

TECHNICAL MANUAL
FOR

DISHWASHING MACHINE MODEL 45SA7-F2

ELECTRICALLY HEATED;

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FOREWORD

This technical manual provides description, operation, maintenance, installation, and parts list information for the electrically heated dishwasher, model 45SA7-F2. This technical manual is intended for the guidance of and use by personnel operating and maintaining the equipment described herein.

The manual consists of one volume arranged in eight chapters as follows:

- Chapter 1. General Information
- Chapter 2. Operation
- Chapter 3. Functional Description
- Chapter 4. Scheduled Maintenance
- Chapter 5. Troubleshooting
- Chapter 6. Corrective Maintenance
- Chapter 7. Illustrated Parts Breakdown
 - Section I. Introduction
 - Section II. Illustrations and Group Assembly Parts Lists
 - Section III. Numerical Index
- Chapter 8. Installation

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SAFETY SUMMARY

GENERAL SAFETY NOTICES

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. Should situations arise that are not covered in the general or specific safety precautions, the commanding officer or other authority will issue orders as deemed necessary to cover the situation. No work shall be undertaken on energized equipment or circuits until approval of the commanding officer is obtained, and then only in accordance with Naval Ships' Technical Manual (NSTM) S9086-KC-STM-010/Chapter 300.

DO NOT REPAIR OR ADJUST ALONE

Under no circumstances shall repair or adjustment of energized equipment be attempted alone. The immediate presence of someone capable of rendering first aid is required. Before making adjustments, be sure to protect against grounding. If possible, adjustments should be made with one hand, with the other hand free and clear of equipment. Even when power has been removed from equipment circuits, dangerous potentials may still exist due to retention of charges by capacitors. Circuits must be grounded and all capacitors discharged prior to attempting repairs. Equipment should be de-energized and properly tagged out according to the ship's Standard Operating Procedures.

TEST EQUIPMENT

Make certain test equipment is in good condition. If a metal-cased test meter must be held, ground the case of the meter before starting measurement. Do not touch live equipment or personnel working on live equipment while holding a test meter. Do not ground any measuring devices; these devices should not be held when taking measurements.

INTERLOCKS

Interlocks are provided for safety of personnel and equipment and should be used only for the purpose intended. They should not be battle shorted or otherwise modified except by authorized maintenance personnel. Do not depend solely upon interlocks for protection. Whenever possible, disconnect power at the power distribution source.

MOVING EQUIPMENT

Personnel shall remain clear of moving equipment. If equipment requires adjustment while in motion, a safety watch shall be posted. The safety watch shall be qualified to administer CPR, have a full view of the operations being performed, and have immediate access to controls capable of stopping equipment motion.

FIRST AID

An injury, no matter how slight, shall never go unattended. Always obtain first aid or medical attention immediately, and file an injury report in accordance with OPNAVINST 5102.1 series, subj: Mishap Investigation and Reporting.

SAFETY SUMMARY – Continued

RESUSCITATION

Personnel working with or near high voltage shall be familiar with approved methods of resuscitation. Should someone be injured and stop breathing, begin resuscitation immediately. A delay could cost the victim's life. Resuscitation procedures shall be posted in all electrically hazardous areas.

GENERAL PRECAUTIONS

The following general precautions are to be observed at all times.

1. Install and ground all electrical components associated with this system/ equipment in accordance with applicable Navy regulations and approved shipboard practices.
2. Ensure that all maintenance operations comply with Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat, OPNAVINST 5100.19 series.
3. Observe precautions set forth in NSTM S9086-KC-STM-010/Chapter 300 with respect to electrical equipment and circuits.
4. Ensure that protective guards and shutdown devices are properly installed and maintained around rotating parts of machinery and high voltage sources.
5. Do not wear loose clothing while working around rotating parts of machinery.
6. Ensure that special precautionary measures are employed to prevent applying power to the system/equipment any time maintenance work is in progress.
7. Do not make any unauthorized alterations to equipment or components.
8. Before working on electrical system/equipment, use the correct tag out procedure and check with voltmeter to ensure that system is not energized.
9. Consider all circuits not known to be "dead," "live" and dangerous at all times.
10. When working near electricity, do not use metal rules, flashlights, metallic pencils, or any other objects having exposed conducting material.
11. Deenergize all equipment before connecting or disconnecting meters or test leads.
12. When connecting a meter to terminals for measurement, use range higher than expected voltage.
13. Before operating equipment or performing any tests or measurements, ensure area is dry of water or other liquid conductive material and that frames of all motors and starter panels are securely grounded.
14. Ensure that area is well ventilated when using cleaning compound or solvent. Avoid prolonged breathing of fumes and compound or solvent contact with skin or eyes.

SAFETY SUMMARY – Continued

WARNINGS AND CAUTIONS

Specific warnings and cautions applying to the system/equipment covered by this manual are summarized below. These warnings and cautions appear elsewhere in the manual following paragraph headings and immediately preceding the text to which they apply. They are repeated here for emphasis.

WARNING

Warning definition: A warning indicates potential bodily harm if not observed.

WARNING

Do not open the door during the wash or rinse cycle because hot water is being sprayed. An interlock is provided to stop the cycle if the door is opened, but some hot water may escape. (Page 2-2)

WARNING

Hot water and surface temperatures exist in the machine. Allow the machine to cool to 110 °F before proceeding. Wear rubber gloves. (Page 2-3)

WARNING

Electric float switches, probes, and heating elements must be cleaned daily. Accumulation of grease, minerals or debris will cause faulty operation tank fill and heating systems. Use Scotch-Brite or equivalent cleaning pads on heavy dirt. (Page 2-3)

WARNING

To prevent personal injury or death, secure all primary power and water supply valves and tag “OUT OF SERVICE” before performing any maintenance on the Model 45SA7-F2 dishwasher. (Pages 5-1 and 6-1)

WARNING

Wear rubber gloves while performing the following steps. Do not eat, drink, or smoke. (Pages 5-1 and 6-1)

SAFETY SUMMARY – Continued

WARNINGS AND CAUTIONS - Continued

WARNING

Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. To prevent injury, death or equipment damage, exercise extreme caution when working with energized equipment. (Pages 5-1 and 6-1)

WARNING

The following steps require testing with the equipment power on. To prevent injury, death or equipment damage, exercise extreme caution when working with energized equipment. (Page 6-3)

WARNING

Dangerous voltages are present on connections to the electrical control enclosure and electric booster heater. Observe safety precautions for high voltage electrical equipment when connecting to the local distribution system. All work should be done by a qualified electrician. (Page 8-2)

WARNING

At start up, and after any draining of the electric booster tank, turn off the 440 volt power to the booster during the initial wash tank fill (para 2-3.2). This will allow the booster reservoir to fill and vent trapped air without overheating the booster heating elements. (Page 8-3)

CAUTION

Caution Definition: A caution indicates potential equipment damage if not observed.

CAUTION

The operator should become thoroughly familiar with the equipment and these operating instructions prior to starting the equipment. (Page 2-1)

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CHAPTER 1

GENERAL INFORMATION

1-1 INTRODUCTION

This technical manual provides information for the installation, operation, inspection and maintenance of the Model 45SA7-F2 dishwasher manufactured by Insinger Machine Company, Philadelphia, PA.

1-2 SCOPE

Chapters 1, 2, 3, and 8 provide information required for installation, start-up, and operation of the equipment. Chapters 4, 5, 6, and 7 provide information on maintenance operations.

1-3 EQUIPMENT DESCRIPTION

The Model 45SA7-F2 dishwasher is a single tank, front loading, under counter dishwasher used for the washing of plates, glassware, and small utensils in a 16" by 16" racks. The machine can process up to 45 racks per hour through timed wash and final hot rinse cycles.

1-4 EQUIPMENT SUPPLIED

The dishwasher and the final rinse water electric booster are mounted on a common frame. The following loose components are supplied for mounting adjacent to the machine:

- Electrical control enclosure.
- Thermometer bracket
- Plate Racks
- Cup, bowl and cutlery racks.
- Manifold cleanout brushes

Table 1-1. Reference Data

Manufacturer:	Insinger Machine Company Philadelphia, PA
FSCM:	30793
Type:	Insinger Model 45SA7-F2
Characteristics:	
Type:	Single tank, front loading, undercounter dishwasher.
Capacity:	45 racks (16" by 16") per hour, manually loaded.
Wash Tank Capacity:	6.2 gal.
Rinse Water Requirements:	
Rated Flow:	4.1 gpm peak at 20 psig. 36 gal/hr average flow.
Supply Temperature:	140 °F minimum.
Electrical Power Requirements:	
Power Supply:	440 VAC, 3 Phase, 60 Hz.
Operating Current:	
Dishwasher:	3.1 amps
13.5 KW Booster	17.9 amps

CHAPTER 2

OPERATION

2-1 INTRODUCTION

The Model 45SA7-F2 dishwasher is a heavy-duty machine designed for daily use in a Naval shipboard environment.



The operator should become thoroughly familiar with the equipment and these operating instructions prior to starting the equipment.

2-2 CONTROLS AND INDICATORS

Table 2-1. Controls and Indicators

ITEM #	CONTROL	TYPE	FUNCTION
1	Power Switch	On/Off Toggle switch on control panel	Controls power on & off
2	Power On	Red pilot light on control panel	Indicates control power on & off
3	Wash Cycle Switch	Manual/Auto toggle switch on control panel	Manual – Equipment will remain in continuous wash cycle for extended wash or de-liming procedure. Auto – Normal operation for timed wash and rinse cycles
4	Wash Indicator	White pilot light on control panel	Signals wash cycle operation
5	Rinse Indicator	Amber pilot light on control panel	Signals rinse cycle operation
6	5-Amp Circuit Breaker	Circuit Breaker located on control panel	Over-current protection for control circuit
7	Temperature Gauges:		
	Wash:	Gauge on remote bracket	Water temperature of wash tank water
	Rinse:	Gauge on remote bracket	Water temperature of rinse water
8	Booster Thermometer	Located on electric booster	Controls final rinse water temperature and provides low rinse temperature interlock

2-3 START-UP PROCEDURE

2.3.1 Pre-Operational Checks. Before starting the machine, inspect the inside and ensure the following:

- a. Drain overflow tube is in place.
- b. Suction strainer is in place over the pump intake.
- c. Scrap screen is clean and in place.
- d. Upper and lower wash manifolds are securely installed.
- e. Plastic caps at the ends of all manifolds are installed and hand tight.
- f. Ensure hot water supply valve is open and electric service is on.
- g. Fill detergent dispenser reservoir in accordance with detergent supplier recommendations. Only flake, beaded or pelletized detergents should be used.

2-3.2 Dishwasher Operation. At the completion of pre-operational checks proceed as follows:

- a. Turn the detergent dispenser power switch to “On”.
- b. Connect the rinse injector supply line to a source of rinse water conditioner.
- c. Turn rinse injector power switch to “On”.

NOTE

The detergent dispenser and rinse injector systems are not furnished as part of this machine.

- d. **On the electrical control enclosure, move the Wash Cycle Switch to the “Auto” position. Move the Power Switch to the “On” position. The red “Power On” light will illuminate.**
- e. **Close the machine door. Machine will automatically fill. When wash tank reaches operating level, the thermostatically controlled tank heater will be activated. Allow the tank temperature to reach 156 °F. before washing.**
- f. **Open the door; insert a rack of soiled dishware, and close door. The machine will automatically cycle through a timed wash and rinse cycle then stop. When the amber “Rinse” light goes off, it is safe to open the door, unload the rack, and repeat the cycle.**

NOTE

The wash pump will not start if the water in the rinse booster is below 180 °F. Allow time for the washer to reach its operating temperature.

WARNING

Do not open the door during wash or rinse cycles because hot water is being sprayed. An interlock is provided to stop the cycle if the door is opened, but some hot water may escape.

NOTE

Overloading racks will impede proper cleaning of dishware.

2-4 SHUT-DOWN PROCEDURE

At the completion of every meal-service conduct the following:

- a. Turn power switch to the "Off" position.
- b. Drain the wash tank by completing the following:

WARNING

Hot water and surface temperatures exist in the machine. Allow the machine to cool to 110 °F before proceeding. Wear rubber gloves.

- c. Remove lower wash manifold.
- d. Rotate lower rinse manifold to vertical position.
- e. Remove scrap tray and tray spacers.
- f. Remove drain overflow tube.
- g. After draining, remove upper wash manifold and pump suction strainer.
- h. Remove end caps from wash manifold and clean with provided brush. Flush after cleaning and replace caps.
- i. Clean and flush scrap tray and tray spacers, pump suction strainer, and drain overflow tube.
- j. Clean and flush entire inside of wash tank, wash and rinse chamber, and door. Wipe inside if drain overflow tube fitting. Pay special attention to moving float mechanisms, detergent conductivity probe, and electric heater elements.

WARNING

Electric float switches, probes, and heating elements must be cleaned daily. Accumulations of grease, minerals or debris will cause faulty operation of tank fill and heating systems. Use Scotch-Brite or equivalent cleaning pads on heavy dirt.

- k. Use a small wire or pin to clean the rinse nozzles of mineral accumulations.
- l. Replace all removed parts in reverse order.
- m. Door should remain open to allow interior surfaces to dry.

CHAPTER 3

FUNCTIONAL DESCRIPTION

3-1 OVERVIEW

The 45SA7-F2 dishwasher consists of a wash tank and integral wash and rinse chamber with a front access door. A detergent solution in the wash tank is heated to a nominal 156 °F. operating temperature by an electric immersion heater.

3-2 WASH CYCLE

During the wash cycle a centrifugal pump draws hot water detergent solution through a suction strainer then forces the solution under pressure to the upper and lower wash manifolds, where the solution exits through slots and impacts the dishware in racks. Spent wash solution returns to the wash tank through a scrap tray, where debris from dishware is captured for later disposal.

3-3 DETERGENT STRENGTH

The detergent strength is maintained by a concentration sensing controller and detergent supply reservoir (not supplied).

3-4 RINSE CYCLE

A hot fresh final rinse cycle follows the wash cycle. Incoming fresh water supply is first reduced to 20 psig. by a pressure regulating valve and then heated to 180 °F. (minimum) by an electrically powered booster heater located adjacent to the dishwasher. Hot rinse water enters the wash and rinse chamber through upper and lower rinse manifolds, and exits through rinse nozzles and impacts dishware. Spent rinse water returns to the wash tank through scrap screens.

The residual heat in the rinse water helps maintain wash tank temperature. The additional volume of rinse water, when added to the wash tank, increases the solution level and then overflows into the drain, carrying away any floating grease and debris.

3-5 ELECTRIC BOOSTER

Electric booster has a low water temperature interlock that prevents or interrupts washing when water temperature in the booster is below 180 °F.

3-6 WATER CONDITIONER

A feed pump (not supplied) injects conditioner into hot rinse water during the rinse cycle. This conditioner improves the rinsing and drying of dishware by promoting a sheeting action of rinse water.

3-7 ELECTRICAL CONTROL ENCLOSURE

A remote electrical control enclosure contains magnetic contactors, overload protection for the drive motor, control relays, wash and rinse cycle timers, selector switches and pilot lights.

CHAPTER 4

SCHEDULED MAINTENANCE

4-1 INTRODUCTION

4-1.1. Planned Maintenance System. Required preventive maintenance procedures to be performed on a scheduled basis are provided in Planned Maintenance System (PMS) documentation. OPNAVINST 4790.4 describes this system that also covers departmental and work center recordkeeping, as well as the Maintenance Index Page (MIP) and Maintenance Requirement Cards (MRCs). MRCs cover scheduled inspection, testing, and lubricating procedures for the Oil-Free High Pressure Air Compressor covered by this manual.

4-1.2. Extent Of Coverage. The extensive and comprehensive scheduled maintenance provided by MRCs eliminates the need for any coverage within this chapter. Specific corrective maintenance is covered in Chapter 6 of this manual.

CHAPTER 5

TROUBLESHOOTING

5-1 INTRODUCTION

This chapter contains information to assist the operator and/or maintenance personnel in troubleshooting abnormal operation.

5-2 SCOPE

Personnel involved must be familiar with the description of the equipment and the functioning of all components, as described in Chapter 3.

5-3 FAULT ISOLATION

The following tables list the more common symptoms, which may be experienced, their causes, and recommended corrective action. The tables are separated into operator and technician maintenance actions.

WARNING

To prevent personal injury or death, secure all primary power and all water supply valves and tag "OUT OF SERVICE" before performing any maintenance on the Model 45SA7-F2 dishwasher.

WARNING

Wear rubber gloves while performing the following steps. Do not eat, drink, or smoke.

WARNING

Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. To prevent injury, death, or equipment damage, exercise extreme caution when working with energized equipment.

Table 5-1. Operator's Troubleshooting Guide

SYMPTOM OF TROUBLE	POSSIBLE CAUSE	SOLUTION
1. Machine will not operate.	a. No power.	a. Move power switch to ON.
2. Tank will not hold water.	a. Drain standpipe (not installed). b. Pump petcock opened.	a. Install drain standpipe. b. Close pump petcock.
3. Tank fills beyond overflow level.	a. Obstruction in drain standpipe. b. Clogged drain line.	a. Remove obstruction. b. Remove drain standpipe (water is hot). If water does not drain, maintenance must snake drain line.
4. Water leaks from around door.	a. Door is not seated. b. Clogged spray pipes.	a. Check for proper seating. b. Clean with brush provided.
5. Weak or ineffective wash spray.	a. Clogged spray pipes. b. Manifolds not installed properly. c. Suction strainer clogged.	a. Clean with brush provided. b. Ensure proper placement of upper and lower manifolds. c. Clean suction strainer.
6. Weak or ineffective final rinse spray.	a. Lime deposit on spray nozzles. b. Low water pressure. c. Closed supply valve.	a. Clean nozzles. b. Should be 20-PSI supply pressure. c. Open valve.

Table 5-2. Maintenance Troubleshooting Guide

SYMPTOM OF TROUBLE	POSSIBLE CAUSE	SOLUTION
1. Machine will not operate.	<ul style="list-style-type: none"> a. No power. b. Blown fuse/breaker. c. Power shut off at disconnect switch. d. Motor overload protection tripped. 	<ul style="list-style-type: none"> a. Move power switch to ON. b. Replace fuse; reset breaker and troubleshoot source of problem. c. Move disconnect switch to ON. d. Press reset button; if motor overload trips repeatedly, check overload setting and motor current.
2. Tank will not hold water.	<ul style="list-style-type: none"> a. Drain standpipe (not installed). b. Pump petcock opened. 	<ul style="list-style-type: none"> a. Install drain standpipe. b. Close pump petcock.
3. Tank fills beyond overflow level.	<ul style="list-style-type: none"> a. Obstruction in drain standpipe. b. Clogged drain line. 	<ul style="list-style-type: none"> a. Remove obstruction. b. Remove drain standpipe (water is hot). If water does not drain, snake drain line.
4. Water leaks from around door.	<ul style="list-style-type: none"> a. Door is not seated b. Clogged spray pipes. 	<ul style="list-style-type: none"> a. Check for proper seating and repair as necessary. b. Clean with brush provided.
5. Weak or ineffective wash spray.	<ul style="list-style-type: none"> a. Clogged spray pipes. b. Manifolds not installed properly. c. Suction strainer clogged. d. Pump motor running in the wrong direction. e. Pump impeller worn. 	<ul style="list-style-type: none"> a. Clean with brush provided. b. Ensure proper placement of upper and lower spray pipes. c. Clean suction strainer. d. Correct electrically; proper pump direction indicated by arrow on pump housing. e. Replace pump impeller.

Table 5-2. Maintenance Troubleshooting Guide - Continued

SYMPTOM OF TROUBLE	POSSIBLE CAUSE	SOLUTION
6. Weak or ineffective final rinse spray.	<ul style="list-style-type: none"> a. Lime deposit on spray nozzles. b. Closed supply valve. c. Low water pressure. d. Final rinse nozzles worn. 	<ul style="list-style-type: none"> a. Clean nozzles. b. Open valve. c. Adjust to 20 PSI. d. Replace final rinse nozzles.
7. Final rinse spray will not turn off.	<ul style="list-style-type: none"> a. Clogged final rinse solenoid valve. b. Worn disc and seat in final rinse solenoid valve. 	<ul style="list-style-type: none"> a. Turn off water supply, disassemble valve and clean internal parts of lime and scale. b. Turn off water supply, disassemble valve and replace worn parts with repair kit.
8. Water hammer.	<ul style="list-style-type: none"> a. Excessive line pressure. 	<ul style="list-style-type: none"> a. Install shock arresters.
9. Machine vibrates (see also water hammer #8).	<ul style="list-style-type: none"> a. Worn motor bearing. b. Reversed pump rotation. 	<ul style="list-style-type: none"> a. Replace motor. b. Correct electrically, proper pump rotation indicated by an arrow on pump housing.
10. Tank and or booster will not hold specified temperature.	<ul style="list-style-type: none"> a. No power. b. Thermostat not adjusted or defective. c. Heat circuitry not working. d. Temperature gauge inaccurate/defective. e. Power turned off. f. Immersion heaters limed or defective. 	<ul style="list-style-type: none"> a. Check power supply. b. Adjust or replace thermostat. c. Troubleshoot heater circuitry using wiring diagram in Figure 8-2 on page 8-5. d. Replace temperature gauge. e. Turn on power. f. De-lime or replace immersion heater.
11. Tank not filling/tank heat coming on with no water in tank.	<ul style="list-style-type: none"> a. Level float dirty or defective. b. Level control system not working. 	<ul style="list-style-type: none"> a. Clean or replace level float. b. Troubleshoot level control circuitry using wiring diagram in Figure 8-2 on page 8-5.

CHAPTER 6

CORRECTIVE MAINTENANCE

6-1 INTRODUCTION

This chapter contains instructions for maintenance and replacement of components that may be damaged or fail during normal operation.

6-2 MAINTENANCE AND REPAIR PROCEDURES

WARNING

To prevent personal injury or death, secure all primary power and all water supply valves and tag "OUT OF SERVICE" before performing any maintenance on the Model 45SA7-F2 dishwasher.

WARNING

Wear rubber gloves while performing the following steps. Do not eat, drink, or smoke.

WARNING

Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. To prevent injury, death, or equipment damage, exercise extreme caution when working with energized equipment.

6-2.1 Removal and Replacement of Electric Tank Heater. To remove and replace the tank heater proceed as follows:

- a. Turn off dishwasher power at main disconnect switch
- b. Drain wash tank per 2.4.3.
- c. Remove the external heater cover and disconnect the three power wires. Disconnect electrical conduit.
- d. On inside of wash tank, loosen and remove large nut from heater body and withdraw the heater from the tank.
- e. Install a new heater in the tank hole. Use plumber's putty between the heater body and the outside of the tank. Install and tighten large nut from inside the tank.
- f. Reconnect the power wires and conduit and replace heater cover.

6-2.2 Removal and Replacement of Thermometers. If a thermometer is suspected of being defective, proceed as follows:

- a. Check the unit against a reference thermometer and compare readings. Tolerance is ± 2 °F.
- b. To remove the wash thermometer, secure the power switch on the electrical control enclosure.
- c. Drain the wash tank in accordance with paragraph 2-4.b and proceed as follows:
 1. Loosen the split hex nut that holds the capillary bulb in the rinse line fitting (rear of dishwasher) or the wash tank wall (side of dishwasher). Withdraw the bulb.
 2. Remove the thermometer-mounting bracket and remove the outer hex nut from the stem of the thermometer. Withdraw the capillary and bulb through the hole in the bracket.
 3. Install new thermometer in the bracket. Pass the capillary and bulb through the hole in the bracket and tighten the hex nut on the stem of the thermometer. Replace the thermometer bracket.
 4. Clean the inside of the bulb fitting on the dishwasher. Install the bulb and tighten the split hex nut.

6-2.3 Overload Relay Settings and Functions. Refer to Figure 6-1.

6-2.3.1 Overload Current Setting. To adjust the current overload proceed as follows:

- a. Lift the clear plastic cover.
- b. With a small screwdriver, align the overload setting dial value with the set point for the motor nameplate full load current value for 440V. The nominal full load current for 440-volt operation of a typical 1/2-HP motor is 1.2 amps.

6-2.3.2 Auto Reset Selection. The overload relay is factory installed in the auto-reset configuration. Always use this configuration. If the manual reset configuration has been selected, proceed as follows:

- a. The reset selector will extend beyond the plastic cover and the pointer will align with "M".
- b. Lift the clear plastic cover, push the reset selector in and turn clockwise until the square pointer is aligned with the "A".

6-2.3.3 Reset Test. To conduct a reset test proceed as follows:

- a. Lift the clear plastic cover.
- b. Use a small screwdriver to press the recessed test button.
- c. With auto reset selected, the overload trip indicator will change to yellow and both auxiliary contacts (NO and NC) will change state as long as the test button is pressed in.

6-2.3.4 Stop Function. Press the red stop button to operate the NC auxiliary contact. This contact (OL reset) is wired in series with the motor contactor (M-1) and when opened will stop the motor.

6-2.4 Wash Tank Temperature Adjustment. Wash tank temperature should be 156 to 160 °F. Tank temperature is sensed by a thermistor on the tank wall and regulated by a temperature control board in the electrical control enclosure. To adjust the wash tank temperature proceed as follows:

- a. Locate the round slotted adjustment disk on the temperature control board.
- b. Rotate in small increments (Clockwise to increase temperature, counterclockwise to decrease temperature)
- c. Allow tank temperature to stabilize between adjustments.

6-2.5 Electric Tank Heat Temperature Control Board or Thermistor Removal. To replace the electric tank heat temperature control board or thermistor, proceed as follows:

- a. Disconnect and tag all wires.
- b. Remove the board or thermistor. Note the connection points for red and black thermistor wires.

6-2.6 Rinse Booster Temperature Adjustment. Booster water outlet temperature should be 190 to 195 °F. To adjust this temperature proceed as follows:

- a. The temperature controller is on the front of the booster. Remove the sheet metal cover.
- b. Water outlet temperature control switch is on the left, marked "Temp Set 190 °F." Use a hex key to rotate the pointer and change the setting. Higher scale settings correspond to higher outlet temperatures.
- c. While the rinse cycle is operating, turn the pointer in 1/2-turn increments and observe the rinse temperature over several rinse cycles.

6-2.7 Low Water Temperature Interlock Switch. The interlock switch is factory set at 180 °F and has no operator adjustments. To remove proceed as follows:

- a. The switch is located in the front of the booster.
- b. Remove the sheet metal cover and the switch is located on the right.
- c. Close the manual hot water valve.
- d. Disconnect and tag all wires.
- e. Unscrew the entire thermostat assembly from the coupling on the booster.

6-2.8 Inspection and Repair of Solenoid Actuated Valves. A solenoid valve is used for controlling the flow of final hot rinse water. If the valve in question will not open or close, inspect the valve as follows:

6-2.8.1 Preliminary Electrical Check. A solenoid valve is opened by a mechanical plunger, which is lifted when voltage is applied to the valve coil.

WARNING

The following steps require testing with the equipment power on. To prevent injury, death, or equipment damage, exercise extreme caution when working with energized equipment.

- a. Ensure there is voltage to the coil
- b. If voltage is present, disconnect all power to the equipment and remove the coil. Check for signs of heat discoloration or carbon deposit due to a short in the coil. Check coil winding for continuity. If coil measures as open, replace the coil.

6-2.8.2 Inspection and Repair of Solenoid Valve. Disconnect electrical power to the equipment and secure the water supply to the valve.

- a. Remove cap on top of coil housing and remove housing and coil.
- b. Unscrew 4 hex screw bolts and remove bonnet from valve body. Note positioning of spring and pilot plunger.

- c. Remove main piston.
- d. Inspect rubber diaphragm for wear, deterioration, or holes.
- e. Inspect all parts for dirt, wear, and lime buildup or physical damage. Clean or replace as required.
- f. Reverse procedure to reassemble valve.

6-2.9 Removal and Replacement of Recirculating Pump. Before disassembling pump, drain the tank and remove the suction strainer (inside tank). Inspect pump inlet for foreign objects then proceed as follows:

- a. Working parts of pump can be serviced by removing the pump motor and impeller adapter.
- b. Remove four (4) 3/8" dia. hex head screws to remove impeller and motor from the pump body.

NOTE

It is not necessary to remove pump body from the equipment.

- c. Repair or replace pump motor or impeller as required.

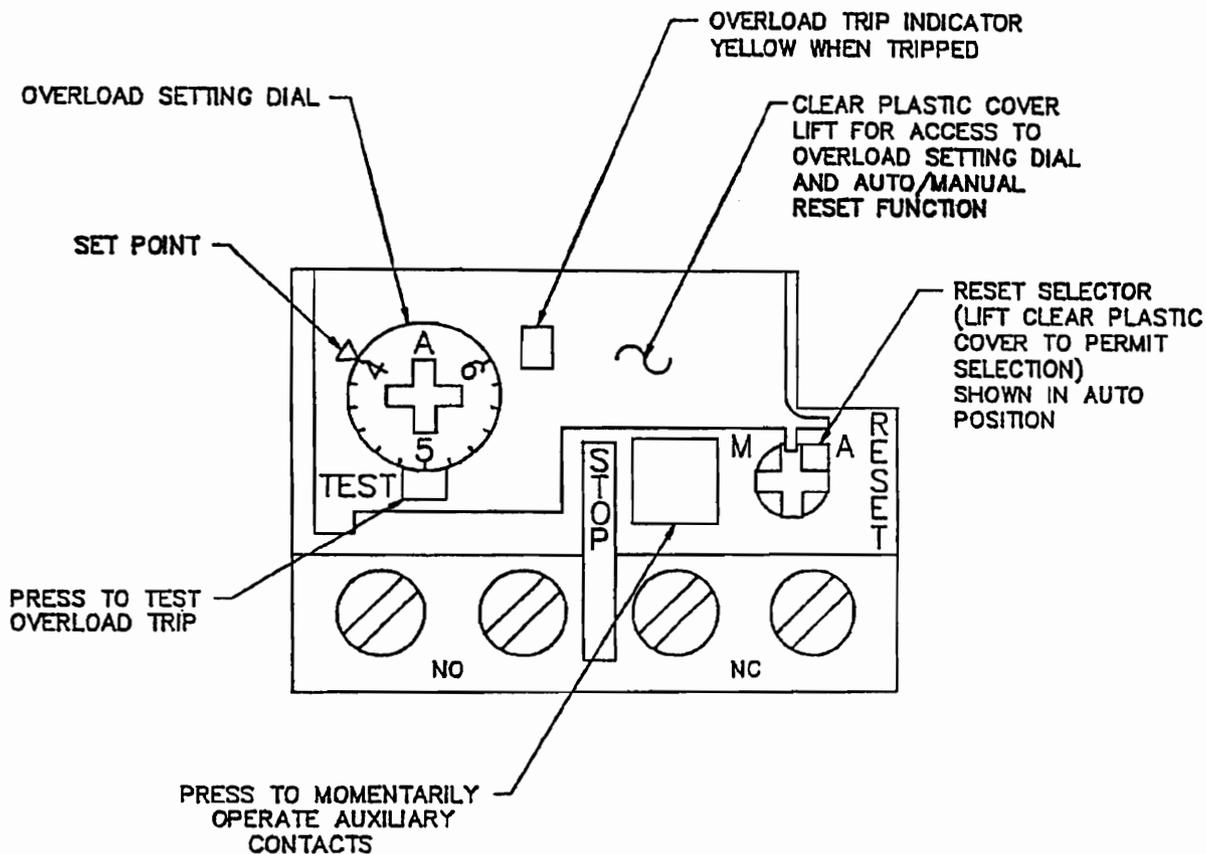


Figure 6-1. Overload Relay Settings

CHAPTER 7
ILLUSTRATED PARTS BREAKDOWN

SECTION I
INTRODUCTION

7-1 SCOPE

7-1.1 **Presentation.** This chapter provides the illustrations and parts list for all the components of the turbine generator circulating water pump. Section I outlines the scope and content of the chapter and also provides general procedures for using the data in the illustrated parts breakdown to identify and requisition repair parts. Section 2 includes the illustrations and parts lists for all components of the pump.

7-1.2 **Repair Parts Identification and Procurement.** The information contained in this chapter, combined with the Coordinated Shipboard Allowance List (COSAL) and the related Allowance Parts List (APL) for the equipment, will assist in identifying and procuring repair parts needed for maintenance/repair.

7-1.3 **Coordinated Shipboard Allowance List.** Another important document relative to repair part support aboard ship is the COSAL. A ship is provisioned with repair parts based on the COSAL prepared for that specific ship. The COSAL is generated from the Allowance Parts List or APL, which is equipment/system configuration, oriented. For additional information regarding the COSAL, refer to SPCCINST 4441.170, COSAL Use and Maintenance Manual.

7-1.4 **Allowance Parts List/National Stock Number.** The APL contains descriptive information (e.g., name, characteristics, CAGE number, NSN) for equipment/component parts that are stocked aboard ship. System and complex-equipment APLs may reference other applicable APLs, as well as parts that apply to the overall system/equipment. The APL lists the corresponding NSN for the applicable part listed, as shown in Figure 7-1. Once the part has been identified, using the IPB, refer to the description column of the related GAPL to obtain the applicable APL and NSN for the respective part. The APL should be checked to verify part number accuracy and/or to detect recent changes in repair part support. Also, the COSAL, part III, Stock Number Sequence List (SNSL) or the Integrated Stock List (ISL) can be checked to determine if the part identified by the NSN is stocked aboard ship. The ISL is a summary of SNSLs/APLs that is prepared upon completion of a ship overhaul.

7-1.5 **Group Assembly Parts List Versus Allowance Parts List.** Not all of the parts listed in the GAPL are listed in the APL or carried aboard ship as repair parts. A typical step-by-step procedure for obtaining a repair part is shown in Figure 7-2. A part number listed in the GAPL that does not have an APL part number or NSN in the description column may be checked against the COSAL, Part III, Section D, which is a cross-reference listing. If a needed part listed in the GAPL is not listed in the COSAL or the APL, it is not likely to be carried aboard ship. The part must be obtained from another source, usually a Navy supply depot. Procedures for obtaining repair parts from the supply department will vary slightly from ship to ship. The supply department requires a requisition containing a part number (if available), the CAGE, and all of the information listed in the GAPL description column.

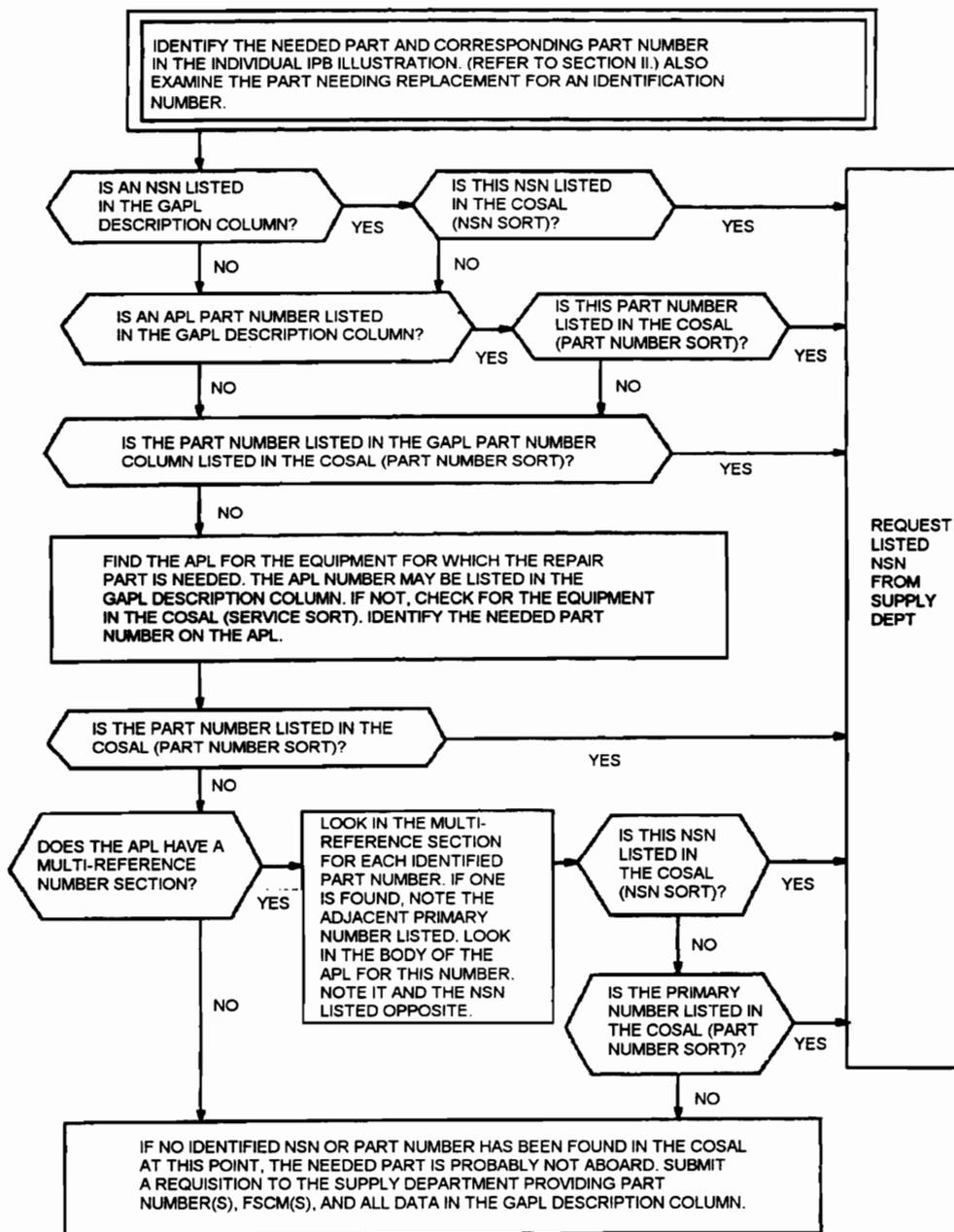


Figure 7-2. Part Identification, Research, and Procurement Flow Chart

HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN

PART NUMBER	FIG. & INDEX NUMBER	REFERENCE DESIGNATION
8801-188 (ENR)	7-1-1	
2184007823A	7-3-29	
880A015C141A	7-5-28	
3880000A041A	7-6-25	
2442001878EC	7-4-21	
8442001878EC	7-4-23	
24800078082A	7-4-6	
247A0008022A	7-4-23	
248000C100A	7-3-7	
2480018C131A	7-4-22	
2880018C131A	7-5-10	
290000LJ037A	7-3-23	
290001AJ037A	7-5-7	
290001AJ037A*	7-4-3	
29000078082A	7-7-48	
2940001G110A	7-7-28	
2940001G110A	7-7-48	
2900007817A	7-7-27	
2910000J028A	7-4-18	
2900000J028A	7-4-28	
30380006271A	7-5-3	
3038010071A	7-5-9	
3078000A114A	7-4-18	
3080000A114A	7-4-14	
3080000A114A	7-4-16	
3100000C 1	7-3-11	
3100018 C 1	7-3-21	
3100020 C 1	7-4-13	

PART NUMBER	FIG. & INDEX NUMBER	REFERENCE DESIGNATION
28100018022A	7-7-23	
28400018787A	7-7-13	
28400018787A	7-7-18	
28400018787A	7-7-9	
2870000B022A	7-7-19	
28700018022A	7-7-20	
288000057806A	7-7-14	
288000057806A	7-7-13	
29000118028A	7-7-43	
29000118028A	7-7-29	
29000018787A	7-7-23	
29000018787A	7-7-33	
29000018787A	7-7-24	
29000018787A	7-7-8	
29000018787A	7-7-7	
29000018787A	7-7-47	
29000018787A	7-7-49	
2900018C131A	7-5-28	
2900000L022A	7-8-9	
2900001A10A	7-8-11	
2900001A10A	7-8-14	
2900001A10A	7-5-15	
2900001A10A	7-8-12	
2900001A10A	7-8-24	
2900001A10A	7-8-23	
2900001A10A	7-8-22	
2900001A10A	7-8-11*	
2900001A10A	7-8-21	
2900001A10A	7-8-20	
2900001A10A	7-8-19	
2900001A10A	7-8-18	
2900001A10A	7-8-28	
2900001A10A	7-8-10	
2900001A10A	7-8-28	

2900001A10A

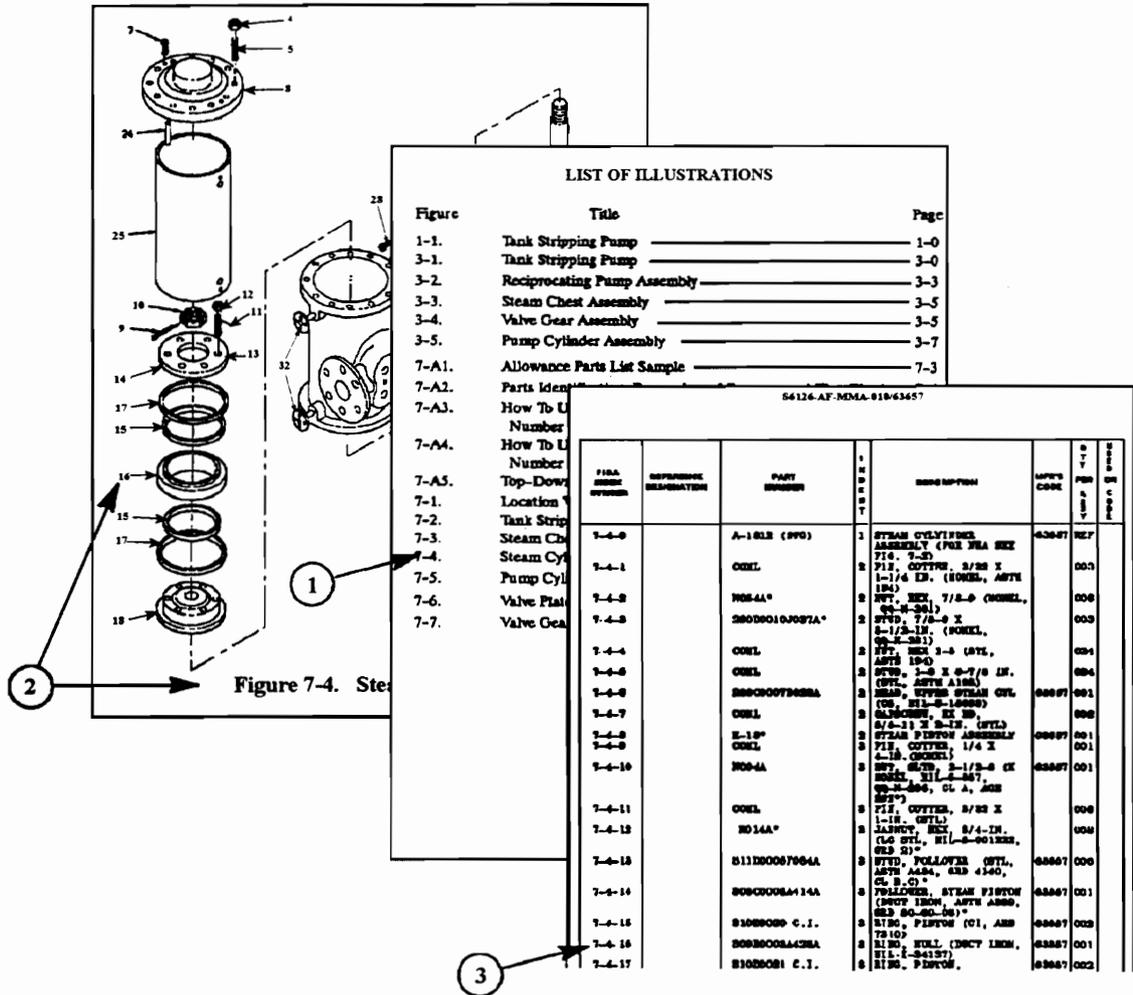
FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	INDEX NUMBER	DESCRIPTION	REF. CODE	QTY	UNIT	USE
7-4-0	A-1812 (ENR)	1		STEAM CYLINDER ASSEMBLY (FOR NHA SEE FIG. 7-2)	63857	1	KEP	
7-4-1	COEL	2		FIN. CUTTER 3/32 X 1-1/4 IN. (BORL., ASTH 184)		003		
7-4-2	NO84A*	2		NUT, HEX. 7/8-9 (BORL., ASTH 194)		003		
7-4-3	2900001GJ037A*	3		STUD. 7/8-9 X 5-1/2 IN. (BORL., Q2-S-281)		003		
7-4-4	COEL	3		NUT, HEX. 1-8 (STL., ASTH 194)	024			
7-4-5	COEL	2		STUD. 1-8 X 2-7/8 IN. (STL., ASTH 194)	024			
7-4-6	290000078028A	2		HEAD, UPPER STEAM CYL. (CB, STL-8-16288)	63857	001		
7-4-7	COEL	3		CAMSCREW, KE 88 8/8-11 X 2-1/2 IN. (STL.)	002			
7-4-8	E-18*	2		STEAM PISTON ASSEMBLY	63857	001		
7-4-9	COEL	3		FIN. CUTTER 1/4 X 4-1/2 (BORL.)	001			
7-4-10	NO84A	3		NUT, SLT, 2-1/2-8 (K BORL., STL-2-267, Q2-S-380, CL A, ABE STE)	63857	001		
7-4-11	COEL	3		FIN. CUTTER 3/32 X 1-1/2 IN. (STL.)	006			
7-4-12	NO16A*	3		JANUT, HEX. 3/4-18 (LC STL., STL-8-001222, GRD 2) *	008			
7-4-13	311000067084A	3		STUD. FOLLOWER (STL., ASTH A424, GRD 4140, CL B, C) *	63857	006		
7-4-14	3080000A414A	3		FOLLOWER, STEAM PISTON (DUCT IRON, ASTH A530, GRD 80-80-80) *	63857	001		
7-4-15	31000020 C. I.	3		RING, PISTON (CI, ABE 7810)	63857	002		
7-4-16	3090000A428A	3		RING, BULL. (DUCT IRON, STL-1-24137)	63857	001		
7-4-17	31000021 C. I.	3		RING, PISTON, 0.010-IN. OS (CB, ABE)	63857	002		

WHEN THE PART NUMBER IS KNOWN

1. Refer to section III, Numerical Index. Locate the number and note the figure and index number(s) assigned the part number.
2. Turn to the figure number(s) indicated, determine applicable equipment (if more than one figure number is provided), and locate the index number referenced the numerical index.
3. If a pictorial representation of the part or its location is desired, refer to the same index number on the accompanying illustration.

Figure 7-3. How to use the Illustrated Parts Breakdown When the Part Number is Known

HOW TO USE THE ILLUSTRATED PARTS BREAKDOWN



WHEN THE PART NUMBER IS NOT KNOWN

- Determine the function and application of the part required. Turn to the List of Illustrations and select the most appropriate title. Note the Illustration figure number.
- Turn to the figure indicated and locate the desired part on the illustration.
- From the illustration, obtain the index number assigned to the part desired. Refer to the accompanying description for specific information regarding the part.

Figure 7-4. How to Use the Illustrated Parts Breakdown When the Part Number or Reference Designation is Not Known

Table 7-1. Manufacturer's Names and Addresses

Code	Name	Address
04613	Tyco Valves and Controls	9700 W. Gulf Bank Rd Houston, TX 77040-3314
25795	W.W. Granger Inc.	DBA Grainger Div. 100 Grainger Parkway Attn: K560 Lake Forest, IL 60045-5201
30793	Insinger Machine Co.	6245 State Rd Philadelphia, PA 19135-2996
71244	Burling Instrument Company	16 River Rd PO Box 298 Chatham, NJ. 07928-1916
72219	Conbraco Industries, Inc.	HWY 51 E Matthews PO Box 247 Matthews, NC 28105

SECTION II
ILLUSTRATIONS AND GROUP ASSEMBLY PARTS LISTS

7-2 SCOPE

7-2.1 Equipment Breakdown. This section provides illustrations and the related Group Assembly Parts List (GAPL) for the turbine generator circulating water pump in top-down breakdown/disassembly sequence. Each illustration is assigned a figure number based on the chapter number and the sequence in which the illustration appears in the chapter. For example, Figure 7-6 is the second IPB figure in Chapter 7.

7-2.2 Group Assembly Parts List Description. The GAPL contains parts information relevant to the pump components shown in each IPB. An index number is assigned to each disassembled valve component depicted in the illustration. Index numbers indicate the disassembly sequence for the illustrated assembly or subassembly. Index numbers on the illustration also correspond to numbers in the GAPL. For example, an item with index number 26 in Figure 7-6 (Chapter 7, second figure) is listed as 7-2-26 in the corresponding GAPL. The following paragraphs further describe the information contained in each column of the GAPL. Table 7-3 is a list of all illustrations in the IPB.

7-2.2.1 Figure and Index Number Column. The figure and index number column lists, in numerical order, the figure and index number of each part shown on the corresponding illustration.

Table 7-2. Illustrated Parts Breakdown Illustrations

Figure	Title
Figure 7-5	Parts List SK-2484
Figure 7-6	Parts List SK-2397
Figure 7-7	Float and Probe Devices SK-3704
Figure 7-8	Booster Piping 1398-42
Figure 7-9	Self Contained Booster Assembly 1192-1
Figure 7-10 (2 sheets)	Control Panel Layout and Components SK-3627

7-2.2.2 Part Number Column. The part number column lists the part identification for all parts shown on the applicable disassembly illustration. Numbers listed in this column are obtained from engineering design drawings/drawing parts lists, manufacturer assembly drawings, vendor parts lists, ship check verification, photographs, previous manuals, and other source material. Entries include some or all of the following:

- Ship check Part Number Identification
- NAVSEA Drawing Number
- NAVSEA Drawing and Item/Piece Number
- Manufacturer Drawing Number
- Manufacturer Drawing and Item/Piece Number
- Manufacturer Part or Identification (ID) Number
- Commercial (COML)
- NO NUMBER

In every case, the number listed identifies the part in some way. When ordering or requesting replacement parts, each number must be transcribed exactly as written, including dashes, slashes, periods, and spaces, so that the supply department can identify and procure the part.

7-2.2.3 Commercial and No Number Entries. The entry COML indicates that the item is a common hardware item (such as a nut, screw, bolt, or washer). The item may be carried as consumable stock in general stores aboard ship or is available through a variety of commercial sources, and it is identified by the data in the description column. The entry NO NUMBER indicates that the item is a general arrangement or grouping/installation of equipment assemblies, or that the assembly/part has no identified applicable part number. Should such a part have to be ordered, the order/request shall include all the data in the description column.

7-2.2.4 Drawing Number Entries. A drawing number entry consists of a number or alphanumeric set followed by (DWG), such as 4497172 (DWG). Drawing numbers are listed when no other part identification is available. Sometimes, the manufacturer of the part considers the drawing number and part number the same. The drawing number permits further research of the equipment being maintained, if required. The drawing number can assist the supply department in identifying and procuring parts not normally stocked or identifiable as repair/replacement parts. After initial introduction of an assembly/component drawing number followed by (DWG), subsequent entries of the same drawing plus dash number for piece parts will not repeat the (DWG) identifier.

7-2.2.5 Drawing Number Table. Engineering/manufacturer drawings used to develop the IPB/GAPL, and identified as such in the GAPL, are listed in Chapter 8. Some of these drawings may be included in the engineering drawing chapter of this manual (if applicable), or may be obtained from the ship's department technical library.

7-2.2.6 Indent Column. The numbers 1 through 9 in the indent column show the relationship of subassemblies and parts to major assemblies. The indent system lists the principal (or top) item (equipment installation/general arrangement/assembly) in a particular figure as indent 1. The detail parts and subassemblies that make up the top item are indent 2. If an indent 2 subassembly is further broken down in the same figure, its detailed parts are indent 3. Further breakdown of subassemblies into subassemblies and/or parts is indicated by the next higher number, as required. Generally, indent numbers will not exceed 5.

7-2.2.7 Description Column. The description column contains parts identifying information for the applicable disassembly illustration. Modifiers are included to identify the characteristics of a particular item.

Table 7-3. GAPL Example

Part Number	Indent	Description
Example 1: D-02N-099-005	1	NAVY STD CLOSE COUPLED PUMP (APL: 017030249)
Example 2: A-014-01N-0-03	2	SPACER, SEAL (NSN: 4720-00-470-6540)
Example 3: A-007-02N-01U/S	2	RING, WEARING (APL PN: A007-2NA01-253US/NSN: 4320-00-470-6364)

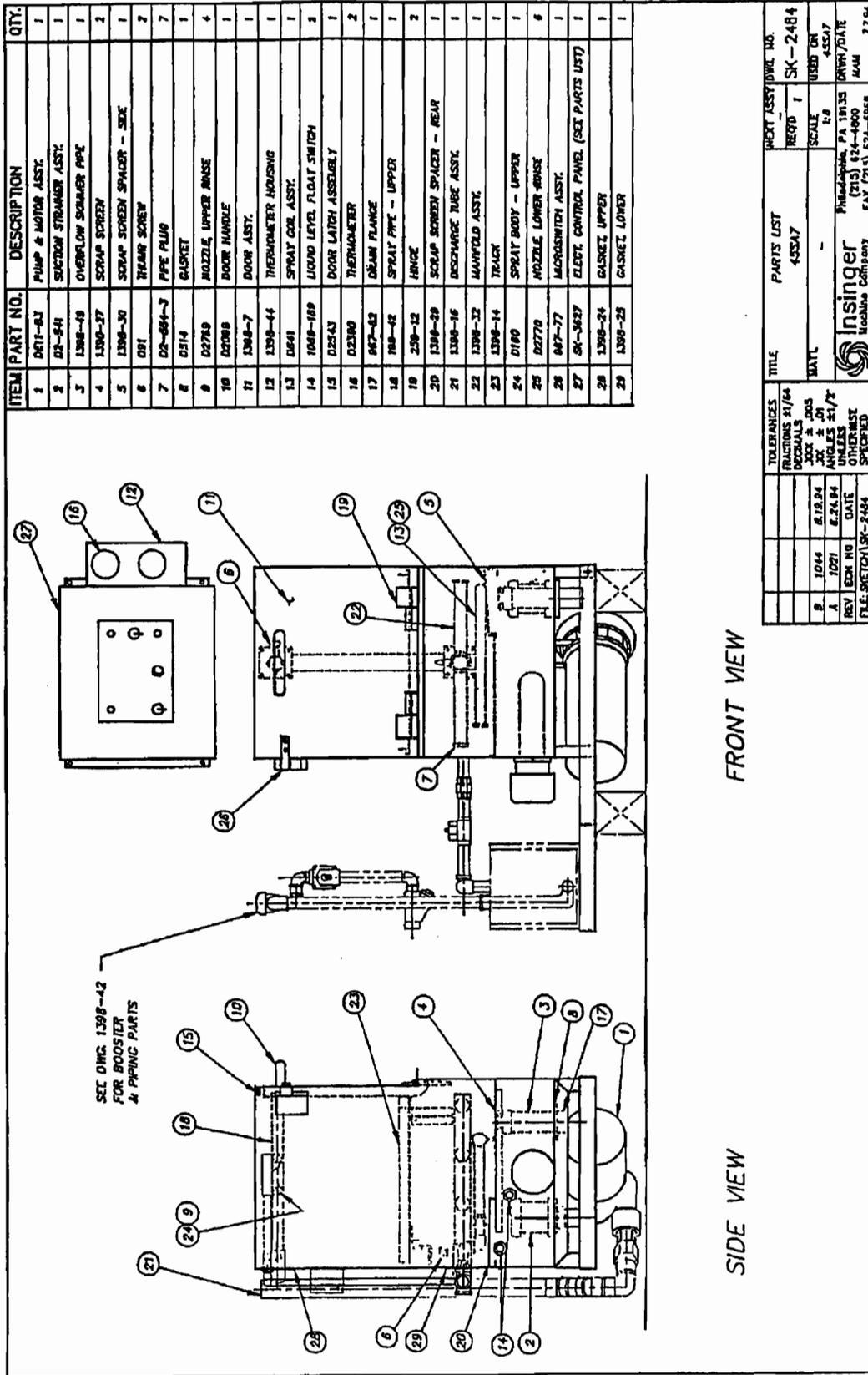


Figure 7-5. 45SA7 Parts List

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	I N D E N T	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-5-1		DE11-83		PUMP AND MOTOR ASSY.	30793	1
7-5-2		D2-541		SUCTION STRAINER ASSY	30793	1
7-5-3		1398-49		OVERFLOW SKIMMER PIPE	30793	1
7-5-4		1390-27		SCRAP SCREEN	30793	2
7-5-5		1398-30		SPACER PLATE	30793	1
7-5-6		D91		THUMB SCREW	30793	2
7-5-7		D2-554-3		PIPE PLUG	30793	7
7-5-8		D514		GASKET	30793	1
7-5-9		D2769		NOZZLE, UPPER RINSE	30793	4
7-5-10		D2099		DOOR HANDLE	30793	1
7-5-11		1398-7		DOOR ASSY	30793	1
7-5-12		1398-44		THERMOMETER HOUSING	30793	1
7-5-13		D541		SPRAY COIL ASSY	30793	1
7-5-14		1089-189		LIQUID LEVEL FLOAT SWTCH	30793	2
7-5-15		D2543		DOOR LATCH ASSY	30793	1
7-5-16		D2390		THERMOMETER	30793	2
7-5-17		967-82		DRAIN FLANGE	30793	1
7-5-18		199-42		SPRAY PIPE, UPPER	30793	1
7-5-19		259-12		HINGE	30793	2
7-5-20		1398-29		SCRAP SCREEN SPACER, REAR	30793	1
7-5-21		1398-16		DISCHARGE TUBE ASSY	30793	1
7-5-22		1398-32		MANIFOLD ASSY	30793	1
7-5-23		1398-14		TRACK	30793	1
7-5-24		D160		SPRAY BODY, UPPER	30793	1
7-5-25		D2770		NOZZLE, LOWER RINSE.	30793	6
7-5-26		987-77		MICROSWITCH ASSY	30793	1
7-5-27		SK-3627		ELECT. CONTROL PANEL	30793	1
7-5-28		1398-24		GASKET, UPPER	30793	1
7-5-29		1398-25		GASKET, LOWER	30793	1

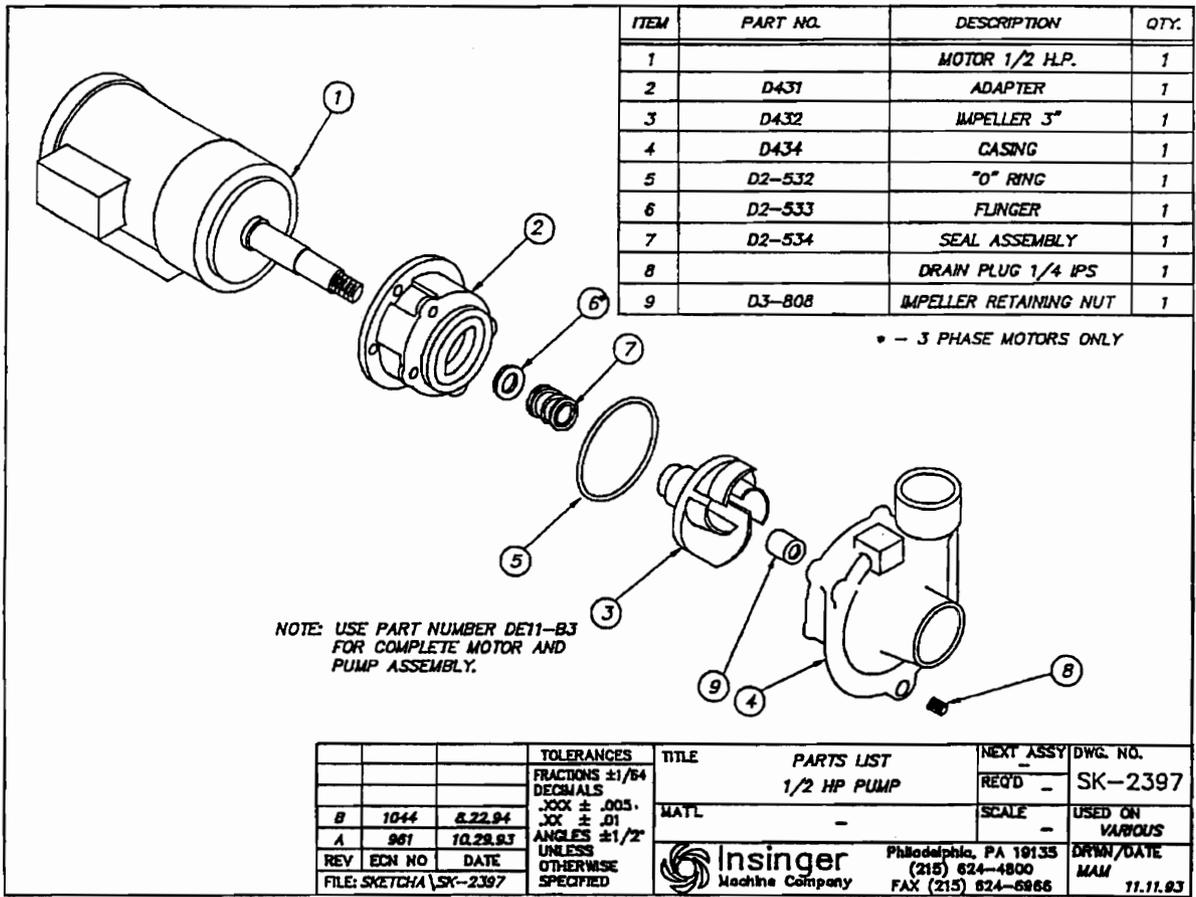


Figure 7-6. Parts List 1/2 HP Pump

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	INDENT	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-6		DE11-B3		PUMP AND MOTOR ASSY.	30793	1
7-6-1				MOTOR, 1/2 HP	30793	1
7-6-2		D431		ADAPTER	30793	1
7-6-3		D432		IMPELLER 3"	30793	1
7-6-4		D434		CASING	30793	1
7-6-5		D2-532		"O"RING	30793	1
7-6-6		D2-533		FLINGER	30793	1
7-6-7		D2-534		SEAL ASSY	30793	1
7-6-8				DRAIN PLUG 1/4 IPS	30793	1
7-6-9		D3-808		IMPELLER RETAINING NUT	30793	1

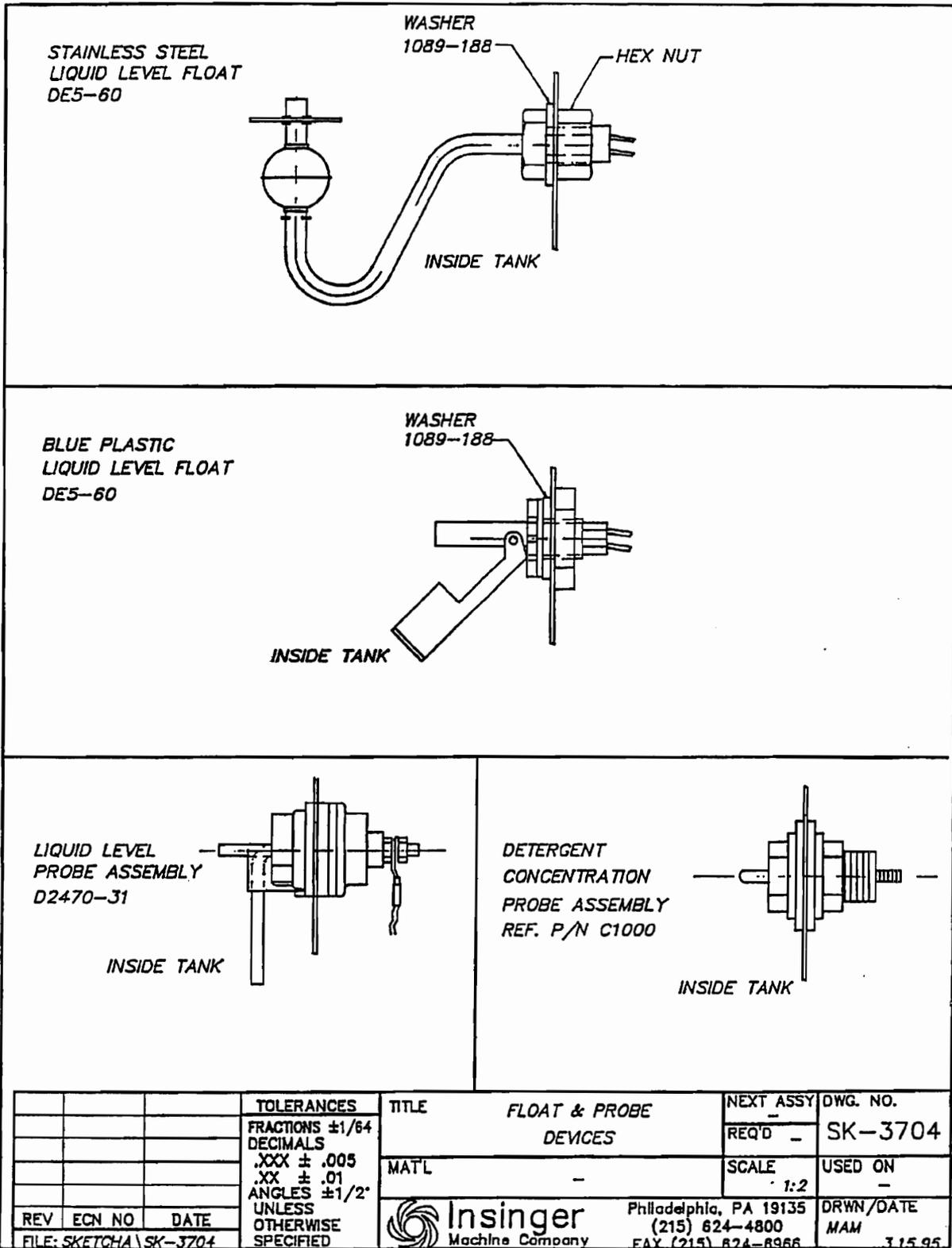


Figure 7-7. Float and Probe Devices

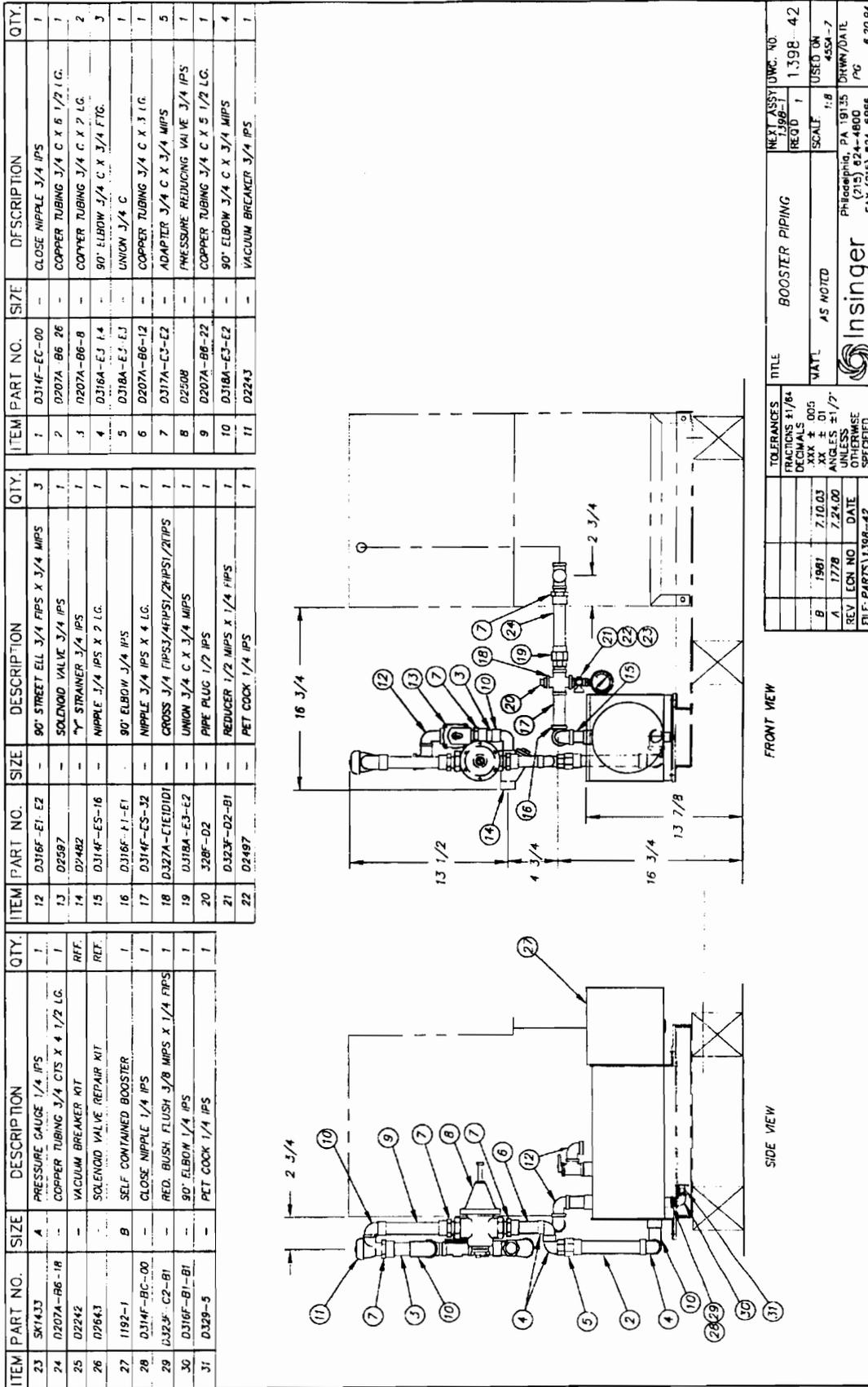


Figure 7-8. Booster Piping

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	I N D E N T	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-8 -1		D314F-EC-00		CLOSE NIPPLE 3/4 IPS	30793	2
7-8 -2		D207A-B6-26		COPPER TUBING 3/4 C X 6-1/2 LG.	30793	1
7-8 -3		D207A-B6-8		COPPER TUBING 3/4 C X 2 LG.	30793	2
7-8 -4		D316A-E3-E4		90° ELBOW 3/4 C X 3/4 FTG.	30793	3
7-8 -5		D318A-E3-E3		UNION 3/4 C	30793	1
7-8 -6		D207A-B6-12		COPPER TUBING 3/4 C X 3 LG.	30793	1
7-8 -7		D317-E3-E2		ADAPTER 3/4 C X 3/4 MIPS.	30793	5
7-8 -8		D2508		PRESSURE REDUCING VALVE 3/4 IPS.	30793	1
7-8 -9		D207A-B6-22		COPPER TUBING 3/4 C X 5-1/2 LG.	30793	1
7-8 -10		D318A-E3-E2		90° ELBOW 3/4 C X 3/4 MIPS	30793	4
7-8 -11		D2243		VACUUM BREAKER 3/4 IPS	30793	1
7-8 -12		D316F-E1-E2		90° STREET ELL 3/4 FIPS X 3/4 MIPS	30793	3
7-8 -13		D2597		SOLENOID VALVE 3/4 IPS	30793	1
7-8 -14		D2482		"Y" STRAINER 3/4 IPS	30793	1
7-8 -15		D314F-ES-16		NIPPLE 3/4 IPS X 2 LG.	30793	1
7-8 -16		D316-E1-E1		90° ELBOW 3/4 IPS	30793	1
7-8 -17		D314F-ES-32		NIPPLE 3/4 IPS X 4 LG.	30793	1
7-8 -18		D327A-E1E1D1D1		CROSS 3/4 FIPS3/4FIPS1/ 2FIPS1/2FIPS	30793	1
7-8 -19		D318A-E3-E2		UNION 3/4 C X 3/4 MIPS	30793	1
7-8 -20		328F-D2		PIPE PLUG 1/2 IPS	30793	1
7-8 -21		D323F-D2-B1		REDUCER 1/2 MIPS X 1/4 FIPS	30793	1
7-8 -22		D2497		PET COCK 1/4 IPS	30793	1

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	I N D E X T	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-8 -23		SK1433		PRESSURE GAUGE 1/4 IPS SIZE A	30793	1
7-8 -24		D207A-B6-18		COPPER TUBING 3/4 CTS X 4-1/2 LG.	30793	1
7-8 -25		D2242		VACUUM BREAKER KIT	30793	REF
7-8 -26		D2643		SOLENOID VALVE REPAIR KIT	30793	REF
7-8 -27		1192-1		SELF CONTAINED BOOSTER TYPE B	30793	1
7-8 -28		D314F-BC-00		CLOSE NIPPLE 1/4 IPS	30793	1
7-8 -29		D323F-C2-B1		RED. BUSH. FLUSH 3/8 MIPS X 1/4 FIPS	30793	1
7-8 -30		D316F-B1-B1		90° ELBOW 1/4 IPS	30793	1
7-8 -31		D329-5		PET COCK 1/4 IPS	30793	1

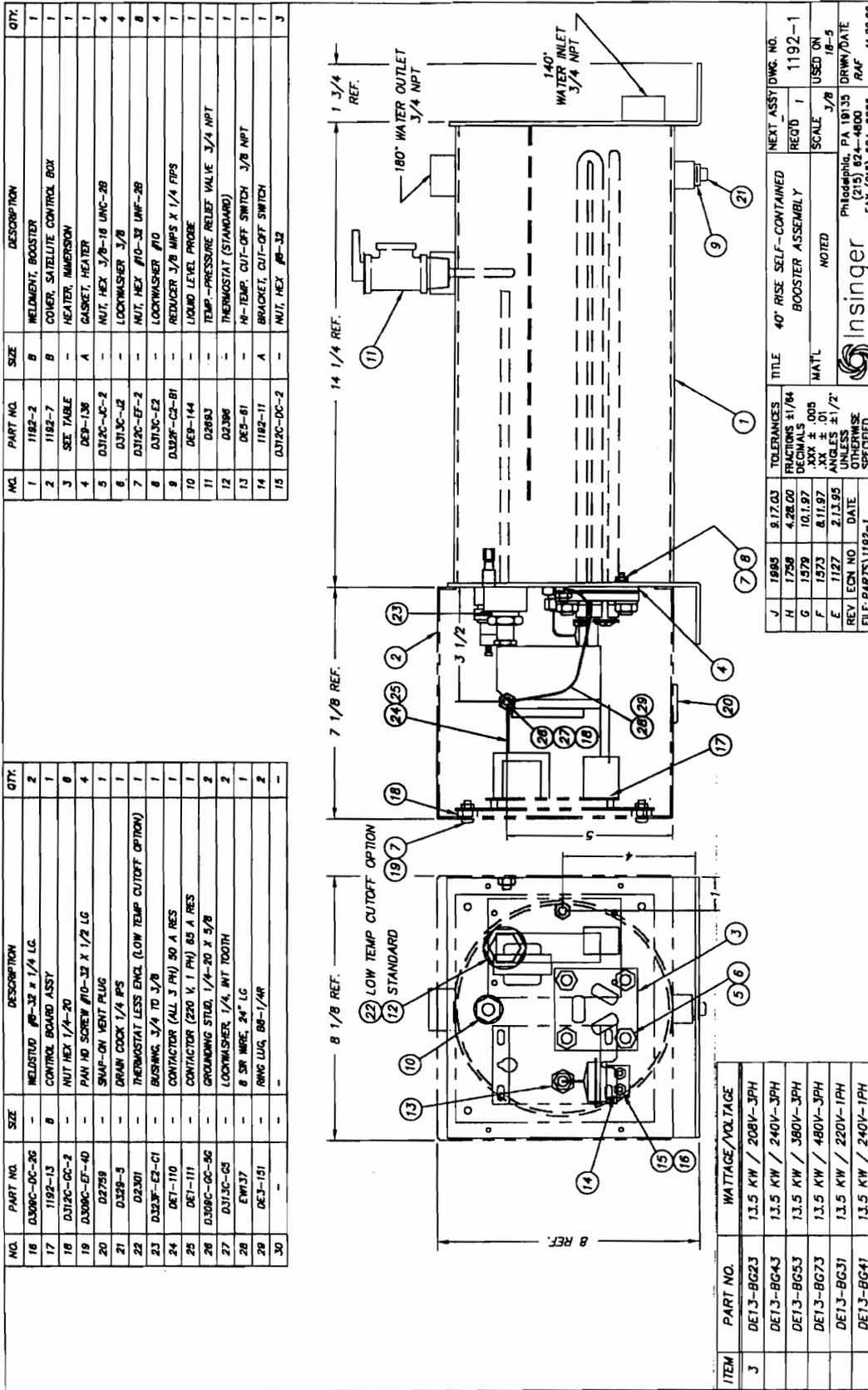


Figure 7-9. Self Contained Booster Assembly

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	INDEX	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-9 -1		1192-2		WELDMENT, BOOSTER SIZE B	30793	1
7-9 -2		1192-7		COVER, SATELLITE CONTROL BOX, SIZE B	30793	1
7-9 -3		DE13-BG23 DE13-BG43 DE13-BG53 DE13-BG73 DE13-BG31 DE13-BG41		HEATER, IMMERSION 13.5KW / 208V-3PH 13.5KW / 240V-3PH 13.5KW / 380V-3PH 13.5KW / 480V-3PH 13.5KW / 220V-1PH 13.5KW / 240V-1PH	30793	1
7-9 -4		DE9-136		GASKET, HEATER SIZE A	30793	1
7-9 -5		D312C-JC-2		NUT, HEX 3/8- 16UNC-2B	30793	4
7-9 -6		D313C-J2		LOCKWASHER 3/8	30793	4
7-9 -7		D312C-EF-2		NUT, HEX #10-32- UNF-2B	30793	8
7-9 -8		D313C-E2		LOCKWASHER #10	30793	4
7-9 -9		D322F-C2-B1		REDUCER 3/8 MIPS X 1/4 FIPS	30793	1
7-9 -10		DE9-144		LIQUID LEVEL PROBE	30793	1
7-9 -11		D2693		TEMP. PRESSURE RELIEF VALVE 3/4 NPT	30793	1
7-9 -12		D2396		THERMOSTAT, STANDARD	30793	1
7-9 -13		DE5-61		HI-TEMP, CUT-OFF SWITCH 3/8 NPT	30793	1
7-9 -14		1192-11		BRACKET, CUT- OFF SWITCH	30793	1
7-9 -15		D312C-DC-2		NUT, HEX #8-32	30793	3
7-9 -16		D309C-DC-2G		WELDSTUD #8-32 X 1/4 LG.	30793	2
7-9 -17		1192-13		CONTROL BOARD ASSY TYPE B	30793	1
7-9 -18		D312C-GC-2		NUT, HEX 1/4-20	30793	6
7-9 -19		D309C-EF-4D		PAN HEAD SCREW #10-32 X 1/2 LG	30793	4
7-9 -20		D2759		SNAP-ON VENT PLUG	30793	1
7-9 -21		D329-5		DRAIN COCK 1/4 IPS	30793	1

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	I N D E X T	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-9 -22		D2301		THERMOSTAT LESS ENCLOSURE (LOW TEMP CUTOFF OPTION	30793	1
7-9 -23		D323F-E2-C1		BUSHING, 3/4 TO 3/8	30793	1
7-9 -24		DE1-110		CONTACTOR (ALL 3 PH) 50A RES	30793	1
7-9 -25		DE1-111		CONTACTOR (220V 1PH) 65A RES	30793	1
7-9 -26		D309C-GC-5G		GROUNDING STUD, 1/4-20 X 5/8	30793	2
7-9 -27		D313C-G5		LOCKWASHER, 1/4, INT TOOTH	30793	2
7-9 -28		EW137		8 SIR WIRE, 24" LG.	30793	1
7-9 -29		DE3-151		RING LUG, B8-1/4R	30793	2

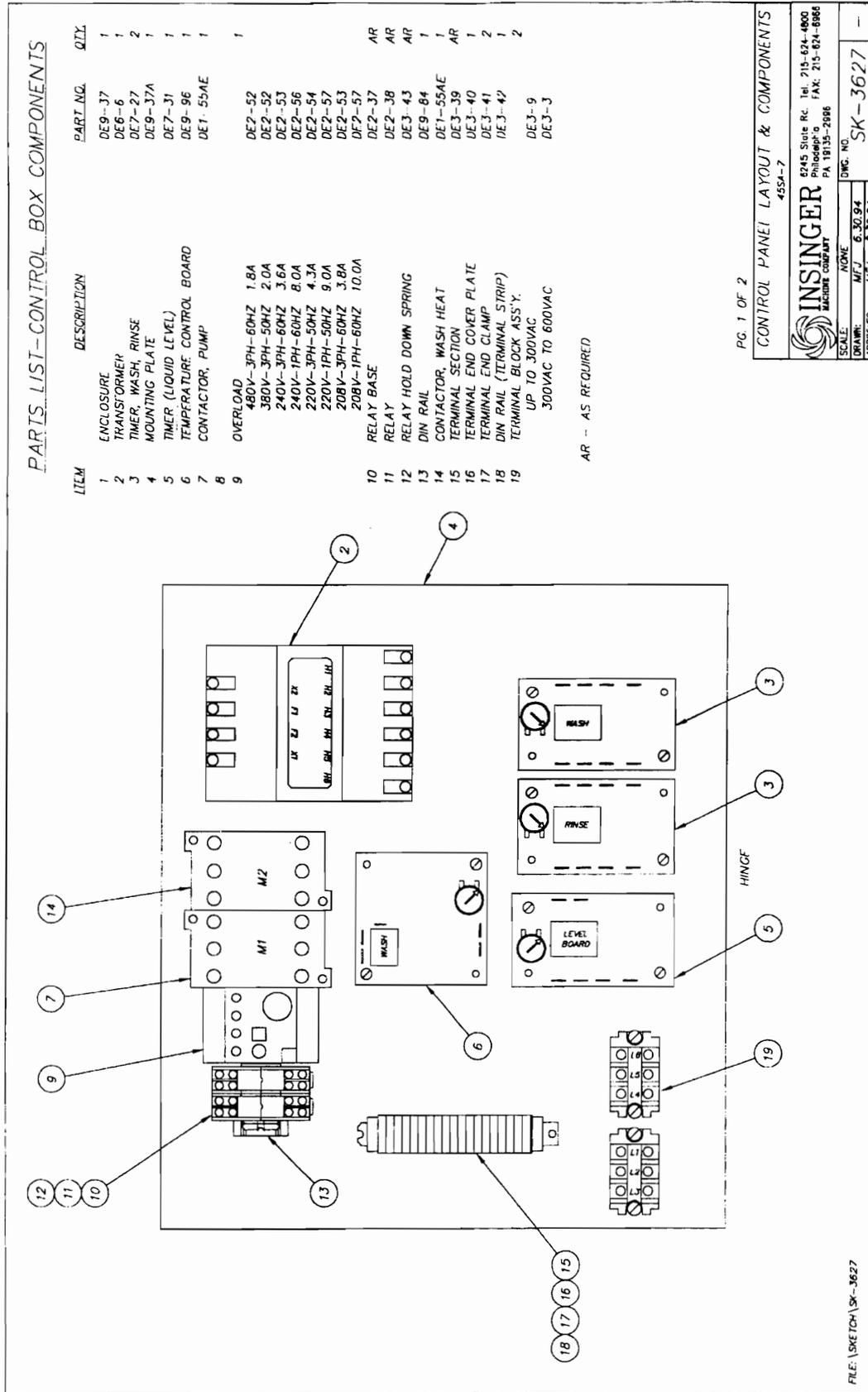
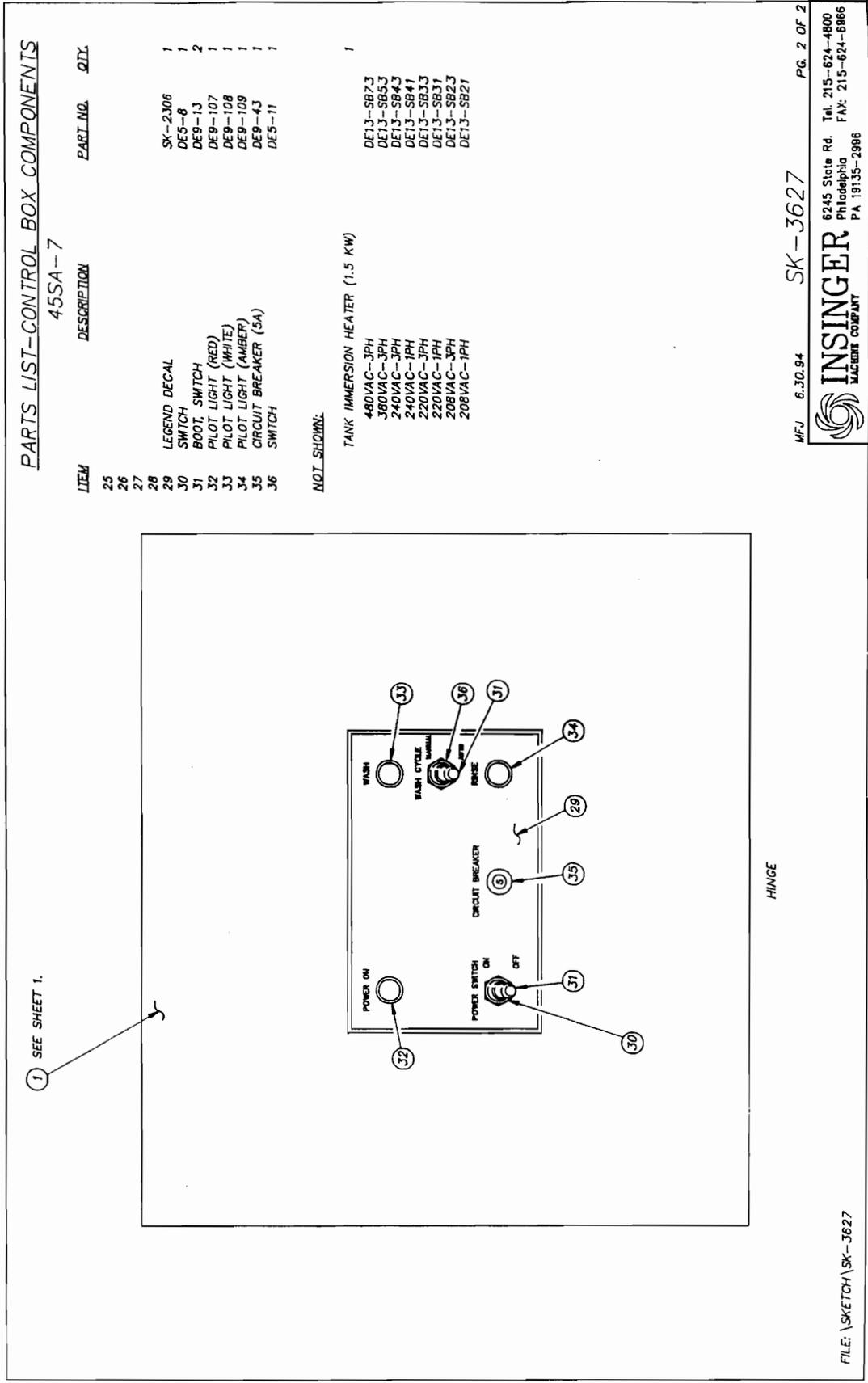


Figure 7-10. Control Panel Layout and Components (Sheet 1 of 2)



MFJ 6.30.94 SK-3627 PG. 2 OF 2
INSINGER MACHINE COMPANY
 6245 State Rd. Philadelphia PA 19135-2986
 Tel. 215-624-4800 Fax: 215-624-6886

Figure 7-10. Control Panel Layout and Components (Sheet 2 of 2)

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	I N D E X	DESCRIPTION	MFR'S CODE	QTY PER ASSY
7-10 -1		DE9-37		ENCLOSURE	30793	1
7-10 -2		DE6-6		TRANSFORMER	30793	1
7-10 -3		DE7-27		TIMER, WASH, RINSE	30793	2
7-10 -4		DE9-37A		MOUNTING PLATE	30793	1
7-10 -5		DE7-31		TIMER (LIQUID LEVEL)	30793	1
7-10 -6		DE9-96		TEMPERATURE CONTROL BOARD	30793	1
7-10 -7		DE1-55AE		CONTACTOR, PUMP	30793	1
7-10 -9		DE2-52 DE2-52 DE2-53 DE2-56 DE2-54 DE2-57 DE2-53 DE2-57		OVERLOAD 480V-3PH-60HZ 1.8A 380V-3PH-50HZ 2.0A 240V-3PH-60HZ 3.6A 240V-1PH-60HZ 8.0A 220V-3PH-50HZ 4.3A 220V-1PH-50HZ 9.0A 208V-3PH-60HZ 3.8A 208V-1PH-60HZ 10.0A	30793	1
7-10 -10		DE2-37		RELAY BASE	30793	AR
7-10 -11		DE2-38		RELAY	30793	AR
7-10 -12		DE3-43		RELAY HOLD DOWN SPRING	30793	AR
7-10 -13		DE9-84		DIN RAIL	30793	1
7-10 -14		DE1-55AE		CONTACTOR WASH HEAT	30793	1
7-10 -15		DE3-39		TERMINAL SECTION	30793	AR
7-10 -16		DE3-40		TERMINAL END COVER PLATE	30793	1
7-10 -17		DE3-41		TERMINAL END CLAMP	30793	2
7-10 -18		DE3-42		DIN RAIL (TERMINAL STRIP)	30793	1
7-10 -19		DE3-9 DE3-3		TERMINAL BLOCK ASSY UP TO 300VAC 300VAC TO 600VAC	30793	2

FIG. & INDEX NUMBER	REFERENCE DESIGNATION	PART NUMBER	I N D E X	DESCRIPTION	MFR'S CODE	QTY PER ASS Y
7-10 -29		SK-2306		LEGEND DECAL	30793	1
7-10 -30		DE5-8		SWITCH	30793	1
7-10 -31		DE9-13		BOOT, SWITCH	30793	2
7-10 -32		DE9-107		PILOT LIGHT (RED)	30793	1
7-10 -33		DE9-108		PILOT LIGHT (WHITE)	30793	1
7-10 -34		DE9-109		PILOT LIGHT (AMBER)	30793	1
7-10 -35		DE9-43		CIRCUIT BREAKER 5A	30793	1
7-10 -36		DE5-11		SWITCH	30793	1
NOT SHOWN		DE13-SB73 DE13-SB53 DE13-SB43 DE13-SB41 DE13-SB33 DE13-SB31 DE13-SB23 DE13-SB21		TANK EMERSION HEATERS 1.5KW 480VAC 3PH 380VAC 3PH 240VAC 3PH 240VAC 2PH 220VAC 3PH 220VAC 1PH 208VAC 3PH 208VAC 1PH	30793	1

CHAPTER 8 INSTALLATION

8-1 INTRODUCTION.

This chapter provides a general description for the installation of the 45SA-7 Washing Machine. The installation procedures provided in this chapter, in conjunction with the drawings listed in table 8-1, are sufficient to enable assigned personnel to safely and efficiently install the dishwasher.

8-2 INSTALLATION AND EQUIPMENT DRAWINGS.

Table 8-1 provides a list of engineering drawings (appearing in the Ship Drawing Index) relevant to the dishwashing machine.

8-3 REFERENCE DRAWINGS IN SHIP DRAWING INDEX.

Any drawing listed in the Ship Drawing Index (SDI), a comprehensive list of engineering drawings maintained by the engineering department, is excluded from this chapter. (Refer to the SDI for applicable revision to drawings listed in table 8-1.)

Table 8-1. Engineering Drawings

Drawing Number	Drawing Title	Figure Number
45SA7	Installation Drawing	8-1
W45SA070	Wiring Diagram 45SA7 – Electric	8-2
1398-50	Field Wiring Interconnections	8-3

8-4 QUALITY CONTROL DOCUMENTATION.

For equipment purchased with Quality Control (QC) Certification, check the package of documents to ensure QC certificates are complete as per the purchase order.

8-5 RECEIPT AND INSTALLATION

8-5.1 **Packing Description.** The 45SA7-F2 dishwasher is shipped from the factory securely bolted to a single shipping pallet. The entire unit is then enclosed by protective crating.

8-5.2 **Receipt Inspection Procedure.** Upon receipt of new unit perform the following:

- a. Check packing crate and skid section for damage. Crate and skid condition is indicative of the care with which the equipment was handled.
- b. If extensive damage is indicated, ship the entire unit back to the manufacturer.

8-5.3 **Packing Removal.** If condition of shipping container is satisfactory proceed as follows:

- a. Remove all external protective crating.
- b. Remove all fasteners holding dishwasher and component parts to the pallet.
- c. Ensure the following items have been received:

Qty.	Description
1	Dishwasher and booster assembly.
1	Electrical control enclosure.
1	Thermometer bracket with thermometers.
2	Plate racks.
4	Cup, bowl and cutlery racks.
3	Manifold cleanout brushes.
2	Technical manuals.

8-6 INSTALLATION

8-6.1 Mechanical and Piping. The dishwasher frame is designed for installation on shock absorbing mounts installed by shipboard or shipyard personnel. Position the dishwasher frame on these mounts and proceed as follows:

- a. Connect a 3/4" hot water supply line (140 °F minimum) to the inlet strainer on the booster piping. Inlet water pressure should not be less than 20 psig with water flowing, or not more than 125 psig static. Use unions on the piping system to facilitate the replacement of individual components.
- b. Connect a 1-1/4" drain line to the drain coupling on the bottom of the wash tank.
- c. Install the thermometer bracket (with wash and rinse thermometers) on the side of the electrical enclosure. Neatly coil unused capillary length.
- d. Install and plumb the detergent reservoir and controller, and rinse injector, in an easily accessible location, above the level of the wash tank. Follow the manufacturer's directions. A connection for the rinse injector outlet tube is provided on the final hot water rinse pipe between the booster and the machine. Holes for the detergent probe and supply must be added to the tank at assembly.

8-6.2 Electrical Installation. To install power and control to the dishwasher proceed as follows:

WARNING

Dangerous voltages are present on connections to the electrical control enclosure and electric booster heater. Observe safety precautions for high voltage electrical equipment when connecting to the local distribution system. All work should be done by a qualified electrician.

NOTE

Mounting hardware for electrical control enclosure and electrical power cables from the electrical control enclosure and electric booster heater to the ship's local distribution panel are furnished by the installing activity.

- a. Install the electrical control enclosure on a bulkhead adjacent to the dishwasher. Controls should be easily accessible to the operator.

- b. Install the 440V power wires between circuit breakers in the ship's local distribution panel and the dishwasher electrical control enclosure. One circuit for the machine (L1, L2, L3) and one circuit for the booster (L4, L5, L6).

NOTE

Power requirements for the dishwasher are listed in Table 1-1.

- c. Install the power and control wires between the electrical enclosure and the junction box on the dishwasher. Numbered terminals are provided in each enclosure for all the wires.
- d. Wire the detergent controller and rinse injector per manufacturer's recommendations. Terminals are provided in the main enclosure and junction box for the detergent dispenser probe wires.

8-6.3 Operational Check. Upon completion of installation, remove all tags and provide power and water supply to the dishwasher. Perform start up procedure, in accordance with Section 2-3. If equipment and piping reveal no leaks proceed as follows:

WARNING

At startup, and after any draining of electric booster tank, turn off the 440 volt power to the booster during the initial wash tank fill (paragraph 2-3.2). This will allow the booster reservoir to fill and vent trapped air without overheating the booster heating elements.

- a. Verify the pump rotation is correct. An arrow on the pump casing indicates the correct direction.
- b. Inspect all plumbing joints for leakage and verify water is running freely through the drain.

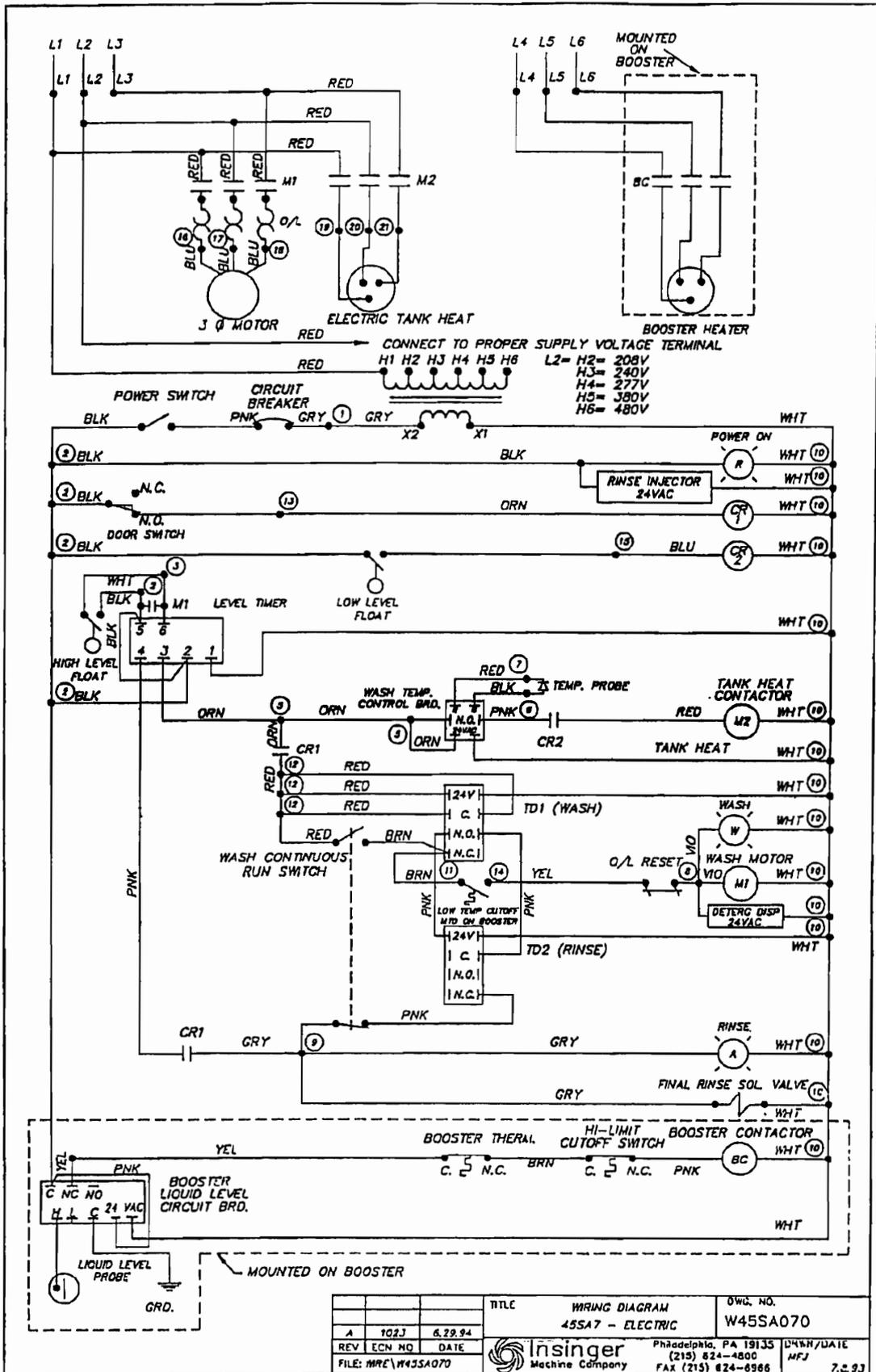
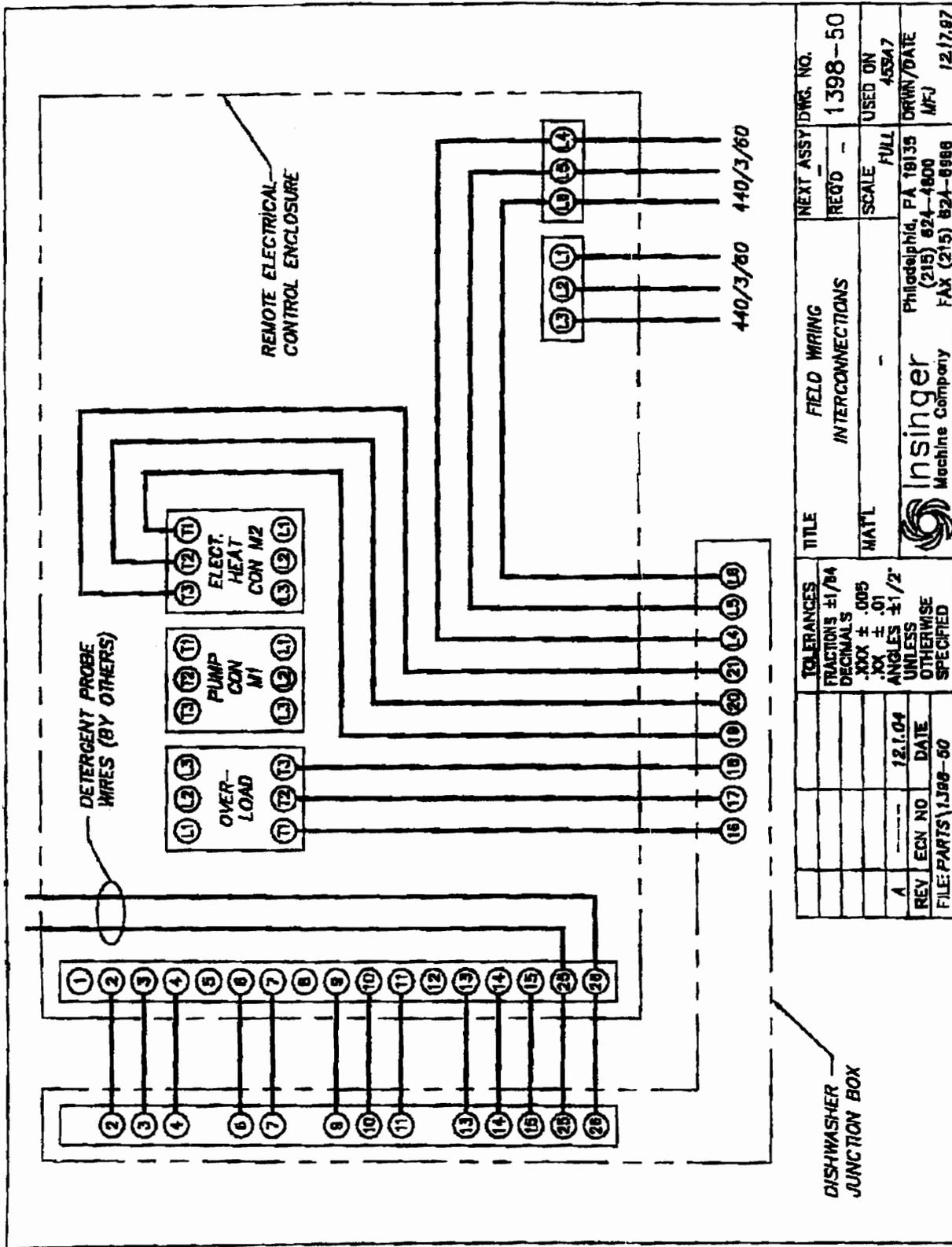


Figure 8-2. Electrical Wiring Diagram



TITLE		FIELD WIRING		NEXT ASSY DWG. NO.	
MATEL		INTERCONNECTIONS		REQ'D - 1398-50	
TOLERANCES		SCALE		USED ON	
FRACTIONS ±1/8"		FULL		455A7	
DECIMALS		FULL		DRAWN/DATE	
.XXX ± .005		FULL		Philadelphia, PA 19139	
.XX ± .01		FULL		(215) 824-4800	
ANGLES ±1/2"		FULL		MFJ	
UNLESS OTHERWISE SPECIFIED		FULL		12/7/87	
REV		DATE		Machine Company	
A		12.1.04		FAX (215) 824-8988	
REV ECN NO		DATE		Insinger	
FILE PARTS \1398-50		DATE		Machine Company	

Figure 8-3. Field Wiring Diagram

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