

## 11.0 LIMITED WARRANTY STATEMENT

Your new X-Change-R® Oil Change System is warranted by Advanced Marine Technologies, Inc., Attention: Customer Service. This Warranty is extended to original purchasers only. This Warranty gives you specific legal rights, and you may also have other rights which may vary from State to State.

The oil change system (including any and only parts supplied by Advanced Marine Technologies, Inc.) is warranted to be free of defects in material or workmanship under normal use and service. The warranty period shall commence upon the installation of the system by the original purchaser through authorized dealers, or if installed in a new vessel, the date of the initial launching, and shall end twelve (12) months thereafter. This limited warranty does not cover contingent or consequential liabilities of any kind. Our entire liability is limited to replacement or repair in the manner set forth below.

NEITHER THIS WRITTEN WARRANTY NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, SHALL EXTEND BEYOND THE WARRANTY PERIOD. (Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitations of incidental or consequential damages, so the above limitation may not apply to you).

No system will be accepted for return or replacement without prior authorization from Advanced Marine Technologies, Inc.. Upon such authorization, and in accordance with instructions from Advanced Marine Technologies, Inc., the product will be returned, shipping charges prepaid by the buyer, to: Customer Service Department, Advanced Marine Technologies, Inc., 212 Yacht Club Drive, St. Augustine, FL 32084. Delivery by United Parcel Service (UPS) is recommended. The unit will be repaired or replaced within in a reasonable length of time and returned postage paid.

Do not attempt to repair unit as warranty may be affected.

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Send To:

**X-Change-R®**

Advanced Marine Technologies, Inc.  
212 Yacht Club Drive  
St. Augustine FL 32084

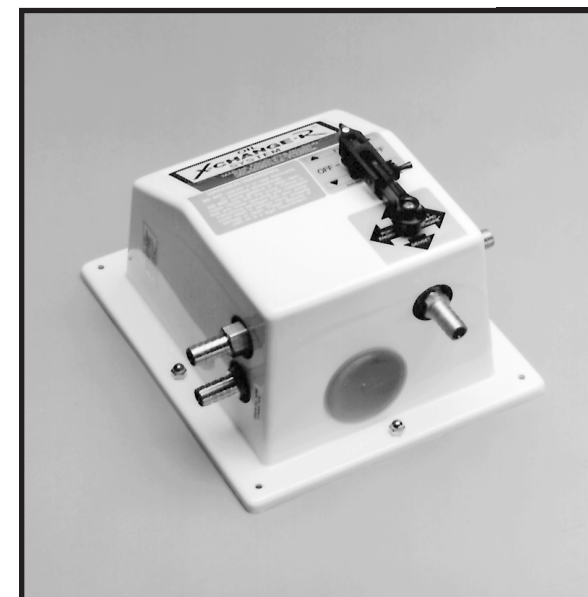
## 12.0 RETURN GOODS PROCEDURE

Prior to returning product to ADVANCED MARINE TECHNOLOGIES, INC. under warranty, please obtain a return goods authorization number (claim number) by calling customer service at 1-866-922-4804 or 904-829-1800. Once you have received an authorization number, be sure to label goods with the following:

- a) your name, address and phone
- b) the authorization number,
- c) the make and model year of your boat
- d) purchase date, if different from the model year

Please address the returned goods as follows:

Customer Service Department  
Advanced Marine Technologies, Inc.  
212 Yacht Club Drive  
St. Augustine, FL 32084



**OIL  
X-CHANGE-R  
SYSTEM**

**INSTALLATION AND OPERATING  
INSTRUCTIONS**

**Models 946D & 946DT**

Advanced Marine Technologies, Inc.  
212 Yacht Club Drive  
St. Augustine, FL 32084

866-922-4804 / 904-829-1800 / FAX 904-829-2800  
E-MAIL : pumps@x-change-r.com

**THIS PRODUCT IS NOT TO BE USED TO TRANSFER GASOLINE!**

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## 1.0 GENERAL DESCRIPTION

Your X-Change-R® Oil change unit is one of the following:

**MODEL 946D** - designed to remove crankcase oil from two engines and a generator in either gas or diesel powered vessels, and to refill each crankcase oil pan with fresh oil.

**MODEL 946DT** - designed to remove crankcase oil from two engines, a generator and two transmissions in diesel powered vessels, and to refill each crankcase oil pan and transmission with fresh oil. These models are recommended for use only with transmissions which utilize motor oil as a lubricate.

NOTE: The 946DT is not recommended for use with engines having transmissions that use specially designed fluids as a lubricant.

The X-Change-R® is housed in a fire retardant, high impact, high gloss case. The solid brass pump has a nitrile impeller, is self-priming and pumps immediately, whether in the "drain" or "fill" mode.

### 1.1 SPECIFICATIONS OF THE X-CHANGE-R® SYSTEMS

MOTOR:	Heavy duty DC 15 AMP, 12 Volt (24 Volt Available)	
PUMP:	Solid Brass, Self-Priming, Nitrile Impeller, Stainless Steel Shaft	
HOUSING:	Non-Corrosive, High-Impact	
HOSE:	Reinforced, Rubber 200 psi, 200° F	
FITTINGS:	All Brass 3/8" NPT	
FUSE	Built In	
HOLDER:	Built In	

### DIMENSIONS

	946D	956DT
WIDTH:	8.8"	8.9"
HEIGHT:	10.1"	12.8"
DEPTH:	6.6"	6.6"
WEIGHT:	6.2 lbs.	7.2 lbs.

### 2.0 INSTALLATION OF X-CHANGE-R® SYSTEMS

This is a permanent system for wall or bulkhead installation. Installing the unit requires only general knowledge of hose fitting shapes and sizes, and electrical wiring skills. If you are not familiar with basic pipe fitting or wiring techniques, it is recommended an experienced mechanic be engaged to install the X-Change-R®.

Because of the wide variety of oil pan connections (as well as engine room layouts), the quantity of hose and type of fittings is difficult to estimate. The average installation requires approximately the following:

946D - 12 feet of approved oil line hose for the engines, 7 stainless steel hose clamps and 3 brass hose barbs to replace the drain plugs in each engine serviced.

946DT - 12 feet of approved oil line hose for the engines, 10 feet of hose for the transmissions, 11 stainless steel hose clamps and 5 brass hose barbs to replace the drain plugs in each engine serviced.

All of the above is supplied with your unit.

Should you require additional hose or different fittings, check with your dealer, or call Advanced Marine Technologies, Inc. at 1-866-922-4804, to order parts.

## 10.0 TROUBLE SHOOTING CHART

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Pump will not prime or retain prime after operating	1. Air leak in suction line	1. Repair or replace
	2. Defective cam or impeller	2. Replace
	3. Seal worn	3. Replace
	4. O-ring leaking	4. Replace
	5. Suction lift too high	5. Lower Pump
	6. Hose kinked	6. Straighten hose
	7. Hose fitting not tight on head	7. Tighten fittings & clamps
	8. Groove worn in shaft at seal	8. Replace motor
Pump runs but no fluid is discharged	1. Faulty suction piping	1. Repair or replace
	2. Defective cam or impeller	2. Replace
	3. Suction lift too high	3. Lower pump
	4. Discharge height too high	4. Lower height
	5. Clogged inlet	5. Clean or replace
	6. Pump too far from liquid	6. Relocate
Motor runs too hot	1. Voltage incorrect	1. Supply to be 12V DC
	2. Excessive discharge pressure	2. Reduce pressure
	3. Impeller swollen	3. Replace
	4. Liquid too viscous	4. Reduce viscosity of liquid
	5. Plugged or kinked discharge	5. Examine and repair
	6. Insufficient air flow to motor	6. Be sure ample fresh air is available to the motor
Flow rate is low	1. Piping or hose is fouled or damaged	1. Clean or replace
	2. Clogged impeller	2. Clear obstruction
	3. Worn impeller	3. Replace
	4. Voltage is incorrect	4. Supply to be 12V DC
Seal leaks	1. Seal worn out	1. Replace
	2. Shaft grooved	2. Replace Motor
	3. Pump head loose on motor	3. Repair
Pump will not run	1. No power	1. Determine that the outlet is for 12V DC
	2. Impeller is jammed	2. Clear obstruction
	3. Motor has an open circuit	3. Check and replace fuse

### IMPORTANT!

Please fill out and return by mail or fax (#904-829-2800) to Advanced Marine Technologies, Inc. within 30 days of purchase and we will send you an X-Change-R® service kit, which includes a replacement impeller & gasket.

Customer's Name \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

If purchased on new boat from manufacturer:

Boat Manufacturer \_\_\_\_\_ Length \_\_\_\_\_ Hull Number/Model Year \_\_\_\_\_

If purchased to install on currently owned boat:

Dealer/Marine Service Facility's Name \_\_\_\_\_

Boat Manufacturer \_\_\_\_\_ Length \_\_\_\_\_ Purchase Date \_\_\_\_\_

## 8.2 Filling the Starboard Engine (All Models)

1. Repeat each of the steps outlined in "Filling the Port Engine" after directing the arrow-shaped tip on the valve handle to the "STARBOARD" engine.
2. When the oil pan nears its filled capacity, flip the pump motor control switch to the "OFF" position and check the proper oil level with the engine's dip stick (or other measuring device supplied with the engine). If filling is completed, place the fail-safe switch in the "OFF" position.

## 8.3 Filling the Generator (Model 946D only)

1. Repeat each of the steps outlined in "Filling the Port Engine" after directing the arrow-shaped tip on the valve handle to the "GENERATOR" engine.
2. When the oil pan nears its filled capacity, flip the pump motor control switch to the "OFF" position and check the proper oil level with the engine's dip stick (or other measuring device supplied with the engine). If filling is completed, place the fail-safe switch in the "OFF" position.

## 8.4 Filling the Generator (Model 946DT only)

1. Repeat each of the steps outlined in "Filling the Port Engine" after directing the arrow-shaped tip on the valve handle to the "GENERATOR" engine.
2. Treating the selector handle on the externally mounted valve as a pointer, point the tip of the handle toward the hose barb connected to the generator. (See Figure 4)
3. Flip the pump motor control switch on the X-Change-R® to the "FILL" position.
4. Continue to operate the pump until a measured amount of oil has been pumped into the engine's crankcase. Fresh oil is pumped at the rate of about one gallon each 90 seconds.
5. When the oil pan nears its filled capacity, flip the pump motor control switch to the "OFF" position and check the proper oil level with the engine's dip stick (or other measuring device supplied with the engine). If filling is completed, place the fail-safe switch in the "OFF" position. (See Figure 5)

## 8.5 Filling the Port and Starboard Transmissions (Model 946DT only)

1. Repeat each of the steps outlined in "Filling the Generator" after using the handle on the externally mounted valve as a pointer, point the tip of the handle toward the hose barb connected to the "PORT" and "STAR

BOARD" (See Figure 6) respectively. (NOTE: Vent the transmission if required. Most transmissions are equipped with a breather cap. If you are not certain your transmission is equipped with a breather cap, remove the dip stick from the transmission to allow air into gear box.)

2. Flip the pump motor control switch on the X-Change-R® to the "FILL" position.
3. Continue to operate the pump until a measured amount of oil has been pumped into the engine's crankcase. Fresh oil is pumped at the rate of about one gallon each 90 seconds.
4. When the oil pan nears its filled capacity, flip the pump motor control switch to the "OFF" position and check the proper oil level with the engine's dip stick (or other measuring device supplied with the engine). If filling is completed, place the fail-safe switch in the "OFF" position. (See Figure 5)

## 9.0 IMPELLER INSTALLATION

Replace impeller every 500 hours, unless the impeller has been damaged by foreign objects, improper liquid, or dry running prior to the 500 hours of normal operation. Service impellers and gaskets available, call 1-866-922-4804

1. Remove four screws (Ref. #1).
2. Remove the cover plate (Ref. #2) and old gasket (Ref. #3).
3. Using your fingers, remove damaged or worn impeller (Ref. #4).
4. Clean the inside of the pump head and remove any foreign materials which will obstruct the impeller's operation. (Note: Also check for foreign material in the brass hose barbs and/or tubing leading from the pump).
5. Apply Vaseline or a similar lubricant to both the inside of the pump head (Ref. #5) and to the outside of the impeller (Ref. #4).
6. Align the flat surface on the inside of the new impeller with the flat surface on the motor shaft. Push into place while twisting blades in a clockwise direction.
7. Place the new gasket (Ref. #3) on the pump body face, align holes and replace cover (Ref. #2).
8. Tighten all four screws evenly and snugly.

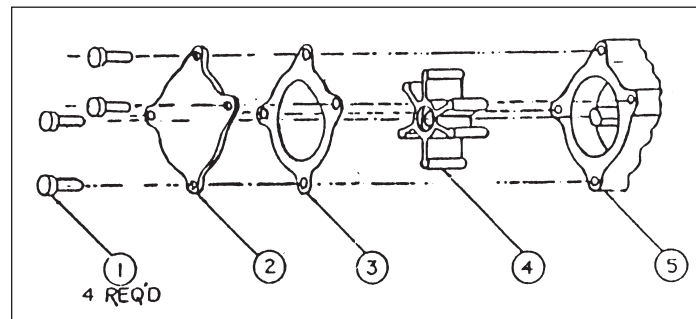
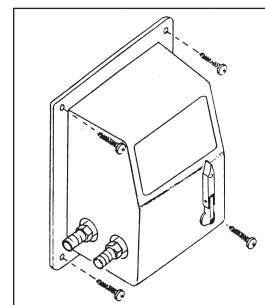


FIGURE 7

## 3.0 MOUNTING THE PUMP/ MOTOR UNIT



Mount the X-Change-R® Pump/Motor Unit in a convenient, safe location where it will be easily accessible. Consider the piping, electrical and service requirements when selecting the location. Pump may be installed vertically or horizontally. Mounting screws are included with your unit. (See Figure 1)

FIGURE 1

**IMPORTANT NOTE:** Pump must be installed above the crankcase level!

## 4.0 ELECTRICAL WIRING PROCEDURE

Your X-Change-R® is designed for use with a 12 Volt, D.C. power source (24 Volt systems are available). When wiring the system, choose UL approved, marine-grade wire and connectors.

A built in fuse holder is located on the side of the X-Change-R® unit and utilizes a 1/4" X 1 1/4" glass, fast action 15 AMP fuse. Replacement fuses are available at any marine or automotive outlet. The motor will safely operate with fuses rated 10 to 20 AMPS. Do not exceed 20 AMPS.

Connecting the Power Leads

1. Connect the BLACK (negative or -) lead to the negative side of a properly ground 12 Volt, D.C. power source.
2. Connect the RED (positive or +) lead to the positive side of the suitable 12 Volt, D.C. power source.

## 5.0 INSTALLATION OF THE HOSES

Because oil is a viscous fluid (particularly when cool) every attempt should be made to keep the length the hose runs at a minimum. When changing engine oil or transmission oil, a small amount of waste oil will return to the system along with the fresh oil. This is acceptable for hose runs of 15 feet or less. Hose runs of 20 feet or more should be avoided, especially when connected to transmissions or small engines. Care should also be taken to avoid sharp bends in the hose and exposure to hot surfaces. When installing the hoses, design the layout symmetrically. It is easier to determine the location of the lines and presents a neat appearance.

### 5.1 Connecting Engine Oil Pan Hoses (All Models)

1. Drain oil from each engine.
2. If the engines are not equipped with a factory installed oil pan drain hose, replace each oil pan drain plug with a drain hose assembly supplied by the engine manufacturer, or install a compatible fitting that will accommodate a 1/2" ID oil drain hose. An adapter may be required.

3. Connect properly measured lengths of approved 1/2" ID hose from each engine's oil pan drain to the appropriate hose barb on the X-Change-R®. (See Figures 2 & 3)
4. Connect the Drain/Fill Clear Hose provided with your X-Change-R® to the drain/fill outlet. (See Figures 2 & 3)
5. After completing the hose installation, carefully inspect the hoses to insure each connection includes a hose clamp and that the clamp is in place and secure.

### 5.2 Connecting Transmission Hoses (Model 946DT only)

1. Drain oil from the transmissions.
2. If the transmissions are not equipped with a factory installed drain hose, replace the drain plug on each transmission with a drain hose assembly supplied by the manufacturer, or install a compatible fitting that will accommodate a 1/2" ID oil drain hose. An adapter may be required.
3. Connect properly measured lengths of approved 1/2" ID hose from each transmission to the appropriate hose barb on the external valve attached to the X-Change-R®. (See in Figures 2 & 3)
4. After completing the hose installation, carefully inspect the hoses to insure each connection includes a hose clamp and that the clamp is in place and secure.

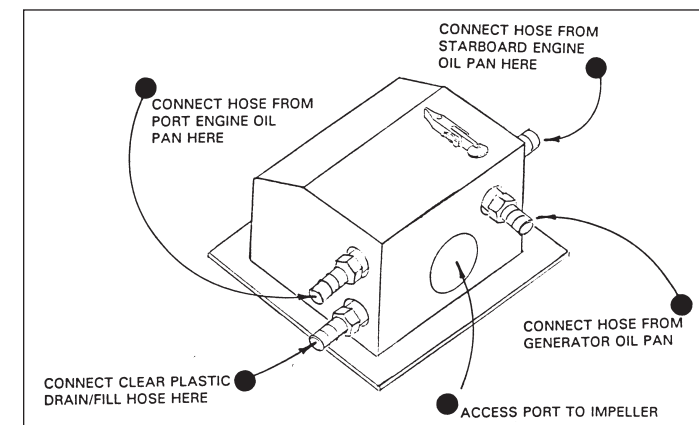


FIGURE 2

Model 946D

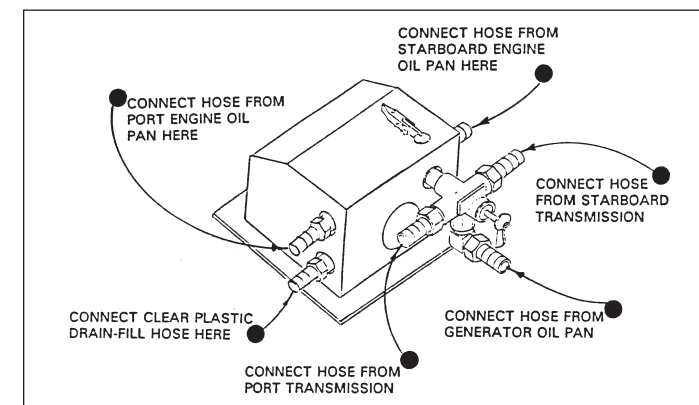


FIGURE 3

Model 946DT

## 6.0 OPERATING THE X-CHANGE-R® SYSTEMS

### 6.1 System Start-up Procedures

When starting the system for the first time, air will be in all of the lines. Operating the X-Change-R® without oil or lubricant will damage the pump's impeller. Although your X-Change-R® Pump/Motor Unit was tested prior to shipping, the amount of oil surrounding the impeller may not be sufficient to insure proper starting lubrication and vacuum. To avoid damage, the following procedure is advised:

1. Insert the PVC wand of the Drain/ Fill Hose into a container containing a small amount (about 1/2 quart) of fresh oil.
2. Release the fail-safe lock device on the Pump/Motor Unit valve handle and direct the arrow-shaped tip to "STARBOARD".
3. Flip the motor control switch to the "FILL" position. The pump will start immediately and you will observe the oil moving through the clear plastic tubing toward the Pump/Motor Unit. You should hear a noticeable change in sound (speed) of the pump motor when the oil enters the pump.
4. Continue to operate the pump for 5 to 10 seconds after pumping action begins, then return the Pump/Motor switch to the "OFF" position and secure the oil filler cap.

#### CAUTION

If oil does not move quickly through the clear tubing towards the pump, turn the switch to the "OFF" position, elevate the clear tubing until it nears the entrance of the pump, then flip the switch to the "FILL" position again. This will lubricate the pump and insure a good starting vacuum.

## 7.0 DRAINING USED OIL FROM THE ENGINES

To insure the oil maintains proper viscosity during the removal process, it is recommended the operator run the engines long enough to permit the engine block to become warm - at least 140°F. Shut the engines down and allow ample time for the circulated oil to return to the oil pan.

### 7.1 Draining the Port Engine (All Models)

1. Warm engine to at least 140°F, then turn engine off.
2. Insert the PVC wand of the Drain/ Fill Hose into a container suitable for waste oil collection. (Remember, it is a legal requirement to dispose of waste oil in a responsible manner.)
3. Loosen the oil filler cap on the engine or remove the dip stick to allow air to enter the crankcase.

4. Release the fail-safe lock device on the Pump/ Motor Unit valve handle and direct the arrow-shaped tip to "PORT ENGINE".

5. Flip the motor control switch to the "DRAIN" position. The pump will start immediately. You should hear a noticeable change in the sound (speed) of the pump motor when the used oil enters the pump.

6. Continue to operate the pump until there is a noticeable change in the sound (speed) of the pump motor, which is an indication air is being drawn into the crankcase oil hose and that the specified crankcase is now empty. Oil is drained at the rate of about one gallon each 22 seconds.

7. Return the pump motor control switch to the "OFF" position when crankcase is empty and place the fail-safe switch in the "OFF" position.

### 7.2 Draining the Starboard Engine (All Models)

1. Repeat each of the steps outlined in "Draining the Port Engine" after directing the arrow-shaped tip on the valve handle to the "STARBOARD" engine.

2. Flip the motor control switch to the "DRAIN" position.

3. Once the crankcase is emptied, return the pump motor control switch to the "OFF" position and place the fail-safe switch in the "OFF" position.

### 7.3 Draining the Generator (Model 946D only)

1. Repeat each of the steps outlined "Draining the Port Engine" after directing the arrow-shaped tip on the valve handle to the "GENERATOR" engine.

2. Flip the motor control switch to the "DRAIN" position.

3. Once the crankcase is emptied, return the pump motor control switch to the "OFF" position and place the fail-safe switch in the "OFF" position.

### 7.4 Draining the Generator (Model 946DT only)

1. Repeat each of the steps outlined "Draining the Port Engine" after directing the arrow-shaped tip on the valve handle to the "GENERATOR" engine.

2. Treating the selector handle on the externally mounted valve as a pointer, point the tip of the handle toward the hose barb connected to the generator. (See Figure 4)

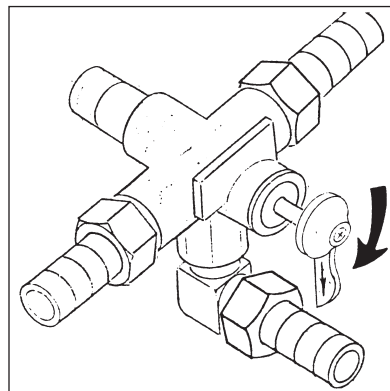


FIGURE 4

3. Flip the motor control switch to the "DRAIN" position.

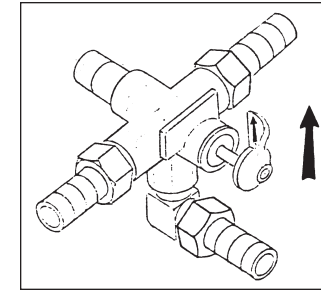
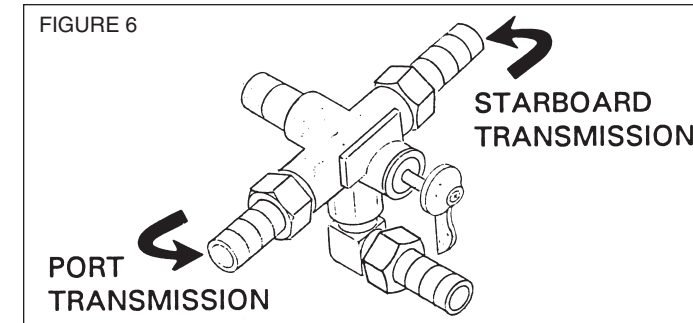


FIGURE 5

4. Once the crankcase is emptied, return the pump motor control switch to the "OFF" position and place the fail-safe switch in the "OFF" position. Then also return the externally mounted valve handle to "OFF" position. (See Figure 5)

### 7.5 Draining the Port and Starboard Transmissions (Model 946DT only)

1. Repeat each of the steps outlined in "Draining the Generator" after using the handle on the externally mounted valve as a pointer, point the tip of the handle toward the hose barb connected to the "PORT" and "STARBOARD" (See Figure 6) respectively. (NOTE: Vent the transmission if required. Most transmissions are equipped with a breather cap. If you are not certain your transmission is equipped with a breather cap, remove the dip stick from the transmission to allow air into gear box.)



2. Flip the motor control switch to the "DRAIN" position.

3. Once the transmission is emptied, return the pump motor control switch to the "OFF" position and place the fail-safe switch in the "OFF" position. Then also return the externally mounted valve handle to "OFF" position. (See Figure 5)

## 8.0 FILLING THE ENGINES

If you are using the system to fill the engines for the first time, be sure you have carefully followed the "Start-Up" instructions on Page 4.

1. Before attempting to fill an engine, make certain the engine has been completely drained or is in need of a measured amount of additional oil. **DO NOT OVER FILL!**

2. Next, determine the type and the amount of oil recommended by the manufacturer for each engine. Remember, **FOUR QUARTS = ONE GALLON.**

3. There are two commonly used methods to determine when the proper amount of oil has been delivered to the engine.

**Pre-measured Method** - this method requires the operator to set aside a known quantity of oil prior to filling. For example, if the engine requires 22 quarts of oil, the operator may want to pump from a 5-gallon container, adding 2 additional quarts as the container empties.

**Timed Method** - the timed method is used when pumping from a container of unknown capacity, or a reservoir. The flow of oil through the system varies primarily with the viscosity and temperature of the oil. Under normal conditions (75° - 85°F), the system pumps four quarts of 40 weight oil (1 gallon) in approximately 90 seconds. Filling time is a function of several factors, including the oil temperature and weight. Oil (40 weight) at 85°F pumps approximately 20% faster than the same oil at 75°F.

### FRESH OIL SHOULD BE 75°F OR WARMER BEFORE PUMPING!

### 8.1 Filling Port Engine (All Models)

1. Loosen the oil filler cap on the engine or remove the dip stick to allow air to enter the crankcase.
2. Insert the PVC wand of the Drain/ Fill Hose into a container of fresh oil.

3. Release the fail-safe lock device on the Pump/ Motor Unit valve handle and direct the arrow-shaped tip to "PORT ENGINE".

4. Flip the pump motor control switch on the X-Change-R® to the "FILL" position. The pump will start immediately and you will observe the oil moving through the clear tubing toward the Pump/ Motor Unit. You should hear a noticeable change in the sound (speed) of the pump motor when the oil enters the pump.

5. Continue to operate the pump until a measured amount of oil has been pumped into the engine's crankcase. Fresh oil is pumped at the rate of about one gallon each 90 seconds.

6. Flip the pump motor control switch to the "OFF" position when the oil pan nears its filled capacity and check the proper oil level with the engine's dip stick (or other measuring device supplied with the engine). If filling is completed, place the fail-safe switch in the "OFF" position.

If you have over-filled an engine, you may simply flip the motor control switch to the "DRAIN" position for a few seconds to remove the overage.