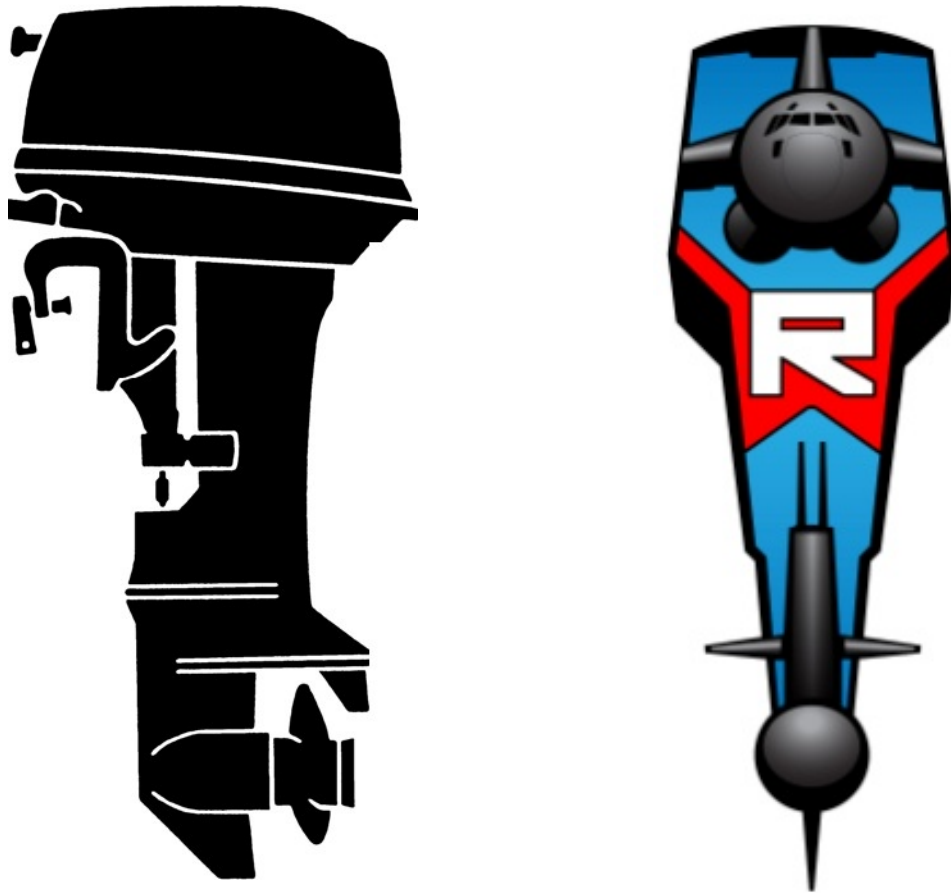


RAIDER OUTBOARD MOTOR

Generation II

Owner's Manual - 40 Horsepower



Two stroke - Multi-Fuel - Submersible – Air Drop

Outboard Motor

Owner's Manual R40-ES-001-16-1

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 2017 representing the latest revision.

Raider Outboards are not sold to the public.

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1. Your Raider 40 Outboard Motor

a. Limited Warranty

This Raider product is fully guaranteed against defective materials and workmanship for the period on one year from date on DD-250 form. The limited warranty will not apply to normal wear and tear of parts, adjustments, tune-ups, or to any damage caused, but not limited to careless use.

Raider has taken every advantage using non-corrosive materials, high quality and high reliable parts. This multi-fuel, submersible outboard has been built for ruggedness and durability to meet war fighter's needs. After missions the motor should be washed with soap and water and let dry. Fuel should be run out prior to storage.

The limited warranty does not cover maintenance items. The following items are a few examples not covered by the limited warranty: spark plugs, Anode, Propeller, Fuel filter, Oil filter, Starter rope, Shear-pin, Rubber goods, water pump impeller, oil seal, vinyl tubing, and battery.

The limited warranty will not cover the boat the product is mounted on, trailer, equipment, or accessories associated with the product.

b. Serial Number

The serial number is located on the engine block-near heads.

c. Safety/Danger/Warnings/Cautions

Before operating the Raider outboard motor, be sure to thoroughly read and understand this Users manual and follow all of the instructions shown. Of particular importance information preceded by the words or symbols draw attention to safety issues. This manual contains information that can help prevent personal injury and damage to equipment. Understand the following symbols before proceeding:

All motors with electric start will start in gear. User has responsibility to insure Raider is in neutral before starting. Operator assumes responsibility for this operation.

Battery

Battery must be safely maintained and cannot – under any circumstances- Take a “fast” charge. A battery “maintainer” is provided and should be used when motor is being stored. The battery will recharge upon running of the Raider Outboard. Primary method of start – Pull Starter.

! Safety Warning: When replacement parts are required, use genuine Raider parts, or parts with equivalent characteristics, including type, strength, and material.

* All photographs and illustrations used in this manual may not depict actual models or equipment, but are intended as representative views for reference only.

d. Features of Raider Outboard

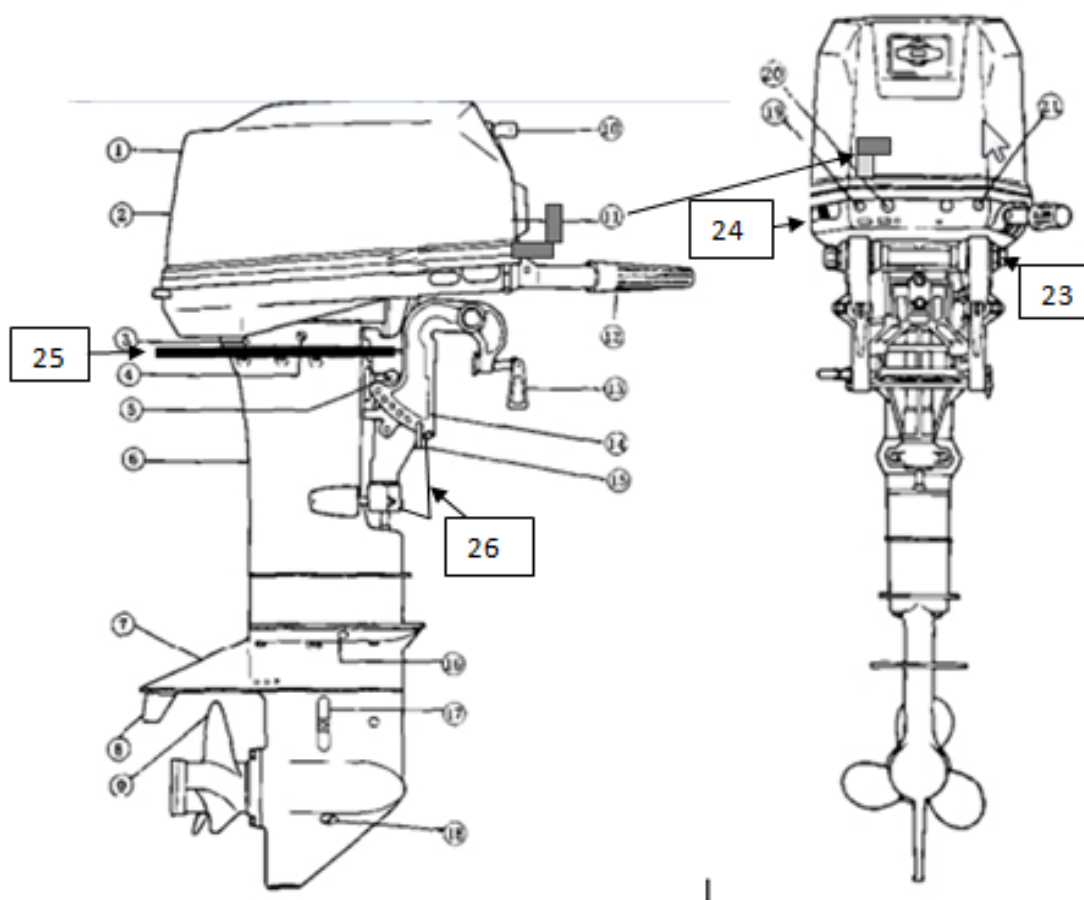
- Electric start with battery located under cowling
- Grab handle for easy movement of motor on land and in water
- Transom plates for easy installation onto RIB
- Dewatering lever to dewater both pistons/heads and fuel
- Lightweight – under 150 lbs.

e. Specification Table

ITEM	RAIDER 40 HP
Overall length	38.18 inches (919 mm)
Overall width	13 inches (330.2 mm)
Overall height	49 inches (1245 mm) (Long Shaft)
Weight	148 lbs. (67kg)
Transom length	20.9 in. (530 mm)
Engine type	2-Stroke Throttle Body
Piston Displacement	493 cc
Bore and Stroke	2.76 x 2.52 (70 mm x 64 mm)
Number of cylinders	2
W.O.T.	5200 – 5800 rpm
Exhaust System	Through Hub
Cooling System	Water cooling (Rotary rubber impeller)
Ignition System	C.D. ignition
Starting System	Pull Start; rope backup (electric start with battery under cowl)
Intake System	Reed Valve
Scavenging system	5-port loop Charge
Military Certified Air Droppable	Yes
Lubrication system	Fuels pre-mixed with additives
Cooling system	Water-cooling
Water temperature control	Thermostat (with pressure relief valve)
Ignition System	Inductive
Gear Reduction	13 : 25
Gear Ratio	1.85
Firing Order	1-2
Spark Plug	NBE1H/10 (stainless steel)
Alternator	12V 280W (Maximum) (13.6 volts regulated)
Battery	Lithium Iron – fully sealed 12 VDC
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	API GL5, SAE#80 to #90 500 ml (16.89 fl. Oz.) (Synthetic recommended)
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

f. Raider Engine Overview

- | | | |
|------------------------------------|-------------------------|------------------------|
| 1-Rear cut out cowling for lifting | 2-Motor Cover (Cowling) | 3-Cooling Water Check |
| 4-Water Plug | 5-Tilt Stopper | 6-Drive Shaft Housing |
| 7-Anti-Cavitation Plate | 8-Trim Tab | 9-Propeller |
| 10-Pull Start Handle | 11-Shift Lever | 12-Throttle Grip |
| 13-Clamp Screw Handles | 14-Stern Bracket | 15-Thrust Rod |
| 16-Oil Plug – Higher | 17-Water Strainer | 18-Retainer to Transom |
| 19-Oil Plug – Lower | 20-Stop Switch | 21-Primer Plunger |
| 22-Electric Start Button | 23-Fuel Connection | 24-Dewatering Lever |
| 25-Grab Handle | 26-Tramson Slide Plate | |

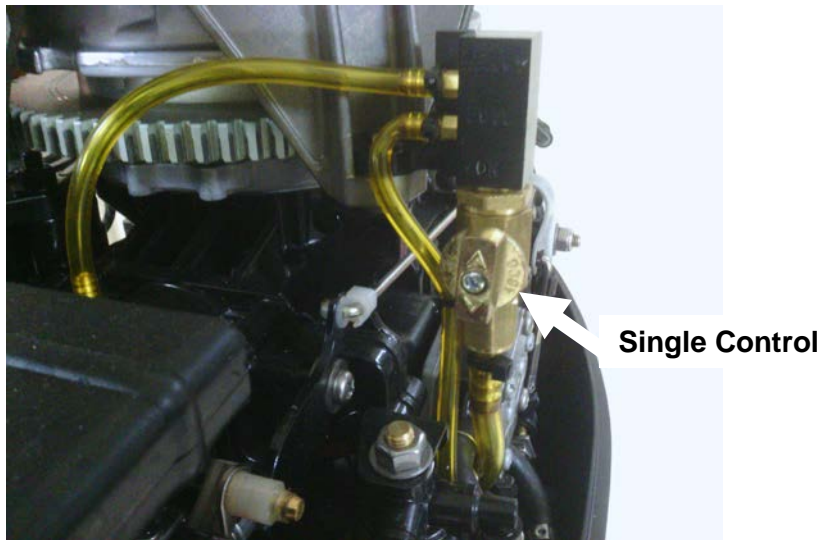


To operate: Mix 50:1 Two-Stroke Synthetic Oil to gasoline. Hook up fuel lines. Squeeze fuel bulb to get fuel into motor. Insure battery is connected. Press start button – or pull start. Dewatering: slide lever located on left side of motor to rear of engine; pull 8 times slowly; press start button; close dewatering.

g. Multi-fuel Capable

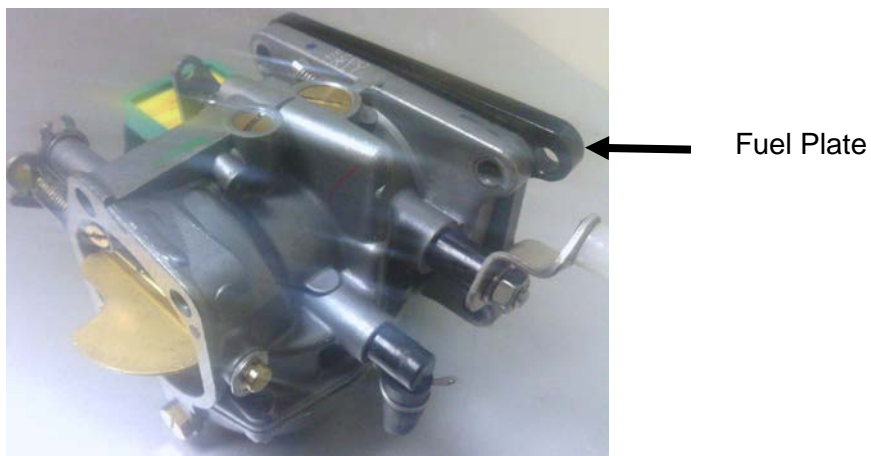
Gasoline to Heavy Fuels – Open valve – Turn Right (Marked)

To go from gasoline to a heavy fuel simply turn valve to the right. For multi-fuel operation it is essential that Raider additive is included with the heavy fuels. Heavy fuels are kerosene; diesel; AvGas; JP fuels.



Multi-fuel Fuel Operation

The carburetor is integrated with a fuel plate located behind the carburetor just before the intake. The heavy fuel breaks down to a fine mist prior to entering the combustion chamber. The fuel consumption is significantly reduced from Generation I.



2. Raider Installation

a. Handling Engine

! The Raider was designed to be carried by a grab rail unit. This allows the outboard to be moved through submarine hatches and small areas. The grab rail will protect engine from getting damaged. Be aware of the sharp propeller when lifting through submarine hatches.

To move engine around shop area, use the Raider outboard stand, supplied with the delivered engines, that supports engine by transom mount.

WARNING

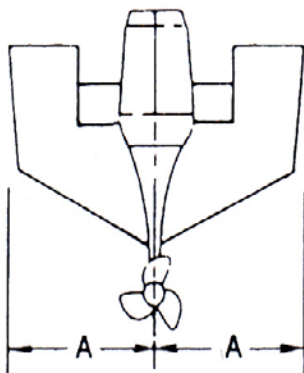
Most Rubber Inflatable Boats are rated and certified in terms of their maximum horsepower on the transom. This information is shown on the boat's certification plate. Do not equip your RIB with an outboard that exceeds this limit.

Do not operate the engine until it has been securely mounted on the boat in accordance with the instructions. Attach safety wire to boat to avoid losing the motor overboard.

b. Installation of single Engine -Raider Transom Plate

When using the Raider Transom Plate simply place the motor anywhere on the transom plate and slide to center of RIB. The Raider outboard will center exactly to centerline of RIB. Tighten clamp screws. Safety has been designed in for clamps that might get loose during mission. Tighten clamp screws by hand DO NOT use tools to tighten clamp screws. Retighten engine clamps after 15 minutes of operation.

The Raider Transom mount can be adjusted vertically for optimum performance. This should be done prior to any mission to determine maximum performance.



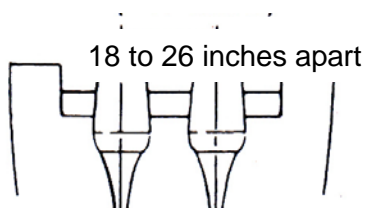
Raider 40 single engine transom plate
Fits Wing and Zodiac RIB's.

c. Installation of Twin Engines - Raider Twin engine transom plate

Raider has designed a twin or dual engine transom plate that makes installation of two engines simple. There are two “slots”; one for engine 1 and one for engine 2. After installing engines in each slot, tighten clamps. Install hardware/cable to connect each motor to have “single motor control” over both engines.

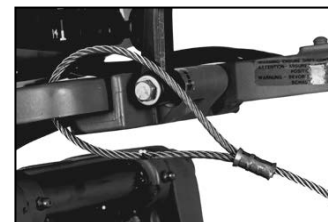


If the Raider transom plate is not available when installing two outboard engines, be sure to keep an interval of 470 to 600 mm (18 to 26 inches) between the two engines. Both outboard engines should be at the exact center of the stern and mount it against the Rubber Inflatable Boat pad or plate. It is important to keep it centered as much as possible, after centering on transom tighten clamp screws of both motors by hand. The attachment of a single steering unit for dual mount assembly can be quickly placed on dual motors for control and a cable inserted from one engine to the opposite for single power to both outboards.

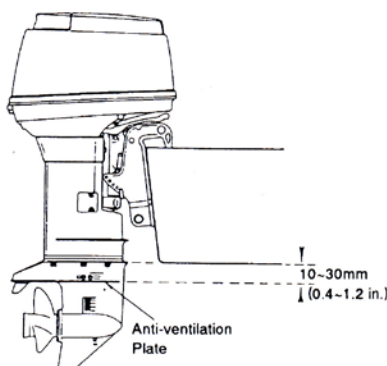


d. Installation of Safety Wire

To prevent loss of engine (engines) overboard, attach engine retention cable that is attached to the Raider outboard to the boat.



e. Transom Height



CAUTION
Overheating may occur if Anti-ventilation plate is at higher level than the boat as a lack of cooling water.

The Raider has been designed to have the anti-ventilation plate at a level 10 to 30 mm (0.4 to 1.2 inches) below the bottom of the boat as shown above. Be sure the anti-

ventilation plate of the Raider outboard is below the water surface when running with wide open throttle.

NOTE: Optimum performance might be gained by vertical movement of Raider transom plate.

f. Propeller

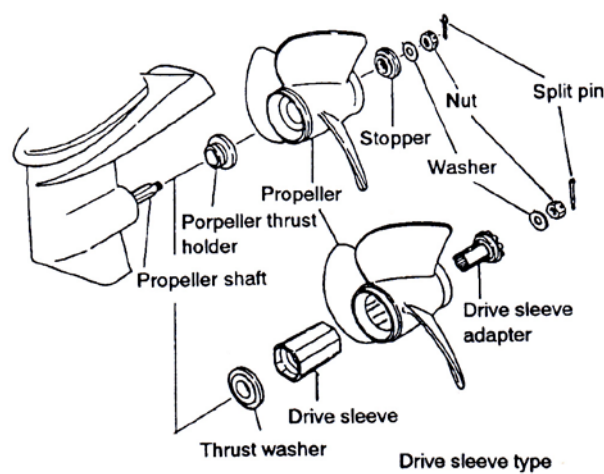
A propeller must be selected so that the engine rpm measured at wide open throttle while cruising is within the maximum operating range. In the Raider that range is between 5200 and 5800 rpm.

To ensure optimum performance, the propeller should match the boat type and its load.

Replacing the propeller.

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

1. Pull out the split pin and remove the propeller nut and washer,
2. Remove the propeller by pulling towards 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.



Battery

The Raider 40 has electric start with built in battery under the cowling. The electric start is a secondary method of starting the outboard. The primary start is the manual pull start.



The battery is lithium iron and has been sealed and totally waterproof. Prior to mission the Battery should be placed on the “maintainer” to insure a charged battery. If the battery is not charged start the motor via pull start and the battery will automatically charge when Raider 40 Gen II is running.

The battery should never be placed on a “fast” charger. When battery not in use – UNPLUG. An exterior plug is available for RAMZ package allowing the maintainer to charge while in a RAMZ configuration.

Primer

The primer is similar to a choke except it forces fuel to the carburetor.



Primer: This is used to push fuel into the Carburetor

3. Raider Running

a. Fuels (Multi-fuel)

The Raider can run on jet fuels (JP-5/8), diesel fuel, kerosene, gasoline or gasohol/ethanol. Simply turn the valve (G) above. If you switch from one fuel to another fuel the Raider engine will operate during transition. When using the twin engine configuration it is recommended similar fuels are used. Additives must be added to fuel prior to missions that use JP-5/8 heavy fuels.

b. Raider Break in

10 Hours. The Raider has provided the break in at the factory. The most critical time in the life of the Raider 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. The procedures we follow are shown below.

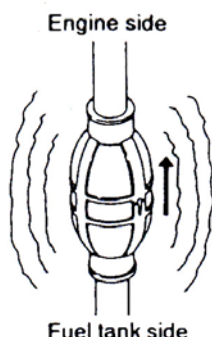
Time	Break-in method	Running Conditions
0 min –	Trolling or idling speed	Cruising at minimum speed
10 min –	Throttle opening < 1/2 about 3,000 rpm	—
1 hr –	Throttle opening < 3/4 about 4,000 rpm	Run with full throttle for 1min – 10 min.
2 hrs –	Throttle opening 3/4 about 4,000 rpm	Run with full throttle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

c. Normal Starting Procedure

Move the tilt/run lever to RUN position. Place engine in normal operating position. Connect the fuel line connector from the tank to the engine's fuel connector. Turn fuel line connector onto fuel tank connector. = if the fuel tank has a manual vent, open it. If you don't, the engine will eventually die from fuel starvation. Squeeze fuel line primer bulb until firm.



Raider Fuel valve



! Attach the clip and lanyard assembly to emergency stop switch. Clip must be installed to start engine.

Attach lanyard to secure place on your clothing. An extra emergency restart clip is provided and stored in the cowling parts tool kit in cowling. Turn twist grip to **start position**.


= Move the twist grip from the start position. Move shift lever to the NEUTRAL position. The engine will **ONLY** start in NEUTRAL for manual pull start. **ENGINE WILL START IN ANY POSITION WITH BATTERY.**

Pull starter handle slowly until starter engages, **then pull forcibly for a full rope pull** (short or slow pulls will not provide enough current to the ECU to start). Maintain fuel pressure by squeezing primer bulb until engine is running. Raider comes with an electric start option.

d. After Raider Starts/Warm Up

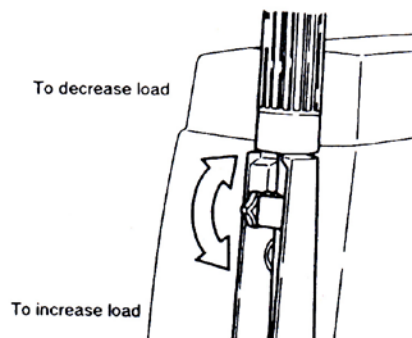
α Check the water pump is working by looking for a steady stream of water indicates the water pump is working.

= **IF** the water pump indicator **is not discharging** a steady stream of water, **STOP** the engine when it is safe.

⚠ CAUTION	
<p>If cooling water is not discharged and engine operation is continued, the engine will overheat and damage occur.</p>	 <p>Stream of water out back of Raider</p>

e. Throttle Friction

β To increase throttle friction, turn the throttle friction screw clockwise. To decrease friction, turn the throttle friction screw counter-clockwise. DO NOT over tighten.



f. Shifting

= To avoid gear case damage:

χ **DO NOT** attempt to shift engine from NEUTRAL α to FORWARD β or REVERSE χ when the engine is NOT running. Clutch dogs can align lug-on-lug and result in shift linkage and lower gear case parts damage. When shifting, always wait until boat has slowed and engine is at idle speed.

Shift to FORWARD

After engine is running smoothly, turn throttle control to SHIFT position or slower. Move shift lever to FORWARD/down with a firm, quick motion. **DO NOT shift engine with throttle control advanced beyond the shift position.**

- **Increase Speed:** Turn throttle control counterclockwise toward FAST (toward you if seated in boat next to engine).
- **Decrease Speed:** Turn throttle control clockwise toward SLOW (away from you if seated in boat next to engine).

Shift to NEUTRAL

Turn throttle control clockwise to the SHIFT position or slower. Move the shift lever to NEUTRAL α with a firm, quick motion.

= When shifting, always wait until boat has slowed and engine is at idle speed.

Shift to REVERSE

Turn throttle control clockwise to the SHIFT position or slower. Move shift lever to REVERSE \square with a firm, quick motion.

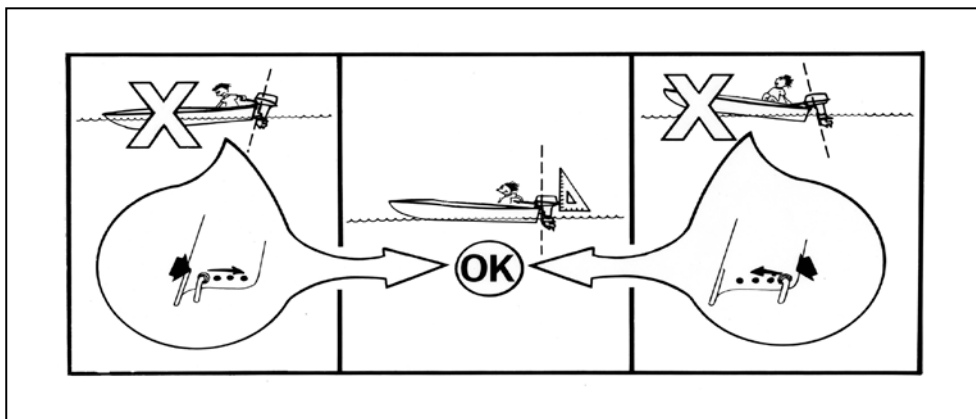
= When in REVERSE, operate with additional care as the engine has no impact protection if it hits an underwater obstruction.

!Do not operate engine in REVERSE with the tilt/run lever in TILT. Engine may tilt out of the water, resulting in loss of control.

g. Stopping Raider

1. Slow engine to idle speed.
2. Move shift lever to NEUTRAL position.
3. Press and hold stop button until the engine stops running.

h. Trim Angle



Engine should be perpendicular to water when boat is underway. This adjustment can only be determined by water testing the boat. Set angle adjustment for NORMAL boat load.

Move angle adjusting stop rod as shown in picture.

i. Trailering

Place the engine in the normal vertical position. For additional road clearance, move angle adjusting rod to an outer stern bracket position. Refer to **Raider Trim Angle**.

= **DO NOT** use the tilt support as a Trailering bracket. The engine should always be resting on the angle adjusting stop rod when under full power or when trailering.

j. Tilting

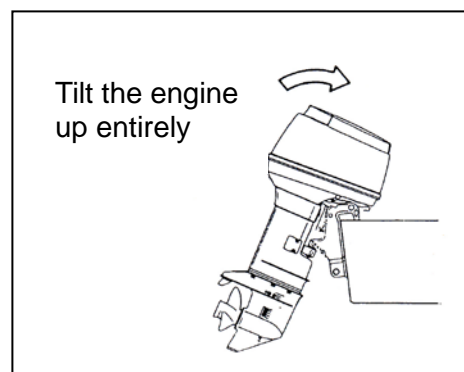
= DO NOT push down on tiller handle to tilt engine.

Raise Raider

1. Move tilt/run lever to the TILT position.
2. Use tilt grip on engine cover to raise engine. When desired angle is reached, move lever to lock position.

! Lower Raider

1. Move tilt/run lever to RUN position. Engine will lower to set run position.

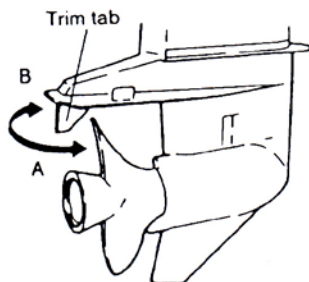


k. Trim Tab Adjustment

2. Trim Tab Adjustment

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

- If the RIB veers right, direct the trim tab towards A.
- If the RIB veers left, direct the trim tab towards B.



Notes:

1. The trim tab also acts as an anode to prevent electrolytic corrosion. Therefore 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 wear down over time.

l. Shallow Water Drive

The engines shallow water tilt is controlled by a single lever on the left hand side of the Raider Outboard.

Disengage Shallow Water Drive

1. Move red tilt/run lever to RUN position.

m. Shallow Water Operation

= **DO NOT** operate engine with gear case dragging on sea bottom. This can result in propeller or water pump damage.

1. Place engine in shallow water drive position. Refer to **Shallow Water Drive**.
 - a. **!DO NOT operate engine in REVERSE with the tilt/run lever in the TILT position. Engine can tilt up resulting in loss of control.**
2. Run at SLOW SPEEDS ONLY. Check water pump indicator often. (Note; Shallow water drive setting can be adjusted for different boat load conditions.)
3. Before operating in deep water, be sure to lower engine and move tilt/run lever to the RUN position.

! Engine does not have impact protection when operated in the shallow water drive position or when the tilt/run lever is in the TILT position. Engine will tilt up suddenly if it hits an underwater obstruction.

n. Impact Damage

Your boat and engine can be seriously damaged by a collision at high or low speeds, while trailering, or in the water.

If you hit an object, stop immediately and examine the engine for loose mounting hardware or clamp screws. Inspect for damage to stern and swivel brackets, and components in the area of impact. Also, examine the boat for damage. Tighten any loose hardware. If collision occurred in the water, proceed slowly to shore. Before operating again, inspect all components.

! Failure to inspect for damage can result in sudden, unexpected component failure and loss of boat control. Uncorrected damage can adversely affect the boat and engine's ability to resist subsequent collisions.

o. Special Operating Conditions

Raider will be used primarily in salt water. It is important to wash down outboard as soon as possible after missions with fresh water. It is important to run out fuel. During the final burn out of fuel spray Corrosion Zero mist into throttle body. After drying spray Corrosion Zero into starter motor and fine mist over motor.

Sea Water

Fresh water flushing is recommended after use in salt, polluted, or brackish water to prevent deposits from clogging the cooling passages.

Check gear case anodes for deterioration, and replace if necessary.

During long periods of non-use, tilt engine so that the gear case is out of the water, unless the temperature is below 32° F (0° C). When removing engine from water, allow cooling system to drain completely by placing engine in upright position.

Weedy Water

Weeds can block the water intakes and cause engine to overheat. Weeds on the propeller will cause engine to vibrate.

Run at slow speeds and reverse engine frequently to clear weeds from propeller. Check water pump indicator often. Remove weeds from propeller and water intakes before operating in clear water.

Freezing Weather

To avoid engine damage, keep the gear case submerged in the water at all times. Before operating in freezing temperatures, check gear case lubricant. If leakage is found, gear case seals will need service.

When removing engine from water, keep the engine in an upright position until the cooling system is completely drained.

= Water that leaks into gear case or is left in the cooling system can freeze when the engine is removed from the water. This can cause serious damage.

p. Overheating

= **DO NOT** operate engine out of water even momentarily.
The engine's Water Temperature sensor is NOT a warning device.

The Raider does not have an overheat warning. The Raider will not initiate a warning to prevent powerhead damage. In the event of an overheat situation called **"vapor lock"** slide dewatering valve to rear which initiates dewatering of fuel; then squeeze new fuel into engine, close dewatering valve and start.

If you suspect the engine is overheating or has overheated, STOP the engine **only when it is safe**.

When operating the engine, the water intakes must be completely submerged. **Make sure the water intake screens are not installed upside down** (ramps must be forward). If upside down, the engine will overheat. Observe proper transom height and engine trim angle.

When engine is running the water pump indicator on the starboard side of the lower motor cover must be discharging a steady stream of water. Check the indicator often, particularly when operating in weeds, mud, or debris laden water, or at an extreme engine angle.

IF the water pump indicator stops or becomes intermittent, reduce engine speed to an idle when it is safe. Shift engine into REVERSE and operate at a slow speed for about 10 seconds. This might clear debris blocking the water intake screens.

IF the water pump indicator is still **not discharging** a steady stream of water, **SHUT OFF** the engine when it is safe. Clean the water intake screens and water pump indicator. Restart the engine and run at idle.

IF the water pump indicator still does not discharge a steady stream of water, **SHUT OFF** the engine when it is safe. **DO NOT** attempt to operate engine.

IF a steady stream of water is **visible** from the water pump indicator, **check to see if the restrictor is installed in the end of the water hose**. Without it, the engine and ECU will overheat. Continue to run engine at SLOW SPEED ONLY when it is safe until it returns to normal operating temperature.

= If the engine overheats; the cylinder and exhaust cover screws must be re-torqued.

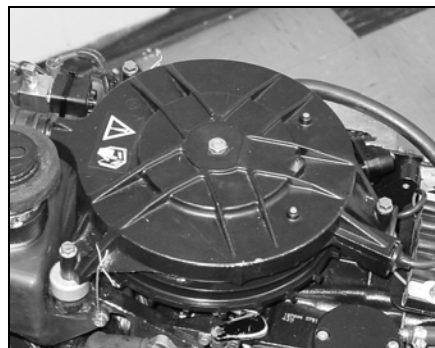
q. Emergency Starting

! Make sure the shift lever is at NEUTRAL to prevent sudden boat movement when the engine starts.

! The engine cover is a machinery guard. Prevent injury by keeping hands, clothing, and hair clear of all moving parts. **DO NOT** use your hands to turn the flywheel; use recoil starter only.

! Prevent electric shock by keeping clear of the ignition coil and spark plug leads when the engine is being started or is running. Shock can cause serious personal injury under certain conditions.

Unlatch, then lift and remove engine cover.



Reach inside the cowling cover. On one side you will find a rope with handle; on the other side of the cowling you will find a tool that allows the removal of the pull starter. Use the special service tool to remove the three screws retaining the starter housing. Lift the pull starter assembly from engine.

Take stored starter rope and wind on the engine flywheel with the knot end in the groove.

If starter cord is missing or gets broken, it might not be long enough to use as an emergency starter cord. If in you need an additional rope cut cord from starter assembly.

Tie a knot to one end of cord. Place knot in the notch on top of flywheel. Wrap cord around flywheel clockwise as shown.

Follow **Normal Starting Procedure**.

In your emergency kit you will find tools that will be required to get engine running. If pull start rope breaks; electric start does not function; remove three bolts on pull start unit and remove unit. You will see flywheel (shown). Tie knot in rope; insert in slot; Wrap rope around unit and pull until engine starts.



r. Dewatering System

Pushing or sliding lever to back of motor opens the dewatering valves, to close valves return Lever to front of Raider outboard.



Slide Lever to rear –opens valves



Lever moves Arm



Arm opens valves

s. Pre-Submersion Procedure

To prevent water intrusion on electronics during submersion:

1. Make sure the inside of all electrical connectors are thoroughly connected.
2. Insure the de-watering valves lever is closed
3. Insure battery is fully charged and re-connected correctly.
4. Insure fuel bladder if fully filled – with 50:1 oil mix and cap tightened.
5. Connect fuel line and pump primer bulb until firm resistance is felt to fill fuel system.

6. If JP-5/8 or heavy fuel insure fuel additive is placed in bladder along with 50:1 mix.
7. Insure the four procedures for heavy fuel have been moved to “green”.

t. Dewatering Procedure

1. Make sure that the shift lever is in the NEUTRAL position. Open dewatering valve on side of Raider
2. Hook up fuel line
3. Open dewatering valves by sliding dewatering lever to back of Raider
4. Pulling engine rope slowly 8-10 times
5. Raider is in standard running position
6. Push dewatering valve back and hold to push new fuel
7. Keep dewatering valve open
8. Push start button; it will displace remaining water in cylinder
9. When engine tries to start - close dewatering valve
10. If no battery available pull until remaining water is displaced using pull starter
11. Start engine – throttle in ½ position

Note: *Spark plugs should not need changing after being submersed.*

= You **MUST** run the engine after performing the **Dewater Procedure** to dissipate internal moisture. In other than mission situations, run engine under normal operating conditions for 15 to 40 minutes.

During mission situations, operate as conditions require.

Emergency Dewatering Procedure – Open dewatering lever; press electric start three seconds to clear water; press starter again and close valve. (Will dewater less than 1 minute).

u. Post Submersion Procedure

After your mission, the Raider must be prepared to be returned to nonuse or prepared for your next mission.

If the RAIDER is re-submersed after your mission and it cannot be serviced, keep it submersed to avoid prolonged exposure to the atmosphere, until it can be serviced. If the Raider is brought on deck and it can't be operated or serviced, keep it submerge in fresh water, but get it prepared for your next mission as soon as possible.

If the RAIDER can be operated on deck, dewater the engine following the procedures in **De-water Procedure**; operate the engine for approximately five minutes at full operating temperature with fresh water. Remove the upper cover to allow the powerhead and other components to air dry. Whenever possible after use or submersion in sea water, wash entire engine with fresh water to remove salt deposits and wipe down with a dry cloth. Spray the entire powerhead with an Anti-Corrosion Spray- recommended – Corrosion Zero or equivalent. Follow this procedure to prepare the Raider for your next mission.

Place special cover (removes moisture) over engine after drying out – if available.

4. General Maintenance

! General Safety Warnings

When replacement parts are required, use genuine Raider parts or parts with equivalent characteristics including type, strength, and material. Failure to do so may result in product malfunction and possible injury to the operator and/or passengers.

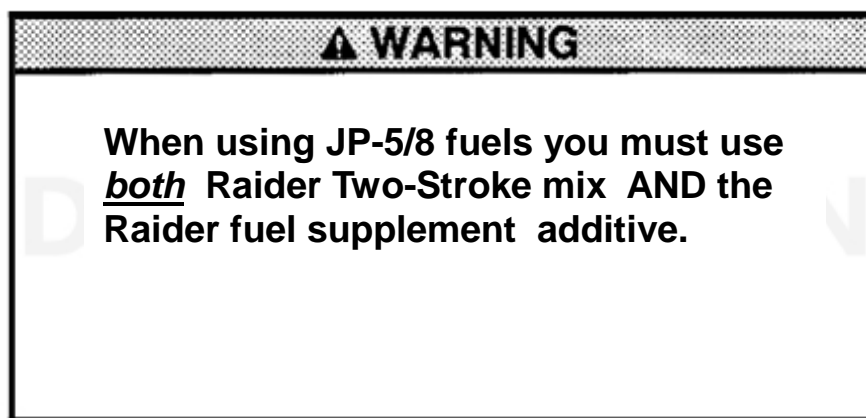
To prevent possible eye injury, always wear SAFETY GLASSES while servicing the unit.

Always read and follow safety related precautions found on containers of hazardous substances like parts cleaners, primers, sealants, and sealant remover.

The engine cover is a machinery guard. Use caution when conducting tests on running engines. Do not wear jewelry or loose clothing. Keep hair, hands, and clothing away from rotating flywheel.

Replace any locking fastener (locknut or patch screw) if it's locking feature becomes weak. Definite resistance to tightening must be felt or locking fastener is not suitable for continued use. Replace only with authorized replacement part or equivalent.

a. Fuel/Oil Requirements



Mix Fuel to Oil ratio: 50 - 1

Oil Requirements: Recommend - Raider Oil additive.

Above 30° F Biodegradable Outboard Oil

Below 30° F 100% Fully Synthetic 2-Cycle Engine

Recommended Fuel: Gasoline,
Jet A, - Heavy Fuels JP5 or JP8, kerosene, diesel #2

Additive required to reduce smoke/emissions and carbon build up in Raider. Use in addition to Raider 2-Stroke oil.

b. Removing and Carrying the Raider

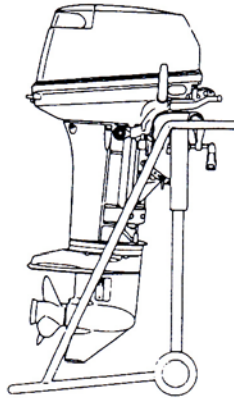
(1) Removing the motor

- ① Stop the engine.
- ② Disconnect the fuel connector
- ③ Remove the motor from the hull and completely drain the water from the gear case.

(2) Carrying the motor

Be sure to keep the engine vertical whenever you carry the motor.

Snap out handles are located on each side of the Raider for ease of movement. These handles can remain extended to lay motor on its side.



Movement and storage of Raider should be done on stand. The Raider stand was developed for durability and excellent height to work on outboard. The Raider cart also provides protection for the outboard as the cart extends over key areas of the outboard.



b. Emergency Kit and spare parts

The emergency kit is provided with the following items:

- Emergency Bag
- Screwdriver (Phillips & Flat)
- Emergency pull rope
- Spark plug socket
- Recoil start sockets (10 & 13 mm)
- Pull starter removal socket
- 2- Spark plugs
- 1-Cotter Key (propeller)
- Crescent wrench

Note: Dewatering – spark plug rarely needs to be replaced due to type of spark plug.

d. Corrosion Protection

Whenever possible after use in sea water or submersion in sea water, wash entire engine with fresh water to remove salt deposits and wipe down with a dry cloth. Spray entire powerhead with a liberal coat of Anti-Corrosion Spray (Corrosion Zero) penetrate or equivalent.

Though not specifically mentioned as a service procedure, Anti-Corrosion Spray or equivalent should be applied after any service repairs under the engine cover and repeated at regular intervals to protect powerhead components. Anti-Corrosion Spray leaves a thin, non-messy, transparent film that actually lifts water and moisture from metal surfaces. It protects equipment and tools that are left outdoors, even in humid coastal areas. Anti-Corrosion Spray dries out ignition systems to start wet engines and stops moisture-induced short circuits in electrical systems.

e. Optional Accessories

- 1) Aluminum engine stand.
- 2) Raider Transom Plates for center line placement; clamping safety
- 3) A safety jet drive can be added to replace propeller for training and “brown” water applications. Simply remove propeller and install Safety Jet.
- 4) Stainless Steel propeller can be provided rather than standard aluminum
- 5) Dual control kit to operate two outboards as one.
- 6) Salt-away – rinse engine after salt water usage
- 7) Motor Cover that keeps moisture away from engine when stored

f. Trouble shooting

Difficult to start engine	Engine runs erratically	Boat speed loss				Possible Causes
●						Empty fuel tank
●	●					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 Fuel – or no fuel additive
●						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

g. Storage

Use the following procedure to properly prepare the engine for extended periods of nonuse. These steps are intended to protect the engine during storage and simplify the out of storage servicing procedure.

= Use a flushing attachment to prevent engine or water pump damage if you operate the engine on a trailer or dolly.

! When using a flushing attachment, always remove engine's propeller before starting engine to prevent accidental contact with moving propeller.

1. Follow the directions on a can of Storage Fogging Oil and spray oil through the throttle plate.
2. Stop engine and remove all spark plugs. Spray Storage Fogging Oil into the spark plug holes.
3. Pull starter to distribute the fogging oil throughout the cylinders. Install and torque the spark plugs.

! Leave spark plug leads disconnected to prevent accidental starting during storage.

4. If the engine is removed from the boat, examine all hardware you loosened or removed. Replace damaged or missing parts with genuine Raider parts or equivalent. These fasteners are made of special materials to resist weakening and rusting. **Do not substitute these fasteners with nuts and bolts which look the same. Using the wrong nuts and bolts may result in sudden, unexpected loss of engine control.**

5. **Inspect the engine's steering, throttle, de-watering and shift systems for damage due to corrosion, aging, lack of maintenance, or abuse. Follow the maintenance and lubrication recommendations when servicing these systems.**
6. Replace the engine's fuel filter.
7. Clean and inspect oil reservoir. Fill the oil tank with recommended oil to reduce or prevent condensation from forming in the tank during storage. Tank should be full prior to submersion.
8. Remove propeller and check for damage. A slightly bent propeller blade can hardly be noticed but will affect the performance of the engine. Clean the propeller shaft and lubricate with grease.
9. Drain and refill the gear case. Lubricate the engine. See **Gear case Lubrication** in this section.
10. Check the engine carefully. Make sure screws and nuts are tight. Replace damaged or worn parts.
11. Make sure electrical and fuel system fasteners and clamps are tight and in good condition. **Failure to do so may cause electrical sparks and fuel leakage under the engine cover. Fire and explosion could occur.**
12. Replace engine cover. Use touch-up paint where needed.
13. Coat all outside painted surfaces of engine with automotive wax.
14. The engine should typically stored in a normal (vertical) position on the boat or on an adequate engine stand. The engine is capable of being stored in a horizontal position For extended periods of time in a RAMZ or T-Duck configuration.

h. Out of Storage Service

1. Check gear case lubrication. If leakage is evident, gear case seals may need attention. See **Gear case Lubrication** in this section.
2. Apply a light coating of Electrical Grease to the ribbed portion of the spark plug ceramics and the opening of the spark plug covers. Connect spark plug leads. **Make sure spark plug boots are not cracked or torn.**
3. When engine is reattached to the boat's transom, **make sure the mounting brackets, clamps, and hardware are structurally sound and in proper working condition.** If mounting components use the wrong fasteners, are carelessly installed, or are defective, sudden unexpected loss of engine and boat control may result.
4. Check for evidence of water in the oil tank. Do not operate the engine if water is present in the oil tank. Serious powerhead damage can occur.
5. If the fuel hose has been disconnected, reinstall it.
6. Insure battery is unhooked and plugged into charger.

i. After Submersion Maintenance

After submersion or after a mission, the Raider must be prepared to be returned to nonuse or prepared for your next mission.

If the Raider is re-submersed after your mission and it cannot be serviced, keep it submersed until it can be serviced to avoid prolonged exposure to the atmosphere. If the Raider is brought on deck and it can't be operated or serviced, keep it submerge in fresh water, but get it prepared for your next mission as soon as possible.

If the Raider can be operated on deck. Follow these procedures to prepare the Raider for your next mission.

- Dewater the engine following the procedures in **Dewater Procedure**.
- Operate the engine for approximately five minutes at full operating temperature with fresh water.
- Whenever possible after use or submersion in sea water, wash entire engine and powerhead with fresh water to remove salt deposits, especially under the flywheel where the accumulation of deposits will build up. Wipe down with a dry cloth.
- Spray the entire powerhead with a liberal coat of Anti-Corrosion Spray penetrant/lubricant or equivalent. Spray 6 & 1 Penetrating Lubricant or equivalent under the flywheel.
- Leave the upper cover off, when possible to allow the powerhead and other components to air dry.
- Unplug or remove battery – place on battery tender to maintain charge

Serial Numbers on Raider located on top of block.

Raider 40 TROUBLESHOOTING

High Speed Miss:

1. Check fuel lines/tank for restrictions, leaks or loose connections.
2. Check fuel pump diaphragms for holes, allowing extra fuel at high RPM's.
3. Verify correct spark plugs are installed and are not fouled.
4. Disconnect the stop switch and retest. If the engine performs properly, the stop circuit has a fault.

Caution: Never remove spark plug; ground on engine and fire engine. If ground is not fully completed damage can be done to the CDI. Use a spark tester tool to see if spark is present.

Raider 40

NO FIRE ON EITHER CYLINDER:

1. Disconnect the Black and Brown stop wires and retest. If you now have spark, the stop circuit has a fault.
2. Test the stator (exciter) and trigger (pulsar) stator coils as follows:

Red Lead	Black Lead	Resistance	DVA
Red	Black	200-300	110 V min
Blue	Black	30-46	3 V min

*some have 2 wire exciters, but read similar

No Fire on One Cylinder:

If only one spark plug has fire, the internal ignition coil is defective. The power pack will need to be replaced.

Safety Jet (P/N SJ-R40-01)

The safety jet can be used in place of the propeller. It turns the Raider Gen II to a jet Pump and useful for training or brown water missions. The installation time is approximately ten minutes and does not require any special tools. The Safety Jet comes in a Kit. To return to the propeller will also take about 10 minutes.

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Cage Code 595K1

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