

# Power Wave 450 Water Cooler Upgrade Kit

IM645-A

May, 2000

## UPGRADE INSTALLATION INSTRUCTIONS

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### SAFETY

Follow all safety guidelines in your power source operator manual and any additional guidelines covered in this manual.

### GENERAL DESCRIPTION

This upgrade kit is designed to provide all necessary parts and instruction to replace a G2725 water cooler assembly with an improved design G3503-[ ] water cooler assembly. The G3503-1 and G3503 Coolers are interchangeable as complete units only. These procedures are specified by Lincoln Electric and apply to domestic Power Wave 450 machines requiring a Lincoln internal water cooler.



Date of Purchase: \_\_\_\_\_  
Serial Number: \_\_\_\_\_  
Code Number: \_\_\_\_\_  
Model: \_\_\_\_\_  
Where Purchased: \_\_\_\_\_



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## RECOMMENDED TOOLS FOR INSTALLATION OR SERVICE:

- absorbent towels
- alcohol wipe
- 3 mm allen wrench (G3503 only)
- socket wrench
- 4 inch long minimum socket extension
- 1/4, 5/16, and 3/8 hex standard depth sockets
- 5/32 allen socket
- medium blade slotted screwdriver
- large blade slotted screwdriver, 8 inches long minimum
- two 7/16 open or box end wrenches
- one 7/8 open or box end wrench
- needlenose pliers
- two 10 inch long adjustable wrenches
- wire cutter
- molex pin removal tools
- tape measure
- small mechanic's mirror
- flashlight
- dental pick
- digital multimeter (DMM)

## G3503-[ ] INSTALLATION OR SERVICE TOOL USAGE

Fastener Usage	Qty.	Tool
Shroud to cooler base	4	all use 5/16 hex screw and 3/8 hex nut. Relay may require large blade slotted screwdriver 8 in. long min.
Quick Disconnect (QD) bracket	2	
Heat exchanger to cooler base	2	
Relay to cooler base	2	
Screw to fasten reservoir to cooler base	4	3 mm allen wrench (G3503 only) 5/16 Hex Socket (G3503-1 only)
Hose Clamp	10	1/4 hex or medium slotted screwdriver
Fan set screw	1	5/32 allen socket with wrench and 4 in. min. extension
Pump carbonator clamp screw	1	5/16 hex socket with ratchet wrench
Motor mounting bolts	4	two 7/16 open or box end wrenches
Motor access door	2	1/4 hex socket with wrench
Motor harness ground at motor terminals	1 2	1/4 hex socket with wrench needlenose pliers
relay terminals 1 and 2	2	large blade slotted screwdriver 8 in. minimum long.
relay terminals 3 and 4	2	medium slotted screwdriver
All plumbing components	N/R	two 10 inch adjustable wrenches

## S24505 WATER COOLER UPGRADE KIT CONTENTS:

- 1 Cooler assembly, G3503-[ ]
  - Empty Weight: 36 lbs.
  - Overall Size: 22.38x14.00x12.50, LxWxH
  - Electrical Input: 230VAC, 2.8A max. steady state
  - Coolant Connections:
    - Welding Industry Standard Quick-Disconnect (QD) female fittings. Top: Coolant In, Bottom: Coolant Out
- 1 Cooler access panel, L9387-2
- 1 "P4" Electrical power harness (long), S14165-467
- 1 "P3" Electrical extension harness (short), S14165-466
- 1 Circuit breaker, T12287-14, spare replacement
- 2 fasteners, S9225-8, (1/4-20 thread, spares for cooler mounting)
- 4 fasteners, S8025-91, (spares for cooler access panel mounting)
- 2 Hole plugs, T10397-11
- 1 Ground Decal, T13260-4
- 8 cable ties, T13770-2
- 1 Electrical sleeving, E1159/B-1.00-7.00
- 1 "B" Stencil, S21212
- 1 Power Wave machine label: S24503-1
- 2 Mounting Brackets, S10040-93
- 2 Fasteners, T9447-42, (#10-24 UNC-3A)
- 2 Plain washers, S9262-77 (Socket head- cap screws)

## RECOMMENDED COOLANTS

1. The following coolants have been determined to be compatible with the wetted materials used in the G3503-[ ] cooler assembly:
  - Distilled or deionized water
  - Potable tap water
  - Sediment-free mixtures containing a maximum of 50% ethylene glycol or automotive-grade antifreeze and the balance of distilled or deionized water.
2. Ethylene glycol mixtures should be selected if the cooler may be exposed to a temperature below the freezing point of water.
3. Consult gun, torch, and wire feeder manuals for coolant recommendations and select one from the above list.
4. Pure solutions and mixtures of, or materials (i.e. towels) wetted with ethylene glycol are toxic to humans and animals. They must not be haphazardly discarded, especially by pouring liquids down the drain. Contact the local EPA office for responsible disposal methods or for recycling information.
5. The cooler's reservoir has a nominal liquid capacity of 1.6 gallons.

## G3503-[ ] POWER WAVE 450 WATER COOLER UPGRADE KIT

# INSTALLATION INSTRUCTIONS

## ⚠ WARNING



### ELECTRIC SHOCK Can Kill

- Only qualified persons should perform this installation.



### HOT COOLANT CAN BURN SKIN

- Always be sure coolant is not hot before doing any work on cooler parts.



### ROTATING FAN BLADES ARE HAZARDOUS

- Do not put your hands near an operating fan.

- Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from fans and all other moving parts when starting, operating or repairing equipment.
- In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

## REPLACING A G2725 COOLER WITH A G3503-[ ] COOLER

- Preparation:
  - Always switch off the Power Wave machine power.
  - Always disconnect the Power Wave machine from service input power.
- Remove the G2725 cooler assembly:
  - Remove gas cylinder(s) from machine's rear tray.
  - Remove cooler access panel P/N L9387-1 and set aside. It is no longer needed.
  - Remove machine's left side panel (adjacent to power input cord).
  - Disconnect coolant hoses' mounting bracket from machine's case back.
  - Disconnect all of the coolant hoses' tie-down points. These plastic clips may be removed and discarded if desired.
  - Remove and save both fasteners from Power Wave base holding cooler in place. Carefully pull cooler rearward, partially out of the Power Wave.
  - Disconnect Molex in-line connectors P4 or P5 (cooler power) and P3 (cooler relay and pressure switch) and slide cooler completely from machine.
  - Optionally remove circuit breaker from case back and install replacement.

- Peel off "coolant in / coolant out" decal from machine's case back and discard. Remove residual adhesive from case back with an alcohol wipe.
  - Remove auxiliary transformer #2 (mounted to Power Wave base, ahead of G2725 cooler) and set aside. It is no longer needed.
- Slide electrical sleeving over the non-P4 connector in the Power Wave's harness that runs from its terminal strip.
    - Fold sleeving over itself and firmly secure it to the harness with a cable tie.
  - Install cooler G3503-[ ]:
    - Install plugs into case back to fill coolant hose holes. Bend tabs as required to secure plugs in place.
    - Install new circuit breaker into case back if replacing the old part.
    - Install new P4 electrical harness into Power Wave:
      - Mate together the labeled P4 connectors.
      - Note: H[X]A lead in new harness carries 230 VAC cooler power: (See Table for [X] valve).

[X]	Power Wave Code Numbers	Wiring Diagram
2	10406	G2153-5
2	10431	G2153-4
2	10433	G2153-6
3	10106, 10195, 10366	G2153-1
3	10197, SPLC14895	G2153-2
3	10345, 10347	G2153-3
3	10512	G2153-7
3	10514, 10516	G2153-8
3	10520	G3177-1

- Connect insulated terminals to circuit breaker (order is unimportant).
- Connect P3 electrical extension harness to the machine.
- Apply ground decal to cooler's base:
  - Apply next to mounting screw hole nearest to circuit breaker.
- Mate cooler's connector to the P3 extension harness.
- Mate cooler's power connector to the P4 electrical harness.
- Carefully slide retrofit cooler G3503-[ ] forward into Power Wave. Verify that front tabs on cooler base are properly guided into slots in base of Power Wave (base's underside may be examined with a mirror and flashlight).
- Attach ground lead in P4 harness to top of cooler's base or top of mounting bracket, ( if brackets are necessary). Secure cooler to Power Wave base by installing both fasteners.
- Install Power Wave machine's left side panel.

- l. Attach Power Wave machine label from retrofit kit to its case back.
  - m. Stamp or etch "B" as the suffix of Power Wave's code number located on its rating plate. Include this suffix for all future parts orders.
  - n. Install gas cylinder(s) onto tray.
5. Select a recommended coolant and fill cooler to specified level (see Figure 1).
  6. Attach desired water-cooled accessory (gun and wire feeder or TIG torch) to cooler's QDs.
  7. Reconnect service input power to the Power Wave:
    - Verify that the reconnect panel setting and lead placement match the service voltage.
  8. Prime the cooler:
    - a. Install the Set-up overlay.
    - b. Keep accessories' hose lengths horizontal, either coiled or straight, and no higher than 4 feet of the specified coolant level (Fig. 1).
    - c. Switch on the Power Wave machine.
    - d. Press the "WATER COOLER ENABLE" button so that the "WATER COOLER ENABLED" light is illuminated.
    - e. Press the "PRIME WATER COOLER" button until the "WATER COOLER PRESSURE" light is steadily illuminated.
  9. Check coolant level. Add more if required.
4. Reinstall cooler by reversing tasks in step 2. Be sure to reattach ground lead, if previously removed.
  5. If necessary, fill cooler with selected coolant to specified level (see Fig. 1).
  6. Attach desired water-cooled accessory (gun and wire feeder or TIG torch) to cooler's QDs.
  7. Reconnect service input power to the Power Wave:
    - verify that the reconnect panel setting and lead placement match the service voltage.
  8. Prime the cooler:
    - a. Install the Set-up overlay.
    - b. Keep accessories' hose lengths horizontal, either coiled or straight, and no higher than 4 feet of the specified coolant level (Fig. 1).
    - c. Switch on the Power Wave machine.
    - d. Press the "WATER COOLER ENABLE" button so that the "WATER COOLER ENABLED" light is illuminated .
    - e. Press the "PRIME WATER COOLER" button until the "WATER COOLER PRESSURE" light is steadily illuminated.
  9. Check coolant level. Add more if required.

## REMOVING AND INSTALLING THE G3503-[ ] COOLER

1. Preparation:
  - Always switch off the Power Wave machine power.
  - Always disconnect the Power Wave machine from service input power.
2. Remove cooler assembly G3503-[ ]:
  - a. remove gas cylinder(s) from tray.
  - b. remove cooler access panel.
  - c. Remove both fasteners from base that hold cooler and mounting brackets (if equipped) in place. Remove ground lead, if present. Carefully pull cooler assembly rearward, until cooler's Molex connectors are visible.
  - d. disconnect cooler's connectors from the P3 and P4 harnesses. Continue pulling the cooler out of the Power Wave.
3. If necessary, perform periodic maintenance or service on the cooler.

## G3503-[ ] COOLER PERIODIC MAINTENANCE

1. Preparation:
  - Always switch off the Power Wave machine power.
  - Always disconnect the Power Wave machine from service input power.
  - Do not remove the pump relief valve's 3/4 in. acorn hex nut or attempt to adjust the relief valve setting.
2. Remove the G3503-[ ] cooler from the Power Wave machine.
3. Clean, or replace the pump's inlet strainer: Clogged or partially blocked strainer is the most common cause for unacceptable coolant flow.
  - Drain the reservoir of coolant and dispose of it in an environmentally responsible manner (see Recommended Coolants).
  - Place absorbent towels underneath pump head.
  - Hold pump head to apply countertorque when loosening strainer's 7/8 acorn nut. Do not confuse with 3/4 acorn nut. Remove nut and slide inlet strainer down and out from pump head.
  - Replace or gently rinse strainer under running water to thoroughly clean it.
  - Use the mirror to inspect inside of pump for contamination. Carefully remove hardened debris with dental pick if necessary, without scratching inside of the pump.
  - Reinstall strainer and acorn nut, tightening with 75±15 in.-lbs. of torque. Wipe dry all areas wetted by coolant. Dispose of towels in an environmentally responsible manner (see Recommended Coolants).
4. Remove fan shroud and inspect hoses and electrical harnesses for kinking or damage (cut, abrasion, swelling, etc.). Replace if necessary.
5. Remove accumulated dust from cooler, especially from the motor and heat exchanger, by blowing it off with shop air or vacuuming it out.
  - The heat exchanger fins are sharp but can be easily bent. Treat them with care to avoid personal injury and damaging them.
  - Remove the cooler from the machine for a more thorough cleaning job.
6. Motor lubrication is recommended once a year:
  - Remove plug over lube port at top of motor near fan end.
  - Add 20 drops of electric motor or SAE 10 oil then reinstall plug.
7. Flush coolant from the system and replace with fresh, recommended coolant at least once a year. More frequent flushing may be necessary, depending upon a user's particular system or its usage.

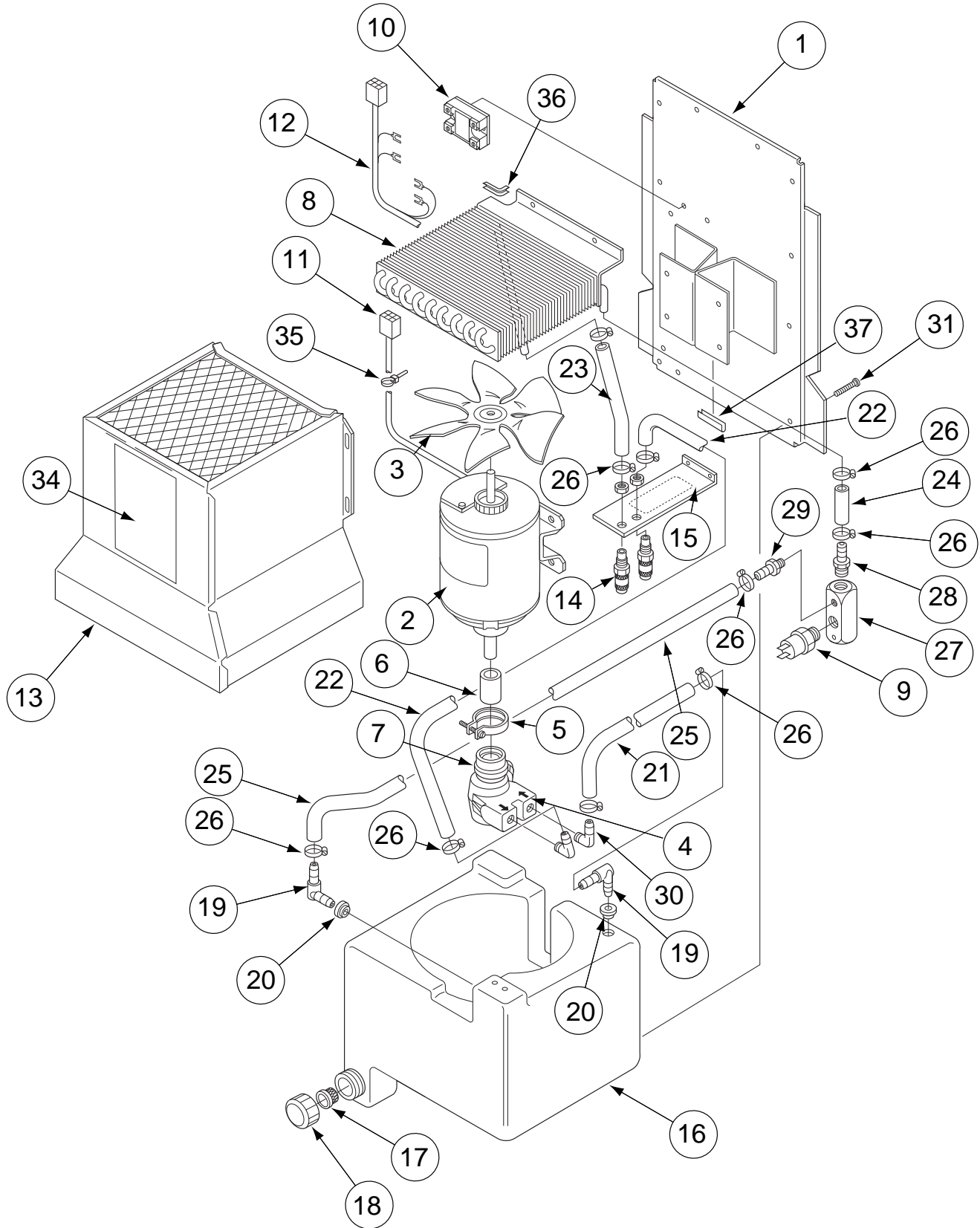
**NOTE:** Never run the pump dry. Always use a recommended coolant, otherwise pump damage may result.

8. Reinstall the G3503-[ ] cooler into the Power Wave machine.

## G3503-[ ] COOLER SERVICE

1. Preparation:
  - Always switch off the Power Wave machine power.
  - Always disconnect the Power Wave machine from service input power.
  - Do not remove the pump relief valve's 3/4 in. acorn hex nut or attempt to adjust the relief valve setting.
2. Remove the G3503-[ ] cooler from the Power Wave machine whenever:
  - replacing major cooler components (i.e. pump, motor, heat exchanger, etc.).
  - replacing hoses and electrical harnesses that are kinked or damaged (cut, abraded, deteriorated or swollen, etc.).
  - investigating suspect coolant leakage.
3. Pump replacement:
  - a. Drain the reservoir of coolant and dispose of it in an environmentally responsible manner (see Recommended Coolants).
  - b. Remove fan shroud.
  - c. Place absorbent towels underneath pump head and wherever coolant system is opened.
  - d. Carefully pull pump inlet hose and its elbow from reservoir (bottom).
  - e. Loosen pump outlet hose clamp at QD then carefully remove from fitting.
  - f. Disconnect v-band clamp from motor and remove pump:
    - Do not drop or lose drive coupling between pump and motor.
    - Do not discard old pump. Remove both fittings, Keep v-clamp, Seal old pump in a waterproof bag, Package into protective container, and Return to nearest Lincoln Electric FSS center.
  - g. Install new pump and v-band clamp:
    - Do not apply any lubricant to pump's drive coupling.
    - Pump body is properly oriented with its strainer at the 6:00 position.
    - Tighten v-clamp with 15 to 30 in.-lbs. of torque.
  - h. Attach coolant lines to QD and reservoir.
  - i. Wipe dry all areas wetted by coolant. Dispose of towels in an environmentally responsible manner (see Recommended Coolants).
  - j. Reinstall cooler into machine.
4. Motor removal or replacement:
  - Do not reuse the 4 internal-tooth star washers. Replace with new parts..
5. Installing the fan:
  - Slide onto motor shaft until the fan is located between 0.25 to 0.50 inches from the heat exchanger.
  - Tighten set screw with 65 to 75 in.-lbs of torque against motor shaft's flat.
  - Fan rotation is counterclockwise, as viewed from fan-end of motor's shaft.
  - Fan pulls air through the heat exchanger, blows it over the motor, then exhausts it through the reservoir.

# COOLER ASSEMBLY PARTS



# Indicates a change this printing.

Use only the parts marked "x" in the column under the heading number called for in the model index page.

Recommended Spare Parts are Highlighted in Bold

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	<b>Powerwave 450 Water Cooler Upgrade Assembly, Includes:</b>	<b>G3503 &amp; -1</b>	<b>1</b>	<b>X</b>								
1	Base Assembly (G3503 Only)	S24504-1	1	X								
1	Base Assembly (G3503-1 Only)	S24504-36	1	X								
<b>2</b>	<b>Motor</b>	<b>S24504-2</b>	<b>1</b>	<b>X</b>								
<b>3</b>	<b>Fan Blade</b>	<b>S24504-3</b>	<b>1</b>	<b>X</b>								
<b>4</b>	<b>Pump with Torque Coupling</b>	<b>S24504-4</b>	<b>1</b>	<b>X</b>								
<b>5</b>	<b>V-Clamp, Pump</b>	<b>S24504-5</b>	<b>1</b>	<b>X</b>								
<b>6</b>	<b>Torque Coupling, Pump</b>	<b>S24504-6</b>	<b>1</b>	<b>X</b>								
<b>7</b>	<b>Pump Inlet Strainer</b>	<b>S24504-7</b>	<b>1</b>	<b>X</b>								
<b>8</b>	<b>Heat Exchanger</b>	<b>S24504-8</b>	<b>1</b>	<b>X</b>								
<b>9</b>	<b>Pressure Switch</b>	<b>S24504-9</b>	<b>1</b>	<b>X</b>								
<b>10</b>	<b>Solid-State Relay</b>	<b>S24504-10</b>	<b>1</b>	<b>X</b>								
11	Electrical Harness, Motor	S24504-11	1	X								
12	Electrical Harness, Pressure Switch & Relay	S24504-12	1	X								
13	Fan Shroud (G3503 Only)	S24504-13	1	X								
13	Fan Shroud (G3503-1 Only)	S24504-37										
<b>14</b>	<b>Quick Disconnect Fitting</b>	<b>S24504-14</b>	<b>2</b>	<b>X</b>								
15	Quick Disconnect Bracket with Label	S24504-15	1	X								
16	Reservoir (G3503 Only)	S24504-16	1	X								
16	Reservoir (G3503-1 Only)	S24504-38	1	X								
16	Replacement Reservoir & Fan Shroud (G3503 Only)	S24504-39	1	X								
<b>17</b>	<b>Reservoir Inlet Strainer (G3503 Only)</b>	<b>S22067-3</b>	<b>1</b>	<b>X</b>								
<b>17</b>	<b>Reservoir Inlet Strainer (G3503-1 Only)</b>	<b>S24504-40</b>	<b>1</b>	<b>X</b>								
<b>18</b>	<b>Reservoir Cap (G3503 Only)</b>	<b>S22067-2</b>	<b>1</b>	<b>X</b>								
<b>18</b>	<b>Reservoir Cap (G3503-1 Only)</b>	<b>S24504-41</b>	<b>1</b>	<b>X</b>								
19	Reservoir Elbow Fitting	S24504-34	2	X								
20	Reservoir Sealing Bushing	S24504-35	2	X								
<b>21</b>	<b>Hose, Pump Inlet</b>	<b>S24504-17</b>	<b>1</b>	<b>X</b>								
<b>22</b>	<b>Hose, Pump Outlet</b>	<b>S24504-18</b>	<b>1</b>	<b>X</b>								
<b>23</b>	<b>Hose, Heat Exchanger Inlet (G3503 Only)</b>	<b>S24504-19</b>	<b>1</b>	<b>X</b>								
<b>23</b>	<b>Hose, Heat Exchanger Inlet (G3503-1 Only)</b>	<b>S24504-42</b>	<b>1</b>	<b>X</b>								#
<b>24</b>	<b>Hose, Heat Exchanger Outlet</b>	<b>S24504-20</b>	<b>1</b>	<b>X</b>								
<b>25</b>	<b>Hose, Reservoir Inlet (G3503 Only)</b>	<b>S24504-21</b>	<b>1</b>	<b>X</b>								
<b>25</b>	<b>Hose, Reservoir Inlet (G3503-1 Only)</b>	<b>S24504-43</b>	<b>1</b>	<b>X</b>								#
<b>26</b>	<b>Hose Clamp</b>	<b>S24504-22</b>	<b>10</b>	<b>X</b>								
<b>27</b>	<b>Hydraulic Manifold</b>	<b>S24504-23</b>	<b>1</b>	<b>X</b>								
<b>28</b>	<b>Manifold Inlet Fitting, 1/4 NPT to 3/8 ID Hose Barb</b>	<b>S24504-24</b>	<b>1</b>	<b>X</b>								
<b>29</b>	<b>Orifice Fitting, 1/89 NPT to 3/8 ID Hose Barb</b>	<b>S24504-25</b>	<b>1</b>	<b>X</b>								
<b>30</b>	<b>Pump Elbow Fitting</b>	<b>S24504-26</b>	<b>2</b>	<b>X</b>								
31	Screw, Reservoir (G3503 Only)	S24504-27	4	X								
31	Screw, Reservoir (G3503-1 Only)	S24504-45	1	X								#
32	Internal-tooth Star Washer, Motor (Not Shown)	S24504-28	4	X								
33	Warranty Label (Not Shown)	S24504-29	2	X								
34	Data Plate (G3503 Only)	S24504-30	1	X								
34	Data Plate (G3503-1 Only)	S24504-44	1	X								#
35	Cable Holder, Push Mount	S24504-31	2	X								
36	Grommet Edging, Heat Exchanger	S24504-32	1.75in.	X								
37	Trim, Motor Mount	S24504-33	1.5in.	X								
39	Platform (Not used on 450 w/stand)	G2391	1	X								
40	Axle	M8809-129	1	X								
41	Wheel	S13127-3	2	X								
42	Push Nut	T12570-2	2	X								
<b>43</b>	<b>Base Assembly</b>	<b>L8860</b>	<b>1</b>	<b>X</b>								
44	Caster	S11124-4	2	X								
44A	Thread Forming Screw	S9225-28	8	X								

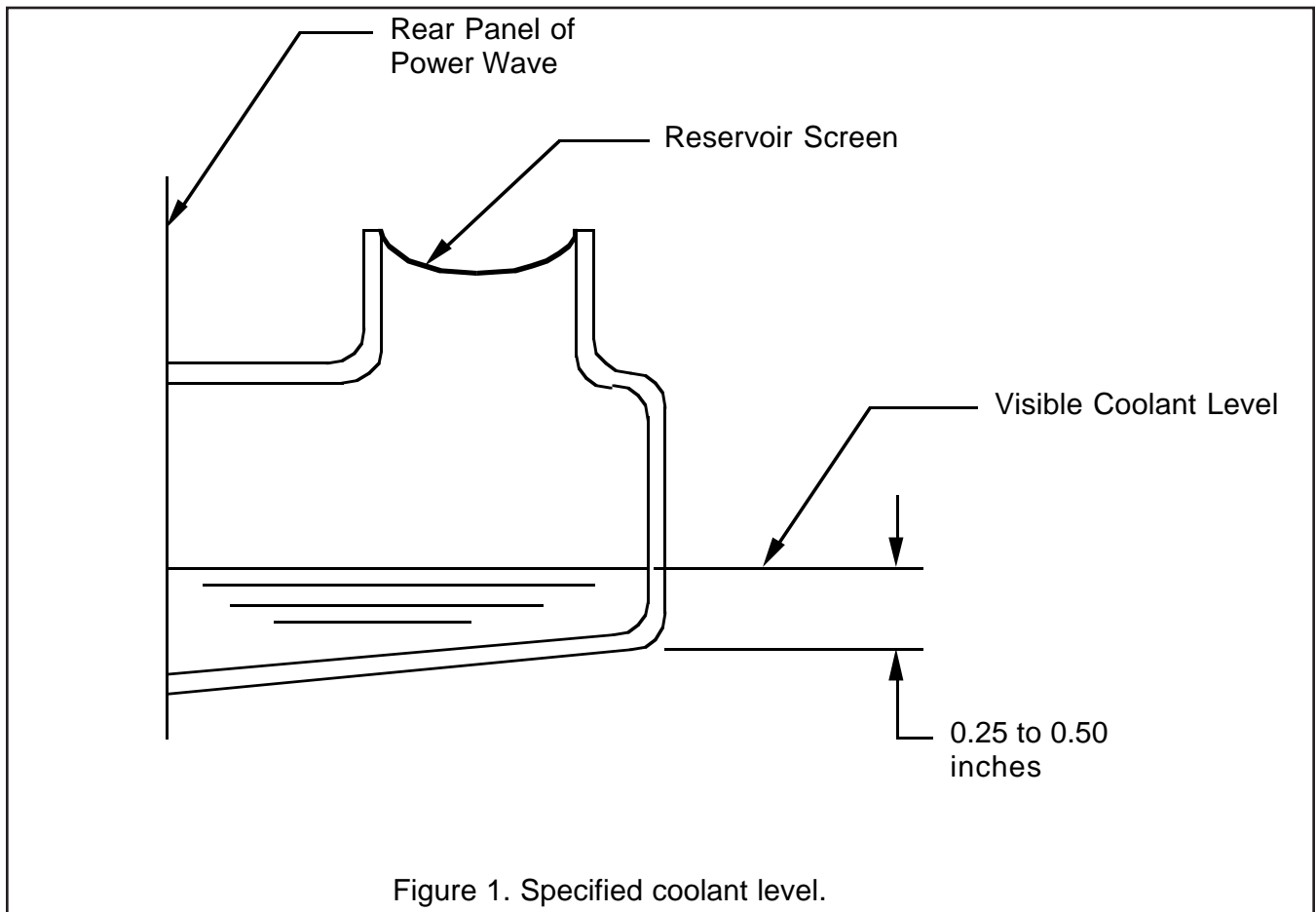


Figure 1. Specified coolant level.

TABLE 1 COOLER ELECTRICAL HARNESS PIN-OUTS		
Molex Connector	Molex Pin No.	Description
large	1	Ground
large	2	Motor Common
large	3	Unused
large	4	Unused
large	5	Motor 230 VAC (PW 450 only)
large	6	Motor 230 Vac (PW 455 only)
small	1	Unused
small	2	Unused
small	3	Relay coil
small	4	Relay coil
small	5	Pressure Switch - NO contact
small	6	Pressure Switch - common contact



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