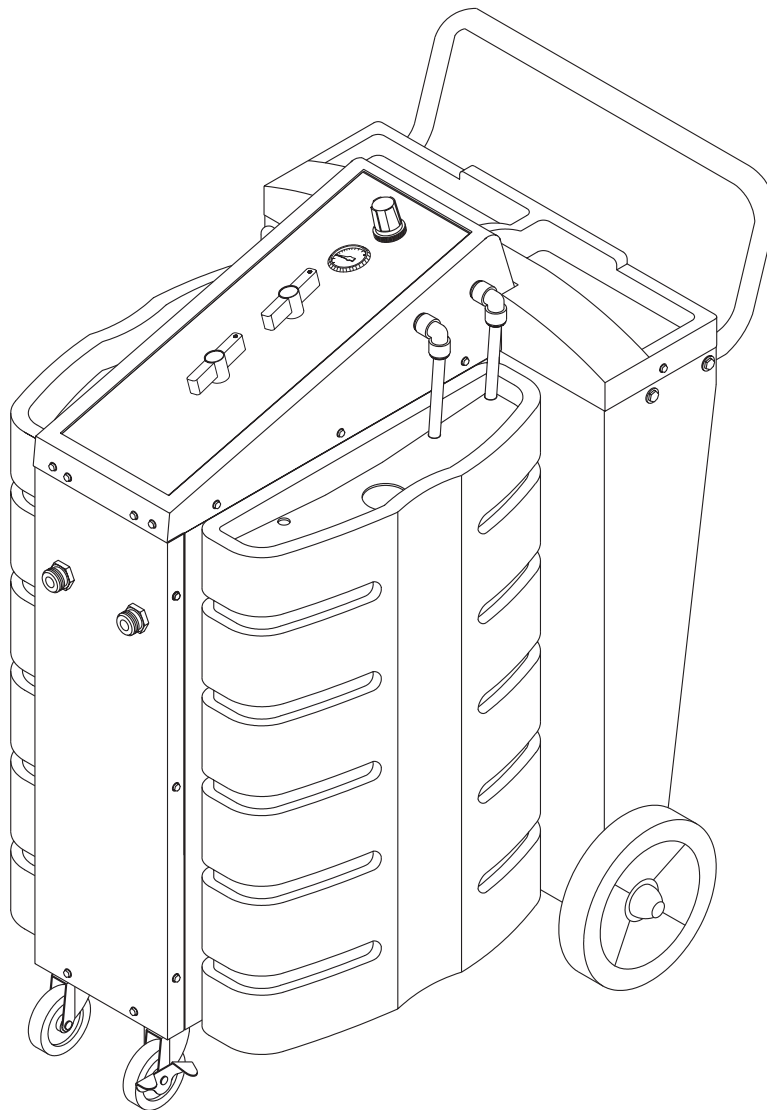


# VIPER

**ANTIFREEZE / COOLANT  
DRAIN / FLUSH / FILL SYSTEM  
Model AF3250**

## Operation Instructions

---



CE

# TABLE OF CONTENTS

<b>SHIPPING CONTAINER CONTENTS</b> .....	<b>3</b>
<b>EC MANUFACTURER DECLARATION</b> .....	<b>4</b>
<b>SAFETY SUMMARY</b> .....	<b>5</b>
NOISE INFORMATION .....	5
SAFETY INSTRUCTIONS .....	5
MOTION HAZARDS.....	5
FUME HAZARDS.....	5
HEAT HAZARDS .....	6
POISONOUS FLUID HAZARDS .....	6
SPLASH HAZARDS.....	6
ADDITIONAL SAFETY INFORMATION .....	6
<b>INTRODUCTION</b> .....	<b>6</b>
ABOUT THIS MANUAL.....	6
BENEFITS OF THE DRAIN, FLUSH & FILL PROCESS .....	7
ABOUT COOLANT .....	7
<b>ACCESSORIES</b> .....	<b>7</b>
OPTIONAL ACCESSORIES .....	8
<b>MACHINE PREPARATION</b> .....	<b>9</b>
INSTALL COMPRESSED AIR FITTING .....	9
CONNECT HOSES.....	10
<b>OPERATING INSTRUCTIONS</b> .....	<b>10</b>
CONTROLS AND INDICATORS .....	10
PRIMING THE MACHINE .....	11
HOT CAR METHOD .....	11
INSPECT THE VEHICLE .....	12
MAKING CONNECTIONS AND TESTING THE COOLING SYSTEM .....	12
Lower Fluid Level in the Radiator .....	12
Attach Cross Flow Adapters .....	13
Pressure Test .....	13
Vacuum Test .....	13
FORWARD FLUSHING .....	14
EXCHANGE COOLANT .....	14
DISCONNECTING .....	15
COLD CAR METHOD .....	16
INSPECT THE VEHICLE .....	16
MAKING CONNECTIONS AND TESTING THE COOLING SYSTEM .....	16
Attach Permanent Tee Fitting .....	17
Pressure Test .....	17
Vacuum Test .....	17
Attach Cross Flow Adapter .....	18
BACK FLUSHING .....	18
DRAIN AND FILL .....	19
EXCHANGE COOLANT.....	20
DISCONNECTING .....	20
<b>SPECIAL PROCESSES</b> .....	<b>20</b>
REMOVING AND REPLACING SIDE TANKS .....	20
PULL NEW COOLANT INTO THE NEW COOLANT TANK .....	21
EMPTY THE USED FLUID FROM THE PROCESSING TANK .....	21
<b>UNIQUE SITUATIONS</b> .....	<b>21</b>
INSTALLATION OF A TEMPORARY TEE .....	21
ATTACHING A RADIATOR CAP ADAPTER .....	22
RADIATOR CAP IS ON THE OVERFLOW RESERVOIR.....	22
VEHICLES KNOWN TO CONTAIN LEAK PREVENTION ADDITIVES .....	22
THERMOSTAT IS NOT LOCATED ON THE TOP OF THE BLOCK.....	22
SERVICING VEHICLES WITH ALTERNATE TYPES OF COOLANT.....	22
<b>MAINTENANCE</b> .....	<b>23</b>
CLEANING THE HOSE SCREENS .....	23
FLUSHING OUT THE MACHINE .....	23
<b>PLUMBING DIAGRAM</b> .....	<b>25</b>
<b>REPLACEMENT PARTS</b> .....	<b>26</b>
<b>LIMITED WARRANTY</b> .....	<b>28</b>

# SHIPPING CONTAINER CONTENTS

The shipping container contains the packing list items listed in Table 1 below.

**Table 1.** Shipping Container Packing List

<b>QTY</b>	<b>Part Number</b>	<b>Description</b>
1	AF3250	Antifreeze/Coolant Drain, Flush & Fill
2	253-313-000	Coupler, quick connect (installed on hose assemblies)
1	804-304-000	Customer response card
1	804-691-200	Catalog
1	842-411-000	Manual
1	870-371-000	Hose assembly (black) 8 ft. (2,44 m)
1	870-372-000	Hose assembly (red w/ sight tube) 8 ft. (2,44 m)
1	930-440-000	Parts bag
1	059-204-000	Radiator hose 1-1/4" x 2.5" (31,8 mm x 63,5 mm)
1	059-205-000	Radiator hose 1-3/8" x 2.5" (34,9 mm x 63,5 mm)
1	059-206-000	Radiator hose 1-1/2" x 2.5" (38,1 mm x 63,5 mm)
1	059-215-000	Radiator hose 1-3/4" x 2.5" (44,5 mm x 63,5 mm)
1	059-216-000	Radiator hose 1-1/4" x .75" (31,8 mm x 19 mm)
1	059-230-000	Radiator hose 1-15/16" x 2.5" (40,2 mm x 63,5 mm)
2	134-019-001	Pliers, pinch
2	253-013-000	Tee, 1/2" (12,7 mm) flusher
4	253-014-000	Tee, 5/8" (15,9 mm) flusher
4	253-015-000	Tee, 3/4" (19,1 mm) flusher
10	253-016-000	Tee cap, flusher
1	253-063-000	Radiator cap adapter, large
1	253-110-000	Radiator cap, small
2	253-254-000	Cross flow adapter, 1-1/4" (31,8 mm)
2	253-255-000	Cross flow adapter, 1-3/8" (34,9 mm)
2	253-256-000	Cross flow adapter, 1-1/2" (38,1 mm)
1	253-314-000	Quick connect, male
2	253-315-000	Quick connect, female
2	253-410-000	Cross flow adapter, 1-3/4" (44,5 mm)
2	253-416-000	Cross flow adapter, 1-1/8" (28,6 mm)
2	253-423-000	Cross flow adapter, 1-15/16" (40,2 mm)
1	870-682-000	Drain fill hose
1	253-424-000	Ford radiator cap adapter
8	414-017-000	#12 hose clamp (1-1/4")
8	414-022-000	#24 hose clamp (2")
3	414-031-000	#32 hose clamp (2-1/2")
19	512-021-000	Vinyl hose washer
1	512-149-000	Hose screen washer

# EC MANUFACTURER DECLARATION

Manufacturer Declaration according to EC Machinery Directive 89/392/EEC, Annex II A

Herewith we, Clore Automotive, formerly Century Mfg. Co.  
8600 NE Underground Drive, Pillar 248  
Kansas City, MO 64161  
USA

declare that the following machine complies with the appropriate basic safety and health requirements of the EC Directive based on its design and type, as brought into circulation by us. In case of alteration of the machine, not agreed to by us, this declaration will lose its validity.

Machine description : Antifreeze/Coolant Recycling System

Machine Type : 143-026 / \*143-030 / 143-033

**\* Note that this product has been added to the report. The product has the same components and construction as the 143-026. Only cosmetic changes have been performed.**

Applicable EC Directives : EC Machinery Directive (89/392/EEC)

Applicable Harmonized Standards Particularly : EN 292-1, EN 292-2, EN 414, EN 294, EN 349, EN 983

Date/ Authorized Signature :



Title of Signatory : Product Engineer

# SAFETY SUMMARY

Congratulations on the purchase of your new antifreeze/coolant service center. The following safety information is provided as guidelines to help you operate your new antifreeze/coolant service center under the safest possible conditions. Any equipment that uses chemicals can be potentially dangerous to use when safety or safe handling instructions are not known or not followed. The following safety instructions are to provide the user with the information necessary for safe use and operation. Please read and retain these instructions for the continued safe use of your antifreeze/coolant service center.

A procedure step preceded by **WARNING** is an indication that the step contains a procedure that might be injurious to a person if proper safety precautions are not heeded.

A procedure step preceded by **CAUTION** is an indication that the step contains a procedure that might damage the equipment being used.

A **NOTE** may be used before or after a procedure step to highlight or explain something in that step.

## NOISE INFORMATION

This unit measured a continuous A-weighted sound level of 66 db at a workstation. This unit also had a peak C-weighted instantaneous sound pressure of less than 76 db relative to 20 mPa. All measurements were conducted under normal operating conditions using a hand held Simpson 884-2 type S2A, serial number 002764, calibrated 13 April 1998.

## SAFETY INSTRUCTIONS

Every craftsman respects the tools with which they work. They know that the tools represent years of constantly improved designs and developments. The true craftsman also knows that tools are dangerous if misused or abused. To reduce risk of discomfort, illness, or even death, read, understand, and follow the following safety instructions. In addition, make certain that anyone else that uses this equipment, understands and follows these safety instructions as well.

**READ ALL SAFETY INSTRUCTIONS CAREFULLY** before attempting to install, operate or service this equipment. Failure to comply with these instructions could result in personal injury and/or property damage.

**RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.**

Published standards on safety are available. They are listed in **ADDITIONAL SAFETY INFORMATION** at the end of this **SAFETY SUMMARY**.

The National Electrical Code, Occupational Safety and Health Act regulations, local industrial codes and local inspection requirements also provide a basis for equipment installation, use, and service.

**Note:** The following safety alert symbols identify important safety messages in this manual.

- When you see one of the symbols shown here, be alert to the possibility of personal injury and carefully read the message that follows.

## MOTION HAZARDS



### WARNING

**ENGINE PARTS THAT ARE IN MOTION AND UNEXPECTED MOVEMENT OF A VEHICLE CAN CAUSE INJURY OR DEATH.**

- When working near moving engine parts, wear snug-fitting clothing and keep hands and fingers away from moving parts. Keep hoses and tools clear of moving parts. Always stay clear of moving engine parts. Hoses and tools can be thrown through the air if not kept clear of moving engine parts.
- The unexpected movement of a vehicle can cause injury or death. When working on a vehicle, always set the parking brake or block the wheels of the vehicle being serviced.

## FUME HAZARDS



### WARNING

**FUMES, GASES, AND VAPORS CAN CAUSE DISCOMFORT, ILLNESS, AND DEATH!** Breathing vehicle exhaust emissions can cause sickness, injury, or death. Always work in a properly ventilated area when servicing a vehicle with the engine running.

- Always perform vehicle service in a properly ventilated area. Never run an engine without proper ventilation for its exhaust.
- Stop the process if you develop momentary eye, nose, or throat irritation as this indicates inadequate ventilation. Stop work and take necessary steps to improve ventilation in the work area.

## HEAT HAZARDS



### WARNING

#### **HOT ANTIFREEZE/COOLANT CAN BURN SKIN AND INJURE EYES.**

Hot vehicle cooling systems are under pressure. Opening a hot cooling system can cause hot antifreeze/coolant to be forcibly sprayed in all directions.

- Wait until the engine has cooled in the vehicle before removing the radiator cap, cutting a system hose or in any way opening the vehicle cooling system when the engine is hot.

## POISONOUS FLUID HAZARDS



### WARNING

#### **ANTIFREEZE/COOLANT IS POISONOUS.**

Ingesting antifreeze/coolant can cause serious illness and even death. If coolant is spilled on the skin or the clothing next to the skin, it can cause discomfort due to irritation.

- Keep antifreeze/coolant where children and pets cannot get to it.
- If some antifreeze/coolant should be accidentally swallowed, take the person or pet in for medical assistance immediately. Be sure to identify to the doctor the type of antifreeze/coolant or chemical that was ingested.
- If medical assistance is not immediately available, call the local poison center.
- If someone is experiencing discomfort due to irritation from antifreeze/coolant coming in contact with the skin, use water with a mild detergent and/or rinse thoroughly with clean water.

## SPLASH HAZARDS



### WARNING

#### **CONTACT WITH ANTIFREEZE/COOLANT CAN BE HARMFUL!**

If coolant is spilled on the skin or the clothing next to the skin, it can cause discomfort due to irritation.

Contact with the eyes may cause permanent damage. Be careful not to splash fluid in your eyes.

- Wear protective gloves and safety glasses or goggles when handling antifreeze/coolant.

- Flush eyes with water for at least 15 minutes and get medical attention immediately if antifreeze/coolant comes in contact with your eyes.

## ADDITIONAL SAFETY INFORMATION

For additional information concerning safety, refer to the following standards and comply with as applicable.

- ANSI Standard Z87.1 — SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION — obtainable from the American National Standards Institute, 11 West 42nd St. New York, NY 10036 (212) 642-4900, fax (212) 398-0023 [www.ansi.org](http://www.ansi.org)

## INTRODUCTION

### CAUTION

This is a single vehicle use machine. To avoid accumulation of sediment in the Processing Tank, empty the tank or recycle the used coolant immediately after each vehicle service.

Thank you for selecting the Drain, Flush & Fill machine. You have joined the many automotive service centers and fleet operators that use it to reduce the time and expense of changing antifreeze/coolant.

This machine is easy to use, durable, and trouble-free:

- Back-flushes cooling systems, removing deposits, scale and corrosion.
- Pressure tests cooling systems, aiding in leak detection.
- Facilitates vehicle repairs by draining and holding antifreeze/coolant from cooling systems.
- Allows used coolant to be pumped into a large container for mass recycling purposes.
- Saves money by reducing the time needed to change antifreeze/coolant.

## ABOUT THIS MANUAL

This manual includes safety information, accessory list, machine preparation, operating procedures, special processes, unique situations, maintenance instructions, plumbing diagrams, replacement parts list, and warranty information for the Model AF3250. Anyone intending to use this machine should become familiar with ALL the information included in this manual (especially the SAFETY SUMMARY) before attempting to use the ANTIFREEZE/COOLANT machine. In order to properly perform a complete service, follow the procedures in the order presented. Please take the time to study this manual before operating the machine. Then keep this manual close at hand for future reference.

The fluid used in a vehicle's cooling system is known as both antifreeze and coolant. Antifreeze gets its name by

the properties in the fluid that prevent it from freezing at very low temperatures. It is also known as coolant, because of its ability to cool the engine during operation. Both terms are correct, however one or the other may be more commonly used in different geographical areas. From this point on in this instruction manual, we have elected to use the term coolant.

## BENEFITS OF THE DRAIN, FLUSH & FILL PROCESS

Used coolant may damage a vehicle's cooling system in numerous ways. The drain, flush & fill system can correct problems that might cause vehicle damage and can even prevent possible cooling system damage. Table 2 describes the potential cooling system problems, the damage that can be caused by that problem and the solution to the potential problem.

**Table 2.** Cooling System Potential Problems and Solutions

POTENTIAL PROBLEM	DAMAGE CAUSED	RECYCLING SOLUTION
Suspended Matter: Metal Metal oxides (rust) Hard water scale Solidified antifreeze additives	Engine overheating from: Plugged radiator Plugged heater core Plugged intercooler Premature engine wear Water pump wear and failure Thermostat deposits and failure	Flush system
Dissolved Matter: Metals Minerals	Engine overheating from: Mineral deposits, leading to plugged radiators or heater cores	Flush, Add new or recycled coolant
Inadequate freeze and boil-over protection	Cooling system/engine damage in cold/hot weather	Add new or recycled coolant

## ABOUT COOLANT

### CAUTION

DO NOT BLEND DIFFERENT TYPES OF COOLANT. Different types of inhibitors may react with one another, leading to engine damage.

Coolant can generally be divided into four classifications, which can be identified by color.

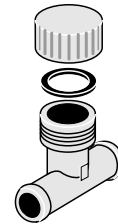
1. **DOMESTIC COOLANT:** is green to blue-green in color and may contain phosphate, silicate and molybdate inhibitors. Ideal pH range is 9.8 to 10.5.
2. **DEX-COOL:** is orange in color, contains organic acid inhibitors. Ideal pH is 8.3.

**Note:** Many foreign vehicles will contain domestic coolant, depending on the manufacturing site and the vehicle port-of-entry into the United States.

3. **ASIAN COOLANT:** is red in color, contains low level of silicate inhibitors, high level of molybdate inhibitors, and moderate level of nitrate inhibitors. Ideal pH range is 8.2 to 8.6.
4. **EUROPEAN COOLANT:** is blue in color or colorless, and is free of phosphates. Ideal pH range is 9.8 to 10.5.

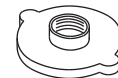
## ACCESSORIES

Some of the accessories will be used up as service the vehicle. A reorder chart is included at the end of this section as a quick reference for reordering additional supplies. The following accessories are included with your recycler.



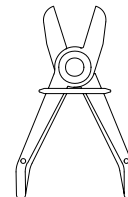
**Figure 1.** Flushing Tees

**Tees:** A flushing tee (Figure 1) of the correct size must be installed in the heater outlet hose of each vehicle serviced, using the COLD CAR METHOD. It becomes a permanent part of the vehicle. Tees are supplied, complete with sealing washers and caps, in three sizes: 1/2 inch (part # 5001), 5/8 inch (part # 5002) (most common), and 3/4 inch (part # 5003).



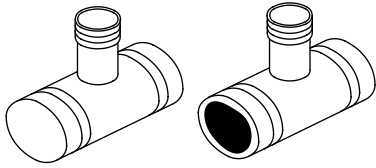
**Figure 2.** Radiator Cap Adapter

**Radiator Cap Adapter:** For vehicles with vertical flow radiators. Radiator cap adapters (Figure 2) are used to replace the vehicle's radiator cap during the flush process. There are three styles available: large diameter (part # 5017), small diameter (part # 5024), and the Ford radiator cap adapter with a diameter of 2" which mounts on the overflow reservoir (part # 5016).



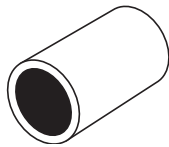
**Figure 3.** Pinch-Off Pliers

**Pinch-Off Pliers:** (part # 5020) These special pliers (Figure 3) are used to pinch off the vehicle's heater hoses and prevent excessive fluid loss during tee installation. They are also used to direct the flow of coolant during the backflushing process. Two pinch pliers are provided.



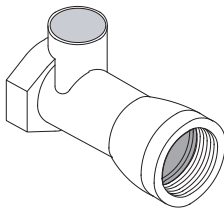
**Figure 4.** Cross Flow Radiator Adapters

**Cross Flow Radiator Adapters:** For vehicles with cross flow radiators. An adapter (Figure 4) must be installed between the upper radiator hose and the radiator during the flush process. Two each of six different size adapters are provided (1-1/8" part # 253-416-000, 1-1/4" part # 253-254-000, 1-3/8" part # 253-255-000, 1-1/2" part # 253-256-000, 1-3/4" part # 253-410-000, 1-15/16" part # 253-423-000). Additional adapters are available, in other sizes.



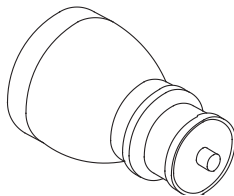
**Figure 5.** Hose Adapters

**Hose Adapter:** The hose adapter (Figure 5) is a short piece of radiator hose that is used to connect the cross flow adapter to the radiator or thermostat housing. One each of six different size hose adapters are provided (1-1/4" part # 059-216-000, 1-1/4" part # 059-204-000, 1-3/8" part # 059-205-000, 1-1/2" part # 059-206-000, 1-3/4" part # 059-215-000, 1-15/16" part # 059-230-000). Additional hose adapters are available, in other sizes.



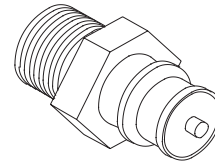
**Figure 6.** Quick Connect Coupler

**Quick Connect Coupler:** The quick connect coupler (Figure 6) (part # 253-313-000) is attached to the end of each hose. The coupler automatically shuts off when an insert is removed.



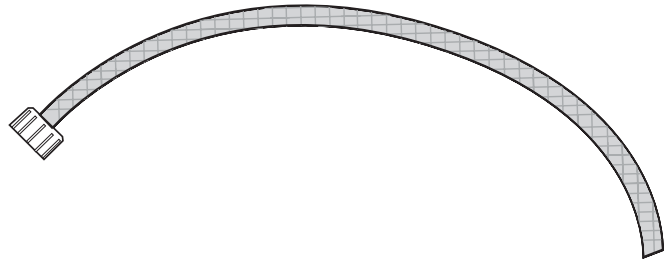
**Figure 7.** Quick Connect Insert (Female)

**Female Quick Connect Insert:** The female quick connect inserts (Figure 7) (part # 253-315-000) are used to connect the hoses to the cross flow adapters and tees.



**Figure 8.** Quick Connect Insert (Male)

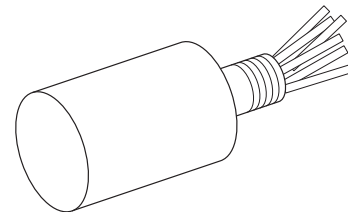
**Male Quick Connect Insert:** The male quick connect insert (Figure 8) (part # 253-313-000) is used to connect the Quick Connect Coupler on the end of the red or black hose. It is also used on the Radiator Cap Adapter.



**Figure 9.** Drain-Fill Hose

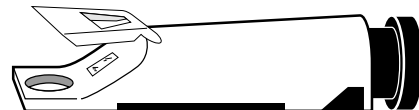
**Drain-Fill Hose:** This hose (Figure 9) (part # 5041) is designed to attach to a male Quick Connect Insert and connect to the Quick Connect Coupler at the end of the black hose (TO VEHICLE). It will make the job of draining or filling coolant from the radiator or overflow reservoir much easier and with less mess.

## OPTIONAL ACCESSORIES



**Figure 10.** Optional Litmus Paper pH and Freeze Point Test Strips

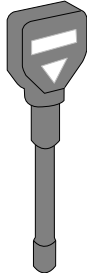
**pH & Freeze Point Test Strips:** Litmus paper (Figure 10) (part # 5039) is available separately to use for checking freeze point and corrosion protection (pH factor). Litmus Paper is not supplied with your machine and must be ordered separately.



**Figure 11.** Optional Refractometer

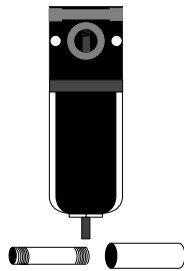
**Refractometer:** The optional refractometer (Figure 11) (part # 5021) determines the freezepoint of coolant. It is a delicate instrument. Handle it with care and do not expose it to extreme hot or cold conditions. Do not drop it or misuse it. The Refractometer is not supplied with your machine and must be ordered separately.





**Figure 12.** Optional pH Pen

**pH Pen:** A pH Pen (Figure 12) (part # 5036) is available separately to use for measuring the pH of antifreeze/coolant. The pH Pen is not supplied with your machine and must be ordered separately.



**Figure 13.** Optional Water Trap and Trap Elements

**Water Trap and Trap Elements:** A Water Trap (Figure 13) (part # 4435) is available separately to remove water from the air line. A package of four replacement elements for use in the Water Trap is also available (part # 4436). The Water Trap and Trap Elements are not supplied with your machine and must be ordered separately.

See the replacement parts diagram and list on pages 26-27 for ordering information on replacement accessories, optional accessories, and consumable supplies.

## MACHINE PREPARATION

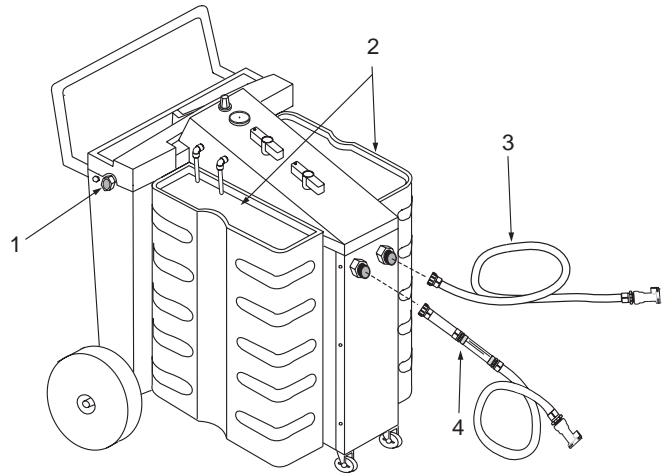
Although minimal, the machine requires some assembly and setup before use. The following instructions describe the necessary steps to prepare your new machine for use.

### INSTALL COMPRESSED AIR FITTING

The only assembly required for this machine is the installation of a fitting to the machine AIR INLET for connecting the shop compressed air to the machine.

1. Apply one or two wraps of Teflon tape to the threads of a 1/4 inch pipe thread nipple that threads into the machine AIR INLET port (Item 1, Figure 14) and mates with the quick-connect couplers on your shop compressed air line. Make certain that the Teflon tape is on the fitting

threads only and does not block the air flow path. (The fitting is not supplied due to the variety of fittings for compressed air.) Tighten fitting securely.



1. AIR INLET – connect shop compressed air to your machine
2. Side Tanks – hold 7 gallons each and can be replaced
3. Black Hose (TO VEHICLE) – connect to vehicle
4. Red Hose (FROM VEHICLE) – return line from vehicle

**Figure 14.** Machine Hose Port Connection Locations

2. Connect the compressed air line to the nipple connection.

### CAUTION

Compressed air that supplies more than 125 psi (862 kPa) may damage the machine. Never connect a compressed air line that is in excess of 125 psi (862 kPa) to this machine. The compressed air supply must be fairly dry and free from oil and other debris. If the machine pump speed slows dramatically or becomes erratic (slowing down and speeding up, repeatedly), you may need to install a water trap or drying device in your compressed air system. Failing to heed this caution could damage the pump.



### WARNING

Coolant can cause severe skin irritation or burns, on contact. If coolant is spilled on the skin or the clothing next to the skin, it can cause severe discomfort due to irritation. When opening orifices or any portion of system that could potentially contain coolant, take special care not to spill the fluid on skin or clothing. If a spill should occur, flush with large quantities of cool or lukewarm fresh water immediately. Wear safety glasses or goggles and latex gloves while handling coolant.

## CONNECT HOSES

Connect the black hose (Figure 15) to the TO VEHICLE machine port (Figure 14) and connect the red hose (Figure 16), with sight tube, to the FROM VEHICLE machine port (Figure 14) and verify that the quick-connect couplers are attached to the other end of each hose.

**Note:** The machine's hoses have screen washers in them to collect debris from the vehicle's cooling system. The screens should be removed periodically and cleared of debris so that the hoses do not become plugged, which will cause high system pressure.

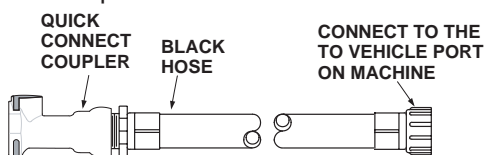


Figure 15. To Vehicle Hose (Black)

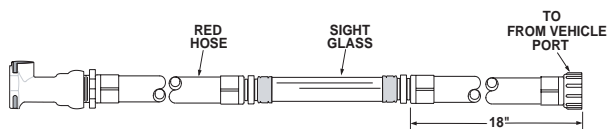


Figure 16. From Vehicle Hose (Red)

## OPERATING INSTRUCTIONS

These operating instructions were written to reflect normal circumstances. It is assumed that the vehicle being serviced will be a passenger car or light truck with the thermostat mounted on the top of the engine block connected to the upper radiator hose and the standard pressure relief cap is mounted on the radiator. Vehicles with larger cooling system capacities may require adjustments, such as longer processing time during the flush process.

There is a UNIQUE SITUATIONS section near the end of this instruction manual, which covers some unusual circumstances in servicing a vehicle's cooling system, however, you may encounter other circumstances which are not covered in this manual.

## CONTROLS AND INDICATORS

Figure 17 defines and explains the controls and indicators that are used to operate the machine.

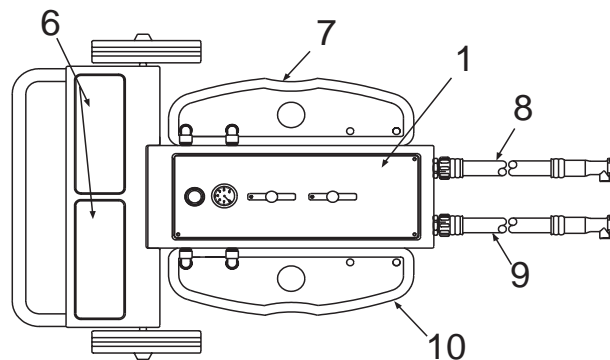


Figure 17. Controls and Indicators

1. The Control Panel contains operating controls and indicators used during the operation of the machine.
2. Valve B: PUMP FROM selects the source for coolant to draw from. If VEHICLE is selected, and the black hose is connected to the vehicle, the machine will draw the coolant out of the vehicle through the black hose.
3. Valve A: PUMP TO selects the destination for fluid to flow to. If VEHICLE is selected, it pumps through the black hose.

4. The PUMP SPEED CONTROL (Figure 19) is used to adjust the internal pump to regulate the flow rate and system pressure. Turning the knob counterclockwise (to the left) decreases flow and pressure while turning it clockwise (to the right) increases flow and pressure. Pushing the knob down (in toward the machine) will lock it in position (pull out to unlock).
5. The COOLING SYSTEM PRESSURE gauge (Figure 19) indicates the pressure that will build up within the vehicle's cooling system. It is important not to pressurize the cooling system beyond its pressure rating (sometimes indicated on the radiator cap or in the vehicle owner's manual) by more than 3 psi.
6. Storage compartments provide space to keep flushing tees and cross flow adapters.
7. The NEW COOLANT TANK is used to hold new or recycled coolant only.
8. The black hose (TO VEHICLE) is the active line through which coolant is pumped out of the machine when Valve A: PUMP TO is set to VEHICLE. When Valve B: PUMP FROM is set to VEHICLE, the coolant is pumped from the vehicle back into the machine through the black hose.
9. The red hose (FROM VEHICLE) is a passive line that allows the coolant to return to the processing tank when fluid is pumped to the vehicle.
 

**Note:** If both valves A & B are set to VEHICLE, fluid will circulate internally in the machine without any effect.
10. The PROCESSING TANK is used to hold used coolant from the vehicle and also for processing during the flushing process.

## PRIMING THE MACHINE

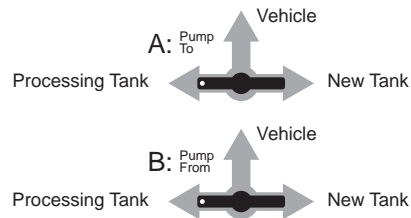
Whenever this machine is used, make sure that a minimum amount of coolant is available in the Processing Tank. If there is not sufficient coolant in the Processing Tank, air will be pulled into the machine's system as well as the vehicle's cooling system during operation.

### CAUTION

Compressed air that supplies more than 125 psi (862 kPa) may damage the machine.

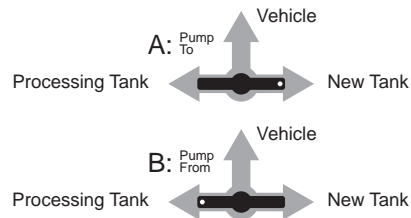
Never connect a compressed air line that is in excess of 125 psi (862 kPa) to this machine.

1. Verify that the AIR INLET port is connected to your shop compressed air line.
2. Pour equal amounts of new coolant and water into the Processing Tank through the fill hole at the top of the tank to fill to the priming level or above (about 2 gallons of each).
3. Set Valve A to Processing Tank; Valve B to Processing Tank.



**Figure 18.** Control Positions

4. Turn PUMP SPEED CONTROL clockwise to start the pump and allow it to run until coolant steadily flows into the processing tank (about 1 minute). This will purge air from the internal tubing and the pump, allowing it to work more efficiently.
5. Set Valve A to New Tank; Valve B to Processing Tank.



**Figure 19.** Control Positions

6. Run pump to transfer coolant into the NEW TANK. When the fluid level in the PROCESSING TANK is at the priming level, turn the PUMP SPEED CONTROL counterclockwise to turn the pump off.

## HOT CAR METHOD

The HOT CAR METHOD is used to flush the cooling system and exchange the old fluid with new. Sometimes it is much easier to make the connections with this method than it would be using the COLD CAR METHOD. If the purpose of the service is to perform repairs on the vehicle that require most of the coolant to be drained, such as a water pump replacement, then the COLD CAR METHOD must be used. If the vehicle owner requests that the cooling system be back flushed, then the COLD CAR METHOD is the only option.

A typical cooling system service consists of connecting the machine hoses to the vehicle, testing the cooling system for leaks and testing the radiator cap, flushing the system to loosen and remove scale and other deposits, replacing the old coolant, and disconnecting the machine from the vehicle.



## WARNING

Engine parts that are in motion can cause injury or death. When working near moving engine parts, wear snug fit clothing and keep hands and fingers away from moving parts. Keep hoses and tools clear of moving parts. Always stay clear of moving engine parts. Hoses and tools can be thrown through the air if not kept clear of moving engine parts.

The unexpected movement of a vehicle can cause injury or death. When working on a vehicle, always set the parking brake or block the wheels of the vehicle being serviced.

Move the vehicle into servicing position and shut off the engine. Set the transmission in park or neutral and set the parking brake or block all four wheels.

**Note:** When operating in the HOT CAR METHOD, you can neither drain nor backflush the vehicle. If you wish to drain or backflush the vehicle, use the COLD CAR METHOD.



## WARNING

Hot engines, exhaust systems, and hot cooling systems can cause severe burns. Do not remove the radiator cap, cut a system hose, or open the vehicle cooling system in any way while the engine is hot. Always wait until the engine cooling system is cooled down before attempting service.

## INSPECT THE VEHICLE

Always inspect the vehicle before starting the coolant change.

1. Check fan belts for wear and adjust to the proper tension, if necessary.
2. Check for damp spots or rust near or on the hose clamps, water pump, or other areas that might indicate possible leakage.
3. Check hose clamps for tightness and inspect all hoses for swelling, hardness, cracks, soft spots, or other signs of wear or aging.
4. Inspect radiator cap for signs of damage or wear. Also, find and note the pressure rating printed on the radiator cap.
5. Repair or replace damaged parts as necessary.



## WARNING

Hot antifreeze/coolant can burn skin and injure the eyes. Hot vehicle cooling systems are under pressure. Opening a hot system can cause hot antifreeze/coolant to be forcibly sprayed in all directions. Never attempt to open a vehicle radiator cap, cut hoses or open the system in any way if it is hot. Wait until the system cools down before attempting to open the system.



## WARNING

Make certain the vehicle exhaust system is properly vented to the outside and that the work area is properly ventilated with fresh air. Automobile exhaust fumes are poisonous and can cause sickness and death.

## MAKING CONNECTIONS AND TESTING THE COOLING SYSTEM

To connect the machine to the vehicle using the HOT CAR METHOD will require the installation of two cross flow adapters in the upper radiator hose.

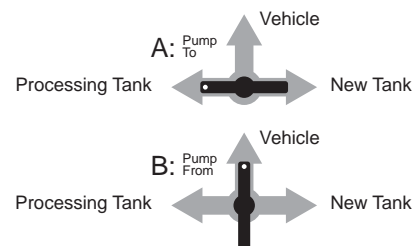
### Lower Fluid Level in the Radiator

1. Verify that the vehicle is off and that the engine has had time to cool off.
2. Slowly remove the radiator cap.
3. Attach the Drain-Fill hose (Figure 9) to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE).

**Note:** You may leave the male Quick Connect Insert on the Drain-Fill hose for future use.

4. Set the controls:

- Valve A: PUMP TO – Processing Tank
- Valve B: PUMP FROM – Vehicle



**Figure 20.** Control Positions

5. Insert the end of the Drain-Fill hose into the radiator and turn the Pump Speed Control on (clockwise) until the fluid level in the radiator is below the level of the upper radiator hose.

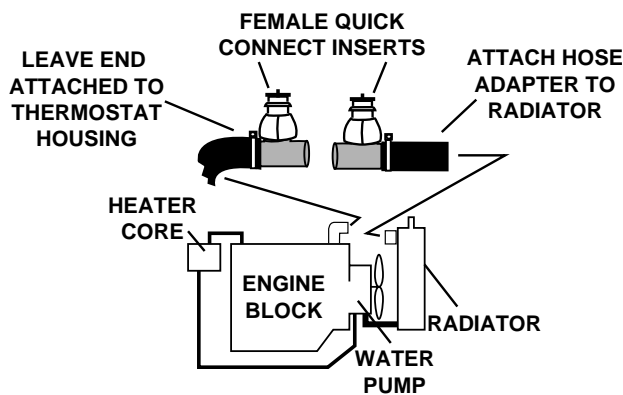
**Note:** If the radiator is configured in such a way that the Drain-Fill hose cannot be placed into the radiator tank, then you will need to install a radiator cap of the proper size. Install the male Quick Connect Insert onto the radiator cap and connect to the Quick Connect Coupler on the black hose (TO VEHICLE).

#### Attach Cross Flow Adapters

1. Disconnect the upper radiator hose from the radiator.
2. Install the open end of the proper size cross flow adapter into the end of the upper radiator hose. Secure with hose clamp.
3. Install a hose adapter of the same diameter as the upper radiator hose onto the open end of another cross flow adapter with hose clamps.

**Note:** After you have installed the hose adapter onto the cross flow adapter, you may leave it connected for future use.

4. Connect the cross flow adapter and hose adapter to the radiator. Secure hose clamps
5. Screw two female Quick Connect Inserts (Figure 21) onto the cross flow adapters.

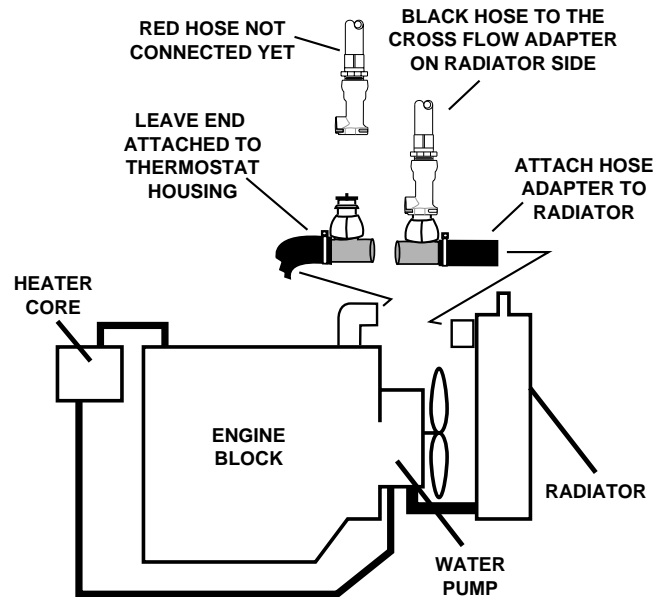


**Figure 21.** Cross Flow Adapters

#### Pressure Test

The Pressure Test is performed to show if the radiator cap is working properly (it should relieve pressure at  $\pm 3$  psi of its rating and coolant will flow into the overflow tank). It will also help you detect leaks in the cooling system. When the cooling system is pressurized, coolant will be forced out any small cracks or holes, enabling you to find the location and repair the leak.

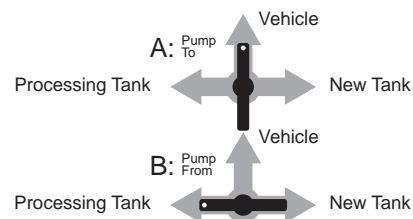
1. Verify that the radiator cap is in place and note the cap pressure rating.
2. Connect the black hose (TO VEHICLE) to the cross flow adapter installed on the radiator (Figure 22). The other cross flow adapter should only have the Quick Connect Insert attached — do not attach the red hose (FROM VEHICLE) yet.



**Figure 22.** Pressure Test and Vacuum Test Connections

3. Set the controls:

- Valve A: PUMP TO – Vehicle
- Valve B: PUMP FROM – Processing Tank



**Figure 23.** Control Positions

4. Turn the Pump Speed Control on (clockwise). Watch the COOLING SYSTEM PRESSURE gauge. When it reaches 3 psi less than the cap rating, turn the pump off (counterclockwise) and check the radiator and hoses for leaks. The gauge will probably go down 1 or 2 psi, but should hold after that if there are no leaks.
5. Restart the pump again and let the pressure continue to rise.
6. Observe the COOLING SYSTEM PRESSURE gauge. If the radiator cap is operating properly, coolant will be released into overflow tank within  $\pm 3$  psi of the cap rating.
7. If the radiator cap releases pressure, it has passed this test, otherwise replace the cap and perform the test again.

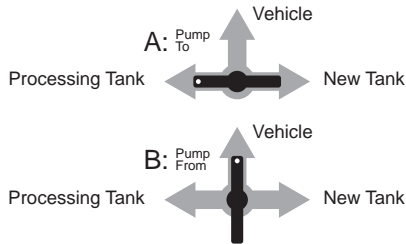
#### CAUTION

Do not exceed system pressure by more than 3 psi.

#### Vacuum Test

The purpose of the Vacuum Test is to check if the radiator cap will allow coolant to be pulled from the overflow tank back into the cooling system. If this test is successful, it also gives the benefit of draining the coolant from the overflow tank so that it will be exchanged as well.

1. Verify that there is coolant in the overflow reservoir, the radiator cap is in place and that the black hose (TO VEHICLE) is attached to the cross flow adapter installed on the radiator. See Figure 22.
2. Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle



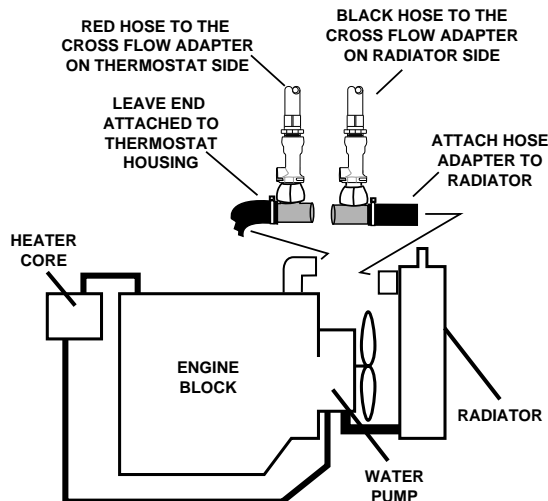
**Figure 24.** Control Positions

3. Turn the Pump Speed Control on (clockwise). Watch the fluid in the overflow tank. When there is sufficient vacuum, typically  $-8$  to  $-10$ , the remaining coolant will be sucked back into the radiator. If coolant is not sucked out of the overflow tank, replace the radiator cap and repeat the test.
4. Turn the Pump Speed Control off (counterclockwise).

### FORWARD FLUSHING

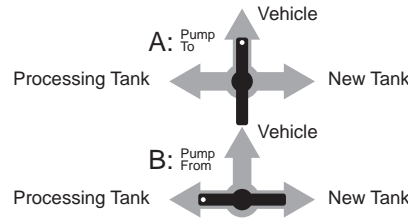
Forward flushing is where the flow of coolant is flowing in the normal direction that it flows when the vehicle is running. For this to happen, the engine needs to be running and warm, so that the thermostat will open and allow coolant to flow from the engine block and through the upper radiator hose to the machine where it can be pumped back into the cooling system.

1. Verify that the heater control is turned to its warmest setting and the fan motor is off or to its lowest setting.
2. Verify that the black hose (TO VEHICLE) is connected to the cross flow adapter installed on the radiator.
3. Connect the red hose (FROM VEHICLE) to the cross flow adapter installed on the upper radiator hose. (Figure 25)



**Figure 25.** Forward Flushing Hose Connections

4. Verify that the radiator cap is on the radiator.
5. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – Processing Tank



**Figure 26.** Control Positions

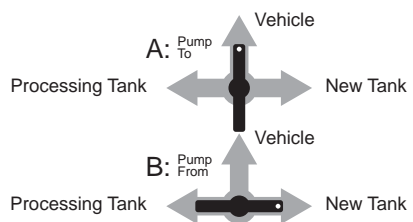
6. Turn the pump on and slowly increase until the system pressure gauge indicates 3 psi less than the cap pressure rating. The pump should stall out at this point. Lock the PUMP SPEED CONTROL knob.
7. Start the engine.
8. When the thermostat opens, the pump will start pumping again and coolant will flow into the Processing Tank.
 

**Note:** At times the cooler fluid will cause the thermostat to close. If the pump is set correctly, it will stall out before excess system pressure builds up and restart when the thermostat opens again.
9. Allow the pump to flush for several minutes.
10. Verify that coolant is flowing through the sight glass in the red hose (FROM VEHICLE). Continue flushing for 10 minutes.

### EXCHANGE COOLANT

The FORWARD FLUSHING procedure should have been performed just prior to exchanging the coolant in the vehicle. If not, go back and complete those steps.

1. Verify that the black hose (TO VEHICLE) is connected to the cross flow adapter installed on the radiator and that the red hose (FROM VEHICLE) is connected to the cross flow adapter installed on the upper radiator hose. See Figure 25.
2. Verify that you have at least three more gallons of coolant in the NEW COOLANT TANK than the capacity of the vehicle's cooling system.
3. Verify that the engine is running, the heater control is set to its warmest setting, and the fan motor is off or to its lowest setting.
4. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Tank



**Figure 27.** Control Positions

- Monitor the sight glass in the red hose (FROM VEHICLE). You will see coolant flowing through it when the thermostat is open.
- The pump should be on and set according to the steps in FORWARD FLUSHING. The pump should stall out at this point. Lock the PUMP SPEED CONTROL knob if not already done.

**Note:** At times the cooler fluid from the New Coolant tank may cause the thermostat in the vehicle to close. If the pump is set correctly, it will stall out before excess system pressure builds up and restart when the thermostat opens up again.

- Observe the coolant flowing through the sight glass in the red hose (FROM VEHICLE). When the color of the coolant turns from a dull gray color to a bright green color, the new coolant has replaced the old.

### DISCONNECTING

The fluid level in the radiator must be lowered to prevent coolant from leaking out when reconnecting the upper radiator hose to the radiator. After removing the Cross Flow Adapters and reconnecting the upper radiator hose, the fluid level in the radiator should be restored.

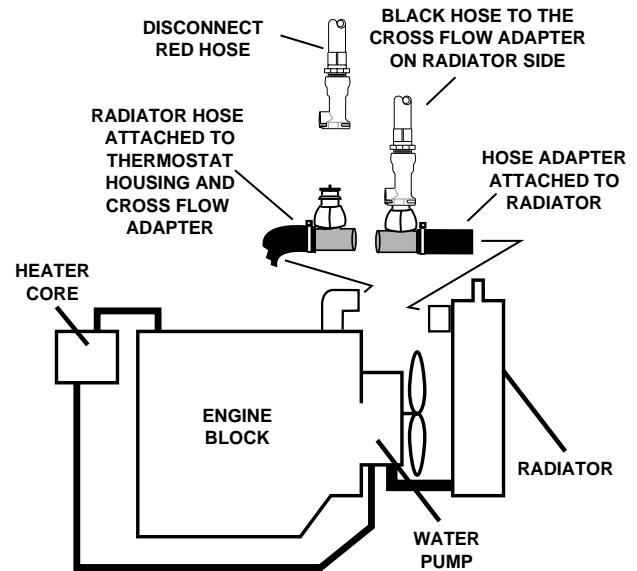
- Turn the engine off.
- Turn the Pump Speed Control off (counterclockwise).



### WARNING

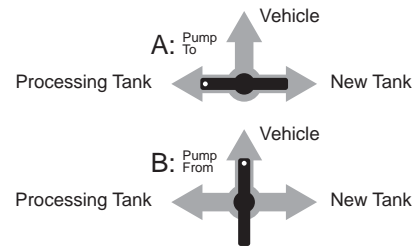
Hot antifreeze/coolant can burn skin and injure the eyes. Hot vehicle cooling systems are under pressure. Opening a hot system can cause hot antifreeze/coolant to be forcibly sprayed in all directions. Never attempt to open a vehicle radiator cap, cut hoses or open the system in any way if it is hot. Wait until the system cools down before attempting to open the system.

- Disconnect the red hose (FROM VEHICLE) from the cross flow adapter installed on the upper radiator hose. (Figure 28)



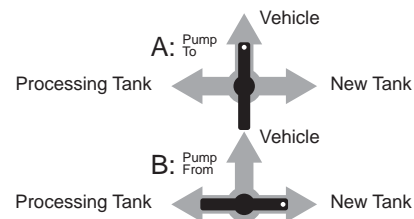
**Figure 28.** Cross Flow Adapter Connections

- Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle



**Figure 29.** Control Positions

- Draw a small amount of coolant out of the top of the radiator by turning the pump on (clockwise) to a slow speed and then off after several seconds.
- Disconnect the black hose (TO VEHICLE) from the cross flow adapter installed on the radiator and connect it to the cross flow adapter installed on the upper radiator hose.
- Turn pump on (clockwise) slowly for several seconds to pull the coolant out of the upper radiator hose. It should collapse unless the engine is too hot and the thermostat is still open. If so, wait until engine cools and try again.
- Remove the cross flow adapters and reconnect the upper radiator hose to the radiator.
- Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Tank



**Figure 30.** Control Positions

10. Carefully remove the radiator cap.
11. Attach the Drain-Fill hose to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE) and place the end into the radiator.
 

**Note:** Be careful not to let coolant spill out of the black hose after attaching the Drain-Fill hose.
12. Turn pump on (clockwise) slowly and fill until fluid level is up to the neck of the radiator.
13. Start the vehicle and allow it to warm up.
14. If necessary, continue to fill the radiator with new coolant by turning the pump on slowly.
15. Fill the overflow tank in the same manner if necessary.
16. Replace the radiator cap.

## COLD CAR METHOD

The COLD CAR METHOD offers several benefits to servicing the vehicle's cooling system. The COLD CAR METHOD is the only method that can be used for back flushing the cooling system and for draining the system for repair. You may want to use HOT CAR METHOD if the engine compartment is designed in a very tight space which severely restricts your ability to access the heater hose.

A typical cooling system service using the Cold Car Method consists of connecting the machine hoses to the vehicle, testing the cooling system for leaks and testing the radiator cap, backflushing the system to loosen and remove scale and other deposits, replacing the old coolant, and disconnecting the machine from the vehicle.



### WARNING

The unexpected movement of a vehicle can cause injury or death. When working on a vehicle, always set the parking brake or block the wheels of the vehicle being serviced.

Move the vehicle into servicing position and shut off the engine. Set the transmission in park or neutral and set the parking brake or block all four wheels.



### WARNING

Hot engines, exhaust systems, and hot cooling systems can cause severe burns. Wait until the engine has cooled in the vehicle being serviced before removing the radiator cap, cutting a system hose or in any way opening the vehicle cooling system when the engine is hot. Always wait until the engine cooling system is cooled down before attempting service.

### INSPECT THE VEHICLE

Always inspect the vehicle before proceeding with the coolant change.

1. Check fan belts for wear and adjust to the proper tension, if necessary.
2. Check for damp spots or rust near or on the hose clamps, water pump, or other areas that might indicate possible leakage.
3. Check hose clamps for tightness and inspect all hoses for swelling, hardness, cracks, soft spots, or other signs of wear or aging.
4. Inspect radiator cap for signs of damage or wear. Also, find and note the pressure rating printed on the radiator cap.
5. Repair or replace damaged parts as necessary.



### WARNING

Hot antifreeze/coolant can burn skin and injure the eyes. Hot vehicle cooling systems are under pressure. Opening a hot system can cause hot antifreeze/coolant to be forcibly sprayed in all directions. Never attempt to open a vehicle radiator cap, cut hoses or open the system in any way if it is hot. Wait until the engine cools down before attempting to open the system.

### MAKING CONNECTIONS AND TESTING THE COOLING SYSTEM

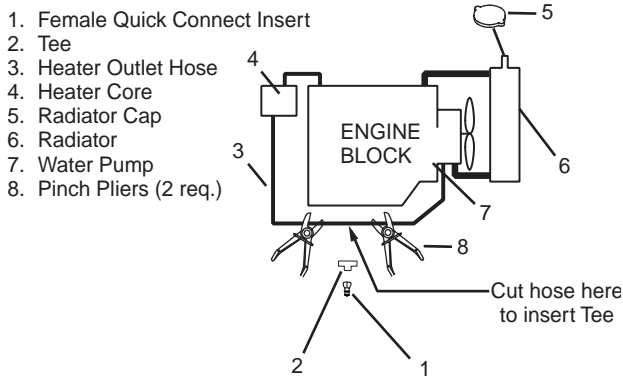
Connecting the machine to the vehicle using the COLD CAR METHOD will require the installation of a permanent tee fitting in the heater hose and a temporary cross flow adapter in the upper radiator hose. If the vehicle that is being serviced only has a radiator cap on the overflow reservoir, see the UNIQUE SITUATIONS section near the end of the manual.



**Attach Permanent Tee Fitting**

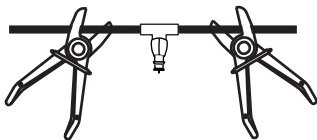
**Note:** In some cases, you may not want to cut the heater hose and install a permanent tee in the hose. See the UNIQUE SITUATIONS section near the end of the manual for instructions on how to install a temporary tee without cutting the hose.

1. Start the engine and set the heater control to the warmest setting. Allow the engine to run for 2 or 3 minutes. This will open any vacuum controlled valves.
2. Turn the vehicle off, but leave the heater controls set to its warmest setting.
3. Locate the heater outlet hose that runs between the heater core and the water pump or the radiator.
4. Pinch off the hose with two pinch-off pliers 6 inches apart in a convenient spot for the tee to be installed. (Figure 31)



**Figure 31.** Install Permanent tee

5. Cut the hose between the two pinch-off pliers.
6. Slide hose clamps onto the hose next to each of the pinch-off pliers.
7. Insert the tee fitting into each end of the hose and fasten securely with the hose clamps.
8. Screw the female Quick Connect Insert (Figure 32) onto the tee fitting.



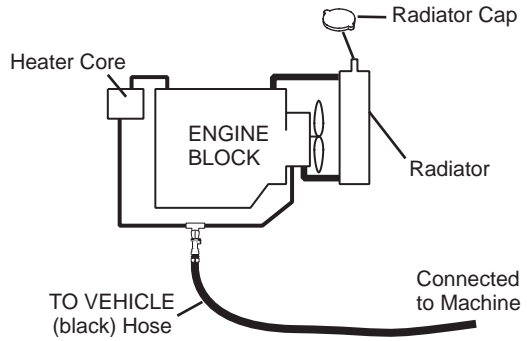
**Figure 32.** Attach female Quick Connect Insert

9. Remove both pinch-off pliers.

**Pressure Test**

The Pressure Test is performed to determine if the radiator cap is working properly (it should relieve pressure at  $\pm 3$  psi of its rating and coolant will flow into the overflow tank). It will also help you detect leaks in the cooling system. When the cooling system is pressurized, coolant will be forced out any small cracks or holes, enabling you to find the location and repair the leak.

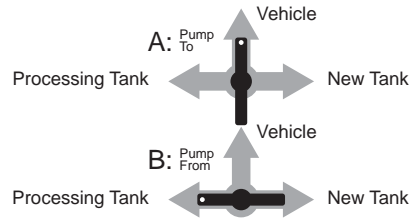
1. Verify that the radiator cap is in place and note the cap pressure rating.
2. Connect the black hose (TO VEHICLE) to the tee fitting installed in the heater hose. (Figure 33)



**Figure 33.** Connect Black Hose (TO VEHICLE)

3. Set the controls:

- Valve A: PUMP TO – Vehicle
- Valve B: PUMP FROM – Processing Tank



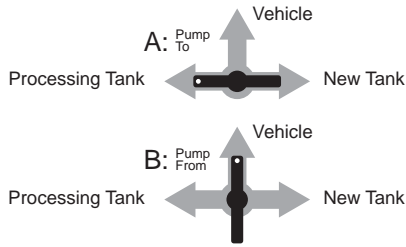
**Figure 34.** Control Positions

4. Turn the Pump Speed Control on (clockwise). Watch the COOLING SYSTEM PRESSURE gauge. When it reaches 3 psi less than the cap rating, turn the pump off (counterclockwise) and check the radiator and hoses for leaks. The gauge will probably go down 1 or 2 psi, but should hold after that if there are no leaks.
5. Restart the pump again and let the pressure continue to rise, but not to exceed 3 psi over the cap pressure rating.
6. Observe the COOLING SYSTEM PRESSURE gauge. If the radiator cap is operating properly, coolant will be released into overflow tank within  $\pm 3$  psi of the cap rating.
7. If the radiator cap releases coolant into the overflow reservoir, it has passed this test, otherwise replace the cap and perform the test again.

**Vacuum Test**

The purpose of the Vacuum Test is to check if the radiator cap will allow coolant to be drawn from the overflow tank back into the cooling system. It will also lower the fluid level in the upper radiator hose which will reduce coolant loss when attaching the cross flow adapter. If this test is successful, it also gives the benefit of draining the coolant from the overflow tank so that it will be recycled as well.

1. Verify that the radiator cap is in place and that the black hose (TO VEHICLE) is attached to the tee fitting installed in the heater hose. See Figure 33.
2. Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle



**Figure 35.** Control Positions

3. Turn the Pump Speed Control on (clockwise). Watch the fluid in the overflow tank. When there is sufficient vacuum, typically  $-8$  to  $-10$ , the remaining coolant will be sucked back into the radiator. If coolant is not sucked out of the overflow tank, replace the radiator cap and repeat the test.
4. Turn the Pump Speed Control off (counterclockwise).

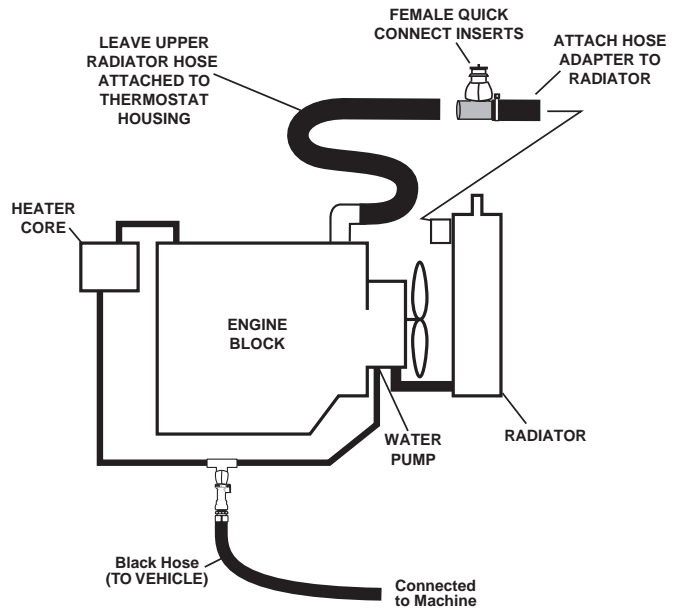
#### Attach Cross Flow Adapter

The fluid level in the upper radiator hose must be lowered to prevent coolant from leaking out of the upper radiator hose when attaching the cross flow adapter. If you just performed the vacuum test, the fluid level should already be low enough. If it is not low enough, remove the radiator cap and turn the pump on with the valves in the same position as they were for the Vacuum Test (Figure 35). If the vehicle has a vertical flow radiator (fins are oriented up and down), see the UNIQUE SITUATIONS section near the end of the manual for alternate instructions on how to quickly make the connection for the red hose (FROM VEHICLE).

1. Detach the upper radiator hose from the radiator. Leave the hose connected to the thermostat housing on the engine block.
2. Attach the other end of the upper radiator hose to the closed end of the cross flow adapter and secure with a hose clamp.
3. Install a hose adapter of the same diameter as the upper radiator hose onto the open end of cross flow adapter with a hose clamp.

**Note:** After you have installed the hose adapter onto the cross flow adapter, you may leave it connected for future use.

4. Connect the cross flow adapter and hose adapter to the radiator. (Figure 36) Tighten the hose clamp securely.



**Figure 36.** Connect Cross Flow Adapter

5. Screw the female Quick Connect Insert onto the cross flow adapter.

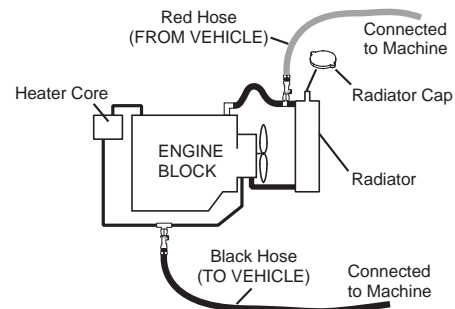
#### BACK FLUSHING

Back flushing is the process of pumping fluid in the reverse direction of its normal flow in the vehicle cooling system when the vehicle is in operation.

1. Verify that the heater control is turned to its warmest setting.

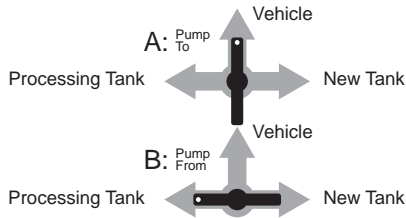
**Note:** Since the engine will be off, you may need to keep the heater water valve (in or near the heater core) open by using an external vacuum source (e.g. Mityvac, etc.).

2. Verify that the black hose (TO VEHICLE) is connected to the tee which was installed in the heater hose.
3. Connect the red hose (FROM VEHICLE) to the cross flow adapter (Figure 37).



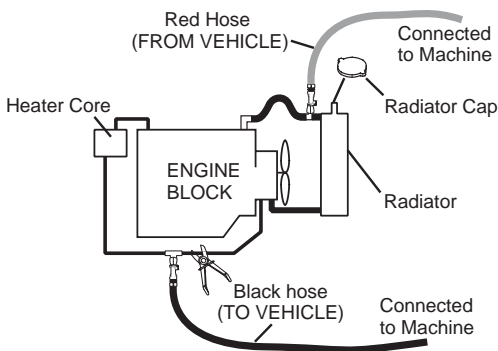
**Figure 37.** Attach Red Hose

4. Verify that the radiator cap is on the radiator.
5. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – Processing Tank



**Figure 38.** Control Positions

6. Turn the Pump Speed Control on (clockwise). Regulate the pressure on the COOLING SYSTEM PRESSURE gauge so that it remains below the rated pressure for the radiator cap.
7. Allow the pump to run for several minutes. This step will back flush the radiator only.
8. Pinch off the heater hose next to the tee where the black hose (TO VEHICLE) is connected (Figure 39). The pinch-off pliers should be on the side of the tee going toward the water pump. This will redirect the flow of the coolant into the heater core, through the engine block, through the radiator, and out the red hose (FROM VEHICLE) back to the Processing Tank.



**Figure 39.** Pinch Off Heater Hose

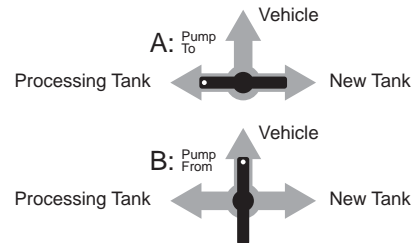
9. Verify that coolant is flowing through the sight glass in the red hose (FROM VEHICLE) or coming out of the short tube in the Processing Tank. Continue backflushing for 10 minutes.
10. Turn the PUMP SPEED CONTROL counterclockwise to turn the pump off unless you immediately advance to the next function.
11. Determine which function you will perform next.
  - a. DRAIN AND FILL — if you intend to perform repair or replacement work on the cooling system and need to have the coolant drained.
  - b. EXCHANGE COOLANT — if no repairs are needed, and you are ready to exchange the coolant.

### DRAIN AND FILL

When there is a need to perform service on the cooling system such as replacement of the water pump or radiator, this machine will efficiently drain about two thirds of the coolant from the cooling system and hold it until the repairs are complete and you are ready to fill the system back up again.

1. Verify that the black hose (TO VEHICLE) is connected to the tee fitting installed in the heater hose.

2. Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle

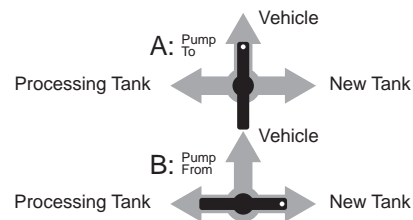


**Figure 40.** Control Positions

3. Remove the radiator cap from the radiator.
4. Turn the Pump Speed Control on (clockwise). Watch the fluid being pumped into the processing tank.
5. When there seems to be no more coolant flowing into the processing tank, turn the Pump Speed Control off (counterclockwise).
6. Complete the necessary repairs on the vehicle.
7. Verify that the red hose (FROM VEHICLE) is connected to the cross flow adapter and the black hose (TO VEHICLE) is connected to the tee fitting installed in the heater hose. See Figure 37.
8. Verify that the pinch-off pliers is locked on the heater hose on the side of the tee fitting that goes to the water pump and that the heater control is set to its warmest setting with an external vacuum source applied if necessary. See Figure 39.
9. Replace the radiator cap on the radiator.

**Note:** Steps 10–15 will fill the cooling system with new coolant and purge the remainder of the old coolant into the Processing Tank.

10. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Coolant Tank



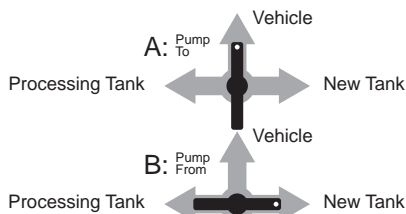
**Figure 41.** Control Positions

11. Verify that there is at least three more gallons of coolant in the New Coolant Tank than the capacity of the cooling system of the vehicle.
12. Turn the Pump Speed Control on (clockwise) and regulate the pressure on the COOLING SYSTEM PRESSURE gauge so that it remains below the rated pressure for the radiator cap.
13. Eventually, the new or recycled coolant will begin flowing through the sight glass in the red hose (FROM VEHICLE).
14. Remove the pinch-off pliers from the heater hose.
15. Turn the pump off and advance to the DISCONNECTING section.

## EXCHANGE COOLANT

The BACK FLUSHING procedure should have been performed just prior to exchanging the coolant in the vehicle. If not, go back and complete those steps.

1. Verify that the black hose (TO VEHICLE) is connected to the tee fitting installed in the heater hose and that the red hose (FROM VEHICLE) is connected to the CROSS FLOW adapter installed on the upper radiator hose. See Figure 37.
2. Verify that the pinch-off pliers is locked on the heater hose on the side of the tee fitting that goes to the water pump and that the heater control are to their warmest setting with an external vacuum source applied if necessary. See Figure 39.
3. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Tank



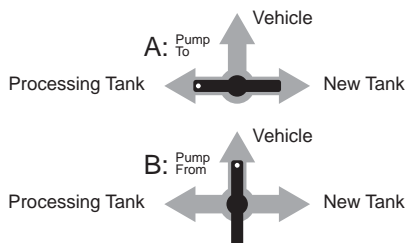
**Figure 42.** Control Positions

4. Verify that you have at least three more gallons of coolant in the NEW COOLANT TANK than the capacity of the vehicle's cooling system.
5. Turn the Pump Speed Control on (clockwise) and regulate the pressure on the COOLING SYSTEM PRESSURE gauge so that it remains below the rated pressure for the radiator cap.
6. Observe the coolant flowing through the sight glass in the red hose (FROM VEHICLE). When the color of the coolant turns from a dull gray color to a bright green color, the new coolant has replaced the old.
7. Turn the Pump Speed Control off (counterclockwise).

## DISCONNECTING

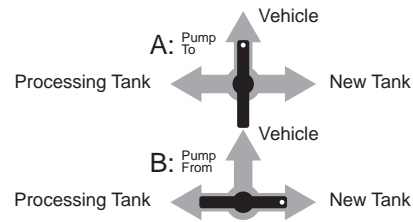
The fluid level in the radiator must be lowered to prevent coolant from leaking out when reconnecting the upper radiator hose to the radiator. After removing the Cross Flow Adapter and reconnecting the upper radiator hose, the fluid level in the radiator should be restored.

1. Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle



**Figure 43.** Control Positions

2. Remove the radiator cap.
3. Disconnect the red hose (FROM VEHICLE) from the cross flow adapter.
4. Turn pump on (clockwise) slowly until fluid level is lowered enough to prevent coolant from leaking out when the cross flow adapter is removed.
5. Remove the cross flow adapter and hose adapter from the radiator and replace the upper radiator hose.
6. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Tank



**Figure 44.** Control Positions

7. Turn pump on (clockwise) slowly until fluid level come back up to the neck of the radiator.
8. Disconnect the black hose (TO VEHICLE) from the tee fitting on the heater hose.
9. Pinch the heater hose on both sides of the tee fitting. Remove the female Quick Connect Insert and replace with a cap and washer that came with the tee fitting. Remove both pinch-off pliers.
10. Start the vehicle and allow it to warm up.
11. If necessary, fill the radiator with new coolant by attaching the Drain-Fill hose to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE) and turn the pump on slowly.
 

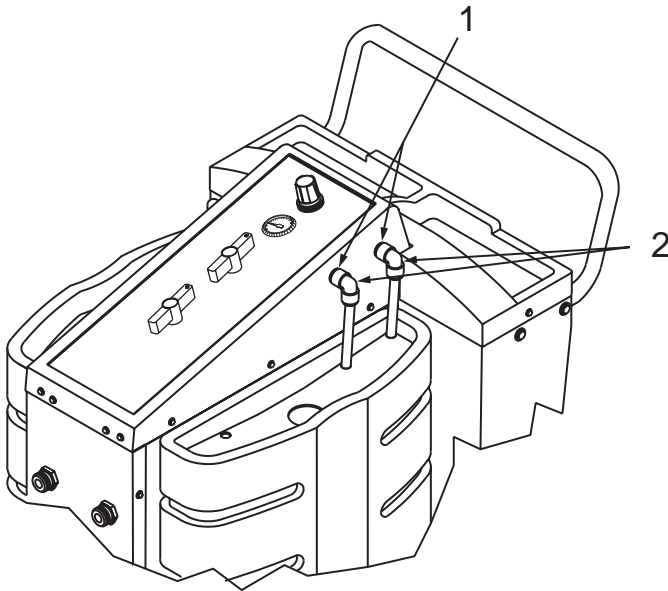
**Note:** Be careful not to let coolant spill out of the black hose after attaching the Drain-Fill hose.
12. Fill the overflow tank in the same manner if necessary.
13. Replace the radiator cap.

# SPECIAL PROCESSES

## REMOVING AND REPLACING SIDE TANKS

There are several reasons for removing and replacing the side tanks. One reason might be to set up the machine for use with vehicles that contain coolant other than the standard domestic coolant. Another reason would be to replace cracked or leaking tanks. Yet a third reason would be to thoroughly clean out the sludge that accumulates in the bottom of the tanks.

**Note:** Mark the existing tanks as NEW COOLANT and PROCESSING tank. Mark the new tanks according to the purpose you intend for them.



**Figure 45.** Remove Elbow Couplings

1. Use a needle nose pliers to press inward on the small ring (1) at the top of each elbow coupling where it attaches to the side of the machine above the side tank you are going to remove.
2. Pull out on the elbow (2), attached to the tubing that extends down into the side tank. Lift up on the tubing and the tubing will slip out of the tank.
3. When both plastic tubes have been removed from the tank, lift the side tank up and away.
4. Lift the new side tank in place and press down until it locks in place on the side of the recycler.
5. Insert the plastic tubes from the old side tank into the hole provided for each in the new tank.

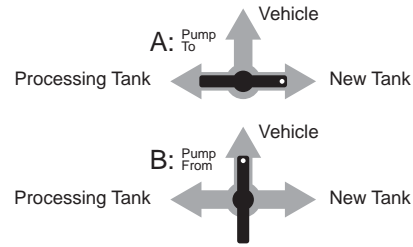
**Note:** The unit will not function properly if the tubes that enter the tank are not reinstalled in the proper locations. Make certain the longer tube is reinstalled through the hole nearest the rear of the tank.

6. Press the elbow coupling into the hole in the side of the machine. The pressure on the tubing will fix the elbow coupling in place.

## PULL NEW COOLANT INTO THE NEW COOLANT TANK

You can easily transfer new coolant from a large bulk container

1. Attach the Drain-Fill hose to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE) to open the hose to atmosphere.
2. Insert the end of the Drain-Fill hose into a container mixed with desired parts of coolant and distilled water.
3. Set the controls:
  - Valve A: PUMP TO – New Tank
  - Valve B: PUMP FROM – Vehicle



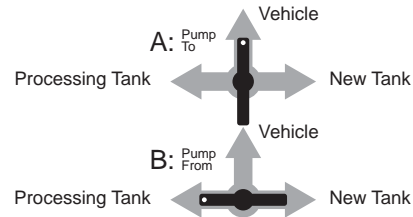
**Figure 46.** Control Positions

4. Turn the Pump Speed Control on (clockwise) and run until the desired amount of the fluid is transferred.
5. Remove the Drain-Fill hose and Quick Connect Insert from the black hose (TO VEHICLE).

## EMPTY THE USED FLUID FROM THE PROCESSING TANK

**Note:** This procedure should be used for Asian or European coolants. If you have Dex-cool or standard domestic coolant in the PROCESSING TANK.

1. Attach the Drain-Fill hose to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE) to open the hose to atmosphere.
2. Insert the end of the Drain-Fill hose into a suitable container for disposing of used coolant.
3. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – Processing Tank



**Figure 47.** Control Positions

4. Turn the Pump Speed Control on (clockwise) and run until the desired amount of the fluid is transferred.
5. Remove the Drain-Fill hose and Quick Connect Insert from the black hose (TO VEHICLE).

## UNIQUE SITUATIONS

### INSTALLATION OF A TEMPORARY TEE

There may be instances where it is not desirable to install a permanent flushing tee. In these cases, a temporary tee may be installed and then removed after servicing the cooling system. The original uncut hose can be reattached after the flushing tee is removed.

1. Remove the heater hose that runs from the water pump to the heater core at the point it attaches to either the heater core or the water pump with a hose clamp. If this is not possible, then you must install a permanent flushing tee in the vehicle.
2. Obtain a length of hose the same diameter as the heater hose and attach it to the flushing tee of the same diameter with a hose clamp.
3. Attach the end of the heater hose that was disconnected to the other side of the flushing tee with a hose clamp.
4. Attach the remaining end of hose to the heater core or water pump, depending on where you disconnected the original hose.

## ATTACHING A RADIATOR CAP ADAPTER

There is a shortcut for vehicles with a vertical flow radiator (the fins in the radiator run up and down). Instead of removing the upper radiator hose and installing a cross flow adapter, you may attach a radiator cap adapter when using the COLD CAR METHOD.

1. When you are ready to attach the cross flow adapter during the COLD CAR METHOD, skip steps 1–4 and instead remove the radiator cap and replace it with the radiator cap adapter.
2. For step 5, screw the female Quick Connect Insert onto the radiator cap adapter instead of the cross flow adapter.

## RADIATOR CAP IS ON THE OVERFLOW RESERVOIR

Perform the normal steps of operation for either the Hot Car Method or Cold Car Method except that you must pinch off all hoses to the overflow reservoir before starting the Flushing function and then disconnect them at the end of the service. Since you are originally supplied with only 2 pinch-off pliers, you will need to order 2 or 3 extras.

## VEHICLES KNOWN TO CONTAIN LEAK PREVENTION ADDITIVES

When you are aware of vehicles that contain a leak prevention additive, you should not attempt to recycle the coolant. Furthermore, you should take measures to not contaminate any coolant that would likely be recycled at a future time. Recycling coolant with a leak prevention additive will immediately clog the filters and require replacement.

1. Replace the Processing Tank with a side tank marked DISCARD according to instructions in REMOVING AND REPLACING SIDE TANKS.
2. Fill the DISCARD TANK with at least one gallon of water.
3. Perform the following functions in either the HOT CAR METHOD or COLD CAR METHOD.
  - a. Inspect the Vehicle

- b. Making Connections and Testing the Cooling System
- c. Forward Flushing or Back Flushing
- d. Drain and Fill (Cold Car Method only)
- e. Exchange Coolant
- f. Disconnecting
4. Pump the contents of the DISCARD TANK into a container suitable for proper disposal.
5. Flush out the machine according instructions in MAINTENANCE.
6. Replace the DISCARD TANK with the PROCESSING TANK removed in step 1.

## THERMOSTAT IS NOT LOCATED ON THE TOP OF THE BLOCK

For both HOT CAR METHOD and COLD CAR METHOD, you must remove the thermostat during the cooling system service. Remember to reinstall the thermostat after completing the service.

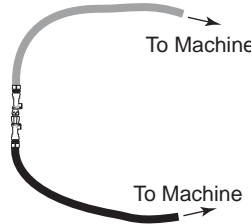
During the COLD CAR METHOD, you must attach the open end of the upper radiator hose to the closed end of the cross flow adapter. Be sure to use a hose clamp to prevent coolant from leaking out.

## SERVICING VEHICLES WITH ALTERNATE TYPES OF COOLANT

Besides domestic coolant (blue-green in color), there are three other major types of coolant. Dex-Cool is also used in the United States. It is orange in color, Asian (red) or European (blue or colorless).

1. For vehicles with Dex-Cool that you want to continue using Dex-Cool instead of converting to standard domestic coolant:
  - Mark the existing tanks as NEW COOLANT and PROCESSING tank.
  - Replace the NEW COOLANT tank with a new tank designated for new Dex-Cool coolant and mark it as NEW Dex-Cool.
  - After disconnecting the machine from the vehicle, replace the NEW Dex-Cool tank with the NEW COOLANT tank that was previously installed on the machine.
  - Store any remaining new Dex-Cool coolant in the side tank that you just removed from the machine. Be careful to store it in a location that will not accidentally be tipped over.
2. For other types of coolant such as Asian or European:
  - Mark the existing tanks as NEW COOLANT and PROCESSING tank.
  - Replace both side tanks with new side tanks designated for that particular use.
  - Mark the left tank DISCARD and the right TANK either NEW ASIAN or NEW EUROPEAN.
  - Fill the NEW TANK with new Asian or new European coolant, depending on your application.

- After disconnecting the machine from the vehicle, replace the NEW ASIAN or NEW EUROPEAN tank with the NEW COOLANT tank that was previously installed on the machine.
- Store any remaining Asian or European coolant in the side tank that you just removed from the machine. Be careful to store it in a location that will not accidentally be tipped over.
- Screw a male and a female Quick Connect Insert together and connect them to the ends of the black and red hoses. See Figure 48.



**Figure 48.** Quick connect hose connection

- With at least one gallon of water in the NEW COOLANT tank, pump from the NEW COOLANT TANK into the DISCARD (Processing) tank until the NEW COOLANT tank is empty. The Asian or European coolant will be purged from the machine. (Valve A: PUMP TO – Vehicle; Valve B: PUMP FROM – New Tank)
- Replace the DISCARD tank with the PROCESSING tank and properly dispose of the used coolant.

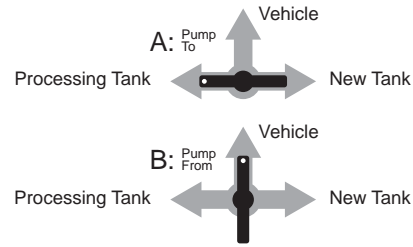
## MAINTENANCE

Keep your Antifreeze/Coolant System Service Center looking good and operating efficiently by performing regular maintenance. Coolant will occasionally splash and deposit on the exterior of the machine. Periodically wipe down the side tanks and metal casing with a cloth and mild cleaner.

### CLEANING THE HOSE SCREENS

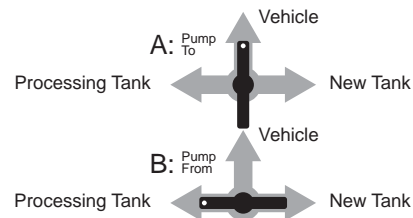
Periodically, the screens in the hoses that are designed to prevent larger particles from entering the machine, need to be removed and cleaned. If the COOLING SYSTEM PRESSURE gauge starts reading higher than normal pressure for no apparent reason, it may be that the hose screens are plugged with debris.

1. Screw a male and a female Quick Connect Insert together and connect them to the ends of the black and red hoses. (Figure 48)
- 2. Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle



**Figure 49.** Control Positions

3. Turn the Pump Speed Control on (clockwise) and run until the flow of coolant into the Processing Tank stops. (This will drain the hoses of fluid)
4. Slowly remove the red hose from the machine. This will allow any remaining coolant in the hose to be pumped into the processing tank.
5. Remove black hose from the machine and remove the hose screens from both hoses. Clean them by blowing compressed air through them or by flushing water through them.
6. Replace the hose screens back in the hoses. Reconnect the hoses to the machine. Leave the hoses connected to each other with the Quick Connect Inserts.
7. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – Processing Tank



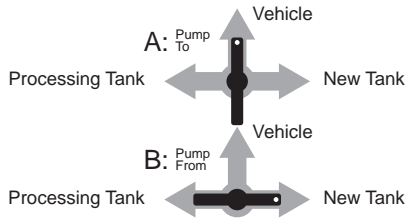
**Figure 50.** Control Positions

8. Turn the Pump Speed Control on (clockwise) and run until the flow of coolant into the Processing Tank has a steady stream of coolant. (This will prime the machine.)
9. Remove the Quick Connect Inserts from the end of the hoses.

### FLUSHING OUT THE MACHINE

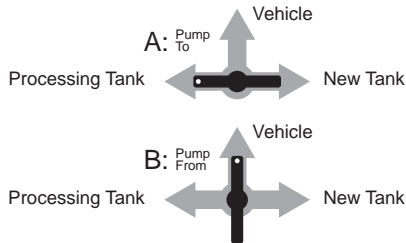
Once a year, the machine should be thoroughly cleaned to keep it running smoothly and efficiently. The internal piping should be flushed with water and the side tank should be cleaned to remove any debris that has settled on the bottom.

1. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Tank



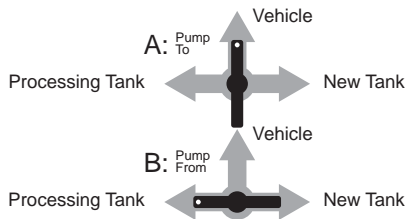
**Figure 51.** Control Positions

2. Attach the Drain-Fill hose to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE).
3. Insert the end of the Drain-Fill hose into a suitable container for holding the new coolant.
4. Turn the Pump Speed Control on (clockwise) and run until the New Tank is empty and the flow of coolant into the container has stopped.
5. Spray the inside of the Processing Tank with a garden hose to loosen any debris or sludge that has accumulated on the bottom of the tank.
6. Remove the tank and drain water and sludge into a suitable container for proper disposal. Replace Processing Tank when clean. See REMOVING AND REPLACING SIDE TANKS for detailed instructions.
7. Set the controls:
  - Valve A: PUMP TO – Processing Tank
  - Valve B: PUMP FROM – Vehicle



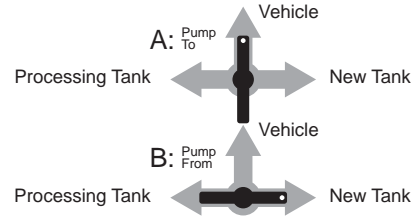
**Figure 52.** Control Positions

8. Fill a container with 3 gallons of water and place the end of the Drain-fill hose into it.
9. Turn the Pump Speed Control on (clockwise) and run until the water is transferred into the Processing Tank. Disconnect the Drain-fill hose from the black hose (TO VEHICLE).
10. Screw a male and a female Quick Connect Insert together and connect them to the ends of the black and red hoses. See Figure 48.
11. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – Processing Tank



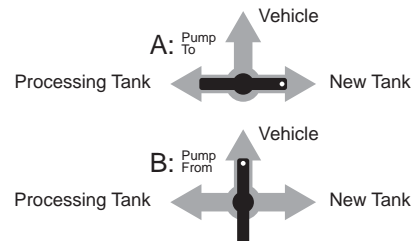
**Figure 53.** Control Positions

12. Turn the Pump Speed Control on (clockwise) and run until a steady stream of water is flowing into the Processing Tank.
13. Turn Valve A: PUMP TO – to New Tank and run until the water is transferred into the New Coolant Tank.
14. Set the controls:
  - Valve A: PUMP TO – Vehicle
  - Valve B: PUMP FROM – New Tank



**Figure 54.** Control Positions

15. Disconnect the Quick Connect Insert from the red hose (FROM VEHICLE) and unscrew it from the other Quick Connect Insert. Attach the Drain-Fill hose to a male Quick Connect Insert and connect it to the Quick Connect Coupler at the end of the black hose (TO VEHICLE).
16. Insert the end of the black hose (TO VEHICLE) into a suitable container for proper disposal of contaminated water.
17. Turn the Pump Speed Control on (clockwise) and run until the New Tank is empty.
18. Set the controls:
  - Valve A: PUMP TO – New Tank
  - Valve B: PUMP FROM – Vehicle

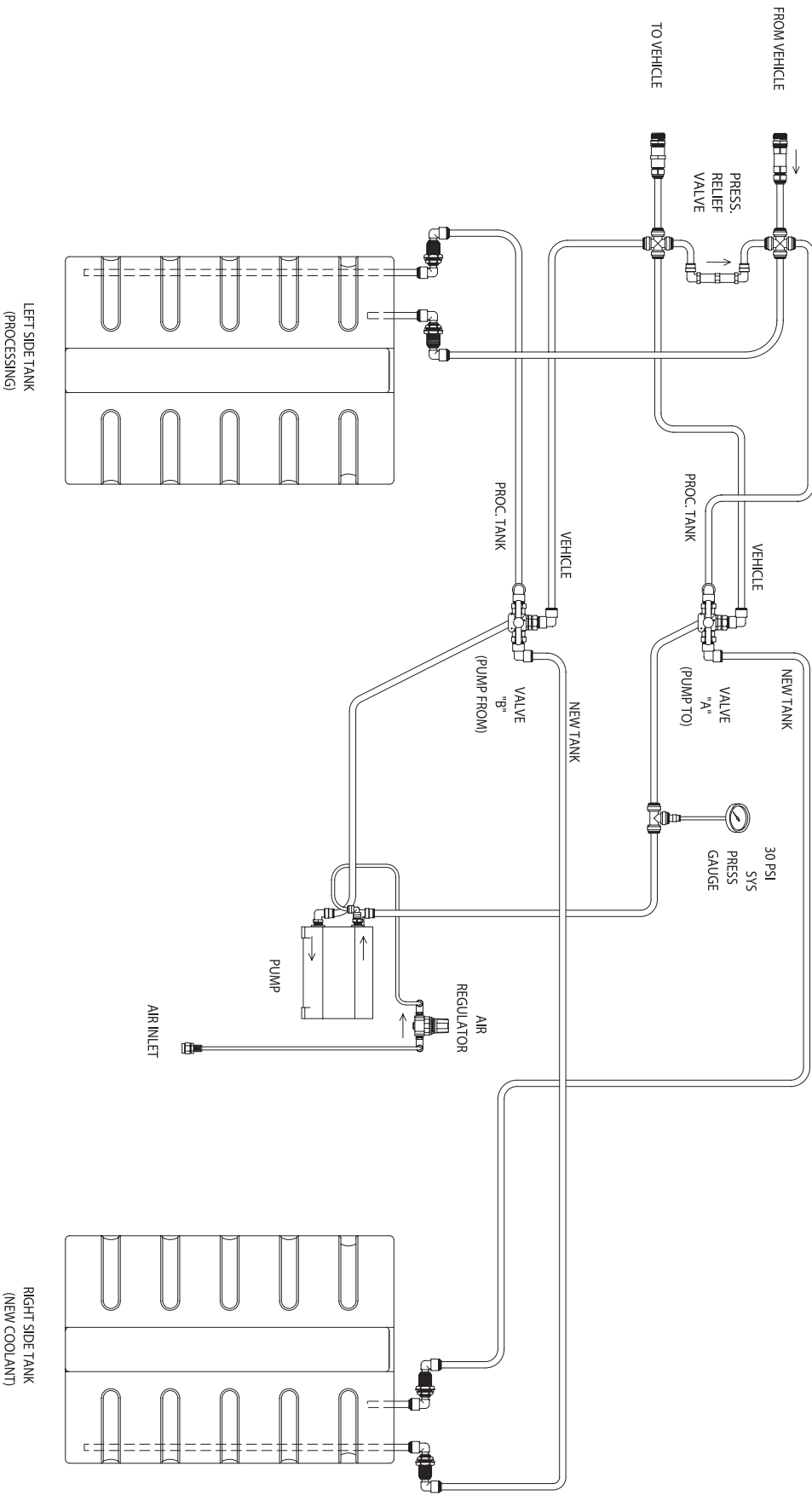


**Figure 55.** Control Positions

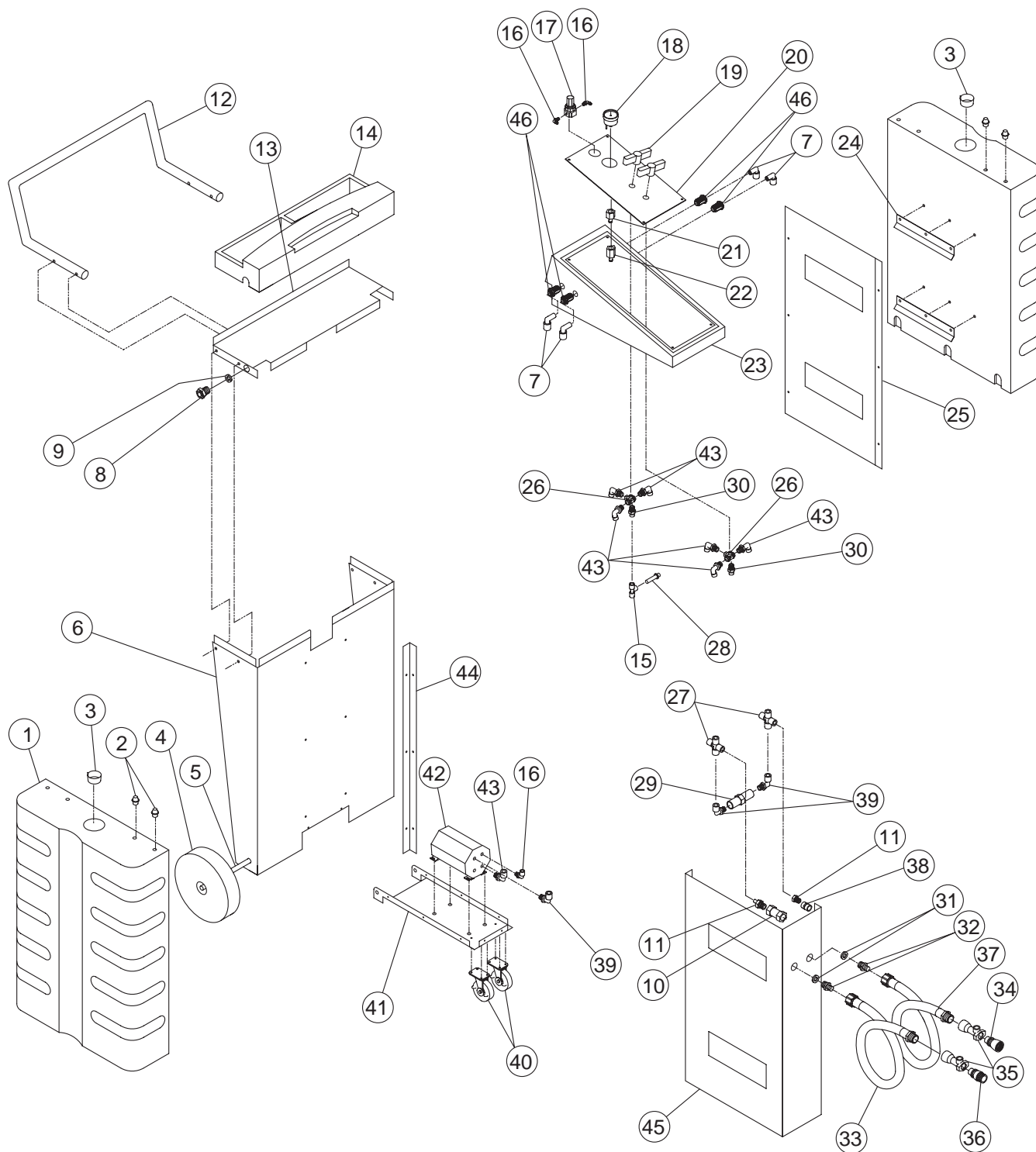
19. Insert the end of the black hose (TO VEHICLE) with the Drain-Fill hose attached into the container used for holding the new coolant.
20. Turn the Pump Speed Control on (clockwise) and run until all of the coolant is transferred back into the machine.
21. Prime the Machine. See PRIMING THE MACHINE.
22. Clean the outside of the machine with a mild cleaner.



# PLUMBING DIAGRAM



# REPLACEMENT PARTS





# LIMITED WARRANTY

The manufacturer warrants that for one year from date of purchase, of this Antifreeze/Coolant MACHINE (excluding normal wear components), they will repair, at no charge for parts or labor, this MACHINE that is proven to be defective in material or workmanship. If after reasonable efforts by the manufacturer, this MACHINE is deemed to be not repairable, the manufacturer will, at its option refund the original purchase price or supply a replacement MACHINE.

This warranty extends to the MACHINE only. It does not apply to any accessory items included with the product that are subject to wear from usage. Likewise, this warranty does not extend to any normal-wear components of the pump. The replacement or repair of these items shall be at the expense of the owner.

THE TERMS OF THE MANUFACTURER'S LIMITED WARRANTY ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND CONSTITUTE THE BUYER'S SOLE AND EXCLUSIVE REMEDY. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THIS EXPRESS WARRANTY.

THE MANUFACTURER SHALL NOT BE LIABLE FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES UNDER ANY CIRCUMSTANCES. THE MANUFACTURERS LIABILITY, IF ANY, SHALL NEVER EXCEED THE PURCHASE PRICE OF THIS PRODUCT, REGARDLESS OF WHERE LIABILITY IS PREDICATED UPON BREACH OF WARRANTY (EXPRESS OR IMPLIED), NEGLIGENCE, STRICT TORT OR ANY OTHER REMEDY.

This warranty extends to each person who acquires lawful ownership within one year of the original retail purchase for the MACHINE, but is void if it has been abused, altered, misused, or improperly packaged and damaged when returned for repair.

Some states do not permit the limitation of warranties or limitation of consequential or incidental damages, so the above disclaimer and limitation may not apply to you. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

## TO OBTAIN EQUIPMENT SERVICES UNDER THE WARRANTY

1. Owner pays transportation charges to and return from the nearest Authorized Service Center.
2. Owner may avoid transportation charges, if he wishes, by calling ANTIFREEZE RECYCLER SERVICE, at the telephone number listed below, for free diagnosis and immediate shipment of replacement parts. The owner in this case assumes the responsibility for installation of parts.

Antifreeze Recycler Service  
Eden Prairie, MN 55344  
1-800-328-2921 or (952) 884-3211