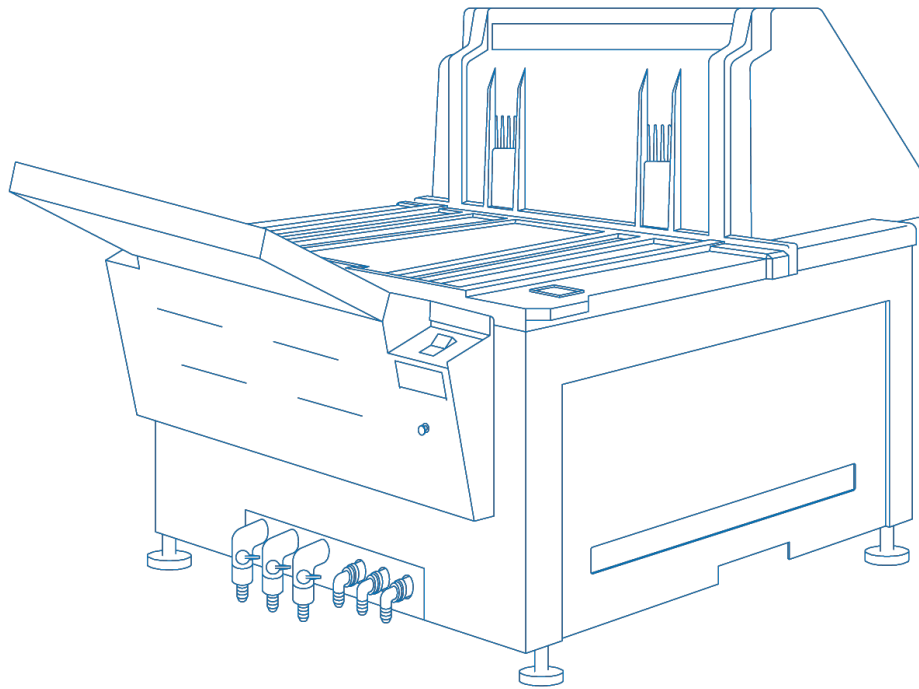




X-Ray Film Processors

Mini NDT



Installation, Operation, Service & Parts Manual

www.AFPmanufacturing.com
(914) 592-6665

November 2017

0000061122 REV 06

WARRANTY

AFP Manufacturing Corporation x-ray film processors are warrantied to be free from defects in workmanship and material for 24 months from the date of sale.

All part and component returns require a Return Materials Authorization (RMA). Returns must be received within 30 days of the RMA issue date and in appropriate packaging to prevent shipping damage. Items returned after the return period or without an RMA, or included with other products for which an RMA has been issued, will be returned to the customer at the discretion of AFP Manufacturing. Return shipping expenses are the customer's responsibility. For x-ray film processors, the RMA will be issued for the defective part or component only.

Any item returned under warranty will be repaired or replaced at our option at no charge to the customer, provided that our inspection confirms it to be defective. AFP Manufacturing Corporation is not liable for indirect or consequential damage or loss of any nature in connection with this equipment. Dealer labor and shipping and handling charges are not covered by this warranty.

Warranty credit will not be applied to product returns that exhibit damage due to shipping, misuse, careless handling, improper installation by dealers or repairs by unauthorized personnel. Credit or partial credit will not be issued until the part or component has been received and assessed. If, after evaluation, it is determined that there is no fault found and the unit is working properly, a credit will not be issued.

Warranty is void if the product is installed incorreced or installed or serviced by anyone other than an authorized AFP Manufacturing Distributor or Dealer.

**Go to www.AFPmanufacturing.com/product-registration/
to register your AFP x-ray film processor.**

Please note: This warranty applies to all Mini-Med and Mini-NDT models with serial numbers 31468 and above. Older models carry the warranty shown in their manual.

**AFP Mini NDT
X-Ray Film Processor**

TABLE OF CONTENTS

Section 0 - Safety Information



Section 1 - Introduction

Content	1-1
Description	1-1
Operation	1-2
Capabilities	1-2
Transport System	1-2
Developer System	1-4
Fixer System	1-4
Developer & Fixer Replenishment	1-4
Anti-Crystallization	1-4
Wash System	1-5
"No Plumbing" System (Optional)	1-5
Dryer System	1-5
Cover Interlock Switches	1-5
General Specifications	1-6

Section 2 - Installation

Introduction	2-1
Pre-Installation	2-1
Location	2-1
Dimensions & Weight	2-2
Through-the-Wall Installation	2-2
Ventilation	2-2
Electrical	2-2
Plumbing	2-3
"No Plumbing" System Option	2-3
Installation	2-4
Set Up	2-4
Assemble Stand	2-4
Position Processor	2-4
Connect Replenishment	2-4
Replenish Mode	2-4
Batch Mode	2-6
Connect Plumbing	2-7
"No Plumbing" Option	2-7
Control Panel Position	2-8

Section 2 - Installation (continued)

Processor Checkout	2-9
Operational Checkout	2-9
Transport Film	2-11
Complete Checkout	2-11
Processor Set Up Checklist	2-12
Operational Checklist	2-13
Notes	2-14

Section 3 - Operation

Controls and Indicators	3-1
User Controls	3-1
Power Switch	3-1
Manual Replenishment Switch	3-2
Power ON LED	3-2
Dev Temp LED	3-2
Wait LED	3-2
Low Dev LED	3-2
Drain Valves	3-2
Overflow Lines	3-2
Top Cover Interlock Switch	3-2
Loading Chemicals	3-3
Daily Start Up	3-4
Processor ON, Fill Wash Tank	3-4
Check Developer and Fixer Levels	3-4
Check Drive	3-4
Processing Film	3-5
Shutdown and Daily Cleaning	3-5
Drain Wash Tank	3-5
Clean Top Cover, Guides & Rollers	3-5
Wipe Off Processor	3-5
Quality Control	3-6
Developer	3-6
Fixer	3-6
Replenishment	3-7
Checklists for Daily Use	3-8
Startup	3-8
Operation	3-8
Shutdown and Daily Cleaning	3-8

Section 4 - Maintenance

Maintenance Program	4-1
Maintenance Records	4-1
Cleaning	4-1

Section 4 - Maintenance (continued)

Mini NDT Processor Maintenance Schedule	4-2
Daily	4-2
Weekly	4-2
Monthly	4-2
Yearly	4-2
Mini NDT Processor Maintenance Log	4-3
Weekly Cleaning	4-4
Monthly Cleaning	4-5
Clean Tanks	4-6
Inspect Processor	4-6
Prepare Fresh Chemicals	4-7
Lubrication	4-7
Annual Maintenance	4-7
Removing Old Lubricants	4-8
Lubrication Points	4-8

Section 5 - Service

Content	5-1
Troubleshooting	5-1
Service Procedures	5-2
Service Procedures Index	5-2
Schematics	5-2
Troubleshooting Processor Problems	5-3
Service Procedure 5-1, Main Drive Belt	5-6
Service Procedure 5-1a, Film Sensors/Adjustments	5-7
Figure 5-1, Film Sensor Location Configurations	5-8
Service Procedure 5-2, Servicing Circulation Pumps	5-9
Figure 5-2, Recirculation Pump Head, Early Style	5-11
Figure 5-3, Recirculation Pump, Later Style	5-11
Service Procedure 5-3, Servicing Replenisher Pumps	5-12
figure 5-4, Disassembly of Replenisher Pumps	5-12
Service Procedure 5-4, Circuit Descriptions & Calibration Procedures	5-13
Developer Temperature Control	5-13
Developer Temperature Calibration	5-14
Dryer Temperature Control	5-14
Over Temperature Protection	5-15
Dryer Temperature Calibration	5-15
Replenishment Operation	5-16
Replenishment Calibration	5-16
Triacs & SCRs	5-17
Outputs	5-17

Fuses	5-17
Section 5, Service (continued)	
Service Procedure 5-5, Theory of Operation	5-18
Solution Temperature Control	5-18
Dryer Temperature Control	5-18
Solution Level Sensor	5-19
Automatic Shut-Off	5-19
AC Interface Board	5-19
Waveforms & Voltages	5-20
Schematics & Wiring Diagrams	5-22
Figure 5-5, Main Wiring Diagram	5-22
Figure 5-6, Dryer Rack Wiring Diagram	5-23
Figure 5-7, AC Interface Board Schematic	5-24
Figure 5-8, Logic Board Schematic	5-25
Figure 5-9, 110v Logic Board Layout	5-26
Figure 5-10, 220v Logic Board Layout	5-27
Figure 5-11, AC Interface Board Layout	5-28
Figure 5-12, Ready Tone Generator Layouts & Schematics	5-29
Figure 5-13, LED Board Layout & Schematic	5-30
 Section 6 - Parts	
Introduction	6-1
How Parts Are Listed	6-1
When Ordering Parts	6-1
Maintenance Kit	6-1
Documentation	6-1
Part Listings	
General Assembly	6-2
Figure 6-1, General Assembly	6-3
Figure 6-2a, Feed Tray & Control Chassis Assembly	6-4
Figure 6-2b, Feed Tray & Control Chassis Assembly	6-5
Figure 6-3, Drive System	6-6
Figure 6-4, Tank/Frame Assembly	6-7
Wet Rack Assembly	6-8
Figure 6-5, Wet Rack Assembly, Top Roller Group	6-9
Figure 6-6, Wet Racks, Bottom Roller Group	6-10
Figure 6-7, Wet Racks, Film Guide Group	6-11
Figure 6-8, Wash Rack, Squeegee Roller Group	6-12

Dryer Assembly, Front Exit	6-13
Figure 6-9, Dryer Assembly, Full View	6-14
Figure 6-10, Dryer Assembly, Side View	6-14

Section 6 - Parts (continued)

Plumbing Schematic (Early Style Parts Listing)	6-15
Figure 6-11, Plumbing Schematic (Early Style)	6-16
Plumbing Schematic, (Later Style Parts Listing)	6-17
Figure 6-12, Plumbing Schematic (Later Style)	6-18
Notes	6-19

Section 7 - Accessories

Processor Support Stand	7-1
Support Stand Parts	7-2
Notes	7-4

Section 0

Safety Information

IMPORTANT SAFETY INFORMATION

TO REDUCE THE RISK OF INJURY OR ILLNESS, READ, UNDERSTAND, AND HEED THE INFORMATION ON THIS SHEET, ALL PRECAUTIONARY LABELS ON THE EQUIPMENT, AND ALL INSTRUCTIONS INCLUDED WITH THE EQUIPMENT BEFORE ATTEMPTING INSTALLATION, USE, OR MAINTENANCE.



WARNING: SERIOUS BODILY INJURY can result from improper handling or usage.



WARNING: NEVER move the equipment without enough help and/or lifting tools.



WARNING: ALWAYS use care when opening the shipping carton. Strapping bands can snap and injure you.



WARNING: NEVER operate the equipment without its protective panels and guards installed. Beware of rotating gears and belts, rollers, and chains, and keep from becoming entangled in them.



DANGER: POTENTIALLY FATAL VOLTAGES ARE PRESENT IN THIS EQUIPMENT.



CAUTION: NEVER make electrical connections to the equipment unless you are a qualified electrician.



WARNING: ALWAYS route power supply wiring through a nearby disconnect device.



WARNING: NEVER attempt electrical service on the equipment unless you are a qualified electronics technician.



CAUTION: ALWAYS shut off power at the disconnect device before making electrical connections or servicing electrical components.



CAUTION: ALWAYS replace fuses with those of the same type and rating.



WARNING: NEVER touch supply voltages; **THEY CAN BE LETHAL.**




CAUTION: NEVER operate the equipment until it is reliably electrically grounded, **NOT** through the water system.



CAUTION: "DEV" indicates "developer solution".

PROCESSORS AND PROCESSOR ACCESSORIES



DANGER! POISON!  **PROCESSING CHEMICALS MAY BE HARMFUL OR FATAL IF SWALLOWED. KEEP OUT OF REACH OF CHILDREN.** Always review and follow the hazard warnings and the ventilation, use, and disposal instructions of the chemical's manufacturer. Install all fluids correctly before operating.



CAUTION: TO AVOID POSSIBLE DRINKING WATER CONTAMINATION, make certain that all plumbing complies with local codes.



WARNING: PROCESSING CHEMICALS CAN CAUSE SEVERE BURNS. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor, mist or dust, and use only with adequate ventilation. **ALWAYS FOLLOW THE SAFETY RECOMMENDATIONS OF THE CHEMICAL'S MANUFACTURER.**

LITERATURE

The following publications relate to safety in film processing.

PUBLICATION	AVAILABLE FROM
ANSI.PH 4.37 Photographic Processing Effluents	American National Standards Institute 1430 Broadway New York, N.Y. 10018
Technical Data Sheet, Photographic Processing Wastes (6 pages)	E.I. DuPont DeNemours and Co., Inc. Photo Products Dept. Wilmington, Delaware 19898
J4: Safe Handling of Photographic Chemicals J28: Disposal of Photographic Processing Effluents and Solutions J43: A Simple Waste-Treatment System J50: Sampling and Flow-measurement Methods J52: Disposal of Small Volumes of Photographic Processing Solutions K13: Photolab Design S39: Water Conservation in Photographic Processing	Eastman Kodak Co. 343 State Street Dept. 412-L Rochester, N.Y. 14650

The preceding information is presented as a guide to precautions associated with photographic processing. No claim is made as to the currency, accuracy or completeness of the listed information. Please do not fail to contact your chemicals supplier to obtain additional advice and assistance.

Section 1

Introduction

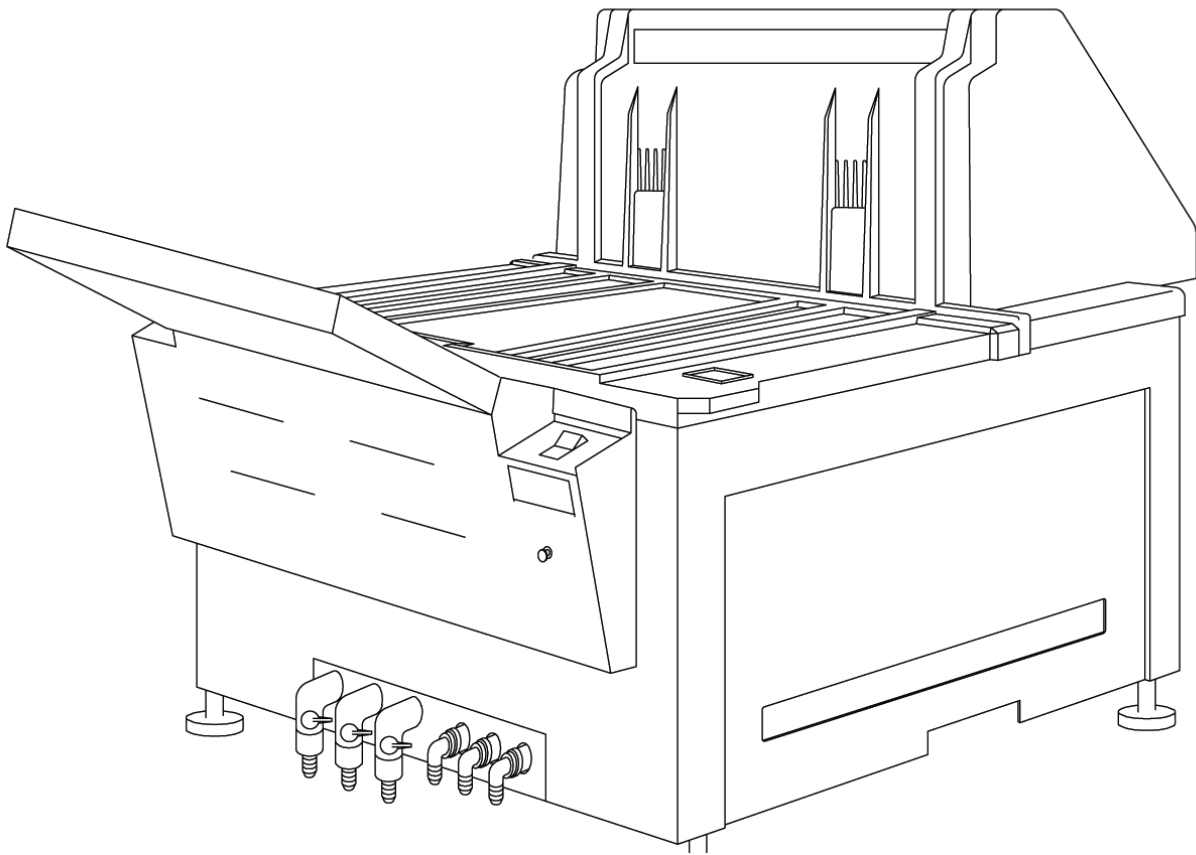


Figure 1-1, AFP Mini NDT X-Ray Film Processor

Content

This manual contains instructions for installing, using and maintaining the AFP Mini NDT X-Ray film processor.

Description

The Mini NDT system includes the processor with daylight tight film feed tray, replenishment tanks, necessary hoses, and this manual.

Major processor sections and components are shown in Figure 1-1.

INTRODUCTION

Operation

The processor is operated from the control panel. Basic processor functions are described in the following paragraphs. Figure 1-2 is a diagram of the transport system.

Capabilities

Mini NDT processors develop, fix, wash and dry exposed RP type medical X-ray films of all sizes, from 4" X 4" (10 X 10 cm) to 14" X 36" (35 X 91 cm).

Transport System

Four removable roller rack modules transport the material being processed through the developer, fixer, wash and dryer sections.

The developer, fixer and wash sections make use of "Deep Tank" racks to maintain developing quality and improve productivity. The dryer section includes a long path length vertical dryer to assure material drying at short developing times, reduce space requirements and return the film to the operator's position for ease of pick-up.

All racks and rollers in the wet sections and dryer are driven from a common drive shaft by a fractional horsepower AC motor.

For ease of use, and accuracy of processing, developing times and developing temperatures are factory set at the following values:

Model	Dev. Time	Developer Temp.
Mini NDT	2 min	85°F (32°C)

Before processing film, the processor must first be turned ON and allowed to bring the developer up to operating temperature.

As the processor warms up, it runs for one (1) process cycle (approximately 5 minutes) and then remains in the Stand-By mode. In this mode, only the developer heater, one dryer blower and the circulation pumps operate.

Film being fed into the processor is detected by a dual film sensor assembly located in the feed slot. When film is sensed, the Wait lamp will illuminate and stay illuminated until shortly after the trailing edge of the film has passed the sensor(s).

Transport System (continued)

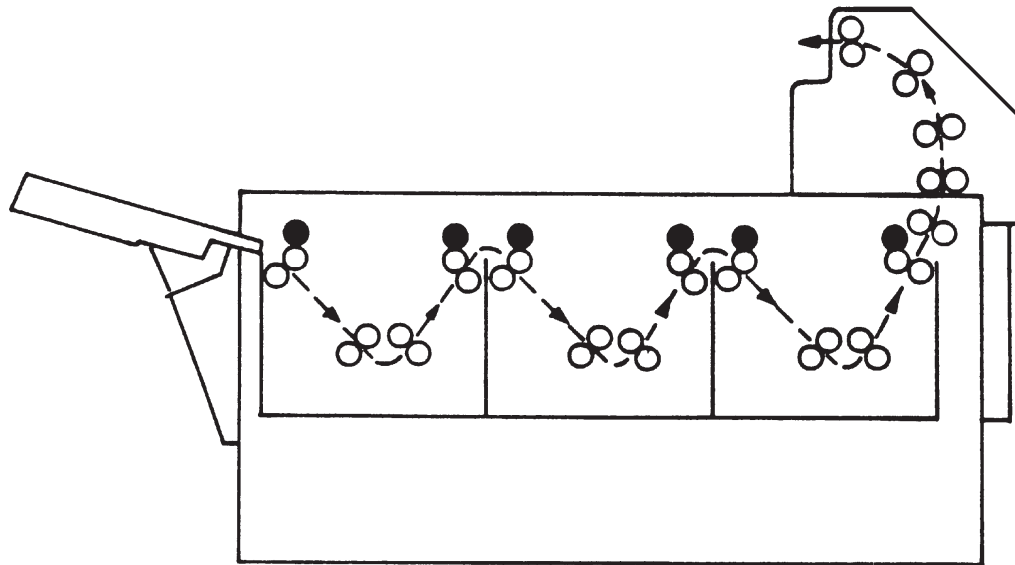


Figure 1-2, Transport System

The above activation of the film feed sensor(s) also places the processor into Process mode, starting the transport system, the dryer heaters and blowers and, as long as the feed switch is tripped, operating the replenishment system.

Shortly after the Wait lamp extinguishes, an audible signal will sound, indicating to the operator that additional film may be fed into the processor.

An electronic holding circuit will keep the processor in Process mode for approximately 4 minutes after the feed switch is released. This will allow complete processing of the film, after which time the processor will return to the Stand-By mode to conserve energy, water and wear on the processor.

Film is pulled into the processor by the input roller set on the developer rack. The film then passes through the recirculating developer bath. As it leaves the developer, excess chemicals are squeezed off by the exit rollers. This process is repeated in the fix, wash and dryer sections.

Processed and dried film is then deposited in the film delivery area on top of the processor.

INTRODUCTION

Developer System

As the film passes through the developer tank, developer is continuously circulated and agitated around the rollers in the developer rack.

This developer circulation and agitation is provided by the developer chemistry being drawn down into the developer circulation pump, located in the base of the tank, and then being pumped back through the side of the tank, at a rate of approximately 2 gallons per minute.

The developer is replenished during operation by chemicals being drawn from the replenishment tank by a pump controlled by the replenishment circuit. This circuit operates the pump continuously, with the actual output rate, in ml/minute, being electronically controlled by the processor's circuitry.

Developer heat is provided by a 500 watt heater located in a heat-exchanger below the tank.

Developer temperature is sensed by a temperature sensor, located in the bottom of the developer tank.

Developer temperature is factory set at the values shown on Page 1-2, and may be re-adjusted by the installing technician to temperature values from ambient to 115°F (46°C)

Fixer System

The film is fixed in the fix tank. Fixer is agitated, circulated and replenished in the same manner as the developer. The fixer is not heated.

Developer & Fixer Replenishment

Mini NDT processors are designed to operate in either "Batch" or "Replenishment" mode. As such, replenishment chemicals may be replenished as necessary, with tank overflow being directed into a drain or collection container for disposal, or recycled until exhausted, then discarded and fresh chemicals installed. For additional information refer to the Operation and Maintenance sections of this manual.

Anti-Crystallization

To prevent the build-up of chemicals on the processing rollers, an anti-crystallization or "Jog" feature is built into all Mini NDT processors.

This feature automatically runs the drive system at process speed for 20 seconds every 4 minutes, allowing fresh chemistry to be washed over the air-exposed rollers, effectively preventing crystallization of chemistry on the roller surfaces.

Wash System

The film being processed is washed in the wash tank before entering the dryer. The wash water solenoid is actuated during the processing cycle and refreshes the water in the wash tank with tempered water from an external source.

“No Plumbing” System (Optional)

The available “No Plumbing” wash water recirculation system P/N 9992305003 (110 VAC) or P/N 9992305004 (240 VAC) allows the installation of Mini NDT processors without external plumbing connections.

When using this option, wash water is recirculated from a 7 gallon reservoir, to the processor, and then back into the 7 gallon reservoir.

Processing chemistry (developer & fixer) is recirculated through each respective processing tank and replenishment container until its activity level is no longer satisfactory, at which time it is drained and replaced.

Dryer System

As film passes through the dryer, it is subjected to warm air from two linear infrared quartz heating elements and a pair of fans.

Upon leaving the dryer the film is deposited in the receiving bin.

Cover Interlock Switch

To prevent accidental injury from moving parts, a mechanical safety switch is interlocked with the processor’s top cover. If the top cover is removed, the processor automatically shuts down.

INTRODUCTION

General Specifications

Films

RP type medical X-Ray films and compatible chemicals designed for RP type processing.

Film Size

Minimum Size:	4" X 4" (10 X 10 cm)
Maximum Size:	14" X 36" (35.6 x 91.4 cm)
Base thicknesses	0.004 - 0.008"

Developing Time

Factory set as follows:

Model	Dev. Time	Leading Edge to Leading Edge
Mini NDT	2 min	8 min (approximate)

Developer, Fix, & Wash Systems

Capacity: 1.9 gallons (7.2 L.)

Temperature Control:

Factory Set as follows:

Mini NDT	85°F (32°C)
----------	-------------

Fixer: Heated by heat exchanger

Wash: Controlled by incoming water supply, .25 GPM (.95 LPM) during process and anti-crystallization cycle. There is no water flow in standby mode.

Dryer System

Temperature: Factory set at 105°F (40.5°C).

General Specifications (continued)

Environmental Conditions

Temperature: 40° - 80°F (5° - 26°C)
Humidity: 40% - 60% RH

Electrical Requirements

120 VAC, 15 amps, 60 Hz
220 VAC, 7.5 amps, 50 Hz (optional)
220 VAC, 7.5 amps, 60 Hz (optional)

Dimensions

Width 22" (56.1 Cm)	Stand Only: Width 22.875"
Height: 24.5" (62.2 Cm)	Height 29.5"
Length: 33" (84.1 Cm)	Length 22.125"
(Including feed tray)	Allow approximately 1" for leveling

Weight

Approximate Shipping Wt.: 110 lbs.
Approximate Operating Wt.: 160 lbs.

Air Conditioning Heat Load (approximate)

Total Heat @ 60Hz	Process Mode	Standby Mode
	2800 B.T.U./Hour	1800 B.T.U./Hour

Darkroom venting is required. Use a blower and vent combination that allows for approximately 300 CFM air flow through the darkroom.

Component Power Requirements

Component	Amperage @ 115VAC
Solenoid	0.10
Developer Heater	4.55
Recirculation Pumps (3)	0.22 Ea.
Replenisher Pumps (2)	0.35 Ea.
Dryer Lamps (2)	2.17 Ea.
Fan Motors (2)	0.44 Ea.
Drive Motor	0.76
Total:	11.99 Amps

Specifications are subject to change without prior notice.

Section 2

Installation

ATTENTION:

When testing or operating the processor with water (as opposed to chemistry), there will be a LOW LEVEL condition in effect which will disable the solution heater. This is due to the fact that water by itself cannot conduct well enough. To prevent this, add 1 to 2 tablespoons of salt or a cup of used or fresh developer to the developer tank.

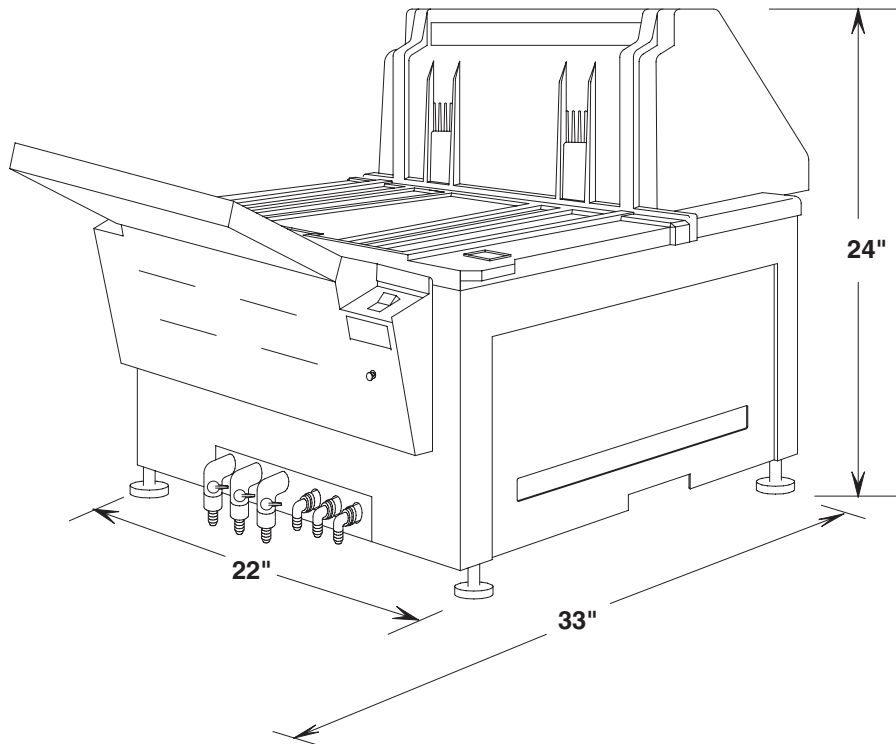


Figure 2-1, Processor Dimensions

Introduction

This section includes instructions for Pre-Installation, Installation and Check Out of AFP Mini NDT X-Ray film processors.

Pre-Installation

Pre-installation includes instructions for preparing the processor operating site.

Have these operations completed before the scheduled installation date.

If the installing technician is delayed by incomplete site preparation, you may be charged for costs during the delay.

Location

AFP Mini NDT processors must be operated in a darkroom suitably safelighted for the film being used.

INSTALLATION

Pre-Installation (continued)

Dimensions

Mini NDT Processors occupy 8.0 square feet (22.5" X 24") (57 X 61 cm.) of floor or counter space. The processor should be positioned to allow easy access to all sides of the unit for routine cleaning and preventive maintenance. Drain tubes, leading out of the “front” of the processor, below the feed tray, must be readily accessible.

Weight

The Mini NDT Processors weigh approximately 110 lbs. when empty, and approximately 160 lbs. when operating.

To support this weight a Processor Stand Assembly (P/N 9995100004 - sold separately) is recommended. Instructions for the assembly of this stand can be found in Section 7, Accessories. If the stand is not used, a sturdy, stable and level stand, table or counter must be provided.

Ventilation

WARNING: Some processing chemical fumes may irritate eyes and/or respiratory systems when used in a poorly ventilated area. If the processor is to operate in a confined area, provide for at least ten complete changes of air per hour.

Provide adequate ventilation for proper machine operation and operator comfort. The processor generates a moderate amount of heat when operating and must not be placed in a confined space, such as a closet.

For best processing results, relative humidity should be between 40% and 60%.

Electrical

Electrical connections must include a ground and conform to local codes. The processor plugs into a standard 120 VAC, 60 Hz, 15 amp., 3 wire outlet. As a factory installed option, Mini NDT Processors may also be configured for 220 VAC, 50 Hz and 220 VAC, 60 Hz operation.

Through-the-Wall Installation

If your processor is to be Installed through the darkroom wall, refer to Section 7, page 5.

Pre-Installation (continued)

Plumbing

WARNING: Obey all instructions of the chemicals manufacturer, and follow all recommended safety precautions when handling, using and disposing of chemicals.

The following plumbing requirements are recommended for installation of the Mini NDT Processors:

1. A flow controlled water source for wash water and for cleaning the processor.
2. A sink, with running tempered water, approximately 12" X 16", for use when cleaning rack modules.
3. A drain suitable for dumping photographic chemical wastes.

CAUTION: In some locales, environmental regulations may require the capturing and safe disposal of photographic processing wastes other than in the sanitary sewer system. Check with your local authorities if you are unsure of regulations in your area.

NOTE: The replenisher and drain connections may be run out of the front of the processor in standard configuration or, using the optional Side Drain Kit P/N 9992305002, these lines may be routed out either the right or left side of the processor. See Section 7, Accessories, for additional details.

No Plumbing" System Option

The available "No Plumbing" wash water recirculation system, P/N 9992305003 (110 VAC) or P/N 9992305004 (220 VAC), allows the installation of Mini NDT Processors without the need for an external water supply or drains. If this system is being installed with the processor, refer to the instructions packed with that unit and to Section 7, Accessories, in this manual.

This concludes the pre-installation preparations you are expected to have completed before the processor installation date.

INSTALLATION

Installation

NOTE: Do not unpack the processor until you have thoroughly inspected the shipping container for evidence of damage. If there is any damage, contact your shipper immediately for instructions on filing a claim.

Set Up

Unpack the processor and accessory boxes and inspect for any visible shipping damage. As above, if any damage is discovered after unpacking, contact the shipper immediately for instructions on filing a claim.

Remove the processor side covers. Remove each of the rack modules and any packing material from the tanks. Inspect each of the racks for loose parts or screws.

Position Processor

Using two people, carefully position the processor on its stand if purchased, or a sturdy, stable and level stand, table or counter.

Using a level placed across the walls of the processing tanks, adjust the leveling feet until the processor is level in both directions.

Connect Replenishment

The processor may be set up to operate its replenishment system in either “Replenish” or “Batch” mode.

In “Replenish” mode the chemicals will be replenished with fresh chemicals from the replenisher supply and the overflow will be collected for disposal or routed directly to a drain.

In “Batch “ mode the developer and fixer chemicals will be recycled from the replenisher supply to the processing tank and back to the replenisher supply.

Replenish Mode

In “Replenish” mode, fresh replenisher will be pumped from the replenisher supply to the processing tank. Excessive chemicals in the processing tank will flow out of the tank at an overflow port and into either a container for disposal or an appropriate drain line. In this manner, constant processing chemical strength may be maintained for longer periods of operation.

Replenish Mode (continued)

To install the processor for “Replenish” mode replenishment operation proceed as follows:
(See Figure 2-2)

- 1) Attach the red developer replenisher pickup tube from the developer replenisher pump to the developer replenisher reservoir fitting.
- 2) Route the red developer drain line and red overflow line from the processor to an overflow container or drain line.
- 3) Attach the blue fixer replenisher pickup tube from the fixer replenisher pump to the fixer replenishment reservoir fitting.
- 4) Route the blue fixer developer drain line and blue overflow line from the processor to the overflow container or drain line.

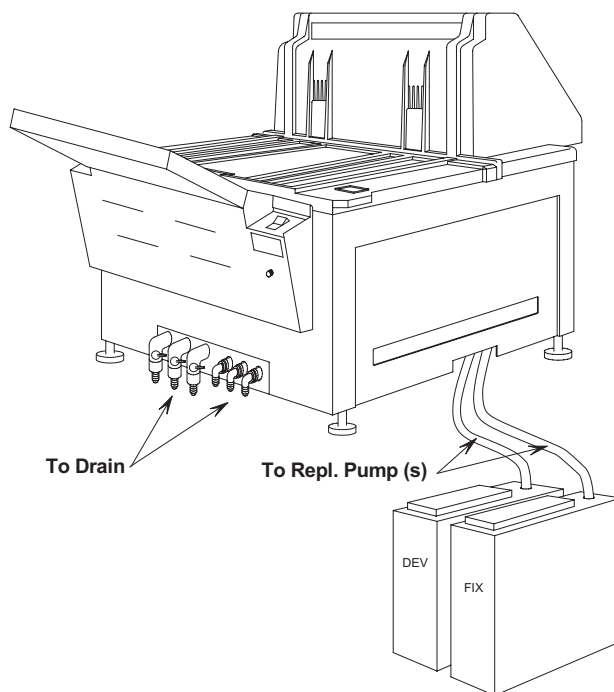


Figure 2-2, Replenish Mode Operation

INSTALLATION

Batch Mode

In “Batch” mode the replenisher will be recycled from the replenisher supply to the processing tank and will then, via the tank overflow port, return to the replenisher supply to be recycled again. As the chemical's processing strength becomes depleted, the entire batch is disposed of and new chemistry installed.

To install the processor for “Batch” mode replenishment operation proceed as follows: (See Figure 2-3)

- 1) Route the red developer replenisher pickup tube from the developer replenisher pump to the developer replenishment reservoir or to a container of developer replenisher.
- 2) Route the red developer drain line and red overflow line from the processor to the same container as the developer replenisher pickup tube.
- 3) Route the blue fixer replenisher pickup tube from the fixer replenisher pump to the fixer replenishment reservoir or to a container of fixer replenisher.
- 4) Route the blue fixer developer drain line and blue overflow line from the processor to the same container as the fixer replenisher pickup tube.

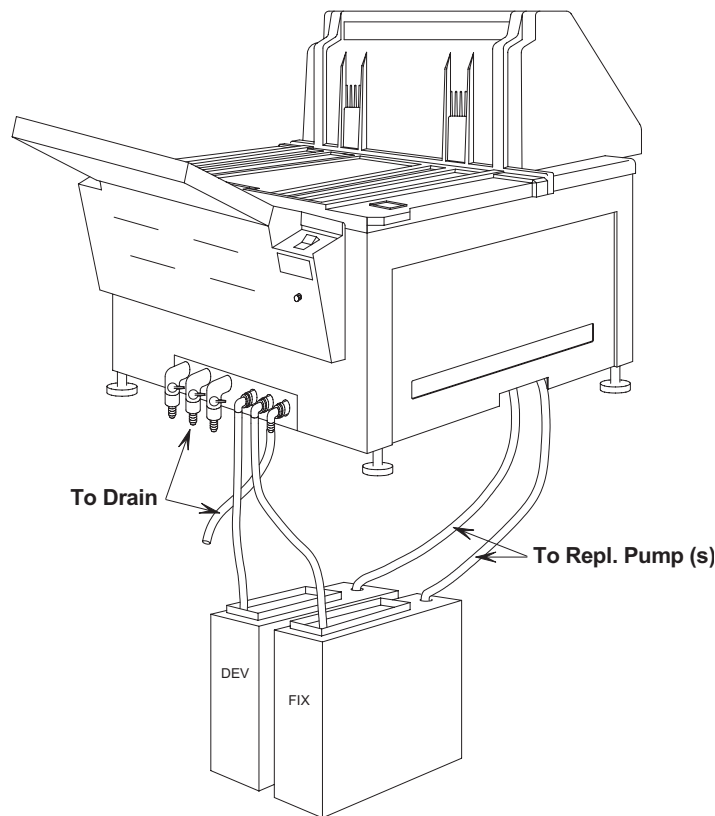


Figure 2-3, Batch Mode Operation

Connect Plumbing

Wash water into the processor is controlled by the water solenoid valve. When the processor is in the process mode the solenoid is actuated, allowing wash water to flow into the bottom of the wash tank. Excess water in the wash tank flows over the overflow port and down the drain.

To connect the wash water proceed as follows: (See Figures 2-2 and 2-3)

- 1) Route the supplied reinforced water hose from the output of your water panel to the fitting on the wash water solenoid under the right side of the processor.
- 2) Route the clear wash water drain line and the clear overflow line from the utility section of the processor to the building drain or a suitable overflow container.

CAUTION: If you are draining your processor directly into a sanitary sewer, be certain that such connections are in accordance with local plumbing codes and comply with all local and federal EPA anti-pollution requirements.

DO NOT drain the processor into any drain lines that are made of copper pipe as chemical reactions will quickly damage the pipes.

"No Plumbing" System Option

The available "No Plumbing" wash water recirculation system, P/N 9992305003 (110 VAC) or 9992305004 (220 VAC), allows the installation of Mini NDT processors without the need for an external water supply or drains. If this system is being installed with the processor, refer to the instructions packed with that unit and to Section 7, Accessories, in this manual.

Control Panel Positioning

In some installations, such as with the right side of the processor against a wall, it may be difficult for the processor operator to view the LED's on the Display Panel to the left of the feed tray.

If this is the case, to make the LED Display Panel more visible, use the following procedure to reverse the positions of the Power Switch/Circuit Breaker and the LED Display Panel.

- 1) Disconnect the processor power cable from its outlet.
- 2) Remove the two screws holding the control chassis panel to the front of the processor. Carefully lower the panel until it is supported by its restraining straps.
- 3) Locate the small screw(s) that holds the LED Display Panel and the Power Switch panel in place. Remove the screws.
- 4) Carefully unlace the cables for each panel from the retaining clips back as far as the center of the loom.
- 5) Re-install the panels in the desired position, taking care to replace the cables through the retaining clips.
- 6) Replace the panel securing screws and close the control chassis and secure it with its two screws.
- 7) Return the processor to service.

Processor Checkout

Following set up, inspect the processor as described below to make sure it is ready for use.

WARNING: During this inspection, be sure that the processor power is disconnected at the wall plug.

Inspect and clean the processor tanks, racks and hoses as described below:

- 1) Open the drain valves on the front of the processor for the developer, fixer and wash tanks. Use warm water to rinse each tank clear of dust and debris. Close all drain valves.
- 2) Shine a light through all hoses to check for foreign matter. To remove anything, disconnect hose at one end, flush with water, and reconnect.
- 3) Check, and tighten if necessary, loose hose clamps and/or hardware on the processor.
- 4) Check that processor is level from front-to-rear and side-to-side. Correct as necessary.

Operational Checkout

Read these instructions completely before starting the processor.

WARNING: Never operate the processor without an electrical ground connection.

- 1) Close the tank drain valves.
- 2) If not already done, remove the three racks and set aside.
- 3) Carefully pour about 1.5 gallons of warm water into each of the solution tanks. Do Not attempt to fill the tank to the overflow.

Attention: When testing or operating the processor with water (as opposed to chemistry), there will be a LOW LEVEL condition in effect which will disable the solution heater. This is due to the fact that water by itself cannot conduct well enough. To prevent this, add 1-2 tablespoons of salt or a cup of used or fresh developer to the developer tank

- 4) Install all three racks in their appropriate tanks.
- 5) With the Power Switch OFF, plug in the power cord.

CAUTION: Never attempt to operate the processor without liquid in the tanks.

INSTALLATION

Operational Checkout (continued)

6) Switch the Power Switch to ON.

7) The transport system will run at Process speed for the duration of one processing cycle, the recirculation pumps will operate and the dryer heaters and fans will be activated.

NOTE: If either of the recirculation pumps do not prime, squeeze the rubber elbow on the inlet side of the pump(s) to purge the air from the line.

8) Inspect all rack modules to verify that they are turning freely.

9) Carefully inspect the underside of the processor for any signs of leakage. Correct if necessary.

10) Operate the Manual Replenishment switch to run the replenishment pumps until the developer and fixer tanks are full of water to the overflow port.

11) Activate the Film Feed switch with a piece of film. The Wait light will turn ON and every few seconds the replenishment pumps will cycle. Remove the film from the sensor. In a few seconds the Wait light will go out and the beeper will sound.

12) When the Dev Temp lamp turns OFF, check the temperature of the developer with a metal stem or digital thermometer*. If it is not correct for the film you will be using, adjust the temperature as outlined in Section 5, Service.

WARNING: Do not use a mercury thermometer. If a mercury thermometer breaks, it will contaminate the machine.

Transport Film

Transport several pieces of film of your usual size(s) through the processor. Inspect and, if necessary, correct for the following:

1) Film Feed switch operation. The Wait lamp should stay on continuously until a few seconds after the trailing edge of the material being processed is clear of the Film Feed switch.

As the Wait light turns off, an audible beeper will sound indicating it is safe to feed in another piece of material.

The processor will remain in the process mode for approximately 5 minutes after the film feed switch is released.

2) Drift or Skewing. The film should feed through the processor in a straight line. If it drifts, skews or wrinkles, check the racks for proper seating or loose assembly screws. Be certain you are feeding the film in straight before checking racks.

3) Drying. Be sure the dryer is operating properly. Film processed in water alone may still be slightly tacky or damp when exiting the processor.

Complete Checkout

1) Turn the Power Switch OFF. Unplug the power cord.

2) Drain each of the processing tanks and the replenishment containers for the developer and fix replenishment systems. Close all drain valves.

3) Wipe any excess water from the racks and tanks.

The processor is now ready to be charged with fresh chemistry as instructed in Section 3, OPERATION.

INSTALLATION

Processor Set Up Checklist

- ___ 1) Uncrate processor. Inspect for shipping damage.
- ___ 2) Assemble processor stand.
- ___ 3) Set processor on stand.
- ___ 4) Level processor.
- ___ 5) Inspect tank and racks for loose parts.
- ___ 6) Install replenisher system, replenish or batch mode.
- ___ 7) Connect wash water system and drain.
- ___ 8) Rinse out wet tanks, inspect recirculation lines.
- ___ 9) Perform Operational Checkout.

Operational Checklist

- ___ 1) Close drain valves.
- ___ 2) Remove racks.
- ___ 3) Partially fill tanks with warm water.
- ___ 4) Replace racks.
- ___ 5) Plug in processor, apply Power.
- ___ 6) Inspect transport drive system.
- ___ 7) Check recirculation plumbing for leaks.
- ___ 8) Top off tanks using Manual Replenishment switch.
- ___ 9) Check Film Feed switch and “Beeper” operation.
- ___ 10) Check temperature control systems.
- ___ 11) Check developing time.
- ___ 12) Check for dryer heat and operation of both fans.
- ___ 13) Check transport of material.
- ___ 14) Drain Processor.
- ___ 15) Charge with fresh chemistry.

INSTALLATION

Notes:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Section 3

Operation

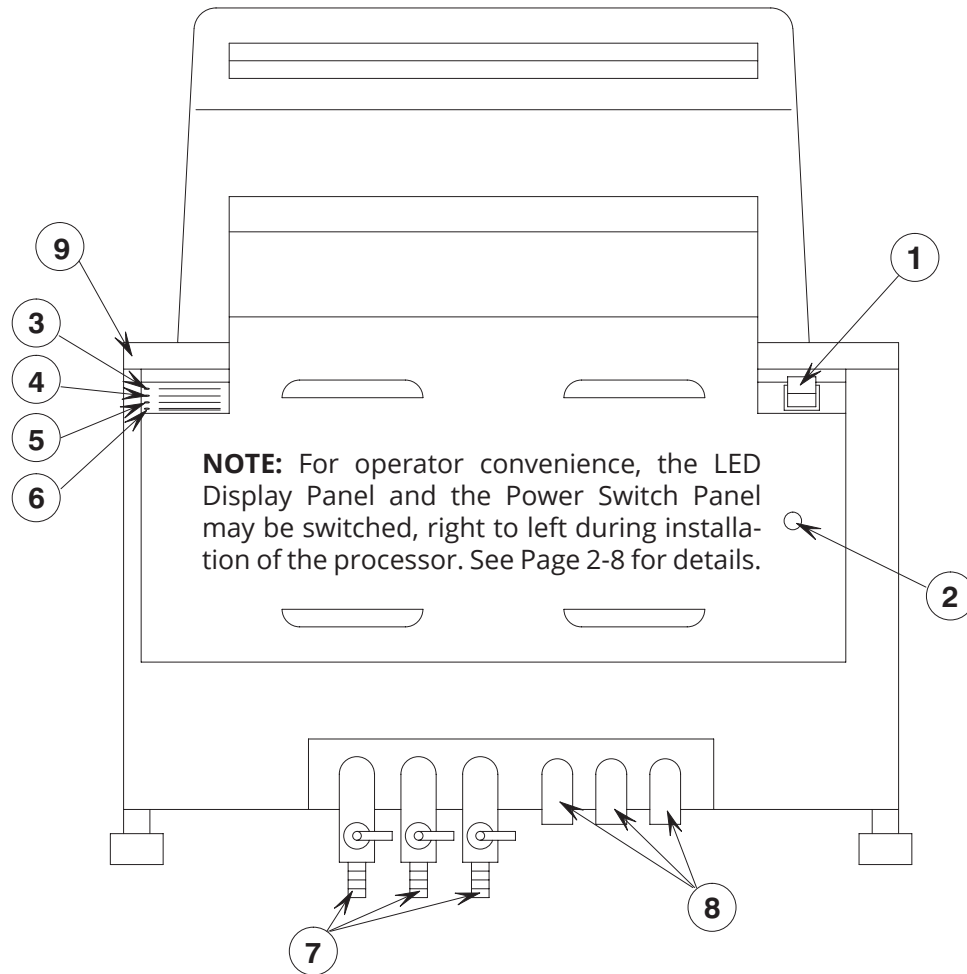


Figure 3-1, User Controls

Controls and Indicators

All of the user controls and indicators for operation of Mini NDT Processors are located on the front of the processor. These controls are described below and on the following page.

User Controls

1. Power Switch

- | | |
|--------|--|
| OFF | All power to processor is OFF. |
| ON | Processor is ON, (runs one approximate 5 minute process cycle initially), then reverts to standby mode. Circulation pumps, developer heater and air circulation fan are ON. Transport, replenishment system and dryer will operate when Film Feed switch is activated. Power On lamp will light. |
| CENTER | This switch also serves as the circuit breaker for the processor. If tripped to the center position reset to OFF, then turn ON. If the switch trips again, the processor probably needs a service call. Do not use the processor if it trips off repeatedly. |

User Controls (continued)

2. Manual Replenishment Switch

Provides for manual operation of replenishment pumps. Use to “top off” tanks or to turn over chemistry when activity levels have dropped.

3. Power ON LED

Lights when Power Switch is ON.

4. Dev Temp LED

Lights when developer heater is ON. Wait for light to cycle OFF before first use each day.

5. Wait LED

Illuminates when Film Feed switch is activated. To prevent fogging of film, wait until lamp goes OFF or beeper sounds before opening feed tray.

6. Low Dev LED

Lamp ON indicates that developer is too low for safe operation. To prevent damage to the processor, the developer heat function is turned OFF when a low level condition exists.

7. Drain Valves

Drains the Developer, Fixer, Wash tank and recirculation pumps.

8. Overflow Lines

Drain lines from developer, fix & wash overflow ports.

9. Top Cover Interlock Switch

To prevent accidental injury from moving parts, a safety switch is interlocked with the processor's top cover. If the top cover is removed, the processor automatically shuts down. This interlock may be overridden for service use only by using the service hold down tool included in the Maintenance Kit provided with each unit.

CAUTION: DO NOT attempt to process film in this unit when the interlock is overridden.

Loading Chemicals

Always begin with a clean processor. The processor should have been cleaned in the normal course of installation or maintenance.

With the developer and/or fixer tank cleaned and drained, add processing chemicals as described below:

WARNING: Read and heed safety precautions given by your chemical manufacturer in mixing, using and disposing of processing solutions.

To prevent chemical splashing and the risk of contamination follow these instructions carefully.

- 1) Close the tank drain valves at the front of the processor.
- 2) If not already done, remove the three racks and set aside.
- 3) Cover the developer tank with a sheet of newspaper to protect it from accidental splashes of fixer.
- 4) Carefully pour about 1.5 gallons of fixer working solution into the fix tank. Do Not attempt to fill the tank to the overflow.
- 5) Cover the fixer tank with a sheet of newspaper to protect it from accidental splashes of developer.
- 6) Carefully pour about 1.5 gallons of developer working solution into the developer tank. Do Not attempt to fill the tank to the overflow.
- 7) Carefully pour about 1.5 gallons of warm water into the wash tank. Do Not attempt to fill the tank to the overflow.
- 8) Replace the racks. Lower them into the tanks slowly to prevent splashing. Check for correct seating on the locating pins and driveshaft.
- 9) Attach the replenisher hoses to the fittings on the replenisher supply containers.
- 10) Turn the Power Switch-ON. Operate the Manual Replenishment switch to run the replenishment pumps until the developer and fixer are seen in the overflow drain tubes.

OPERATION

Daily Start Up

The daily start up procedure is as follows:

Processor ON, Fill Wash Tank

1) Close the wash tank drain valve.

2) Switch the Power Switch to the ON position. The processor will start in the process mode and run for approximately 5 minutes, filling the wash tank. If, at the end of the process cycle, the wash water has not reached the overflow port, trip the Manual Replenishment switch to initiate another processing cycle.

3) Allow the developer to warm up to operating temperature (Dev Temp light will cycle OFF). Check for leaks around all hose fittings.

CAUTION: Always inspect to see that all drain tubes are properly positioned and draining correctly. All drain tubes must be routed in a continuously downward direction, without dips or loops that can cause airlocks.

CAUTION: A kink or twist in a drain tube can cause a serious chemical or water spill in the processor.

Check Developer and Fixer Levels

If not previously done, check the developer and fix tanks to see that they contain adequate solution. Prepare fresh replenisher if necessary and using the Manual Replenishment switch, top off each tank with chemistry to the overflow port.

Check Drive

With the Power Switch in the ON position, check all turning drive gears to see that they mesh properly and turn without binding. Make sure the transport rollers are turning freely, without interference or binding.

Processing Film

Feed film into the processor. As it actuates the feed sensor, the WAIT lamp on the control panel will light.

If you turn the room lights on after feeding film, to prevent fogging the end of your film, do not open the daylight cover until after the Wait light goes out or the beeper sounds.

After the processor completes its processing cycle it will automatically return to Stand-By mode.

Shutdown and Daily Cleaning

Basic care of the processor goes hand-in-hand with its operation. Following each day's work, allow 15 minutes to clean the processor as described below.

Drain Wash Tank

Open the wash tank drain valve and allow the wash water to drain. Rinse out the wash tank with fresh warm water, then close the drain valve.

Clean Top Cover, Guides & Rollers

Using a separate wet cloth for developer and fixer, wipe the exposed rollers on each rack.

CAUTION: Do not use the same cloth for fixer and developer racks. Fixer may contaminate the developer.

Wipe off Processor

Thoroughly wipe the inside and outside surfaces of the top cover and side panels with a damp cloth. Replace the top cover, leaving a slight opening over the drive shaft to prevent condensation of chemistry vapors.

Quality Control

A good quality control program is essential to the production of quality radiographs.

It is recommended that a quality control program for your processor be established and maintained to assure the quality of your output.

Following are some suggestions for those areas that should be monitored. Contact your film and chemistry technical representative for additional information and assistance.

Developer

Developer activity can be monitored by use of pre-exposed control strips, available from your film supplier, or by careful monitoring of your production work.

Fixer

Exhausted fixer will usually result in dark streaks in your film's emulsion that may appear immediately after processing or may not appear until hours or even days after processing.

Exhausted fixer can also contribute to transport problems such as jams and will frequently prevent proper drying from taking place, resulting in sticky film surfaces.

The general health of your fixer can be determined by monitoring the pH of the chemistry.

When pH is too high, films may jam in the wash tank and the dryer. To determine pH, immerse pH test strips, available from your dealer, in the fixer and read its pH value from the resultant color change on the strip. If the pH rises toward the chemical manufacturer's recommended upper limit, dump the old fixer and replace with fresh chemicals.

NOTE: Only terminal-type silver recovery systems are recommended for use with this processor. Do not try to re-use fixer after silver has been removed.

Replenishment

Replenishment in Mini NDT Processors consists of “topping” off the developer and fixer tanks with fresh working solution at the start of each shift and automatic replenishment by the replenishment system.

Automatic replenishment is accomplished by the film tripping one or both of the Film Feed Switches which, in turn, actuates the electronic replenishment circuitry. Depending on technician set adjustments, the developer and fixer pumps will cycle on and off during film feeding to replenish the working solution in the developer and fixer tanks.

Manual Replenishment may be required for one of three reasons. They are:

- 1) To top off the tanks at start-up.
- 2) To restore chemical strength after several days of shut down.
- 3) To compensate for a basic under-replenishment condition. (See NOTE below)

NOTE: Chemistry requirements vary by the type of work and average size of films you are processing. If you find that you must frequently use the Manual Replenishment switch to add fresh chemistry, it is recommended that you have your technician adjust the replenishment control circuits as required to allow for adequate automatic replenishment.

Checklists for Daily Use

Startup

- ___ 1) Check solution levels.
 - a. Top off processing tanks and fill wash tank.
- ___ 2) Power Switch to ON, check drive gears for meshing;
allow 15-30 minutes warm up.
- ___ 3) Clean feed tray, receiving bin.
- ___ 4) Check developer activity, fixer pH.

Operation

- ___ 1) Feed material, trip Film Feed switch to start processing cycle.
- ___ 2) Wait until Wait light goes out or beeper sounds before opening film feed tray.

Shutdown and Daily Cleaning

- ___ 1) Switch off power.
- ___ 2) Drain and rinse wash tank, close valve.
- ___ 3) Clean:
 - a. roller surfaces, rack and tank area
 - b. splashes from inside top cover.
- ___ 4) Wipe outside surfaces of the processor, inside surfaces of feed tray and cover box and both side panels.
- ___ 5) Leave top cover slightly open to prevent condensation.

NOTE: Duplicate these checklists and post them near the processor.

Section 4

Maintenance

Maintenance Program

Maintenance of Mini NDT Processors consists of cleaning and adjustment operations, routinely performed, to keep the processor operating correctly. Early in the life of your processor set up a maintenance program, with specific people responsible for performing each maintenance task.

Maintenance Records

Good preventive maintenance is essential to assure a long and trouble free life for your processor. Keeping on-going records of maintenance will help assure that the work is performed when scheduled.

Figure 4-1 is a **Maintenance Schedule** that lists tasks to be performed at prescribed maintenance intervals.

Figure 4-2 is a **Maintenance Log** for keeping monthly records of maintenance performed. Make additional copies and post near the processor.

Cleaning

Cleaning is the most important form of maintenance. If chemicals are allowed to accumulate on processor parts they can cause corrosion or other damage which may seriously affect production and output quality.

Perform daily cleaning, as outlined on the Maintenance Schedule, Figure 4-1, as part of the shutdown procedure.

Weekly cleaning, described below, should take about thirty minutes following the last shutdown and daily cleaning.

Do not replace items removed for daily cleaning until after weekly cleanup has been completed.

CAUTION: *Never use harsh abrasive material to clean racks or processing tanks. Never use scrub pads such as "Scotchbrite" on rollers.*

MAINTENANCE

Mini NDT Processor Maintenance Schedule

DAILY

Clean:

- ✓ Developer Rollers
- ✓ Top Covers, Side Panels
- ✓ Feed Tray, Receiving Bin

Check:

- ✓ Chemical Levels
 - ✓ Replenisher Levels
-

WEEKLY

Clean:

- ✓ Developer Rack
 - ✓ Fix Rack
 - ✓ Wash Rack
 - ✓ Wash Tank
 - ✓ Tank Exteriors
-

MONTHLY

Clean:

- ✓ Developer Tank, Circulation & Replenishment System
- ✓ Fixer Tank, Circulation & Replenishment System
- ✓ Wash Tank, Drain & Overflow System

Check:

- ✓ Hose Clamps & Plumbing
 - ✓ Rack Bearings
 - ✓ Lubrication Points
-

YEARLY

Clean:

- ✓ Developer & Fixer Circulation Pumps

Check:

- ✓ Drive Belt
- ✓ Drive Motor Brushes
- ✓ Lubrication Points

Figure 4-1, Maintenance Checklist

Mini NDT Processor Maintenance Log

MONTH	RECORD	DAILY										WEEKLY				NOTES
DAY	INITIAL UPON COMPLETION	CLEAN DEV. ROLLERS	CLEAN TOP COVERS	CLEAN SQUEEGEE ROLLERS	CLEAN FEED TRAY	CHECK RECEIVING BIN	CHECK CHEMICAL LEVELS	CLEAN WASH WATER	CLEAN DEV. TRANSPORT	CLEAN FIX TRANSPORT	CLEAN WASH TRANSPORT	CLEAN WASH TANK	CLEAN TANK EXTERIORS	CHANGE DEVELOPER	CHANGE FIXER	
1																
2																
3																
4																
5																
6								HRS	DATE	OPERATION				INIT		
7								MONTHLY MAINTENANCE								
8										CLEAN DEVELOPER SYSTEM						
9										CLEAN FIXER SYSTEM						
10										CLEAN WASH SYSTEM						
11										CHECK HOSE CLAMPS						
12										CHECK LUBRICATION DIAGRAM						
13																
14																
15																
16																
17								YEARLY MAINTENANCE								
18										CLEAN FIX & WASH PUMPS						
19										CHECK DRIVE BELT						
20										CHECK MOTOR BRUSHES *						
21										CHECK LUBRICATION DIAGRAM						
22																
23								LUBRICATION								
24										DRIVE SHAFT BRGS (MONTHLY)						
25										DRIVE SHAFT GEARS (MONTHLY)						
26										DRYER TRANSPORT GEARS (MONTHLY)						
27																
28																
29																
30																
31																

NOTE: If Processor is run 80 hours or more a week, perform maintenance twice as often.

1. Duplicate this copy to provide a supply of log sheets.
2. Perform operations as instructed in User's Manual.
3. List operating hours at each operation and initial.
4. Retain completed log sheets for continuing history.

* Where applicable

Figure 4-2, Maintenance Log

Weekly Cleaning

1) Remove the developer, fixer and wash racks. To prevent chemical contamination, wash off each rack separately with clean, lint-free cloths and warm water. Clean each roller over its entire surface. Use isopropyl alcohol if necessary to remove traces of adhesives.

NOTE: Soft scrub pads, such as nylon net over sponge, work well on rollers. Metallic, or non-metallic, scrub pads such as "Scotchbrite", must not be used on rollers as they will damage the roller surface.

2) Inspect each rack thoroughly. Verify that the rollers turn freely and that all guides and baffles are properly in place. Carefully set each rack aside to drain and dry while you are cleaning the rest of the processor.

3) Clean the outside surfaces of the processing tank, using warm water with a sponge or non-metallic scrub pad.

CAUTION: Never use steel wool on any part of the processor as its residue may cause rust to form on the metallic parts of the processor.

4) Clean the dryer rollers and rack parts with a damp cloth and wipe dry.

5) Replace all removed racks and other parts.

Monthly Cleaning

As film is processed, by-products are released into the developer, fix and wash systems. These must be removed by regular cleaning. Every month, schedule two hours of processor downtime to thoroughly clean the developer, fixer and wash systems.

NOTE: This cleaning will replace the scheduled Weekly Cleaning due on the same date.

1) Open the drain valves, drain and dispose of the used developer, fixer and wash water. Allow the tanks and recirculation systems to drain completely.

CAUTION: When filling or rinsing the processor tanks, use water no hotter than 120°F (54°C).

2) Rinse out each tank and then close the drain valves and fill the wash tank with warm water.

3) Systems Cleaning.

The use of Developer Systems and Fixer Systems Cleaners are recommended for cleaning the developer and fixer system. Carefully follow the manufacturer's instructions and precautions. Dissolve any powdered chemicals in water before adding to the tank. Be sure to accomplish the neutralizing and rinsing steps recommended by the systems cleaner manufacturer.

WARNING: Beware of all rotating gears, shafts and drive belts when operating the processor with its access panels removed.

4) After the developer and fixer systems are thoroughly cleaned, neutralized and rinsed, fill each tank with fresh warm water and install the racks. Switch processor ON and allow the transport and recirculation systems to run for about 15 minutes as a final rinse.

Monthly Cleaning (continued)

5) Systems cleaning will remove most, if not all, of the chemical residue from the transport racks. For additional cleaning and inspection, proceed as outlined below:

- a. Remove the rack from the tank.
- b. Clean the developer and fix racks without disassembling them.
- c. Appropriate Systems Cleaner may be used to remove stubborn deposits. Never use "Scotchbrite" type pads on roller surfaces. Rinse the rack thoroughly after it has been cleaned.
- d. Inspect all rack end plates for wear. Be sure the rollers turn freely.

Bearing wear differs according to the solution in which the rack is used. Since bearings tend to wear more quickly in the fixer solution, the fixer rack end plates should be checked more frequently for wear.

Clean Tanks

Inspect the empty processing tank for foreign matter and, if necessary, use a soft scrub pad or brush and warm water to clean the tank interior. Flush the tank with warm water and drain.

Inspect Processor

Check the hose clamps on the developer, fixer and wash pumps and the base of each pump for leaks. Secure as necessary.

CAUTION: Do not over-tighten clamps. This can cause leakage or damage to the pump heads.

Prepare Fresh Chemicals

When the developer and fixer systems are clean, prepare and load fresh chemicals in accordance with instructions in Section 3, Operation, and the manufacturer's instructions and precautions.

Monthly Lubrication

Refer to Figure 4-2 (Page 4-3), Maintenance Log and Figure 4-3 (Page 4-8), Lubrication Points and lubricate as indicated. Be sure to clean off all old lubricants and any excessive new lubricants.

Annual Maintenance

Once a year, following a routine monthly cleaning, perform the following tasks on the processor:

- 1) Inspect the drive gears on each rack and replace any gears that are excessively worn or damaged.
- 2) Refer to Service Procedure 5-1. Inspect, and adjust or replace if necessary, the main drive belt.
- 3) Refer to Service Procedure 5-2. Inspect and clean the fixer circulation pump. The developer pump is usually cleaned adequately by systems cleaning and does not require additional servicing.
- 4) Refer to Service Procedure 5-3. Inspect and clean the developer and fixer replenishment pumps.
- 5) Refer to Figure 4-2 (Page 4-3), Maintenance Log and Figure 4-3 (Page 4-8), Lubrication Points and lubricate as indicated. Be sure to clean off all old lubricants and any excessive new lubricants.

Removing Old Lubricants

Dust and dirt, mixed with oil or grease, can prevent fresh lubricants from reaching the surfaces that need it most.

Before applying new lubricant, clean accumulations of grease from the gears. Hold a rag alongside each gear, and brush debris from the gear onto the rag. Clean as much of every drive gear as possible, then run the processor transport system very briefly, and clean again until all portions of the gears have been exposed for cleaning.

After the drive gears have been cleaned, lubricate them as indicated in Figure 4-3.

Lubrication Points

Location	Interval	Lubricant
Drive Shaft Bearing & Worm Gears	Monthly	Oil/Teflon Oiler
Dryer Gears	Monthly	Oil/Teflon Oiler
NOTE: DO NOT lubricate any gears or other parts that come in contact with solutions or water.		

Figure 4-3, Lubrication Points

Section 5

Service

Content

This section contains information on trouble-shooting and repairing **AFP Mini NDT Processors**.

Always consult the Troubleshooting Chart before attempting service or repair, or before calling a service representative.

Even if you do not plan to service the processor yourself, the chart will help you explain the problem to a service representative.

WARNING: Be extremely careful when trouble-shooting or servicing the processor with the power on. Dangerous, potentially lethal, electrical voltages are present at several points.

Following the Troubleshooting Charts are instructions for performing adjustment and repair procedures that may be required to keep the processor functioning.

Also in this section is a description of the control electronics in the processor, with applicable schematics and a wiring diagram. These will enable users who are trained and equipped for electronics trouble-shooting to trace failures in the electronics.

NOTE: The circuit cards in this processor are not considered field repairable and in the event of a component failure, should be replaced.

Attempting to repair them could invalidate any remaining warranty, or may cancel the exchange credit value that some cards may have.

Troubleshooting

The Troubleshooting Charts are divided into three columns. To use either chart, find on the left, under **Symptom**, a problem that sounds like yours. In the middle column, in diminishing order of likelihood, are the **Probable Causes** for such a symptom. The right-hand column, **Remedy**, provides corrective action(s) for each probable cause.

Service Procedures

Following the Troubleshooting Charts are service procedures for repair and maintenance of the processor.

Below is an index to those procedures:

Procedure	Title
5-1	Inspecting, Adjusting & Changing the Main Drive Belt
5-1A	Film Sensors and Adjustments
5-2	Servicing Circulation Pumps
5-3	Servicing Replenisher Pumps
5-4	Calibration Procedures
5-5	Circuit Descriptions

Schematics

The following schematics are included for servicing AFP Mini Medical Series X-Ray film processors.

Figure 5-5	Main Wiring Diagram
Figure 5-6	Dryer Rack Wiring Diagram
Figure 5-7	AC Interface Board Schematic
Figure 5-8	Logic Board Schematic
Figure 5-9, 5-10	Logic Board Layout
Figure 5-12	Ready Tone Generator Schematic

Troubleshooting Processor Problems

SYMPTOM	PROBABLE CAUSE	REMEDY
1. Developing time not constant.	A. Excessive load on drive motor. B. Solution levels low.	A. Check that racks are seated and turn freely. B. Add chemicals as required.
2. Solution temperature too high.	A. Temperature control setting moved. B. Shorted heater triac. C. Defective temperature sensor. (open) D. Logic failure.	A. Restore correct setting. B. Replace heater triac. C. Replace temperature sensor. D. Replace logic board.
3. Solution temperature too low.	A. Heater failed. B. Heater triac failed. (open) C. Temperature control setting moved. D. Shorted temperature sensor. E. Logic failure.	A. Replace heater. B. Replace heater triac. C. Restore correct setting. D. Replace sensor. E. Replace logic board.
4. Dryer temperature too low.	A. Failed heating element. B. Open overtemp switch on dryer. C. Shorted temperature sensor.	A. Replace element. B. Will reset when cool. Inspect for cause: fan not running, dirt buildup, etc. Replace sensor.
5. Dryer temperature too high.	A. Open temperature sensor. B. Blower failure. C. Logic failure.	A. Replace sensor. B. Replace blower. C. Replace logic board.
6. Film jams.	A. Film not fed in squarely. B. Improper fixing, fixer too old, pH too high, or improperly mixed fixer or fixer replenisher.	A. Feed film in carefully, leading edge parallel to rollers. B. Check pH. If pH is above 5.0, dump and mix fresh. Follow the manufacturer's instructions exactly.

Troubleshooting Processor Problems (continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
7. Films overlap or become skewed during transport.	A. Bound rollers. B. Rack end plate bearings worn. C. Missing rack springs.	A. Clean each roller; check for causes of binding. B. Replace bearings. C. Replace springs.
8. Film is tacky, wet or curled when leaving dryer.	A. Improper fixing. B. Dryer temperature too low.	A. See 5B. B. Check dryer for proper operation.
9. Dirt particles on film.	A. Foreign particles in dryer or on squeegee rollers. B. Algae deposits on film. C. Foreign particles on squeegee.	A. Run several outdated sheets of unexposed film. B. Clean wash tanks and racks with nylon scrub brush and warm water. Drain wash tank each night. C. Clean squeegee roller(s).
10. Scratches on film emulsion.	A. Dirt on feed rollers. B. Chemicals crystallized on underside of top film guides. C. Dirt or silver accumulation on rollers. D. Roller in rack not turning. E. Dirty feed tray surface.	A. Clean feed rollers. B. Clean film guides. C. Clean rollers using a nylon scrub pad and warm water, or developer systems cleaner for developer racks/fixer systems cleaner for fixer racks. D. Check all rollers for operation; repair as required. E. Clean feed tray.

Troubleshooting Processor Problems (continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
11. Increase in image density.	A. Film is overexposed.	A. Coordinate exposure with developing time.
	B. Developer temperature is too high.	B. Have service technician troubleshoot developer temperature.
	C. Excessive developing time due to mechanical binding.	C. See Symptom 1.
	D. New developer improperly mixed.	D. Dump and mix fresh, following manufacturer's instructions exactly.
12. Decrease in image density.	A. Film is underexposed.	A. Coordinate exposure.
	B. Developer under-replenished or exhausted.	B. Change developer. Check replenishment rates.
	C. Developer temperature too low.	C. See Symptom 3.
	D. Developer time too short.	D. Check developer for low level.
	E. New developer improperly mixed.	E. Dump developer and mix fresh.
13. Over-replenishing.	A. Shorted film presence switch.	A. Replace switch.
	B. Shorted manual replenishment switch.	B. Replace switch.
	C. Pendulum magnet weak or stuck in the up position.	C. Clean or replace pendulum.
	D. Logic Failure.	D. Replace logic board.
14. No functions.	A. Interrupter switch not activated.	A. Put top cover in place.
	B. Interrupter switch defective.	B. Replace switch.

NOTE: The interrupter switch may be bypassed **for troubleshooting purposes only** by either utilizing the hold down tool (P/N 0000021801) to keep the switch activated. Jumping the pins on J-14 on the logic board is an alternate method.

Service Procedure 5-1

Inspecting, Adjusting and Changing the Main Drive Belt

The main drive belt requires only minimal maintenance and normally lasts many years with normal use.

Inspection

The belt should be inspected yearly. Replacement is indicated if any of the following conditions are found:

- 1) Excessive slack that cannot be corrected.
- 2) Frayed or badly worn edges.
- 3) Missing or damaged drive lugs on the belt surface.

Adjustment

CAUTION: Overtightening the belt will cause the belt to jump on the wormshaft pulley and will cause the saddle bearing nearest the pulley to become excessively hot.

Adjusting slots to tension the drive belt are provided in the motor mounting plate. Adjust in the following manner:

- 1) Unplug the processor from its power outlet.
- 2) Loosen the four motor mounting plate screws. These are accessible on the back of the processor, below the dryer.
- 3) Slide the motor until the belt has approximately 1/2" of play. With no racks in place, you should be able to rotate the driveshaft with your fingers approximately 1/8" back and forth.
- 4) Tighten the four screws.
- 5) If most of the slack cannot be removed, the belt is worn excessively and should be replaced.

Replacement

The following procedure is to be followed when replacing a worn drive belt:

- 1) Unplug the processor from its power outlet.
- 2) Remove all four racks (dev, fix, wash & dryer) and carefully set aside.
- 3) Loosen the four drive motor mounting plate attaching screws on the rear of the processor. Move the motor to remove the drive belt.
- 4) Remove the cotter pin holding the drive belt pulley to the driveshaft.
- 5) Slide the driveshaft pulley forward far enough to allow removal of the belt around the end of the driveshaft.
- 6) Install the new belt in the reverse order.
- 7) Adjust the new belt as described above.

Service Procedure 5-1a

Film Sensors and Adjustments

Mini NDT processors up to and including S/N MM1899-90

Film sensing for Mini NDT processors up to and including S/N MM1899-90 was accomplished by mounting a magnetic reed switch assembly in the center of the upper edge inside the molded feed tray adapter.

When film is not present in the feed tray, a magnetic pendulum assembly is in close proximity to the reed switch, wired in a normally closed configuration. This means that it is held open by the magnet when film is not present. When film is inserted in the feed slot, the pendulum is pushed upward and away from the reed switch, causing it to close. This puts a short across pins 1 and 2 of J13 on the ready tone generator board, putting the machine into the process mode. When the pendulum returns to its position of rest, the reed switch opens initiating timers for the beeper, wait light and cycle time. Approximately 8 seconds after the reed switch opens the beeper should sound and the wait light should go out.

If a machine fails to go into standby, the magnet may have weakened, or the switch may be stuck in the closed position; or the switch may be adjusted too far away from the pendulum to activate the switch.

First, unplug J13 from the ready tone generator board. If the wait light goes out and the beeper sounds after approximately 8 seconds, the switch is either shorted or the magnet is failing to activate it.

To test the switch, first remove the switch from the machine. Use a magnet to activate the switch while looking across the switch with a meter set on Ohms. If the switch fails to open it should be replaced. If it does open, try adjusting it as close to the pendulum assembly as possible. If this doesn't help replace the pendulum assy.

If the machine remains in the process mode after unplugging the switch from the J13 connector on the ready tone board, unplug the ready tone board from J13 on the main logic board. If the wait light goes out after approximately 8 seconds, the ready tone generator board should be replaced. If unplugging the ready tone board does not clear up the problem, a rare problem on the logic board itself is indicated.

Mini NDT processors S/N MM1900-90 and above

Starting with S/N MM-1900-90, Mini NDT processors feature a new style of film sensing. This is in the form of two hall-effect magnetic digital sensors (P/N 21878) located approximately three inches in from the inner right and left sides of the feed tray. There are now two magnetic pendulum assemblies (P/N 21893), located above the feed tray, that are used in conjunction with these sensors.

Activation of either switch will put the machine into the process mode. The purpose of the dual switch arrangement is to accommodate smaller size films. The feed tray assembly has changed to P/N 21876. (The part numbers given above are for 1 each of the parts.)

Service Procedure 5-1a

Film Sensors/Adjustments (continued)

Film sensor location configuration (See figure 5-1)

Film Sensor Adjustment: These sensors are adjusted at the factory and normally do not need adjustment. However, should adjustment be required, follow this procedure:

- 1) Loosen the screw on each small bracket securing the sensors to the molded feed tray adapter; the sensors may be moved up or down.
- 2) Locate each sensor upward close enough to the magnet opposing it so that the machine remains in standby. Raising either magnet by inserting a film should put the machine into the process mode. If this does not occur in either case, lower the sensor in question until it does.

Another Method of Adjustment: Since the two Hall-Effect switches are wired in parallel, simply short out one and position the other until it activates (allow 10 seconds after repositioning the switch for the beeper to sound and the wait light to go off).

The easiest way to short out one switch while adjusting the other is to open the front electrical panel and locate the beeper board. It is the smaller of the three boards, and is located in the upper middle section of the electrical panel. Each switch is connected to the board by means of a plug at the end of a 3 wire ribbon cable.

Unplug one switch from the board and jump the second and third pins (count left to right) together. This completes the circuit for this switch. Now you can adjust the position of the other one. Once this is done, plug the other switch back into the board and adjust its position. There is no need to unplug the other one while doing this since you have already repositioned it. The addition of some silicone caulking to each switch will help assure that they both stay in position.

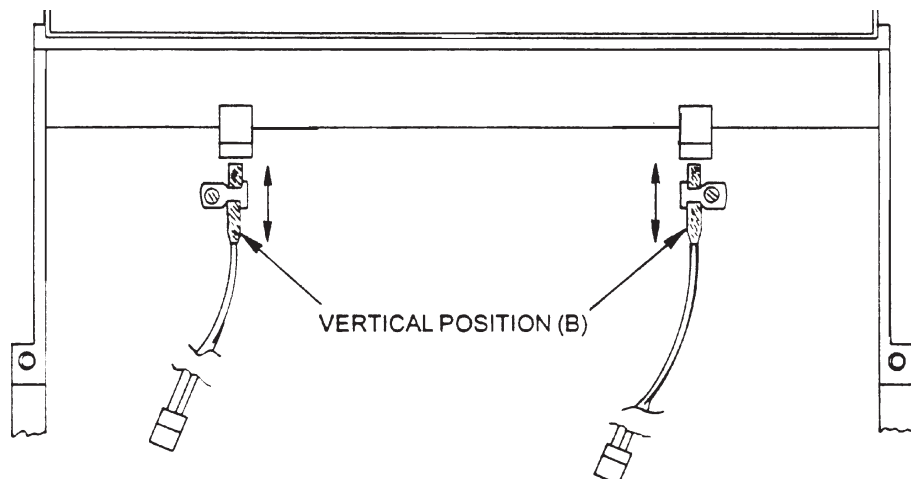


Figure 5-1, Film Sensor Location Configurations

Service Procedure 5-2

Servicing Circulation Pumps

The circulation pumps are easily removed for cleaning and/or servicing. For the early style pump (Figure 5-2, Serial #'s below 8724), proceed as follows:

Removal

- 1) Unplug the processor from its power outlet.
- 2) Drain the tank from which the pump is to be removed.
- 3) Disconnect the pump power cable from the junction box.
- 4) Disconnect the outlet hose from the pump body.
- 5) Remove the drain filter disk from the bottom of the processing tank to expose the four pump mounting screws.
- 6) Carefully remove the four screws and lower the pump.

NOTE: There are five “O” rings between the bottom of the tank and the mounting surface of the pump (see Figure 5-2). Be sure to locate and save all 5 “O” rings when removing the pump.

Disassembly & Cleaning

Developer recirculation pumps are usually cleaned adequately by systems cleaning and do not require disassembly.

Fix and wash pumps should be disassembled for cleaning at least once a year to remove hardened residue build up.

Disassemble and clean as follows:

- 1) Remove the four pump head assembly screws, (Figure 5-2).
- 2) Gently separate the pump head assembly. Locate and save the internal “O” ring seal inside the pump head.
- 3) Remove the impeller from the pump head and thoroughly clean all pump head parts in warm water.

Assembly

- 1) Reassemble the pump in reverse order. Lubricate the internal “O” ring with a silicone base lubricant before installing. Do not over tighten the self-tapping assembly screws.

Installation

- 1) Carefully install the pump in reverse order of removal. Lubricate the 5 “O” rings that seal the pump to the tank base with a silicone base lubricant before installing.
- 2) Test the pump for operation with water before installing chemistry.

Service Procedure 5-2

Servicing Circulation Pumps (continued)

The circulation pumps are easily removed for cleaning and/or servicing. For the later style pump (Figure 5-3, Serial Numbers starting at 8724 and above), proceed as follows:

Removal

- 1) Unplug the processor from its power outlet.
- 2) Drain the tank from which the pump is to be removed.
- 3) Disconnect the pump power cable from the plug channel.
- 4) Disconnect the inlet elbow and output hose from the pump body.
- 5) Loosen the two (2) screws securing the pump mounting feet to the bracket. Slide the pump mounting feet out from under the tabs provided on the bracket and remove.

Disassembly & Cleaning

Developer recirculation pumps are usually cleaned adequately by systems cleaning and do not require disassembly.

Fix and wash pumps should be disassembled for cleaning at least once a year to remove hardened residue build up.

Disassemble and clean as follows:

- 1) Remove the four pump head assembly screws, (Figure 5-3). Be careful to note the orientation of the outlet nozzle for reassembly.
- 2) Gently separate the pump head assembly. Locate and save the internal “O” ring seal inside the pump head.
- 3) Remove the impeller from the pump head, taking care to not lose the small green spacer located on the inside of the indentation of the impeller and thoroughly clean all pump head parts in warm water.

Assembly

- 1) Reassemble the pump in reverse order. Lubricate the internal “O” ring with a silicone base lubricant before installing. Take care to not lose the lock washer and flat washer provided with each screw and do not over tighten the screws.

Installation

- 1) Carefully install the pump in reverse order of removal. Lubricate the 5 “O” rings that seal the pump to the tank base with a silicone base lubricant before installing.
- 2) Test the pump for operation with water before installing chemistry.

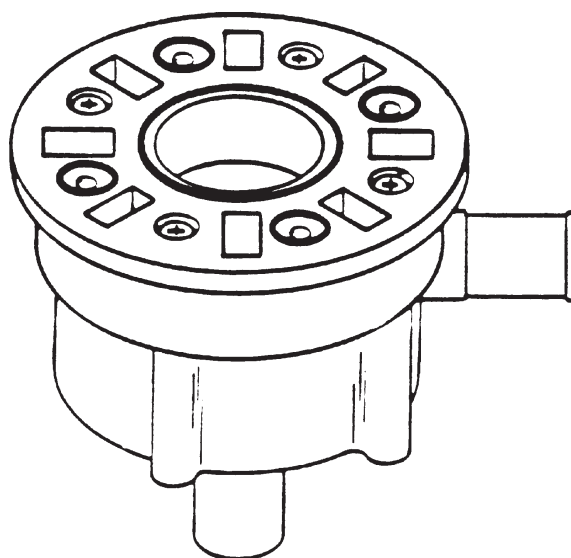


Figure 5-2, Recirculation Pump Head, Early Style (Up to S/N 8723)

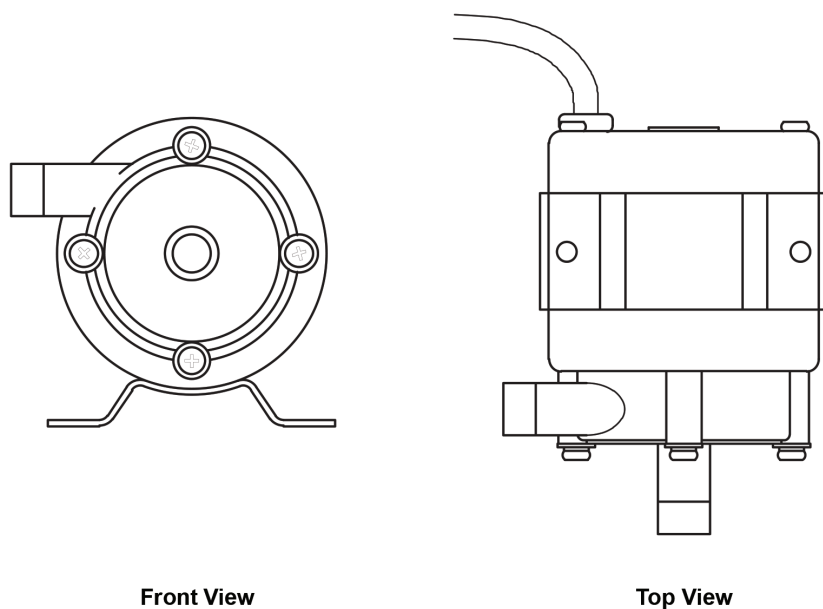


Figure 5-3, Recirculation Pump, Later Style (For S/N's 8724 and higher)

Service Procedure 5-3

Cleaning and Servicing Replenisher Pumps

Mini NDT Processors utilize high reliability, low maintenance oscillating pumps to deliver replenishment to the developer and fix tanks. The following steps will correct most problems that may occur.

NOTE: These pumps operate on half-wave DC. Attempting to operate them on full wave AC (without a blocking diode in place) will lead to overheating and failure of the pump solenoid.

If the pumps run but deliver little or no chemistry.

- 1) Inspect replenishment lines between replenisher tanks and pump inputs for kinks or other damage. If installed, disassemble and clean in-line filter(s). Check all hose clamps for security.
- 2) Replenishment lines should not be lengthened, nor should the tanks be positioned such that more than 36" of chemical lift is required.
- 3) Check valves may be obstructed with debris or crystallized chemistry.
 - A) If pump will move any chemistry, try cleaning valves in place by placing pickup tube in a container of warm water, not over 120°F (49°C) and activating the pumps with the Manual Replenishment switch. The warm water will usually remove hardened chemical residue.
 - B) Stubborn deposits and larger pieces of foreign material may require that the pump be disassembled for cleaning. Figure 5-4, below, details disassembly of the pumps.

Clean the valves, using hot water if necessary to remove any chemical residue. Older valves may require replacement.

When assembling, take care to install the pump valves exactly as they were removed.

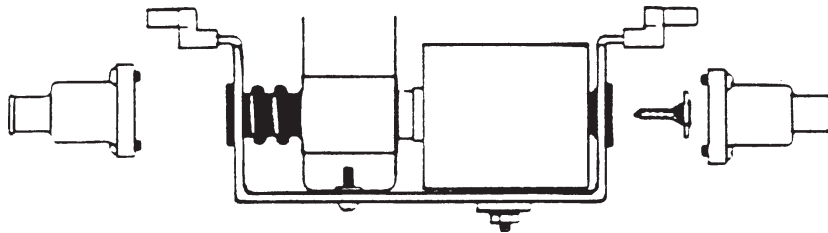


Figure 5-4, Disassembly of Replenisher Pump

Service Procedure 5-4

Circuit Descriptions and Calibration Procedures

WARNING: The following calibration adjustments are made on the Logic Board. As potentially fatal voltages are present and easily contacted, these adjustments must be performed only by qualified service technicians.

Access to the circuit cards may be gained by removing the two mounting screws from the underside of the feed tray, then lowering the control box door assembly.

All calibrations are done on the Logic Control Board located on the right half of the opened control box door.

Developer Temperature Control

The developer is heated by a single 500 watt heating element located under the developer tank in a heater exchange assembly.

Developer temperature is controlled by an IC temperature sensor mounted on the bottom of the developer tank. This sensor is a constant current generator who's output is directly proportional to the temperature of the tank.

The temperature control is a proportional controller that allows full power to be sent to the heating element during warm-up, when the processor is first turned ON. This will be indicated by the DEV TEMP light on the control panel or LED L-2 on the logic board being ON.

When the temperature in the tank is within 2°F (1.1°C) of the desired temperature, the controller will start cycling the power to the heater to prevent temperature over run. At this point the LEDs' mentioned above will blink, indicating that the temperature is very near its set point.

The temperature controller signals the triac switch Q2 through opto-isolator U-2 on the AC interface board. The triac switches line voltage to the heater.

The desired temperature set point is adjusted with trim pot R-20 on the logic board. **NOTE:** Clockwise rotation increases temperature. See Calibration Procedure below.

In the unlikely event of an electronic failure, providing continuous full power to the heating element, an overtemp safety thermostat located on the heater exchange assembly will open, thus disabling heat. In addition, a protective internal fusible link is present in the heating element as an added safety feature. When an open heating element is found, the operation of the triac should also be checked. (The heating element has a nominal resistance value of approximately 25 ohms).

Note that the temperature controller is disabled if a low level condition exists in the developer tank.

Service Procedure 5-4

Circuit Descriptions and Calibration Procedures (continued)

Developer Temperature Calibration

- 1) Verify that there is enough conductive liquid in the developer tank to cover the low level sensor, located in the front wall of the tank. (About 1.5 gallons [6 L.])
- 2) Turn the processor ON.
- 3) Rotate trim pot R-20 on the Logic Board several turns clockwise to force the heater ON. The DEV HEAT LED and LED L-2 must be on steady, if not, continue turning R-20 clockwise until both LEDs' are ON steady.
- 4) Place a known accurate metal stem thermometer into the developer solution.

CAUTION: Do Not use a glass/mercury thermometer in the processor. If a glass thermometer should break, the resultant mercury leakage would permanently contaminate the processor.

- 5) As the temperature of the solution reaches the desired value, slowly adjust trim pot R-20 counterclockwise until LED L-2 starts to blink. When the desired temperature is reached the LED should flash ON only occasionally to indicate temperature is being maintained.

Dryer Temperature Control

The dryer uses two 275 watt infra-red lamps (heaters), and airflow provided by 2 fans, to dry the film as it passes through the dryer section.

A thermistor in the dryer section is used as a temperature sensor. Control is provided by the logic board. LED L-1 on the logic board will light when the dryer is calling for heat.

The temperature controller signals the Triac switch Q-1 through opto-isolator U-1 on the AC interface board. The triac switches line voltage to the heaters.

Trim pot R-21 on the logic board adjusts the set temperature of the dryer.

NOTE: Counterclockwise rotation of the trim pot increases the set temperature of the dryer.

The upper dryer blower is controlled by opto-isolator U-3 and triac Q-3. The lower, or back blower is on continuously

Service Procedure 5-4

Circuit Descriptions and Calibration Procedures (continued)

Over Temperature Protection

The dryer is equipped with over temperature protection in the form of a safety switch located on one of the lamp reflectors. If temperature inside the dryer exceeds 155 *f* (68 C), the safety will open and remain open until the temperature drops below 105 *f* (41 C).

If this should happen the dryer should be checked for dirt build up, nonoperating fans or shorted triac.

CAUTION: In no event should the processor ever be operated with this safety device shorted or bypassed. Severe equipment and/or personal injury could occur.

Dryer Temperature Calibration

Dryer temperature should be checked by inspecting the film being processed. If the film is exiting the dryer damp, temperature may need to be increased. If the processed film shows heat marks (wavy horizontal lines across the film) the dryer temperature should be reduced.

1. Inspect a piece of processed film.

NOTE: All covers and panels must be on the processor when checking operation of the dryer.

2. Adjust trim pot R-21 as follows to adjust dryer operating temperature:
 Counterclockwise = Increase Dryer Temperature
 Clockwise = Decrease Dryer Temperature
3. Process another piece of film and inspect for proper drying.

Service Procedure 5-4

Circuit Descriptions and Calibration Procedures (continued)

Replenishment Operation

The replenishment system operates in two modes. The first is by the film feed sensor being tripped, indicating that material is being processed. This is called automatic replenishment. The other method is via the manual replenishment button located at the front of the processor, known appropriately as manual replenishment.

Two trim pots on the logic board allow the adjustment of cycle length for the developer and fixer replenishment pumps, thus allowing adjustment for differing processing loads, materials and other variable conditions.

Before attempting adjustment of the replenishment system, verify that the replenisher lines are clear and not bent or kinked. If replenishment seems to be below earlier performance, clean the check valves as outlined in Service Procedure 5-3 before proceeding.

Replenishment Calibration

The following outlines basic calibration for the replenishment system. Depending on the customer's materials, film sizes and production, it may be necessary to make further adjustments to the replenishment rate(s).

- 1) Turn the processor ON.
- 2) Lift the developer or fixer "J-Hook" out of the processing tank far enough to hang it into a graduated container.
- 3) Press the manual replenishment button until all air is purged out of the replenishment line.
- 4) Empty the graduated container.
- 5) Feed in a piece of 14" X 17" film and measure the amount of replenishment delivered into the container. The recommended starting point amounts are:

Developer = 110 ml

Fixer = 120 ml

If these amounts are not delivered adjust the appropriate trim pot(s) shown below until the 1 minute delivery amount for each pump is as recommended or as required for your application. **NOTE:** Counterclockwise rotation increases output per minute.

Developer = R-47

Fixer = R-28

Service Procedure 5-4

Circuit Descriptions and Calibration Procedures (continued)

Triacs & SCRs

There are 5 Triac's and 2 SCRs on the AC interface board. Their functions are:

- Q1 Controls dryer heaters (lamps).
- Q2 Controls developer heater.
- Q3 Controls dryer blower.
- Q4 Controls drive motor and water solenoid.
- Q5 Not used on thls processor.
- Q6 Controls fixer replenishment pump.
- Q7 Controls developer replenishment pump.

Outputs

The output of the AC interface board to the main harness is via connector J1 on the following pins:

- Pin 1 Dryer lamps (heaters).
- Pin 2 Developer heater.
- Pin 3 Drive motor, wash water replenishment pump or solenoid.
- Pin 4 Dryer blower.
- Pin 5 Not used.
- Pin 6 Fixer replenishment pump.
- Pin 7 Developer replenishment pump.

Fuses

The following fuses on the AC interface board protect the indicated circuits:

Fuse	Type/Rating	Protects
F1	3AGC 1 amp	Developer & fixer replenishment pumps.
F4	3AGC 5 amp	Developer heater.
F5	3AGC 8 amp	Dryer lamps, 115V(heaters).
F5	3AGC 5 amp	Dryer lamps, 220V(heaters).
F6	3AGC 5 amp	Drive motor, wash water solenoid.
F7	3AGC 5 amp	Dryer Blower

Service Procedure 5-5

Theory of Operation

Solution Temperature Control

Temperature in the developer tank is sensed by an integrated circuit temperature sensor which generates a current that is directly proportional to temperature.

The signal from temperature sensor is sent to I.C. U2, an LM 3900 quad current-differencing amp. The amplifiers in this package amplify differences in current at its inputs. Two of the amplifiers are connected as comparators comparing the current generated by the temperature sensor with the current set by the front panel temperature control. R20 sets the maximum temperature at which the front panel control can be set. R20 is preset at the factory for approximately 110°F maximum temperature.

When replacing the Logic board or when replacing U2 or the temperature sensor, R20 must be re-calibrated (see calibration Procedures). The other two amplifiers in U2 are used as a triangle wave signal which is mixed with the current from the controls. This gives proportional temperature control supplying less heat as the temperature approaches the set temperature, and automatically adjusts the amount of heat supplied to maintain temperature as closely as possible. The action of the temperature control is indicated by the LED lamp on the front panel and L2 on the Logic Board. When the lamp is on, the heater is activated.

As the tank temperature approaches the set temperature, the LED will begin blinking and will remain on for less time as the temperature comes closer to the set temperature.

Drive to the heater is disabled if the solution level in the developer tank drops below the level sensor probe.

Dryer Temperature Control

Temperature in the dryer transport is sensed by an integrated circuit temperature sensor which generates a current that is directly proportional to temperature.

The signal from the temperature sensor is sent to I.C. U2, an LM 3900 quad current-differencing amp. The amplifiers in this package amplify differences in current at its inputs. Two of the amplifiers are connected as comparators comparing the current generated by the temperature sensor with the current set on the board. R21 sets the temperature for the dryer. R21 is preset at the factory for 135°F maximum temperature.

When replacing the Logic board or when replacing U2 or the temperature sensor, R21 must be re-calibrated (see calibration Procedures). The other two amplifiers in U2 are used as a triangle wave signal which is mixed with the current from the controls. This gives proportional temperature control supplying less heat as the temperature approaches the set temperature, and automatically adjusts the amount of heat supplied to maintain temperature as closely as possible. The action of the temperature control is indicated by the LED L1 on the logic board. When the lamp is on, the heater is activated.

As the dryer temperature approaches the set temperature, the LED L1 will begin blinking and will remain on for less time as the temperature comes closer to the set temperature.

Service Procedure 5-5

Theory of Operation (continued)

Solution Level Sensor

A metal screw located in the developer tank detects when the solution level becomes so low that there is a danger of the heater becoming dry. If the developer level drops below the end of the metal screw, the red Low Solution light will turn on to warn the operator. When the red light is on, the heater is turned off to prevent tank damage. If an attempt is made to run the processor, it will turn on as usual but the red Low Solution light will begin to blink, drawing attention to the problem. When the solution level in the tank is again at the proper level, the red light will go out and heating will automatically resumes.

Automatic Shut-Off

The processor is preset at the factory to shut off and go into a standby mode approximately 5 minutes after the sensor(s) in the film entry lip is released by the trailing edge of the film.

This time interval is controlled by adjusting Pot R29. R29 adjusts the frequency of an oscillator in U6. The output of the oscillator is sent to U5 which divides the frequency by 16,384. The oscillator is adjusted so that after division, one pulse is output by U5 after approximately 4 minutes. When the sensor is triggered by film presence, it resets U5 to zero and holds it there. When the sensor is released, U5 again functions and outputs its pulse after approximately 5 minutes. The output of U5 goes to a flip flop (U4) which turns off all machine functions except solution temperature control, recirculation pumps and one (1) dryer blower.

When the reset pushbutton is depressed, the timer is disabled and all machine functions run continuously.

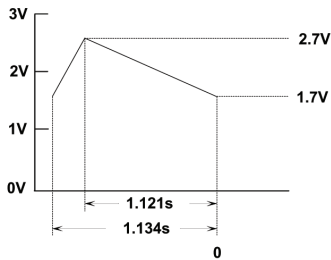
AC Interface Board

This board connects the low voltage signals from the main logic board and uses them to switch the various AC components in the machine on and off.

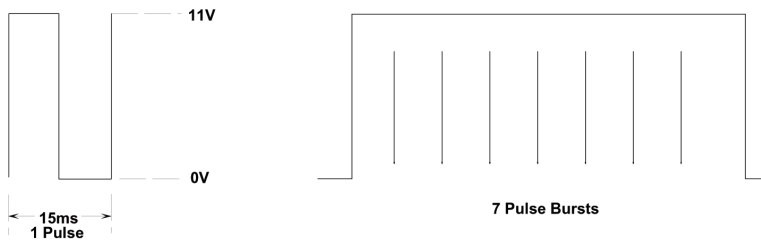
The low level signals are interfaced by six optically isolated TRIAC TRIGGERS (U1-U7). These contain an LED which is optically coupled to a small TRIAC Trigger. The LED in the Trigger is connected in series with the appropriate control panel LED which indicates whether each component is operating. If either the trigger LED is bad or the control panel LED is bad, the circuit will not operate.

Waveforms & Voltages

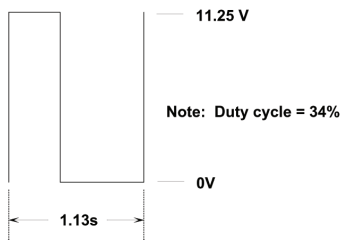
1. Pin 4 of U2 on Logic Board



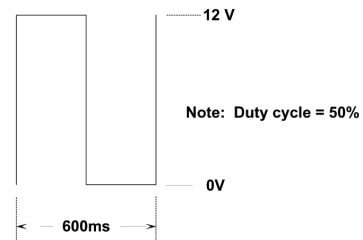
2. Pin 9 of U2 on Logic Board



3. Pin 5 of I.C. U2 on Logic Board



8. Pin 7 of I.C. U5 on Logic Board



9. Pin 18 of I.C. U7 on Logic Board = 10 VDC

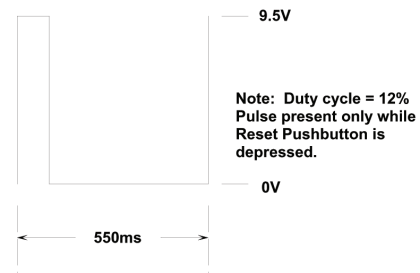
4. Pin 12 of I.C. U4 on Logic Board = 2.4VDC

5. Pin 13 of I.C. U4 on Logic Board = 0VDC

6. Pin 11 of I.C. U4 on Logic Board = 11.9VDC

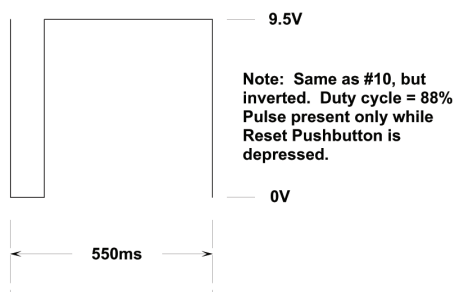
7. Pin 5 of I.C. U1 on Logic Board = 11.38VDC

10. Pin 15 of I.C. U7 on Logic Board = 0VDC



Waveforms & Voltages (continued)

11. Pin 11 of I.C. U6 on Logic Board = 0VDC



12. Pin 17 of I.C. U7 on Logic Board = Same as #11 only while Reset Pushbutton is depressed. 5 second duration

13. Pin 14 of I.C. U7 on Logic Board = Same as #10

14. Pin 10 of I.C. U6 on Logic Board = Same as #'s 11&12

15. Pin 8 of I.C. U6 on Logic Board

Ready Tone Generator Board

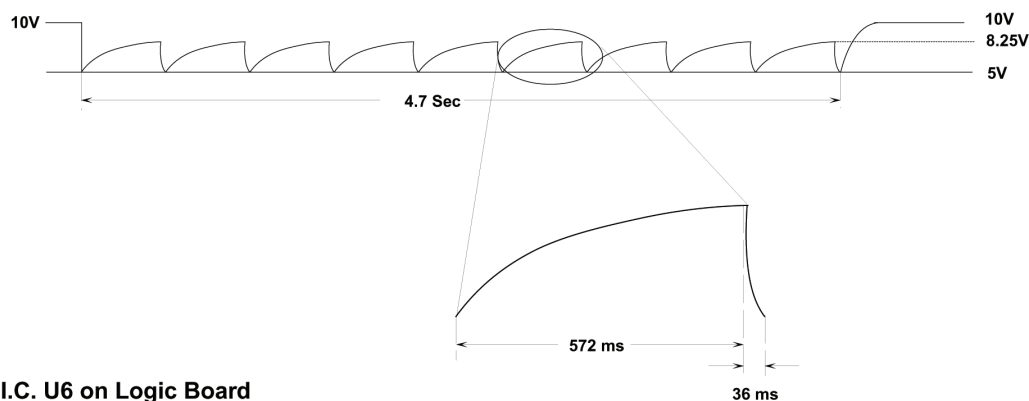
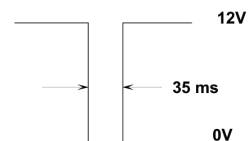
Middle pin of J13 = Low (Gnd) when no film is present
= High (12V) when film is present

Middle pin of J12 = Low (Gnd) when no film is present
= High (12V) when film is present

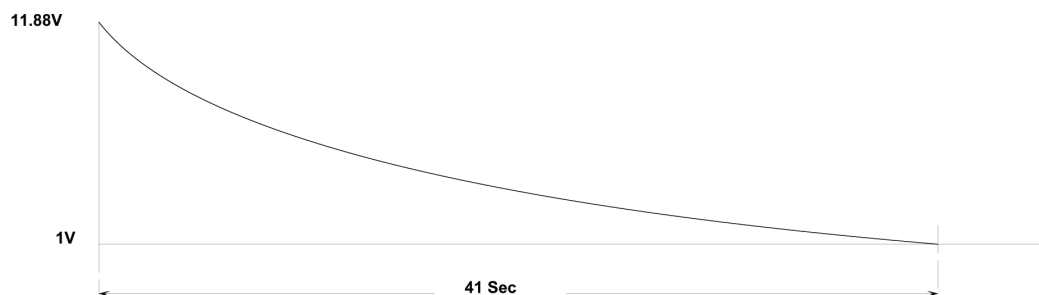
Output of either Q1 or Q2 = 12V when either input goes high

Pin 5 of I.C. U1 = Output of Q1 or Q2 Inverted.

Pin 6 of I.C. U2 = high (12V) normally
Low pulse when film exits



16. Pin 13 of I.C. U6 on Logic Board



Main Wiring Diagram

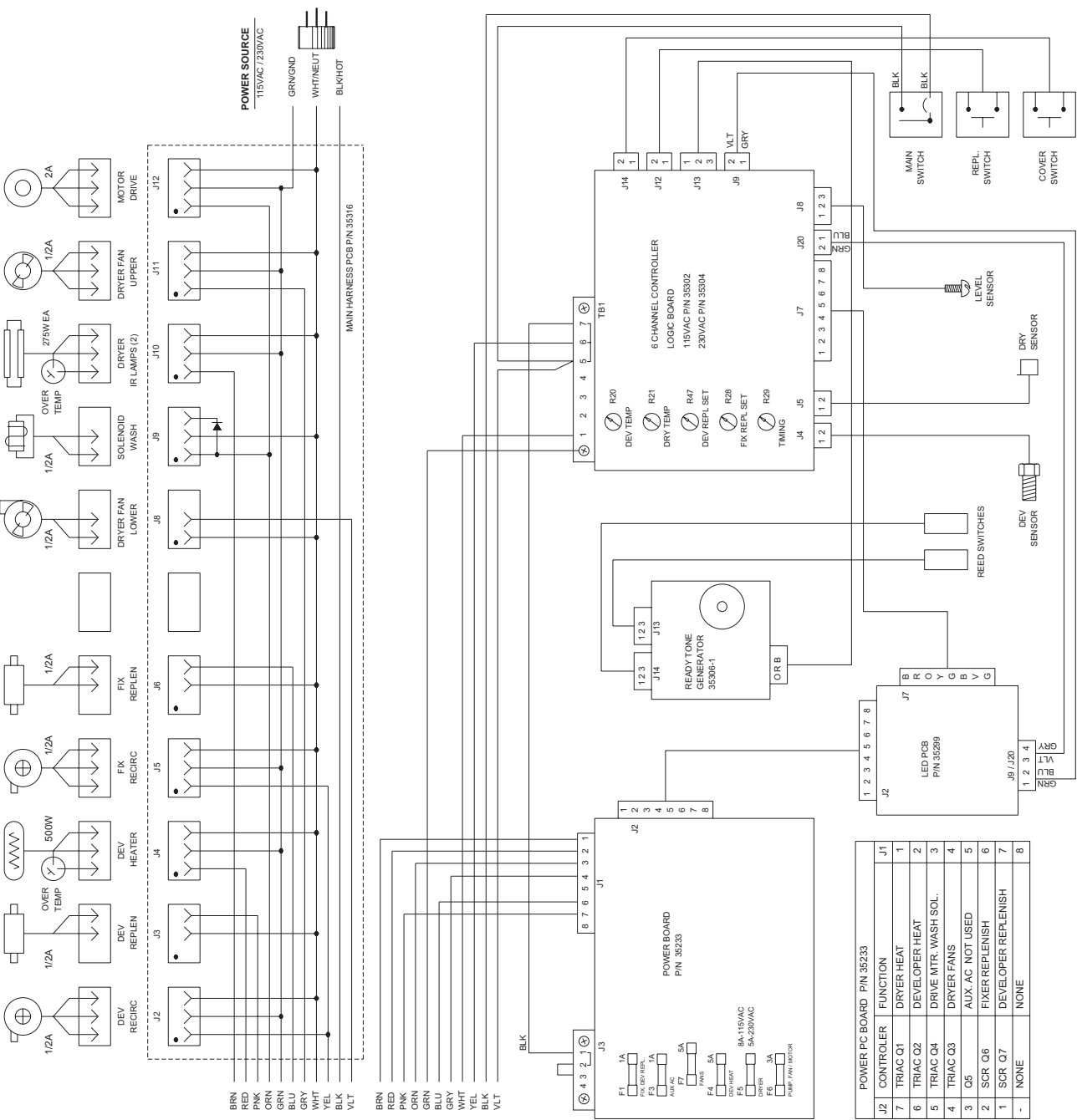


Figure 5-5, Main Wiring Diagram

Dryer Rack Wiring Diagram

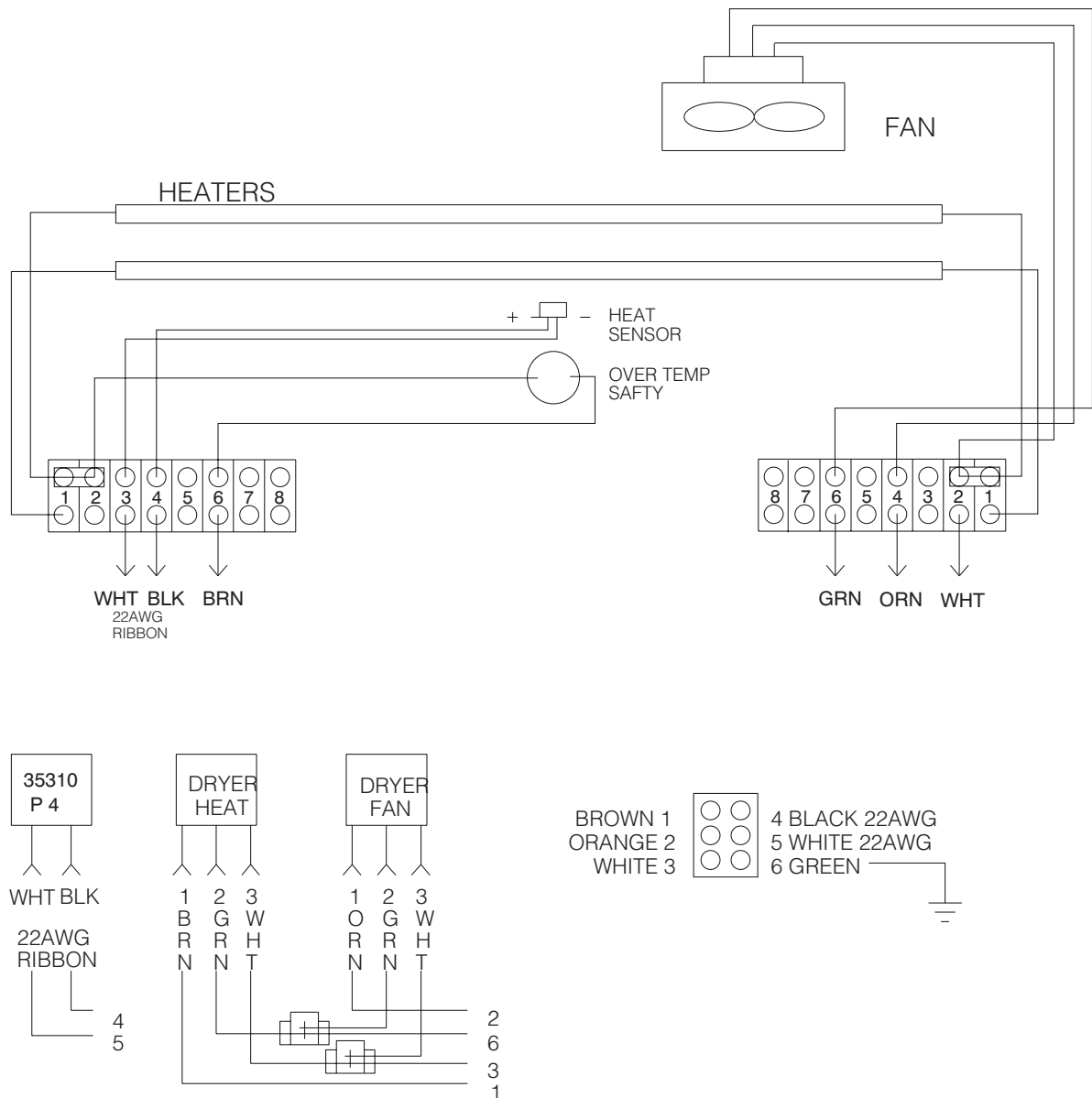


Figure 5-6, Dryer Rack Wiring Diagram

AC Interface Board Schematic

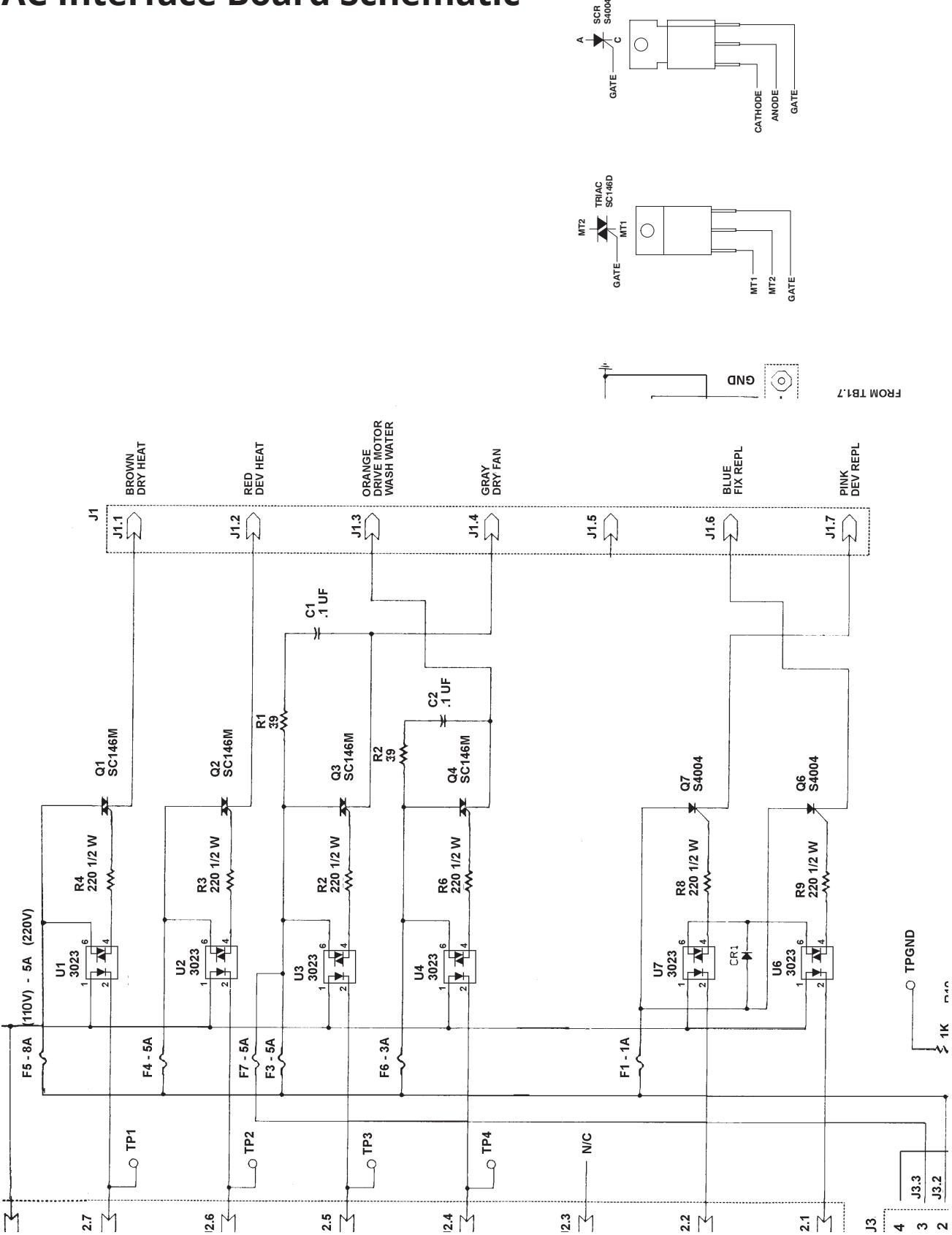


Figure 5-7, AC Interface Board Schematic

Logic Board Schematic

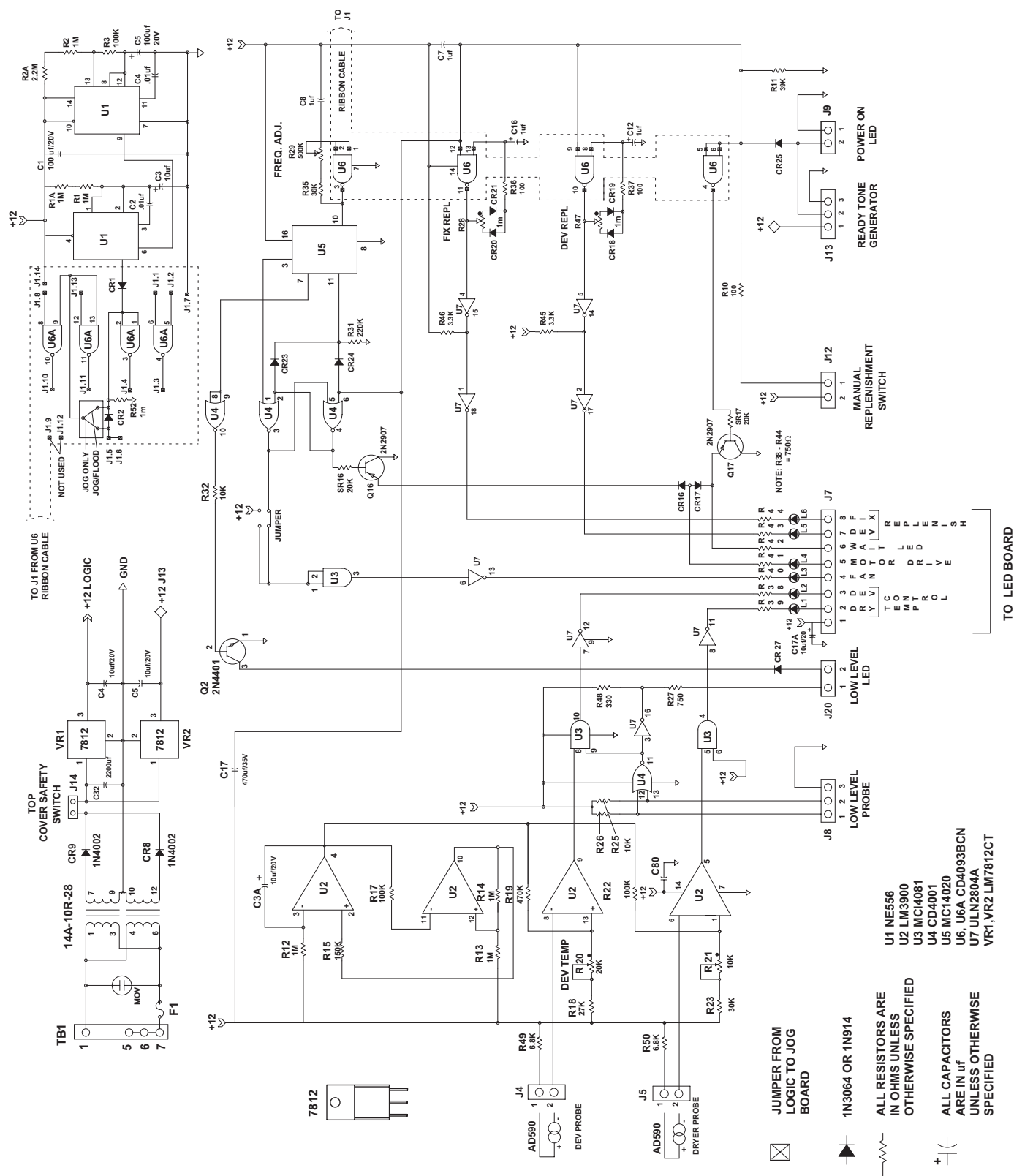


Figure 5-8, Logic Board Schematic

Logic Board Layout (110v)

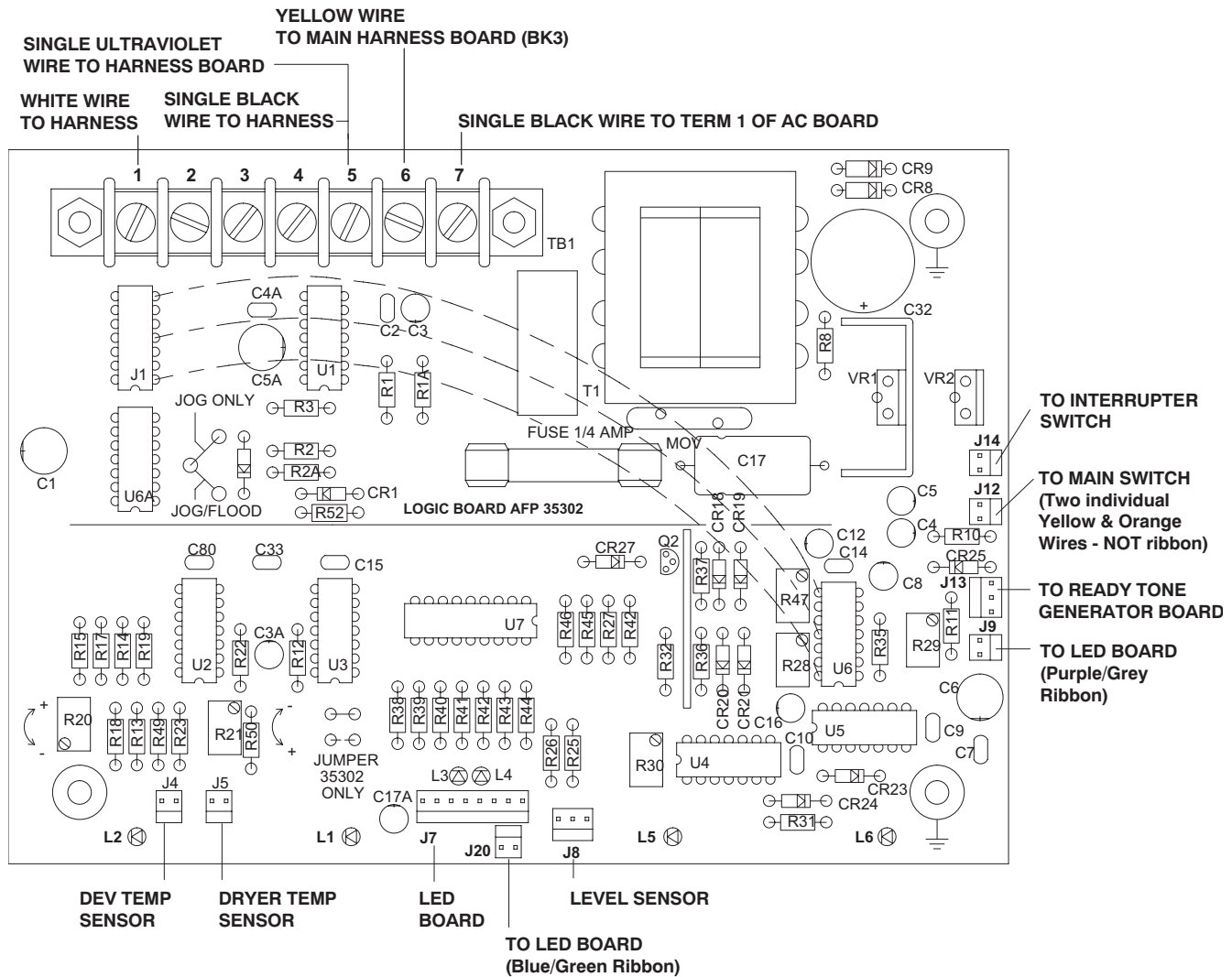


Figure 5-9, 110v Logic Board Layout



Ready Tone Generator Layout and Schematic

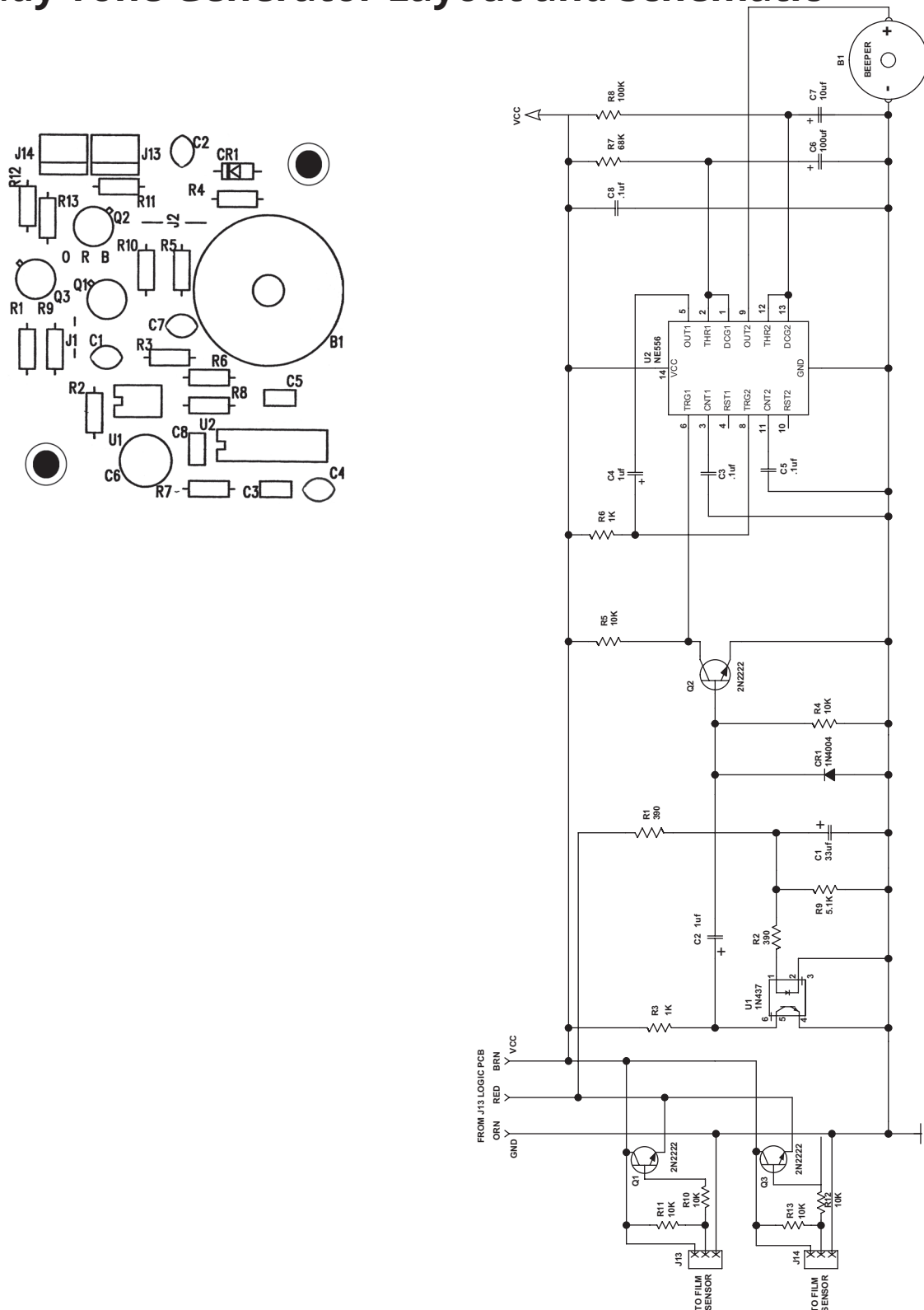


Figure 5-12, Ready Tone Generator Layout & Schematic
(For Serial #'s 1900 And Higher)

LED Board Layout and Schematic

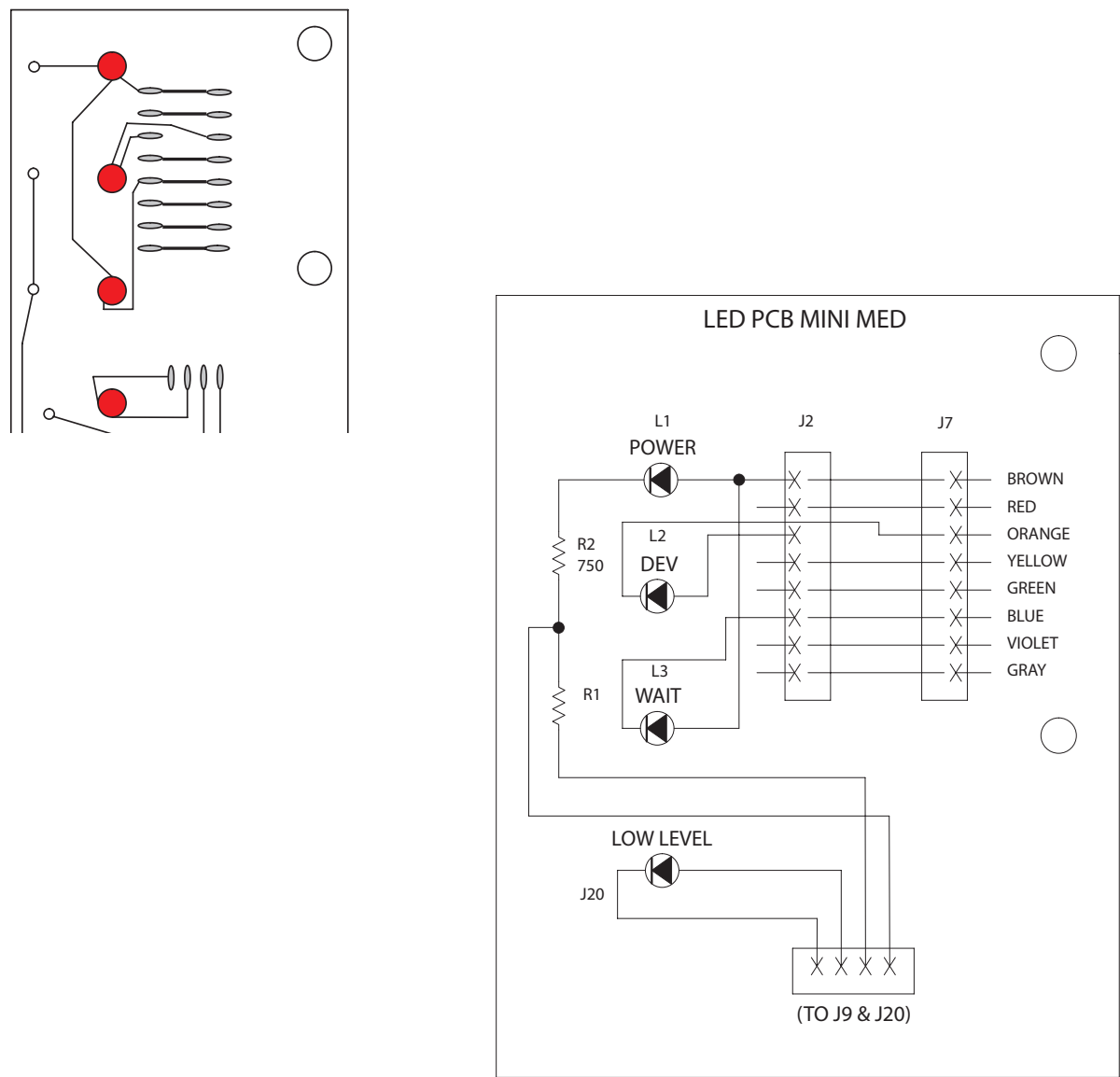


Figure 5-13, LED Board Layout & Schematic

Section 6

Parts

Introduction

This section is an illustrated catalog of repair and replacement parts for the **Mini NDT Processors**. Illustrations show the locations of replaceable parts and corresponding lists give the part number, description and quantity per assembly for each.

How Parts Are Listed

Most parts shown in the illustrations are identified with reference numbers which are repeated on the accompanying parts list(s). The list(s) will include the part number, description and quantity of the parts.

Attaching parts, when listed, are shown below the listing for that part or assembly.

When Ordering Parts

Give the part number, description and quantity required for each part. Give also the model and serial number of the processor for which the parts are needed.

Maintenance Kit

The following items are found in the Maintenance Kit (P/N 9992302604) included with each **Mini NDT processor**.

1	0000021306-K	Worm Gear	1
2	0000021467	Drive Gear, 24P, 24T	1
3	0000021346	Retaining Ring, 1/4 Noryl	3
4	568-007004-1	Washer, Retaining, .640 Dia	3
5	0000047802	Spring, Extension, Racks	4
6	0000021085	Gear, Idler, W4P 18T, 3/4 PD	1
7	883-055-55	Oiler, 1/4 Ounce	1
8	0000084407	Beaker, Graduated, Tri	2
9	800-089210	Scrub Brush	2
10	0000021658	Key, Side Plate, Double Hole	1
11	0000041406	Clamp, Hose, Worm Gear, 3/8-7	8
12	0000046285-C	Tee, 1/2" X 1/2" X 1/2" Barb	2
13	0000046251-C	Elbow, 1/2" Barb X 1/2" Barb	1
14	0000021801	Service Tool, Hold Down	1

Documentation

Mini Medical Series Manual, P/N 0000061122

PARTS

General Assembly

Item	Part Number	Description	No. Used
1	0000021257-2	Tank/Frame Unit	1
2	0000021421-1	Side Cover	2
3	See Pgs 4 & 5	Cover, Elect. Door	1
4	0000021700	Panel, Drain	1
5	0000021701	Clamp, Panel, Drain	1
6	568-007074	Tank, 7 Gal. Replenisher	2
7	0000022120	Dip Tube Assy, Repl. Tank	2
8	N/A	N/A	N/A
9	0000021845	Front Top Cover	1
10	0000021846	Rear Top Cover	1
11	N/A	N/A	N/A
12	0000021881	Rear Top Cover (Rear Exit - NotShown)	1
13	0000022003	Foot, Molded	4
14	See Pgs 4 & 5	Film Feed Tray	1
15	0000021442	Feed Tray Cover	1
16	568-007064-1	Floating Lid	1
17	0000037112	Manual Replenishment Switch	1
18	0000037283	Circuit Breaker, 15 Amp	1
19	0000044755	Leveling Foot	4
20	0000037051	Interrupter Switch, Rear	1
21	0000046251-C	Elbow, 1/2"	3
22	0000047833	Spring, Compression	4
23	0000087222	Ball Valve, Drain (Gray W/Blue Handle)	3
	0000087220	Ball Valve, Drain (Black older style)	3
24	0000046191-E	Nipple, 1/4 X 2 In Toe	3
25	0000046291-B	Wash Water Hose	1
26	0000046300-A	Hose Gasket	2
27	9526062640	Tubing, 1/2" I.D. X 11/16" O.D. Clear	4 ft.
28	9527062640	Tubing, 1/2" I.D. X 11/16" O.D. Red	4 ft.
29	9528062640	Tubing, 1/2" I.D. X 11/16" O.D. Blue	4 ft.
30	0000032679	Cover, interrupter switch, harness	1
31	0000021795	Plate, interrupter switch	1
32	000-09000-AA-H	Flat washer, switch	1
33	000-05400-AM-H	Mounting screws, switch	1
34	9992305005	Replenisher Tank Set, 7 Gal.	1

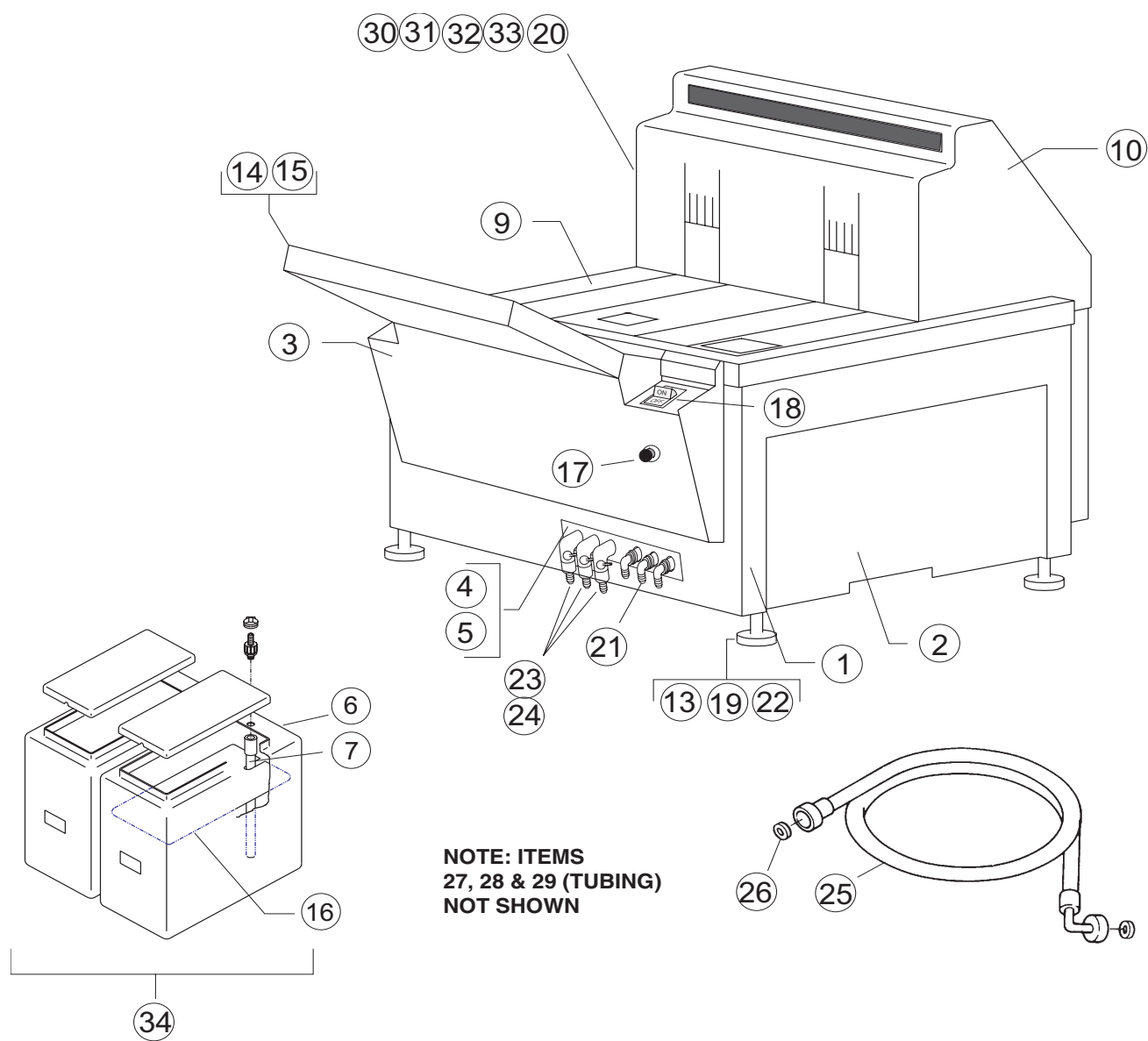


Figure 6-1, General Assembly

PARTS

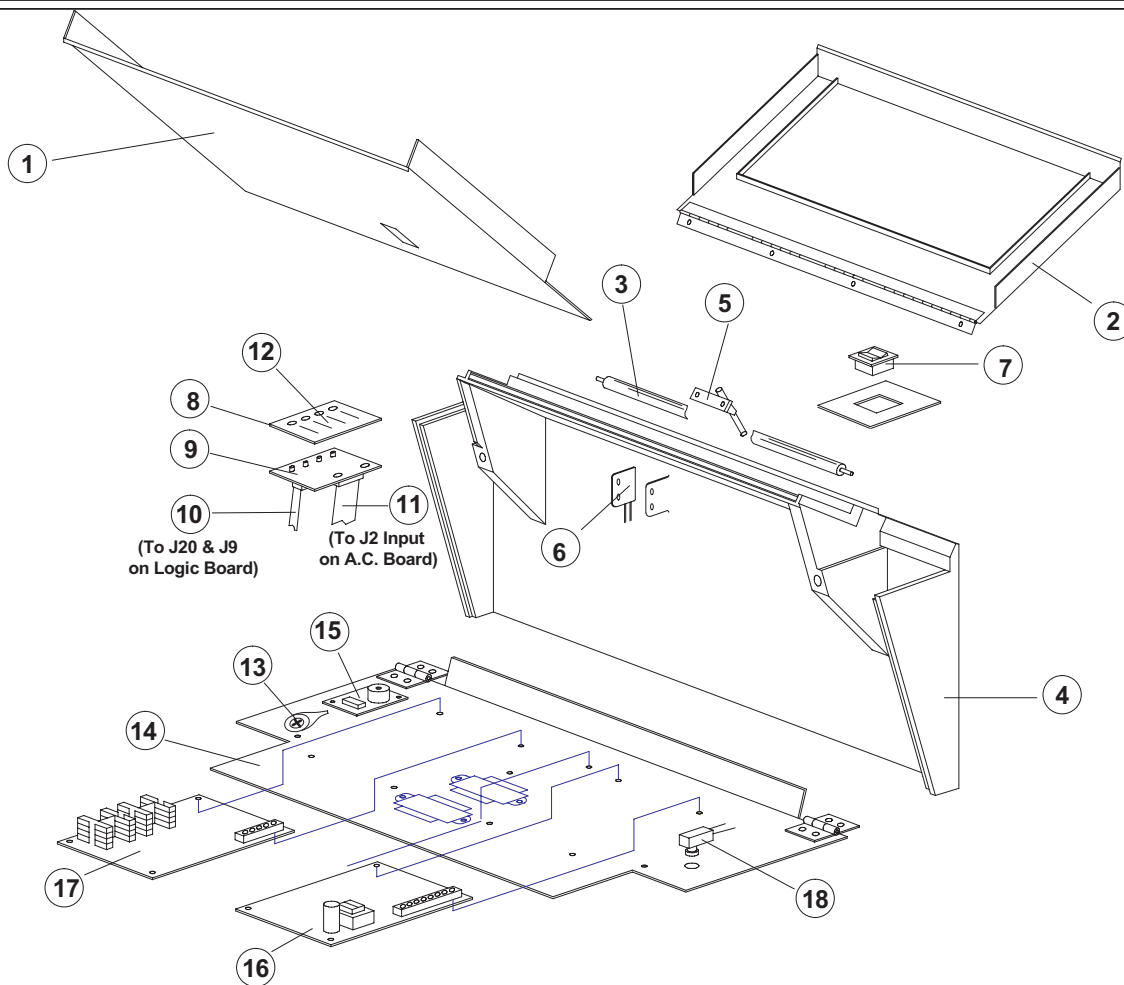
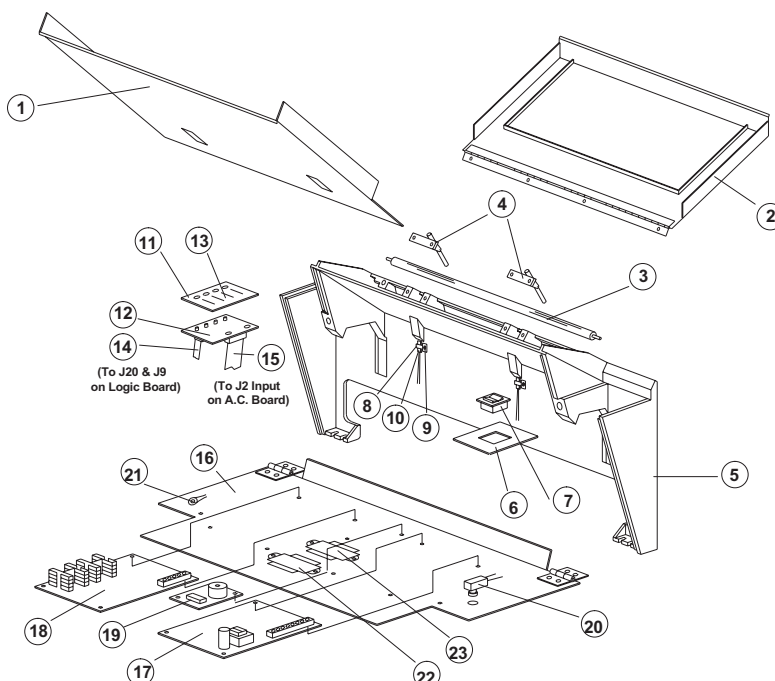


Figure 6-2a, Feed Tray & Control Chassis Assembly

Item	Part Number	Description	No. Used
1	0000021441	Film Feed Tray, (1 Sensor)	1
2	0000021442	Cover Assy, Feed Tray	1
3	0000020692	Roller Assy, Feed Tray	1
4	0000021874-G	Adaptor, Feed Tray, Molded	1
5	0000021539	Pendulum Assy, (1 Sensor)	1
6	0000021878	Assy, Film Presence Switch	1
7	0000037283	Switch, Circuit Breaker, 15 Amp	1
8	0000021461-3	Bracket, L.E.D.	1
9	0000035299	P.C.B. Assy, L.E.D.	1
10	0000032651	Harness, Logic/L.E.D., 4-Pin	1
11	0000032650	Harness, A.C./L.E.D., 8-Pin	1
12	0000045584	Label, Control Panel, MM	1
13	0000021703	Strap, Cover	1
14	0000021875-G	Cover, Front, Electronic, Mounting	1
15	0000035306	P.C.B. Assy, Ready Tone Board, (1 Sensor)	1
16	0000035302	P.C.B. Assy, Logic Board (115V)	1
	0000035304	P.C.B. Assy, Logic Board (230V)	
17	0000035233	P.C.B. Assy, Power Board	1
18	0000037112	Switch, Manual Replenishment	1



NOTE: ITEM 22 (P/N 38096) DISCONTINUED
ON MACHINES S/N 8677 AND HIGHER WITH
THE INTRODUCTION OF 220VAC DRYER FANS

NOTE: ITEM 23 (P/N 38095) USED FOR CONVERTING
220 VOLTS TO 110VAC FOR 60HZ DRIVE MOTORS
ON 220VAC 60HZ MACHINES ONLY

Figure 6-2b, Feed Tray & Control Chassis Assembly

Item	Part Number	Description	No. Used
1	0000021876	Film Feed Tray, (2 Sensor)	1
2	0000021442	Cover Assy, Feed Tray	1
3	0000020692	Roller Assy, Feed Tray	1
4	0000021893	Pendulum Assy, (2 Sensor)	2
5	0000021874-G	Adapter, Feed Tray, (2 Sensor)	1
6	0000021462-3	Bracket, Switch	1
7	0000037283	Switch, Circuit Breaker, 15 Amp	1
8	0000031713	Mount, Tie	2
9	000-00706-BA-H	Screw, 6-32 X 3/8", Slot Pan Head	2
10	0000021878	Film Presence Switch Assy (2 Sensor)	2
11	0000021461-3	Bracket, L.E.D.	1
12	0000035299	P.C.B. Assy, L.E.D. Board	1
13	0000045584	Label, Control Panel	1
14	0000032651	Harness, Logic/L.E.D.	1
15	0000032650	Harness, A.C./L.E.D., 8-Pin	1
16	0000021875	Cover, Front, Electrical, Mounting	1
17	0000035302	P.C.B. Assy, Logic Board (115V)	1
	0000035304	P.C.B. Assy, Logic Board (230V)	1
18	0000035233	P.C.B. Assy, Power Board	1
19	0000035306-1	P.C.B. Assy, Ready Tone Board (2 Sensor)	1
20	0000037112	Switch, Manual Replenishment	1
21	0000021703	Strap, Cover	1
22	0000038096	Assy, Transformer, Dryer Harness (230VAC Only) S/N 8676 and below	1
23	0000038095	Assy, Transformer, Drive Motor (230V/60Hz Only)	1

PARTS

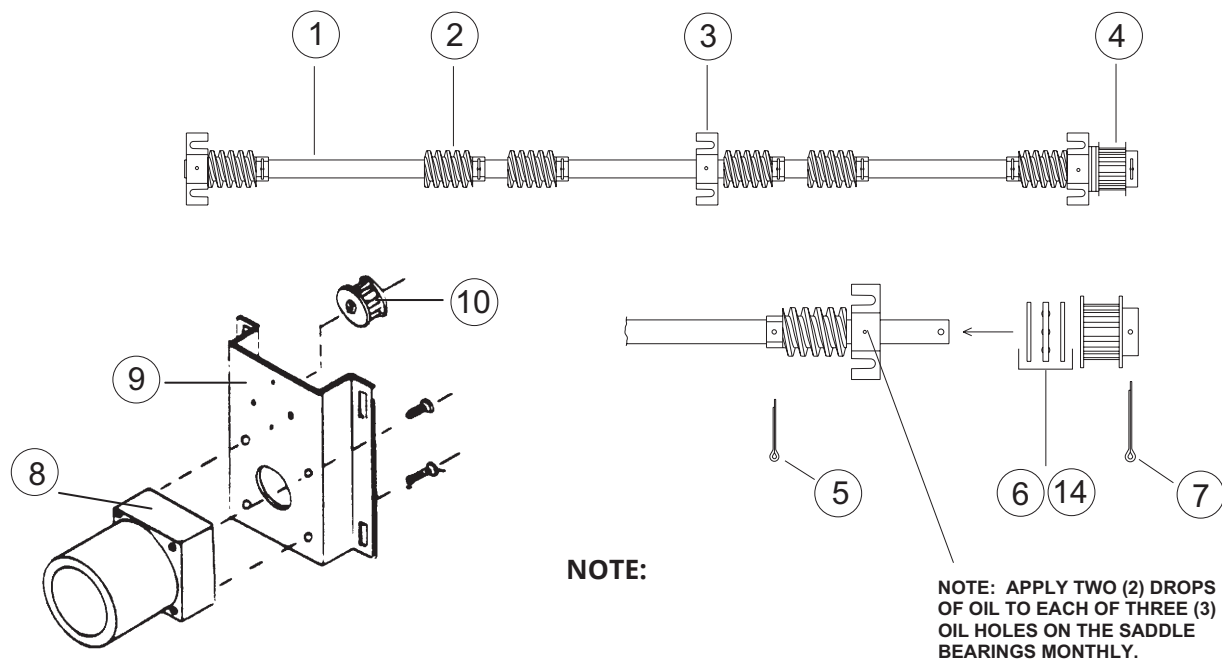


Figure 6-3, Drive System

Model (115/230 Volt 60Hz)	Motor Pulley	Timing Belt	Developer Dwell
Mini NDT/90	0000046463 (12T)	0000041023	22 Seconds
Model (230 Volt 50Hz)			
Mini NDT/90	0000021649 (12T)	0000041023	22 Seconds

Item	Part Number	Description	No. Used
1	0000021302	Driveshaft	1
2	0000020145-1	Worm	6
3	0000021720	Saddle Bearing, Flanged	3
4	0000021002	Pulley, Driveshaft	1
5	0000041552-B	Cotter Pin	6
6	0000083764	Bearing, Thrust Ball	1
7	0000041550-B	Cotter Pin	1
8	9992305311	Drive Motor Kit* (115V 60Hz)	1
	9992305312	Drive Motor Kit* (230V 60Hz)	1
	9992305313	Drive Motor Kit* (230V 50Hz)	1
8a	0000021308	Nut Bar, Motor bracket	1
9	0000021465	Motor Bracket	1
10	See Note	Motor Pulley (See Note)	1
12	L3081901041	Bead Shield (Not Shown)	1
13	00130506251	Capacitor, Motor Start (Not Shown)	1
14	0000022005	Sleeve, Bearing (Not Shown)	1
15	9992305036	Drive Shaft Assembly	1

* Drive Motor Kits consist of all three belts and motor pulleys.

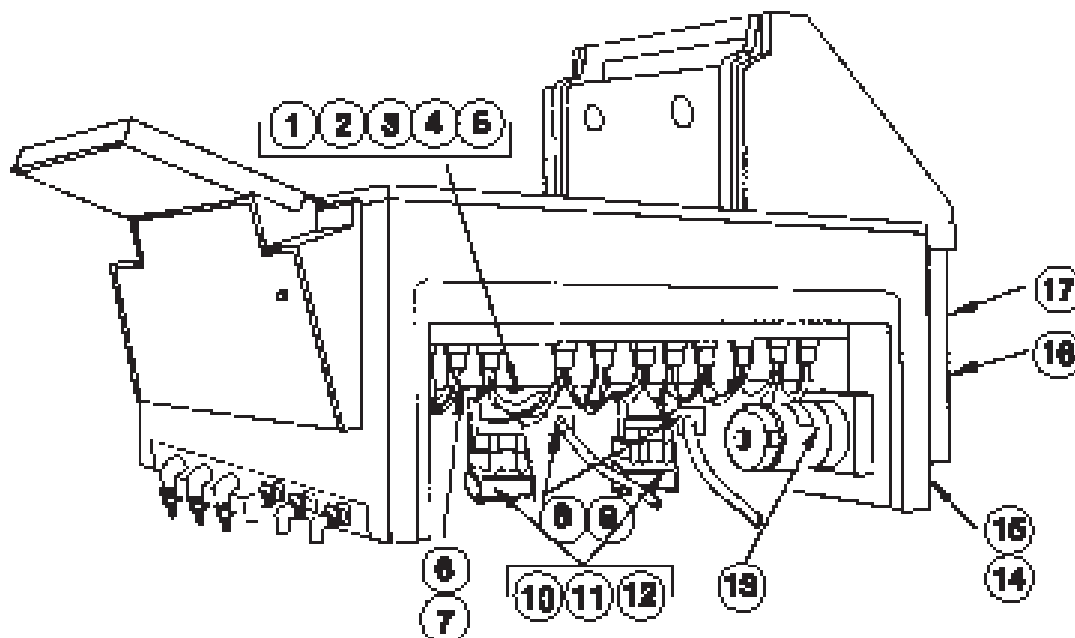


Figure 6-4, Tank/Frame Assembly

Frame/Tank Assembly

Item	Part Number	Description	No. Used
1	0000021869	Overtemp Safety Thermostat	1
2	0000021848-1	Heater Weldment, 500W (115V)	1
	0000020864	Heater Assembly, (115V, S/N 1534 and Lower)	1
	0000021848-2	Heater Assembly, (230V)	1
3	0000038150	Temperature Sensor	1
4	0000045805	"O" Ring, Temperature Sensor	1
5	000-06000-AA-R	Nylon Nut, Temperature Sensor	2
6	0000045822	"O" Ring, Size 008, Recirculation Pump	8
7	0000045825	"O" Ring, Size 025, Recirculation Pump	2
8	0000020995	Replenisher Pump (115V)	2
	00000f20995-1	Replenisher Pump (230V)	2
9	0000083915	Poppet Valve, Replenisher Pump	2
10	(See Pg. 6-8)	Recirculation Pump	2
11	0000021436	Rubber Tee	2
12	0000021642	Restrictor For Dev Inlet Elbow (Not Shown)	1
13	9992305311	Drive Motor Assembly (115V, See Fig 6-3)	1
	0000021507	Drive Motor (230V, See Fig 6-3)	1
14	0000038904	Line Cord Assy, 14/3, 6' W/Plug	1
15	0000021308	Nut Bar For Motor Mount Bracket	1
16	0000021668	Rear Cover	1
17	0000021666	Dryer Support	2
18	0000020354	Replenishment Gooseneck (Not Shown)	2
19	0000021210	Diffuser, (Curved Baffle Dev - Not Shown)	1
20	568-007038	Recirc. Dev. Inlet Elbow (Not Shown)	1
21	0000045824	"O" Ring For Above Elbow (Not Shown)	1
	000-06702-AA-R	Nut, Union, 3/4-20 X 1/4	1
22	0000049008	Solenoid Valve (115V, Not Shown)	1
	0000049013	Solenoid Valve (230V, Not Shown)	1
23	0000048326	Recirc. Pump Screen (Inlet - Not Shown)	2

PARTS

Wet Rack Assembly

Item	Part Number	Description	No. Used
1	000-15304-AE-H	Pin, Plain, 3/32" X 5/8" Long	2
2	0000040803	Bushing, Nyliner 1/4"	4
3	000-00808-BQ-H	Drive Screw 8 X 1/2"	2
4	0000047802	Spring, Extension	8
5	0000021468	Driveshaft	2
6	0000020474	Roller, 3/4" Rubber	8
7	0000020433	Bushing, Grooved	16
8	000-09500-AA-H	Washer, Flat, 1/4" (Exit, Wash Only)	2
9	0000048205	Spacer, 1/4" I.D. X 3/8" O.D. (Entrance & Exit, Dev and Fix)	2
10	0000020576	Gear, Drive, 24P, 18T D Bore	8
11	568-007004-1	Washer, Retaining, .640 Dia	8
12	0000021306-K	Worm Gear	2
13	0000021467	Gear, Drive, 24P, 24T	2
14	0000021085	Gear, Idler, 24P, 18T	2
15	0000047701	Ring, Retaining, 5/16" Noryl	4
16	000-09200-AF-H	Washer, #6 Split Lock, S.S.	4
17	000-00706-AM-H	Screw, 6-32 X 3/8" Phil Pan Head	4
18	0000020654	Idler Post	4
19	0000021346	Ring, Retaining, 1/4" Noryl	2
20	0000048204	Spacer, 1/4" I.D. X .084 (Entrance, Wash Only)	1
21	0000021796	Gear, Idler, 54T	1
22	0000021797	Gear, Idler, 60T	1
23	0000021238-1	Roller, 3/4" Dia. Polyurethane (Bottom Roller Group, Wash Rack / Fix Rack [Exit] Only)	4
24	0000021546	Film Guide, Entrance/Exit, (Dev & Wash)	1
24	0000021546	Film Guide, Entrance/Exit (Fix)	2
25	0000021602	Diffuser (Dev Rack Only)	1
26	0000021603-1	Side Plate (Dev & Fix)	2
27	0000021705	Side Plate (Wash Only)	2
28	0000020652	Shaft, Film Guide	2
29	000-05100-AA-H	Nut, Hex, 8-32	18
30	0000020577	Guide, Film	10
31	0000021493-2	Guide, Film	4
32	000-00808-AM-H	Screw, 8-32 X 1/2", Philips Pan Head	19
33	000-00816-BL-H	Screw, 8-32 X 1", Philips Pan Head	4
34	0000021616	Rack Support, Molded	2
35	000-00810-AM-H	Screw, 8-32 X 5/8" Philips Pan Head	2
36	0000021492-R	Handle, Red, Developer Rack	1 Ea
37	0000021492-B	Handle, Blue, Fixer Rack	1 Ea
38	0000021492-BK	Handle, Black, Wash Rack	1 Ea
	801-030761	Screw, Rack Handle	2
39	0000021658	Key, Rack Locator, 2-Hole, Non Drive Side	1 Ea
40	0000020664	Key, Rack Locator, 1-Hole, Drive Side	1 Ea
41	0000020576-1	Gear, Roller, Entrance	1 Ea

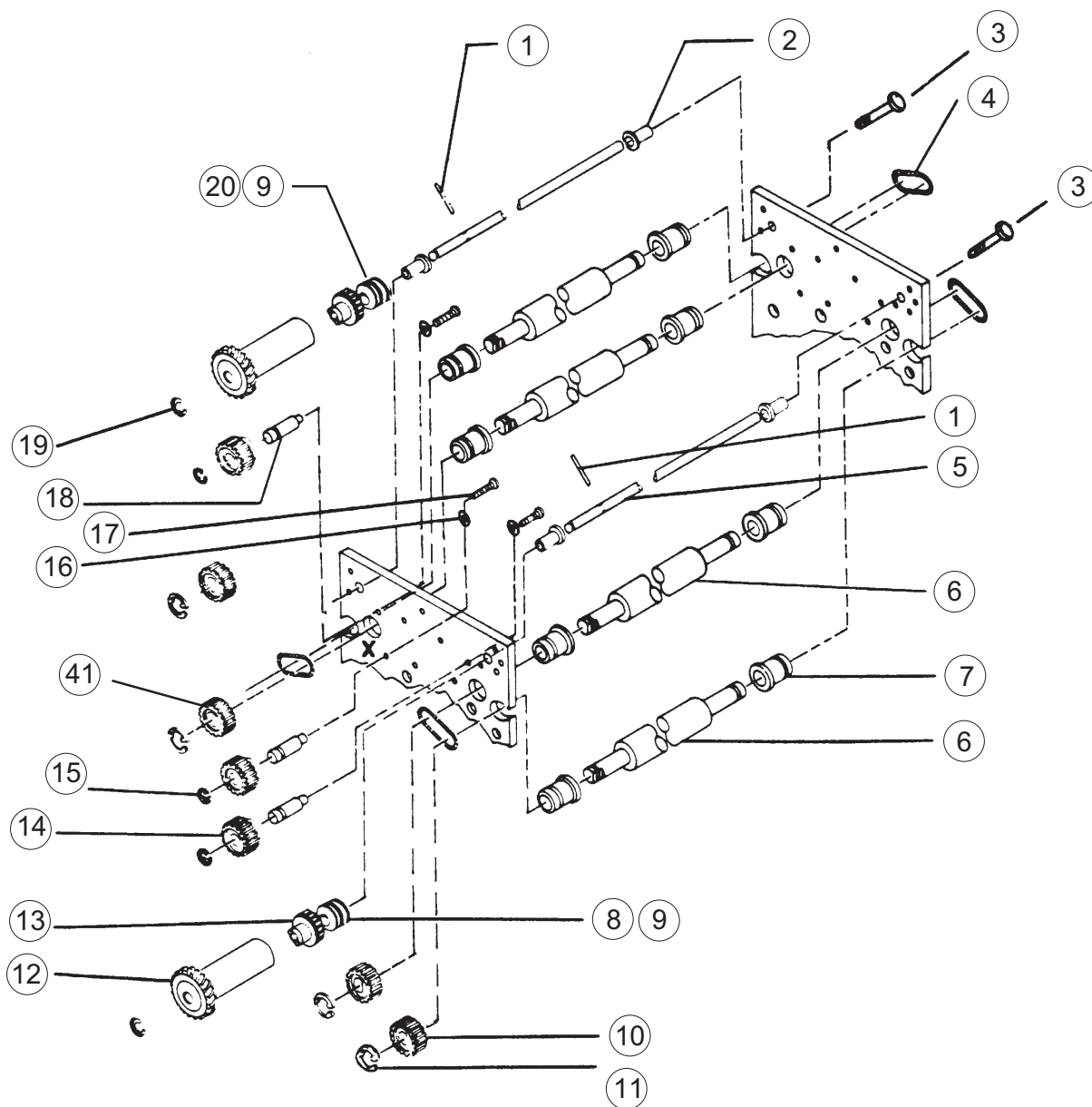
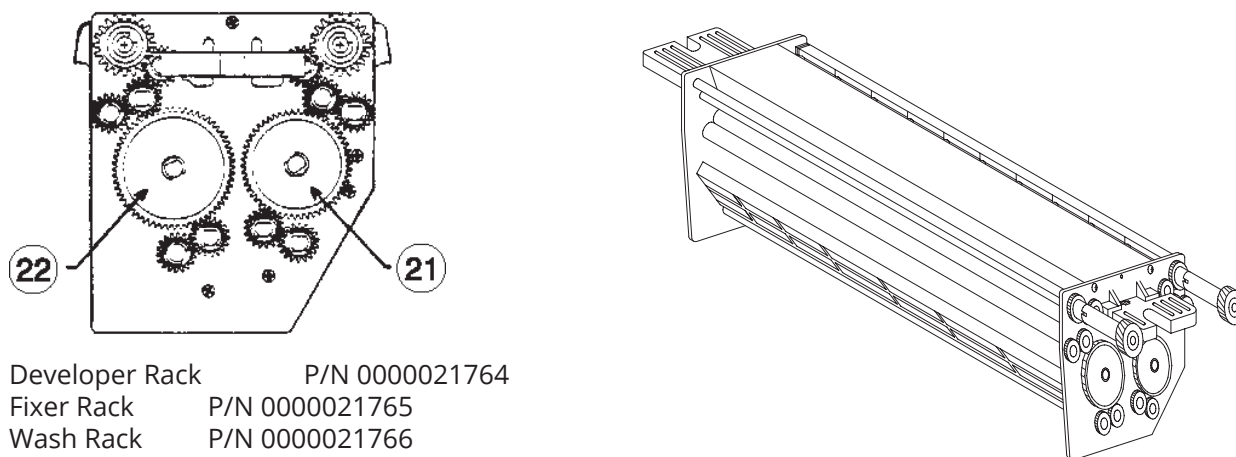
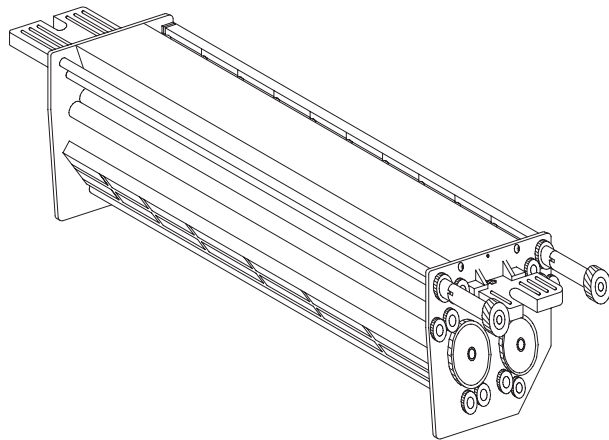


Figure 6-5, Wet Rack Assembly, Top Roller Group

PARTS



Developer Rack P/N 0000021764
 Fixer Rack P/N 0000021765
 Wash Rack P/N 0000021766

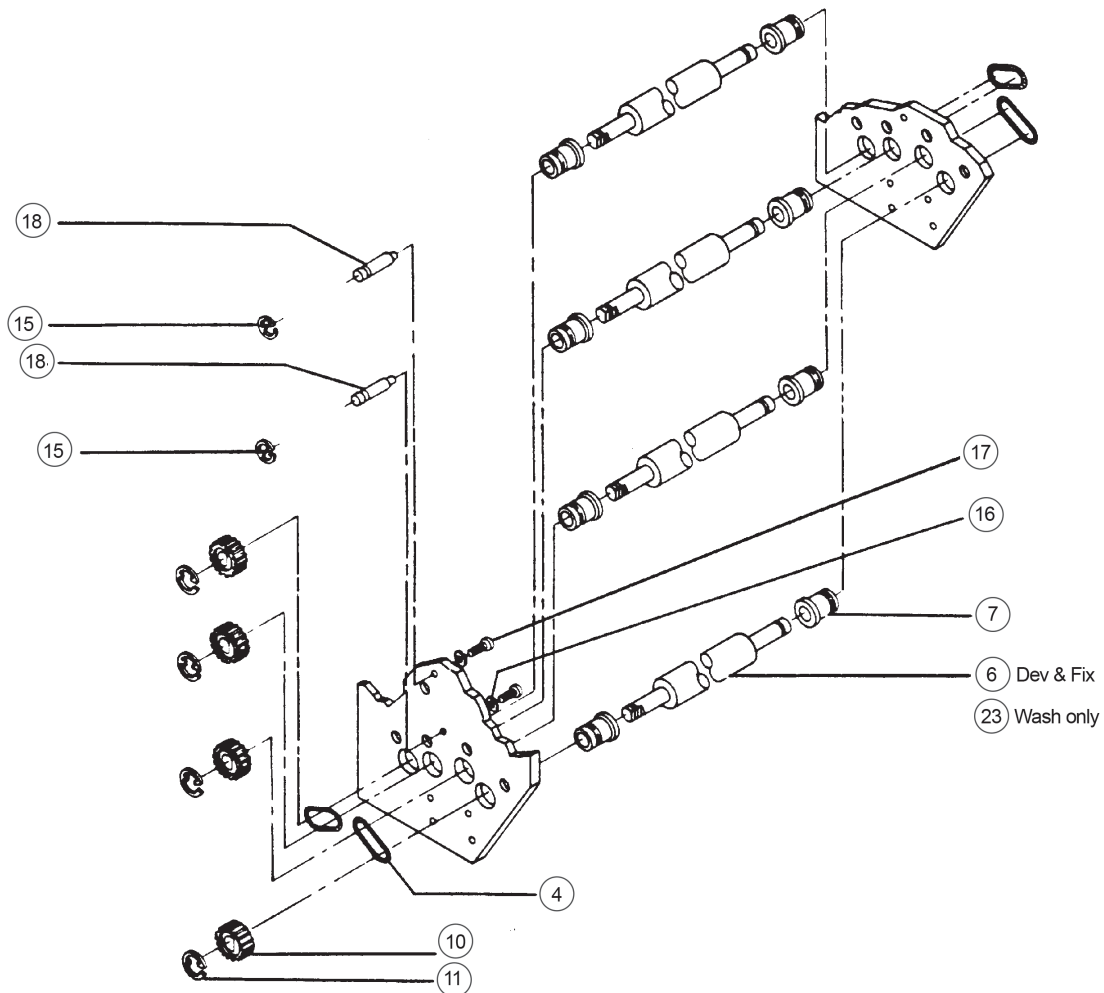


Figure 6-6, Wet Racks, Bottom Roller Group

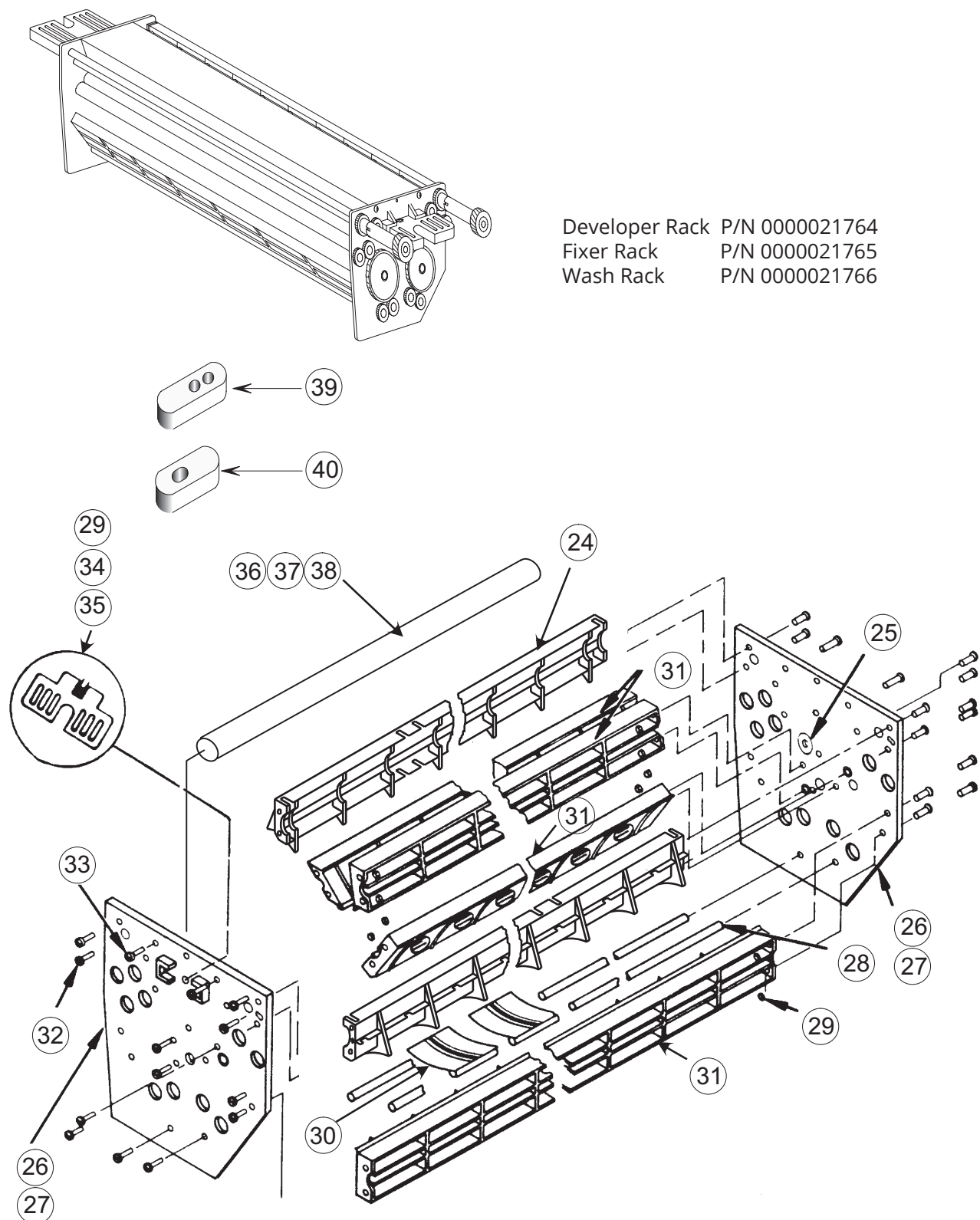


Figure 6-7, Wet Racks, Film Guide Group

PARTS

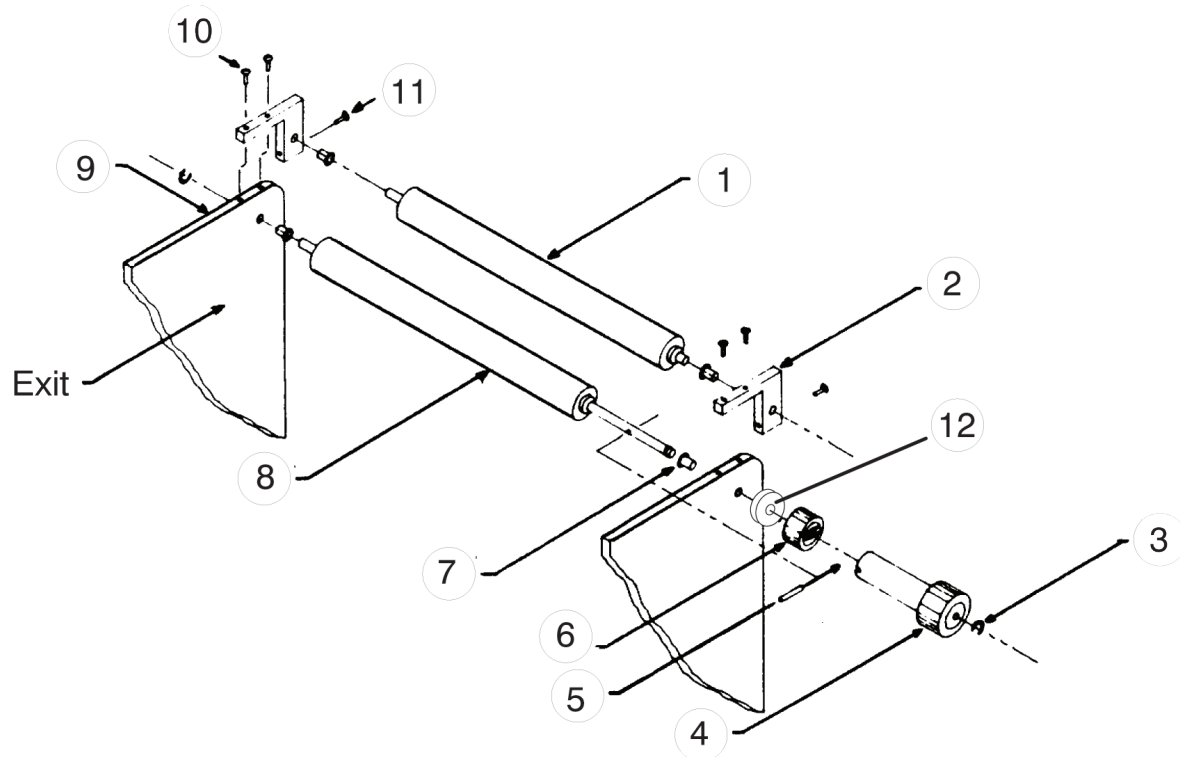


Figure 6-8, Wash Rack, Squeegee Roller Group

Wash Rack Squeegee Roller Group

Item	Part Number	Description	No. Used
1	0000020261-4	Rubber Roller, Driven	1
2	0000021704	Bracket, Squeegee Roller, Reworked	2
3	0000021346	Retaining Ring, 1/4" Noryl	2
4	0000021759	Worm Gear, Reworked	2
5	000-15304-AE-H	Pin, Plain, 3/32" Dia X 5/8" Long	1
6	0000021562	Gear, Dryer Drive	1
7	0000040803	Bushing, Nyliner, 1/4" Dia	4
8	0000020261-5	Roller, Driving, Long Shaft	1
9	0000021705	Side Plate, Modified, Wash Rack	2
10	000-00510-BR-H	Screw, #4 X 5/8" Self-Tap, Phillips	4
11	000-00514-BR-H	Screw, #4 X 7/8" Self-Tap, Phillips	2
12	000-09500-AA-H	Washer, 1/4 Flat, Small O.D.	2

Dryer Assembly, P/N 0000021767

Item	Part Number	Description	No. Used
1	0000020572	Bushing, Spring Groove, 3/8"	12
2	0000047802	Spring, Extension, Racks	6
3	568-007095	Spacer, Film Guide	4
4	0000021678	Block, Dryer Adjustment	2
5	0000021493-2	Guide, 1-Piece Film, Dryer	1
6	0000021175-1	Lamp Assy, I.R., 14", 275W, 115V	2
	0000021175-2	Lamp Assy, I.R., 230V	2
7	0000021575	Wire, Film Guide	10
8	0000021726	Reflector Assy	2
9	0000021728	Bracket, Air Knife	4
10	0000088981	Terminal Strip	2
11	0000081993	Strip Marker, MS601-0	2
12	575-007028	Cover, Terminal Strip	2
13	0000037800	Thermostat, Dryer, High Limit	1
14	568-004095	Hold Down, Temp Sensor, Dryer	2
15	0000021781	Sensor, Dryer	1
16	0000021734	Bracket, Connector	1
17	0000032676	Harness, Dryer Rack	1
18	0000021690	Air Knife Assy, Rear	1
19	0000021675	Duct, Plenum	1
20	0000087738	Jumper	2
21	0000020260-2	Roller, Rubber	2
22	000-01108-AW-R	Screw, Thumb 1/4-20 X 1/2"	2
23	0000021463	Side Plate	2
24	0000021579	Pivot Stud, Dryer	2
25	0000020417-1	Bearing, Roller, 3/8"	4
26	0000021564	Gear, Driving	2
27	086-000228	Ring (Collar), Hub Tap, 8/32"	2
28	0000021563	Gear, Idler, 24P, 24T	1
29	0000021797	Gear, 24P, 60T	3
30	0000020575	Gear, Idler, 24P, 48T	1
31	0000020654	Stud, Idler	5
32	0000021086-3	Gear, 24P, 24T	6
33	0000021686	Air Knife Assy, Front	1
34	0000021730	Bracket, Blower Mount	1
35	0000021569	115V Dryer Fan Assy (2 Per Machine, 1 Per Dryer)	1
	0000021637	230V Dryer Fan Assy (S/N 8677 and higher)	1
36	0000021771	Vertical Duct	2
37	0000021231	Roller Assy	6
38	0000021679	Coupler Duct, Fan	1
39	0000021493-1	Guide, 1-Piece Film, Dryer	1
40	0000041550-B	Pin, Cotter, 1/16" X 1"	6
41	0000021879	Cover, Blower Motor, Mini-Med	1
43	000-00805-AQ-H	Screw, 8-32 X 5/16", Soc. Set	2
44	0000047701	Clip, Retaining, 5/16" Noryl	5
45	0000048280	Spacer, .200 I.D. X .375 I.D. X 1/4"	4
46	0000021760	Cover, Rear, Dryer, Mini-Med	1

PARTS

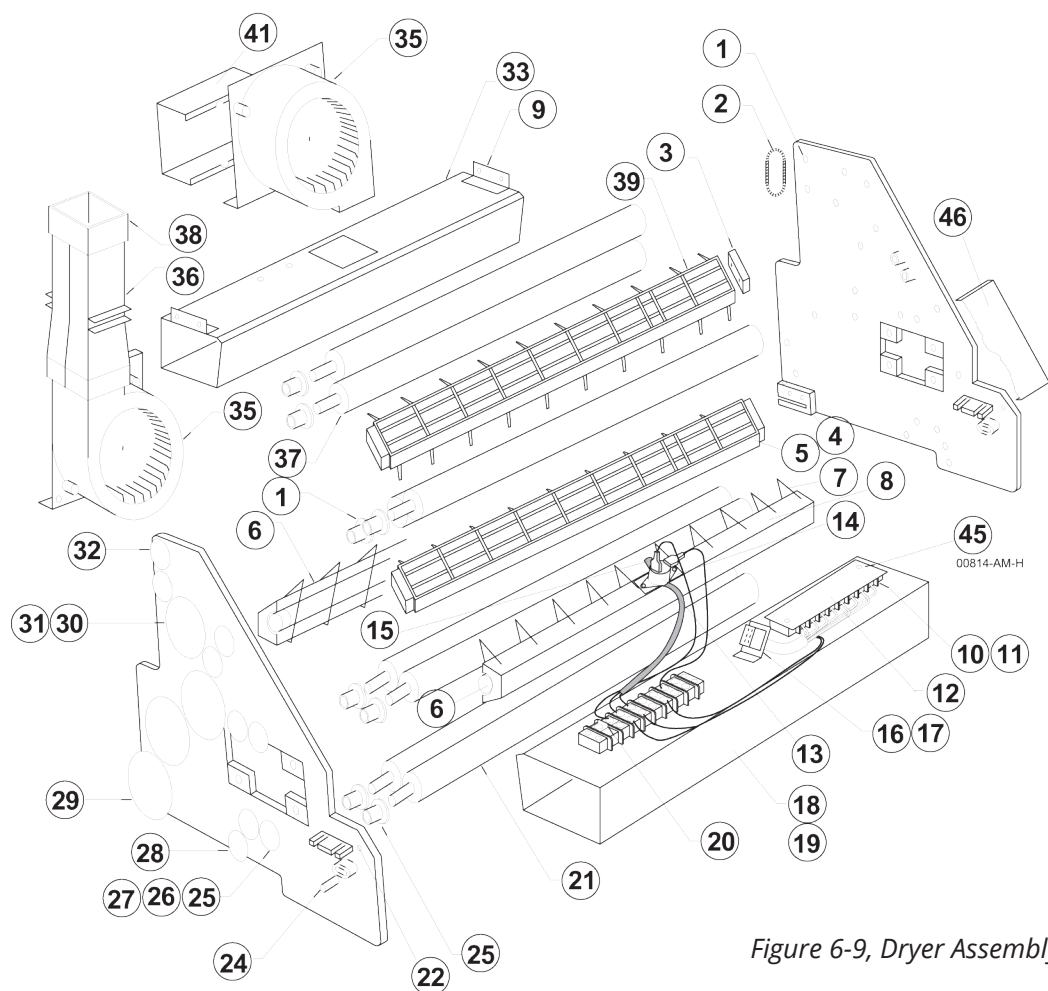


Figure 6-9, Dryer Assembly, Full View

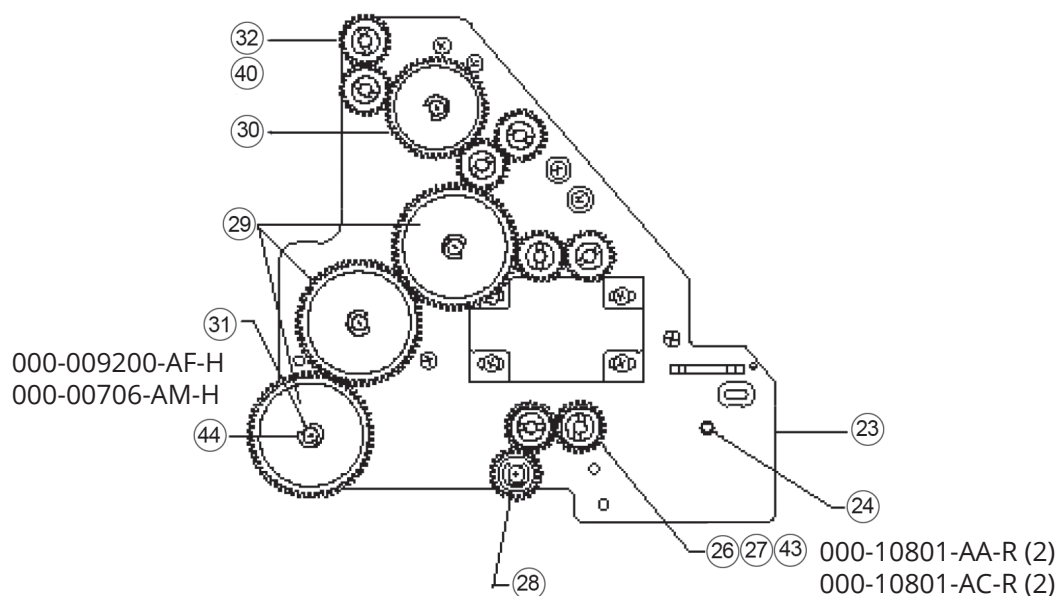


Figure 6-10, Dryer Assembly, Side View

Plumbing Schematic, (Figure 6-12)

Item	Part Number	Description	No. Used
1	0000035316	P.C.B Assy, Main Harness	1
2	0000021485	Motor, Main Drive, (115VAC/230VAC-60Hz)	1
3	0000021507	Motor, Main Drive, (230VAC/50Hz)	1
4	0000021145	Pump, Recirculation, (115VAC)	2
5	0000021101	Pump, Recirculation, (230VAC)	2
6	0000020995	Pump, Replenisher, (115VAC)	2
7	0000020995-1	Pump, Replenisher, (230VAC)	2
8	0000021436	Tee Fitting, Rubber	2
9	0000021904	Clamp, SNP 22	2
10	0000021569	Fan Assy, Lower, (115VAC)	1
11	0000021637	Fan Assy, Lower, (230VAC)	1
12	0000021903	Nipple, Heat Exchanger	2
13	0000041405	Clamp, Hose, Worm Gear	12
14	0000046251-C	Elbow, 1/2" Barb X 1/2" Barb	3
15	800-070391	Clamp, SNP 28	2
16	0000049008	Valve, Solenoid, 115VAC	1
17	0000049013	Valve, Solenoid, 230VAC	1
18	0000021880	Jacket, Heat Exchanger	1
19	0000021848-1	Heater, 500W, 115VAC	1
20	0000021848-2	Heater, 550W, 230VAC	1
21	0000021869	Sensor Assy, Overtemp Safety	1
22	0000021851	Bracket, Heater Mounting	1
23	0000087220	Valve, Drain, Specialty FN	3
24	0000046243-B	Elbow, 90Deg, 1/4 FPT X 1/4 FPT	3
25	0000046191-E	Nipple, 1/4 MPT X 3" PVC	3
26	0000046303-C	Spring, Replenisher Pump Mount	8
27	0000021051	Hanger, Replenisher Pump	4
28	0000021701	Clamp, Drain Panel	1
29	0000021700	Drain Panel	1
30	0000041449	Clamp, SNP 12 (Not Shown)	11
31	0000041450	Clamp, SNP 14 (Not Shown)	6

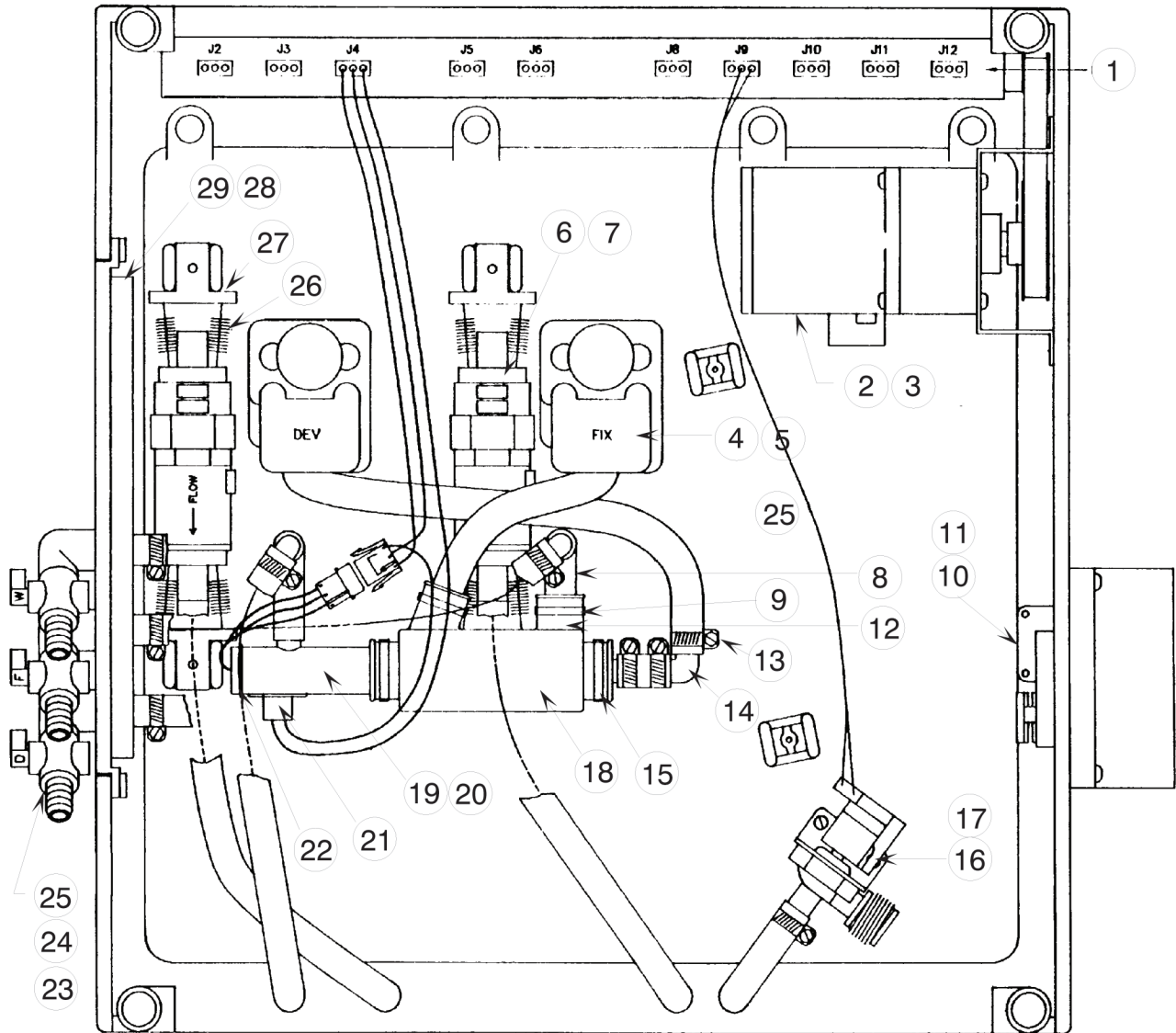


Figure 6-11, Plumbing Schematic
Machines Sr/Nr 8723 and Lower

Plumbing Schematic, (Figure 6-13)

Item	Part Number	Description	No. Used
1	0000035316	P.C.B Assy, Main Harness	1
2	0000021483	Motor, Main Drive, (115VAC/230VAC-60Hz)	1
3	0000021507	Motor, Main Drive, (230VAC/50Hz)	1
4	0000022100	Pump, Recirculation, (115VAC)	2
5	0000022101	Pump, Recirculation, (230VAC)	2
6	0000020995	Pump, Replenisher, (115VAC)	2
7	0000020995-1	Pump, Replenisher, (230VAC)	2
8	0000021436-2	Elbow, Rubber	2
9	0000021904	Clamp, SNP 22	2
10	0000021569	Fan Assy, Lower, (115VAC)	1
11	0000021637	Fan Assy, Lower, (230VAC)	1
12	0000021903	Nipple, Heat Exchanger	2
13	0000021436	Tee Fitting, Rubber	2
14	0000041406	Clamp, Hose, Worm Gear	15
15	0000046251-C	Elbow, 1/2" Barb X 1/2" Barb	5
16	800-070391	Clamp, SNP 28	2
17	0000049008	Valve, Solenoid, (115VAC)	1
18	0000049013	Valve, Solenoid, (230VAC)	1
19	0000021880	Jacket, Heat Exchanger	1
20	0000021848-1	Heater, 500W, 115V	1
21	0000021848-2	Heater, 550W, 230V	1
22	0000021869	Sensor Assy, Overtemp Safety	1
23	0000021851	Bracket, Heater Mounting	1
24	0000087220	Valve, Drain, Specialty FN	3
25	0000046243-B	Elbow, 90Deg, 1/4 FPT X 1/4 FPT	3
26	0000046191-E	Nipple, 1/4 MPT X 3" PVC	3
27	0000046303-C	Spring, Replenisher Pump Mount	8
28	0000041114	Bracket, Pump Mounting	1
29	0000084771	Spring	2
30	0000021051	Hanger, Replenisher Pump	4
31	0000021701	Clamp, Drain Panel	1
32	0000021700	Drain Panel	1
33	0000041449	Clamp, SNP 12 (Not Shown)	13
34	0000041450	Clamp, SNP 14 (Not Shown)	8
35	0000041405	Clamp, Hose, Worm Gear (Not Shown)	6

PARTS

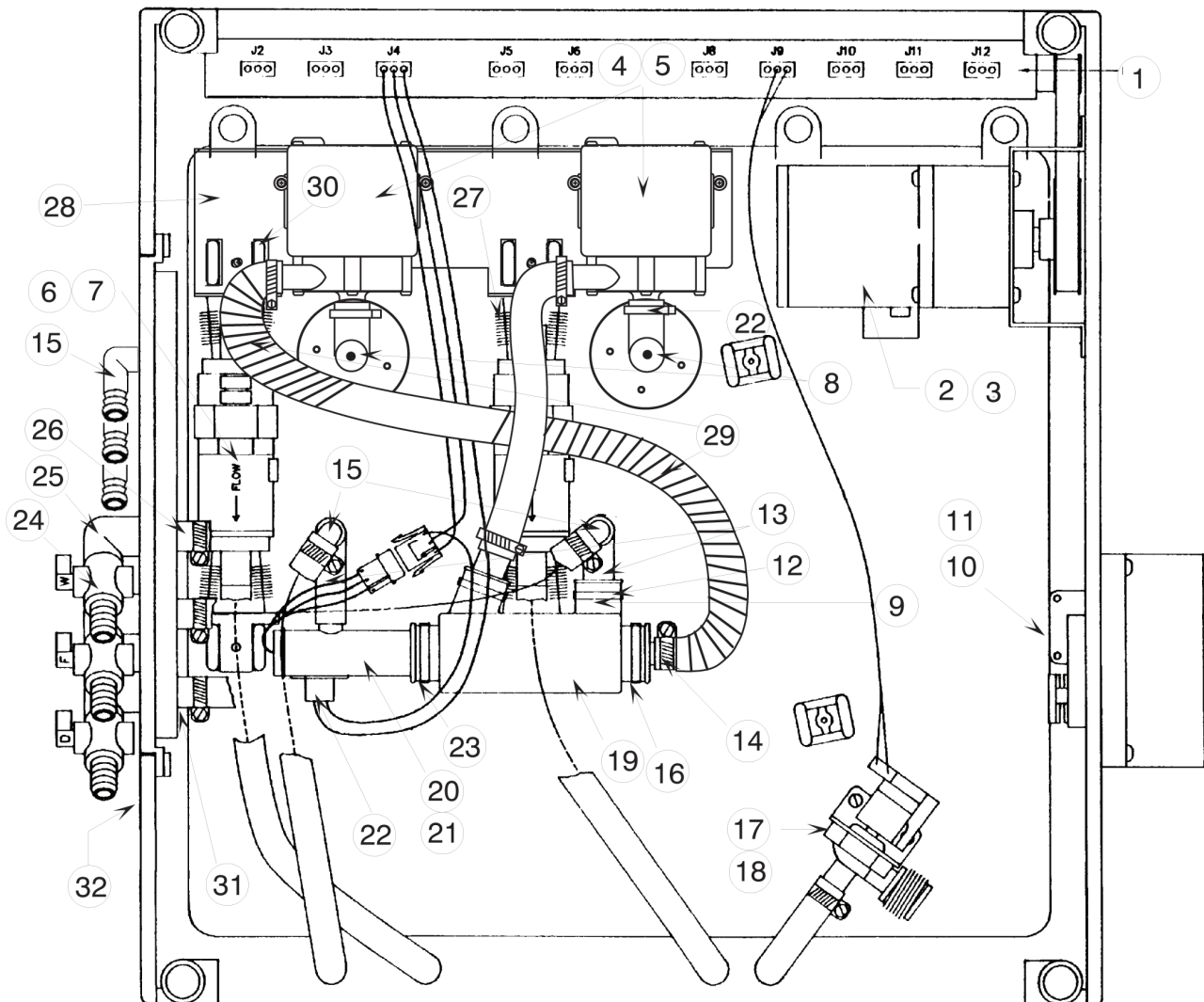


Figure 6-12, Plumbing Schematic
Machine Sr/Nr 8724 and higher

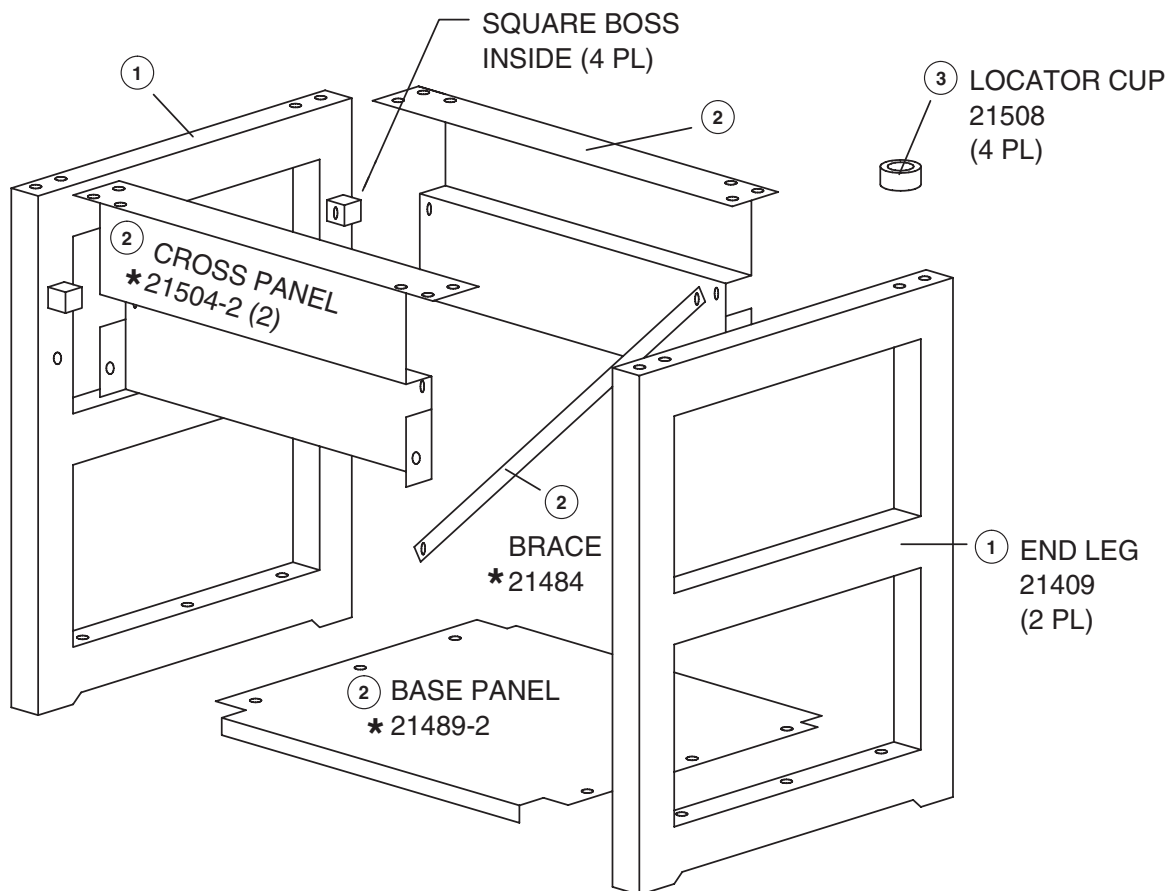
Notes:

[illegible]

Section 7

Accessories

Support Stand Assembly - P/N 9995100004



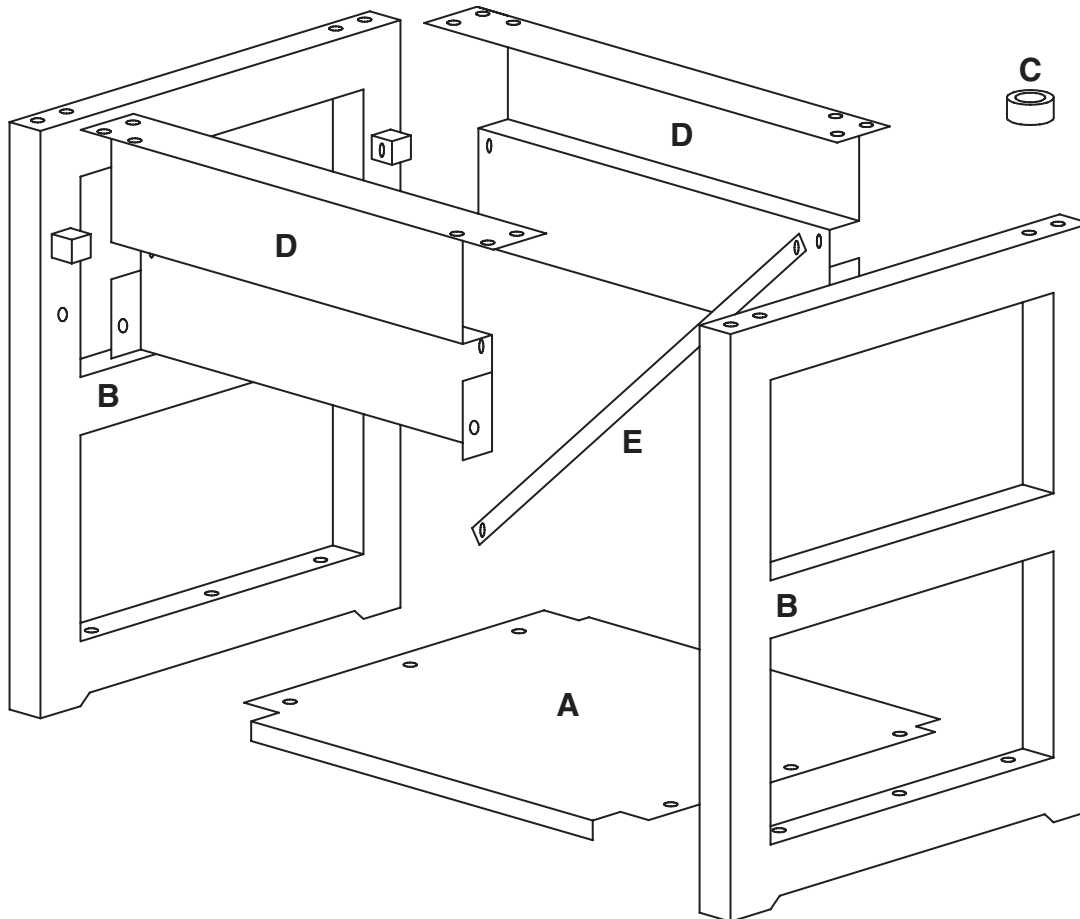
*** Part of larger assembly P/N 799-001083-1BK**

Figure 7-1, Base Stand Exploded View

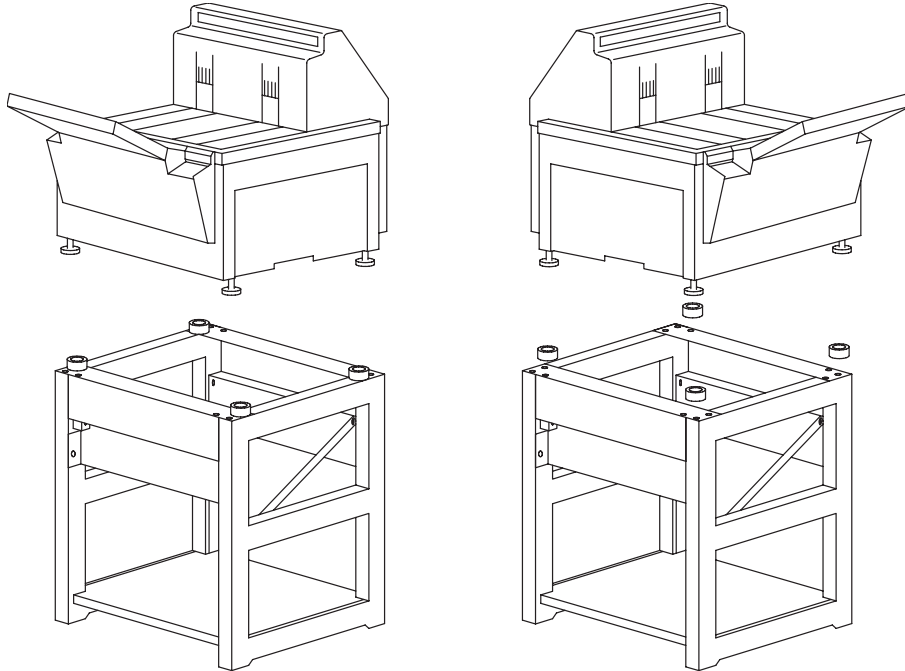
Item	Part Number	Description	No Us
1	0000021409	End Legs, Black	2
2	799-001083-1BK	Base Stand Parts Kit - Includes:	1
N/A	0000021489-2	Base Panel (Not Available Separately)	1
N/A	0000021504-2	Cross Panel (Not Available Separately)	2
N/A	0000021484	Cross Brace (Not Available Separately)	1
3	0000021508	Processor Foot Cups	4
4	000-01108-AM-H	Screw, 1/4-20 X 1/2" Long P.P.H. (Not Shown)	25
5	000-05400-AA-H	1/4-20 Hex Nuts	2

Support Stand (continued)

These instructions cover assembly of the support stand used for all AFP Mini NDT processors.



1. Assemble the Base Panel (Item A) to both End Legs (Item B) using six (6) of the 1/2" Philips screws provided. Do not tighten.
2. Hang the Cross Panels (Item D) over the square bosses on the End Legs (Item B) and secure with four (4) Philips screws, one on each boss.
3. Determine the positions of the Locator Cups (Item C) depending on whether it is to be a Standard or Right/Left Side installation (refer to the illustrations on the next page). Attach the Locator Cups (Item C) and use four (4) additional Philips screws to finish attaching the Cross Panels.
4. Attach the Cross Brace (Item E) between one of the holes common to the Cross Panel and the square boss and one of the threaded holes in the flange of the Base Panel. Tighten all screws.

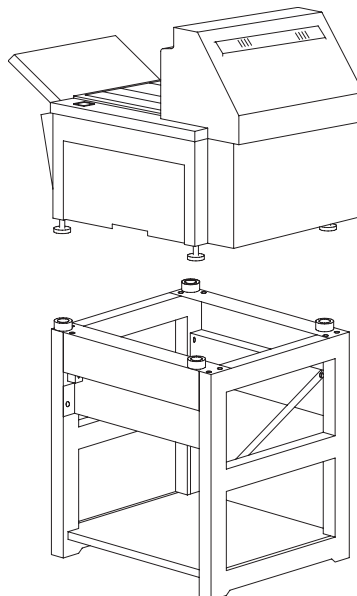


Standard Installation

Chemical tank access is from front of processor. Four (4) cups screwed on inboard top leg holes.

Left Side Installation

Chemical tank access is from the left side of processor. Two (2) cups are screwed on the outboard top leg holes (at the front of the processor). Two (2) cups are mounted on the open slots on the cross panel using the screws and nuts provided.



Right Side Installation

Chemical tank access is from the right side of processor. Two (2) cups are screwed on the outboard top leg holes (at the front of the processor). Two (2) cups are mounted on the open slots on the cross panel using the screws and nuts provided.

ACCESSORIES

Notes:

[illegible]

About this Product

Performance

Mini NDT processors develop, fix, wash and dry industrial X-ray film that has been exposed by X-rays for the purpose of non-destructive testing. Sensors present on this feed tray detect the presence of film and automatically initialize the process cycle. The machines automatically maintain solution temperature (developer), drying temperature, and chemical strength through automatic replenishment of the working solutions from reservoirs.

The system is designed and manufactured to perform in accordance with the manufacturer's specifications. Performance qualification criteria is available from the manufacturer.

Disposal

The Mini NDT processor may be disposed of by any means appropriate for the discard of electro-mechanical devices.

REVISION RECORD

Title: AFP X-Ray Film Processors Mini NDT

Document #: 0000061122

Revision	Effective Date	Description
01	August 1, 1992	Initial Release
02	January 1, 1997	Total Publication Revision
03	April 26, 2001	Warranty Page Revised
04	December 15, 2001	Total Publication Revision
05	September 6, 2016	Total Publication Revision
06	November 1, 2017	Warranty Page Revised