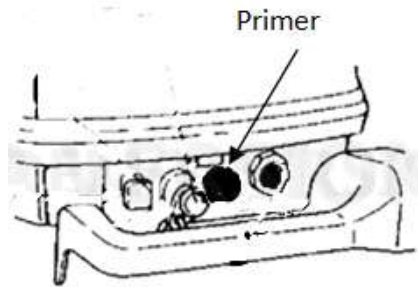
Motor will start in gear when electric start is used.



- c. Turn the throttle grip so that the indicator line meets the "START" mark.



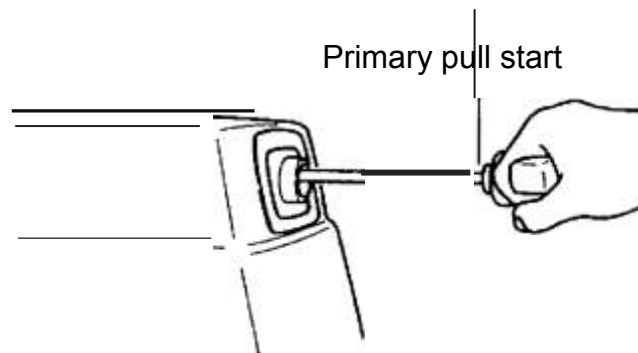
- d. If not dewatering insure dewatering valve is pushed to in position.



Note:

Primer can be used to inject fuel into the Fuel Induction System.

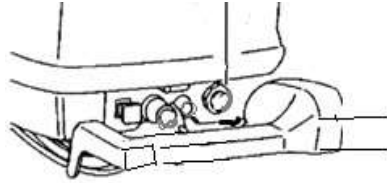
- e. Pull the starter rope slowly until resistance is met. Give it a sharp tug to start the engine.  
f. Electric start button can be used to start engine if user desires.



- g. Turn the handle grip to its original position gradually once the engine has started.  
h. Carefully turn the throttle grip to "SLOW".  
i. Press the starter button if Raider to be started via battery. If battery is dead, pull start, and battery will recharge.



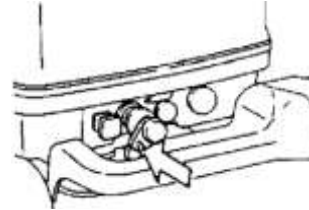
Location of starter button – push to start



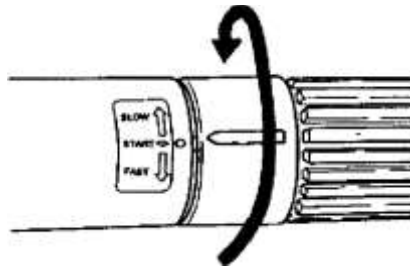
j. Release the starter button as soon as the engine starts. For dewatering you can pull dewatering valve:

Note: Pull starter rope slowly eight (8) times; leave open valve; press starter button. This will eliminate any water left in cylinder. Close valve once engine begins to start.

k. Pull back the dewatering valve when Raider starts.

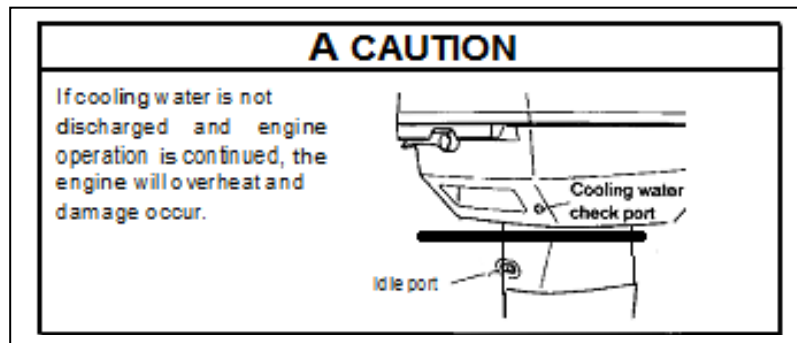


l. Gradually turn the throttle grip to "SLOW".



Notes:

1. Extended operation of the starter motor will run the battery down. Operate the starter motor for maximum 5 seconds. If the engine does not start, wait for 10 seconds before operating the starter motor again.
2. NEVER operate the starter motor once the engine has started.
3. If the starter motor won't turn over, start engine with pull starter.



m. Engine speed - Proper idlespeed after warm-up operation

Clutch engaged	Clutch disengaged
750 rpm	900 rpm

Do not exceed the full-throttle enginespeed

Full throttle engine speed
5150-5850 rpm



## 6. OPERATION

---

### 6-1. Forward/Reverse Running

Turn the throttle grip toward "SLOW" and move the Shift Lever quickly to Forward or Reverse when the engine speed has reached the lowest rpm.

#### **A CAUTION**

It May be dangerous to attempt shifting at high **RPM**.  
Be sure to slow down to trolling or idling rpm before shifting.

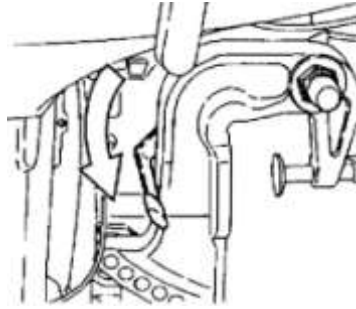
#### **A CAUTION**

1. The engine must be at idling speed when the shift Lever is moved from Forward to Reverse.
2. Before moving the Shift Lever to Reverse, make sure the Reverse Lock is engaged (in up position).
3. Do not increase the engine speed unnecessarily while reversing. Limit half throttle - at maximum - when running in reverse.
4. The shift lever cannot be turned from Neutral to Reverse unless the throttle grip has been turned fully toward "SLOW".

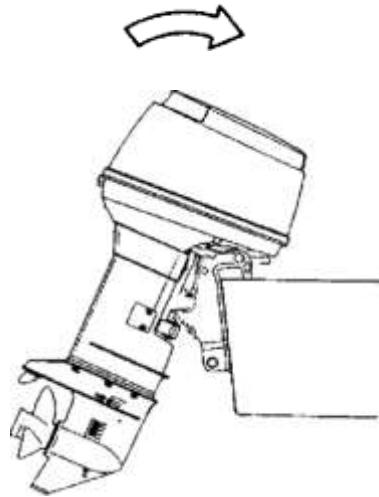
### 6.2 Shallow water running.

- a. When in shallow water running take care the water strainer is submerged. At all times and water is continuously running out of the cooling water check port.
- b. Be sure to run slowly when using the shallow water drive to maintain control of the RIB. Could cause damage to gear case.
- c. If in REVERSE make sure Raider does not strike object as the impact could cause damage to Raider and RIB.

Set the Reverse Lock Lever provided on the starboard side to "Release"  
by turning it **downward**.

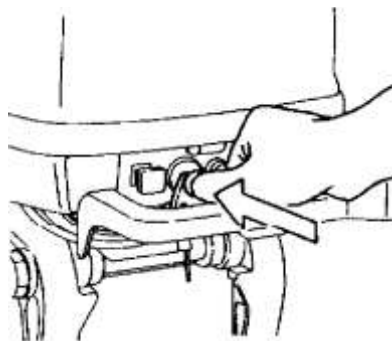


Tilt the engine up approximately to 45 ° and lower it. The engine will now be set to the shallow water setting.



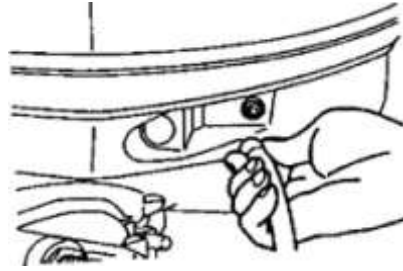
### 6-3. Stopping the engine

- a. Reduce the engine speed to idling RPM. Keep pressing on the Stop Switch and the engine will then stop.



#### Notes:

1. When the engine stopped, Disconnect the bladder .
2. Disconnect the fuel connector from the engine.
3. Disconnect the cables from the battery
4. Disconnect fuel hose.



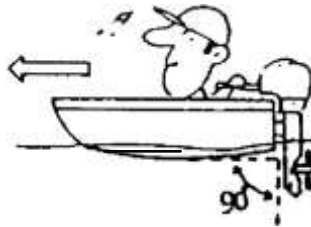
## 7.0 TRIM ADJUSTMENT

---

The following instructions explain how to set the best trim angle of the RIB. The trim angle is adjusted by setting the thrust rod in the correct thrust rod hole.

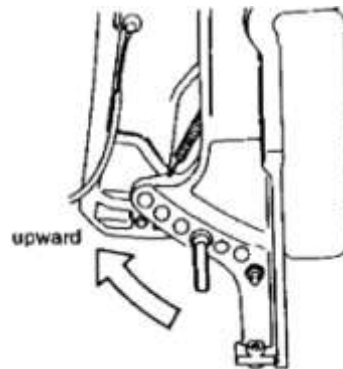
### - Proper Trim Angle

The trim angle is optimum when the RIB is parallel to the water surface while running.



### Improper Trim Angle (bow rises too high)

If the trim angle is excessive, the bow will rise out of the water and the speed will decrease. Furthermore, the bow may sway or the bottom may slam the water while cruising. In this case decrease the trim angle by setting the thrust rod in a lower hole.

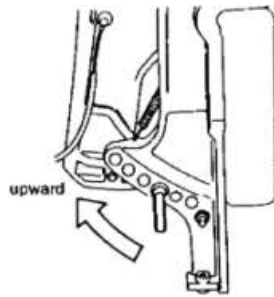


Select a lower hole

If water from the Raider enters the RIB the motor is too low in the water. Modify the RIB motor mounting plate to a larger height. Wing and Zodiac's may have different transom heights. Improper Trim Angle (bow dips into the water) If the trim angle is too small, the bow will dip into water, the speed will decrease, and water may enter the boat.

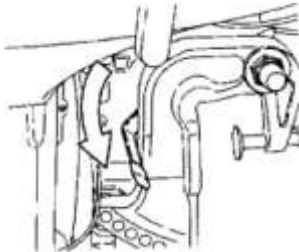


In this case, the trim angle should be increased by setting the thrust rod in a higher hole.



Select a higher hole

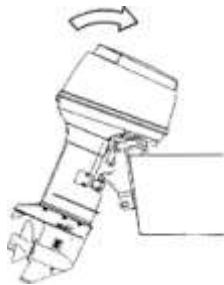
The Reverse Lock Lever is located on the starboard side - to "RELEASE" by turning it downward.



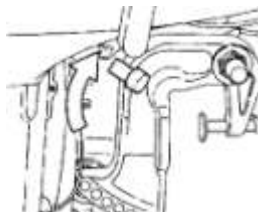
#### **⚠ WARNING**

When tilting up or down, be sure that no finger or hand is placed in between the swivel bracket and stern bracket.  
Be sure to tilt down the outboard slowly.

Tilt the engine up entirely. The tilt will lock in the raised position.



To tilt the engine down. Turn the Reverse Lock Lever upward (toward "LOCK"). Tilt the engine up slightly and then let it go down. (The Reverse Lock will be set automatically.)







## 8. REMOVING AND CARRYING THE MOTOR

---

The Raider 50 has a “Grab” handle installed to help the operator install/remove the outboard. This also protects the Raider when dropped.

### 8.1 Removing the motor from the RIB

- 1) Stop the engine.
- 2) Disconnect the fuel connector from the bladder
- 3) Undo the clamps that hold Raider to RIB transom.
- 4) Remove the motor from the transom.

**CAUTION: Weight of Raider 50 is 178 pounds – two man carry.**

### 8.2 Carrying the motor

Grab rail has been placed on the Raider to assist in carrying. The motor can be carried in any position.

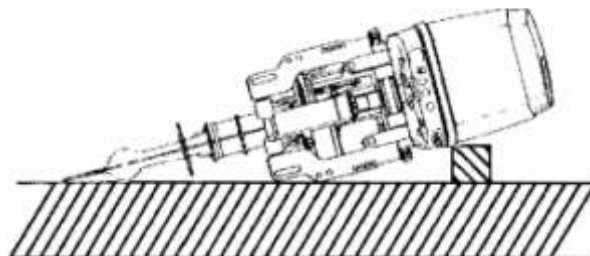


Raider Carrying Cart

### CAUTION

Beware of explosion danger. Spilled and vaped fuel may catch fire and explode. Be sure to fully discharge gasoline from the carburetors when transporting the engine. Wipe off spilled fuel with a rag.

*Raider can be placed in any position. However, after mission, run motor in fresh water via “ear muffs”; disconnect battery; wash complete motor and let dry. Insure fuel is completely run out of Raider.*



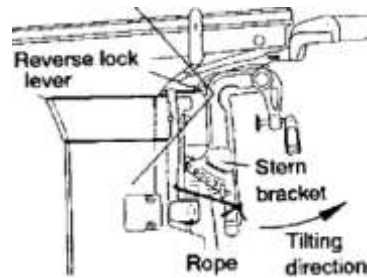


### 8.3 Storing the motor

Store the motor on the Raider Carts supplied if possible. For long periods of time unplug battery; Insure motor has been washed and dried; spray Corrosion Zero on engine; run all fuels from engine; Spray corrosion zero inside Fuel Induction System – all three carbs.

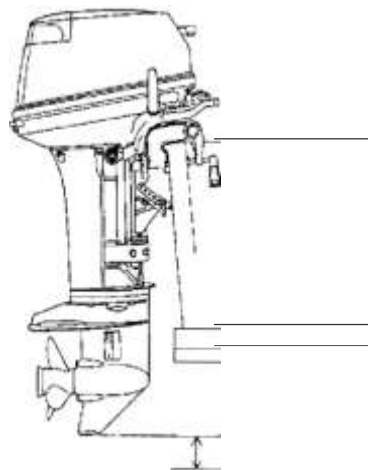
### 8.4 Trailering the Raider on RIB

When trailering insure the motor is tilted up and secure. If rough terrain fasten motor with strap.



## A. CAUTION

When trailering the engine or installing on a RIB, the motor should be in a running position fully tilting down. Trailering in a tilted up condition could cause damage to the motor, RIB, etc. by unexpected tilt lock release getting a shock when trailering. If trailering the motor at tilt down position is unavoidable fix the motor securely.



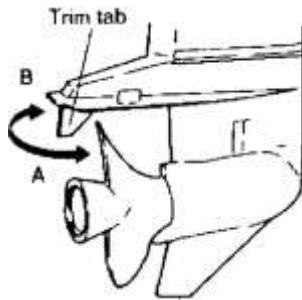


### 8.5 Trim Tab Adjustment

If straight-line cruising cannot be achieved, adjust the trim tab located under the anti-ventilation plate.

If the boat veers toward the right, direct the trim tab towards A

If the boat veers toward the left, direct the trim tab towards B



#### Notes:

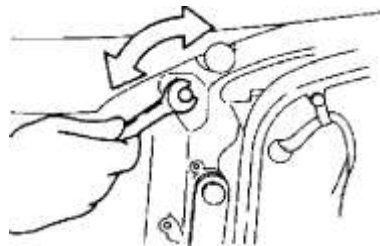
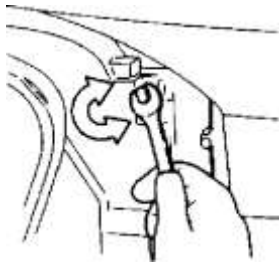
1. The trim tab also acts as an anode to prevent electrolytic corrosion. Thus do not paint or grease this part.
2. After adjustment securely tighten the trim tab fixing bolt.
3. Check for looseness of the bolt and the trim tab at regular intervals. Due to corrosion, the trim tab will over time wear down.

### 8-6. Steering Load Adjustment

Steering load can be adjusted by turning the steering adjust bolt on the Swivel Bracket.

Turn clockwise to increase the load

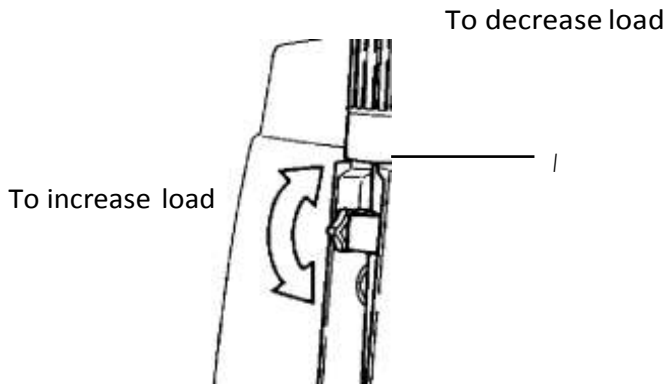
Turn counter-clockwise to decrease the load.





### 8-7. Throttle Grip Turning Load Adjustment

Turn the friction adjustment screw on the steering handle to adjust the turning load of the throttle grip.



## 9.0 INSPECTION AND MAINTENANCE

### *Care of your outboard motor*

To keep your motor in the best operating condition, it is very important that you perform daily, and periodic, maintenance prior to missions as suggested in the maintenance schedules that follow.

### CAUTION

Your personal safety and that of your on board soldiers depends on how well you maintain your outboard motor. Carefully observe all of the inspection and maintenance procedures described in this section.

The maintenance intervals shown in the checklist apply to an outboard motor in normal use. The Raider outboard motor will probably be operated under severe conditions such as frequent full-throttle operation or frequent operation in brackish water, maintenance should be performed at shorter intervals than shown.

### 9.1 Pre-mission Inspection Checklist

Perform the following checks and inspection before and after use.

#### **FUELS:**

1. Gasoline – use 87 Octane mixed with 50:1 Outboard Oil (TC-W3) or Raider Outboard oil
2. JP-5/8 – mix to 50:1 with TC-W3 oil and place Raider additive inside bladder. Additive supports a 6-gallon bladder.



### Check List

Item	Points to Check	Action
Fuel System	Check fuel/2-Stroke oil/Additive in the bladder. Check for water in the fuel filter. Check rubber hoses for integrity	Replenish Clean Replace
Lubrication System	If JP-5/8 is being used insure additive is placed in bladder. 2-Stroke oil is also required.	Replenish Clean
Electrical	Check the spark plugs for dirt, wear and carbon build up. Plugs should be light brown at tip.  Check battery for charge. 13.1 volts; only use maintainer – no fast charges.  Check for loose connections  Check if the emergency stop switch functions normally. Check wires for loose connections and damage.	Clean or replace    Remedy or replace Replenish or recharge Retighten
Throttle System	Check If the primer valve works normally. Check if the carburetor and magneto work normally when turning the throttle grip, and also check cables for looseness.	Replace  Correct
Recoil starter	Check ropes for wear and damage. Check the latchet for engagement.	Replace Correct or replace

Check operation of dewatering system. Insure valves in rear open when pressing lever. Insure fuel removal works by depressing lever to all the way.

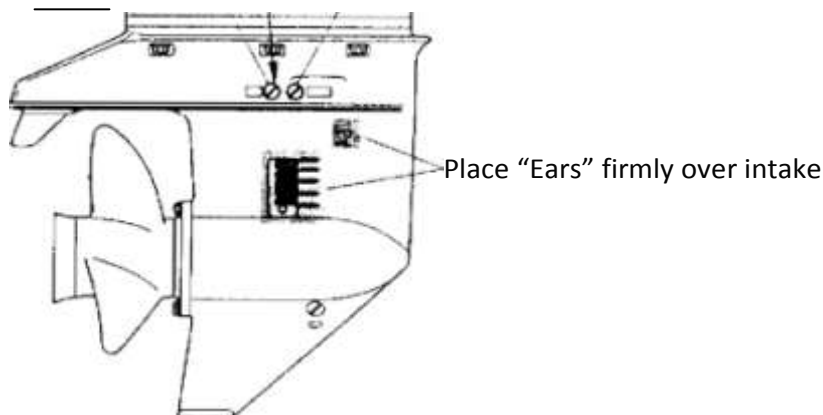


Item	Points to Check	Action
Clutch and Propeller System	Check the propeller for bent or damaged blades. Check if the propeller nut is tightened and the split pin is present.	Adjust Replace
Dewatering	Check movement of valve; inspect back valves Check the dewatering rod Installation.	Tighten
Starter Button	Check connections; rubber is intact	
Cooling Water	Check that cooling water is discharged from the cooling water check port after the engine has started.	
Tools and Spares	Insure the BII (Emergency Kit) contains all contents.	
Steering	Check working of steering handle/tiller.	
Other Parts	Check if the anode and trim tab are securely installed. Check the anode and trim tab for corrosion	Repair if necessary Replace

## 9-2 Post Mission Maintenance

### • Washing Raider with fresh water

When the engine has been used in salt water or polluted water, wash the exterior and flush the cooling passage with fresh water. This can be done by applying "EARS" over intake. Connect hose to "Ears" and place over intake. Turn on Hose; start Raider 50. Water will come through outlet port at top. Run until fuel runs out.





## ⚠ WARNING

To prevent rotation of the propeller, remove it before flushing the passage if unfamiliar with Raider 50.

Remove cowling and wash motor with soap and water. Let dry. Spray Corrosion Zero on Raider.

Long-term storage.

After mission run the engine at low speed with the fresh water/ear muffs; set shifter to Neutral to flush out fresh water from the cooling system and in the process remove salt, mud and other foreign panicles. Run the fuel from the Raider – engine will stop. Spray WD-40 or Corrosion Zero into cylinders from carbs. Store on Raider engine stand.

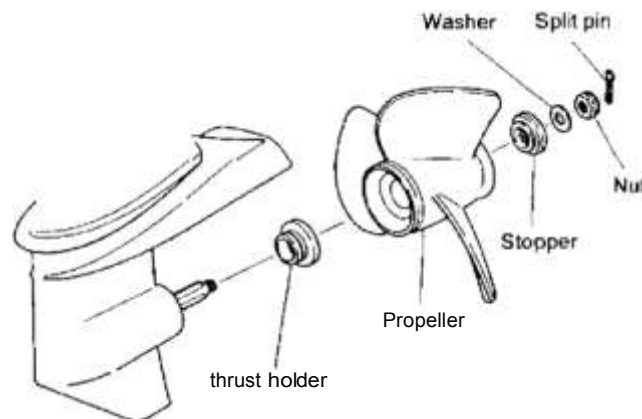
Note:

Run the engine at low speed when flushing the cooling system.

### 9.3 Replacing the propeller

A worn or bent propeller will affect engine performance and may cause engine trouble.

1. Pull out the split pin and remove the propeller nut and washer.
2. Remove the propeller by pulling toward you.
3. Apply grease to the propeller shaft before mounting the new propeller.
4. Fit the washer, securely tighten the nut and insert the split pin (cotter key).



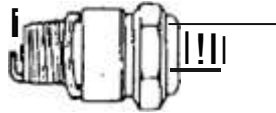
## CAUTION

Before removing the propeller, remove the spark plug caps from the spark plugs for safety.



#### 9.4 **Replacing the spark plugs - Pulstar Model SBE 1/10 Spark Plugs must be used**

1. Remove the upper engine cover (cowling).
2. Remove the spark plugs by turning counter-clockwise with the socket wrench. Tap lightly on the spark plugs if they are hard to turn.



The Pulstar Model SBE 1/10 spark plugs are especially designed for Submersibility – the user Does not have to replace spark plugs after dewatering.

### **CAUTION**

Do not touch the high tension wires running from the ignition coil to the spark plugs while engine running. These wires generate very high electric voltage, which can cause a serious electrical shock if touched during running. Remove these coil wires gently when removing from spark plugs to avoid damage to wires.





## 10. Periodic Inspection

It is important to inspect and maintain your outboard motor regularly. At each interval on the chart below, be sure to perform the indicated servicing. Maintenance intervals should be determined according to the number of hours or number of months, whichever comes first.

Your outboard motor should receive careful, and complete, inspection at 300 hours. This is the best time for major maintenance procedures to be carried out.

The following chart details what the service person should use as a guide.

If issues arise please contact Raider Outboards, Inc. [www.raideroutboards.com](http://www.raideroutboards.com) and we will review issues. We want to maintain good working outboards and fix any issue on all Raiders.

### 10-1 Periodic Check List

Item		Servicing Interval			Action	Remarks
		10 hours or 1 month	50 hours or 3 month	Every 100 hours or 6		
Fuel System	Carburetor or Fuel filter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strip, clean and adjust. Adjust idling.	
	Hoses			<input type="radio"/>	Check and clean.	
	Primer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Check and clean.	
					Clean	
	Spark plugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Check gaps. Remove carbon deposits.	



Ignition	Ignition timing	O		O	Adjust timing.	
Starting System	Starter motor			O	Check for salt deposits and battery cable condition.	
	Dewatering	O	O	O	Check for tightness	
	Starter rope	O	O	O	Check for wear or damage	

## 10-2 Periodic DEWATERING SYSTEM Maintenance

The dewatering system consists of valves located in the Raider heads that can be opened to insure water is purged between the pistons and the heads. When the valves are opened the valves act like de-compression valves and the engine turns over very easy with pull start. It is essential the user pulls slowly a minimum of 8 pulls to eliminate water prior to starting. Maintenance includes spraying the valves with WD-40 after missions. Also check linkage to insure nothing has been bent or has come loose.

## 10-3 Battery Maintenance

When stored for a period of time the battery connector should be disconnected. When being prepared for missions the battery should be placed on a battery tender to insure it is fully functional and fully charged.

Note: If the battery is functional, with minimal charge to start the Raider, pull start the motor and the battery will automatically recharge.

## 10-4 GRAB RAIL Maintenance

Insure all the bolts are tight on the grab rail (4 bolts).

## 10-5 EMERGENCY KIT Maintenance

An emergency kit has been placed inside each Raider Outboard. Insure this kit is in place prior to mission and all parts are in the BII. The Emergency Kit is housed in a waterproof/sealed container.

## 10-6 Maintenance Chart

Item	Servicing Interval			Action	Remarks
	10 hours or 1 month	50 hours or 3 month	Every 100 hours or 6 month		



Lower Unit	Pro- peller	O	O	O	Bend of blades damage and wear	
	Gear oil	O	O	O	Change of oil and water leak eval.	
	Water pump		O	O	Check for Wear or damage	Replace impeller -12 months
Bolt and Nuts		O	O	O	Retighten	
Rotating Parts. Grease Nipples			O	O	Apply and pump in grease.	
Grab Bar		O		O	Check for tightness	
Fuel Ind. System (Carb.)	Visual				Idle, high speed issues.	Repair or replace.
	Cables	O		O		
	Cover					
Outer Equipment		O	O	O	Check corrosion	
Anode			O	O	Check corrosion and defamation	Replace

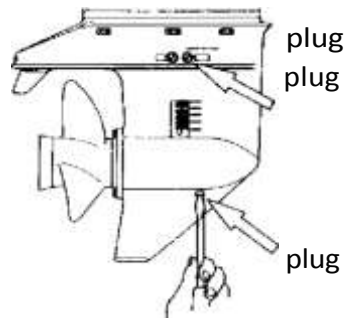
### 10-7 Changing Gear Oil:

Remove the oil plugs (upper and lower), and drain the gear oil completely.

Insert the oil tube nozzle in to the lower oil plug hole, and squeeze the tube until the oil flows out of the upper plug hole.

Re-install the upper oil plug. Then remove the oil tube nozzle and install the lower oil plug.

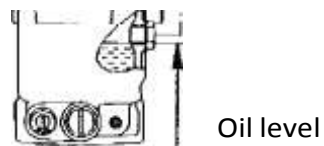




Note:  
Use only recommended gear oil or API (American Petroleum Institute) oil grade of GL5 SAE #80 – SAE #90. Required volume: approx. 500ml (16.89 U.S. fluid oz)

Clean or change fuel filter on the engine after removing the fuel filter case.

Tilt the engine up to check the oil level in the tank. Remove the oil plug by turning Oil plug Counter-clockwise, then check if the oil level reaches the bottom line of the plug hole.



## A CAUTION

Do not fully unscrew the oil plug with the engine tilted down. Pressurized oil in the oil tank may cause oil to spurt out.

### Recommended oil

Use an automatic transmission fluid approved by GM. Recommended oils are as shown below.

- MOBIL: MOBIL DTE #22, MOBIL ATF 220
- SHELL: SHELL DEXTRON-II, SHELL OIL #22 K22
- ESSO: ESSO AUTOMATIC TRANSMISSION OIL

### OFF-SEASON

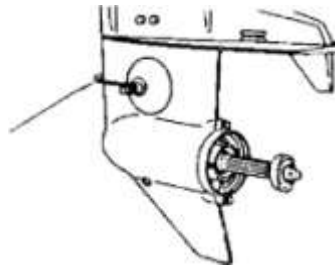


## **⚠ WARNING**

1. When the motor is out of the water, being transported, or in storage, always detach the battery cable to prevent accidental starting of the engine. Accidental starting when the motor is out of the water will cause water pump failure, overheating and damage to the engine due to a lack of cooling water.
2. DO NOT disconnect the electrical harness when operating the motor. The Raider may continue to run and can be started with the electrical harness disconnected. Remove all spark plug connectors from the spark plugs when servicing the engine or propeller.

### **10-8 Engine Long term storage**

Wash the engine exterior and flush the cooling water system thoroughly with fresh water.



Installation of "ear muffs"

Let the water drain completely. Wipe off any surface water with an oily rag. Drain all fuel from the fuel lines, fuel pump and carburetor by running the motor until it quits. Clean these parts. Keep in mind that if gasoline is kept in the fuel Induction system for a long time the fuels will, gum and varnish the internal parts. Remove the spark plugs and spray fogging oil through the spark plug holes. The oil will be fed into the crank case from the attached to the carburetors. Turn the engine over several times while feeding the oil into it and make sure it is evenly distributed. Apply grease to the propeller shaft. Change the gear oil in the gear case. Apply grease to all sliding parts, joints, nuts and bolts. Use a dry cloth to completely wipe off water and salt from the electrical components. Remove the fuel connector from the engine to the bladder. Place on Raider carrier cart.

### **10-9 Battery Long Term Storage**



## CAUTION

- Do not allow the battery to completely discharge, since it could be damaged by freezing.
- Battery is Lithium Iron and is fully sealed.
- Battery is 13.1 volts when fully charged
- Battery will recharge on Raider motor when running.
- Battery is secondary starting method; primary is pull start.
- If sealed battery appears damage – do not use.
- Place in dry place

**NEVER USE BATTERY CHARGER ON BATTERY.**

### 10-10 Electric Starter Motor

Coat the pinion gear and shaft of the electric starter motor with grease. Spray Corrosion Zero on all electrical parts and motor. Motor should be clean and dry before spraying.

## 11. CHECKING AFTER STRIKING UNDERWATER OBJECT

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Striking sea bottom or underwater object may severely damage the outboard. Do the following checks. (1) Looseness or damage of power unit installation bolts, gear case and extension case bolts propeller shaft housing bolts, upper and lower mount rubber bolts and nuts, power trim and tilt bolts, and mount rubber cap bolts. Tighten loose bolts and nuts, and replace damaged parts. Check for deformation and damage of mount rubber, tilt stopper, thrust rod, gears and clutch and propeller.

## 12. WHEN RAIDER BECOMES SUBMERGED

---

- Securely place on transom of RIB after RAMZ drop.
- Open dewatering valves by push the dewatering valve (located next to engine shut down-lanyard)
- **Pull primary (rope start) slowly – minimum of eight times (Insure lock of rope before trying to start Raider)**
- After pulling primary rope starter 8 times – keep dewatering valves open; push start button, it will clear out remaining water.
- When motor wants to start close valve.
- If water is present in fuel line; push dewatering in fully and hold; press fuel bulb three times and it will clear out old fuel.

If engine still does not start push primer in several times; this will put fuel directly into the Fuel Induction System.

## 13. COLD WEATHER OPERATION

---



When operating Raider 50 in cold weather at sub-zero temperatures the water in the cooling water pump may freeze and severely damage the pump, impeller, and associated parts. To avoid this, submerge the lower half of the engine into the water, or tilt the engine and operate the electric starter motor for 5 seconds with the stop switch lock plate taken away to allow the water to drain completely.

When using JP-5/JP-8 or other heavy fuels it is critical to use the heavy fuel additive. Heavy fuels are difficult to begin operation; once started the Raider operates as normal.

## 14. TROUBLESHOOTING

If you encounter a problem with the engine, check the list below and locate the problem you are experiencing. Then follow the suggested remedies.

Difficult to start engine	Engine runs erratically	Boat speed loss	Battery will not hold charge	Starter motor will not crank	Dewater System	Possible Causes
●						Empty fuel
●	●					Incorrect connection of fuel system
●	●					Air enters fuel line
●	●					Deformed or damaged fuel pipe
●						Closed air vent on fuel tank cap
●	●					Fuel filter/fuel pump is clogged with dust.
●						Use of improper
●						Incomplete forced fuel feeding by primer bulb
●	●					Poor connection in compression system
●	●					Use of non-specified spark plugs
●	●					Dirt or carbon deposits on spark plugs
●	●					No sparking or poor sparking (Failure in component of ignition system)
	●					Insufficient cooling water flow
●						Lever Assembly Issue



Difficult to start engine	Engine runs erratically	Boat speed loss	Battery will not hold charge	Starter motor will not crank	Possible Causes
	●	●			Propeller cavitation
		●			Incorrect propeller selection
	●	●			Damaged or bent propeller
		●			Unbalanced loading. Overload
		●			Transom is too high/low.
		●			Bottom of the boat is stained or damaged.
●		●			Insufficient throttle aperture.
				●	Battery is charged insufficiently.
●			●	●	
				●	
●				●	Wrong positioning of shift lever at N (neutral) position.
●			●	●	
●					Lock plate is not inserted or poorly inserted into stop switch.
●			●	●	Wrong wiring, disconnection, poor connection.
●				●	Faulty operation of starter motor/starter solenoid
				●	

## 15. Emergency Tool Kit

Spark Plug Socket  
 Three (3) Spark Plugs  
 Pliers  
 Screwdriver  
 Socket for removal of pull starter  
 Pull Rope  
 Slit Pin

## 16. EPA Emissions Regulations

EPA (United States Environmental Protection Agency) has emission regulations and is controlling air pollution from new outboard motors. The Raider motor does not meet EPA regulations as it can burn heavy fuels (JP-5/8). As a result Raider has received an exemption under the National Security Act to operate these engines in the United States. A sticker has been applied to the side of the Raider indicating authorization of EPA. The Raider motor is only sold to the military.