TEK SERVICE MANUAL

Part No. 070-4498-00
Product Group 12

4691

COLOR GRAPHICS COPIER

Please Check for CHANGE INFORMATION at the Rear of this Manual

First Printing FEB 1983

Tektronix
COMMITTED TO EXCELLENCE

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

MANUAL REVISION STATUS

PRODUCT: 4691 Color Graphics Copier

This manual supports the following versions of this product: Serial Numbers B010100 and up.

	DESCRIPTION
FEB 1983	Original Issue

CONTENTS

Section 4 (cont)

Section 4 (cont)

Section 5 CHECKS AND ADJUSTMENTS

Section 7 (cont)

TABLES

ILLUSTRATIONS

OPERATORS SAFETY SUMMARY

This general safety information is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

IN THIS MANUAL

CAUTION statements identify conditions or practices that can result in damage to the equipment or other property.

WARNING statements identify conditions or practices that can result in personal injury or loss of life.

AS MARKED ON EQUIPMENT

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

IN THIS MANUAL

This symbol indicates where applicable cautionary or other information is to be found.

AS MARKED ON EQUIPMENT

DANGER high voltage.

Protective ground (earth) terminal.

ATTENTION—refer to manual.

Refer to manual.

POWER SOURCE

This product is designed to operate from a power source that does not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

GROUNDING THE PRODUCT

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the power input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

DANGER ARISING FROM LOSS OF GROUND

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

Refer cord and connector changes to qualified service personnel.

USE THE PROPER FUSE

To avoid fire hazard, use only the fuse specified in the parts list for your product, and which is identical in type, voltage rating, and current rating.

Refer fuse replacement to qualified service personnel.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

To avoid explosion, do not operate this product in an atmosphere of explosive gases unless it has been specifically certified for such operation.

DO NOT REMOVE COVERS OR PANELS

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

DO NOT OPERATE PLUG-IN UNIT WITHOUT COVERS

To avoid personal injury, do not operate this product without covers or panels installed. Do not apply power to the plug-in via a plug-in extender.

SERVICE SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary.

DO NOT SERVICE ALONE

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

USE CARE WHEN SERVICING WITH POWER ON

Dangerous voltages may exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing the power supply shield, soldering, or replacing components.

DO NOT WEAR JEWELRY

Remove jewelry prior to servicing. Rings, necklaces, and other metallic objects could come into contact with dangerous voltages and currents.

X-RADIATION

X-ray emission generated within this instrument has been sufficiently shielded. Do not modify or otherwise alter the high voltage circuitry or the CRT enclosure.

POWER SOURCE

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

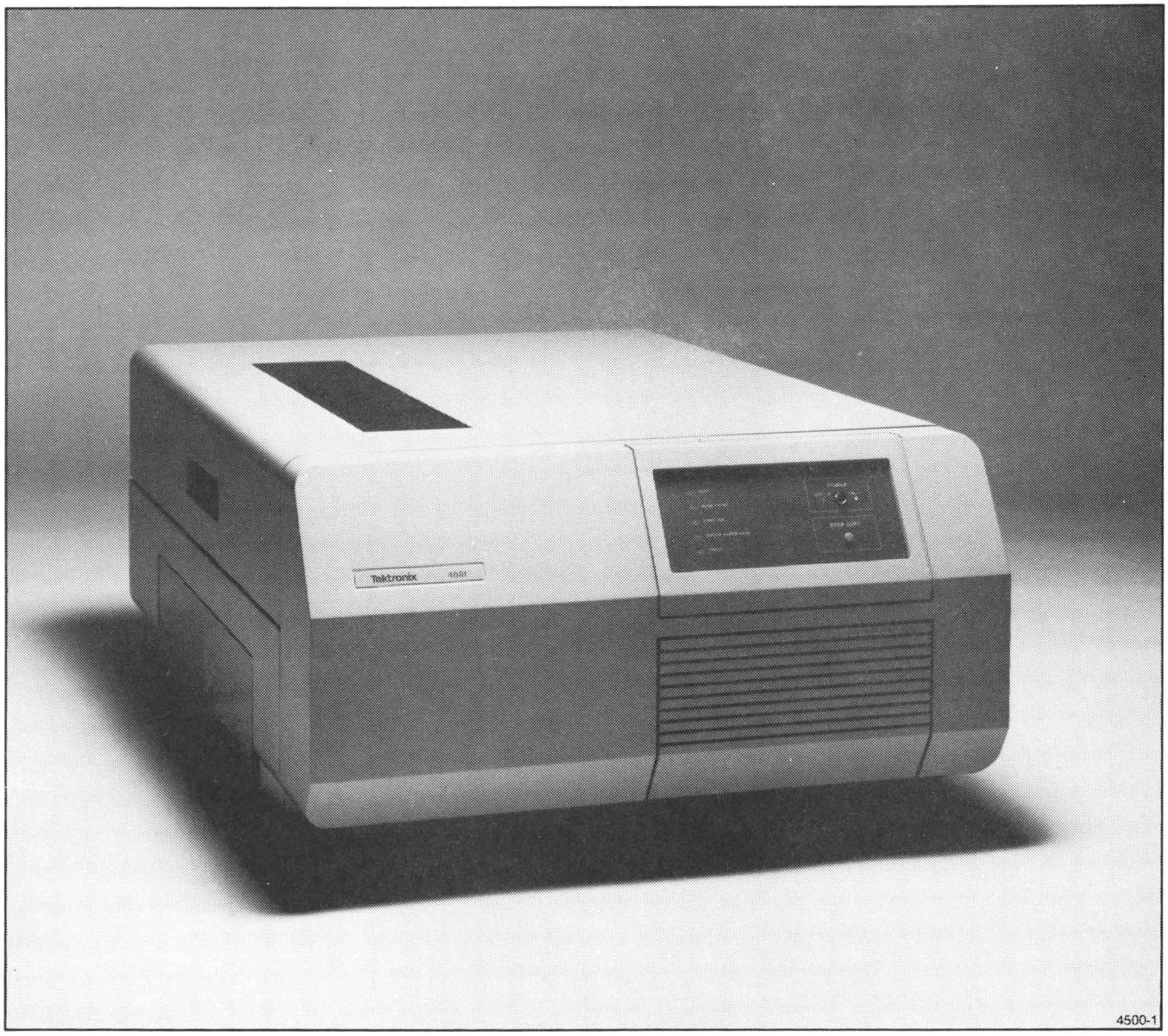


Figure 1-1. 4691 Color Graphics Copier.

Section 1

GENERAL INFORMATION

ABOUT THIS MANUAL

This manual provides servicing information and instructions for the TEKTRONIX 4691 Color Graphics Copier shown in Figure 1-1. The 4691 will be referred to as "copier" throughout the remainder of this manual.

Section 1, General Information, describes the various instrument sections, compatible terminals, printing format, and standard accessories. It also provides a list of options, optional accessories, and supplies that may be ordered.

Section 2, Specifications, lists performance conditions, functional characteristics, and supplemental information for the 4691 Color Graphics Copier.

Section 3, Operating Information, describes the control, connector, and indicator features of the copier and how to access them.

Section 4, Theory of Operation, gives a brief color theory, describes the copy process, and describes the copier's electronic circuitry in detail.

Section 5, Checks and Adjustments, gives a functional check procedure (useful for determining the copier's operational status) and a detailed adjustment procedure.

Section 6, Maintenance and Troubleshooting, describes procedures for preventive maintenance (cleaning and lubrication) and for diagnosing defective copier components (troubleshooting).

Section 7, Mechanical Disassembly/Assembly, describes how to remove and replace major copier components and assemblies.

Section 8, Ink Jet Head Maintenance, contains information on the operation and maintenance of the copier's ink jet heads. Maintenance information includes symptoms of ink jet head problems, procedures for replacing, purging, and converging the ink jet heads, as well as performing the Threshold Voltage (TV) test.

Section 9, Options, describes the options available to the 4691 Color Graphics Copier.

Section 10, Installation, provides information necessary to install the copier into an operating system. This section also describes how to replace ink cartridges, select line voltages, and packing/unpacking procedures.

Section 11, Moving the Copier, describes the procedures and precautions necessary for moving the copier.

Section 12, Electronic Parts List, lists all of the electronic components and their part numbers for the copier.

Section 13, Diagrams and Schematics, shows interconnecting cable and ink line plumbing diagrams, self-test patterns, examples of some poor quality printing, the Tektronix Color Wheel, and schematics for the copier's electronic circuitry.

Section 14, Mechanical Parts List, lists all of the mechanical parts and shows exploded views of the copier.

Appendix A, Accessories And Supplies, provides the part numbers of all accessories and supplies.

Appendix B, Fuses, shows the locations of and describes each of the copier's over-current protections (fuses).

Appendix C, Firmware Locations, shows the locations of and briefly describes the contents of each of the ROMs/EPROMs in the copier.

Appendix D, Straps and Jumpers, shows the locations of and describes the placement of each strap or DIP switch in the copier.

Appendix E, Interface Connector Diagram, shows a diagram of the host (or 4113 terminal) rear panel interface connector. This appendix also shows the connector's signal/pin assignments.

Appendix F, Interconnecting Wiring, shows a cable diagram of the copier and describes the pin/signal assignments for each connector in the copier.

Appendix G, Unpacking/Packing Procedures, shows how to pack and unpack the copier to/from a shipping container.

Appendix H, Diagnostic Guide, shows how to interpret Threshold Voltage Test patterns (procedure described in Section 8).

RELATED DOCUMENTATION

In addition to this Service Manual, the following manuals support the TEKTRONIX 4691 Color Graphic Copier:

- 4691 Operators Guide (located inside the copier)
- 4691 Color Graphics Copier Operator's Manual
- 4113A Option 09 4690 Color Copiers Interface Service Manual
- 4113A Computer Display Terminal Operators Manual
- 4110 Series Programmer's Reference Manual
- Device Driver Development Guide For 4691 Color Graphics Copiers

PRODUCT OVERVIEW

This overview describes copier features, compatible color terminals, and a physical description of the copier.

Copier Features

The copier contains the following features:

The standard copier produces both A-size (8.5x11 inches -- 216x279 mm) and B-size (11x17 inches -- 279x432 mm) output. (An optional metric version of the copier replaces the A- and B-size media dimensions with A4-size (210x297 mm) and A3-size (297x420 mm) media.)

The copier makes copies in portrait (vertical) or landscape (horizontal) format, depending on the image orientation you choose.

You can make copies from either a color terminal or a host computer.

The time to produce printed output is independent of the image or the amount of area filled with color, but is dependent on copy size (approximately 4.5 minutes for B (or A3) size and 2.5 minutes for A (or A4) size.

The copier prints 150 dots per inch in the horizontal and vertical directions.

The copier shows bright colors. "True" black is supplied from a black ink cartridge, rather than from a mixture of primaries that can form an "off" black.

Ink cartridges consist of four disposable 200 ml cartridges.

Paper handling is automatic. The copier loads paper by vacuum from the input paper tray and automatically stacks the printed sheets in the output paper tray.

Compatible Color Terminals

The TEKTRONIX, Inc. 4113A Option 09 and 4113A30 Option 09 terminals are compatible with the color copier. An existing 4113 (pedestal or desktop configuration) can be made compatible with the copier by upgrading to Version 3 firmware and by adding the Option 09 upgrade kit (4110F09). Other color terminals must have a device driver that is analogous to Option 09.

Product Description

The 4691 Copier enclosure consists of a base assembly, a hinged top cover, a plastic water bottle, an input paper tray, a service access door (on the right), and an output paper tray and paper exit door (on the left). The front of the copier consists of the control panel and the ink cartridge access door. Opening the ink cartridge access door exposes the four ink cartridges, the ink cartridge indicator panel, and the Operators Guide.

Internally, the copier contains six major component assemblies (Figure 1-2) which are described as follows:

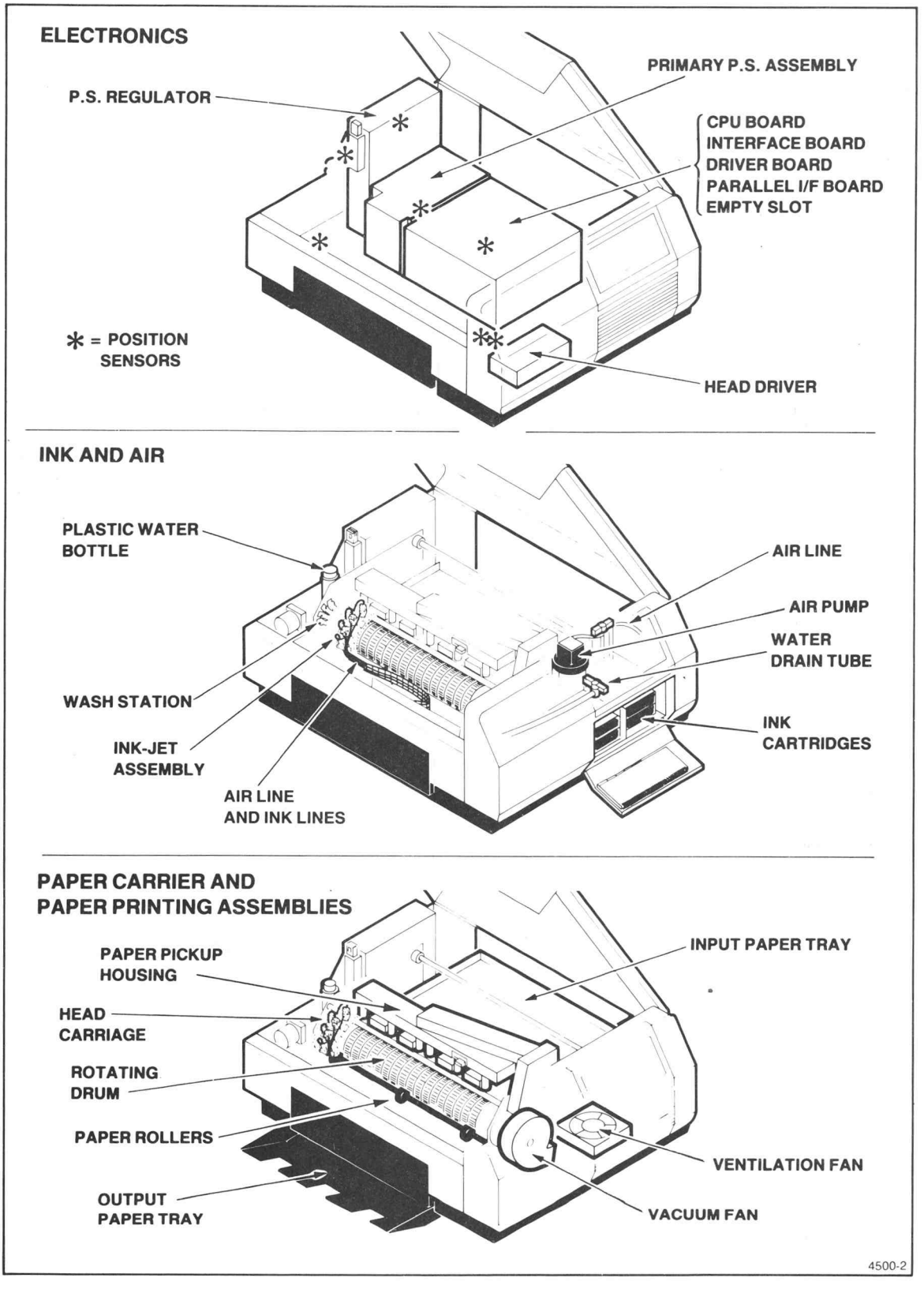


Figure 1-2. Copier's Internal Components.

THE ELECTRONICS consists of four circuit boards in the main card cage (the CPU board, the Interface board, the Driver board, and the Parallel Interface board), the Ink Jet Head Driver circuit board, the ten position sensors, the Low Voltage Regulator circuit board, the High Voltage Regulator circuit board, and the primary power supply.

THE INK AND AIR COMPONENTS consist of the following:

- The ink cartridges, which provide the four basic ink colors - yellow, magenta, cyan, and black.
- The air pump and air lines, which pressurize the ink cartridges and provide air to the ink jet heads.
- The ink plumbing lines, which provide an ink path from each pressurized ink cartridge to its ink jet head.
- The ink jet head assembly, which ejects inks as demanded by the copier's electronics.
- The wash station, which washes the ink jet heads.
- The plastic water bottle, which supplies water for the wash station reservoir. The water is used to clean the ink jet head surfaces.
- The water drain tube, which allows you to drain the ink and water solution in the wash station reservoir.

THE PAPER TRAYS. The copier comes with input and output paper trays:

- The input paper tray stores up to fifty sheets of paper and is available in two sizes; the standard English tray which holds paper sizes A and B, and the Metric tray (4691 Option 01) which holds paper sizes A4 and A3.
- The output paper tray collects up to 50 printed copies.

THE PAPER CARRIER ASSEMBLY positions the paper before printing begins:

- The paper pickup housing moves a piece of paper from the input paper tray to the drum assembly.
- The vacuum fan holds the paper to the paper pickup housing and to the rotating drum assembly.

THE PAPER PRINTING ASSEMBLY inks the paper and then deposits it in the output paper tray:

- The rotating drum spins the paper at 666.7 rpm while the head carriage scans across the drum and inks the paper.
- The paper rollers remove the finished copy from the drum and drops it in the output paper tray.

THE VENTILATION AND COOLING ASSEMBLY cools the electronic assemblies and motors during copier operation.

Section 2

SPECIFICATIONS

PERFORMANCE CONDITIONS

The copier's performance limits specified in this section require the following conditions:

- Locate the copier in an environment that conforms to the limits described in this section.
- Warm up the copier for 30 minutes before checking specifications.

ENVIRONMENTAL CHARACTERISTICS

Table 2-1 lists the environmental characteristics and performance requirements for the Copier.

Table 2-1

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Performance Requirements
TEMPERATURE	
Operating	41 to 95 degrees F (5 to 35 degrees C)
Nonoperating	
- With Ink	32 to 122 degrees F (0 to +50 degrees C)
- Without Ink	-22 to +122 degrees F (-30 to +50 degrees C)
ALTITUDE	
Operating	Ambient air pressure (522 mm Hg)
Nonoperating	
- With Ink	Ambient air pressure (522 mm Hg)
- Without Ink	50,000 feet
VIBRATION	
Nonoperating (no ink/paper)	.038 cm displacement with frequency varied from 10-55-10 Hz.

Table 2-1 (cont)

MAXIMUM TILT	3 degrees from horizontal plane
HUMIDITY	
Operating	15-85% relative humidity, noncondensing
Nonoperating	5-95% relative humidity, noncondensing
PAPER	
Operating	All specifications are the same as the copier specifications
Storage Conditions	Store in a cool, dry, dark location with original packaging or other wrapper
Storage Time	One year from date of shipping
INK	
Operating	All specifications are the same as the copier specifications
Storage Conditions	0-21 degrees C. (in cool, dark location)
Storage Time	24 months from filling at factory

FUNCTIONAL CHARACTERISTICS

Refer to Table 2-2.

Table 2-2

FUNCTIONAL CHARACTERISTICS

Characteristic	Specification
Process	Drop-on-demand (air assisted)
Reproducible Colors	Seven colors (magenta, yellow, cyan, red, green, blue, and black) plus the color of the paper (white)
Paper Trays	Standard A/B-Size Tray (50-sheet capacity) Optional A4/A3-Size Tray (50-sheet capacity)
Copy Time	A- or A4-size copy: about 2.5 minutes. B- or A3-size copy: about 4.5 minutes.
Multiple Copies	Up to 50 copies, by single command, under program control.
Image Format	Landscape (horizontal) or Portrait (vertical) are selectable under program control with Landscape as the default format.
Effective Image Dimensions of Paper	A or A4 - 7.9x10.2 inches (200x260 mm) B or A3 - 10.2x16.1 inches (260x410 mm)
Addressability	150 dots/inch (6 dots/mm) horizontally and vertically

ELECTRICAL CHARACTERISTICS

Refer to Table 2-3 for voltage, fuse, and power specifications.

Table 2-3

COPIER VOLTAGES AND LINE FUSES

Item	Specification
Line Voltage	Four ranges can be set: 90 to 110 Vac, 48-62 Hz 105 to 129 Vac, 48-62 Hz 180 to 220 Vac, 48-62 Hz* 211 to 258 Vac, 48-62 Hz*
Power Consumption	500 watts maximum
Internal Power Supplies	+150 V, +24 V, +12V, +7.4 V, +5 V, -12 V, and -150 V
Fuse Selection	90 to 129 V 6.25A 125 V (medium-blow) 180 to 250 V 3A 250 V (medium-blow)

For power supply fuses, see Appendix B.

* Requires one of Options A1-A5, which include different fuses and/or power cords.

MECHANICAL CHARACTERISTICS

Refer to Table 2-4 for mechanical specifications.

Table 2-4

MECHANICAL CHARACTERISTICS

Characteristic	Specification
Copier Initialization Time	15 to 20 seconds
Media Supply System	Automatic sheet feed, vacuum media pickup, 50-sheet capacity on input paper tray
Media-Size Conversion	Uses tray divider in both standard input paper tray (A/B-sizes) and in Option 01 input paper tray (A4/A3-sizes) Drum adapter mask for converting larger size (A3- or B-size) copier setups to smaller size (A4- or A-size) setups.
Paper Hold-Down	Rotating drum holds leading paper edge with a mechanical clamp; the remainder of paper held by vacuum
Paper Unloading	Automatic, using gravity stacking in output paper tray. Output paper tray capacity is 50 sheets

PHYSICAL CHARACTERISTICS

Refer to Table 2-5 for physical specification of the copier and ink cartridges.

Table 2-5

PHYSICAL CHARACTERISTICS

Characteristic	Specification
SHIPPING	
Weight	225 lbs (102 Kg)
Transit	Meets National Safe Transit Committee Test procedures
COPIER	
Size	Refer to Figure 2-1 Height 13.6 in (346 mm) Width 23.9 in (608 mm) Length 32.3 in (821 mm)
Weight	132.3 lbs (60 Kg) includes covers
Safety	Meets UL 144, UL 478, and CSA 154 Standards
INK CARTRIDGE	
Weight	15 ounces (425 grams)
Ink Capacity	6.8 fluid ounces (200 ml)

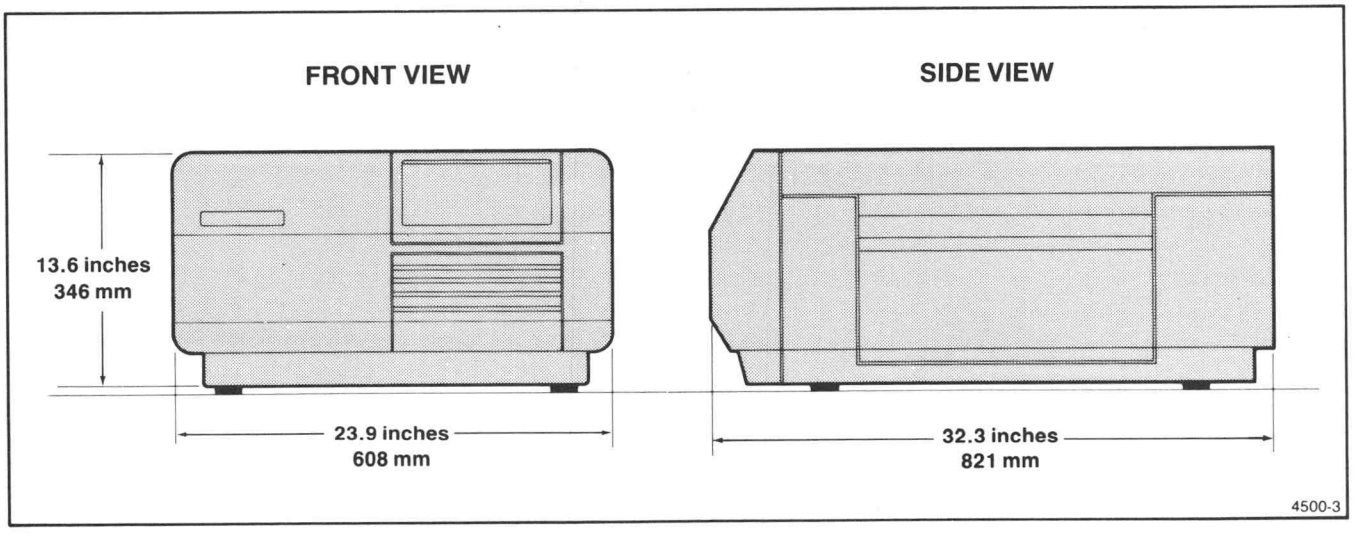


Figure 2-1. Copier Dimensions.

Section 3

OPERATING INFORMATION

INTRODUCTION

This section describes the copier's controls, indicators, and connectors and how to access them.

COPIER ACCESS DOORS AND COVER

The copier has three access doors and a top cover (see Figures 3-1 and 3-2). Use the following procedures to get under the top cover, into the ink cartridge area, and into the service access area.

Ink Cartridge Access Door

To get to the ink cartridges and the operator's guide, press the upper-right corner of the ink cartridge access door on the front panel. The access door unlatches upon release of pressure to the door. Gently lower the door to the work surface.

Service Access Door

To access the service access area on the right side of the copier, press the upper-left corner of the service access door. The access door unlatches upon release of pressure. Gently lower the door to the work surface.

Output Paper Door

This swinging plastic door folds inward and permits easy access to printed copies and allows cleaning of the paper stripping rollers (under the drum assembly).

CAUTION

Do not push the output paper door inward when the copier is either printing or unloading a printed copy.

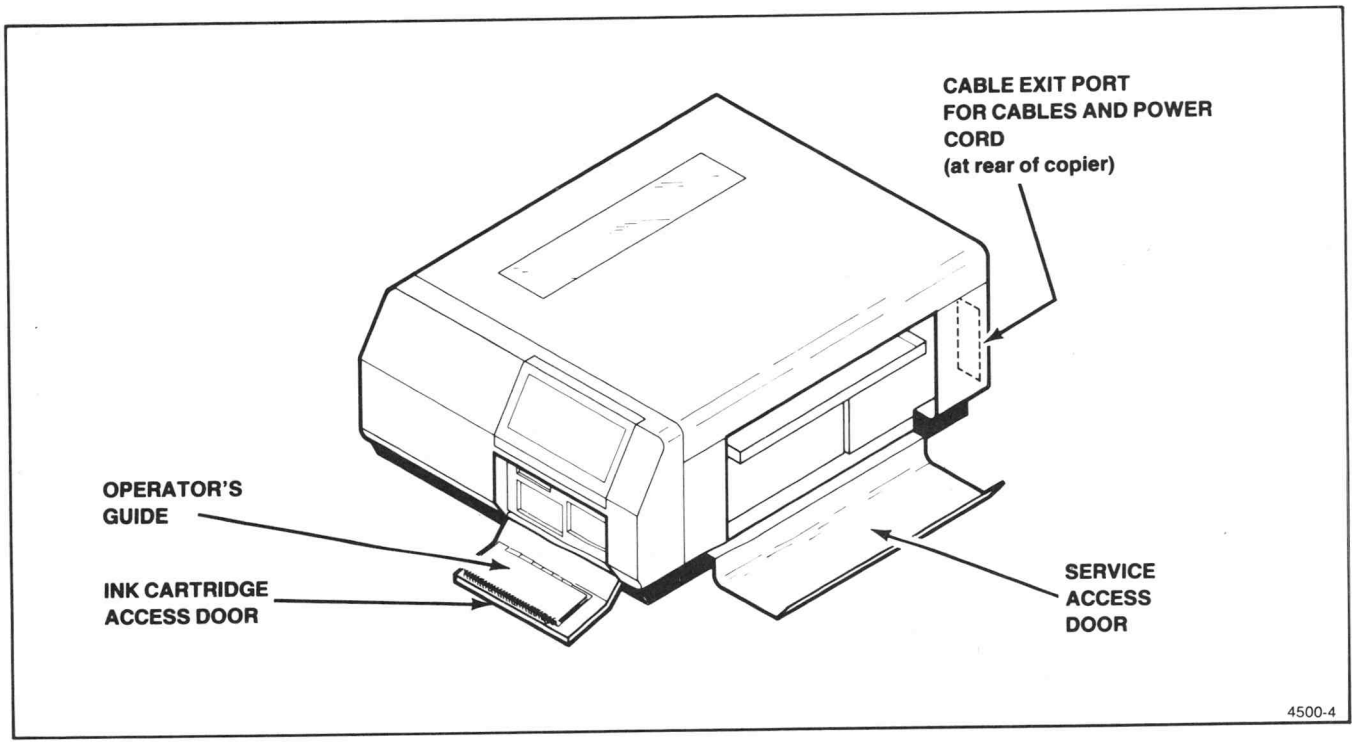


Figure 3-1. Ink Cartridge Access Door and Service Access Door.

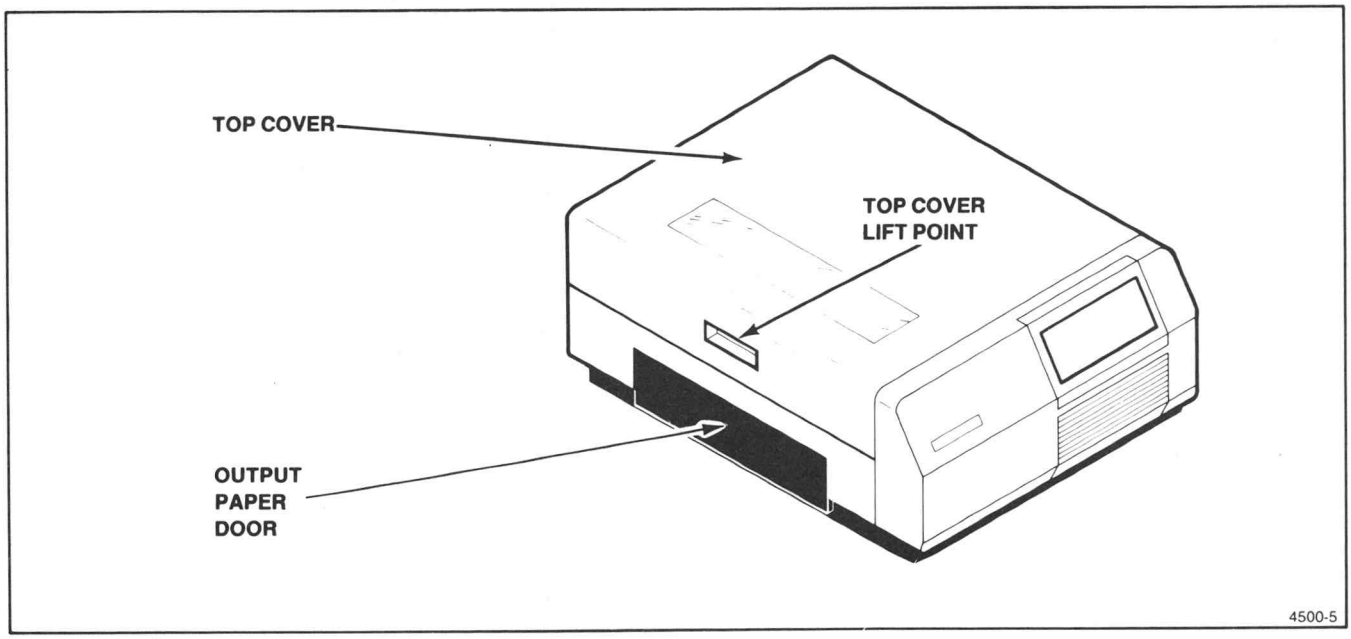


Figure 3-2. Output Paper Door and Copier's Top Cover.

To fully open the plastic door, swing it inward until it is stopped by the metal safety latch (located behind the right side of the door). Then press the side of the metal latch toward the front panel to release and permit full inward movement of the door.

Copier Top Cover

To access parts inside the copier, open the top cover at the lift point (the recessed handle above the copier's output paper door). Once the top cover swings to its fully open position, it stays in that position until you close the cover. To close, gently pull the cover downward and lower it over the copier. NEVER close the cover hard.

CONTROLS AND INDICATORS

Copier controls and indicators are located on the front control panel, inside the ink cartridge area, inside the service access area, and under the top cover. Refer to Figures 3-3, 3-4, and 3-5 for copier locations.

Front Panel

Refer to Figure 3-3 and Table 3-1 for description of controls. Table 3-2 describes the front panel indicators.

Table 3-1

FRONT PANEL CONTROLS

Control	Description
POWER Switch	Turns copier power either on or off.
STOP COPY Push Button	Stops an ongoing printing operation, unloads the paper, and then places the copier into a ready condition (for the next copy command). STOP COPY switch is enabled only during printing.

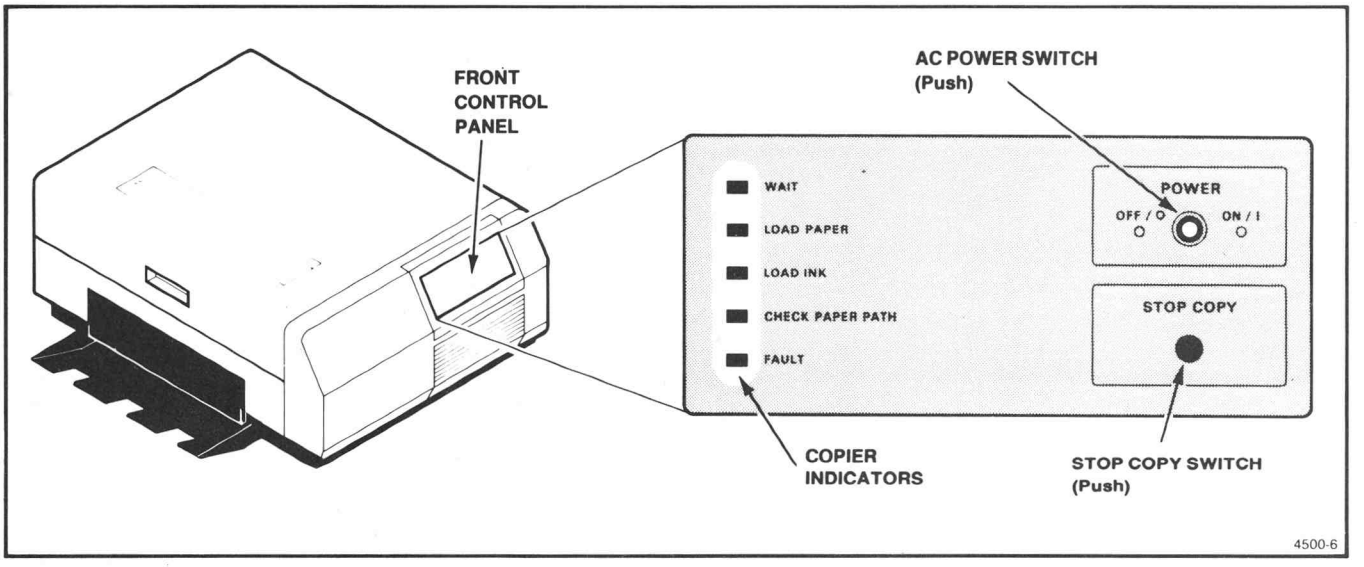


Figure 3-3. Front Panel Locations.

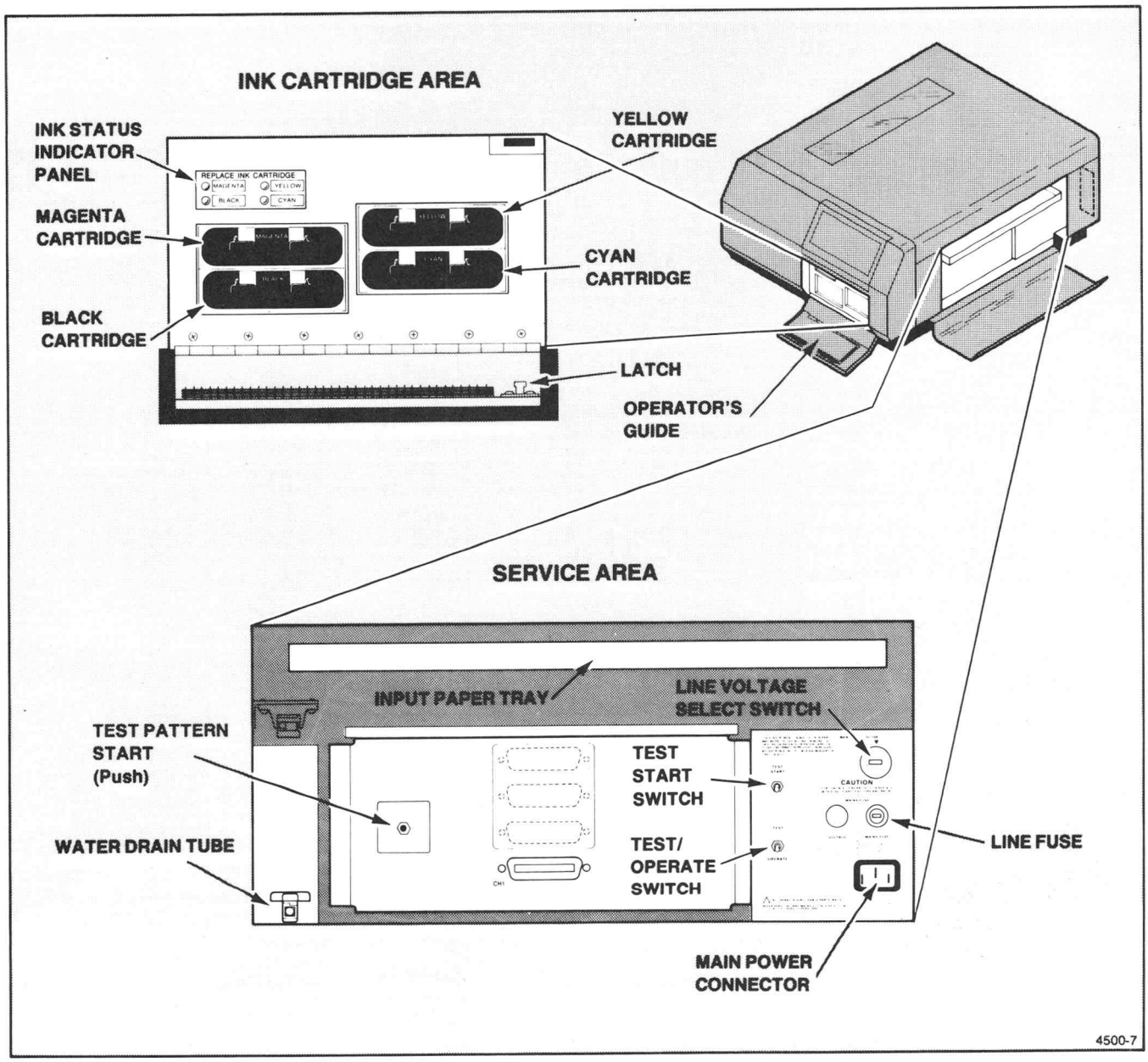


Figure 3-4. Ink Cartridge Area and Service Area.

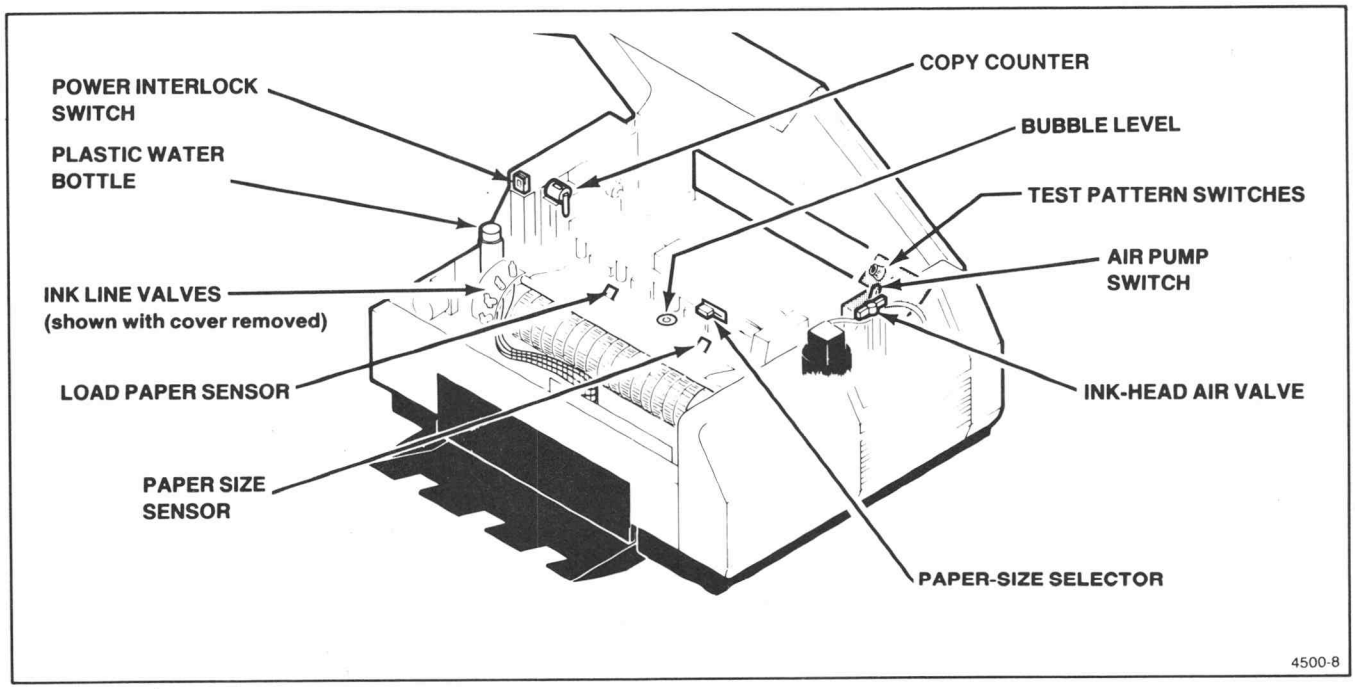


Figure 3-5. Internal Copier Locations.

Table 3-2

FRONT PANEL INDICATORS

Indicator	Description	Operator Action
POWER (on/off)	Power is on when green dot appears. Power is off when green dot is gone.	Press to turn off power. Press to turn on power.
WAIT	Copier not ready for operation.	Wait till indicator goes out.
LOAD PAPER	Paper supply empty.	Load paper (see Operator's Manual).
LOAD INK	An ink cartridge is empty.	Replace the empty ink cartridge using the procedure in the Operator's Manual. DO NOT just pull an empty cartridge out and replace with a new ink cartridge.
CHECK PAPER PATH	Paper has not loaded correctly.	Check input paper tray and revolving drum. Remove any paper with folds or wrinkles. See Operator's Manual. Remove any paper located in the Paper Jam Check Sensor before turning on the power in order to clear the front panel FAULT light.
FAULT	Copier malfunction occurred.	Cycle copier's POWER to off and then to on. If FAULT is still lit, Refer to Section 6

Inside Ink Cartridge Area

Table 3-3 and Figure 3-4 describe the indicators in the ink cartridge area.

Table 3-3

INK CARTRIDGE INDICATORS

Indicator	Description	Operator Action
MAGENTA, BLACK, YELLOW, or CYAN	Indicated ink cartridge is empty.	Replace specific ink cartridge using the "Loading Ink" procedure in the Operator's Manual.

Inside Service Access Area

Table 3-4 and Figure 3-4 describe the controls in the Service Access Area.

Table 3-4

SERVICE ACCESS AREA CONTROLS

Control	Description
TEST PATTERN START Push Button	Generates a test pattern. The specific test pattern is chosen by the TEST PATTERN SELECT switch (located under the copier's top cover).
TEST/OPERATE Switch	Selects the Bar and Line test pattern (see Figure 13-10 in Section 13)(when in the TEST position), or permits signals from a terminal or host computer (or to the rotary TEST PATTERN SELECT switch patterns) to provide a copy (when in the OPERATE position).
TEST START Push Button	If flipped, starts printing the copier's Bar and Line test pattern (when the TEST/OPERATE switch is in the TEST position).
LINE VOLTAGE SELECT Switch	Selects line input voltage for the copier.

CAUTION

After copier installation, do not change the LINE VOLTAGE SELECT switch to another setting. Otherwise, serious instrument damage could result.

Under Top Cover

Table 3-5 and Figure 3-5 Describe the controls under the top cover.

Table 3-5

CONTROLS UNDER THE TOP COVER

Control	Description
TEST PATTERN SELECT Rotary Switch	Specifies which test pattern is printed. (See the TEST PATTERN START push button in the service access area.) The TEST PATTERN SELECT switch should always be set to Position 1. For more information, refer to Appendix D.
PAPER SELECTOR Slide Lever	Controls the copier's paper pick-up vacuum, which holds the paper to the paper pick-up arm. Place the slide lever to the correct paper size by gently lifting the lever and sliding it to the proper position.
AIR PUMP ONLY Toggle Switch	Keep this switch in the NORMAL position at all times except when directed by procedures in this manual or the "Replacing InK" procedure in the Operator's Manual.
POWER INTERLOCK Switch	Removes power from the copier when the copier's top cover is opened. Only qualified service technicians may defeat this INTERLOCK switch.
START Push Button	The START button is wired in parallel with the TEST PATTERN START push button in the service access area.
COPY COUNTER	Counts total number of color copies made. Can be used as a basis for preventive maintenance procedures in Section 6.

CONNECTORS

Copier connectors are located in the service access area (see Figure 3-4 for locations). Table 3-6 describes the connectors.

Table 3-6

CONNECTORS

Connector	Description
CH1 Connector	This 36-pin port and its attaching cable connects the copier to external devices (such as a color terminal or a host driver). Refer to the Appendix E for connector pin assignments.
MAIN POWER Connector	This three-pin connector provides line voltage to the copier (refer also to Options A1 though A5 for different power cords in Section 9).

Section 4

THEORY OF OPERATION

INTRODUCTION

Before we describe the electronic circuitry of the copier, a short color theory may be helpful. It is important to realize that the copier uses a different color principle than the color tv/terminal principle most technicians are familiar with.

COLOR THEORY

No attempt will be made here to describe the entire theory of color since many books are available on this subject. But a brief description of color as it applies to color copiers may be useful here.

All practical illustrations of color, such as color transparencies, water colors, crayons, paint mixing, color TV, and printed color illustrations rely on one of two methods of color formation. One method is the "additive color formation," that is, the mixing of colored lights. The other method is the absorption of light by the use of colorants ("subtractive color formation").

Additive Color Formation

The additive method is based upon the addition of red, green, or blue light. It must be remembered that in the additive method, the colorants themselves are not physically mixed - only the light they transmit or reflect is mixed. That is, light is added to light. This method shows that white light is composed of three primary beams of red, green, and blue light, and that, when additively mixed in various combinations and proportions, create white and all possible colors. Red, green, and blue are called the light, or additive, primaries because each one is unique and cannot be produced by combining the other two, and because when additively mixed they make all other colors. Despite widespread misconceptions to the contrary, the light primaries are not the same as the colorant primaries. Additive mixtures of the light primaries, red, green, and blue, produce green-blue (cyan), blue-red (magenta), and red-green (yellow), which are the three colors transmitted or reflected by the three colorant or subtractive primaries.

Color television operates on the additive three-projector principle. Television receivers use red, green, and blue sources to create all of the various colors we view on the screen. Tektronix Color Computer Display Terminals also use this same principle.

Subtractive Color Formation

The subtractive color formation, which is the second method of color formation, produces the same results as the first, but uses a completely different principle. The subtractive modification of white light is produced by mixing two or more selectively absorbing light transmitters or light reflectors - called colorants. Since all colored substances absorb varying amounts of light from the spectrum, we are interested in those colorants which absorb only a single color of light strongly (light is subtracted from light). These three colorants which absorb only one color of light are:

Colorant	Color of Light Absorbed
Cyan	Red
Magenta	Green
Yellow	Blue

The selective absorption by the cyan, magenta, and yellow colorants makes possible the formation of a wide range of colors. Colored pictures made with mixtures of paints, dyes, and inks derive their final color through this method. Every time a colorant is introduced into or on top of another colorant, light is being absorbed.

Color prints and color transparencies contain these dye images which produce all of the colors we see. These images are the cyan, magenta, and yellow. The function of these dyes is to control the respective amounts of red, green, and blue light reaching our eyes.

If cyan and yellow are mixed (or placed on top of each other), green is produced because the cyan absorbs the red part of the source and the yellow absorbs the blue part, leaving only the green remaining to reach our eyes. This, of course, assumes that white light is a combination of red, green, and blue sources. Cyan and magenta inks produce blue because all but the blue part of the source is absorbed, and magenta and yellow produce red because all but the red part is absorbed. If cyan, magenta, and yellow are mixed, black is produced because red, green, and blue are absorbed.

The 4691 Color Graphic Copier uses the subtractive color formation method to create colors. This means that the inks of the three subtractive primaries are used - cyan, magenta, and yellow.

OVERVIEW OF COPIER OPERATION

The Copying Process

The copy process described in this manual pertains to a 4113A Terminal. However, any similar host computer could be used. For necessary host details, refer to the Device Driver Development Guide.

The 4113A Computer Display Terminal

The 4113A Computer Display Terminal is a raster-type terminal using 480 visible (525 total) non-interlaced horizontal raster scan lines to make up its display. Information is displayed on the terminal screen by turning the three electron beams (guns, one for red, green, and blue) on and off in the proper combination as the screen is scanned 60 times a second. This process is similar to normal color television receivers, except that interlaced scanning is used in TV systems.

The smallest unit of information that can be displayed is the "pixel." (Pixel is a coined word meaning picture element.) A pixel is produced by turning on the electron beam(s) for approximately 39.6 nS during a raster line scan. This produces a dot on the face of the CRT.

Figure 4-1 shows how a display can be made from pixels. Notice that in order to produce three adjacent pixels, the electron beam(s) is turned on for 118.2 nS.

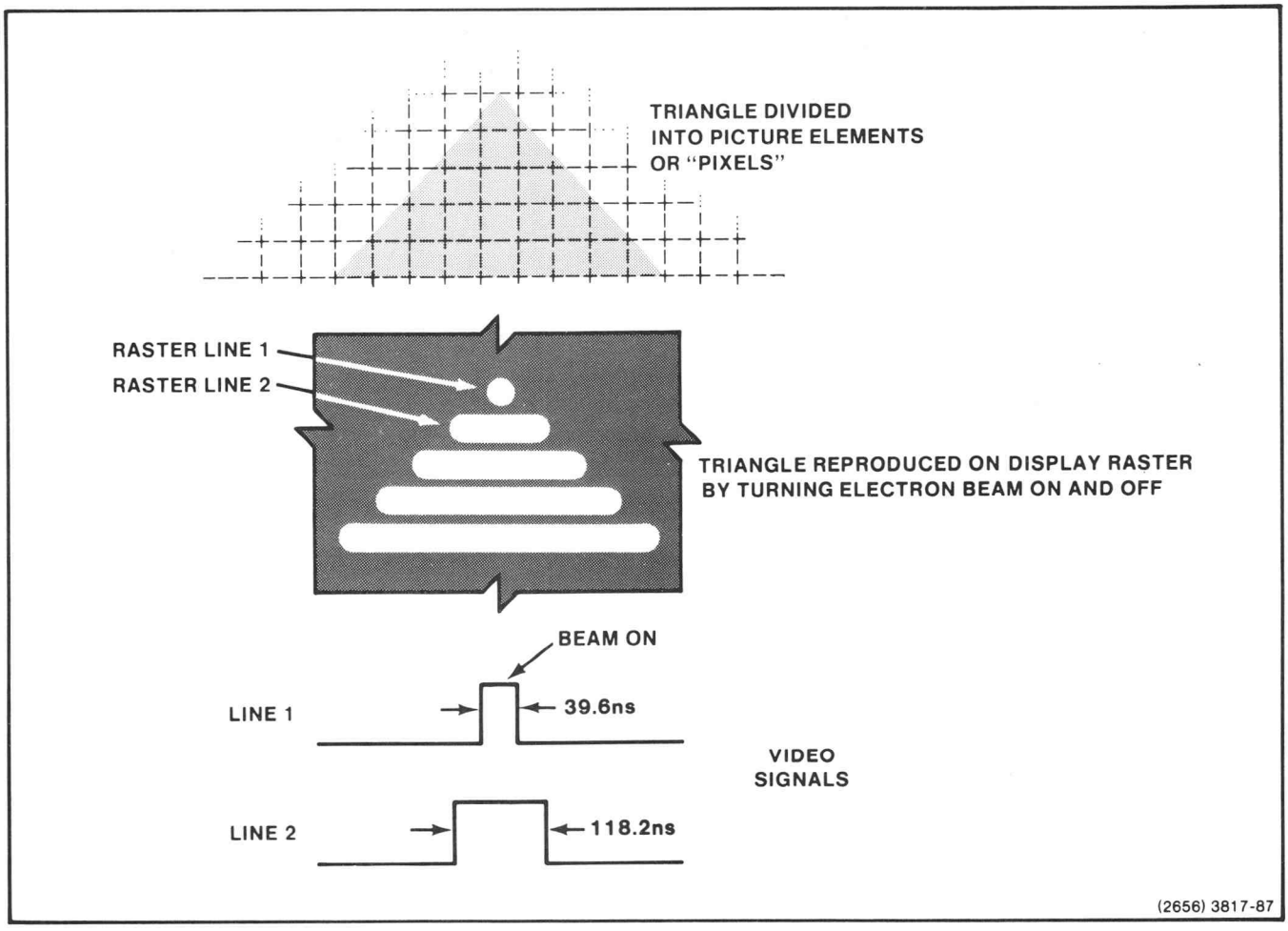


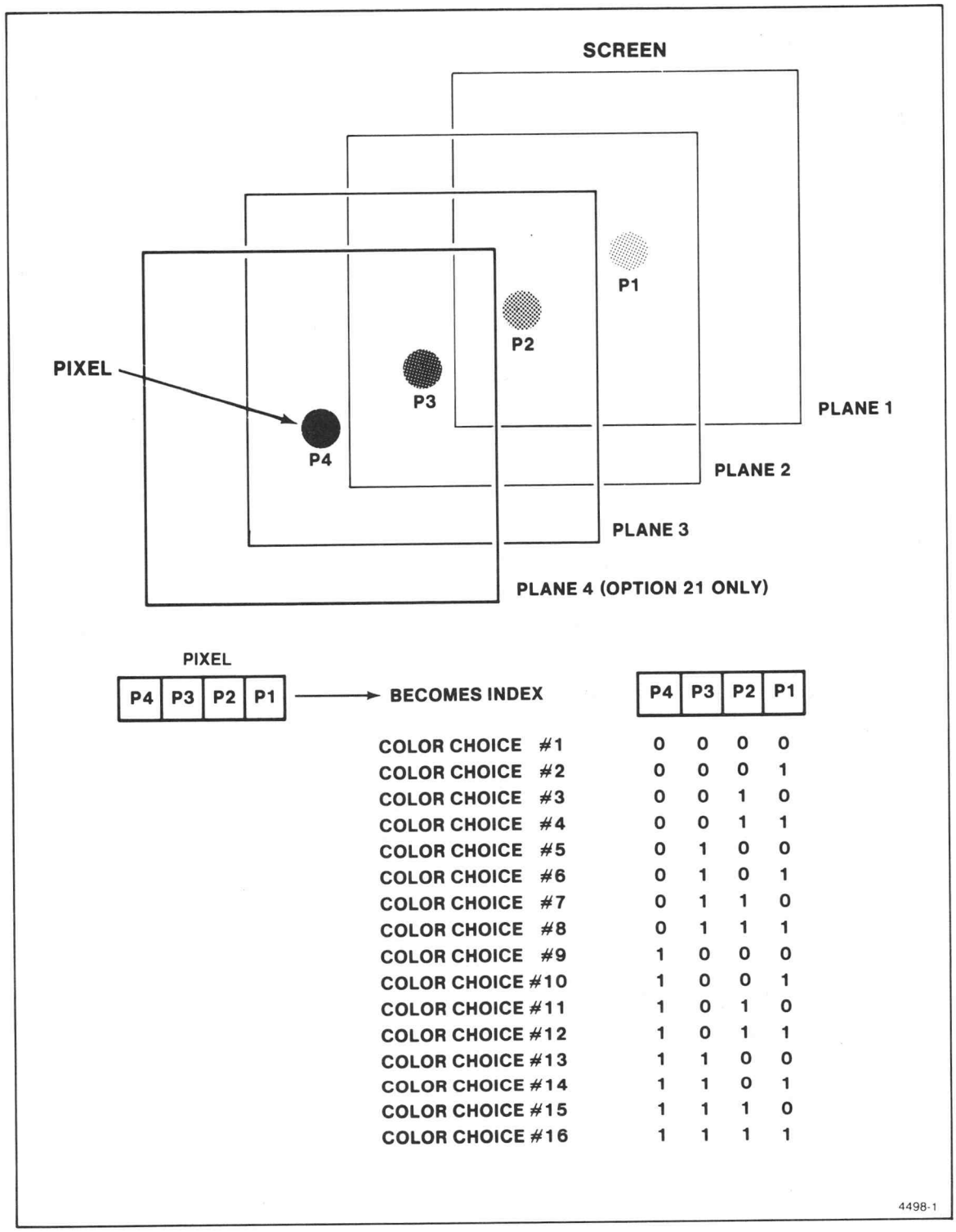
Figure 4-1. Constructing a Display From Pixels.

Information about which pixels in the display are on or off is stored as binary data within the raster display memory. The memory is arranged to correspond with the set of 480 raster scan lines appearing on the terminal's display. Each raster scan line is 640 bits (pixels) long. Each pixel consists of three (or four if Option 21 is installed) planes of data. Figure 4-2 shows a basic diagram of the data making one pixel. The three or four planes of data create a three-bit (or four-bit) color index for that pixel. This means that each pixel can represent one of eight (or 16) colors chosen from a total of 4096 possible colors stored in the terminal.

The terminal's Color Map circuit board looks at the index bits of each pixel stored in the Raster Memory circuit board and compares them to a table defined in the terminal's RAM. The RAM defines each three-bit (or four-bit) color index with a 12-bit binary word which represents a specific color. The 12-bit binary word is converted to analog signals, which drive the three color electron guns in the terminal's display CRT.

The 4113A screen display can be transmitted to the 4691 Color Graphic Copier by transmitting the content of the display memory. The 4113A Computer Display Terminal Option 09 Interface transmits the 12-bit red-green-blue (RGB) color data to the copier.

However, before the 4113A's display memory data can be transmitted to the copier, the terminal needs to know two things. First, what size paper is loaded into the color copier and what orientation the operator wishes to have the display printed on the paper. The copier tells the 4113A what size paper is loaded in the copier using the PSIZE-0 signal and the operator chooses the display orientation on the paper with the HCORIENT command. The display can be oriented either vertically (portrait mode) or horizontally (landscape mode). Since the copier can only print in one direction (from the bottom to the top of the paper, starting in the lower left corner) and can only accept one row (or column) of transmitted printing data at a time, it is necessary that the terminal internally "rotate" the transmitted display to print either B size landscape or A size portrait on the copier. Figure 4-3 shows the four combinations possible with A or B size paper and landscape or portrait mode. Notice that when printing B size landscape or A size portrait, the terminal transmits printing data from its display memory from bottom to top (starting in the lower-left corner). This is perpendicular to the direction when transmitting printing data from its display memory for B size portrait or A size landscape.



	P4	P3	P2	P1
COLOR CHOICE #1	0	0	0	0
COLOR CHOICE #2	0	0	0	1
COLOR CHOICE #3	0	0	1	0
COLOR CHOICE #4	0	0	1	1
COLOR CHOICE #5	0	1	0	0
COLOR CHOICE #6	0	1	0	1
COLOR CHOICE #7	0	1	1	0
COLOR CHOICE #8	0	1	1	1
COLOR CHOICE #9	1	0	0	0
COLOR CHOICE #10	1	0	0	1
COLOR CHOICE #11	1	0	1	0
COLOR CHOICE #12	1	0	1	1
COLOR CHOICE #13	1	1	0	0
COLOR CHOICE #14	1	1	0	1
COLOR CHOICE #15	1	1	1	0
COLOR CHOICE #16	1	1	1	1

Figure 4-2. Color Index-Pixel Diagram.

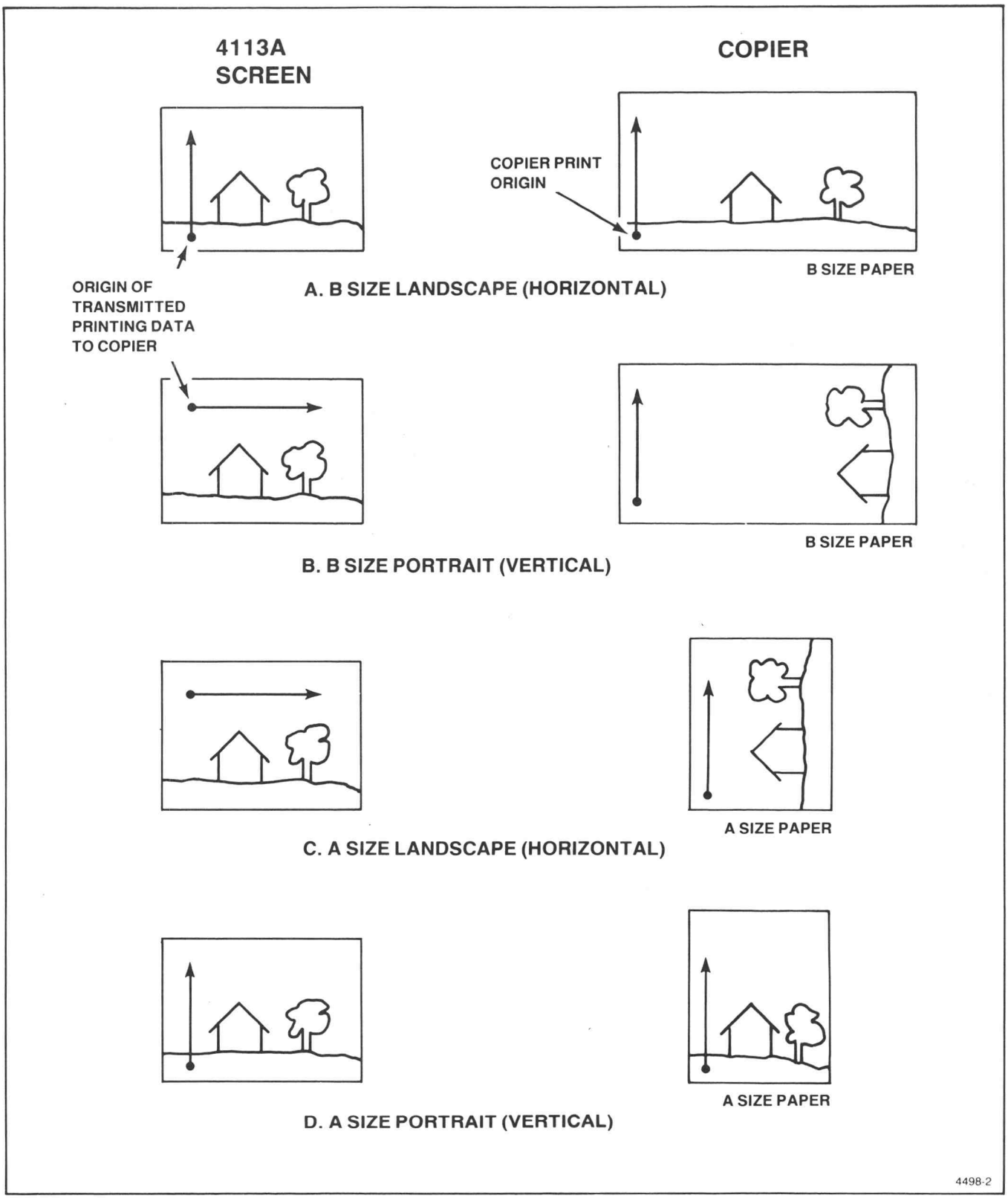


Figure 4-3. 4113A Screen/Copier Display Orientations.

4691 Color Graphics Copier

The 4113A Terminal (or host) sends either commands or color printing data. Commands (which have Bit 7 low) inform the copier about the next image's display size and how the data is to be sent (1 or 2 bytes/pixel and with or without handshaking between pixels). After the command bytes, the host sends the red-green-blue color data (data bytes have Bit 7 high). The RGB color data from the 4113A terminal display memory (additive color method) is converted into cyan-magenta-yellow-black (c-m-y-b) print signals subtractive color method) to print the equivalent color (see Tek Color Wheel, which is Figure 13-11 located in Section 13). The c-m-y-b signals are then timed to be "squirted" on the rotating drum to recreate the terminal's color image. To do this, the copier uses the display size of the next image (sent from the terminal) and the size of the paper loaded to calculate a "multiplication or scaling factor" for printing the image. This scaling factor is referred to as "replication." For example, a 640 x 480 pixel horizontal picture (landscape mode) on the 4113 screen will be printed onto the 4691 copier's B size paper as a 1920 x 1440 point picture. This is a 1 to 3 x 3 replication or a 3(640 x 480)= 1920 x 1440. This means that each pixel on the screen becomes a 3 x 3 matrix or is a 3 x 3 replication.

Figure 4-4 shows examples of the pixel replication process for various terminal pixel dimensions.

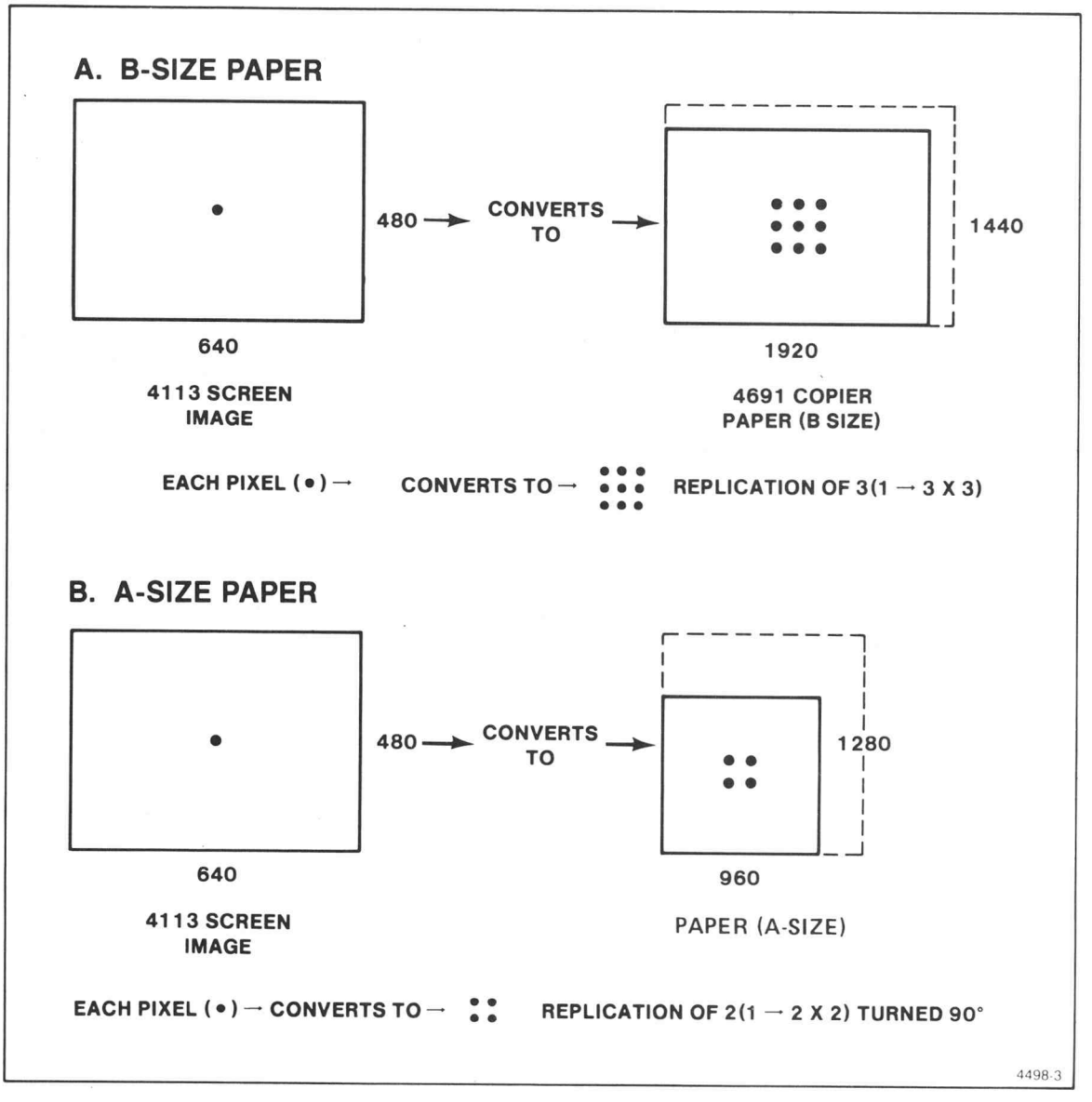


Figure 4-4. Copier Replication of Terminal Pixels.

CIRCUIT DESCRIPTIONS

Introduction

The basic electronics structure of the 4691 Copier is shown in Figure 4-5. This diagram shows that the general flow of color printing data is across the top of the diagram, from the 4113A Terminal/host, through the Parallel Interface, Ink Jet Head Driver, and finally, to the Ink Jet Heads. The CPU circuit board controls the overall operation of the copier, except for when to print or when not to print ink. Printing control is governed by the Parallel Interface. In brief, the CPU controls the mechanical operation of the copier - rotation of the drum, movement of the ink jet head carriage, loading and unloading paper, detection of ink levels, front panel indicators, etc. To do this, the CPU uses a system of sensors to determine the positions of all movable mechanical assemblies and directs their movements with motors or solenoids. The Parallel Interface receives data from the host, determines what colors to print, when to print, and sends printing signals to the Interface when the drum and ink jet head carriage are correctly positioned. The Interface delays three of the four printing signals to allow for the physical geometry of the four heads and sends the printing signals to the Ink Jet Head Driver. The Ink Jet Head Driver boosts the voltage of the printing signals to approximately 200 volts P-P and applies them to the appropriate ink jet head.

The High Voltage Regulator provides the 300 volts to power the Ink Jet Head Driver, which in turn, amplifies the printing signal sufficiently to drive the Ink Jet Heads.

The Low Voltage Regulator provides low voltage power for the copier.

Each of the major functional blocks in Figure 4-5 is broken down into smaller circuit blocks which are later shown and described in more detail throughout this section. Each major functional block corresponds to a circuit board and consists of a schematic or group of schematics with a common first number. For example, the 4691 Parallel Interface, which is shown as one of the major functional blocks in Figure 4-5, is broken down into smaller circuit blocks and shown as Figure 4-6. Then, each smaller circuit block is described in detail later in this section. Schematics A2-1 through A2-5 apply to the 4691 Parallel Interface and show these same smaller circuit blocks outlined by gray tint.

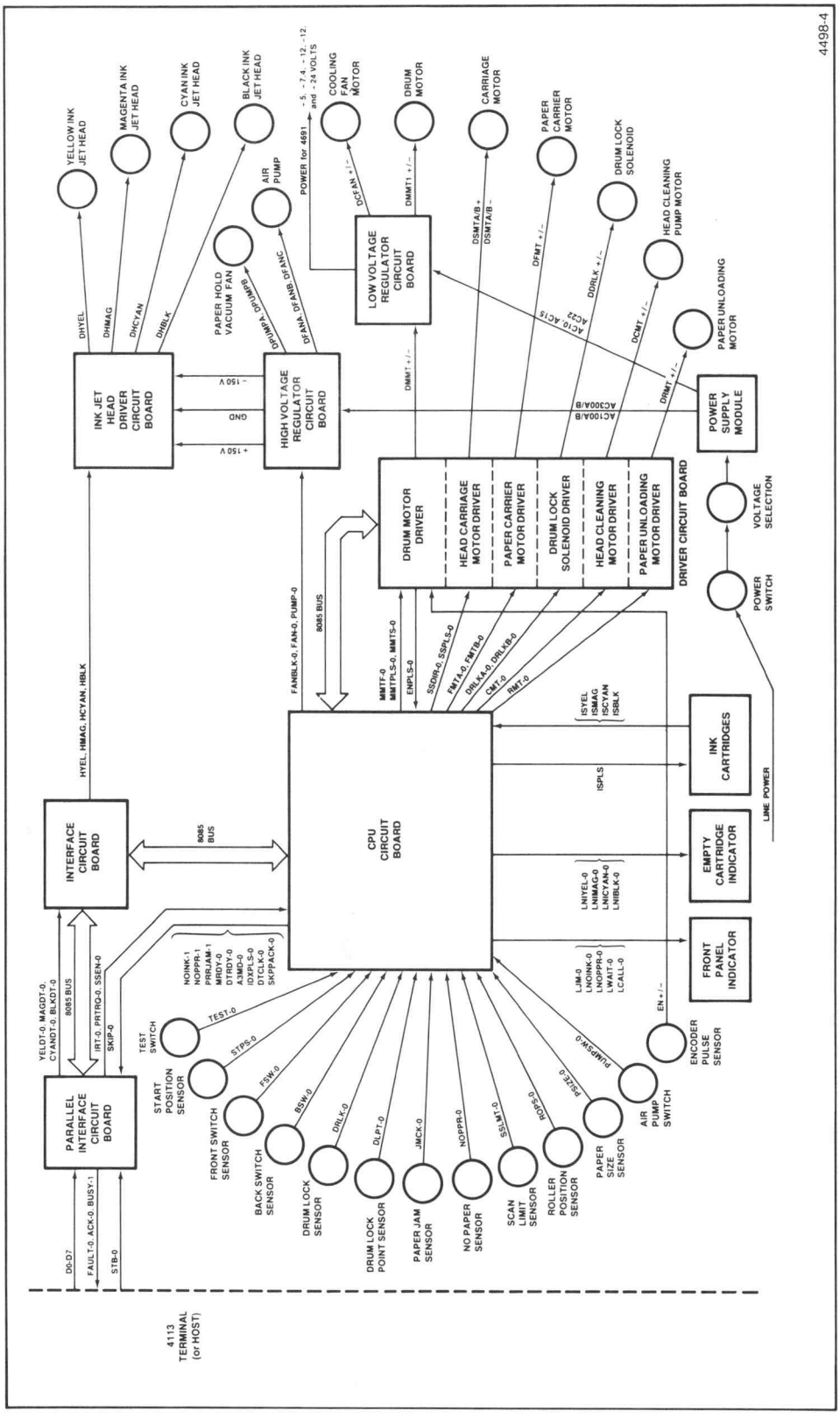


Figure 4-5. 4691 System Block Diagram.

Parallel Interface

General Description

The 4961 Parallel Interface is an eight-bit parallel, byte-serial interface, and is designed to connect the 4691 to TEKTRONIX 4113A Terminals. The Parallel Interface converts the terminal's 6 or 12-bit binary color word containing red, green, and blue information into yellow, magenta, cyan, and black print signals for the Interface circuit board. Figure 4-5 shows how the Parallel Interface connects to the copier and Figure 4-6 shows a circuit block diagram of the 4691 Parallel Interface.

Refer to Schematic A2-1 to A2-4 when reading the circuit descriptions of the 4691 Parallel Interface.

Figure 4-7 shows timing diagrams of many of the important Parallel Interface signals.

Processor

Refer to Schematic A2-1 when reading about the Processor. The 8085 microprocessor, and hereafter referred to as "Processor" (as opposed to "CPU Processor," which is located on the CPU circuit board), controls the overall operation of the Parallel Interface using three interrupts. The first and lowest priority interrupt described is generated by the Parallel Interface as CMD whenever the terminal sends a command. This command can be either a header byte preceding color data or the end of line character after data. The Processor services this interrupt by handshaking the terminal with the BUSY-1 and ACK-0 lines. The Workspace RAM/Timer/I-O Ports circuit generates a second type of interrupt every 10 milliseconds. The Processor uses this 10 millisecond timer interrupt as a real time clock. The third and highest priority interrupt is the PRE-INDEX interrupt. The PRE-INDEX interrupt is synchronized to occur five milliseconds before the copier's drum rotation index. Since the drum rotates at 666.7 rpm, this index pulse occurs every 90.0 milliseconds and interrupts the Processor 5 milliseconds before the bottom edge of the paper comes around on the drum.

The 4 MHz crystal provides system timing.

When power is first applied to the copier, RESET is low and prevents the Processor from starting. When the +5 volts power supply is established, C372 starts charging through R370. When C372 becomes partially charged, RESET changes to a high and the Processor starts.

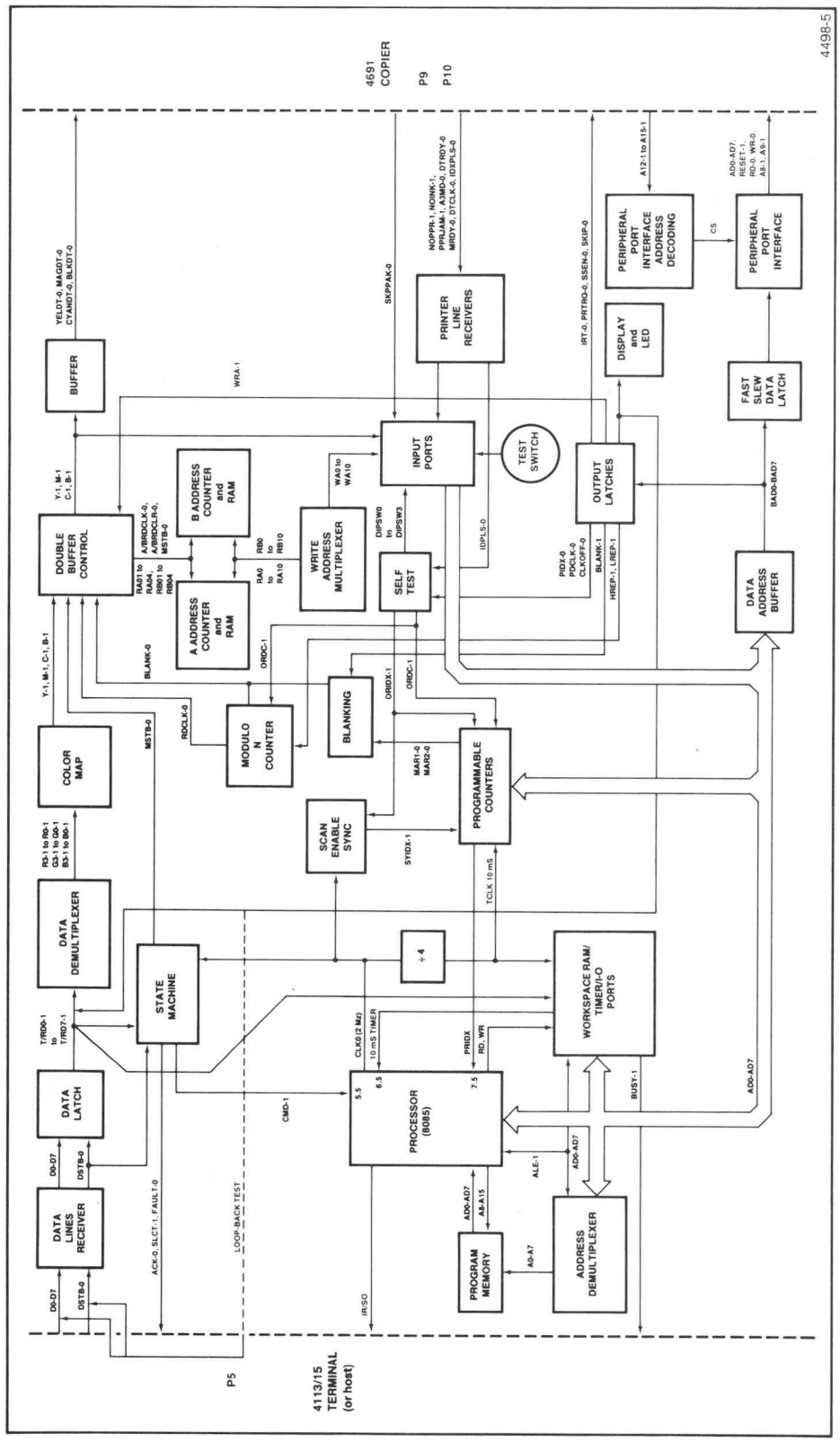
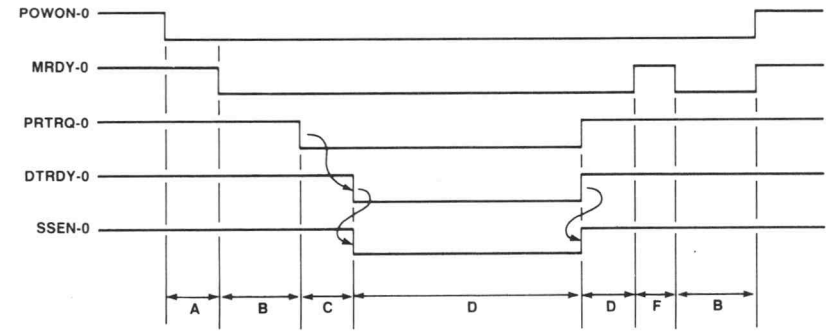


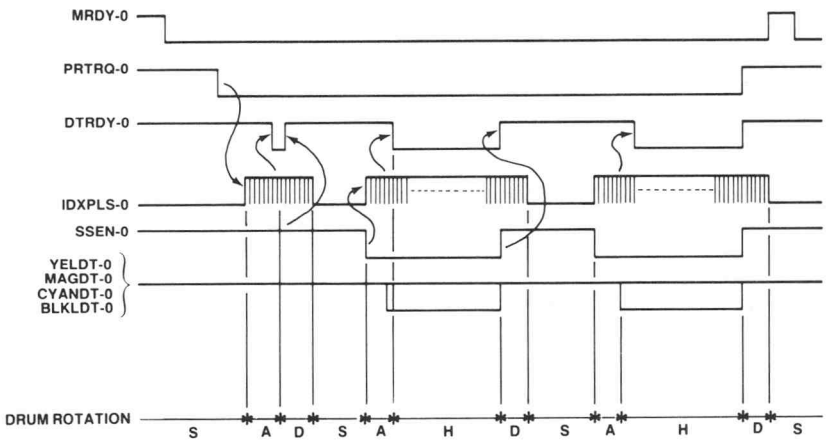
Figure 4-6. 4691 Parallel Interface Circuit Blocks.

A. START AND STOP WAVEFORMS



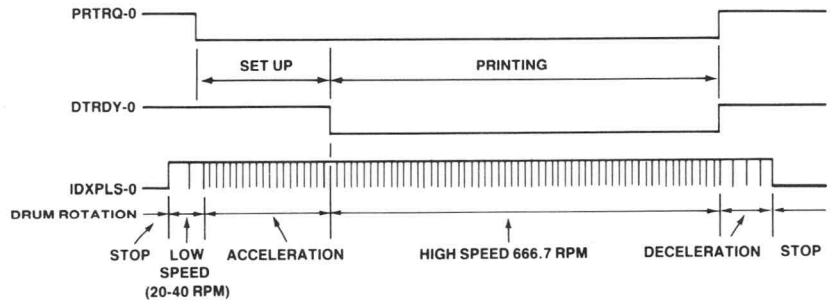
WHERE:
A : INITIAL SET TIME: 15 SECONDS
B : WAINTING TIME: 0 SECONDS (MINIMUM)
C : PAPER LOADING AND DRUM ROTATION SYNCHRONIZED TIME: 30 SECONDS (MAXIMUM)
D : PRINTING TIME
E : PAPER UNLOADING AND INITIAL SET TIME: 20 SECONDS (MAXIMUM)
F : DURATION OF MRDY-0: 1 SECOND (MINIMUM)

B. PRINTING WAVEFORMS



WHERE:
S : STOP
A : ACCELERATION less than 6 seconds
H : HIGH SPEED (printing time)
D : DECELERATION less than 6 seconds

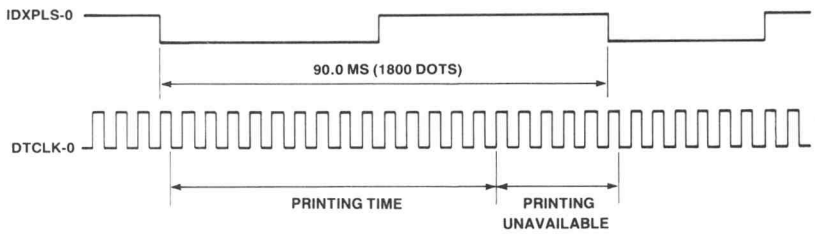
C. INDEX PULSES



4498-6

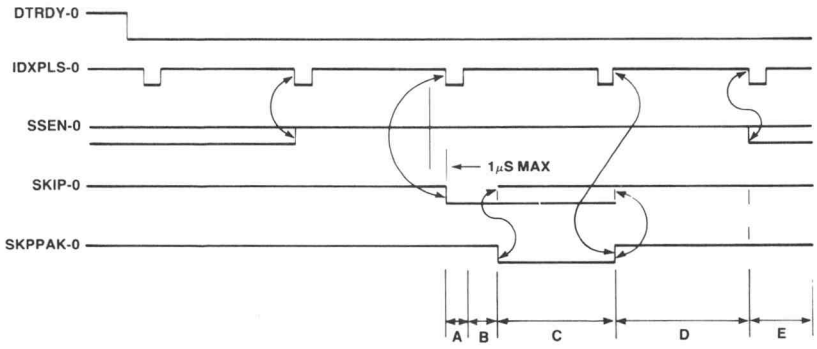
Figure 4-7. Parallel Interface Timing Diagram.

D. DOT CLOCK PULSES



A3/A4 PAPER (1737 DOTS) 86.85 MS (63 DOTS) 3.15 MS
B/A PAPER (1585 DOTS) 79.25 MS (215 DOTS) 10.75 MS

E. CONTROL TIMING



WHERE:

A :	STATUS CHECK TIME	APPROXIMATELY 45 + 13 MICROSECONDS - 0 MICROSECONDS
B :	DATA READ TIME	APPROXIMATELY 25 MICROSECONDS
C :	FAST SLEW TIME	(16 MS MAX) X (NUMBER OF LINES)
D :	ONE DRUM REVOLUTION	(87.4 MS)
E :	PRINTING TIME	

4498-7

The 8085 Processor uses a multiplexed bus structure. Information on the data bus (AD0-AD7) is time multiplexed and contains either data or the lower eight address bits (A0-A7). The remaining address lines (A8-A15) make up the address bus. The Processor issues ALE-1 to indicate that the information on the multiplexed data bus is the lower eight-bits of the address (ALE-0 indicates data).

The Processor uses a combination of the RD-0, WR-0, and the IO/M-0 lines to select either the Workspace RAM/Timer/I-O Ports, Programmable Counter, or the Program Memory. If the Workspace RAM/Timer/I-O Ports is selected, ALE-1 tells the Workspace RAM/Timer/I-O Ports whether the information on the AD0-AD7 lines is data or address (high for address). However, it is the falling edge of ALE-1 that actually latches the address in the 8155 (Workspace RAM/Timer/I-O).

Workspace RAM/Timer/I-O Ports

The 8155 Workspace RAM/Timer/I-O Ports device consists of a 14-bit timer, 256 byte RAM, two 8-bit I-O ports and a 6-bit I-O port all in one chip.

The Processor produces a 2MHz clock signal which is divided by 4 for both the Workspace RAM/Timer/I-O Ports device and the Programmable Counter (described later). The timer in the 8155 further divides this 500KHz clock until an 10 millisecond clock is produced from Pin 6 (TMRO). The 10 millisecond timer becomes the RST6.5 interrupt for the Processor for a real time clock. The 8155 RAM locates its 256 bytes of memory from C000 to C0FF (see Figure 4-8 for a diagram of the Parallel Interface Memory map). All other memory locations are either ROM, I/O, or not used. The Processor uses the IO/M signal line to select memory or I/O. This signal is low when addressing memory.

The data lines, T/RD0 through T/RD7, transfer the self-test patterns to the Data Latch, where they are processed like any other color data from a color terminal. (In addition, during self-test, the Processor supplies PDCLK-0 and PIDX-0 signals to substitute for the CPU produced DTCLK-0 and IDXPLS-0 signals.)

The Processor's RD-0, WR-0, IO/IM-0, and ALE-1 control communications with the Workspace RAM/Timer/I-O Port. As mentioned before, the Processor uses the AD0-AD7 lines to carry both data and the lower 8-bits of address (see Processor). ALE-1 determines whether the information is data or address (falling edge latches information as address). RD-0 and WR-0 determine the direction of data flow and IO/M-0 determine if the 8155 RAM or Timer/IO Ports are selected.

J555 is used to internally select (or match) the impedance of the host-interface cable's BUSY-0. Since the length of a cable partly determines its impedance, this strap allows the Parallel Interface to match the impedance of short (less than 10 foot or 3 meter) or long (greater than 10 foot) cables.

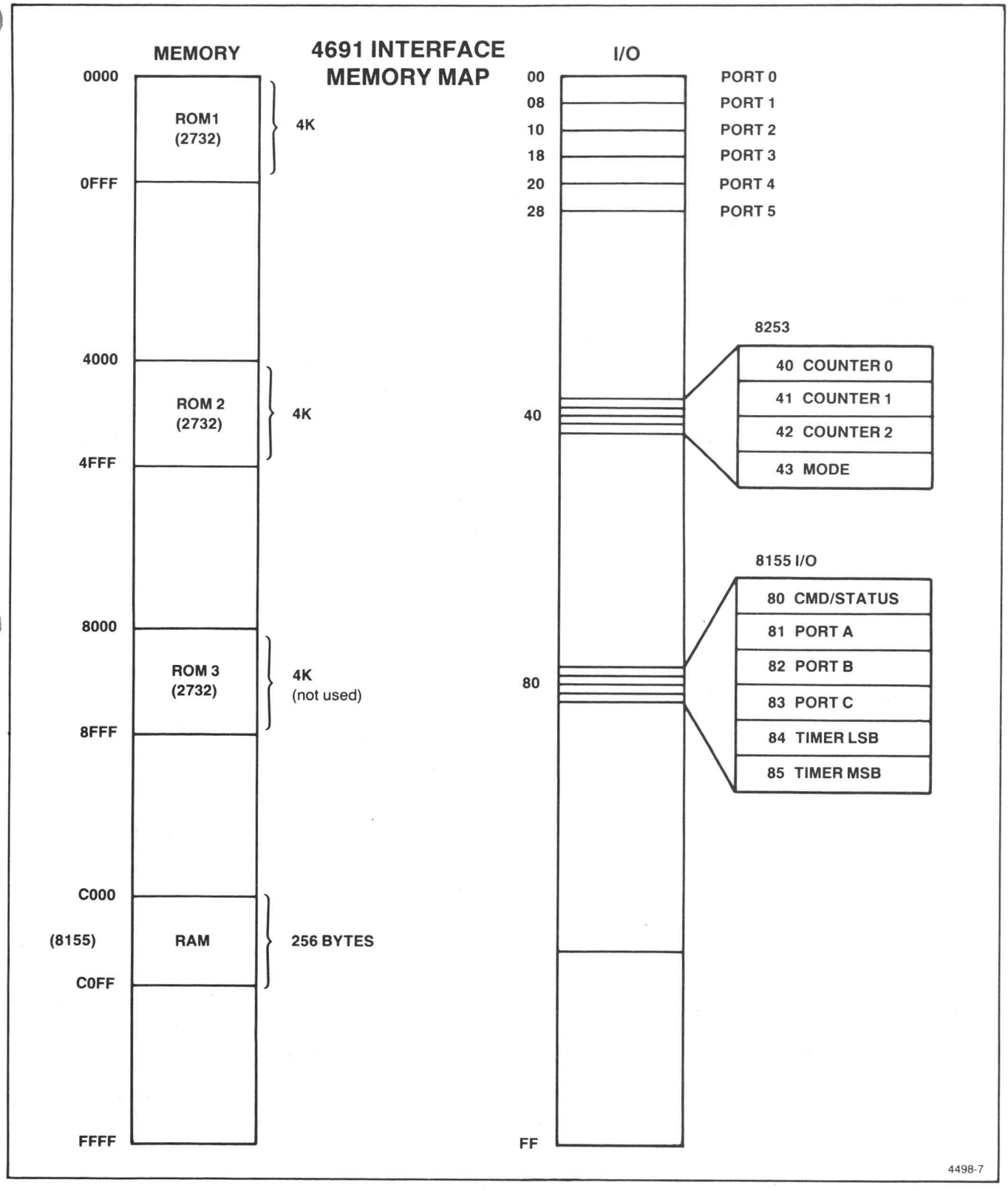


Figure 4-8. 4691 Parallel Interface Memory Map.

Address DeMultiplexer

Refer to Schematic A2-1. We mentioned before that the Processor uses the AD0-AD7 lines to carry both data and the lower eight-bits of data. The falling edge of ALE-1 latches the AD0-AD7 lines out of the Address Demultiplexer as address information (A0-A7).

Program Memory

The instructions for the Parallel Interface's Processor reside in EPROM (Program Memory). The Processor uses a combination of the RD-0, WR-0, and IO/M-0 lines to enable the Program Memory. All test pattern and operating instructions for the Processor are stored in Program Memory. Since the Program Memory resides in lower memory (see Figure 4-8), the address lines A0-A11 are used. A0 through A7 come through the Address Demultiplexer. Although physically there is room for three 2732 devices on the Parallel Interface circuit board, only two devices are installed.

Programmable Counters

The Programmable Counters consists of three, independent and programmable 16-bit counters. The Processor uses the Programmable Counters to synchronize certain timing functions in the copier. Two of these timing functions include top and bottom paper margin timing, and the third is a PRIDX interrupt. As the drum rotates, the CPU circuit asserts one 2.6 millisecond index pulse (IDXPLS-0) per drum revolution. The IDXPLS-0 pulse occurs near the leading edge of the paper on the drum. The Processor calculates the size and orientation of the copy image based upon information sent in an earlier command byte about the terminal/host image. Part of these calculations include the number of data clock (DTCLK-0) pulses that will occur before the image (bottom margin - MAR1) and after the image (top margin - MAR2). The Processor then loads these two margin values in the Programmable Counters using AD0 through AD7. Then, as the drum rotates, the Programmable Counter counts the DTCLK-0 pulses starting from the IDXPLS-0 pulse until it reaches the value set by the Processor. The Programmable Counter then asserts MAR1-0, which causes BLANK-0 (in Blanking circuit) to go low. BLANK-0 enables the color data to be read from the current line buffer (A or B RAM described later) and output to the Interface circuit board. Later, when the drum has rotated to the top of the image, the Programmable Counter counts the number of DTCLK-0 pulses for the MAR2 margin (top margin) and outputs MAR2-0. MAR2-0 ends the BLANK-0 signal, which in turn shuts off the color data flow to the Interface circuit board. Therefore, MAR1-0 and MAR2-0 produces a blank top and bottom margin on the paper.

Every 90 milliseconds (while the drum is rotating), an 85 millisecond PRIDX interrupt (RST7.5) is sent to the Processor, approximately 5 milliseconds ahead of the leading edge of the paper (IDXPLS-0). The Processor services this interrupt by switching the double buffer (described later).

Data Address Buffer

The Processor uses the Data Address Buffer to receive all output data intended as control line signals (see Output Latches) or data intended to be read by the CPU Processor (see Fast Slew Data Latch). This device is simply a buffer for the Processor's Address/Data bus (AD0-AD7). The output is Buffered Address/Data bus (BAD0-BAD7).

Fast Slew Data Latch

The Fast Slew Data Latch is an eight-bit latch, whose input is the Parallel Interface Processor's buffered address/data bus and whose output is the Peripheral Port Interface, which the CPU Processor can read. The Parallel Interface Processor uses the Fast Slew Data Latch to pass two eight-bit bytes to the Peripheral Port Interface, which tells the CPU Processor how wide the left margin of the next image is. So, when printing begins, the CPU Processor can quickly move the ink jet head carriage to the first printing location (fast slew) after receiving SKIP-0 from the Parallel Interface. This speeds up the printing process. The 16-bit number placed into this latch is the number of drum revolutions needed to move the ink jet head carriage when each revolution is 1/6 of a millimeter. Since the latch holds eight-bits, the 16-bit number is loaded in two steps and the complete 16-bit number is formed at the Peripheral Port Interface (described later).

Peripheral Port Interface

The Parallel Interface Processor loads a 16-bit number into the Peripheral Port Interface to be read by the CPU Processor. Refer to the Fast Slew Data Latch for a description and purpose of the 16-bit number. One half of the 16-bit number is loaded into Port A and the other half is loaded into Port B. U125, a decoder/demultiplexer, determines which half of the 16-bit number from the Fast Slew Data Latch goes into which port. The CPU Processor reads the Peripheral Port Interface by addressing the PPI (Peripheral Port Interface) Decoding circuit.

PPI Address Decoding

The CPU Processor reads the fast slew 16-bit number in the Peripheral Port Interface by first addressing the PPI Address Decoding with an F000, and then reading the 8255 with the normal 8085 Processor protocol. The address is changed to F100 and the 8255 is read again to obtain the second byte.

Output Latches

To control the operation of the Parallel Interface, the Processor uses a number of control lines. These control lines spread throughout the Parallel Interface to control different circuits. The Output Latches provide a means by which to derive individual control lines from the Processor's Buffered Address/Data Bus. U125 decodes Processor addresses to enable the correct Output Latch. One of the Output Latches send four signals to the CPU Processor. These signals are:

- SKIP-0 tells the CPU Processor to begin the fast slew process (see Fast Slew Data Latch for description of fast slew). (Also see Figure 4-7.)

- IRT-0 resets the copier and aborts the printing process.

- SSEN-0 (subscan enable) allows the ink jet head carriage to move under control of the CPU Processor. The CPU Processor moves the carriage 1/6 millimeter per drum revolution (or every 90 milliseconds). Normally, SSEN-0 is asserted when either the A or B RAM has been loaded with data and one vertical row of printing (1/6 mm) is ready to be printed. If the next row of printing data is not yet loaded when the first row has been printed, SSEN-0 goes high and stops the horizontal movement of the carriage until the next row of printing data is loaded. (See Figure 4-7.)

- PRTRQ-0 (print request) is asserted by the Processor to the CPU Processor to start the copy process (i.e. load paper, start drum spinning, move ink jet head carriage, etc.). (See Figure 4-7.)

Display And LED

The Display and LED circuit has two functions. The first is to display error codes on a 7-segment LED, and the second is to output a loop-back self-test function. Most of the Parallel Interface's handshaking have built-in timeouts. Instead of waiting forever if a handshaking sequence does not complete, a timeout occurs after a period of time and the copy is aborted. The Processor then loads an error code corresponding to the failure into the Display and LED. The LED code indicates what timeout failed or if some expected data was not received. Table 4-1 shows the error codes and their meanings. Notice that the LED decimal is used in some LED displays.

To interpret the Parallel Interface LEDs, use the following guide:

When the copier first powers up, the Parallel Interface INDICATOR LED will start flashing. The flashing LED indicates that the Procesor is initializing the Parallel Interface. If an error occurs during the initialization, the INDICATOR LED will continue to flash and a "decimal" error code shown in Table 4-1 will be displayed in the 7-segment display (for example, .1 for a ROM 1 checksum error). After a satisfactory initialization, the INDICATOR LED turns on steady. If a subsequent "operational" error occurs, that error code will also be displayed in the 7-segment display (INDICATOR LED continues on steady). For example, 2 for a paper or ink problem. Refer to Table 4-1 for a listing of the operational error codes (non-decimal).

Summary:

Flashing INDICATOR LED in first 20 seconds of power up means that copier is initializing.

Flashing INDICATOR LED after 20 seconds means initization failure. "Decimal" error code (code preceded by a period) is displayed in 7-segment display. Refer to Table 4-1.

Steady INDICATOR LED with blank 7-segment display is normal operation.

Steady INDICATOR LED with error code displayed in 7-segment display indicates an operational error. Refer to Table 4-1.

Table 4-1

Parallel Interface Error Codes

Initialization Errors

LED Display	Error
.0	ROM 0 checksum error (U220)
.1	ROM 1 checksum error (U225)
.2	Could not clear all RAM locations of 8155 (U170)
.3	Could not set all RAM locations of 8155 (U170)
.4	Interrupt 6.5 problem
.5	8155 failure (U170)
.6	8253 failure (U250)
.7	Address counters for buffer A were not cleared
.8	Processor/system failure
.9	Address counters for buffer A did not increment correctly
.A	Interrupt 5.5 problem, command type
.b	Interrupt 5.5 problem, data type
.C	Address counters for buffer B were not cleared
.d	Address counters for buffer B did not increment correctly
.E	Contents of buffer A did not match stored result
.F	Contents of buffer B did not match stored result

Table 4-1 continues on the next page with "Operational" errors.

Table 4-1 (cont)

Operational Errors	
0	48 hr wash cycle is in process. Previous LED error will be restored when wash is done
1	No MRDY signal from CPU board
2	Paper jam, out of ink or paper (see front panel)
3	CMD has been rejected because it was either out of sequence or unrecognized
4	Print request string was rejected because it contained too few bytes (or an early EOL)
5	Print request string rejected due to bad checksum
6	Print request rejected to out of range/illegal parameters
7	Copy terminated because CPU did not assert DTRDY
8	Copy terminated because copier failed to complete fast slew handshake in allotted timeout period
9	Copier did not cycle through unload sequence - fatal
A	An incorrect number of data lines (EOLs) have been received when an EOT is received
b	More than 4 data line pixel count error occurred. No further retransmits will be requested and present data will be printed
C	1 to 4 data line pixel count errors occurred - data retransmit has been requested for each
d	Copy terminated because a valid CMD has not been received within the last 11 minutes
E	Copy terminated because of an abort CMD

The technician can use a self-test procedure and the loop-back test connector to test the operation of the copier. The loop-back connector attaches to P3 (TD0-TD7) and P5 (Schematic A2-3). The Processor now outputs data through the Output Latch (U335), the loop-back test connector, and into the host input connector (P5) in the same manner as a host. This tests nearly all of the copier's circuits, whereas Parallel Interface self-test patterns are introduced to the copier at the Data Latch (Schematic A2-3).

Printer Line Receivers

The Printer Line Receivers receives eight signals from the CPU circuit board. These signals are:

- NOPPR-1 (no paper) is asserted when the CPU Processor determines that the paper tray is empty. Parallel Interface Processor asserts FAULT-0 and BUSY-1 to the host and does not attempt next copy.

- NOINK-1 (no ink) is asserted when the CPU Processor determines that one of the four ink cartridges is empty. Parallel Interface Processor asserts FAULT-0 and BUSY-1 to the host and does not attempt next copy.

- PPRJAM-1 (paper jam) is asserted when the CPU Processor determines that a piece of paper cannot be loaded on the drum. Parallel Interface Processor asserts FAULT-0 and BUSY-1 to the host and does not attempt next copy.

- A3MD-0 (A3 mode) is asserted when the CPU Processor determines that the current paper size is A or A4 (as opposed to A3 or B). Parallel Interface Processor uses this information in calculating printing locations.

- DTRDY-0 (data ready) is asserted when the CPU Processor determines that everything is ready for printing (i.e. drum is spinning with paper loaded, ink is okay, etc.). The Parallel Interface Processor starts sending data to the Interface circuit board.

- MRDY-0 (machine ready) is asserted when the CPU Processor determines that the copier is powered-up and can receive a print request. The Parallel Interface withdraws BUSY-1 to the host, indicating that the printer is available.

- DTCLK-0 (dot clock) is asserted by the Drum/Data Clock Timing circuit (CPU circuit board) at a 20KHz rate to indicate (synchronize) when the Parallel Interface Processor can send printing signals to the Interface circuit board (see Figure 4-7). Each clock pulse corresponds to one printed drop.

- IDXPLS-0 (index pulses) is asserted by the Drum/Data Clock Timing circuit (CPU circuit board) once for each drum revolution. The Parallel Interface Processor uses this signal to time printing and margins.

Signals received (except IDXPLS-0 and DTCLK-0) by the Printer Line Receivers are converted to Processor Address/Data Bus signals when the Processor reads the Input Port. IDXPLS-0 becomes ORIDX-1 (OR'd index) if the Processor is not printing a self-test pattern. If the Processor is printing a self-test pattern, the Processor cuts off the CPU IDXPLS-0 (with CLKOFF-0) and substitutes its own index pulse (PIDX-0). Likewise, DTCLK-0 becomes ORDC-1 (OR'd dot clock) if the Processor is not printing a self-test pattern. If the Processor is printing a self-test pattern, the Processor cuts off the CPU DTCLK-0 (with CLKOFF-0) and substitutes its own dot clock (PDCLK-0).

Self Test

Self Test circuits consist of a 4-bit dip-switch, a 5-position rotary switch and two push-buttons. The technician (or operator) can use the self-test function to see if the copier is operating normally. The copier has several printing patterns stored in ROM, which it can print (without the need of a host). The technician or operator can then compare the printed self-test pattern to that expected to uncover some operating problems with the copier. The rotary switch and dip-switch allow the technician to choose which pattern the copier will print.

Note

There are two independent sets of self-test patterns in the copier. The first, which does NOT use any circuitry in the Parallel Interface, is a single test pattern stored on the CPU circuit board. That pattern is printed after (1) selecting TEST with the TEST/OPERATE switch located to the RIGHT of the of the interface connector and then (2) momentarily pressing the TEST START switch located above the TEST/OPERATE switch. The second set of self-test patterns is stored on the Parallel Interface circuit board and its pattern selection and operating circuitry is described here. The only slight interaction between the two sets of self-test patterns is that in order to operate the second set (Parallel Interface), the TEST/OPERATE switch in the first must be in the OPERATE position.

Up to 16 different patterns can be stored on the Parallel Interface circuit board. A pattern in this set of self-test patterns is selected and printed using a combination of (1) the 5-position rotary TEST PATTERN SELECT switch (located near the AIR PUMP ONLY switch), (2) the nearby START push-button switch, (3) the dip-switch on the Parallel Interface circuit board, and (4) the TEST PATTERN START push-button switch located to the LEFT of the interface connector.

The two TEST PATTERN START push-buttons (2 and 4 above) have the same function and are simply wired in parallel. Periodically, the Processor reads the Input Ports where these switches terminate. If the Processor sees that either of the TEST PATTERN START switches has been pressed, the Processor reads the combination of the TEST PATTERN SELECT and the dip-switch to see which test pattern is to be printed. The test pattern is then printed.

The dip-switches on the Parallel Interface circuit board select one of 16 test patterns if the 5-position rotary TEST PATTERN SELECT switch is in the INTL (internal) position. If the 5-position rotary TEST PATTERN SELECT switch is in Positions 1, 2, 3, or 4, test pattern 1, 2, 3, or 4 will be printed provided the dip-switches are set to OPEN.

NOTE

Dip-switches must be set to OPEN position before selecting a test pattern with the 5-position rotary TEST PATTERN SELECT switch. Otherwise, unwanted test patterns may be printed. The technician must remember to set the dip-switches back to OPEN when finished servicing the copier, so that the operator-accessible 5-position rotary TEST PATTERN SELECT switch functions normally.

Table 4-2 shows the test patterns available on the Parallel Interface and how they are selected.

Table 4-2

PARALLEL INTERFACE TEST PATTERNS

Desired Test Pattern	To Select Pattern			To Initiate Pattern	
	* Rotary Switch	TEST/OPERATE Switch	DIP Switch	TEST/START Switch	TEST PATTERN START Push-Button
Horizontal Bars	1	OPERATE	OPEN	---	Push
Convergence	2	OPERATE	OPEN	---	Push**
Solids/TV	3	OPERATE	OPEN	---	Push
Gen Purpose	4	OPERATE	OPEN	---	Push
Resonance	INTL	OPERATE	0	---	Push
Solid Yellow	INTL	OPERATE	1	---	Push
Solid Magenta	INTL	OPERATE	2	---	Push
Solid Cyan	INTL	OPERATE	3	---	Push
Solid Black	INTL	OPERATE	4	---	Push
Horizontal Bars	INTL	OPERATE	5	---	Push
Horiz Bars	INTL	OPERATE	6	---	Push
Horiz Bars	INTL	OPERATE	7	---	Push
Horiz Bars	INTL	OPERATE	8	---	Push
Horiz Bars	INTL	OPERATE	9	---	Push
Horiz Bars	INTL	OPERATE	10	---	Push
Horiz Bars	INTL	OPERATE	11	---	Push
Horiz Bars	INTL	OPERATE	12	---	Push
Convergence	INTL	OPERATE	13	---	Push
Solids/TV	INTL	OPERATE	14	---	Push
Gen Purpose	INTL	OPERATE	15	---	Push
CPU Board Test Pattern	---	TEST	---	Push Up	---

* Dip-switches must be in the OPEN position.
** Once this pattern has been started, the function of this button changes to a start/stop switch for the rest of the copy.

For example, Test Pattern 9 (Horizontal Bars) is selected by setting the five-position rotary TEST PATTERN SELECT switch to INTL, closing DIP switches 1 and 4 (Binary 9), and pressing TEST PATTERN START.

Scan Enable Synch

The Scan Enable Synch is a synchronizing flip-flop. This flip-flop synchronizes the ORIDX-1 (IDXPLS-0, when the copier is not printing a self-test pattern) to the 2MHz system clock to produce SYIDX-1. SYIDX-1 goes to the 8253 Programmable Counters and is used to start the count which produces the Pre-Index interrupt (refer to previous descriptions of the Processor and Programmable Timer). Since the number of 2MHz pulses between IDXPLS-0 pulses is critical for Processor calculations, it is essential that the IDXPLS-0 pulses are synchronized to the 2MHz system clock.

Data Line Receiver

The Data Lines Receiver receives the eight-bit parallel red-green-blue data and command bytes from the 4113A Terminal (or host). This circuit simply buffers the data or command bytes from the host. Figure 4-6 shows that the Data Lines Receiver is connected to the 4113A Terminal (or host) through P5 (the Interface connector).

Data Latch

The Data Latch stores the eight-bit parallel red-green-blue byte or the command byte after the byte has been buffered by the Data Lines Receiver. DSTB-0 from the 4113A (or host) gates this information into the Data Latch. DFLOAT-1 from the Processor (via the Output Latches), is normally a low (except during self test). This low enables the outputs of the Data Latch and places data onto the T/RD0-T/RD7 bus. This data passes to the Data Demultiplexer if the byte is color data or to the Processor if the stored byte is a command byte (see State Machine for a description of how this works).

J554 and J556 are used to internally select (or match) the impedance of the host-interface cable's ACK-0 and FAULT-0 lines. Since the length of a cable partly determines its impedance, this strap allows the Parallel Interface to match the impedance of short (less than 10 foot or 3 meter) or long (greater than 10 foot) cables.

Data Demultiplexer

The Data Demultiplexer separates the eight-bit parallel red-green-blue data bytes into six-bits of red-green-blue (r-g-b) data (2-bits/color) when operating with one byte/pixel or 12-bits of r-g-b data (4-bits/color) when operating with two bytes/pixel. When operating with one byte/pixel, the Processor asserts SBYTE-0 low. A low on SBYTE-0 disables the six AND gate portion of the Demultiplexer. Now, the two red bits become R2-1 and R3-1; the two green bits become G2-1 and G3-1; and the two blue bits become B2-1 and B3-1 because the r-g-b data byte passes only through U635 (the Data Demultiplexer) to be sent to the Color Map. To do this, The host must make Bit-6 of each byte a 1. Bit-6 becomes the enable for U635 when the DSTB-0 pulse arrives. On the other hand, if two bytes/pixel are used, the Processor asserts SBYTE-0 high. A high on SBYTE-0 enables the six AND gate portion of the Demultiplexer. Now, the first data byte, which also contains two-bits of red, two-bits of green, and two-bits of blue, is processed in the same manner as for the one byte/pixel operation (i.e. Bit-6 is a 1). The host, however, must set Bit-6 in the second byte to a zero (or low). Now, the second byte, which contains two more bits of red, two more bits of green, and two more bits of blue, is processed through the six AND gates. This is because the low on Bit-6 prevents the second byte from passing through U635. The result is that the color information from both bytes is sent to the Color Map (i.e. the four-bits of red appear on R3-1 through R0-1; the four-bits of green appear on G3-1 through G0-1; and the four-bits of blue appear on B3-1 through B0-1).

State Machine

The State Machine has two main functions:

- First, the State Machine determines if each byte from the 4113A or host is a command or data byte and tells the Processor to read the byte if it is a command or process the byte through the Color Map and into the line buffer (A or B RAM) if the byte is color data.

- Second, the State Machine sends acknowledge (ACK-0) or fault (FAULT-0) to the 4113A or host to indicate copier status.

The main input to the State Machine is Bit-7 of each byte from the 4113 or host. If Bit-7 is low, the copier interprets the byte as a command byte. The low on Bit-7 produces CMD-1, which interrupts the Processor as RST5.5. The interrupted Processor then reads the command byte in the Data Latch using the T/RD0-T/RD7 bus.

On the other hand, if Bit-7 is high, the copier interprets the byte from the 4113A or host as a data byte. The high on Bit-7 allows the State Machine to start when a data strobe (DSTB-0) is received. The State Machine produces MSTB-0, which tells the Double Buffer to load this byte into either RAM A or B. (This process is described later.)

As mentioned earlier, the State Machine outputs ACK-0 to the 4113A or host to indicate that the byte was received. If the byte was a color data byte, ACK-0 is generated by U620A and U620B. On the other hand, if the byte was a command byte, the Processor generates PACK-1 after processing the command. PACK-1 then becomes ACK- to the host.

If data is sent in a streaming mode, the State Machine doesn't assert ACK-0 after each byte. In this mode, the host doesn't require any acknowledgment for each pixel. To do this, the Processor asserts STREAM-0 (via the Output Latches), which prevents ACK-0 from being sent to the host.

After processing each command byte, the Processor sends processor clear data strobe (PCDSTB-1) to clear the State Machine for the next byte. After each data byte, the State Machine feeds back to clear itself for the next byte.

Fault-0 (FAULT-0) is one of the indicators to the host that explains the condition of the copier. FAULT-0 is asserted if the copier is out of ink, paper, or did not understand the command or data byte. DSTB-0 from the next byte clears the FAULT-0 line. Earlier, we mentioned that FAULT-0 and BUSY-1 were the two main communicators to the host. Table 4-3 shows the meanings of the combinations of FAULT-0 and BUSY-1.

R655 is used in J655 to internally select (or match) the impedance of the host-interface cable's eight data lines and DSTB-0. Since the length of a cable partly determines its impedance, this strap allows the Parallel Interface to match the impedance of short (less than 10 foot or 3 meter) or long (greater than 10 foot) cables.

Table 4-3

BUSY-1 AND FAULT-0 INDICATIONS

BUSY-1	FAULT-0	INDICATION
0	0	Retransmit the last byte (or line, if in Streaming mode), since the last transmission was not understood.
0	1	Copier is ready to receive commands or data.
1	0	Error condition in copier (i.e. out of ink, paper, or did not understand command or data).
1	1	Byte received okay, copier is busy processing last byte.

Color Map

The Color Map is a 2716 EPROM, which serves as a "look-up table." The EPROM is programmed to output combinations of yellow, magenta, cyan, and black for each incoming combination of red, green, and blue. The six or 12-bits of color data from the Data Multiplexer simply address the EPROM, which produces an eight-bit output corresponding to the data stored at that address. This eight-bit output is divided into two four-bit groups, which are identical except that one group maps black into black, while the other group maps black into white. This allows the host to request black-white invert mode, in which the second group of four-bits is used. In this case, when white is present at the input to the Color Map ROM, the black output is active. When black is present at the Color Map ROM input, none of the outputs are active. In normal printing, the Processor asserts BWINV-1 low to prevent the four black-white invert mode bits from being processed, and processes the first group of four-bits (yellow, magenta, cyan, and black).

Figure 4-9 shows a diagram of the color conversion process.

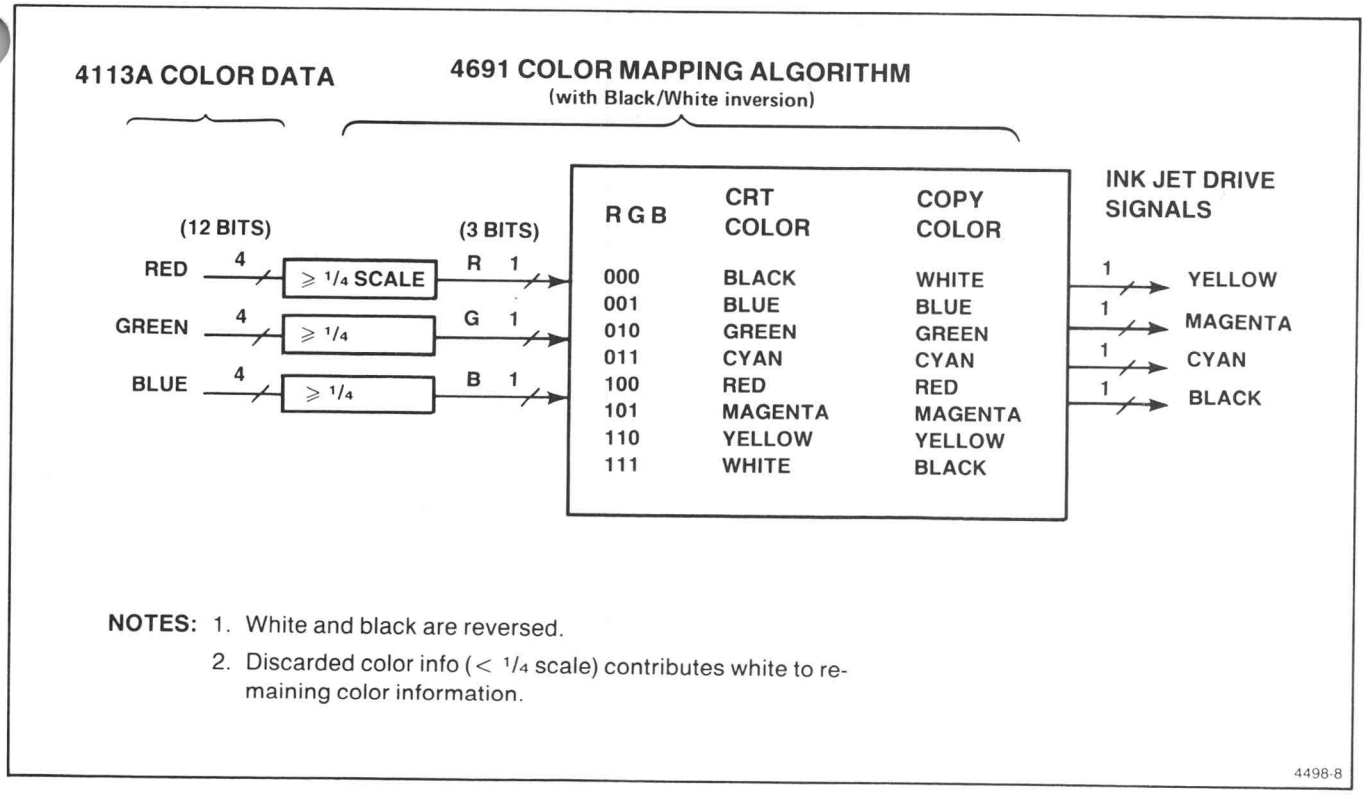


Figure 4-9. 4691 Color Mapping Algorithm.

Double Buffer Control

The Double Buffer Control consists of a tri-state octal buffer, a data selector multiplexer, and controlling circuitry. To visualize the basic operating concept of the copier, imagine that the paper on the spinning drum is divided into many vertical rows, each 1/6 mm wide. With each drum and paper revolution, the four ink jet heads turn on and off to print all of the colors for one vertical row (or line). The printing data for that one vertical row was sent from the host during the printing of the previous vertical row and was stored in either RAM A or RAM B. After that vertical row has been printed, the carriage advances 1/6 mm to the right and the Double Buffer Control reverses the role of the two RAMs. The RAM that supplied printing data to print the previous vertical row, now starts storing incoming color printing data for the next vertical row. And the other RAM that was storing data during the printing of the previous vertical row now starts unloading color printing data for the current vertical row.

The WRA-1 line determines which RAM is storing incoming color printing data and which RAM is unloading data to the Interface circuit board. If WRA-1 is high, U440 sends y-m-c-b input data to RAM A. At the same time, WRA-1 causes U450 to operate out of phase from U440. U450 prevents the data that is going to RAM A from also going to the Interface circuit board. At the same time, U450 enables the y-m-c-b data coming from RAM B to go to the Interface circuit board through buffer U275. The operation is the same when WRA-1 is low except that RAM A and RAM B switch functions. WRA-1 also controls U540 so that the correct clocks are presented to RAM A and RAM B address counters to advance the memory address at the proper time and supply the write pulse to the RAM being written.

A Address Counter and 2K X 4 RAM

As we mentioned before, one RAM stores incoming color print data for the next vertical printing row while the other RAM reads out stored printing data for the current vertical row. The A Address Counter and 2K x 4 RAM contains both the RAM for storing data and the address counter for addressing consecutive RAM address locations. U535 and U550A (or U560 and U550B) operate as an 11-bit counter. This counter counts MSTB-0 pulses when the RAM is being written and RDCLK-0 pulses (from ORDC-1) when the RAM is being read (refer to description of Double Buffer Control for WRA-1 read/write control). The address counter asserts a new address after each four-bits of y-m-c-b data is written into or read After a complete line of y-m-c-b data is written in or read out, the Processor asserts a high on the WRCLR-1 line if the RAM was being written to or a high on the RDCLK-1 line if the RAM was being read to reset the 11-bit counter for the next operation.

B Address Counter and 2K X 4 RAM

Refer to the A Address Counter and 2K x 4 RAM description.

Write Address Multiplexer

The Write Address Multiplexer allows the Processor to read the current count of the address counter for whichever RAM is storing incoming color print data. The current address count from the address counter passes through the Input Port (either U360 or U365) to the Processor Address/Data bus.

Input Ports

As we mentioned earlier, one of the input ports contains the current address count of the RAM being written to (refer to Write Address Multiplexer). The Input Ports also allow the Processor to read all of the CPU circuit board status signals (refer to Printer Line Receivers description). And finally, the Processor monitors two more values through U370 of the Input Ports. The first value is the setting of the Parallel Interface test pattern select switches (refer to the Self-Test description). And the second value is the current y-m-c-b color print data output to the Interface circuit board. Normally, the Processor only monitors the output color print data during self-test.

Blanking

As we mentioned in the Programmable Counters description, the Processor asserts MAR1 and MAR2 to establish top and bottom margins. This means that MAR1 and MAR2 prevent the Double Buffer from passing color printing data to the Interface circuit board while the top and bottom margins are positioned under the ink jet heads. The Processor also asserts BLANK-1, via the Output Latches, to establish the left and right margins. The Processor asserts BLANK-1 until the ink jet head carriage moves past the left margin to the first printing line. Likewise, at the right margin, the Processor again asserts BLANK-1 to prevent unwanted printing in the right margin.

Modulo N Counter

The Modulo N Counter provides drop replication (refer to the Overview of the Copier Operation earlier in this section for a description of drop replication). If the terminal or host image is small, the copier printed image can be "blown up" or increased in size. To blow it up, we print the color data over a larger area (i.e. we repeat each drop per pixel or replicate). To replicate, we simply divide the ORDC (OR'd dot clock).

For example, to print a copy that is three times the terminal or host image size, we replicate by three in both X and Y axes. To do this, we divide the ORDC by three. This causes the same pixel to be read three separate times for each of these vertical lines. Now, instead of one drop of ink in a small space (pixel), we now have one drop of ink in nine spaces (three each direction). Notice that the three by three space is still only one pixel because only one ORDC pulse is passed, but during that pixel time we can print 3 drops in each of three separate vertical lines. The Processor controls horizontal direction replication by simply reprinting a vertical row once, twice, or three times before swapping buffers (RAM A and RAM B) and accepting the next row of data. Replication can be 1 (for 1 to 1 sizes), 2, 3, or 4. The Processor asserts HREP and LREP to represent one of four possible replication factors. U665 is the programmable counter that counts and divides the ORDC pulses to the Double Buffer Control.

Interface

General Description

The Interface circuit block has several functions. These include (1) selecting either the Parallel Interface data (including its test patterns) or the single test pattern stored in ROM on the CPU circuit board, (2) delaying the print signal to the magenta, cyan , and black ink jet heads since they are physically offset from the yellow ink jet head, (3) generation of the 20KHz ink jet head sine wave signal, and (4) buffering the four ink jet head signals for transmission to the Ink Jet Head Driver circuit board. Figure 4-5 shows how the Interface circuit block connect to the remainder of the copier circuitry.

Refer to Schematics A3-1 to A3-2 when reading circuit descriptions of the Interface. Also, refer to Figure 4-10 for a circuit block diagram of the Interface circuit board.

Data Source Select

Parallel Interface data is YELDT-0, MAGDT-0, CYANDT-0, and BLKDT-0. In normal operation, this data passes through the data selector to the dot time delay. However, when the single test pattern is being run (stored in ROM on the CPU circuit board), test pattern data passes through the 8255 Peripheral Interface. The data selector then routes the test pattern data to the dot time delay in the same manner as normal printing data from the Parallel Interface.

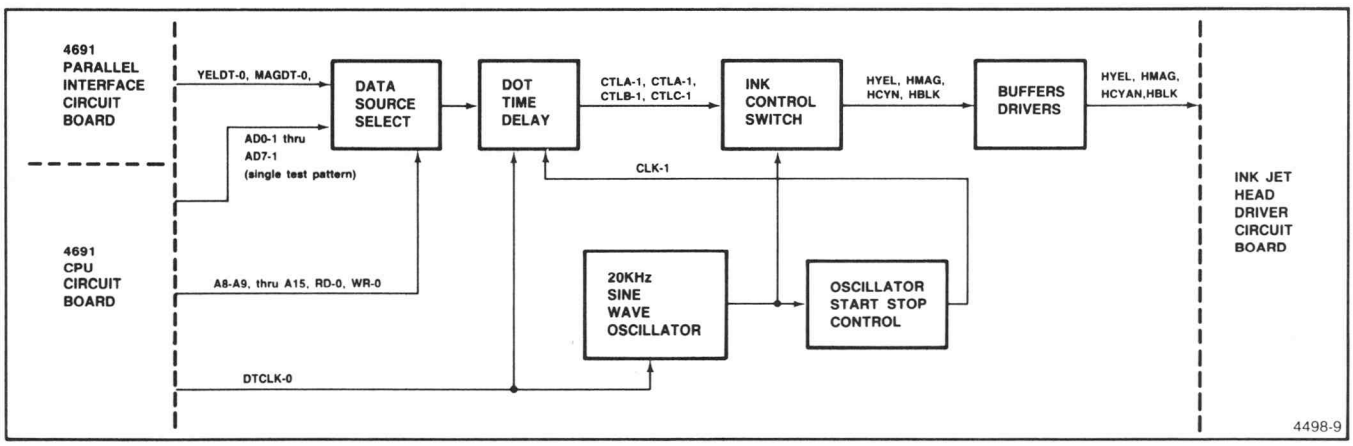


Figure 4-10. Interface Circuit Blocks.

Dot Time Delay

The dot time delay adds a time delay to the 20KHz printing signal for three of the ink jet heads. This delay is necessary because the construction of the ink jet head carriage is such that the four ink jet heads do not have a common location. The delay for each ink jet head is a function of its distance from the fourth "reference" ink jet head and the drum rotation speed. The yellow ink jet head is chosen as the "reference" location because it is the first ink jet head to be passed by the paper on the rotating drum. The distance between adjacent ink jet heads and the drum rotation speed require a delay of 100 ink spots (50 microseconds times 100 spots to equal 5 milliseconds) between adjacent ink jet heads. Since yellow is the reference and has a delay of 0, then magenta must be delayed by 100 locations, cyan must be delayed by 200 locations, and black must be delayed by 300 locations. A series of shift registers determine the delay for each printing signal. The delay for the print signal is the sum of the clock pulsed shifts that the print signal receives in the series of shift registers. For example, cyan is delayed 128 bits in IC6, 48 bits in IC7, and 24 bits in IC11 (the 16 and 8 bits are not strapped for IC11). The sum of these delays is 200 bits. Magenta and black are calculated in a similar manner. DTCLK-0 clocks the shift delay process. DIP switches allow slight adjustment of these delays during vertical adjustments.

20KHz Sine Wave Oscillator

The 20KHz Sine Wave Oscillator is a gated oscillator which is turned on and off by a zero crossing detector (oscillator start/stop control). The gated oscillator generates a 48 to 50 microsecond sine wave every 50 microseconds. L4 adjusts the frequency (and period) of the sine wave. DTCLK-0, which is a function of the main system timing, enables the oscillator. Figure 4-11 shows the DTCLK-0 and the ink jet head waveform generation process.

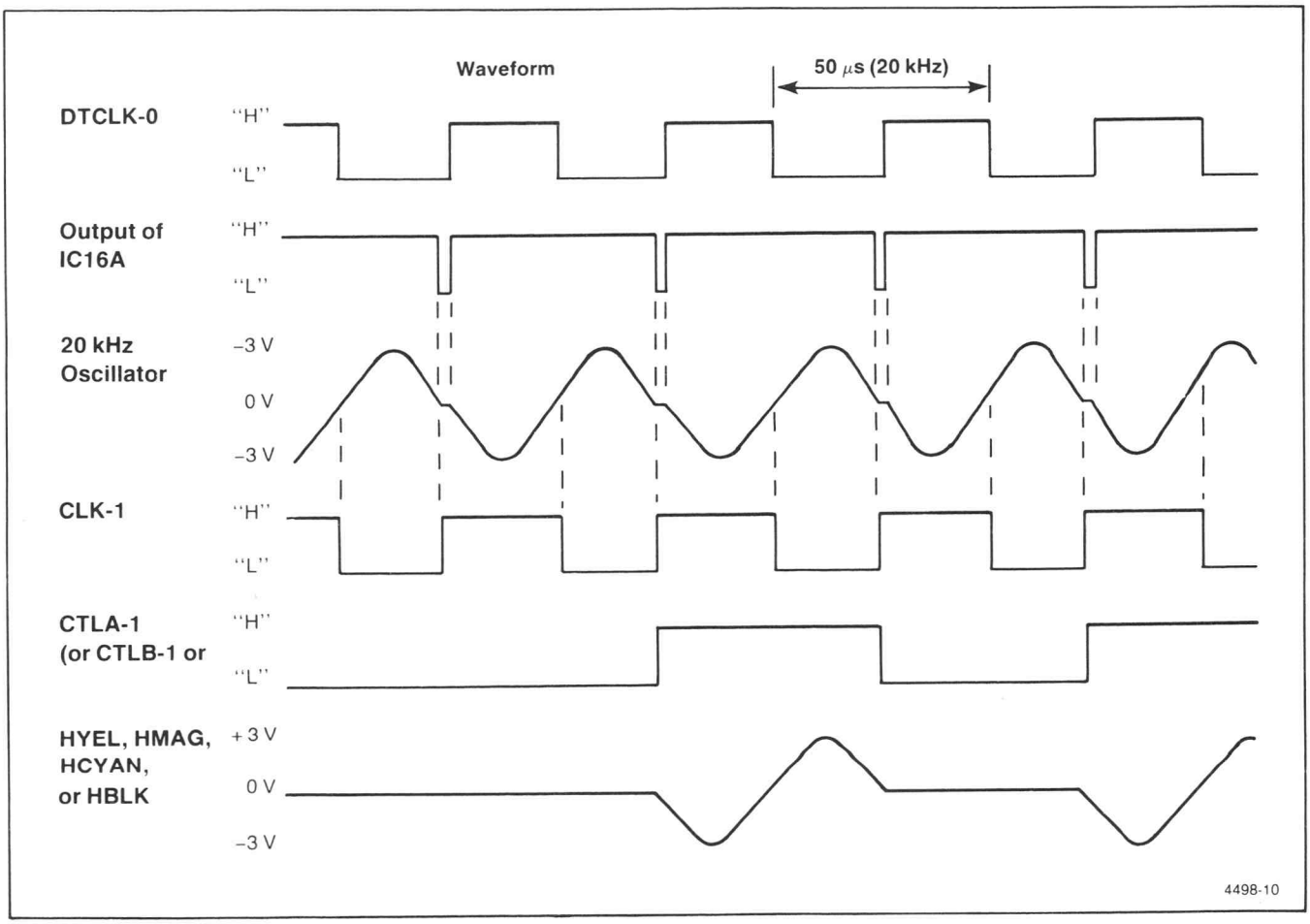


Figure 4-11. Ink Jet Head Waveform Generator.

Oscillator Start/Stop Control

The Oscillator Start/Stop Control is a 360 degree zero point detector and stops the oscillator at the exact 360 degree zero crossing point with no ringing. VR2 (and VR1 in the oscillator circuit) adjust the 360 degree zero crossing point.

Ink Control Switch

The Ink Control Switch is an analog switch that selects which ink jet head or heads receive the 20KHz oscillator print signal (one complete 20KHz sine wave for each drop of ink or print location). The number and combination of ink jet heads turned on is controlled by the analog multiplexer (IC14) using four control lines (two different CTLA-1 lines, CTLB-1, and CTLC-1) from the dot time delay. VR3 sets the voltage level of the ink jet heads.

Buffers/Drivers

The buffers/drivers transmit the 20KHz oscillator ink jet head printing signal to the Ink Jet Head Driver circuit board.

Ink Jet Head Driver

Schematic A4A1-1 shows the electronic circuits on the Ink Jet Head Driver circuit board. Figure 4-12 shows a circuit block diagram of the Ink Jet Head Driver.

The Ink Jet Head Driver circuit board consists of four voltage amplifiers that amplifies the four 20KHz print signals (HYEL, HMAG, HCYAN, and HBLK) from the Interface circuit board. The four voltage amplifiers then create four 200 volt p-p 20KHz print signals, DHYEL, DHMAG, DHCYAN, and DHBLK, which cause the four ink jet heads to eject ink (one drop of ink for each complete 20KHz sine wave). Figure 4-5 shows how the Ink Jet Head Driver connects to the remaining copier circuitry.

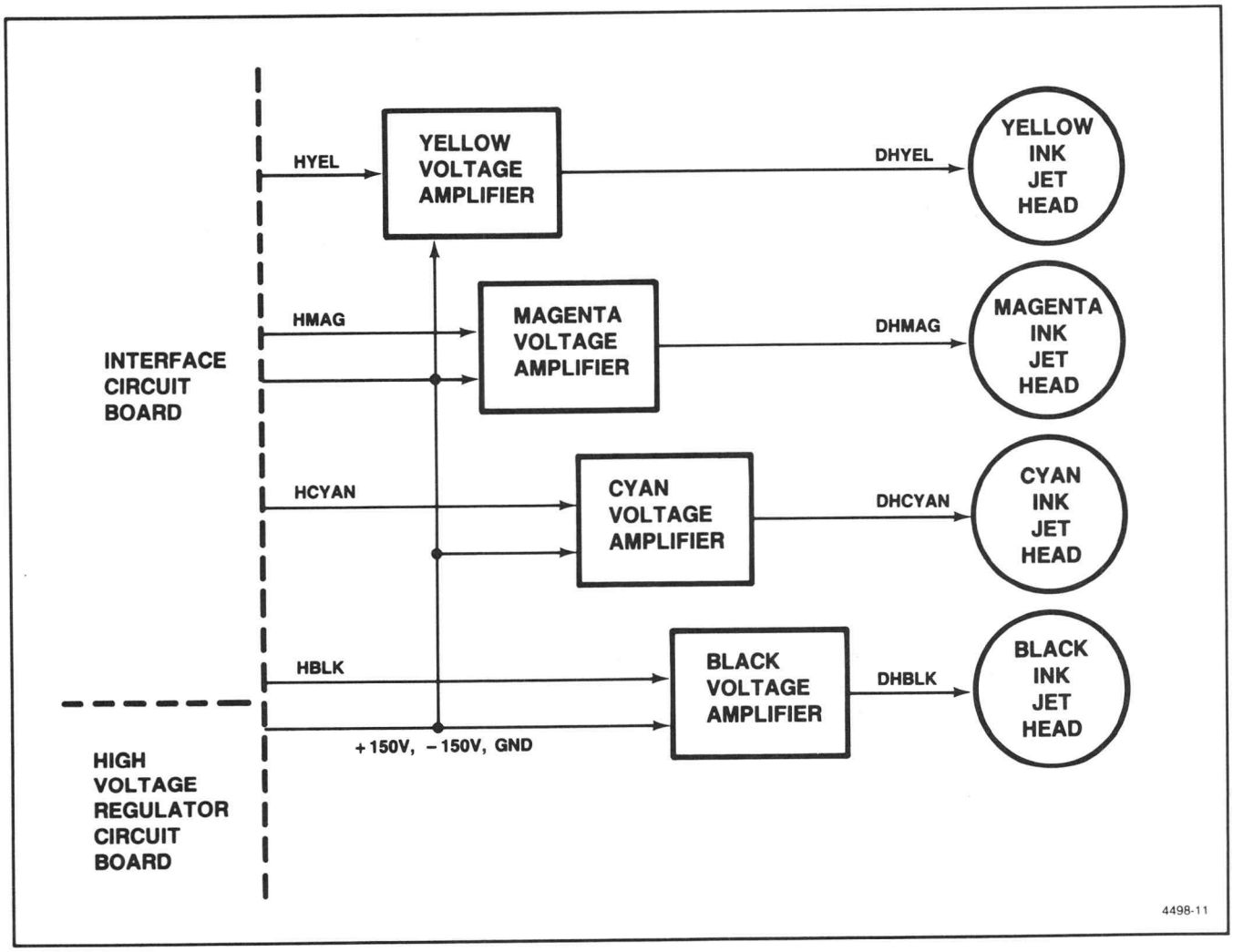


Figure 4-12. Ink Jet Head Driver Circuit Blocks.

CPU

General Description

The CPU is the overall controller for the 4691's printing process from the Interface circuit board to the ink jet heads. The CPU controls all motors and displays, monitors all sensors, and most of the switches in the copier. It does not, however, control or direct any activity on the Parallel Interface circuit board. The Parallel Interface has its own microprocessor.

The CPU Circuit board uses an 8085 microprocessor, hereafter referred to as the "CPU Processor" (as opposed to "Processor," which is located on the Parallel Interface circuit board), ROM, RAM, latches for incoming (input) data, and latches for outgoing (output) data, to control printing activities in the copier.

Figure 4-5 shows how the CPU is connected functionally to the remainder of the copier circuitry. Refer to Schematics A5-1 to A5-4 when reading the circuit descriptions of the CPU circuit board. Also refer to Figure 4-13 for a circuit block diagram of the CPU circuit board.

Clock Generator

Refer to Schematic A5-1 for a diagram of the electronic circuitry of the Clock Generator. The clock generator produces the main system timing for the CPU circuits and much of the rest of the copier. The crystal-controlled clock generator output is a 4.4MHz squarewave signal. JP1, which is normally installed, permits the system clock to be disconnected from the CPU Processor.

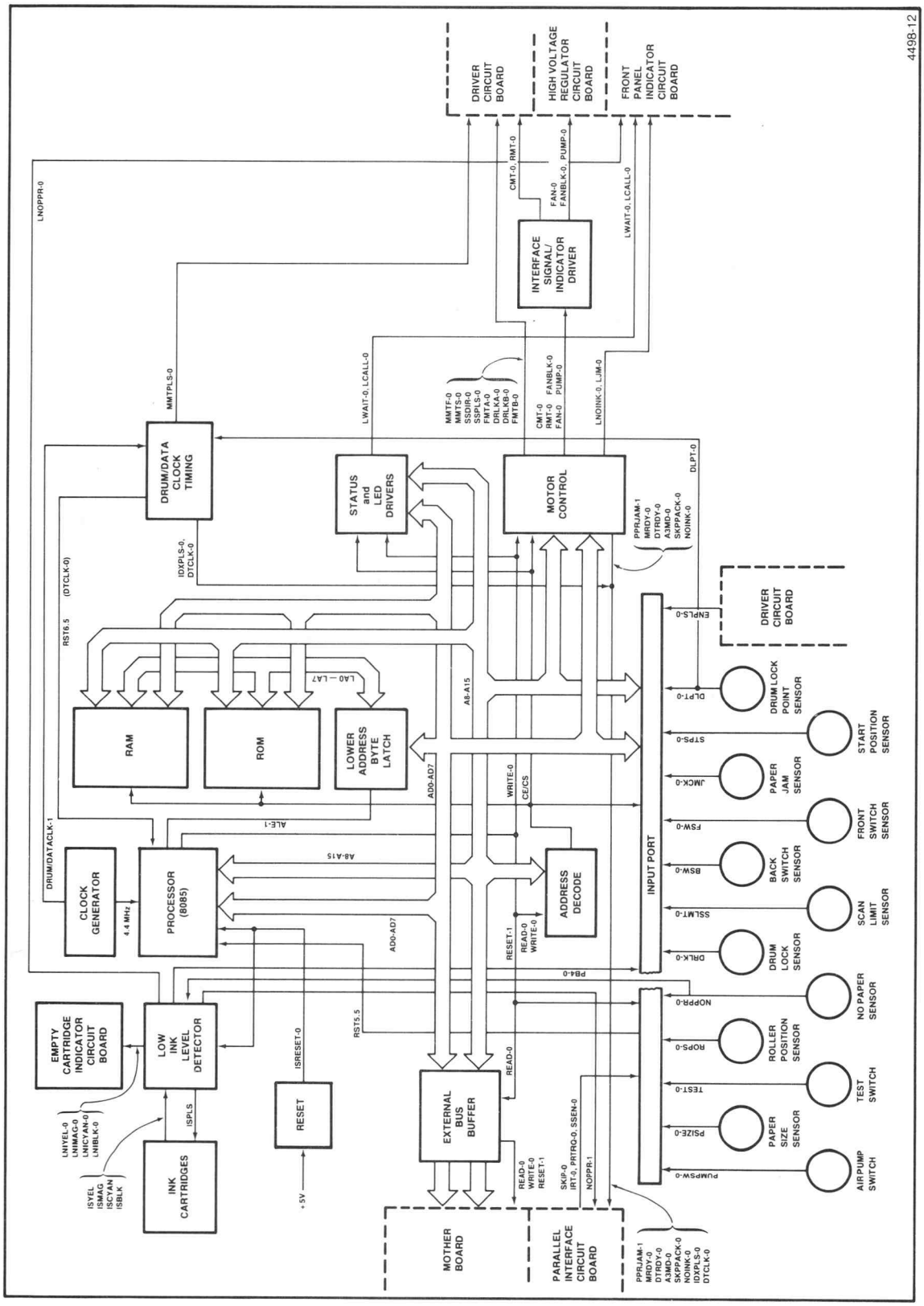


Figure 4-13. CPU Circuit Blocks.

CPU Processor

The CPU Processor, shown in Schematic A5-1, provides the overall control for the printing and operation of the copier. The important tasks include:

- Monitors signal lines from the Parallel Interface circuit board.
- Monitors several front and rear panel switches.
- Monitors all sensors.
- Monitors ink levels in the four ink cartridges.
- Controls the displays of the front panel indicators, including the four ink cartridge LEDs.
- Generates the control signals for the motors and solenoids.
- Generates a test pattern for operator-evaluation of printing quality.

Most of the signals that the CPU monitors come to the Input Port. The CPU Processor scans the Input Port from time-to-time looking for input status changes. The Input Port, however, generates the RST5.5 interrupt for the CPU Processor whenever the Input Port receives an IRT-0 from the Parallel Interface and a SSLMT-0 when the carriage reaches the right printing limit. When interrupted, the CPU Processor reads the Input Port (IC5) to determine which interrupt service routine stored in ROM to use. A second interrupt, RST6.5, is generated by the Drum/Data Clock Timing every 50 microseconds. This tells the CPU Processor that the drum has rotated one pixel (one spot or dot). The CPU Processor uses this interrupt to initiate the printing of one drop of ink and advance the carriage.

Reset

The Reset circuit monitors the +5 volt power supply and asserts a low on the ISRESET-0 line on power-up until the +5 volt power supply is established. The Reset circuit also asserts a low on the ISRESET-0 line if the +5 volt power supply falls to approximately 4.5 volts.

Address Decode

The Address Decode monitors the CPU Processor's address lines and the READ-0 and WRITE-0 lines to produce chip enables for the selected RAM, ROM, Input Ports, Motor Control, or the Status and LED Drivers.

Lower Address Byte Latch

A characteristic of the 8085 microprocessor (CPU Processor) is that data to and from the CPU Processor uses the same eight signal lines as the eight lower address bits (A0-A7). To avoid confusion, data and addresses are not sent at the same time. Usually addresses are sent first, and then data. The multiplexed address/data signal lines (bus) are designated as AD0-AD7. The CPU Processor asserts ALE true whenever an address is sent on the AD0-AD7 bus. ALE then transfers the address, A0-A7, through the Lower Address Byte Latch as LA0-LA7 to the ROM and RAM. Later, when data is sent over the AD0-AD7 bus, ALE is false and the Lower Address Byte Latch prevents the data from reaching the address lines of the RAM and ROM.

ROM

The ROM stores the CPU Processor's instructions. The instructions, which are referred to as a program, instruct the CPU Processor how to do its power-up initialization, input port scan, interrupt service routines, display of front panel status LEDs, and directing motor start and stop actions.

RAM

The RAM, which has a capacity of 1K bytes (1K x 8) is used to store manipulated data during data processing. This means that the CPU Processor uses the RAM as a "scratchpad" during its data processing activity. No programs are stored in RAM.

External Bus Buffer

The External Bus Buffer acts as a transmitter, isolation, and signal conditioning circuit for address, data, read, write, and reset lines going to and from other circuit boards in the copier.

Input Port

The CPU Processor uses the Input Port to monitor all switches (except the five-position TEST PATTERN SELECT and the two TEST PATTERN START switches) and sensors. In addition, the Input Port receives IRT-0, PRTRQ-0, and SSEN-0 inputs from the Parallel Interface. The CPU Processor routinely scans the Input Port's 8255 Peripheral Interface periodically looking for any change in an input. If there is an input status change, the CPU Processor refer to the ROM for instructions on what the change is and what to do next.

Motor Control

The CPU Processor sends all motor and solenoid control signals (except MMTPLS-0 for the drum motor) to the Motor Control's 8255 Peripheral Interface as data over the AD0-AD7 bus. In addition, the CPU Processor also sends front panel LOAD INK and CHECK PAPER PATH LED signals to the Motor Control's 8255 Peripheral Interface. The 8255 Peripheral Interface converts the motor and LED signals from AD0-AD7 bus data into individual motor control and LED status signals and routes them to the Driver circuit board, Front Panel Indicator circuit board, or the Interface Signal/Indicator Driver.

The CPU Processor also writes all status signals that are intended for the Parallel Interface (except IDXPLS-0 and DTCLK-0) into the Motor Control 8255 Peripheral Interface. The 8255 Peripheral Interface then passes these signals on to the Parallel Interface. The Parallel Interface-bound status signals include: PPRJAM-1, MRDY-0, DTRDY-0, A3MD-0, SKPPACK-0, and NOINK-1.

Interface Signal/Indicator Driver

The Interface Signal/Indicator Driver serves as a transmitter and signal conditioner for the following motor control signals: RMT-0 (paper unloading motor), CMT-0 (head cleaning motor), FANBLK-0 and FAN-0 (vacuum fan motor), and PUMP-0 (air pump motor). It must be noted that the these signals do not go directly to their respective motors immediately after leaving the Interface Signal/Indicator Driver circuit. Instead, the first two are routed to the Driver circuit board and the vacuum fan and air pump signals go to the High Voltage Regulator circuit board before eventually reaching their intended motors.

Drum/Data Clock Timing

The Drum/Data Timing uses the 4.4MHz DRUM/DATACLK-1 signal to create the drum motor control signal MMTPLS-0, which governs the drum motor's speed. The drum rotates 666.7 rpm. DLPT-0, which is generated by the Drum Lock Point Sensor once each drum revolution, is delayed by the variable shift register (IC20). The variable shift register is strapped such that index pulses (IDXPLS-0) are created sometime after the DLPT-0 signal to allow for the blank (unprinted) leading margin (i.e. printing must be delayed after the leading edge of the paper passes the ink jet heads).

The Drum/Data Clock Timing also generates the dot clock (DTCLK-0). The leading edge of the DTCLK-0 pulse, in turn, generates RST6.5-1, which interrupts the CPU Processor. The CPU Processor reads DTCLK-0 through the 8255 Peripheral Interface (IC7) to determine the trailing edge, which is used to coordinate two events - the squirting of one ink drop and advancement of the carriage motor one step.

Status and LED Drivers

To turn on the five troubleshooting display status LEDs on the CPU circuit board, the CPU Processor writes data over the AD0-AD7 bus to the 8255 Peripheral Interface in the Status and LED Drivers. The Peripheral Interface separates these five signals and routes them to the individual LEDs. The Status and LED Driver's Peripheral Interface also translates the CPU Processor data to create the front panel WAIT and FAULT LED control signals.

Low Ink Level Detector

The Low Ink Level Detector detects when the ink supply in one or more of the ink cartridges gets down to approximately 10% or less. To do this, the Low Ink Level Detector sends a 5 volt p-p squarewave signal (ISPLS) to the four ink cartridges (see Figure 4-14A). When a ink cartridge is full, the impedance through the ink cartridge is low and the returning ISYEL (or ISMAG, ISCYAN, or ISBLK) signal shows little distortion (see the left side of Figure 4-14B). As the ink cartridge empties, the impedance through the ink cartridge gradually increases. The increase in the impedance causes an decrease in the amplitude of the returning ISYEL signal. Eventually, when the ink cartridge becomes nearly empty, the top of the squarewave drops down to or below the preset threshold level set by VR1, VR2, VR3, or VR4 (see right side of Figure 4-14B). At that time, LNIYEL-0 (or LNIMAG-0, LNICYAN-0, or LNIBLK-0) goes low (see Figure 4-14C). The low-going LNIYEL-0 signal causes three actions. First, the PB4-0 signal line goes low and the CPU Processor (on one of its routine scans) reads the Input Port and discovers the low PB4-0 line low and terminates printing after the current copy. Second, the CPU Processor causes the YELLOW Low Ink Cartridge LED near the ink cartridge to turn on. And finally, the processor turns on the front panel LOAD INK light and signals the Parallel Interface with the NOINK-0 signal. The Parallel Interface's processor then signals the host with the FAULT-0 signal to indicate that the copier is unable to print any more copies.

NOTE

It must be understood that the FAULT-0 can indicate other problems in the copier besides a low ink supply.

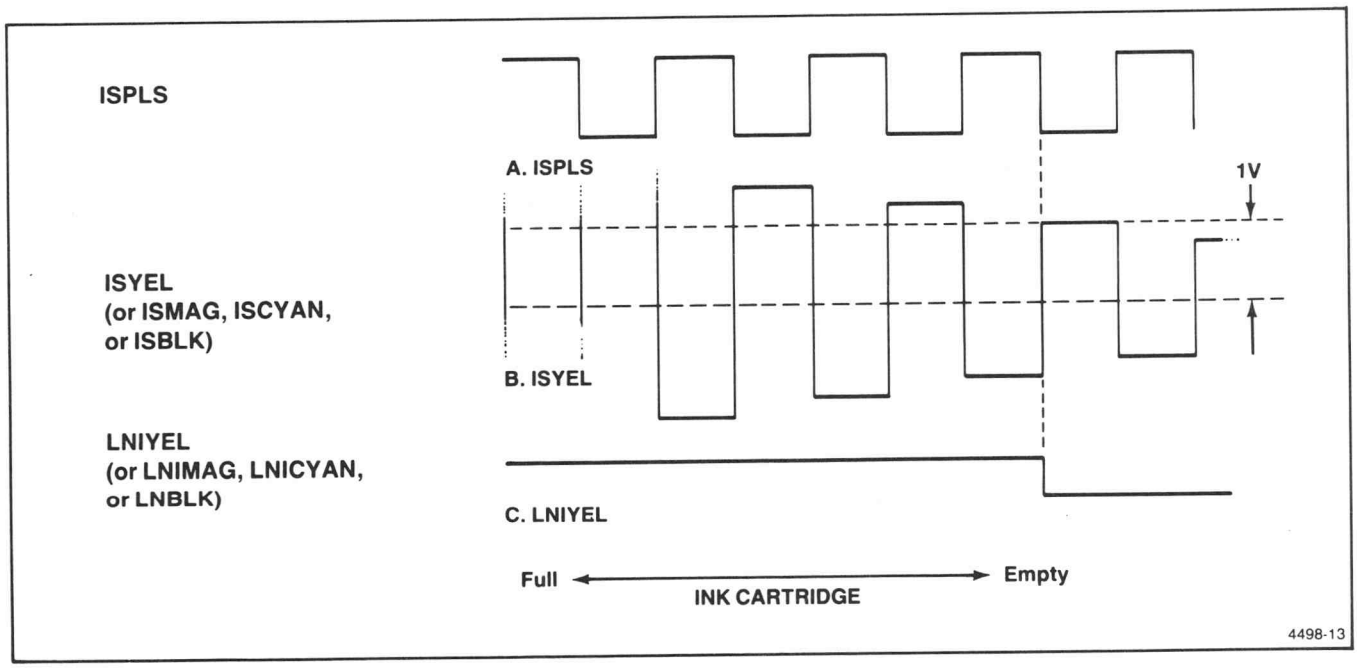


Figure 4-14. Low Ink Level Detector Waveforms.

Driver

General Description

The Driver circuit board (shown how it relates to the copier in Figure 4-5) combines the motor control signals from the CPU circuit board, the Encoder Pulse Sensor, and low voltage power from the Power Supply to create properly phased electrical currents for all five motors and the drum lock solenoid. Figure 4-15 shows a circuit block diagram of the Driver circuit board. Refer to Schematics A6-1 through A6-3 when reading the Driver circuit descriptions.

Motor Buffers

The octal Motor Buffer (IC20) receives and conditions all of the CPU motor control signals except those for the drum motor. The drum motor control signals are handled with different circuitry described later in this section. The CPU motor control signals that are included in the Motor Buffers include:

- SSDIR-0 and SSPLS-0 for the carriage motor.
  FMTA-0 and FMTB-0 for the paper carriage motor.
- DRLKA-0 and DRLKB-0 for the drum lock solenoid.
- CMT-0 for the ink jet head cleaning pump motor.
- RMT-0 for the paper unloading motor.

The motor control signals are then routed to their respective motor drivers described next.

Head Cleaning Motor Driver

The CPU CMT-0 motor control signal drives the Head Cleaning Motor Driver by creating a current path to ground for powering the ink jet head cleaning pump motor.

Paper Unload Motor Driver

The CPU RMT-0 motor signal controls the Paper Unload Motor Driver which controls current to the paper roller motor.

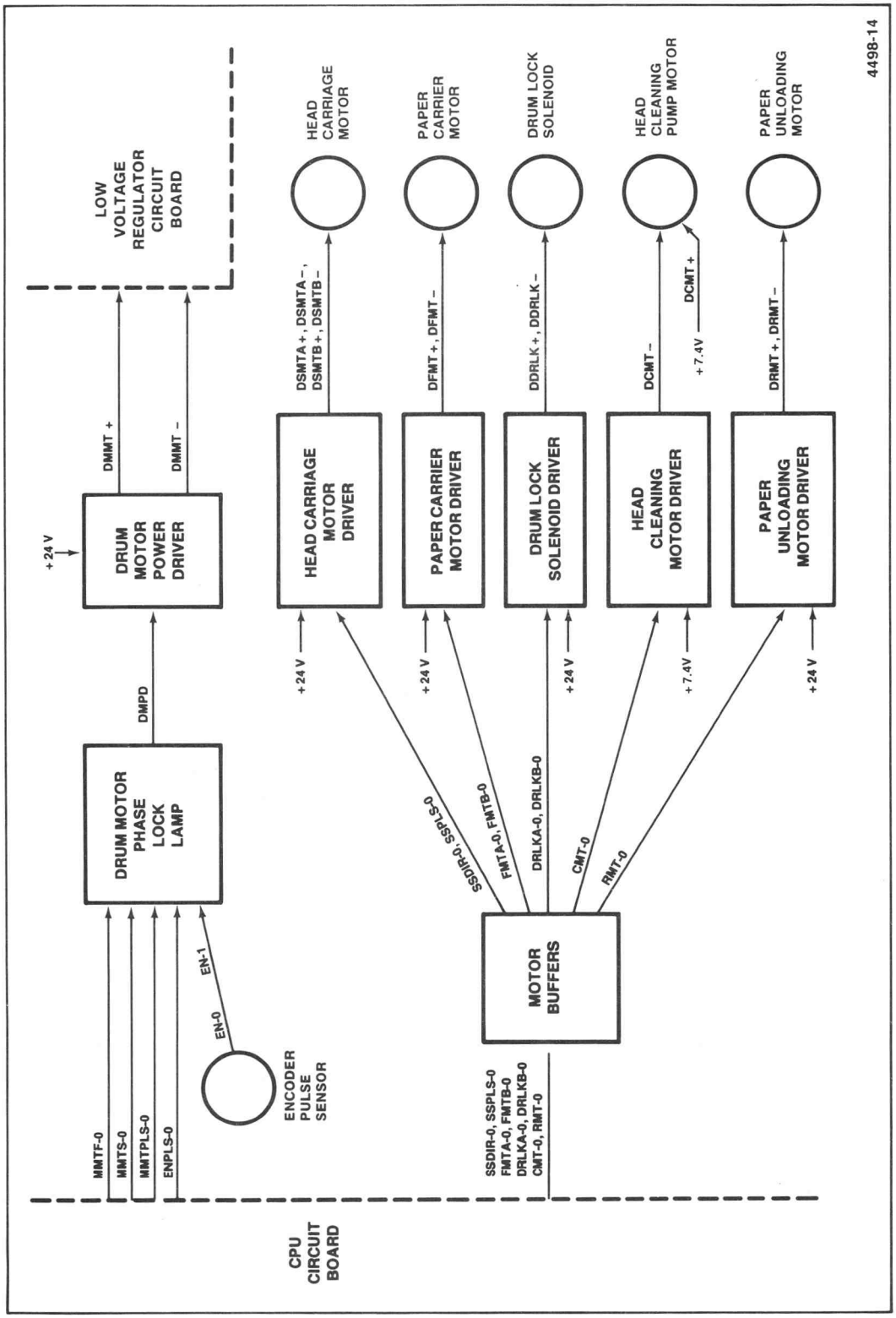


Figure 4-15. Driver Circuit Blocks.

Paper Carrier Motor Driver

The Paper Carrier Motor Driver uses the CPU FMTA-0 and FMTB-0 motor control signals for powering the paper carrier motor. There are two separate amplifiers in this circuit block so that the motor can run in either direction.

Drum Lock Solenoid Driver

The Drum Lock Solenoid Driver uses the CPU DRLKA-0 and DRLKB-0 solenoid signals to control the current for powering the drum lock solenoid during the paper loading and unloading cycles.

Head Carriage Motor Driver

The Head Carriage Motor Driver produces a combination of four signals which drive the head carriage stepper motor. The head carriage stepper motor uses a cyclic pattern of sixteen 0.45 degree quarter-steps to move the stepper motor four complete 1.8 degree steps. The pattern then repeats itself for each 7.2 degrees of motor rotation. The pattern is reversed when the stepper motor rotates in the opposite direction. A simplified block diagram of the Head Carriage Motor Driver is shown in Figure 4-16. SSPLS-0 clocks an up/down counter (IC23), whose counting direction is controlled by SSDIR-0. The counter's output is translated by a PROM (IC24). The PROM's translated output becomes the four control signals for the head carriage stepper motor driver. The Head Carriage Motor Driver is clocked by a 20KHz (50 microsecond period) oscillator (IC22). Table 4-4 shows the cyclic pattern of 16 quarter-steps mentioned earlier. Notice that SSDIR-1 causes the motor to step counter-clockwise, while SSDIR-0 causes the motor to step clockwise. Reduced current signals are used in several of the quarter-steps. These are shown in Table 4-4 as A*+, A*-, B*+, or B*-. The reduced current is 41% of normal. Figure 4-17 also shows a diagram of the head carriage stepper motor with the pattern of 16 quarter-steps.

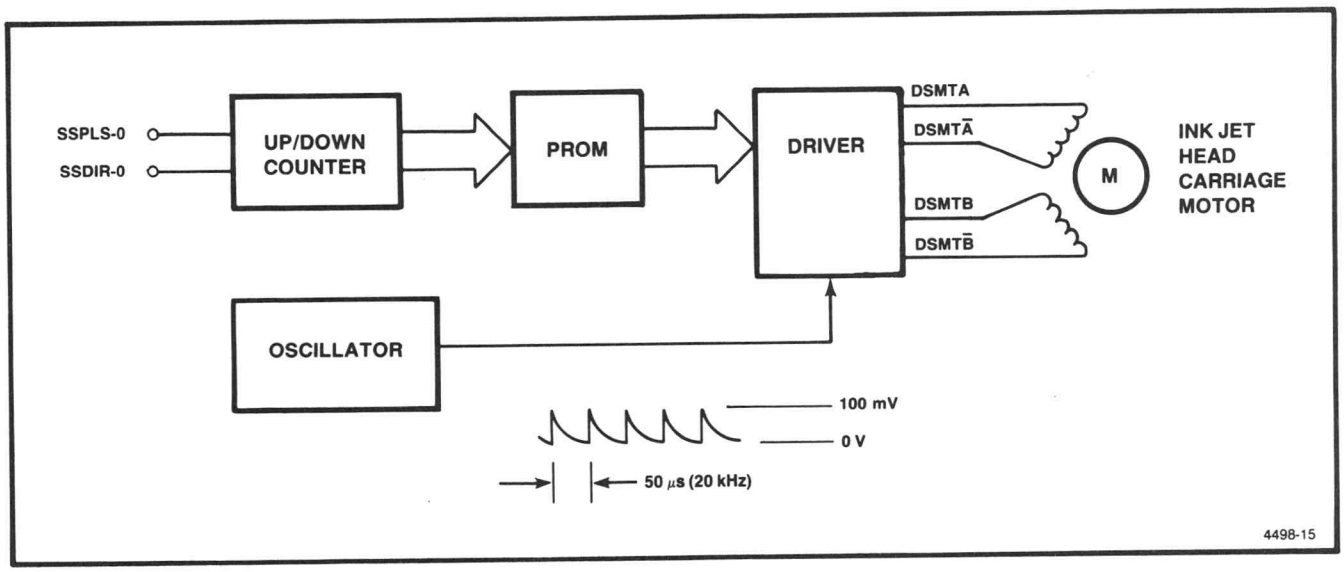


Figure 4-16. Head Carriage Motor Driver Block Diagram.

Table 4-4

Head Carriage Stepper Motor Control Signals

Counter Output	SDIR-0	SSDIR-1	Driver Output
0	CW	CCW	A+
1	↑	↓	A+B*+
2			A+B+
3			A*+B+
4			B+
5			A*-B+
6			A-B+
7			A-B*+
8			A-
9			A-B*-
10			A-B-
11			A*-B-
12			B-
13			A*+B-
14			A+B-
15			A+B*-

Note: For A+, current direction is from DSMTA+ to DSMTA-.
For A-, current direction is from DSMTA- to DSMTA+.
For B+, current direction is from DSMTB+ to DSMTB-.
For B-, current direction is from DSMTB- to DSMTB+.
A*+, A*-, B*+, and B*- are reduced (41%) current.

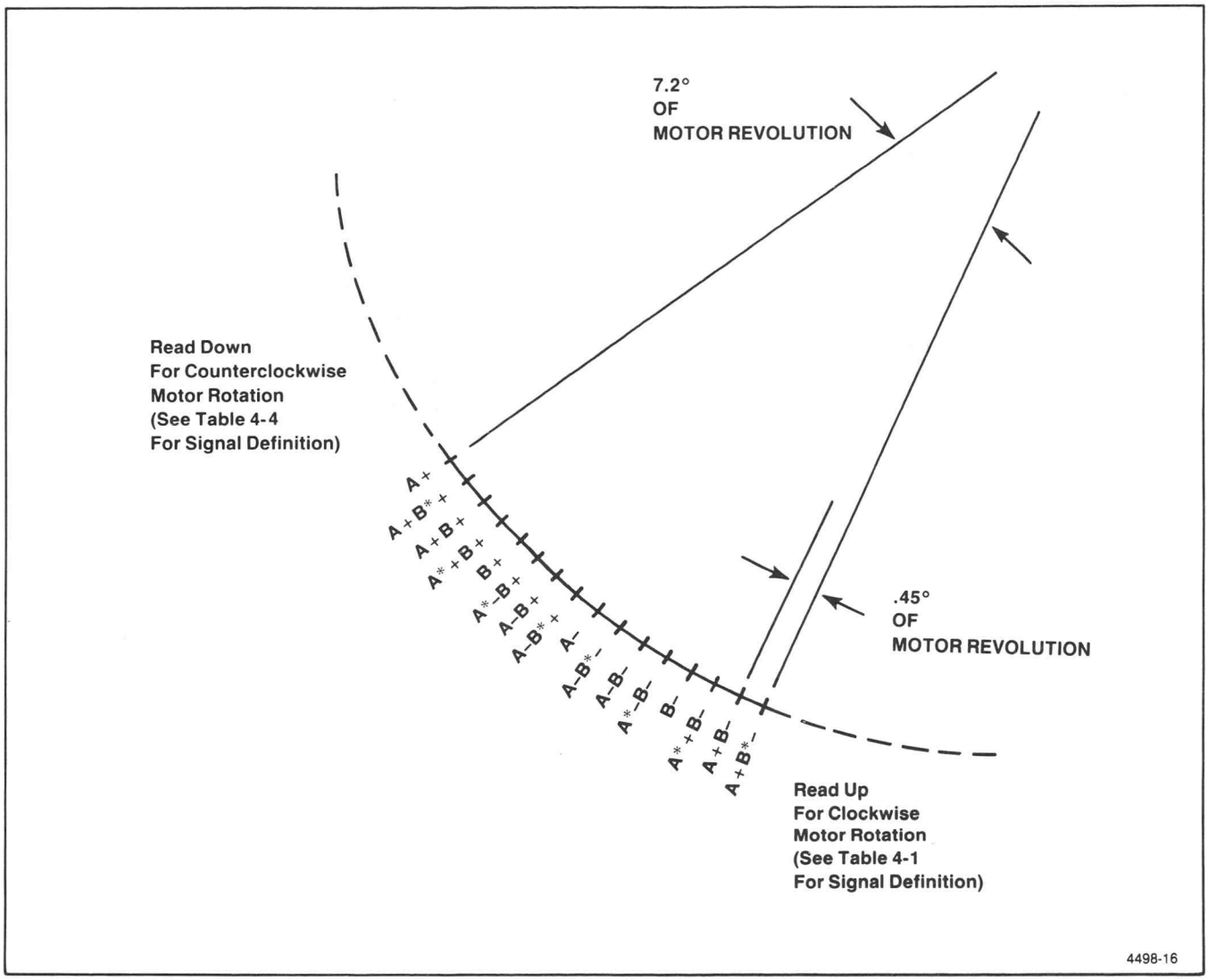


Figure 4-17. Head Carriage Stepper Motor Signal Pattern Diagram.

Drum Motor Driver

The Drum Motor Driver controls the rotational speed of the drum motor. The rotational speed of the drum motor is critical to the operation of the copier since the processor needs to know where the paper is at all times in order to time the ink jet heads in placing the ink in the proper location. The speed of the drum motor is controlled by a combination of MMTS-0, MMTF-0, and MMTPLS-0 from the CPU circuit board. In addition, the Drum Motor Driver monitors three separate feedbacks to determine what speed and how the drum motor is operating. These feedbacks are compared to references using a phase-lock loop circuit. The Drum Motor Driver detects differences to phase, speed, or electromotive force and compensates by causing the motor to supply more or less torque to speed it up or slow it down. Table 4-5 shows how the three signals from the CPU circuit board and the three feedbacks are combined to produce different motor speeds. The drum motor rotates at 666.7 rpm while printing and at 20-40 rpm while loading or unloading paper.

Table 4-5

Drum Motor Control Signals

Control Signal			Feedback			Drum Motor
MMTS	MMTF	MMTPLS	Phase	Speed	EMF	Rotating Speed
1	1		OFF	OFF	ON	STOP
0	1	20KHz	OFF	ON	OFF	Slow (20-40 rpm)
1	0	440KHz	ON	ON	OFF	Fast (666.7 rpm)
1	1		OFF	OFF	ON	STOP
0	0	NOT ALLOWED				

Figure 4-18 shows a simplified block diagram of the Phase Lock Loop circuit shown on Schematic A6-2 and the Drum Motor Power Driver on Schematic A6-3. The dc relay is, however, located on the Low Voltage Regulator circuit board.

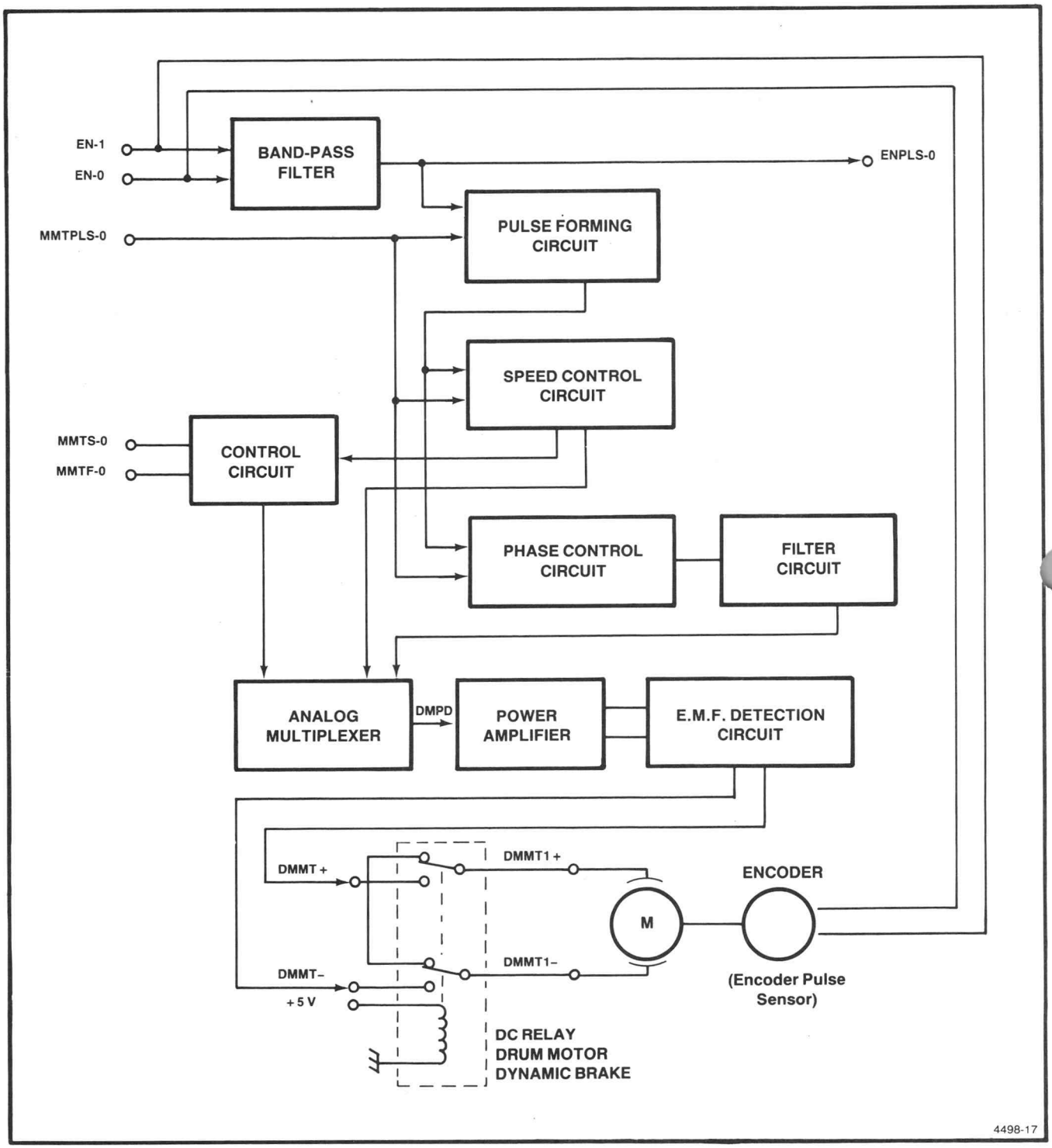


Figure 4-18. Drum Motor Driver Block Diagram.

Drum Motor Power Driver

The Drum Motor Power Driver provides the two signals (DMMT+ and DMMT-) for the dc drum motor. Q15 and Q16 control which of the two bridged amplifiers is turned on and by how much. DMPD from the Analog Multiplexer (see Figure 4-18) controls the two bridged amplifiers. Since the drum motor is a brush-type motor, it acts as a generator to produce an EMF signal which is detected by IC19B, the EMF Detection Circuit. The circuit uses this motor generated EMF signal as negative feedback to stop the motor.

Front Panel Indicator

The Front Panel Indicator circuit board, shown in Figure 4-5 and on the Schematic labeled "A7thruA16," consists of five front panel LEDs and their drivers. The five front panel lights are:

- WAIT
- LOAD PAPER
- LOAD INK
- CHECK PAPER PATH
- FAULT

The signal lines from the CPU circuit board are NOR'd with a one second (approximate) timer. When the timer goes low, any LEDs which the CPU processor has addressed with a low signal line will turn on and blink at a one second rate.

Empty Cartridge Indicator

The Empty Cartridge Indicator circuit board, shown in Figure 4-5 and on the Schematic labeled "A7thruA16," consists of four LEDs. The CPU processor turns on the LED corresponding to a particular color ink after the Low Ink Level Detection circuit has detected its ink cartridge to be nearly empty. The CPU processor also turns on the front panel LOAD INK light and issues the NOINK-O signal to the Parallel Interface. After completing the current printing copy, the copier will not make another copy until the empty ink cartridge is replaced.

Sensors

The copier contains eleven sensors in three forms shown in the Schematic labeled "A7thruA16." These sensors (shown in Figure 4-5) inform the CPU Processor of the location of moving mechanical assemblies in the copier. The CPU Processor uses this information to control the mechanical and electrical activity in the copier. In all cases the sensor uses the same principle - that is a portion of the moving mechanical assembly breaks a light beam traveling from an LED to a phototransistor. Table 4-6 shows the principle of each detector, its output, and the indicator LED status (the Encoder Pulse sensor does not have an indicator LED).

All Sensors, except Drum Lock Point and Encoder Pulse

All of the sensors except the Drum Lock Point and Encoder Pulse operate the same. When no mechanical assembly breaks the light beam between the LED and the phototransistor, the phototransistor conducts. The conduction of the phototransistor turns off the output transistor. This causes a high output signal and turns off the indicator LED. Then, when the mechanical assembly breaks the light beam, the phototransistor stops conducting. This causes the output transistor to turn on, which turns on the indicator LED and asserts a low output signal.

Drum Lock Point Sensor

The Drum Lock Point sensor operates in the opposite manner to the sensors described above. When no mechanical assembly breaks the light beam, the output transistor conducts, the indicator LED is on, and DLPT-0 is low. Then, when the light beam is broken, the DLPT-0 goes high and the indicator LED turns off.

Encoder Pulse Sensor

The Encoder Pulse sensor does not have an indicator LED and EN-1 is ground. EN-0 goes low when the light beam is broken because the phototransistor stops conducting. The opposite happens when no mechanical assembly breaks the light beam - the phototransistor starts conducting and EN-0 goes high.

Table 4-6

SENSORS

Name	Detector Principle	Output	Indicator LED Status
No Paper Sensor	Paper sense lever interrupts light beam	NOPPR-0	LED is on when paper is present
Front Switch	Paper carrier is detected at forward end of travel	FSW-0	LED is on when paper carrier is in forward position
Back Switch	Paper carrier is detected at rear end of travel	BSW-0	LED is on when paper carrier is in rear position
Jam Check	Paper interrupts light beam	JMCK-0	LED is on when paper is being fed onto the drum
Drum Lock	Solenoid bar cuts off light beam	DRLK-0	LED is on when solenoid is locked
Start Position	Ink jet head carriage is detected at left end of travel	STPS-0	LED is on when carriage is at extreme left position
Scanner Limit	Ink jet head carriage is detected at right end of travel	SSLMT-0	LED is on when carriage is at extreme right position
Roller Position	Detects hole in disk on roller bar	ROPS-0	LED is on when rollers are stopped (not removing paper)
Drum Lock Point	Detects hole in disk on drum axle	DLPT-0	LED is on when hole reaches detector
Encoder Pulse	Detects series of holes in disk on drum axle	EN-0,EN-1	No LED
Paper Size	Paper size sense lever interrupts light beam	PSIZE-0	LED is on when B-size paper is present

Power Supply

The copier's power supply consists of three major parts:

- Power Supply Module
- Low Voltage Regulator Circuit Board
- High Voltage Regulator Circuit Board

A detailed description of each of these three parts is described in the following paragraphs. Figure 4-5 shows the electrical relationship of the three power supply parts to the rest of the copier.

Power Supply Module

The Power Supply Module, shown in the System Interconnect 1 diagram (Section 13), consists of the input line conductors, power switch, interlock switch, voltage selector, main transformers, and fuses. The Power Supply Module supplies power for the rest of the copier using the Low and High Voltage Regulator circuit boards. The voltage selector permits the copier to be connected to line voltages of 100 volts (90-110 volt range), 117 volts (105 to 129 volt range), 200 volts (180 to 220 volt range), or 235 volts (211 to 258 volt range).

Table 4-7 shows all of the fuses used in the Power Supply Module.

Table 4-7

POWER SUPPLY FUSES

Fuse #	Rating	Circuit Protected
F1	6.25A slow (for 90-130 volt operation) 3A slow (for 180-250 volt operation)	Primary line input voltage
F2	10A fast	+5 Volt Circuit (logic circuitry in copier)
F3	3A fast	+12 Volt Circuit (analog circuitry in copier)
F4	3A fast	-12 Volt Circuit (analog circuitry in copier)
F5	3A fast	+7.4 Volt Circuit (head cleaning motor)
F6	10A fast	+24 Volt Circuit (motor and solenoid circuits)
F7	1.5A fast	+300 Volt Circuit (ink jet head driver)
F8	0.15A fast	Reference Voltage for the 300 Volt Supply

Low Voltage Regulator Circuit Board

The Low Voltage Regulator circuit board, which is shown in both Figure 4-19 and in Schematic A17A1-1, consists of the circuitry to produce regulated +5, +7.4, +12, +24 (for cooling fan), and -12 volts. In addition, there is an unregulated +24 volt supply for the motors controlled by the Driver circuit board.

+5 Volt Regulator. The +5 Volt Regulator rectifies the ac voltage from the Power Supply Module and produces a regulated output dc voltage of +5 volts @ 6A. The +5 Volt Regulator consists of three series-pass regulators connected in parallel. These are Q3, Q4, and Q5. IC1 uses Q1 and Q2 to control the three series-pass regulators. R3, R4, and R5 provide current and voltage feedback to IC1 for regulating both the output current and voltage. These resistors also help balance the current load between the three series-pass regulators. Q13 and Q14 turn on to short the output to ground if the output voltage should exceed approximately 6 volts. This is a type of "crowbar" protection circuit. VR1 adjusts the output voltage.

+7.4 Volt Regulator. The +7.4 Volt Regulator uses the same principle as the +5 Volt regulator described earlier, except that only one series-pass transistor (Q12) is used. VR4 is used to adjust the output voltage.

+12 And -12 Volt Regulators. The +12 and -12 Volt Regulators use a full-wave bridge rectifier on a center-tapped secondary winding of the main transformer to provide both + and - inputs to the two regulators. The + and - voltages are regulated independently in the same manner as the +5 and +7.4 volt regulators described earlier. Each regulator consists of a single series-pass transistor controlled by IC2 (for the +12 volts) or IC3 (for the -12 volts). VR3 adjusts the -12 volt output voltage and VR2 adjusts the +12 volt output voltage.

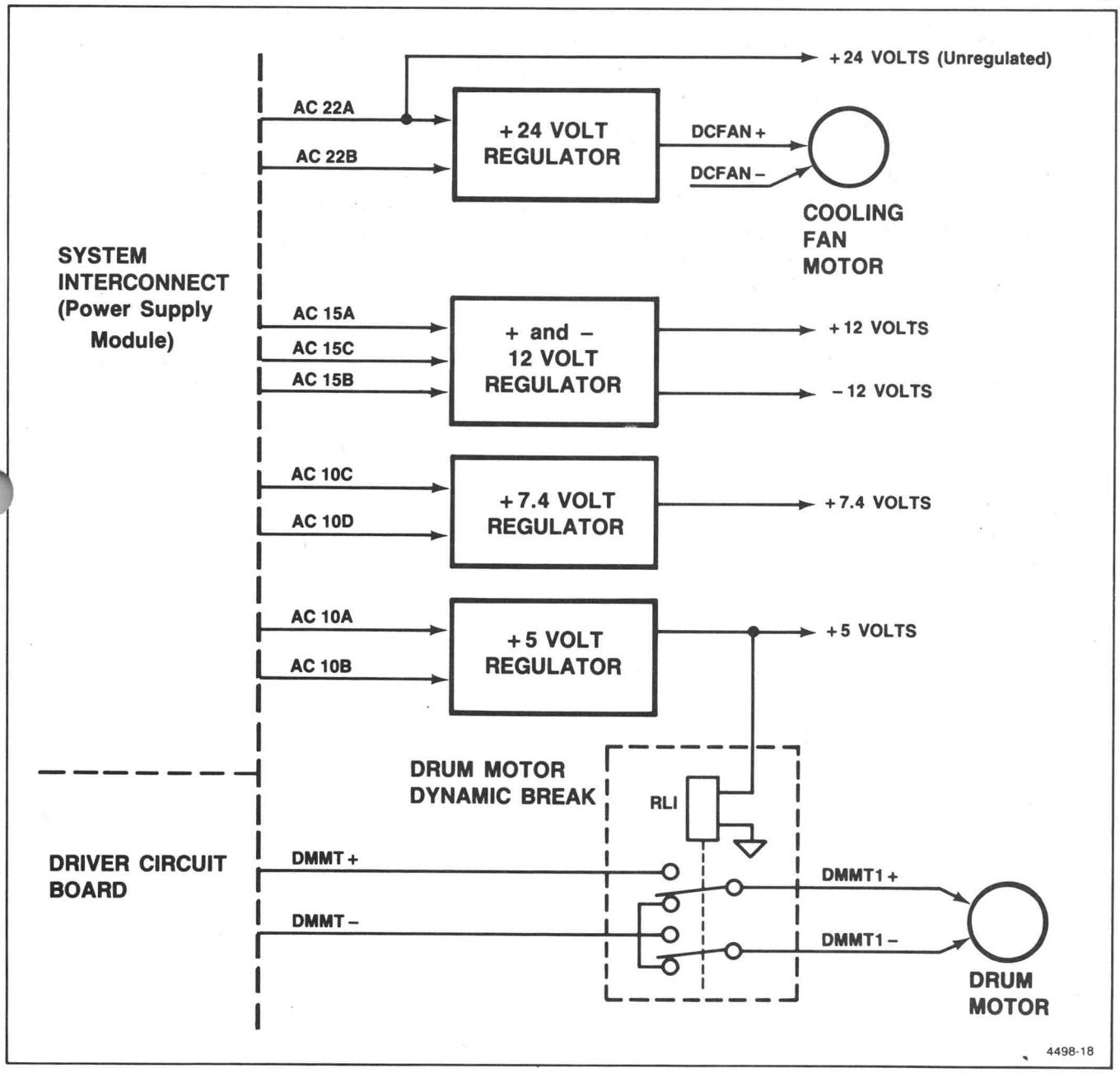


Figure 4-19. Low Voltage Regulator Circuit Blocks.

+24 Volt Regulator. The +24 Volt Regulator provides both an unregulated +24 volt supply for the copier's motors (through the Driver circuit board) and a regulated +24 volt supply for the cooling fan motor. IC5 provides the +24 volt regulation for the cooling fan motor.

Drum Motor Dynamic Brake. The Drum Motor Dynamic Brake shorts the motor winding together (after disconnecting them from the power source) whenever the copier's power is turned off or the +5 volt power supply fails. This causes the motor to stop quickly. Without the brake, if the copier's power should be lost (or turned off) while printing, the drum would continue to rotate while coasting to a stop. At the same time, the loss of power would shut off the paper hold-down vacuum fan and the paper would release from the spinning drum and rub or slap against the delicate ink jet heads - a very undesirable action.

High Voltage Regulator Circuit Board

The High Voltage Regulator circuit board, shown in Figure 4-20, provides power for:

- Ink Jet Head Drivers
- Air Pump Motor
- Paper Hold-Down Vacuum Fan

Schematic A17A2-1 shows the High Voltage Regulator circuitry.

Head Driver Voltage Regulator. The Head Driver Voltage Regulator provides the + and -150 volts (actually approximately +170 volts and -130 volts) for the Ink Jet Head Driver circuit board. There, the + and -150 dc voltage is combined with the 20KHz printing signal to produce the Ink Jet Head printing signal.

The Head Driver Voltage Regulator rectifies a 300 volt ac signal and passes it through a series-pass regulator (Q1). Q1 is controlled by a current-limit detector (Q3) and a voltage comparator (Q4 and Q5). VR1 adjusts the output voltage, which is set at 290 to 300 volts measured between CP1 and CP3.

Air Pump Relay Driver. The Air Pump Relay Driver acts as a switch to couple 100 volts to the air pump motor whenever the CPU Processor asserts PUMP-0. PC1 provides isolation between the TTL logic and the 110 volt circuitry. When PUMP-0 is asserted, Q6 and Q7 are turned on, which, in turn, turns on Q8, the triac. This couples 110 volts to the air pump.

Paper Hold Vacuum Fan. The Paper Hold Vacuum Fan circuit works the same way as the Air Pump Relay Driver circuit described earlier. Q11 (turned on by FAN-0) controls DFANA, which runs the fan and Q14 (turned on by FANBLK-0) controls DFANB, which stops the fan. DFANC is the common for both windings. Figure 4-21 shows a diagram of the Paper Hold Vacuum Fan motor and the input voltages.

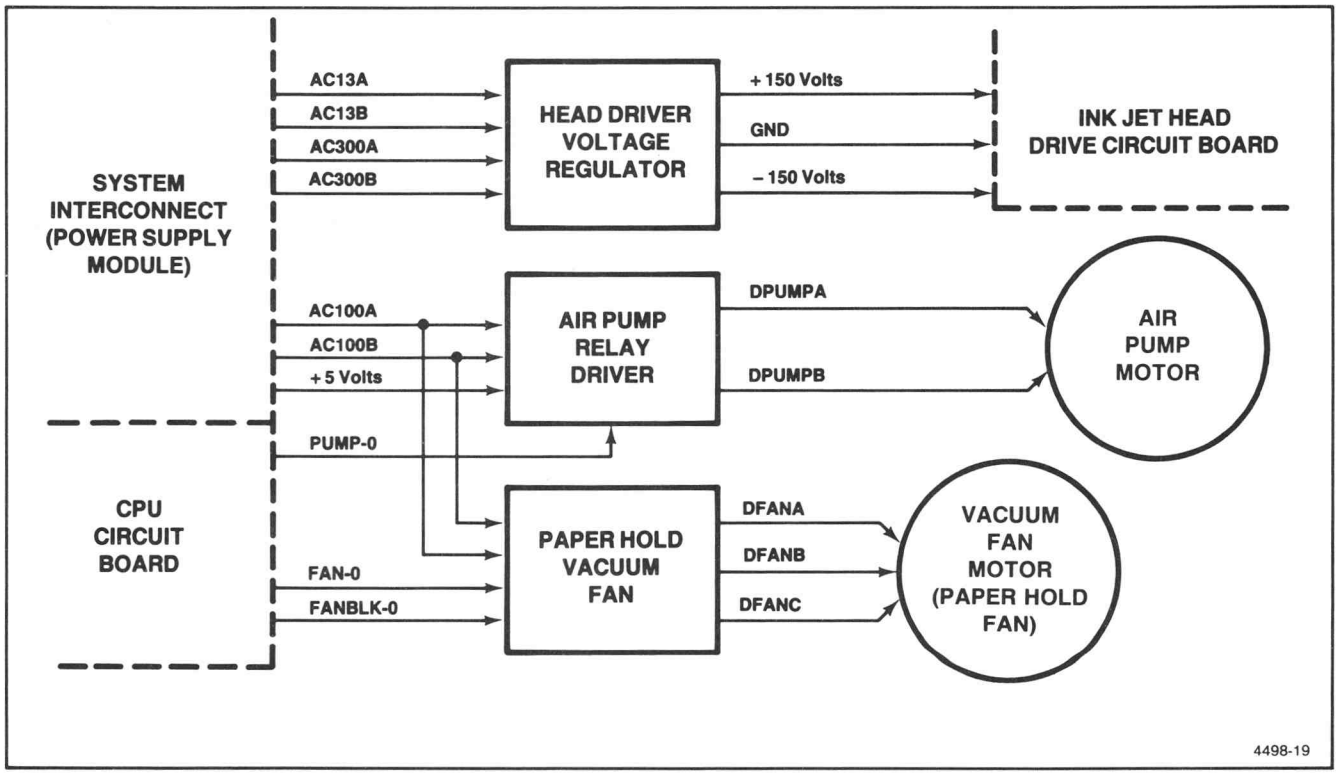


Figure 4-20. High Voltage Regulator Circuit Blocks.

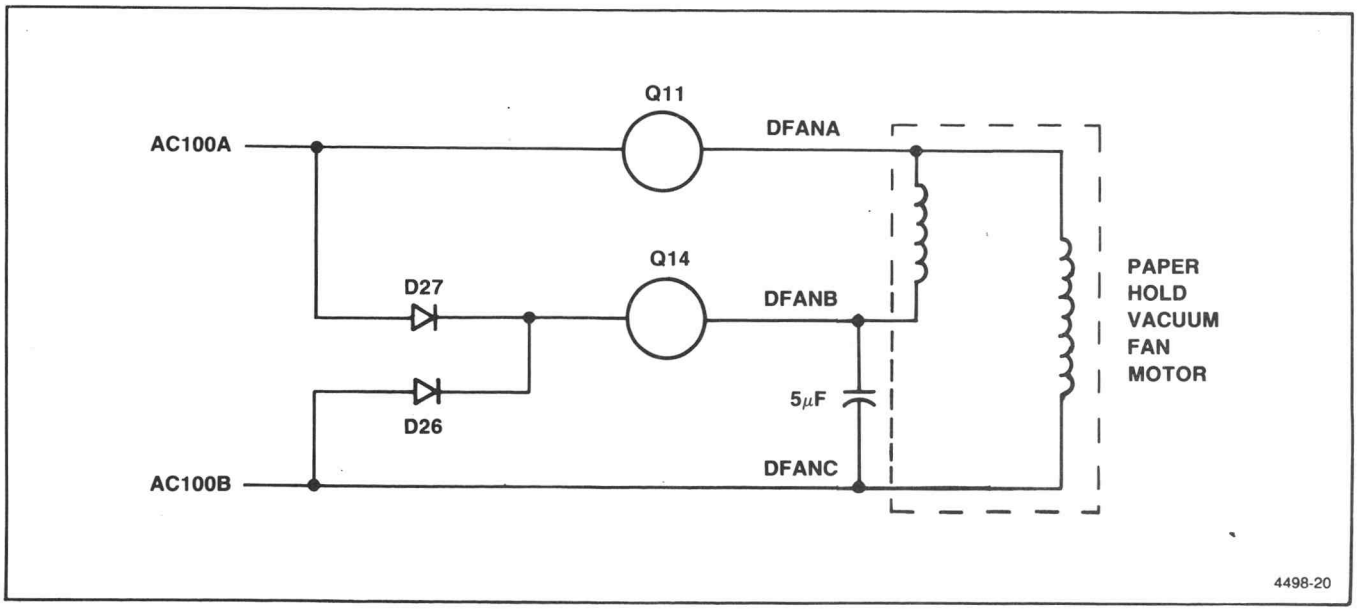


Figure 4-21. Schematic of the Paper Hold Vacuum Fan Motor.

Section 5

CHECKS AND ADJUSTMENTS

INTRODUCTION

Because the copier is an electromechanical device, periodic care and adjustment is necessary for proper performance. The period between adjustments depends on the amount of use that the copier receives. Copier adjustment should be preceded by a thorough cleaning (see Section 6) and inspection for loose, damaged, or worn parts.

After inspecting and cleaning the copier, a 30-minute warmup period must precede the adjustment procedures, which should be performed in a 68 to 86 degree F (+20 to +30 degree C) enviroment.

FUNCTIONAL CHECK PROCEDURES

This procedure exercises the copier's functions and verifies that the copier is working. This procedure can be run by the technician after maintenance.

Power-Up Procedure

1. Open the service access area by pressing the upper-left corner of the service access door. Verify that the Line Voltage Selector switch is set to the appropriate line voltage for your area. See Figure 5-1.

2. Connect the copier's power cord to the ac power source.

3. Press the front panel POWER switch to on.

4. Check that the front panel WAIT indicator flashes for about 15 seconds and then remains off.

5. Load paper according to procedures listed in the 4691 Operator's Manual.

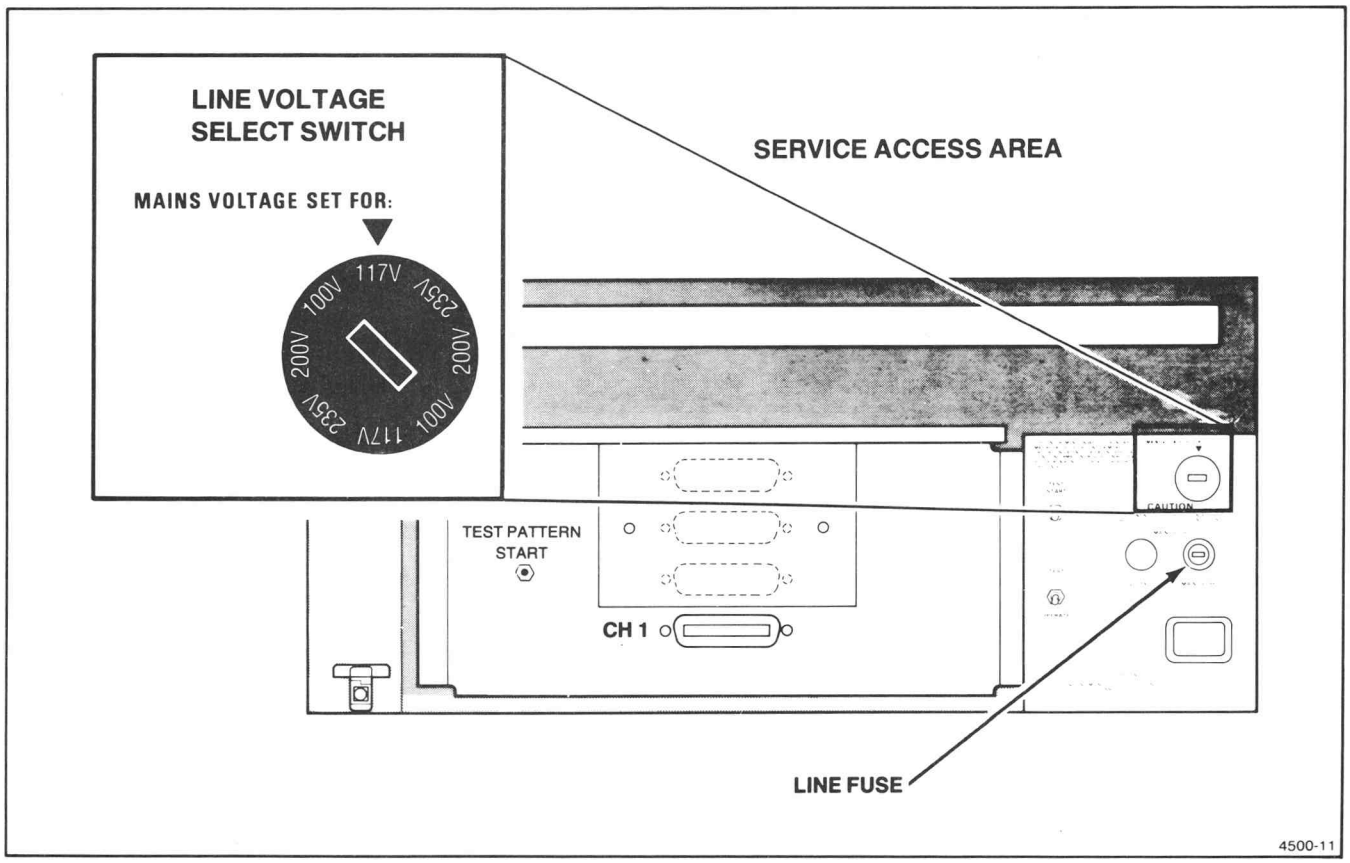


Figure 5-1. Voltage Selection Switch.

Copier Verification

Once the copier is powered up with sufficient ink and paper, perform the following tests to check copier operation.

1. Open the copier top cover (the copier will automatically shut off).

2. Locate the TEST PATTERN SELECT switch at the right rear of the copier. Make sure the five position rotary switch is in the "1" position. See Figure 5-2.

3. Close the copier's top cover.

4. Press the upper-left corner of the service access door and allow it to open.

5. Press the TEST PATTERN START button at the left of the service access. The copier should:

   a. Pick up a sheet of paper.

   b. Load the paper on the drum.

   c. Rotate the paper and drum at high speed without paper flapping.

   d. Make a copy that contains all colors.

NOTE

First time operation after maintenance shut-down may require printing up to five copies to achieve the proper copy quality.

   e. Finally, unload the paper from the drum.

6. Now remove the paper tray, and check that the LOAD PAPER light comes on.

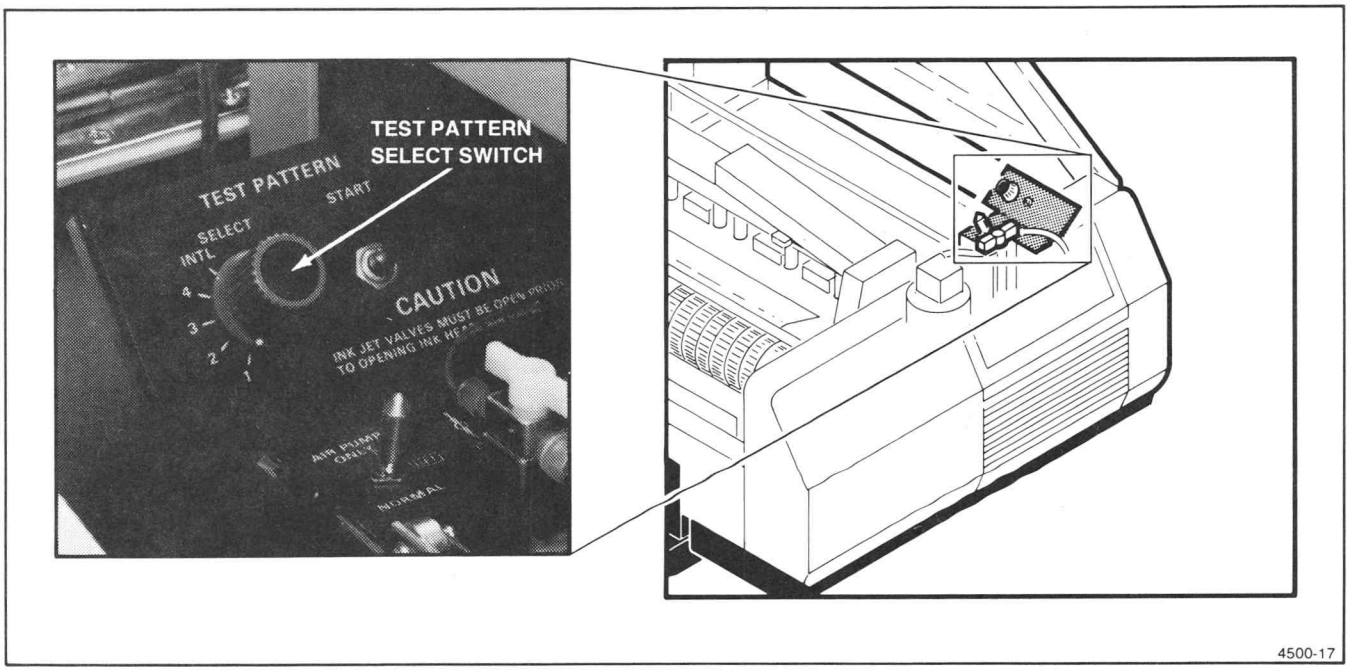


Figure 5-2. TEST PATTERN SELECT Switch.

7. Reload the PAPER TRAY.

8. Go to the service access area and press the TEST PATTERN START button again.

9. Check that the printed copy produced meets the quality criteria outlined in Section 2 of the 4691 Operator's Manual.

10. Close the service access door.

If these tests are successful, the color printing and mechanical parts of the copier are operational. If the test are not successful, refer to Troubleshooting in Section 6 of this manual.

To check the copier interface, perform the next set of listed checks using a TEKTRONIX 4113A Computer Display Terminal (containing 4113A Option 09).

Printing Copies from a 4113A Terminal

The following tests require a TEKTRONIX 4113A terminal that contains Version 3 firmware and has the 4113A Option 09 Interface installed. Customers with 4113A Version 2 firmware must order the 4113A Version 3 firmware upgrade, to be installed at the same time as the Option 09 Interface kit.

1. Connect the copier's 10-foot interface cable to the 36-pin connector at the rear of the 4113A Option 09. The connector is called "Option 9 TO 4690 SERIES COPIER."

2. Once the copier is connected, obtain the desired color display on the terminal screen.

3. To print a copy of the display, simply press the HARD COPY key on the 4113A keyboard.

4. Check that the copier prints a color copy of the display and that its copy quality meets the criteria outlined in Section 2 of the Operator's Manual.

If this test is successful, the copier interface, the 4113A Option 09 (device driver), and the 4113A terminal are operational. If the test is not successful, verify that the terminal has the proper firmware installed. If the terminal is working, the problem exists in the Parallel Interface circuit board. Run the loop-back test described later in this section.

ADJUSTMENT PROCEDURES

Introduction

A thorough cleaning, inspection for loose, damaged, or worn parts, and lubrication should precede any adjustments. After a 30-minute warmup period, perform the adjustment procedures in a +68 to +86 degree F (+20 to +30 degree C) enviroment.

The following checks and adjustments procedures are performed in this section:

- Low Voltage Power Supply Checks and Adjustments
- High Voltage Regulator Adjustment
- Head Driver Waveform Adjustments
- Low Ink Level Detection Adjustment
- Carriage Drive Cable Tension Adjustment
- Drum-To-Carriage Shaft Adjustment
- Stripper Roller Optical Sensor Adjustment
- Chain Hose Assembly Adjustment
- Head Washing Station Adjustment
- Paper Carrier Height Adjustment
- Carriage drive Motor Belt Tension Adjustment
- Carriage End of Travel Sensor Adjustment
- Paper Carrier Optical Sensor Adjustment
- Paper Tray Sensor Adjustment
- Paper Jam Check Sensor Adjustment
- Air Pump Check
- Ink Jet Head Convergence Adjustment (located in Section 8)
- Threshold Voltage Test Procedure (located in Section 8)

Equipment Required

Drum-to-Shaft Adjustment Tool (8mm pin gauge)
(005-0742-00)
Drum Motor Fixture (003-1352-00)
Wash Station Seal Adjustment Fixture (003-1354-00)
Paper Carrier Height Adjustment Fixture (003-1353-00)
#1 and #2 Phillips Screwdrivers (or Pozidriv@)
Slip-Joint Pliers
Small and Medium Slotted Screwdrivers
Needle-Nose Pliers
Air Pressure Gauge (006-6219-00
4691 Test Fixture (067-1158-00 with ID# 670-8123-00)
Extender circuit board (067-1148-00 with
ID# 670-8105-00)
Spring Scale (003-1351-00)
Metric Hex Driver Set (003-1344-00)
Wash Bottle (006-3757-00)
Waste Bottle (006-4433-00)
Loopback Cable (175-8690-00)
Hose Clamps (118-2872-00)
Box of KIMWIPES@ (006-0771-00)

Procedure

Preliminary

1. Turn off the copier's POWER switch and disconnect the line cord.
2. Remove the cabinet (see Section 7).
3. Connect the line cord and insert a small rod (about 1/4 inch in diameter) to activate the safety interlock switch. This permits the copier to operate with the top cover and cabinet off.

Low Voltage Power Supply Adjustments

1. Remove the rear panel on the power supply (see Figure 5-3).
2. Turn on the copier's POWER switch.
3. Attach the ground lead of a DVM to CP5 (see Figure 5-4).
4. Check the voltage on CP1, CP2, CP3, and CP4 (with reference to CP5) and adjust VR1, VR2, VR3, and VR4 using Table 5-1 as a guide. Notice that these test points and adjustments are not in numerical order.
5. Check the voltage on Pin 19 for +24 Vdc (unregulated) and on the cathode of D20 for +24 Vdc (regulated)(see Figure 5-4 for the location of these test points).

Table 5-1

LOW VOLTAGE POWER SUPPLY ADJUSTMENTS

Test Point	Voltage	Adjustment
CP1	+5.05 to +5.15 Vdc	VR1
CP2	+12.05 to +12.15 Vdc	VR2
CP3	-11.95 to -12.05 Vdc	VR3
CP4	+7.45 to +7.55 Vdc	VR4
19	+24 Vdc (unregulated)	No Adjust
D20 (cathode)	+24 Vdc (regulated)	No Adjust

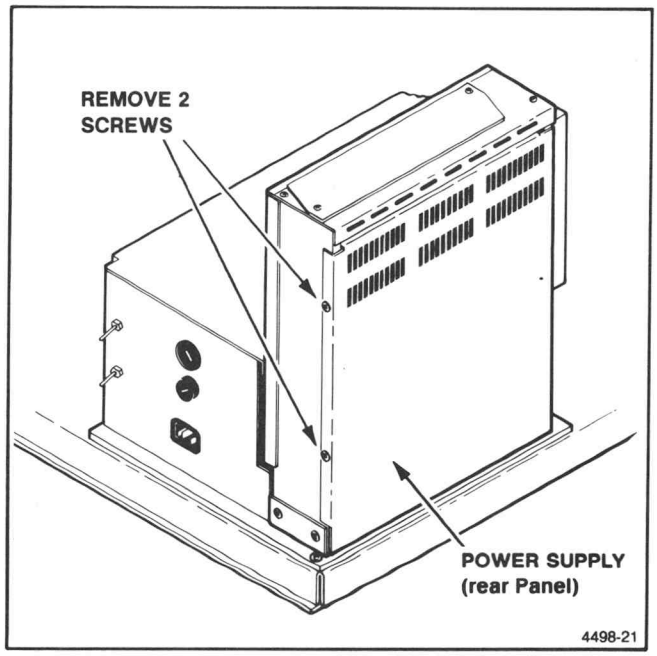


Figure 5-3. Power Supply Rear Panel Screw Locations.

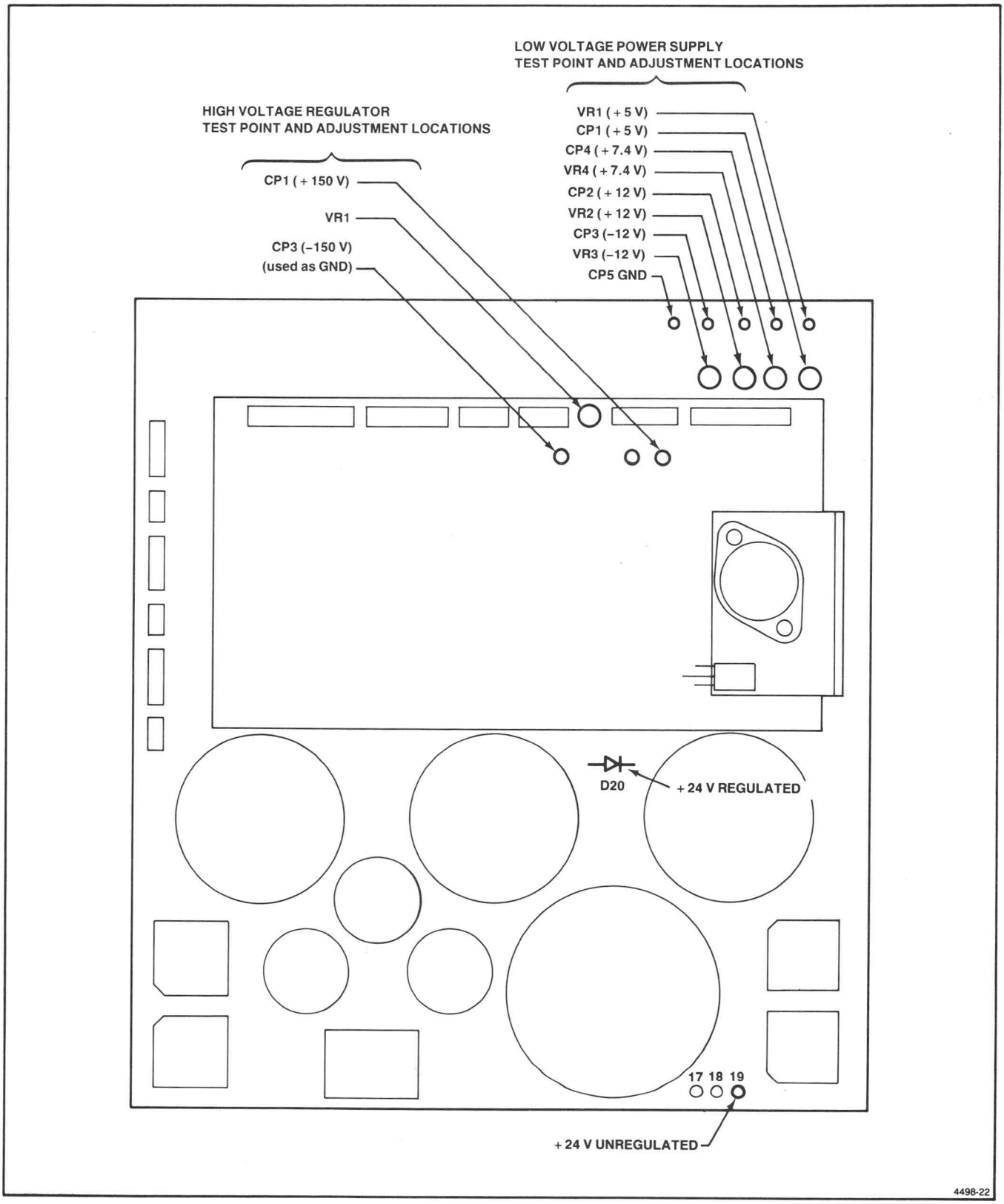


Figure 5-4. Power Supply Test Point and Adjustment Locations.

High Voltage Regulator Adjustment

1. Attach the common or low lead of a DVM to CP3 of the High Voltage Regulator circuit board (see Figure 5-4).

2. Measure the voltage on CP1 and adjust this voltage with VR1 (see Figure 5-4) until the voltage reads between +299 and +300 Vdc.

NOTE

This procedure measures the voltages between two power supplies that share a common "center tap." The center tap (CP2) is not always equidistant between the two supplies. The voltage between CP1 and CP2 can be anywhere from +150 to +172 volts and the voltage between CP2 and CP3 can be anywhere from -127.5 to -150 volts.

Head Driver Waveform Adjustments

1. Turn the copier's POWER switch off.

2. Remove the Interface circuit board and replace with the Extender circuit board.

3. Connect the Interface circuit board to the Extender circuit board.

4. Turn the copier's POWER switch on..

5. Attach the ground lead of an oscilloscope to CP2 on the Interface circuit board (see Figure 5-5).

6. Attach the signal lead of the oscilloscope to Pin 1 of U16A (see Figure 5-5).

7. Set oscilloscope to 2V/Div and 0.5uS/Div.

8. Adjust L4 (see Figure 5-5) for a 2uS plus or minus 0.5uS pulse. The signal should look like that in Figure 5-6A.

9. Attach the signal lead of the oscilloscope to CP1 on the Interface circuit board (see Figure 5-5).

10. Set oscilloscope to 0.5V/Div and 10uS/Div.

CAUTION

Make sure that the voltage set in the next step does not exceed the recommended value. If the voltage is set too high, ink jet head damage may result later when the copier tries to print.

11. Adjust VR3 for a 1.0 Vrms signal (2.8 V p-p plus or minus 0.2 V).

12. Adjust VR2 so that the left end of the 2uS flat portion of the waveform is on the 0 volt line (see Figure 5-6).

13. Adjust VR1 so that the right end of the 2uS flat portion of the waveform is on the 0 volt line (see Figure 5-6). Figure 5-7 shows how the resulting signal should look.

14. Repeat Step 11 and observe the CAUTION.

15. Move the ground lead of the oscilloscope to one of the white wires on the ink jet head carriage.

16. Move the signal lead of the oscilloscope to one of the red wires on the ink jet head carriage.

17. Start the copier printing one of the test patterns (any test pattern using all four ink colors will do).

18. Adjust VR3 on the Interface circuit board so that the ink jet head voltage (on the red wire) is 190 to 195 volts p-p.

19. Turn the copier's POWER switch off.

20. Disconnect the Interface circuit board from the Extender circuit board and remove the Extender circuit board.

21. Replace the Interface circuit board.

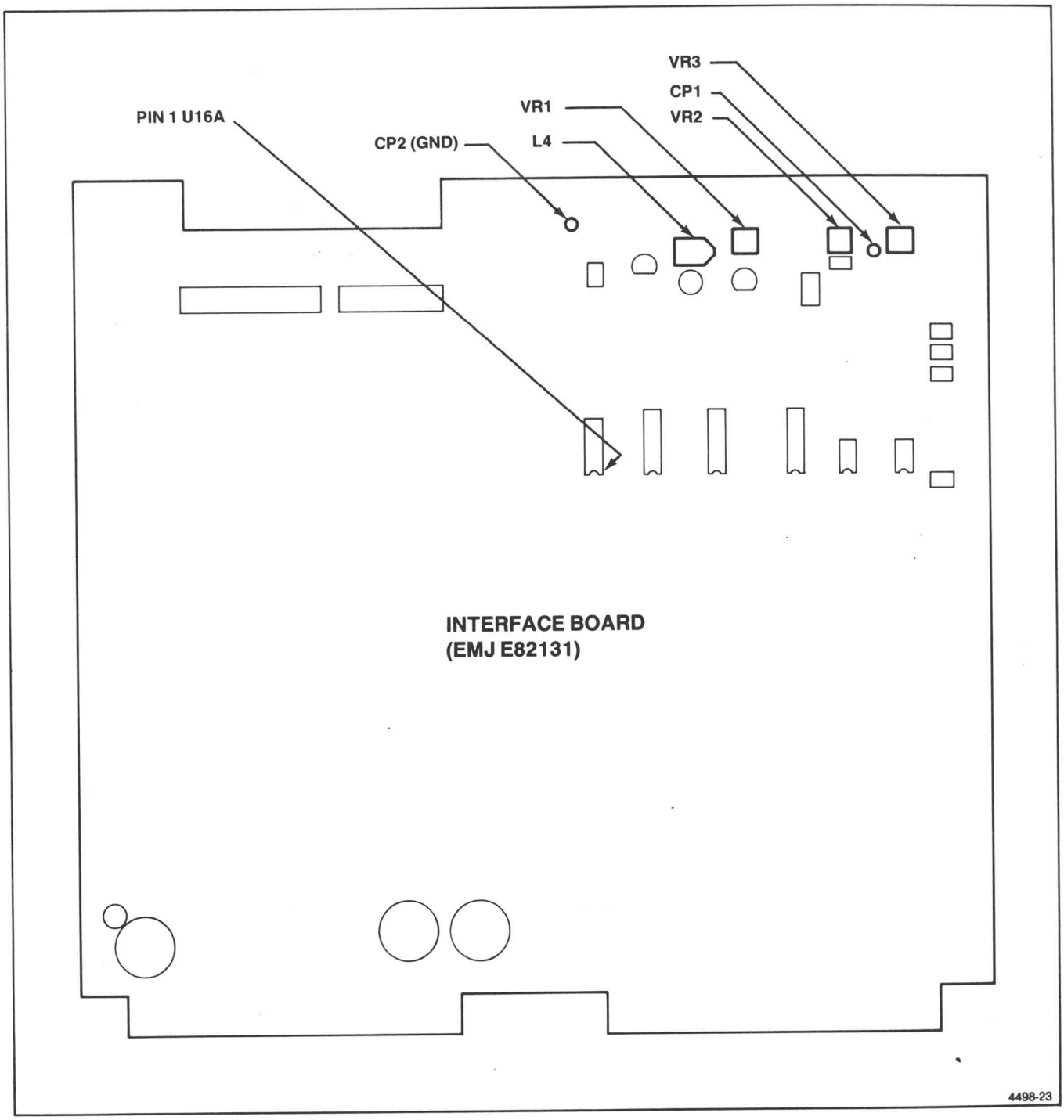


Figure 5-5. Interface Circuit Board Test and Adjustment Locations.

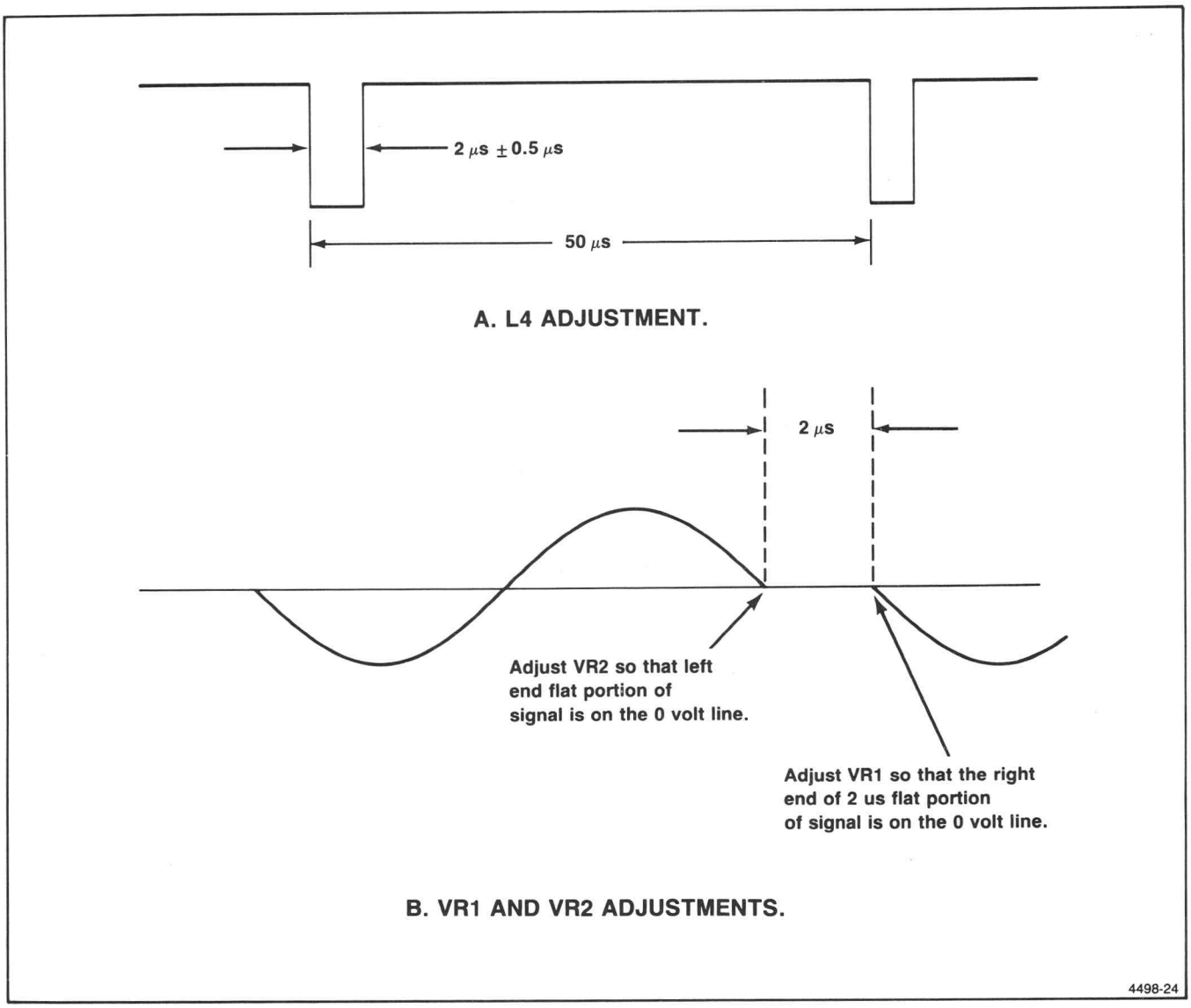


Figure 5-6. Oscillator Waveform Adjustments.

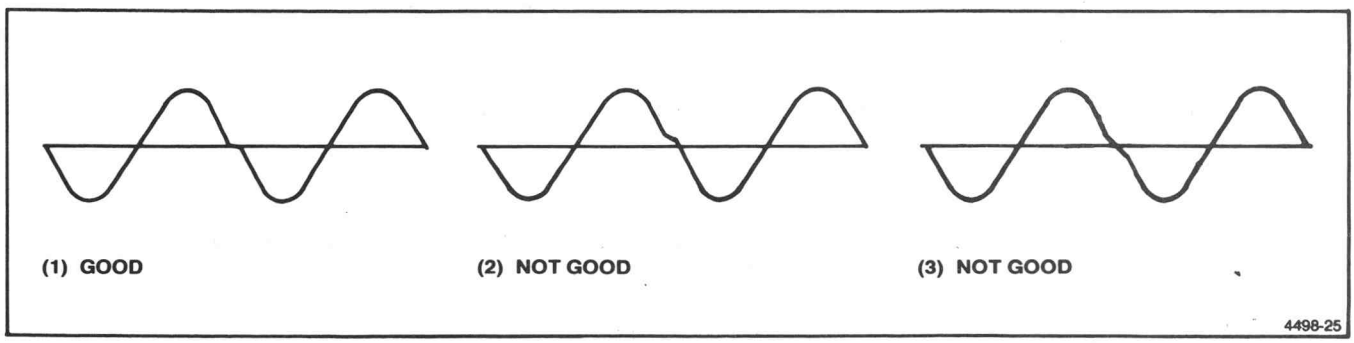


Figure 5-7. Good and Poor Oscillator Waveforms.

Low Ink Level Detection Adjustment

1. Turn the copier's POWER switch off (if not already).
2. Remove the CPU circuit board and replace with the Extender circuit board.
3. Connect the CPU circuit board to the Extender circuit board.
4. Connect the ground lead of a DVM to SG (see Figure 5-8).
5. Turn the copier's POWER switch on.
6. Connect the signal lead of the DVM to the left side of R10 (see Figure 5-8).
7. Adjust VR1 so that the voltage on R10 is 1.0 Vdc (magenta).
8. Move the signal lead of the DVM to the left side of R16 (see Figure 5-8).
9. Adjust VR2 so that the voltage on R16 is 1.0 Vdc (cyan).
10. Move the signal lead of the DVM to the left side of R22 (see Figure 5-8).
11. Adjust VR3 so that the voltage on R22 is 1.0 Vdc (black).
12. Move the signal lead of the DVM to the left side of R28 (see Figure 5-8).
13. Adjust VR4 so that the voltage on R28 is 1.0 Vdc (yellow).
14. Turn the copier's POWER switch off.
15. Remove the DVM's leads.
16. Disconnect the CPU circuit board from the Extender circuit board and remove the Extender circuit board.
17. Replace the CPU circuit board.

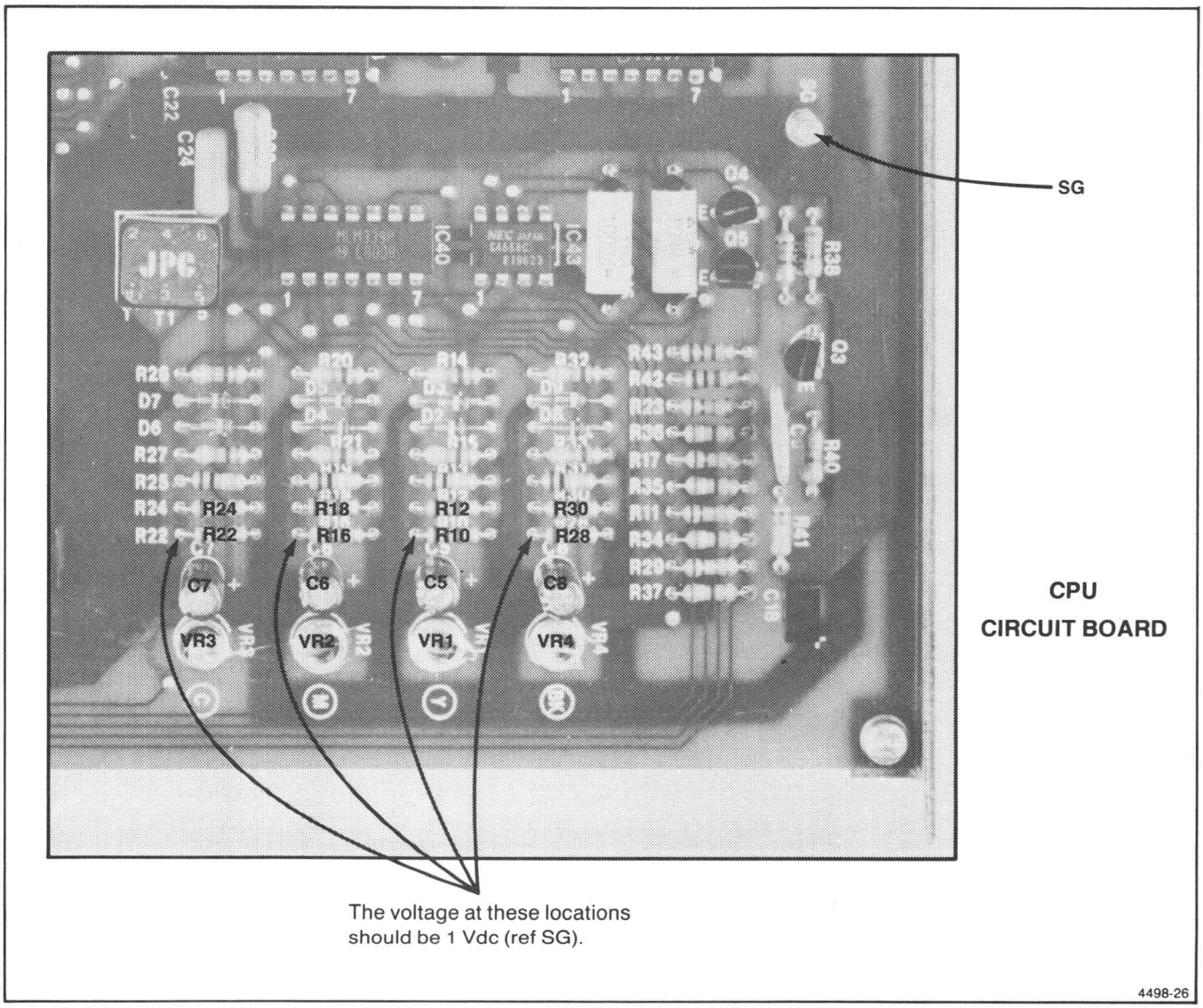


Figure 5-8. Low Ink Level Detection Adjustments and Test Locations.

This completes all of the electrical adjustments in the copier except for Ink Jet Head Convergence, which is performed after all electrical and mechanical adjustments. Proceed to the mechanical adjustments following.

Carriage Drive Cable Tension Adjustment

1. Check that the carriage drive cable is not twisted, frayed, or cut, and that it is not riding up on the pulleys.

2. Loosen the right side pulley mounting screw (see Figure 5-9).

3. Push the right side pulley to the right until visible gaps (spaces) appear between adjacent coils on the two springs connecting the carriage drive cable to the ink jet head carriage (see Figure 5-9).

4. Tighten the right side pulley mounting screw (loosened in Step 2).

5. If the adjustment does not produce gaps between adjacent spring coils, check the routing of the cable. Replace the cable if it is stretched so much that adjustment is not possible.

6. Position the carriage over the wash station cups.

7. Hook the spring scale over the upper carriage drive cable approximately midway between the carriage and the right side pulley. Pull the spring scale vertically up 10 mm. The tension should read 150 grams. The acceptable cable tension range is 150 plus or minus 10 grams with 10 plus or minus 2 mm cable deflection (see Figure 5-9).

8. Repeat Steps 2 through 7 if cable tension is not acceptable.

Drum-To-Carriage Shaft Adjustment

1. Clean the two ink jet head carriage slide shafts with distilled water and wipe dry.

2. Refer to Figure 5-10 and insert the 8mm drum-to-shaft adjustment tool (pin gauge) between the paper drum and the ends of the two ink jet head carriage slide shafts (check four locations). Adjust the position of the shafts to obtain proper clearance.

3. Remove the eight screws holding the chain hose assembly to the chain hose bracket (see Figure 5-10). Remove the two screws that hold the chain hose bracket to the copier's frame and remove the bracket. Let the chain hose assembly hang free.

4. Use the push-pull scale to pull the carriage both to the left and the right. Maximum drag should be less than 300 grams (10.6 oz).

5. If the drag is more than 300 grams, the position of at least one of the two ink jet head carriage slide shafts will have to be changed. Adjust one of the shafts for the minimum drag possible or to 300 grams. The shafts are held by a bolt on each end. If one of the shafts was moved, repeat Steps 2-5.

6. Replace the chain hose assembly with the eight screws removed in Step 3.

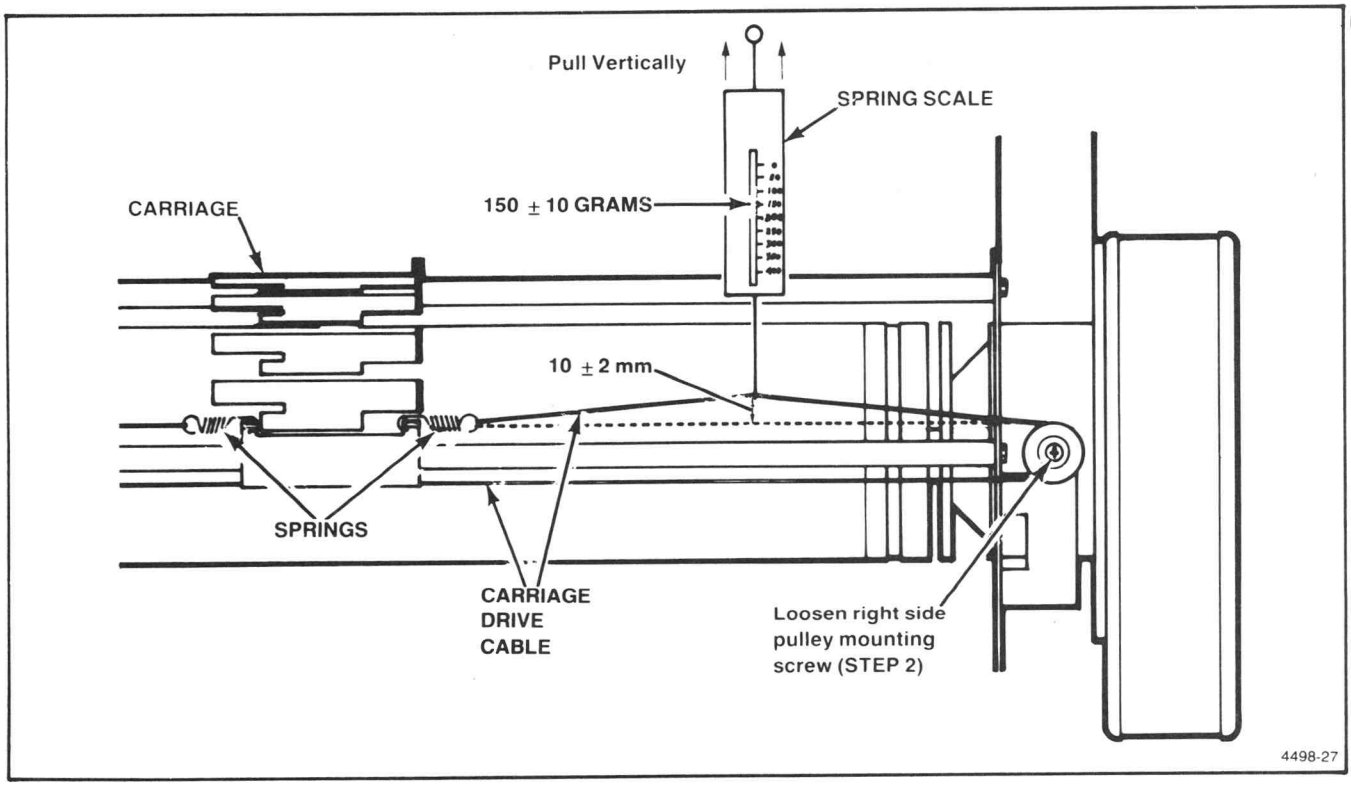


Figure 5-9. Carriage Drive Cable Tension Adjustment.

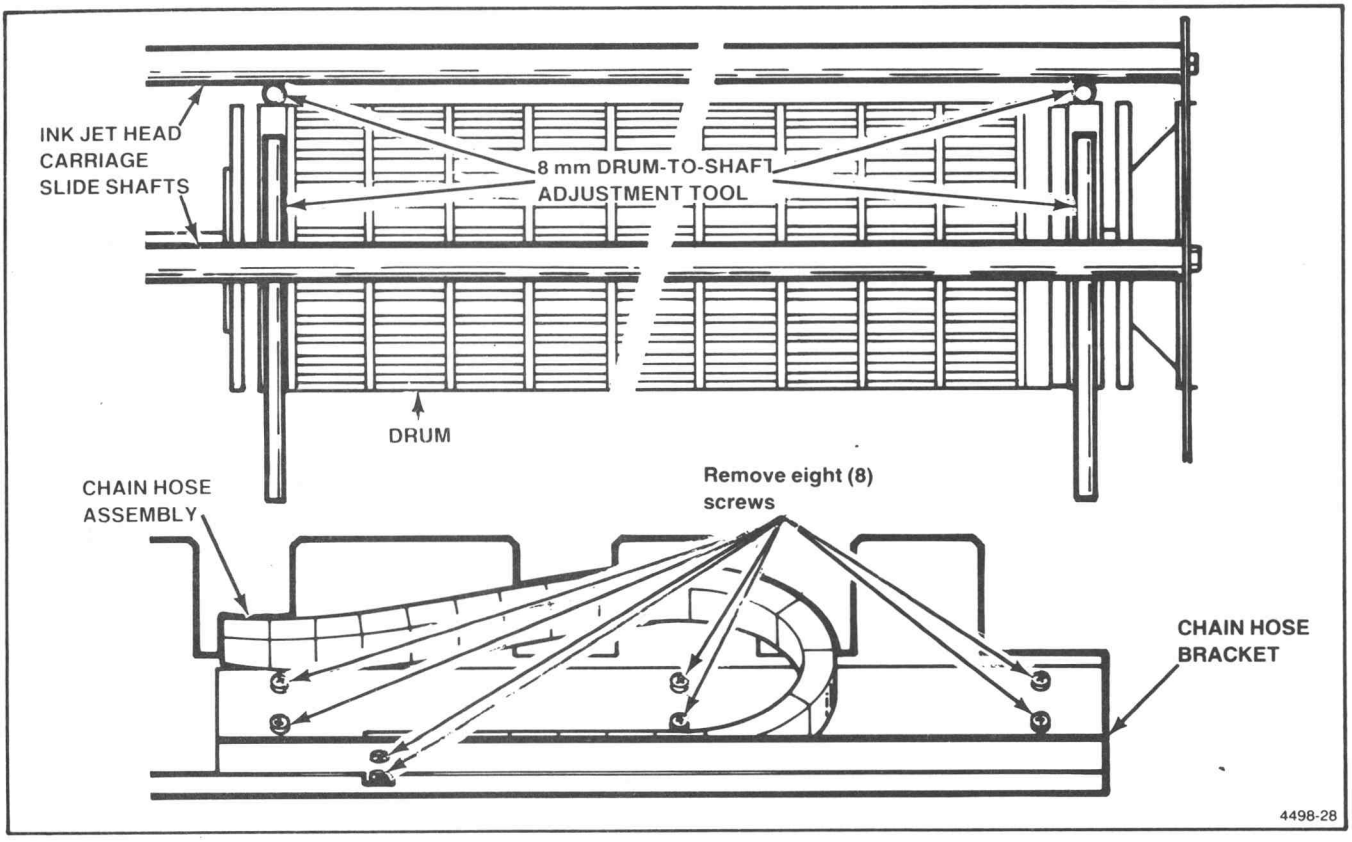


Figure 5-10. Drum-to-Carriage Shaft Adjustment Locations.

Stripper Roller Optical Sensor Adjustment

1. Rotate the stripper roller shaft until the flat surfaces of the rubber rollers face the drum. Notice that there are two roller shafts - one in front of the drum and one behind the drum. However, both of the stripper roller shafts are "ganged" together with a common chain drive.

2. Loosen the set screw on the slotted interrupter disk (see Figure 5-11).

3. Rotate the interrupter disk until the cutout (slot) is positioned in the optical sensor.

4. Tighten the set screw on the slotted interrupter disk (loosened in Step 2).

Chain Hose Assembly Adjustment

This adjustment is not necessary unless the ink jet head carriage wire rides over or on top of the chain hose assembly while the carriage moves back and forth. The carriage drive wire should remain behind the chain hose assembly throughout the carriage travel. If it does not, use the following procedure:

1. Loosen (but do not remove) the two Phillips screws at each end of the chain hose assembly.

2. Twist or rotate the chain ends until the center sections of the chain hose assembly are positioned in front of the carriage drive wire.

3. Tighten the four screws holding the chain hose assembly (loosened in Step 1).

4. Manually move the carriage back and forth to the extreme limits of the carriage travel and check that the chain hose assembly remains in front of the carriage drive wire.

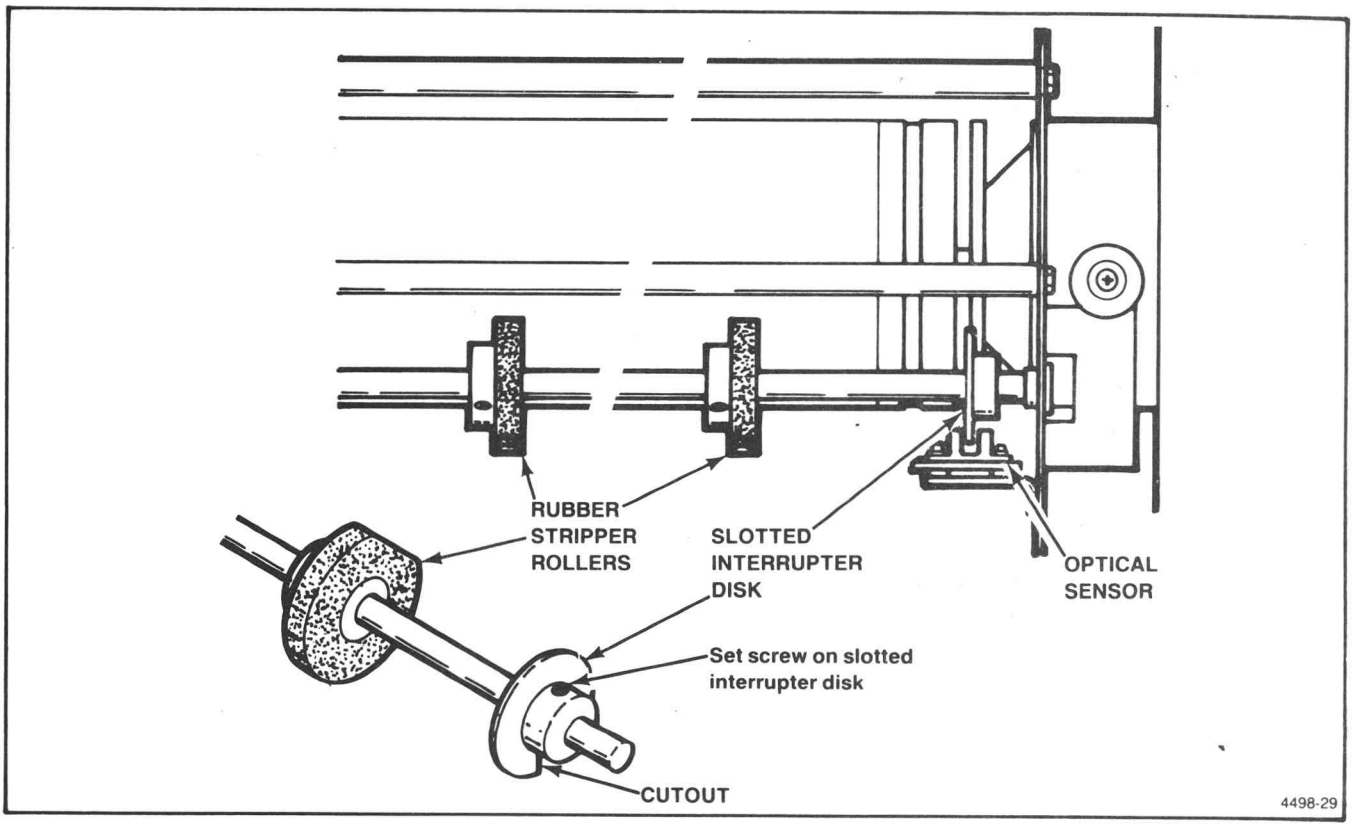


Figure 5-11. Stripper Roller Sensor Adjustment Locations.

Head Washing Station Adjustment

1. Remove the ink jet head wash reservoir (refer to Section 7 for procedure).

2. Remove the drum motor (also refer to Section 7). The drum motor is held with three screws. Also be sure to loosen the two set screws on the drum shaft to allow the motor shaft to slide out.

3. Install the drum motor fixture over the drum shaft. The drum motor fixture keeps the drum shaft in correct alignment while the drum motor is removed.

4. Loosen (but do not remove) the two screws holding the wash station to the frame (see Figure 5-12). These screws are (or were) under the drum motor.

5. Place the wash station seal adjustment fixture over the drum and wash station cups.

6. Slide the wash station seal adjustment fixture to the left and up against the left stop, which is the Z-shaped brackets holding each cup. Slide the fixture to the left until the Z-shaped brackets are "rocked" to the left (see Figure 5-13).

7. Check that the lip of each of the four wash station cups forms a complete O-shaped seal on the underside of the fixture (see Figure 5-13). If the cups do not form a complete O-shaped seal, move the wash station slightly until the all cups make a complete seal. Ensure that the top edge of each Z-shaped bracket is flat against the edge of the wash station seal adjustment fixture. Use pliers and gently rotate any bracket that is not flat against the fixture.

8. Tighten the screws holding the wash station to the frame (loosened in Step 4).

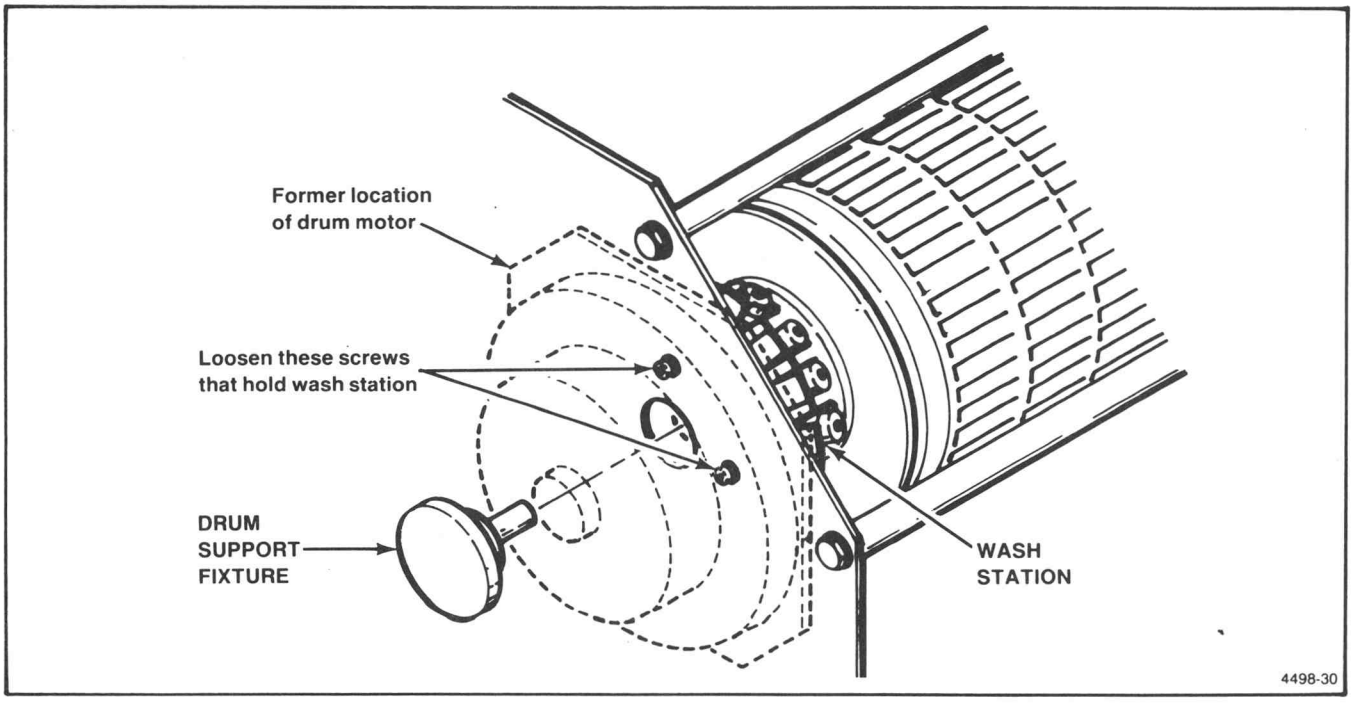


Figure 5-12. Wash Station Adjustment Locations.

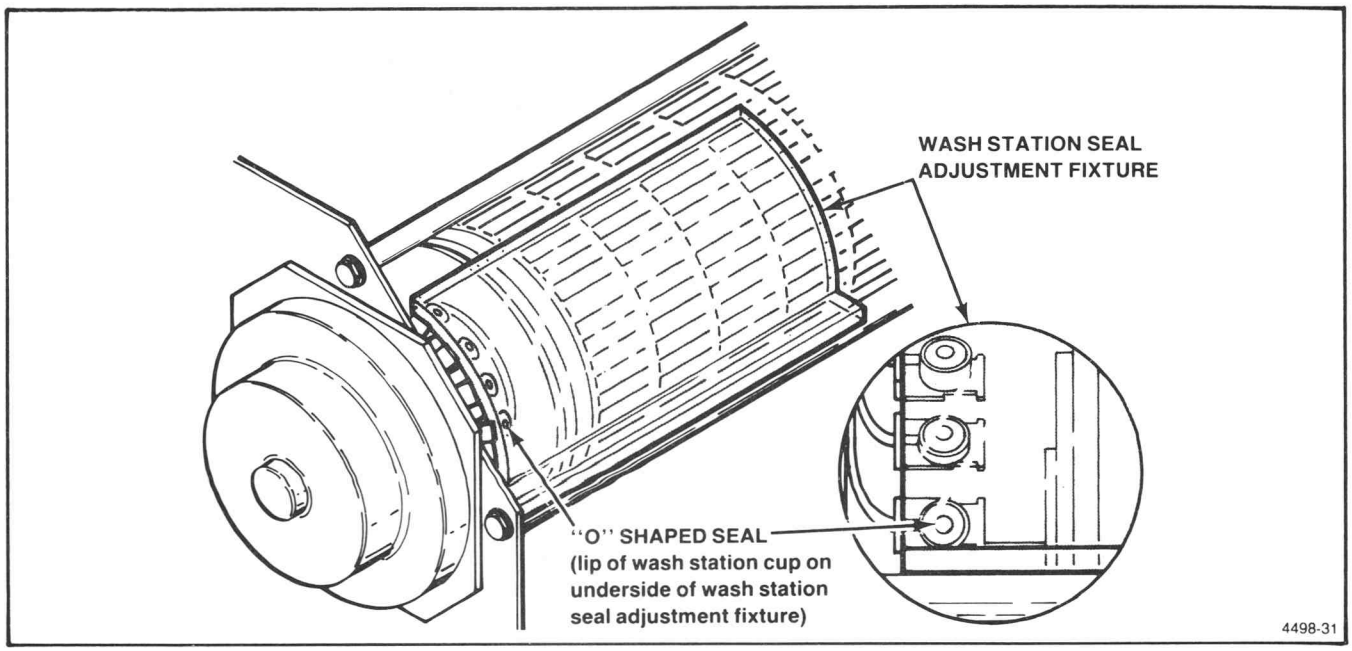


Figure 5-13. Wash Station Seal Adjustment Fixture.

9. Remove the wash station seal adjustment fixture.

10. Check that the tubing to the wash stations is not kinked and has some slack when the wash station cups are in the "rocked" position.

11. Slide the ink jet head carriage to the left and over the wash cups. Ensure that the leading edge of each ink jet head does not scrape the lip of its respective wash cup as it passes over the cup.

12. Remove the drum motor fixture and install the drum motor (refer to Step 2).

13. Replace the ink jet head was reservoir removed in Step 1.

Paper Carrier Height Adjustment

1. Remove all paper from the paper tray.

2. Rotate the paper carrier drive shaft (shaft that passes over paper tray position) to position the paper carrier over the left edge of the paper tray (viewing the front of the copier). This is the portion of the paper tray next to the chrome paper guide strip. At this point, the paper guide is at its highest position. If the paper carrier is moved too far over the paper tray, the paper carrier drops down (as in picking up a piece of paper).

3. At this point, the bottom of the six cylinder-shaped paper pick tubes should be 7 mm above the empty paper tray (paper pick tubes are hanging fully extended from paper carrier). Install the paper carrier alignment tool on the stationary pick block nearest the drum motor side of the unit (left end of drum when looking front of paper drum - see Figure 5-14A).

4. Reach under the right end of the drum (when viewing the front of the drum) and engage the drum lock mechanism. (push up). While still engaging the drum lock mechanism, rotate the drum (either direction) until the drum locks.

5. While still holding the drum lock mechanism engaged, rotate the rear paper carrier shaft (located over the paper tray) so that the paper carrier approaches the drum. Observe the paper carrier alignment tool as it approaches the open drum paper latch (located on top of the drum). The .025" (.6mm) thick alignment tool should enter the middle of the paper latch (see Figure 5-14A). If not, loosen the two end screws of the paper carrier (see Figure 5-14B) and position the paper carrier to obtain the proper adjustment. Then, repeat Steps 4 and 5 as necessary.

6. Move the paper carrier alignment tool to the stationary pick block on the opposite end of the paper carrier (right-most) and repeat Steps 4 and 5 until the paper carrier is aligned.

7. After the paper carrier is set at the correct height, tighten the four screws holding the paper carrier and remove the paper carrier alignment tool.

8. Replace the paper in the paper tray.

Paper Carrier Position Adjustment

1. Loosen the two belt-clamp screws that hold the drive belt to the paper carrier on each side of the paper carrier (see Figure 5-15).

2. Slide the paper carrier mechanism rearward until the slide rails are even with the outer edge of the frame (see Figure 5-15).

3. Use a flat ruler to make certain that each slide rail is even with the frame. Then, tighten the four screws loosened in Step 1.

Paper Carrier Belt Tension Adjustment

1. Rotate the rear paper carrier shaft (located over the paper tray) until the paper carrier is located over the chrome paper guide (next to the drum).

2. Hook the spring scale on the upper belt near the middle and pull up vertically. The belt tension should be 100 plus or minus 10 grams with 3 mm of belt deflection. If adjustment is required, loosen (do not remove) the screw holding the pulley at the drum end of the belt (see Figure 5-15). Position the pulley to adjust the belt tension. Then, check the belt tension again.

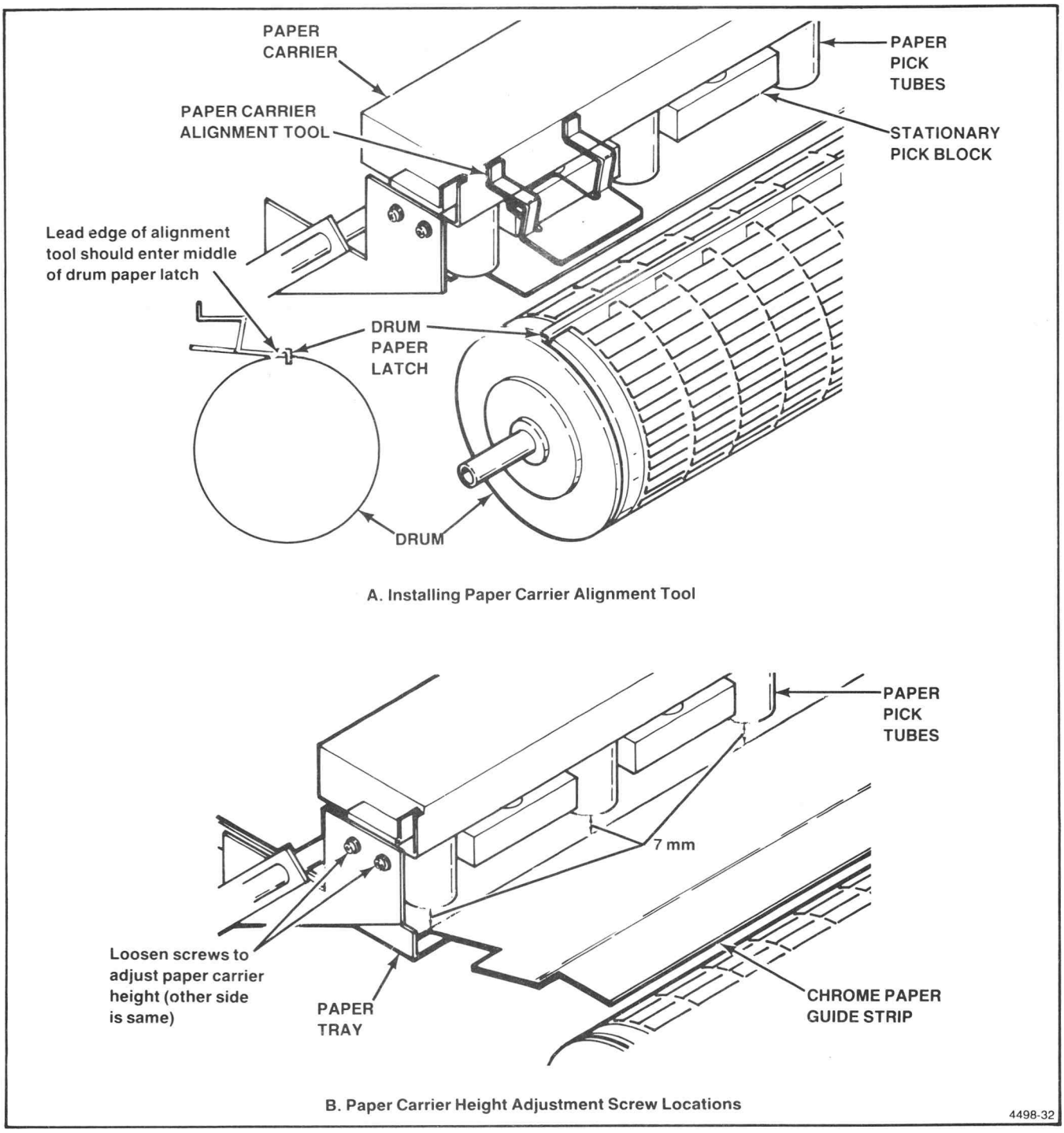


Figure 5-14. Paper Carrier Height Adjustment.

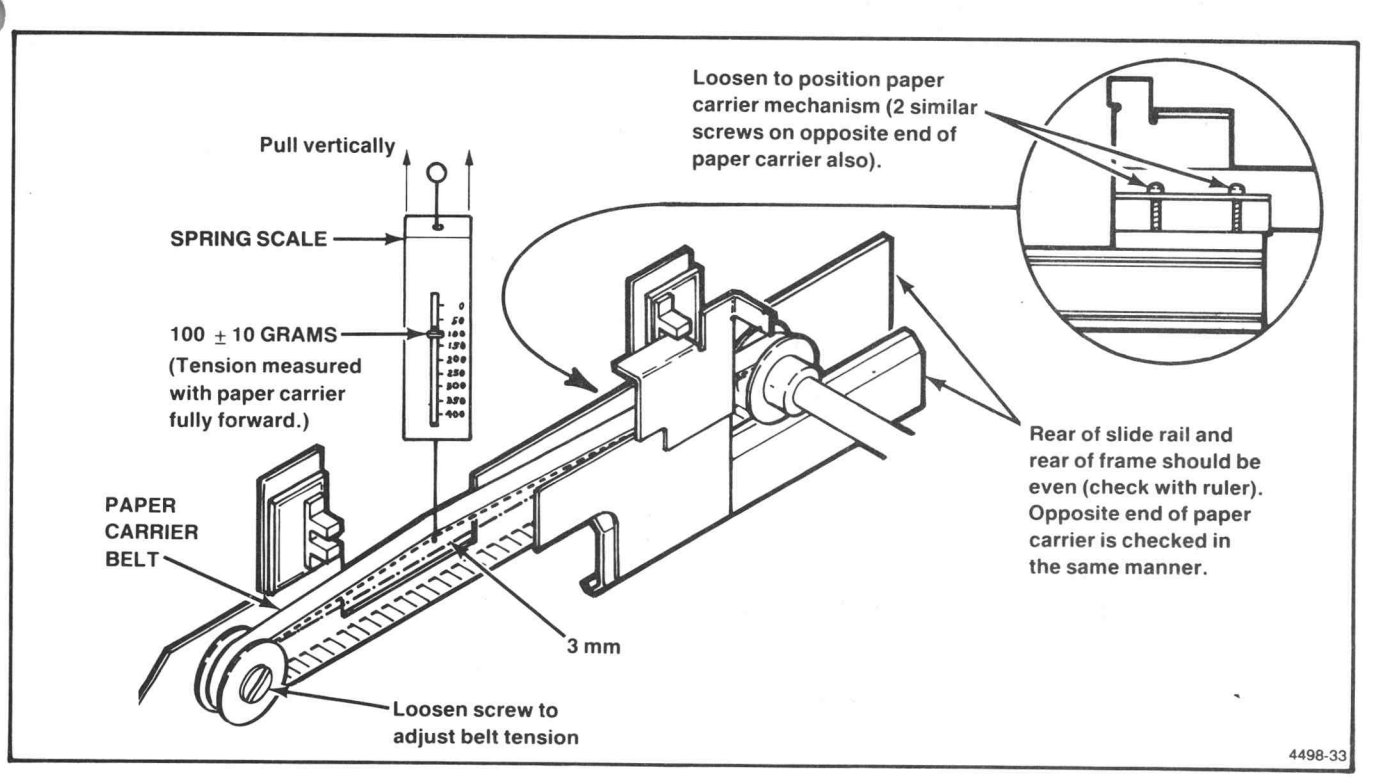


Figure 5-15. Paper Carrier Position and Belt Tension Adjustment.

Carriage drive Motor Belt Tension Adjustment

1. Loosen (but do not remove) the four carriage drive motor mounting screws (see Figure 5-16).

2. Pull (slide) the carriage drive motor away from the carriage cable pulley with enough pressure so that the belt will not slip.

3. Tighten the four carriage drive motor mounting screws (loosened in Step 1).

If the belt slips again, repeat the procedure. Then, if the belt continues to slip, replace the belt.

Carriage End of Travel Sensor Adjustment

There are two optical sensors that detect the limits of the ink jet head carriage travel. There are no adjustments involved with these sensors. This procedure is only a check to ensure that the Sensors are operating correctly. The procedure follows:

1. Disconnect J48 of the carriage stepper motor (this connector is located on the four electrical wires leading to the carriage stepper motor (see Figure 5-16).

2. Turn on the copier's POWER switch.

3. Move the ink jet head carriage to the left and against the wash station firmly. Observe that the LED on the Start Position Optical Sensor circuit board turns on (see Figure 5-17).

4. Move the ink jet head carriage to the right end of its travel and observe that the LED on the Scanner Limit Optical Sensor circuit board turns on (see Figure 5-17).

5. Turn the copier's POWER switch off.

6. Reconnect J48 on the carriage stepper motor electrical cable (disconnected in Step 1).

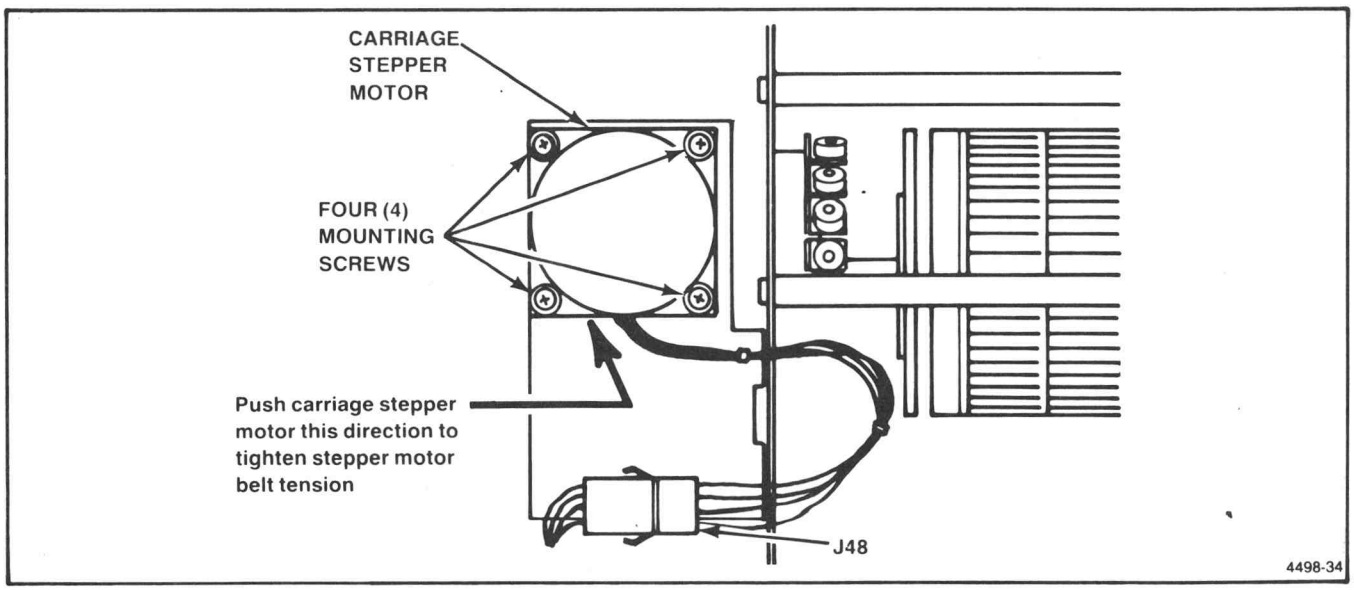


Figure 5-16. Carriage Drive Motor Belt Tension Adjustment.

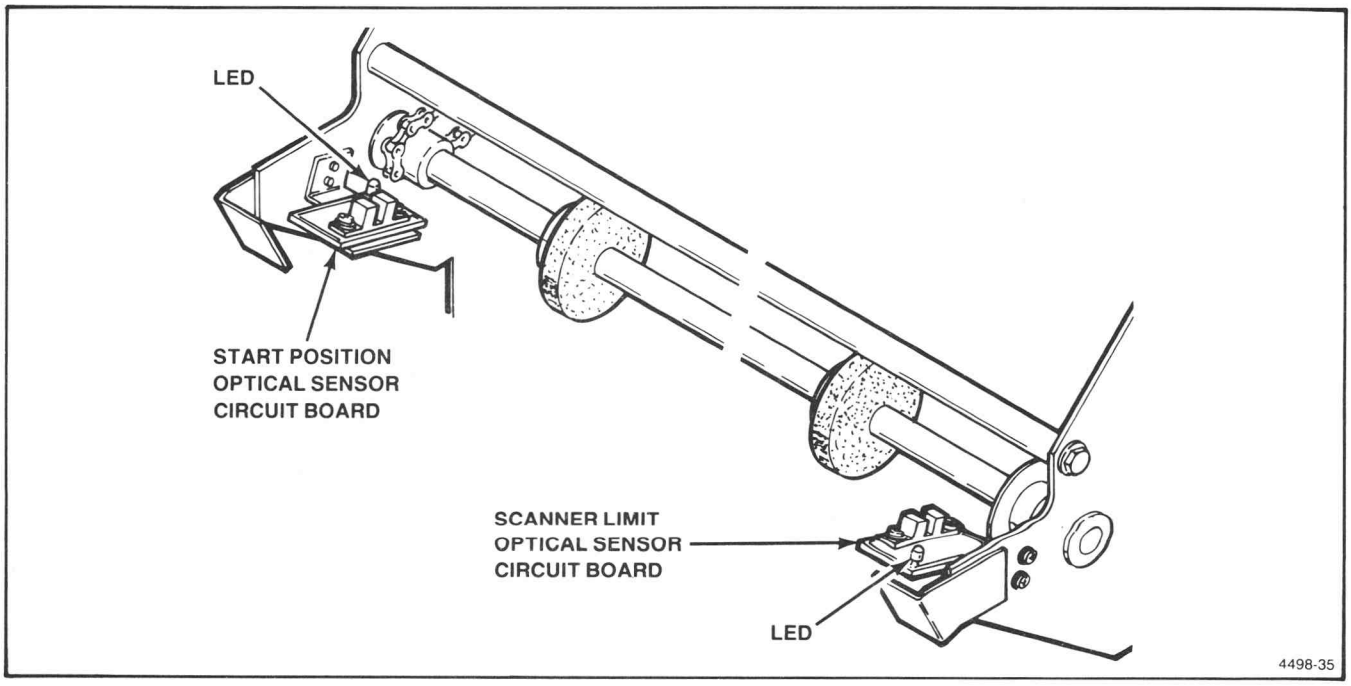


Figure 5-17. Carriage Drive Motor Connector and Sensor Locations.

Paper Carrier Optical Sensors Adjustment

1. Turn the copier's POWER switch on and wait 15 to 20 seconds for the copier to initialize.

2. Remove any paper from the paper tray.

3. Twist the shaft that passes over the paper tray to move the paper carrier toward the drum until the LED on the Front Switch Optical Sensor circuit board just turns on (see Figure 5-18A).

4. Measure the distance from the edge of one of the cylinder-shaped tubes (vacuum cannisters) on the paper carrier to the edge of the paper gripper on the drum (see Figure 5-18B). This distance should be .150 to .250 inches (3.81 to 6.35 mm). If this distance is not in that range, the location of the Front Switch Optical Sensor circuit board will have to be moved so that when its LED just turns on, the vacuum cannisters on the paper pick are .150 to .250 inches from the paper gripper on the drum. To move the Front Switch Optical Sensor circuit board, loosen the three mounting screws holding the circuit board to the frame. Tighten the three screws after moving the Front Switch Optical Sensor circuit board. Hint: it may be easier to (1) position the paper carrier and then (2) move the Front Switch Optical Sensor circuit board until the LED just turns on.

5. Twist the shaft that passes over the paper tray to move the paper carrier over the paper tray until the LED on the Back Switch Optical Sensor just turns on (see Figure 5-18A). Check to see that at this point, the small guide roller next to the paper tray has just dropped into the rear slot.

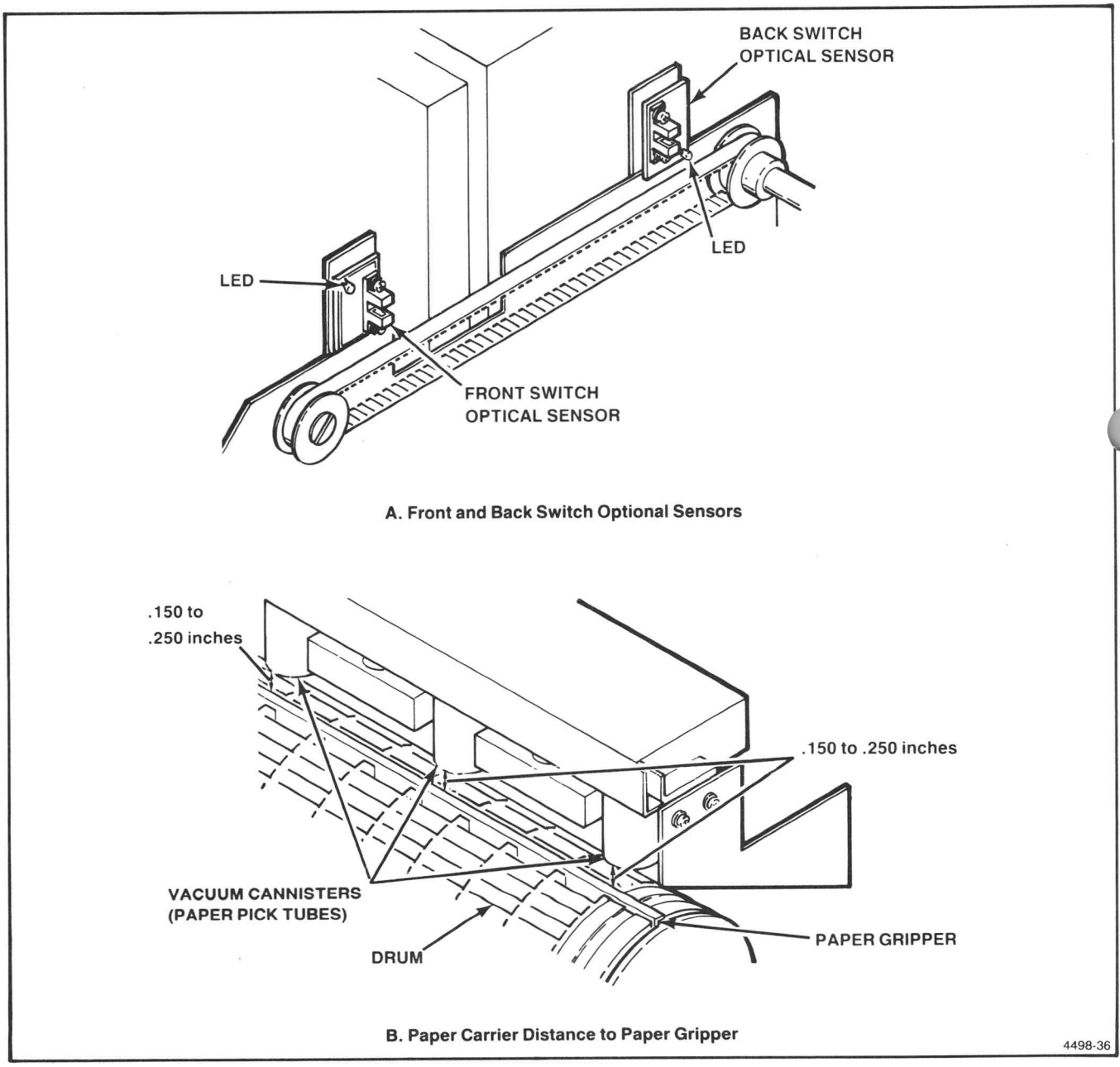


Figure 5-18. Paper Carrier Optical Sensor Adjustment Locations.

6. Carefully lift up one of the vacuum cannisters and measure the distance between the underside of this vacuum cannister and the empty paper tray. This distance should be 7 mm. If this distance is not 7 mm, the Back Switch Optical Sensor circuit board will have to be moved. To do this, (1) remove the Power Supply (see Section 7), (2) position the paper carrier so that the distance between a "raised" vacuum cannister and the empty paper tray is 7 mm, (3) loosen the two screws holding the Back Switch circuit board, (4) move the Back Switch Optical Sensor circuit board until the LED on the circuit board just turns on, (5) tighten the two screws holding the Back Switch Optical Sensor circuit board, and (6) replace the Power Supply.

Paper Tray Sensor Adjustment

The paper tray and the paper loaded in the paper tray activate two sensors. The one closest to the front panel senses the paper size and the rear-most sensor detects whether there is paper in the tray. Both sensors are adjusted when the top of the actuator arm rests 8 mm (.315 inches) from the chrome paper guide (with the paper tray removed). To adjust either sensor:

1. Remove the paper tray.
2. Loosen (but do not remove) the screw shown in Figure 5-19.
3. Position (1) the top of the actuator 8 mm (.315 inches) from the chrome paper guide and (2) the head of the screw loosened in Step 2 on the frame underneath.
4. Tighten the screw loosened in Step 2.
5. Turn the copier's POWER switch on.
6. Push both actuators up against the chrome paper guide and observe that the LEDs on the Paper Size Optical Sensor and the No Paper Optical Sensor turn on.

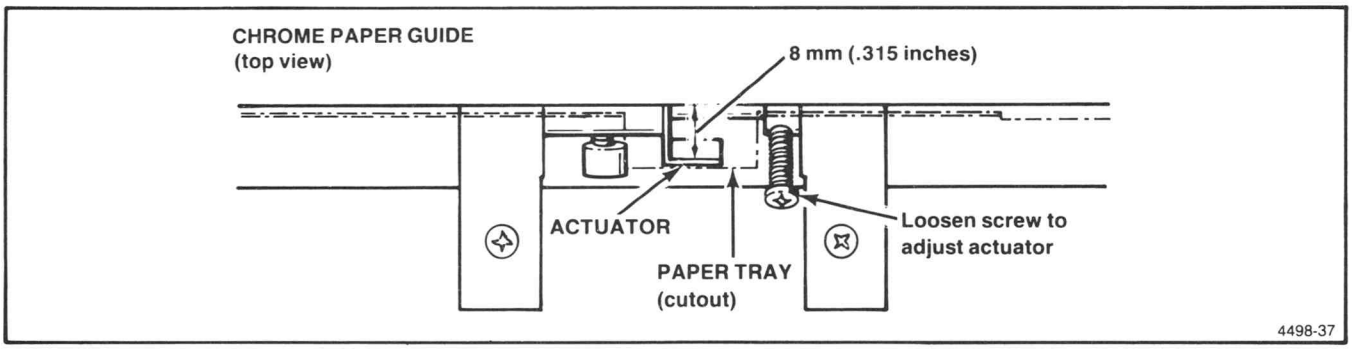


Figure 5-19. Paper Tray Sensor Adjustment Locations.

Paper Jam Check Sensor Adjustment

The Paper Jam Check Optical Sensor is located on the rear portion (when viewing the front panel of the copier) of the chrome paper guide next to the drum. The bottom edge of the optical sensor should be below the chrome paper guide (see Figure 5-20). To adjust, do the following procedure:

1. Loosen (but do not remove) the two screws holding the Paper Jam Check Optical Sensor circuit board to the chrome paper guide.

2. Position the circuit board so that the bottom edge of the optical sensor is just below the chrome paper guide (see Figure 5-20).

3. Tighten the two screws holding the circuit board to the chrome paper guide.

4. To move the optical sensor right or left (if necessary to sense paper), loosen (but do not remove) the four screws holding the chrome paper guide.

5. Position the paper guide so that the paper being loaded on the drum does not touch the inside edge of the Paper Jam Check Optical Sensor.

6. Tighten the four screws holding the chrome paper guide.

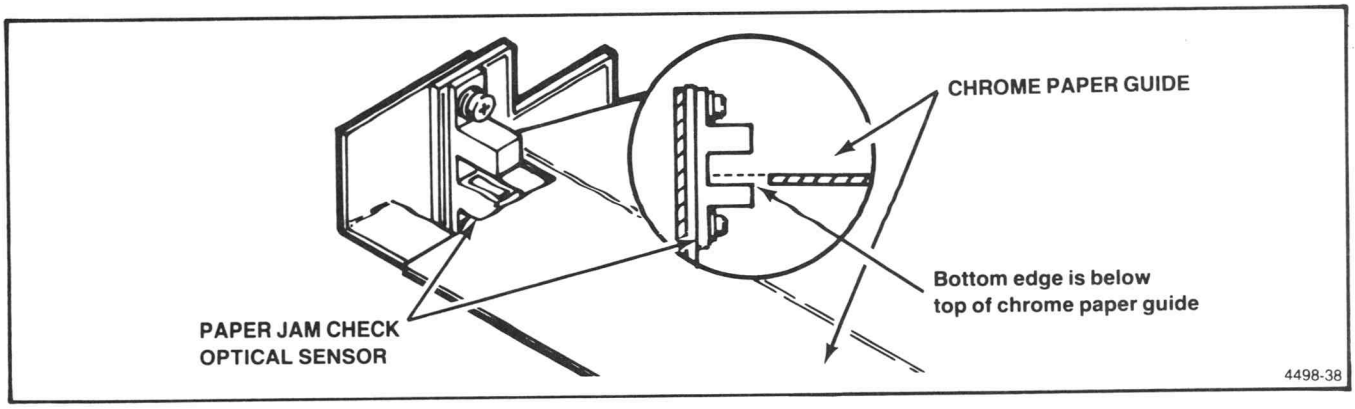


Figure 5-20. Paper Jam Check Sensor Diagram.

Air Pump Check

NOTE

Do not attempt to adjust the air pressure. If the air pressure is not acceptable, replace the air pump.

1. Turn the copier's POWER switch off (if not already).
2. Close the Ink Head Air Valve. This valve is located near the air pump and the AIR PUMP ONLY switch.
3. Disconnect the air line between the Ink Head Air Valve and the air pump.
4. Attach the air gauge to the air pump.
5. Disconnect the ink cartridge air line at the air pump and plug the air pump port. This air line is located beside the air line leading to the Ink Head Air Valve (removed in Step 2).
6. Turn the AIR PUMP ONLY switch to the AIR PUMP ONLY position.
7. Turn the copier's POWER switch on. The air pressure should read more than 36 inches of water (914 mm). If the air pressure is less than 36 inches, replace the air pump.
8. Turn the copier's POWER switch off.
9. Reinstall the ink cartridge air line to the air pump (removed in Step 5).
10. Ensure that the Ink Head Air Valve is still closed.
11. Turn the copier's POWER switch on. The air pressure should be 36 plus or minus 2 inches of water. If the pressure is less, there is a defectve (1) ink cartridge, (2) cartridge housing, or (3) air line leading to the ink cartridges.
12. Turn the copier's POWER switch off.

13. Turn the AIR PUMP ONLY to the NORMAL position.

14. Open the Ink Head Air Valve.

15. Turn the copier's POWER switch on.

16. Ensure that the five-position rotary TEST PATTERN SELECT switch is set to 1.

17. Press the nearby TEST PATTERN START switch. Observe the air pressure gauge. It should read 36 plus or minus 2 inches of water. If the air pressure is less, there is a problem in the air line leading to the ink jet heads or there is a defective ink jet head(s).

18. Turn the copier's POWER switch off.

19. Remove the air gauge and reconnect the air line between the air pump and the Ink Head Air Valve.

Ink Jet Head Convergence Adjustment

The Ink Jet Convergence procedure is located in Section 8.

Threshold Voltage Test Procedures

The Threshold Voltage Test procedure is located in Section 8.

Section 6

MAINTENANCE AND TROUBLESHOOTING

INTRODUCTION

Because the copier is an electomechanical device, periodic care and adjustment is necessary for proper performance. The period between adjustments depends on the amount of use that the copier receives. (Semi-annual or annual adjustments may be required.)

Copier adjustment should be preceded by a thorough cleaning and inspection for loose, damaged, or worn parts.

After inspecting and cleaning the copier, a 30-minute warmup period should precede the adjustment procedure, which should be performed in a 68 to 86 degree F (+20 to +30 degree C.) environment.

PREVENTIVE MAINTENANCE

General

Preventive maintenance consists of cleaning the cabinet and some internal mechanisms, changing water in the ink jet head wash bottle, and checking the tension of several belts and cables. Performed on a regular basis, preventive maintenance may improve the reliability of this instrument. The frequency and severity of the copier's use will determine the required maintenance interval. However, Table 6-1 is a suggested schedule.

Schedules

Table 6-1 shows a recommended maintenance schedule. After the preventive maintenance checks, you may want to perform the adjustment procedures in Section 5.

Table 6-1

PREVENTIVE MAINTENANCE SCHEDULE

Time Interval or Hours of Copier Use (whichever comes first)	Approximate Number of Copies*	Service Procedure (Task)
Weekly or 100 Hours	250	Change Ink Residue Bottle Water
Weekly or 100 Hours	250	Clean Head Carriage Shafts
Monthly or 250 Hours	1000	Clean Stripper Rollers
Monthly or 250 Hours	1000	Clean Chrome Paper Guide
Three Months or 500 Hours	2000	Clean Outside Cabinet
Three Months or 500 Hours	2000	Drain, Flush, and Refill Wash Station Reservoir
Six Months or 1000 Hours	4000	Clean Ink Jet Heads
Six Months or 1000 Hours	4000	Clean Paper Carrier Assembly
Six Months or 1000 Hours	4000	Check Carriage Drive Cable Tension
Six Months or 1000 Hours	4000	Check Carriage Drive Motor Belt Tension
Six Months or 1000 Hours	4000	Check Paper Carrier Belt Tension
One Year or 2000 Hours	8000	Replace Wash Station Pump Motor Filter

* Assumes an average rate of 6.25 copies per hour, for an eight hour, five-day week

Change Ink Residue Bottle Water

See 4691 Operator's Manual.

Clean Ink Jet Head Carriage Slide Shafts

See 4691 Operator's Manual.

Clean Stripper Rollers

See 4691 Operator's Manual.

Clean Chrome Paper Guide

See 4691 Operator's Manual.

Clean Outside Cabinet

See 4691 Operator's Manual.

Drain and Refill Wash Station Reservoir

See 4691 Operator's Manual.

Clean Ink Jet Heads

CAUTION

Use only distilled water when cleaning the ink jet heads. No cloth or paper products should be used on the ink jet head surface or permanent damage may occur. Excessive water may be absorbed from the head by touching the sides of the ink jet head with an absorbent material.

NOTE

For best results, use a spout bottle (003-3757-00) for cleaning residue off the ink jet heads.

1. Refer to Section 11 and perform Steps 1 through 10 of "Prepare the Copier for Move."

2. Remove the two screws that hold each ink jet head to the carriage. These screws are located to the left of the ink line valves closed in Step 1. Do not disconnect any hoses or electrical wires to the ink jet heads.

3. Clean each ink jet head by squirting it with distilled water until clean. Use an aborbant material under the ink jet heads (nozzle surface) to abosrb excess water. Dry the ink jet heads gently. Do not wipe across the face of the ink jet heads, but do lightly blot them dry. Soak up all liquid from the back of the ink jet heads and make sure that the electrical connections are dry.

4. Reinstall the four ink jet heads.

5. Refer to Section 11 and perform Steps 6 through 15 of "Restore Copier to Operation After Moving." Note that the colors may not be located correctly since the ink jet heads are not converged.

6. Refer to Section 8 and do the procedure "Ink Jet Head Convergence Adjustment."

Clean Paper Carrier Assembly

1. Remove and disassemble the paper assembly (refer to Section 7 for instructions).

2. Clean each vacuum cannister and plunger by wiping with a dampened (water) lint free cloth.

3. Throughly dry each item prior to reassembling.

4. Reassemble the paper carrier following the instructions in Section 7.

Check Carriage Cable Tension

Refer to Section 5 for procedure.

Check Carriage Drive Motor Belt Tension

Refer to Section 5 for procedure.

Check Paper Carrier Belt Tension

Refer to Section 5 for procedure.

Replace Wash Station Pump Motor Filter

Refer to Section 7 for procedure.

Lubrication

The only copier lubrication required is the two head-carriage shafts.

1. First, clean the two exposed carriage shafts with a dampened lint-free cloth. Do not move the head-carriage assembly during cleaning.

2. Place a **VERY SMALL** amount of high-grade light oil (such as sewing machine oil) on a portion of a lint-free cloth. Then carefully wipe the cloth over the exposed head-carriage shafts. **NEVER** apply liquid oil directly to the shafts, as too much oil will collect dirt and cause binding of the head-carriage assembly.

TROUBLESHOOTING

General

Troubleshooting complicated electromechanical devices sometimes proves to be frustrating because of the interrelationship of the electronic, mechanical, and ink systems. This may be especially true in the copier. It is possible that a defect in one of these systems may appear as a symptom in another system. Therefore, it may not be initially obvious what part of the copier is defective.

As a starting point, it may be helpful to first decide whether the copier's fault is an imaging problem or a system (mechanical or electrical) problem. Although the results may be similar (poor or no quality printing), the cause in each case is different and there may be a very fine line between the two.

Imaging problems generally involve the ink delivery system and the complaint might be stated as; "Well, the copier works alright, but the printed copies show poor quality." Imaging problems include air bubbles in the ink jet heads, clogged or defective ink jet heads, sticking or binding carriage mechanism, and even some defective parts in the electronics operating the ink jet heads.

On the other hand, electrical or mechanical copier failures, prevent the copier from operating normally through its normal cycle. In this case, the result is also poor quality printing, but notice that the cause is different from the imaging symptoms.

There may be a very fine line between imaging failures and electrical or mechanical failures. But if you analyze the copies produced by the copier, you may get an idea where the fault is.

NOTE

As soon as any copier problem is noticed, it is important that the LED display on the Parallel Interface circuit board be read before the copier is shut off. In many cases, this display and the five-LED display on the CPU circuit board will indicate the source of the copier's problem. Both of these displays must be read before the copier is turned off, since turning off the copier clears the error registers feeding the displays.

Figure 6-1 has a short "Initial Diagnosis Procedure" that may help you decide where the copier's fault is located. The copier's performance in this procedure should guide you to an applicable table of symptoms and possible causes. Tables 6-2 through 6-5 list many of the possible malfunctions and their probable causes. It must be understood that these lists of malfunctions (symptoms) are not totally inclusive. However, the lists of symptoms and their probable causes may help you find a solution for a particular copier defect.

- Table 6-2 lists power supply related problems.
- Table 6-3 lists Parallel Interface and CPU ERROR displays.
- Table 6-4 lists faults that cause poor quality images.
- Table 6-5 lists malfunctions that turn on the front panel FAULT light.
- Table 6-6 lists other copier malfunctions.

Several of the tables refer to copy examples of poor quality printing and these examples are located in Section 13 - Diagrams.

Interpretation of Parallel Interface Error Code Displays

To interpret the Parallel Interface LEDs, use the following guide:

When the copier first powers up, the Parallel Interface INDICATOR LED will start flashing. The flashing LED indicates that the Procesor is initializing the Parallel Interface. If an error occurs during the initialization, the INDICATOR LED will continue to flash and a "decimal" error code shown in Table 6-3 will be displayed in the 7-segment display (for example, .1 for a ROM 1 checksum error). After a satisfactory initialization, the INDICATOR LED turns on steady. If a subsequent "operational" error occurs, that error code will also be displayed in the 7-segment display (INDICATOR LED continues on steady). For example, 2 for a paper or ink problem. Refer to Table 6-3 for a listing of the operational error codes (non-decimal).

Error Code Display Summary:

Flashing INDICATOR LED in first 20 seconds of power up means that copier is initializing.

Flashing INDICATOR LED after 20 seconds means initization failure. "Decimal" error code (code preceded by a period) is displayed in 7-segment display. Refer to Table 6-3.

Steady INDICATOR LED with blank 7-segment display is normal operation.

Steady INDICATOR LED with error code displayed in 7-segment display indicates an operational error. Refer to Table 6-3.

Initial Diagnosis Procedure

The initial diagnosis procedure, shown as a flow procedure in Figure 6-1, will guide you to one of the following tables, which will probably contain the observed symptom. Then, examine that table to find the best symptom that most closely matches the malfunction observed on the copier. Once you have found a symptom listed in the table that matches the observed symptom, examine each of the possible causes listed (there may be several) to see if one of them is affecting your copier.

In addition, Table 6-6 lists some other copier symptoms. Many of these symptoms may not be revealed with the Initial Diagnosis Procedure.

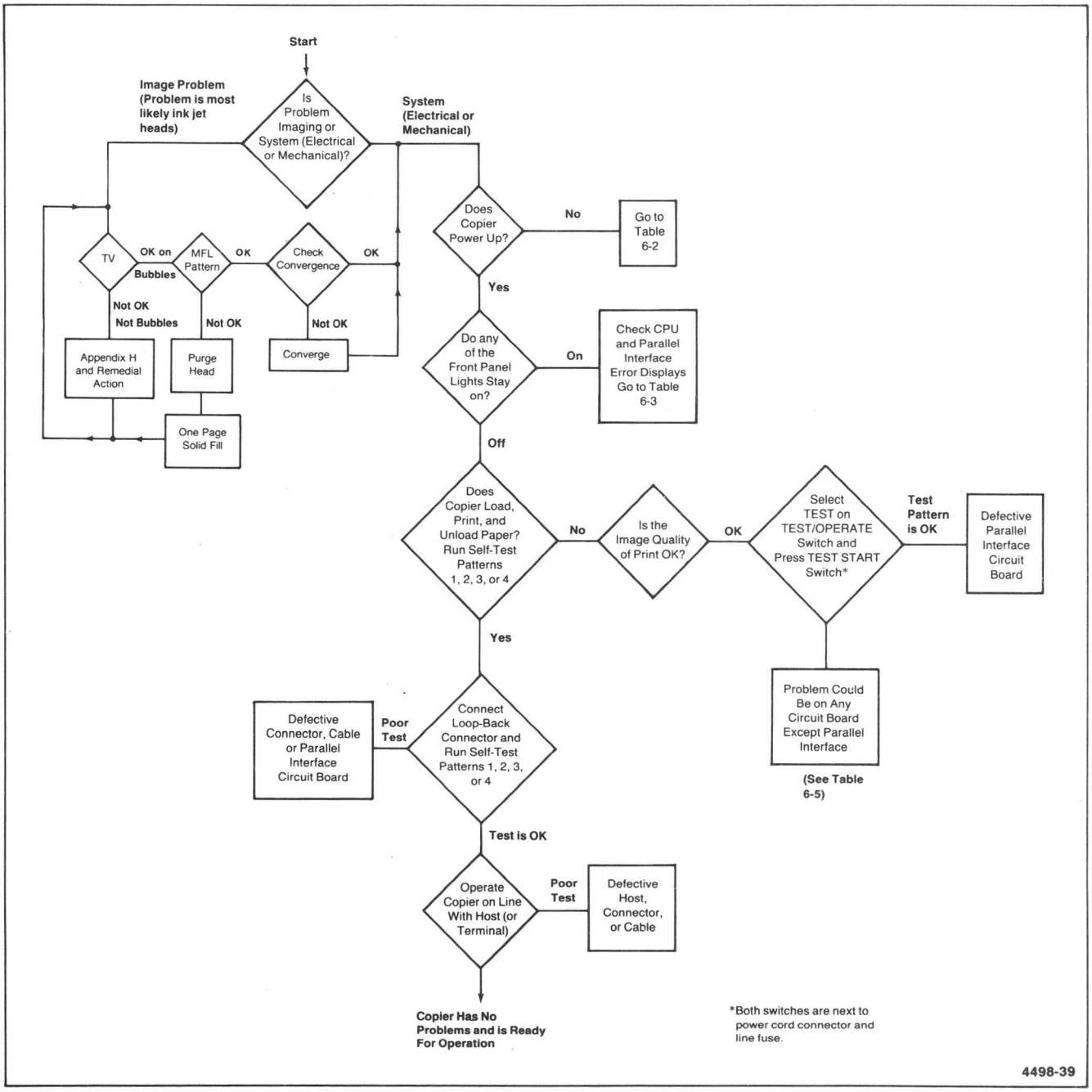


Figure 6-1. Initial Diagnosis Procedure.

Table 6-2

POWER SUPPLY PROBLEMS

Symptom	Possible Cause
Front Panel WAIT light does not flash for a few seconds after power-up	Close top cover or activate safety interlock switch - improper mechanical clearance to engage switch. Is copier plugged in? Blown line fuse Voltage Selector switch is set wrong Defective Low Voltage Regulator circuit board Defective components on primary side of main transformer

Table 6-3

CPU AND PARALLEL INTERFACE CIRCUIT BOARD ERROR DISPLAYS

Parallel Interface board Initialization Errors	
Error Code Display	**Malfunction**
.0	ROM 0 checksum error (U220)
.1	ROM 1 checksum error (U225)
.2	Could not clear all RAM locations of 8155 (U170)
.3	Could not set all RAM locations of 8155 (U170)
.4	Interrupt 6.5 problem
.5	8155 failure (U170)
.6	8253 failure (U250)
.7	Address counters for buffer A were not cleared
.8	Processor/system failure
.9	Address counters for buffer A did not increment correctly
.A	Interrupt 5.5 problem, command type
.b	Interrupt 5.5 problem, data type
.C	Address counters for buffer B were not cleared
.d	Address counters for buffer B did not increment correctly
.E	Contents of buffer A did not match stored result
.F	Contents of buffer B did not match stored result

Table 6-3 is continued on next page with "operational" errors.

Table 6-3 (cont)

Operational Errors	
0	48 hr wash cycle is in process. Previous LED error will be restored when wash is done
1	No MRDY signal from CPU board
2	Paper jam, out of ink or paper (see front panel)
3	CMD has been rejected because it was either out of sequence or unrecognized
4	Print request string was rejected because it contained too few bytes (or an early EOL)
5	Print request string rejected due to bad checksum
6	Print request rejected to out of range/illegal parameters
7	Copy terminated because CPU did not assert DTRDY
8	Copy terminated because copier failed to complete fast slew handshake in allotted timeout period
9	Copier did not cycle through unload sequence - fatal
A	An incorrect number of data lines (EOLs) have been received when an EOT is received
b	More than 4 data line pixel count error occurred. No further retransmits will be requested and present data will be printed
C	1 to 4 data line pixel count errors occurred - data retransmit has been requested for each
d	Copy terminated because a valid CMD has not been received within the last 11 minutes
E	Copy terminated because of an abort CMD

Table 6-3 (cont)

CPU Circuit Board

Troubleshooting Code Display	Malfunction	Probable Cause
00101	Carriage does not move	Defective carriage drive motor
00110	Carriage does not return to the starting position (far left)	Binding Mechanical Parts Defective Start Position Sensor
01001	No Encoder pulse signal	Defective detector or drum motor
01010	Drum does not rotate or does not stop rotating	Defective drum motor or detector
01101	Paper carrier does not go to the rear position	Defective paper carrier motor
01110	Paper carrier does not go to the forward position	Binding mechanical parts
01100	Paper unloading roller does not rotate or does not stop rotating	Defective paper unloading motor
10110	Drum fails to lock	Encoder out of adjustment Defective Encoder Defective drum locking solenoid
01111	Drum rotation does not synchronize with synch pulse	Defective drum motor Defective Encoder
11000	One of the sensors is defective	
11111	NORMAL	

Any other LED troubleshooting code display indicates a defective CPU circuit board.

1=LED light ON
0=LED light OFF

Table 6-4

POOR QUALITY IMAGE FAULTS

Symptom Imperfect Copies	Possible Causes
Low Air Pressure	Defective Ink Cartridge Defective Air Pump (do not adjust - replace if bad) Air Leak in Line Defective Ink Jet Head
Paper shows stripper tracks (dirty foam rollers)	Ink doesn't dry fast enough (too much ink is being used) Dirty Rollers Partially clogged ink jet head Defective wash station Main ink jet head air valve is closed Rollers are misadjusted
Missing or Unfinished lines Line squiggle, or streaks on solid patterns	Air bubbles in ink jet heads Head carriage is binding Excessive vibrations Defective ink jet heads Carriage drive cable is misadjusted
Ink line assembly is binding	Defective carriage drive motor Low air pressure Defective electrical connections to the ink jet heads (see Figure 13-3 and 13-4 in Section 13 - Diagrams)
Wet copy, Blurred Image	Incorrect paper surface or wrong type of paper Misadjusted ink jet head voltage Excessive air pressure

Table 6-4 (cont)

Symptom Imperfect Copies (cont)	Possible Causes
Misconverging	Loose screws holding ink jet heads to carriage Clogged or dirty ink jet heads Incorrect vertical convergence switch setting Defective Interface circuit board Carriage mechanism is binding (see Figure 13-5 in Section 13 Diagrams)
Random or Mis-located Dots	Defective electrical connections to ink jet heads Partially clogged ink jet head Excessive static on copier Electrical noise in copier's electrical system
Excessive Ink Spots (Blobs)	Partially clogged ink jet heads Leaky air and/or ink valves and fittings Excessive ink jet head voltage Ink jet head air valve is closed Leaky wash station Defective ink line to ink jet head
Wrong Picture Orientation	Defective paper size sensor or actuator Wrong orientation of paper tray Paper Size sensing actuator has slipped under paper tray Defective Parallel Interface circuit board Improper host commands
Wrong Aspect Ratio	Binding carriage mechanism Improperly adjusted carriage drive wire or stepper motor belt tension

Table 6-4 (cont)

Symptom	Possible Causes
Imperfect Copies (cont)	
Wrong Starting/Stopping Printing Locations	Wrong Parallel Interface test pattern settings (check also 5-position TEST PATTERN SELECT switch) Excessive static on copier Defective Parallel Interface circuit board Improper host commands Defective Right and Left Carriage Limit Sensors
Incorrect Colors	Incorrect electrical connections to ink jet heads Ink cartridge in wrong slot Defective Parallel Interface Ink jet heads are not converged properly
Pale Color	Ink jet head(s) are partially clogged or has air bubble Air pressure is too low Ink cartridge has an air leak Ink jet head air valve is closed Ink cartridge is out of ink
Skewed vertical lines	Paper slips on drum due to inadequate clamping Defective Parallel Interface circuit board

Table 6-5

MALFUNCTIONS INDICATED BY FRONT PANEL FAULT LIGHTS

Symptom	Possible Causes
Paper Handling Failures	Bent or curled paper Paper size selector (A/B) set wrong on paper pick housing Low vacuum Paper has wrong side up Paper pick motor inoperative Static/sticky paper Paper pick mechanism is binding Vacuum cannisters are sticking or binding Wrong type of paper Wrong paper dimensions Paper carrier belt failed or has wrong tension Front/Back Switch Optical sensors misadjusted Paper was not positioned properly in tray Defective spring on drum paper clamp Drum paper clamp is warped Drum lock solenoid/likage is misadjusted
Drum Latching Failure	Position sensor is defective Position sensor is misadjusted Drum lock solenoid is inoperative Drum lock solenoid linkage is binding Drum motor/drum set screws are loose Defective Drum Lock Solenoid Driver Circuitry

Table 6-5 (con)

Symptom	Possible Causes
Carriage Movement Failures	Defective carriage stepper motor Misadjusted carriage drive wire tension Misadjusted stepper motor belt tension Carriage slide bars are not parallel Carriage slide bars are dirty Binding carriage drive wire pulleys Ink line assembly is binding
No Drum Rotation	Defective drum motor Set screws are loose between drum and drum motor Drum is not positioned properly causing the Encoder Disk to scrape the Encoder Sensor Stripper rollers are touching (binding) the drum Defective Driver circuit board Drum lock solenoid mechanism is jammed Rear panel TEST/OPERATE switch is in the TEST position

Table 6-6

OTHER COPIER SYMPTOMS

Symptom	Possible Causes
Noises	
Whistles	Vacuum leak Wrong size paper Paper size adapter mask installed wrong Paper is skewed A4 Option 01 tape is defective Drum is dirty Paper is bent or curled
Flapping	Vacuum leak Paper pick has loaded two sheets of paper Wrong size of paper A4 Option 01 tape is missing or defective Defective drum
Scraping	Drum motor/drum set screws are loose causing the drum to move horizontally Misadjusted Optical sensor and/or disk Binding paper pick mechanism
Squeals	Defective motor bearings Defective drum bearings Defective stripper shaft bearings
Rattles	Paper pick is not adjusted high enough (vacuum cannisters are touching the chrome paper guide

Table 6-6 (cont)

Symptom	Possible Causes
Drum Unloading Failure	Defective Stripper Motor loose/broken stripper roller hardware Defective drum lock solenoid and/or mechanism Vacuum motor doesn't shut off
Wash Station Has Excessive Leaks	Poor ink jet head to wash station alignment Cracked wash station cups Incorrect hose routing Defective hose fittings Worn or broken hoses
No or Low Vacuum	Sticking vacuum cannisters on paper pick mechanism A4 Option 01 tape is missing on drum Sealing tape is missing on drum Vacuum pump motor failure Defective Driver circuit board
Ink Comes out of Air Pump Bleed Valve	Ruptured ink cartridge bladder
Paper Doesn't Fall Into Tray	Improper Stripper Roller Adjustment
Low Ink Light with a Full Ink Cartridge	Tape was left on the end of the ink cartridge Poor electrical contact with the ink cartridge Poor Low Level Ink Detection Adjustment (see Section 5) Defective CPU circuit board

SECTION 7

MECHNICAL DISASSEMBLY/ ASSEMBLY

This section describes the procedures for the disassembly and assembly of the major components of the 4691 ink-jet printer. The major assemblies are arranged in three major catagories: paper movement, ink movement and printing system, and the electronic components.

7.1 CABINET PARTS

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.1.1 USER ACCESS IN GENERAL

There are four access doors available to the user.

1. Main cover door- Lift type. The main cover is held in place with a magnetic latch.

2. Ink cartridge access door- Push to release type. The ink cartridge access door opens when pressed inward on the upper right corner.

3. Card cage access door- Push to release type. The card cage access door is opened by pressing inward on the upper left corner just below the paper tray.

4. Copy Exit door- Safety latched. The plastic copy exit door is opened by releasing the safety latch in the lower right corner of the copy exit door. The latch much be pushed to the right far enough to clear the copy exit door.

The input paper tray is located on the right side of the copier. The paper tray is removed by lifting and sliding out.

7.1.2 TOP COVER REMOVAL

NOTE

Use ONLY a #1 Phillips posidrive screwdriver or screwdriver tip to remove the screws in this unit.
1" tip part # 003-0443-00
2" tip part # 003-0602-00

1. Remove the input and output paper trays.
2. Open the card cage access door (push to release).
3. Disconnect and remove the power cord and the interface cable from the copier.
4. Remove the four screws that attach the interface cable connector bracket to the rear of the card cage. Lift the connector bracket up and place it where the input paper tray is normally located.
5. Close the card cage access door.
6. Remove the 6 screws at the bottom of the sides and the rear of the copier. See Figure 7-1.

CAUTION

Do NOT force the cover against the stop or mechanical damage may occur.

Do NOT grasp the plastic flap on the paper exit tray during the following procedure.

7. While facing the rear of the copier, carefully slide the cover toward the rear about 1/2" or until it hits the stop.
8. Grasp the top cover on the left side under the middle of the paper tray slot and on the right side to the rear of the plastic copy exit door.
9. Carefully lift the cover straight up and off. Lay the top cover aside.

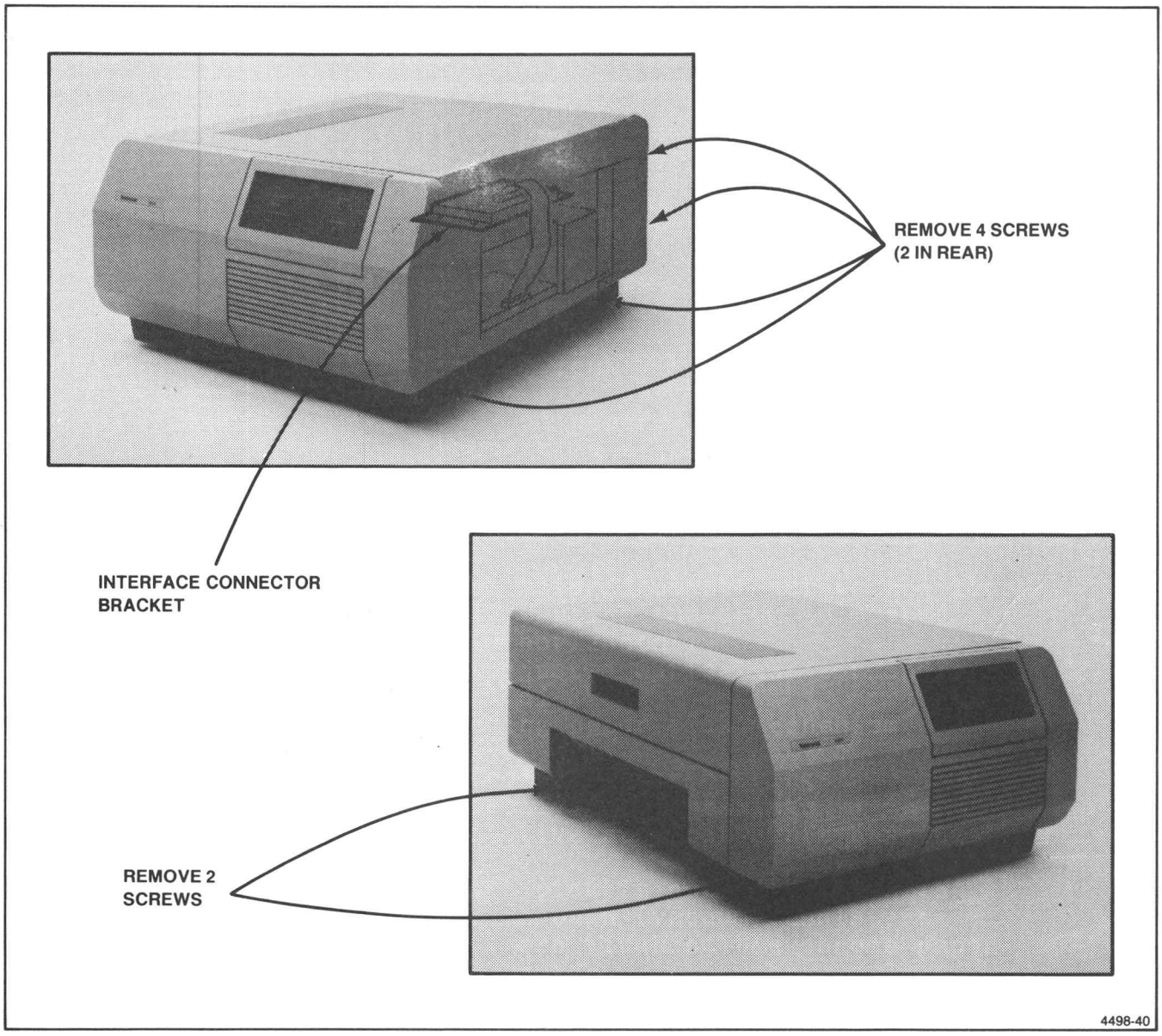


Figure 7-1. Top Cover Removal.

7.1.3 TOP COVER REPLACEMENT

1. Position the printer so that you're facing the rear.
2. Grasp the top cover as outlined in steps 6 and 7 in the previous procedure.

NOTE

When the top cover is replaced, the positioning can be observed through the top window.

3. Carefully lower the top cover onto the printer. Note that the front lip must clear the vacuum arm.
4. Slide the cover toward the front until it mates with the front cover.
5. Secure the cover with the six screws.

7.1.4 FRONT COVER REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Disconnect the front panel cables. J39, J54, and J56. See Figure 7-2.
3. Remove the two screws from the bottom of the front cover.
4. Remove the two screws on the top of the inside brackets that secure the front cover.
5. Carefully lift off the cover.

7.1.5 FRONT COVER REPLACEMENT

1. Reverse the removal procedure to replace the front cover.

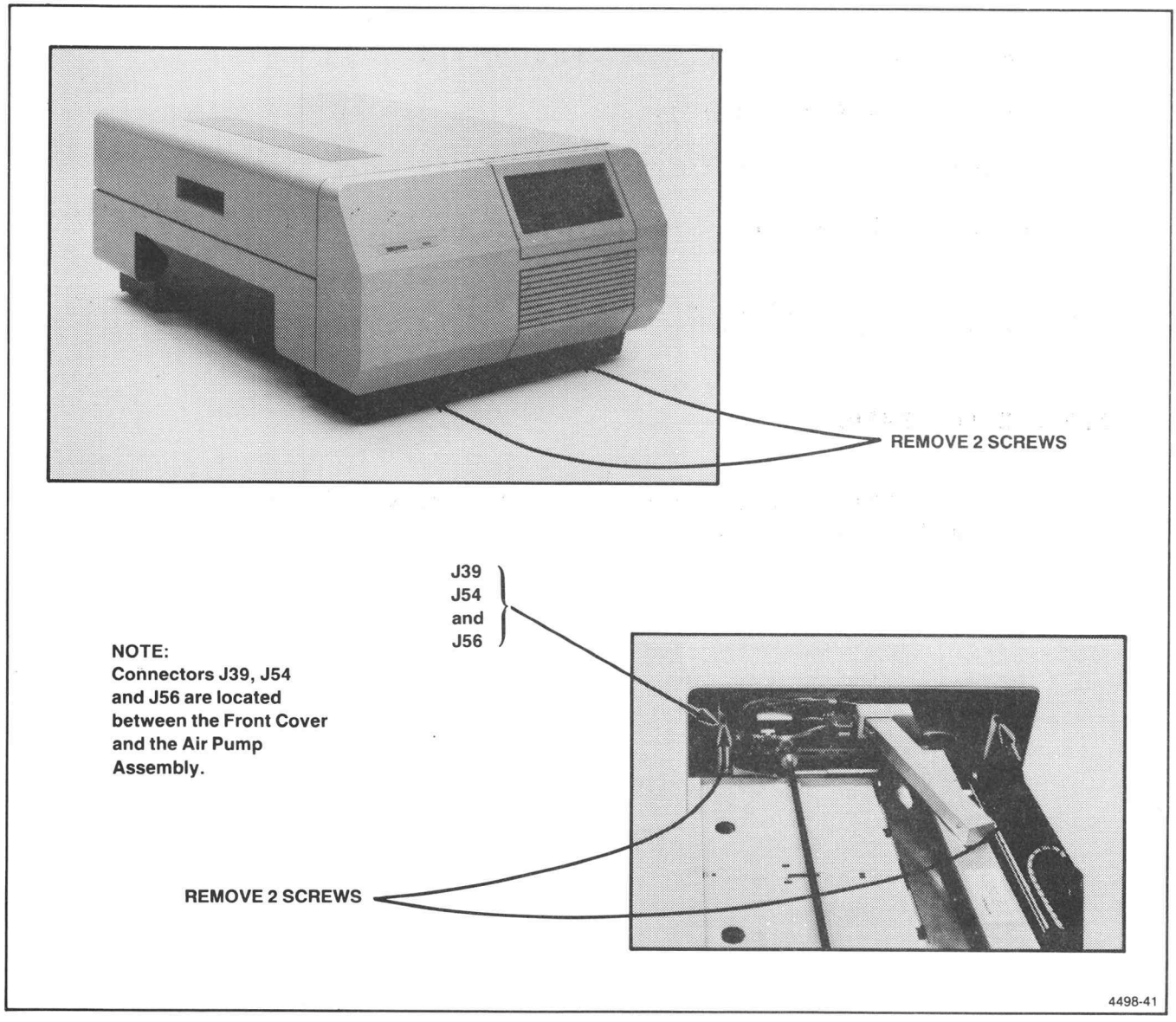


Figure 7-2. Front Cover Removal.

7.2 VACUUM FAN AND MOTOR

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.2.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover. See Section 7.1.4.
3. Disconnect the motor cable (J49). See Figure 7-3.
4. Disconnect the wires from the top of the vacuum fan filter capacitor.
5. Remove the three screws that secure the fan assembly to the chassis, and remove the motor and fan cover assembly.

7.2.2 REPLACEMENT

1. Reverse the removal procedure to replace the vacuum fan/motor assembly.

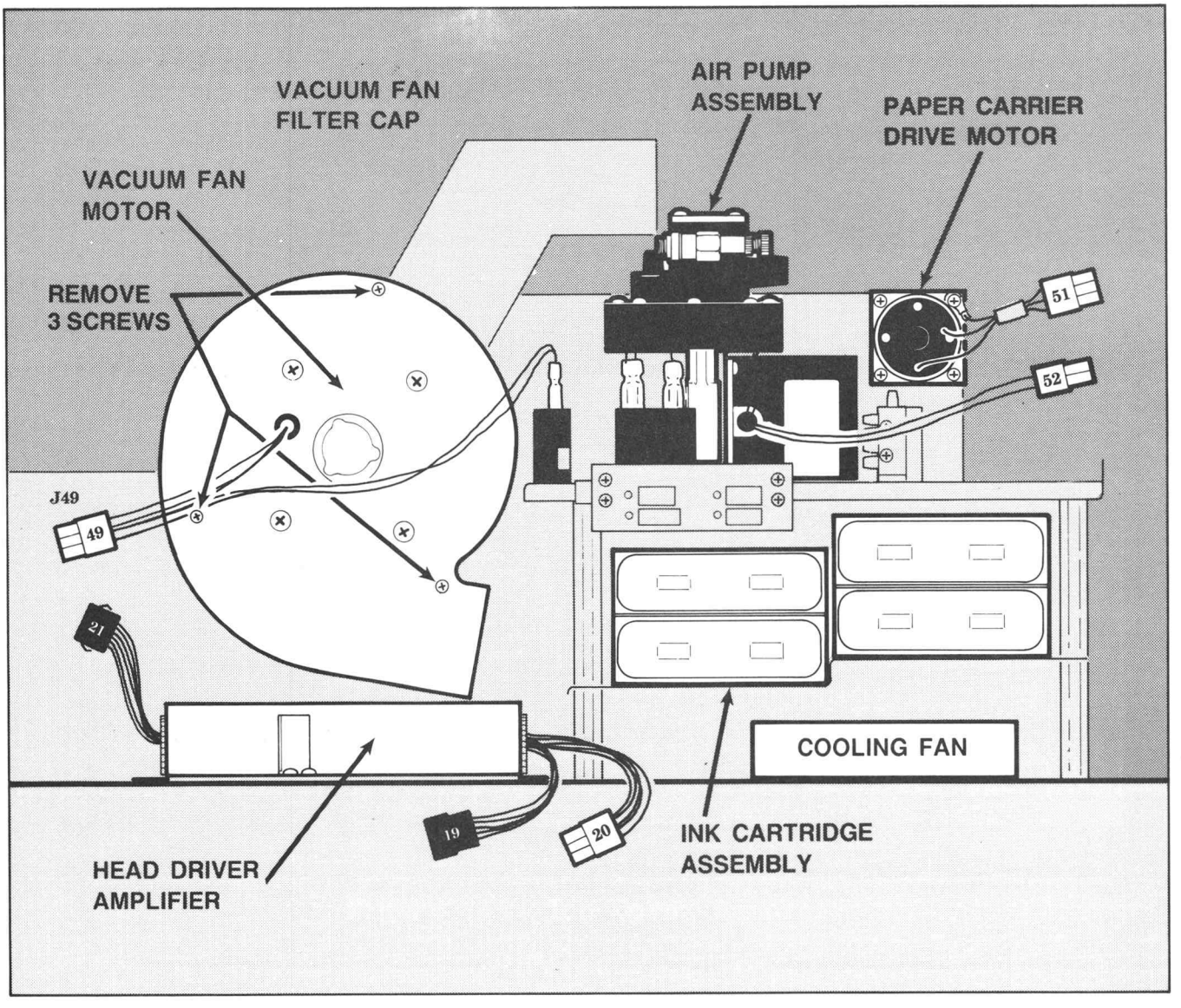


Figure 7-3. Vacuum Fan and Motor Removal.

7.3 HEAD AMPLIFIER

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.3.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover. See Section 7.1.4.
3. Remove the vacuum fan assembly. See Section 7.2.1.
4. Remove the two screws that secure the front cover bracket next to the head amplifier. See Figure 7-4. Lay the bracket aside.

CAUTION

Care must be taken not to damage or stretch the hoses. It may be necessary to clip any cable ties that restrict the movement of the ink/air lines.

5. Remove the two screws that hold the ink/air lines bracket (#1) to the frame. Move the ink lines out of the way.
6. Disconnect J19, J20, and J21 from the head amplifier.
7. Remove the front two screws that attach the head amplifier.
8. Slide the head amplifier to the left to disengage and remove.

7.3.2 REPLACEMENT

1. Reverse the removal procedure to replace the head amplifier.
2. Replace any cable ties that were clipped while removing the head amplifier.

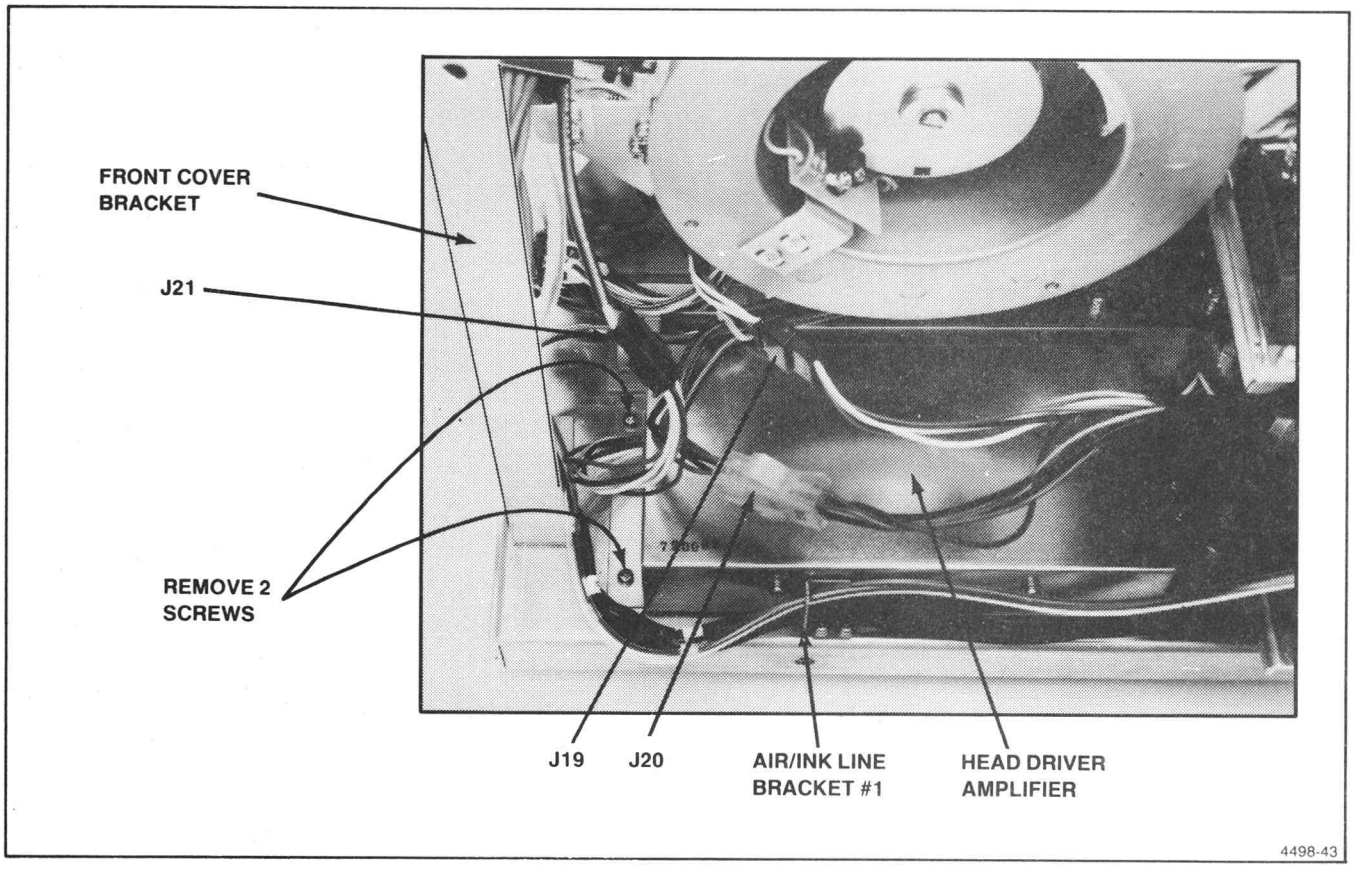


Figure 7-4. Head Driver Amplifier Removal.

7.4 AIR PUMP ASSEMBLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.4.1 REMOVAL

This procedure requires the use of special clamps (P.N.___-____-__). Be sure that these clamps are available before beginning this procedure.

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover. See Section 7.1.4.
3. Disconnect J52 to the air pump, and the two quick disconnects to the air pump capacitor. See Figure 7-5.

NOTE

When disconnecting the hoses, do not pull on them to disconnect them. Instead pry them off with a flat, non-scratching tool.

4. Clamp the two air lines as close to the air pump as possible to avoid excessive contamination. (Clamp P.N. ___-____-__).
5. Disconnect the two air lines at the air pump. Pry these lines off using a pair of tweezers inserted between the end of the hose and the output port of the air pump.
6. Remove four screws at the base of the pump and remove the assembly.

7.4.2 REPLACEMENT

1. Reverse the removal procedure to install the air pump assembly.
2. Use the procedure in Section 5 titled "Air Pump Check" to check the air pressure when a new pump is installed.

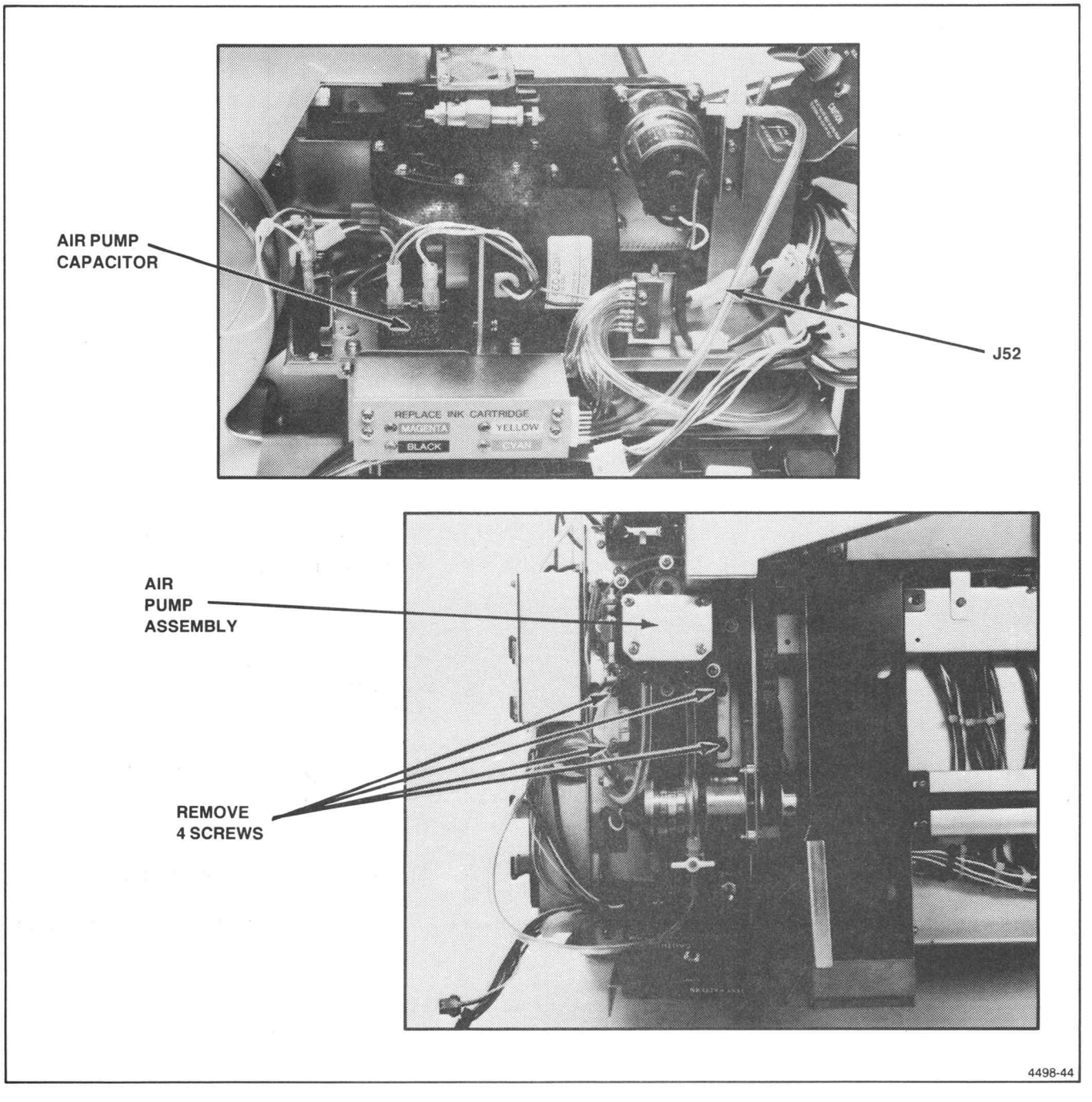


Figure 7-5. Air Pump Removal.

7.5 INK CARTRIDGE HOUSING

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.5.1 REMOVAL

1. Remove the top and front covers. See Sections 7.1.2 and 7.1.4.
2. Remove the ink cartridges. If more information is needed, see the procedure in the operators manual.
3. Remove the two screws that secure the cover plate on the right side of the ink cartridge housing and set the plate aside. See Figure 7-6.
4. Disconnect J53 (Figure 7-6) which is located between the rear of the ink cartridge housing and the card cage.
5. Remove the fault light panel by:
    a. Disconnect J42.
    b. Remove the two screws that hold the fault light panel to the frame and set the panel aside.

CAUTION

Take care not to stretch or damage the ink lines while performing these steps.

6. Clamp the air line that goes from the air pump to the air line manifold as close to the air pump as possible. Remove the air line at the air pump valve.
7. Remove the two screws that secure the air line manifold.
8. Clamp the air line from the air valve that connects to the ink-jet head assembly.

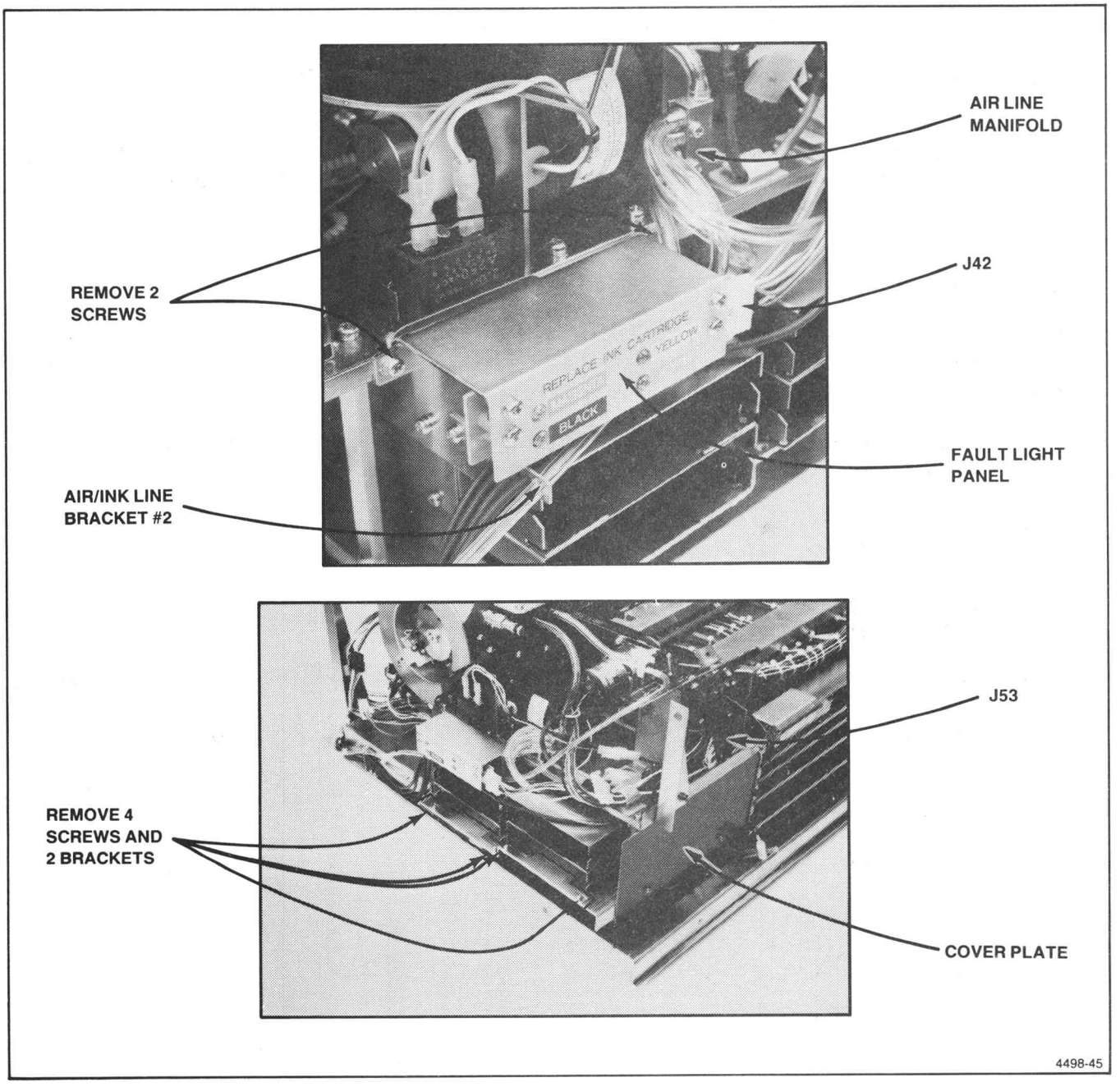


Figure 7-6. Ink Cartridge Housing Removal.

9. Remove the two screws that secure the air/ink line bracket (#1) to the base plate. See Figure 7-4 for the location of the bracket.

10. Remove the four screws and two brackets that secure the ink cartridge housing to the frame. These brackets are located in front of the two bottom housings.

11. Carefully slide the housing assembly forward and out of the copier.

12. Remove the screw that holds the air/ink line bracket (#2) to the left housing and slide the bracket down the hose to obtain slack. See Figure 7-6.

7.5.2 DISASSEMBLY

When the ink cartridge is disassembled, the miscellaneous hardware parts will be needed to install the new ink cartridge housing.

1. Remove the air line from the air manifold of the ink cartridge housing that is to be replaced.

2. Carefully clip the tie wrap that secures the ink lines to the rear of the housing.

3. Remove the two nylon screws that secure the electrode connectors to the rear of the housing.

4. Remove the two brackets that hold the two housings together.

5. Remove the air line from the housing that is to be replaced.

6. Clamp the ink line to the selected housing as close to the housing filter as possible.

7. Remove the ink line from the filter output and set it aside.

8. Remove the plug from the short filter purge line and connect the short line to the filter output port. This will keep any ink remaining in the filter from spilling.

9. Set the defective housing aside.

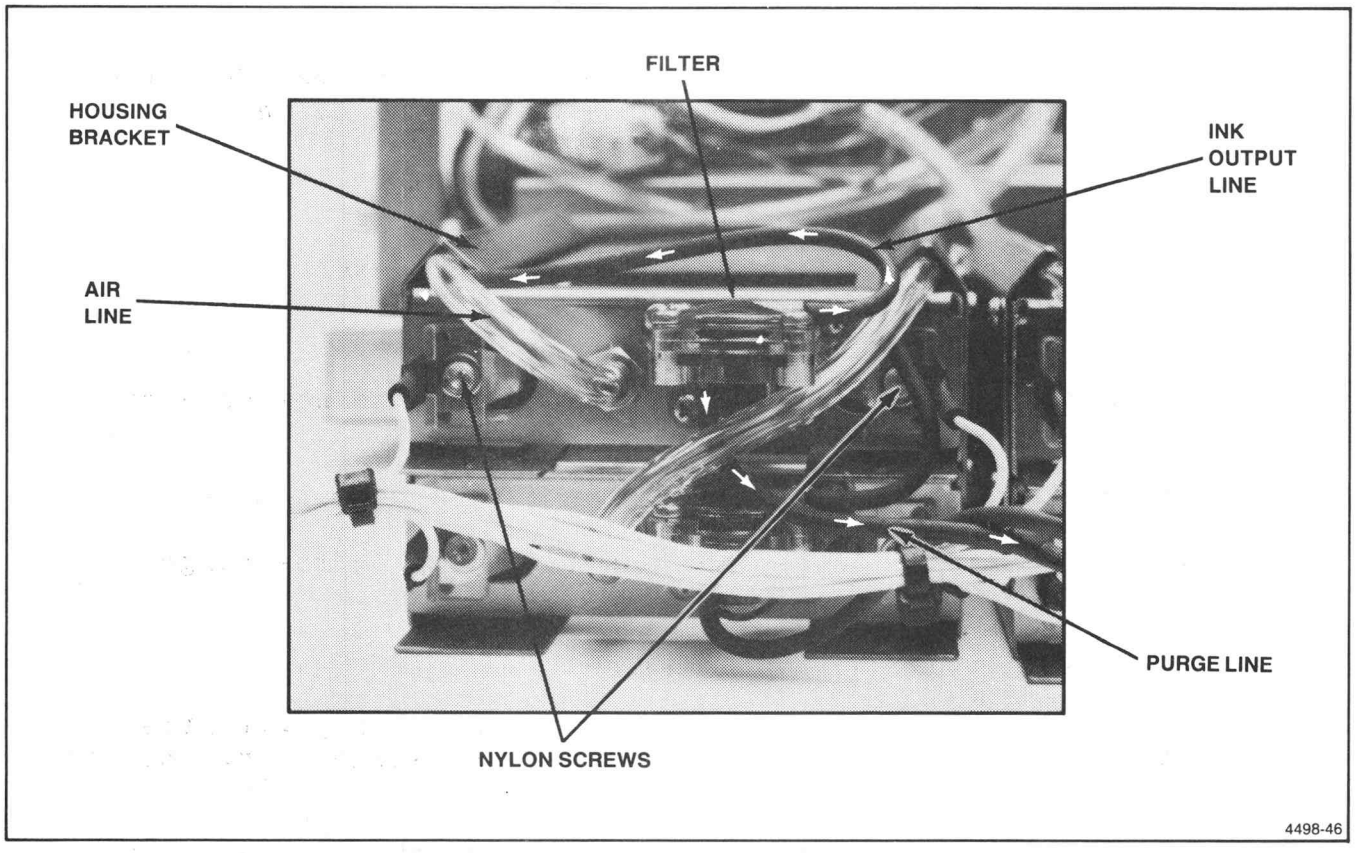


Figure 7-7. Ink Cartridge Housing Disassembly.

7.5.3 ASSEMBLY

1. Remove the electrode connectors and hardware from the back of the new housing assembly.

CAUTION

Use care when sliding the ink cartridge housing into place not to damage the wiring or pinch the hoses behind the assembly.

2. Carefully attach the electrode connectors removed from the old housing to the new housing using the two nylon screws.

CAUTION

It is important not to over-tighten these connections.

3. Disconnect and discard the filter hose on the new housing output port.
4. Connect the ink output line to the filter output port.
5. Replace the short purge line and line plug on the purge port.
6. Remove the clamp on the ink line.
7. Secure the ink lines to the rear of the housing with tie wraps. Do not pinch the ink lines by over-tightening the tie wraps.
8. Connect the air line from the housing to the air manifold.

NOTE

When replacing the housing side brackets, only one air line and one ink line are routed under each bracket. Use tie wraps to secure any loose lines.

7.5.4 REPLACEMENT

1. Replace the housing assembly by reversing steps 2 through 12 in the removal procedure (Section 7.5.1).

2. Purge the ink lines for 1.5 to 2 minutes at the three way valve on the head assembly. The complete ink-jet head purging procedure is in Section 8.

3. Perform the operational checkout procedure as shown in Section 5.

7.6 COOLING FAN

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.6.1 REMOVAL

1. Remove the top and front covers. See Sections 7.1.2 and 7.1.4.

2. Remove the two screws that hold the cover plate on the side of the ink housing. See Figure 7-6.

3. Disconnect connector J57 from the cooling fan motor. See Figure 7-8.

4. Remove the two screws that secure the fan bracket to the bottom plate ane remove the fan.

7.6.2 REPLACEMENT

1. Reverse the removal procedure to replace the cooling fan.

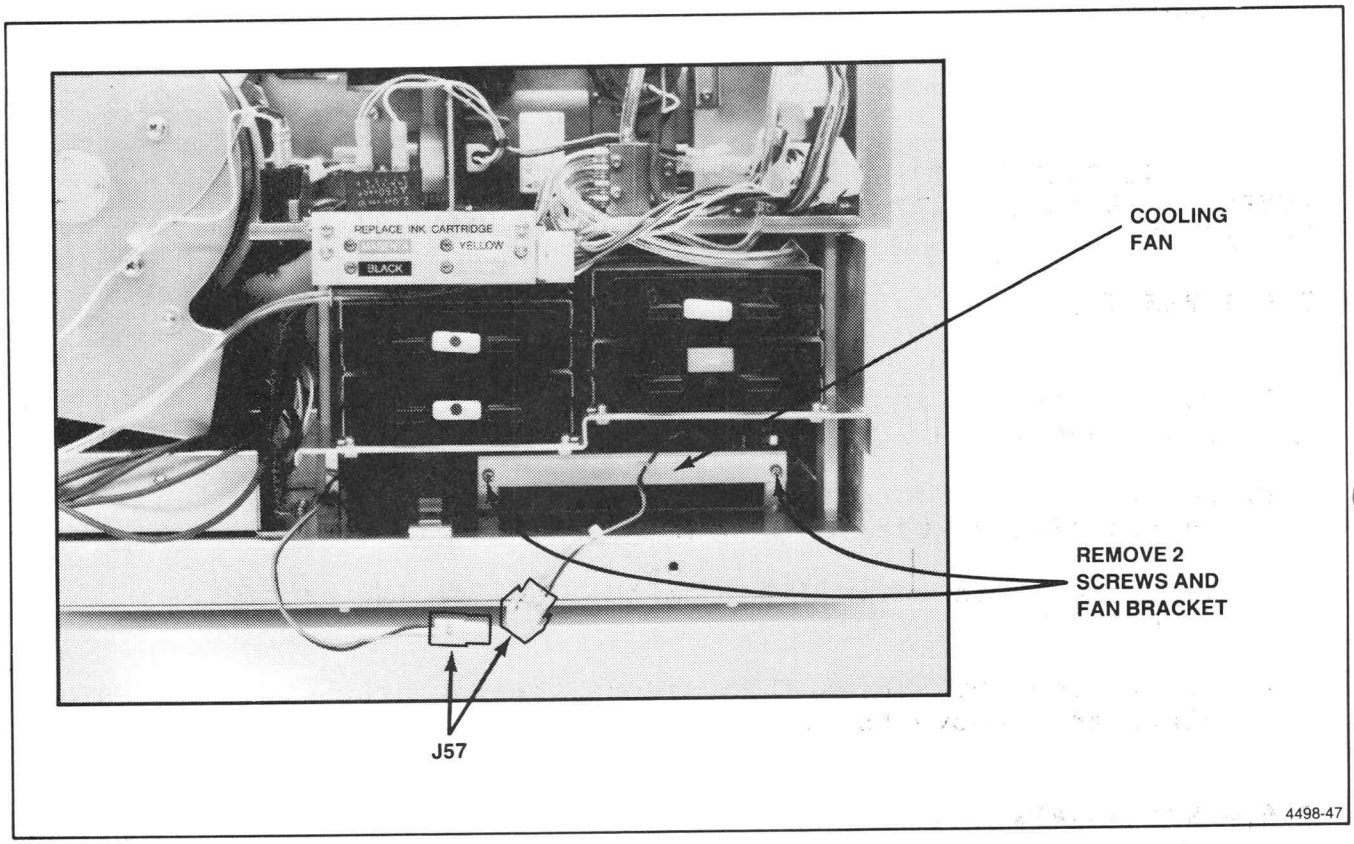


Figure 7-8. Cooling Fan Removal.

7.7 CARRIAGE DRIVE CABLE

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.7.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover (optional). See Section 7.1.4.
3. Manually position the ink-jet head carriage in the middle of its travel. See Figure 7-9a.
4. Note the routing of the drive cable. See Figure 7-9b.

CAUTION

Do NOT scrape or kink the carriage drive cable.

5. Carefully hold the carriage and remove the spring from the left side of the head carriage assembly. While keeping tension on the cable, remove the right spring.
6. Carefully remove the cable and springs.
7. Keep the cable from becoming twisted after removal by hanging or laying it straight.

NOTE

The cable is one length of cord doubled at one end. The end that is tied to the spring attaches to the right side of the head carriage.

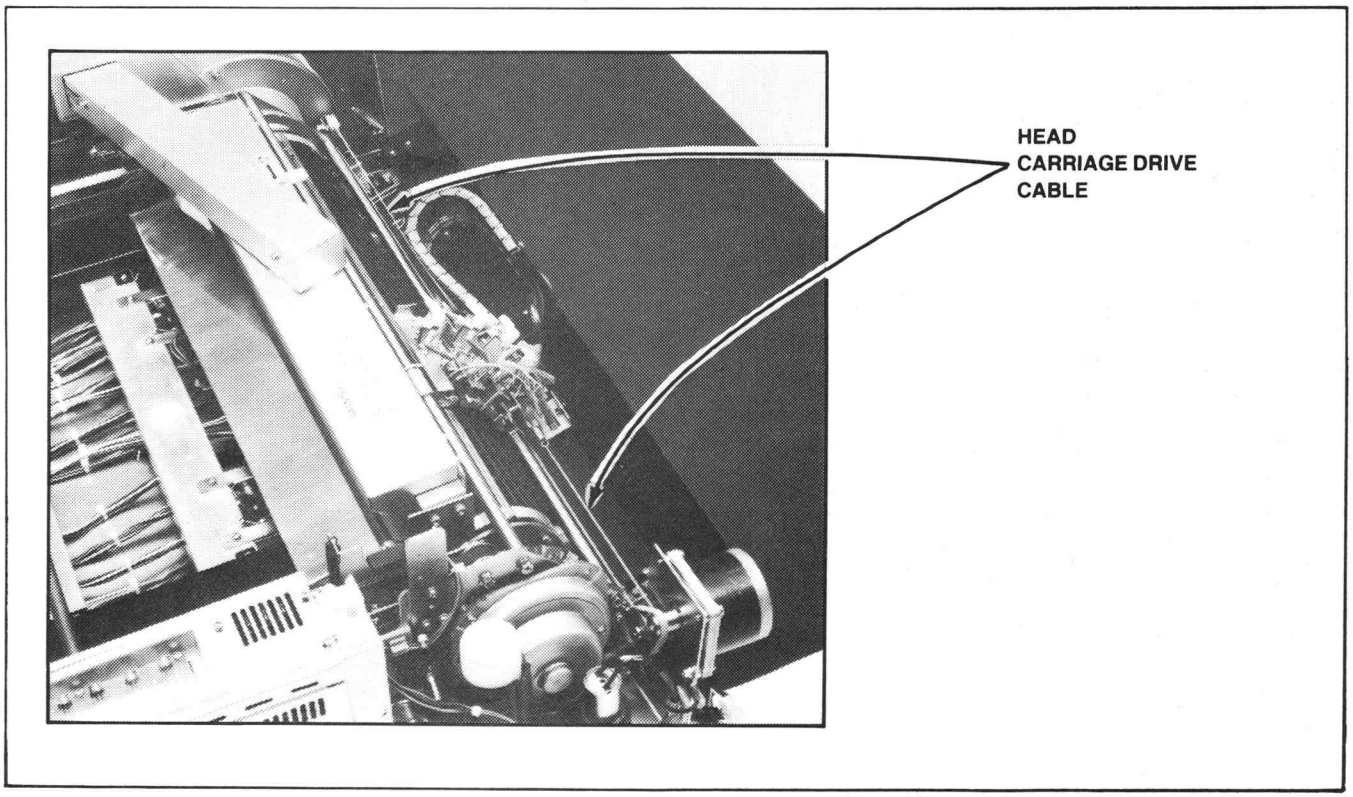


Figure 7-9a. Head Carridge Drive Cable Removal.

7.7.2 REPLACEMENT

1. Position the carriage in the middle of its travel.

CAUTION

The replacement of the carriage drive cable must be done carefully. Any nicks or kinks in the cable fabric will promote premature failure of the drive cable.

2. Route the cable under the carriage and around the motor drive pulley and the idle pulley on the opposite end. See Figure 7-9b.

3. Carefully hook the spring to the right side of the carriage. The spring with cable ends tied to it should be attached to the right side.

4. Ensure that no knots or crossed lines exist and carefully attach the left spring to the head carriage.

5. Manually move the carriage to both ends of the drum several time observing the cable movement and checking for binding, kinking, or crossed lines. Check to ensure that the cable is riding in the grooves on the drive pulley.

6. Perform the procedure titled "Carriage Drive Cable Tension Adjustment" in Section 5.

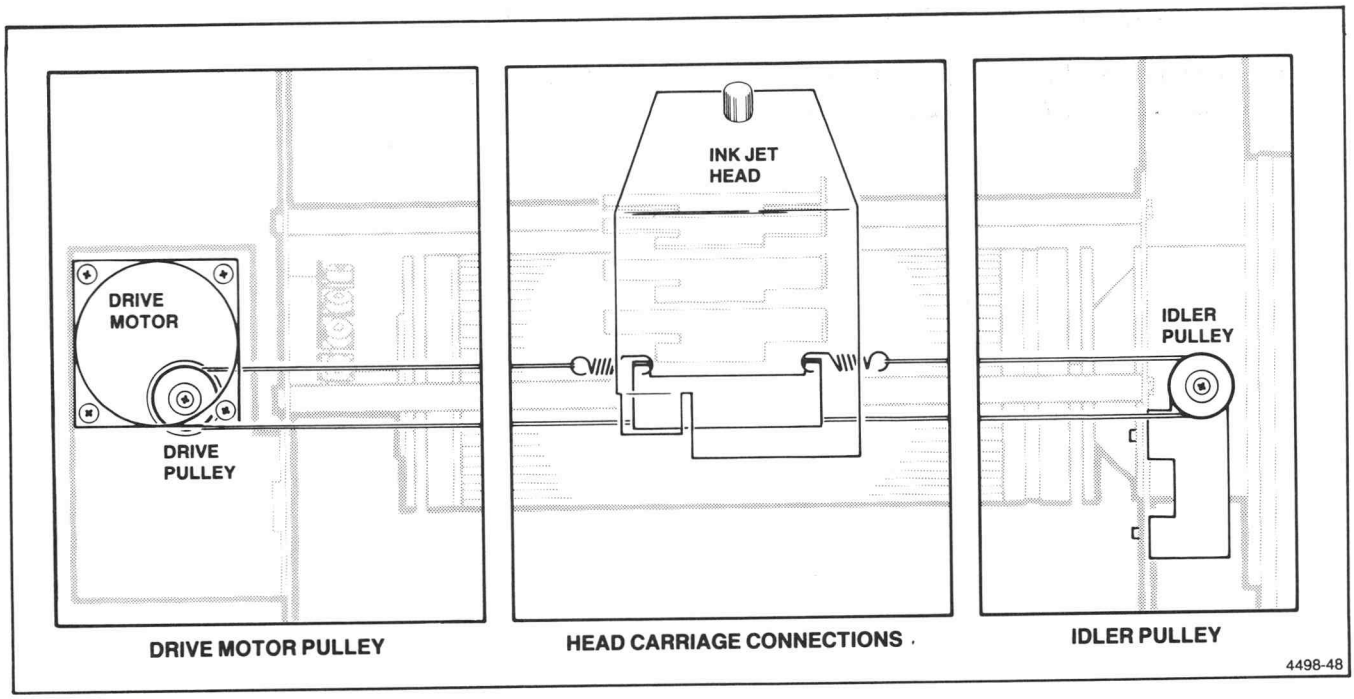


Figure 7-9b. Head Carriage Drive Cable Routing.

7.8 HEAD DRIVE MOTOR

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.8.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover (optional). See Section 7.1.4.
3. Remove the carriage drive cable. See Section 7.7.1.
4. Disconnect J48 from the drive motor. See Figure 7-10.
5. Remove the ground wire attached to the back of the motor bracket.

NOTE

The lower right screw is shorter than the others in order for it to clear the pulley. Be sure to replace it in the same location when the motor is installed.

DO NOT lose the spacers that are placed between the back of the motor and the chassis frame.

The motor drive belt gets its tension from the position of the motor on the bracket. See Figure 7.10.

6. Remove the four screws and spacers that hold the motor to the bracket.
7. Carefully remove the motor and drive belt.

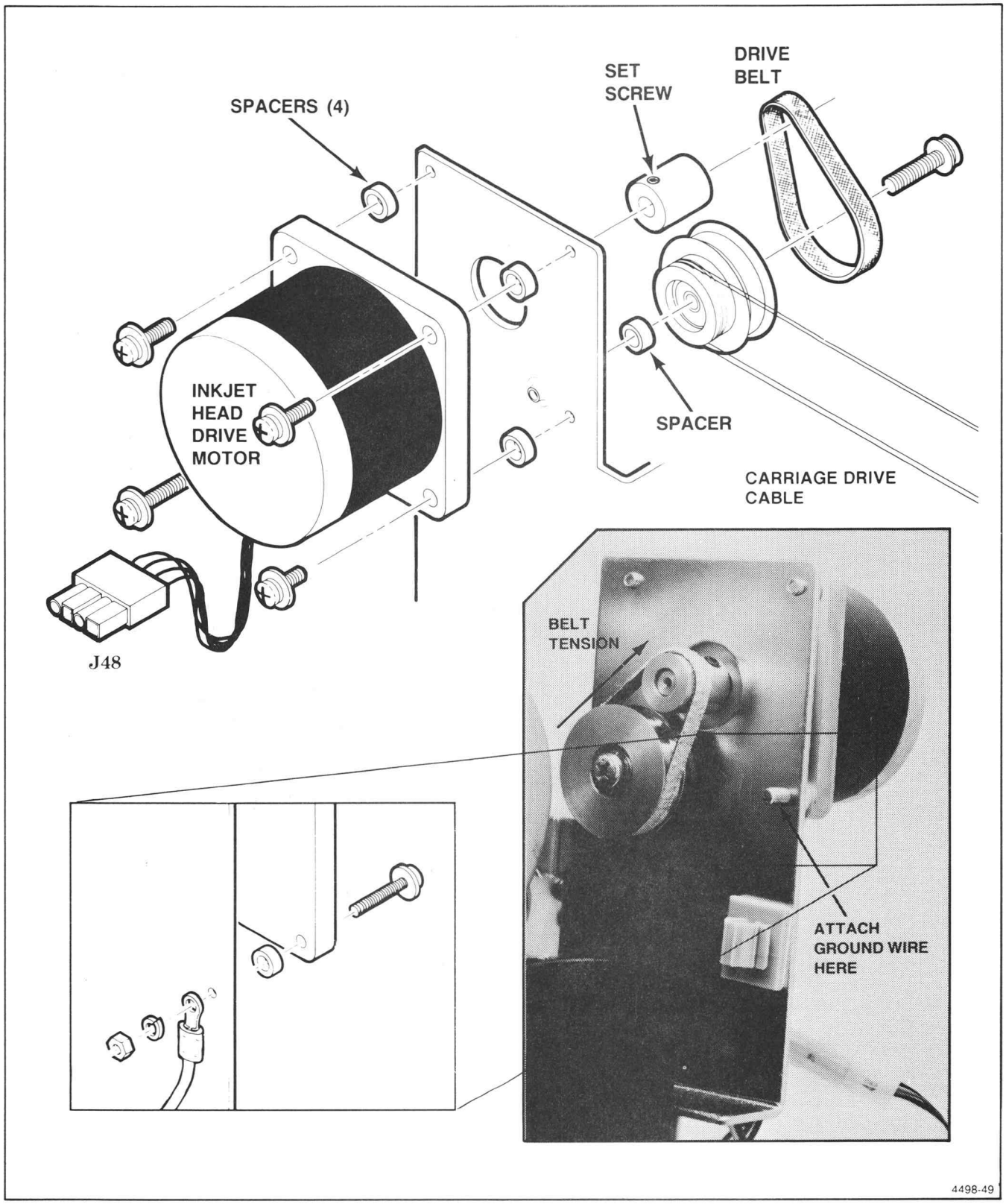


Figure 7-10. Head Drive Motor Removal.

7.8.2 REPLACEMENT

The use of spacers make replacing the carriage drive motor a little difficult due to the belt tension requirements. The following procedure works best.

1. Place the long screw (used for the ground strap) in the lower left motor housing hole. Slide the spacer on the screw between the motor and the frame.

2. Position the motor in place and start the screw in the bracket a few turns. (Do NOT tighten.)

3. Place the drive belt on the pulley.

4. Angling the motor to the left will give enough access to place the spacer on the lower right screw.

5. Install the lower right mounting screw into the mounting bracket. Use the short screw that was removed from this location. Do NOT tighten!

6. Using thin nosed pliers, carefully hold the spacers between the motor and bracket as you install the top screws.

7. As you tighten all the screws evenly, ensure that maximum belt tension is established by directing pressure against the belt. Maximum tensioning can be accomplished by pulling the motor up and to the left. Follow the procedure titled "Head Carriage Drive Motor Belt Tension Adjustment" in Section 5.

8. Replace the grounding wire strap on the lower left mounting screw. Attach the ground wire to the back of the motor bracket with the hex nut that was removed.

9. Reconnect J48.

10. When the copier is powered up, check to ensure that no slippage occurs between the belt and the pulley.

7.9 INK-JET HEAD ASSEMBLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.9.1 REMOVAL

1. Remove the top cover. (optional) See Section 7.1.2.
2. Position the carriage about four inches to the right of the head washing station.
3. Clamp the ink line as close to the head as possible without clamping the fitting.
4. Disconnect the electrical wires to the head at the carriage connectors (J32 & J33). There are four red wires and four white wires. See Figure 7-11a.

CAUTION

Whenever working with the head assembly, be sure to keep the head(s) from coming into contact with any other part of the printer. The head is very fragile and can be easily damaged.

5. Continue with this procedure for the top three heads (yellow, magenta, and cyan).
6. Skip to Section 7.9.2 for the bottom (black) head removal procedure.
7. Remove the two screws attaching the head bracket to the carriage assembly.
8. Slowly and carefully lift the head out. Some side motion may be necessary to clear obstructions.
9. Turn the three way valve fully clockwise to the CLOSED position.

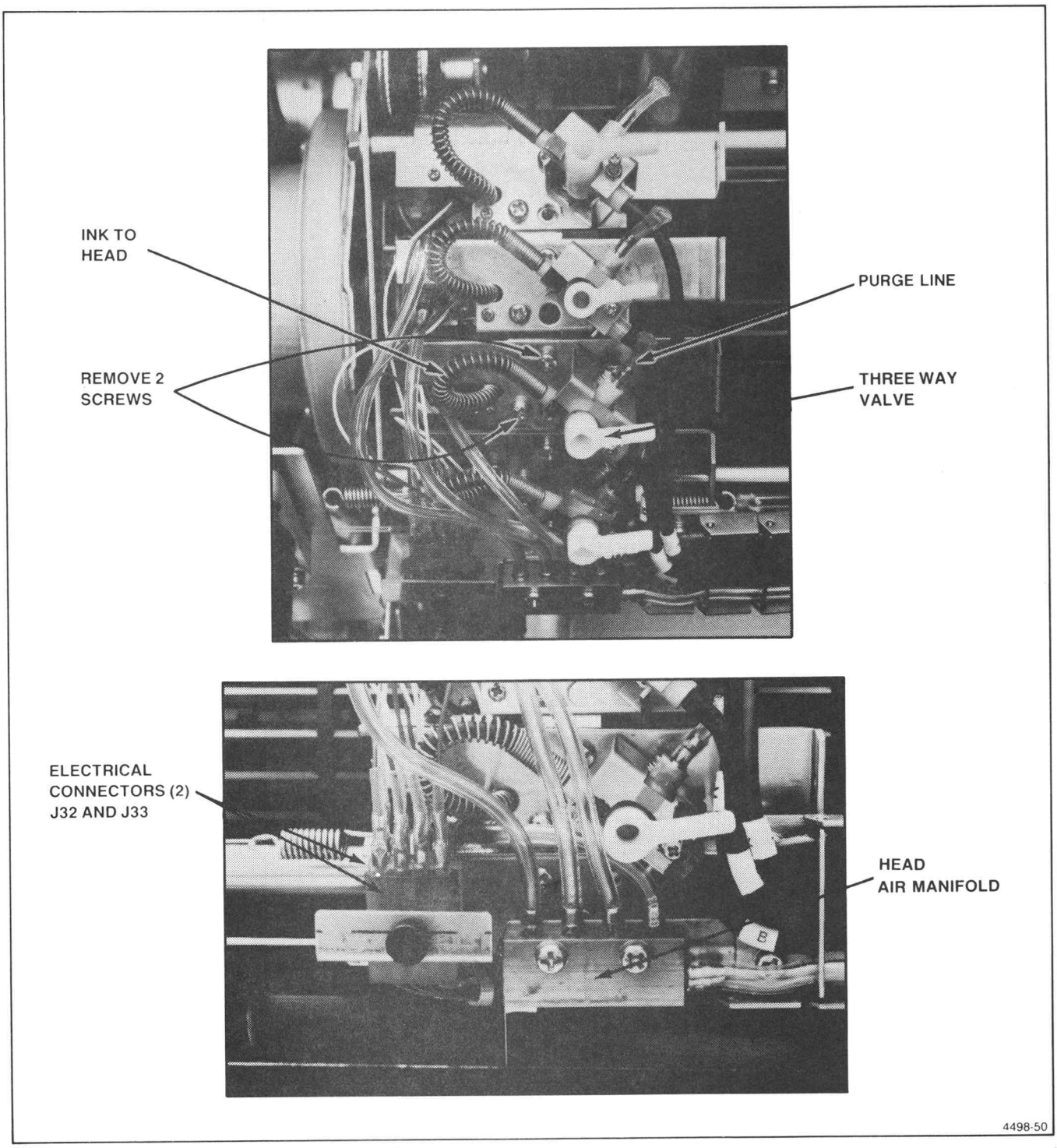


Figure 7-11a. Ink-jet Head Removal. (Yellow, Cyan, and Magenta).

10. Carefully remove the ink line from the head. The best method for removing the ink lines is as follows:

    a. Place the tips of a pair of tweezers between the end of the ink line and the connector on the head.

    b. Slowly pry the tubing off the the connector.

11. Carefully remove the air line from the air manifold port.

12. Remove the head and set it aside.

13. Follow the steps in Section 7.9.3 for the head replacement procedure.

7.9.2 REMOVAL OF THE BLACK HEAD

After steps one through six in Section 7.9.1 have been completed, follow these steps for removing the bottom (black) head. See Figure 7-11b.

1. Clamp and remove all air lines from the carriage air manifold.

2. Remove all wires from the carriage connectors (J32 &J33) and position them out of the way.

3. Remove the two screws that attach the black head bracket to the carriage assembly.

4. Carefully and slowly lift the head out. Some side motion will be necessary to clear obstructions.

5. When the head is clear of the head carriage, set it aside being careful not to touch or damage the face of the head.

6. Carefully remove the ink line from the head. The best method for removing the ink lines is as follows:

    a. Place the tips of a pair of tweezers between the end of the ink line and the connector on the head.

    b. Slowly pry the tubing off the the connector.

7. Carefully remove the air line from the air manifold port.

8. Remove the head and set it aside.

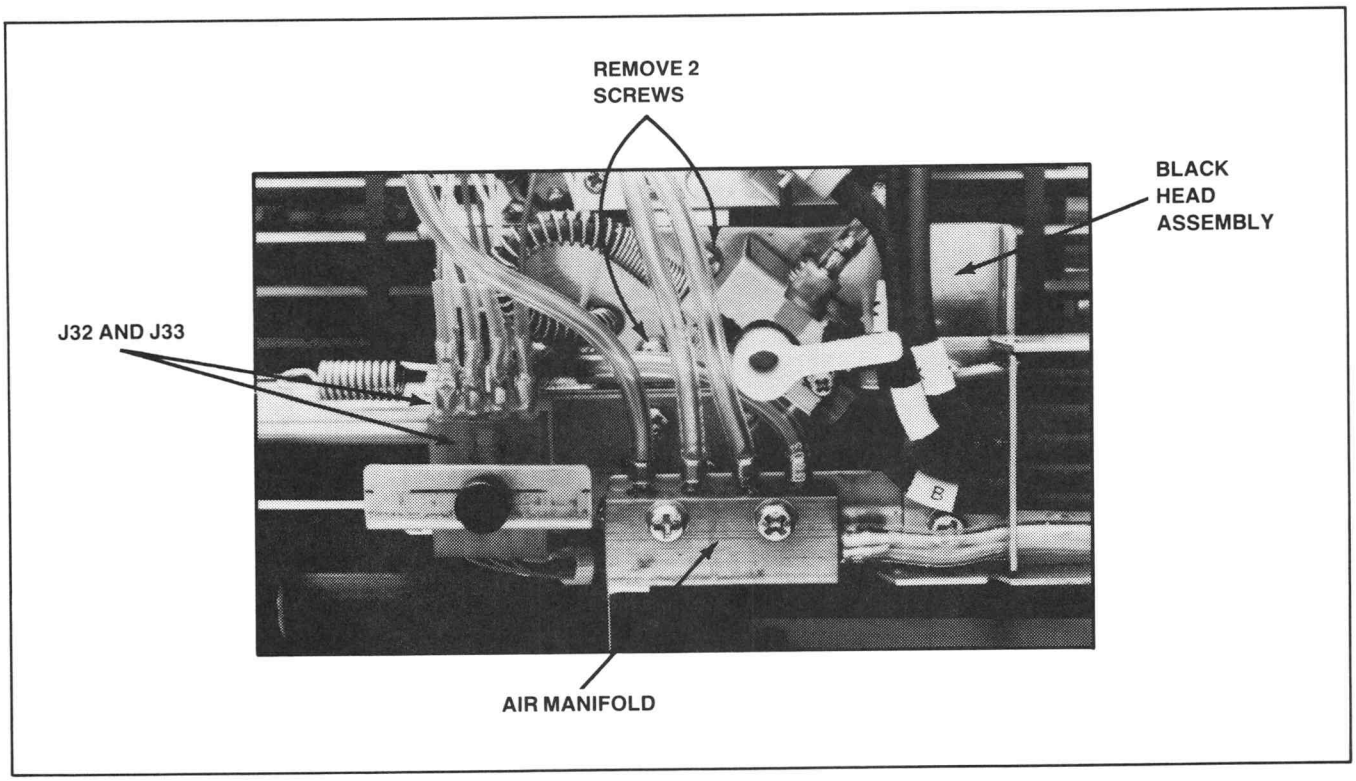


Figure 7-11b. Black Head Removal.

7.9.3 REPLACEMENT

1. Carefully remove the protective cap from the new head and place the new head in position on the head carriage.
2. Attach the new head to the head carriage with the two screws.
3. Use the following steps to connect the air and ink lines to the head.
    a. Remove the coiled line from the hose connector and connect the air line to the connector.
    b. Connect the ink line to the three-way valve.
3. Connect all the air line(s) to the head(s) that were removed.
4. Connect all electrical wires that were removed from J32 and J33.
5. Connect an ink line from the purge port on the three-way valve to a waste ink bottle to allow bleeding of the valve and the new head.
6. Position the three-way valve fully counter-clockwise (PURGE). The valve handle should be positioned over the black dot.
7. Turn the power ON, and allow the bleed line to run for a minimum of 30 seconds.
8. Rotate the valve to the OPERATE position. The handle should be over the blue dot.
9. Remove the purge line and recap the port.
10. Open all the other head ink valves.
11. Turn the power OFF.
12. Wait 10 seconds.
13. Turn the service switch OFF.
14. Open the air line valve.
15. Turn the power ON.
16. Initiate a threshold voltage test pattern.
17. If problems are encountered, refer to Troubleshooting (Section 6) or Ink-jet Head Maintenance (Section 8).

7.10 CHAIN HOSE ASSEMBLY (INK LINES)

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.10.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover. See Section 7.1.4.
3. Close all three-way valves on the head by turning them fully clockwise. The valve handle will be against the screw in the CLOSED position.
4. Remove the eight screws that hold the ink lines to the underside of the chain hose bracket. See Figure 7-12.
5. Remove the two screws securing the chain hose bracket and set it aside.
6. Clamp the four ink lines to the heads in two places.
    a. About one inch from where the ink lines connect to the three-way valves.
    b. At the ink line splices located near the head driver amplifier. See Figure 7.12 for the location of these splices.
7. Carefully remove the ink lines from the three-way valves. The best method for removing the ink lines is as follows:
    a. Place the tips of a pair of tweezers between the end of the ink line and the connector on the three way valve.
    b. Slowly pry the tubing off the the connector.
8. Disconnect the ink lines at the in-line splices using the method outlined in step 7.
9. Remove the air line from the from the air line valve near the air pump. Route the air line through the bracket attached to the ink cartridge housing and through the bracket attached to the base.
10. Disconnect J21 at the head amplifier.

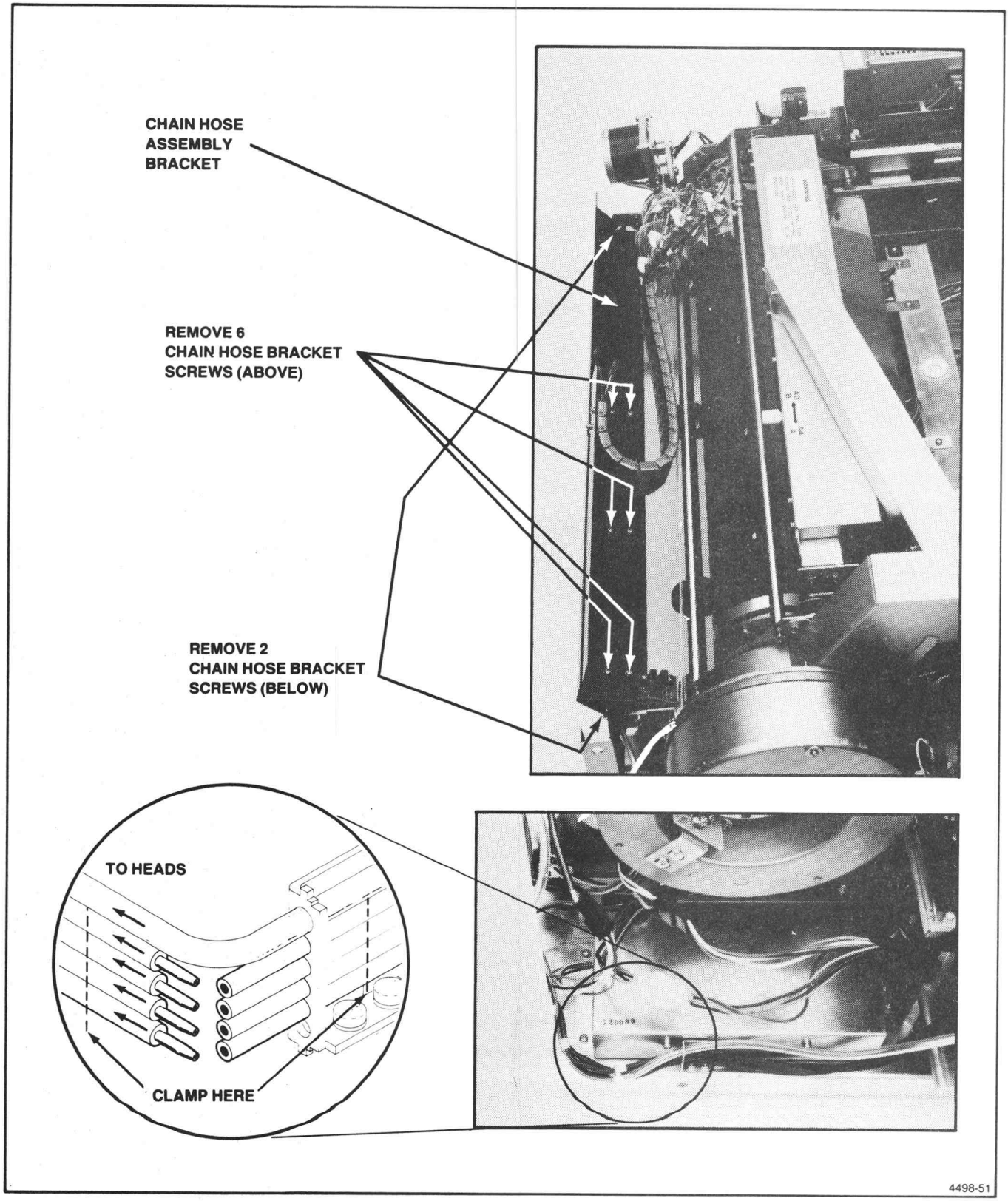


Figure 7-12. Chain Hose Assembly Removal.

11. Disconnect all the wires in J32 and J33 on the head carriage assembly. Use a small flat blade, carefully push in on the connector latches and remove each connector from the bottom.

12. Remove the two screws that attach the chain hose to the carriage assembly.

13. Remove the chain hose assembly air line from the head carriage air line manifold.

14. Remove the chain hose assembly and set it aside.

7.10.2 REPLACEMENT

1. Perform in reverse order steps 3 through 13 in the removal procedure.

   After the chain hose assembly has been replaced, it is important to ensure that it does not interfere with the head carriage drive cable. The carriage drive cable should lie between the chain hose and the drum when the head carriage is moved to the limits of its travel. The drive cable will touch the chain hose, but should not travel either above or below the chain hose. The proper operating position of the drive cable is approximately in the center of the height of the chain hose. Use the following steps to check and adjust the chain hose position.

   a. Move the head carriage to both ends of the drum while watching the carriage drive cable. The cable should remain between the chain hose and the drum. If the cable is allowed to ride over or under the chain hose, the fiber cover on the drive cable will be damaged and the life of the drive cable will be greatly reduced.

   b. If the chain hose must be adjusted, loosen the two screws at each end of the chain hose.

   c. Twist the chain hose counter-clockwise (top away from the drum) at both ends.

   d. Tighten the two screws at each end of the chain hose and repeat step "a". Repeat these steps until the head carriage drive cable and the chain hose do not interfere with each other.

   e. If more information is needed, see the procedure titled "Chain Hose Assembly Adjustment" in Section 5.

2. Ensure that all wiring is properly connected.

3. Ensure that the AIR PUMP ONLY switch to the ON position.

4. Ensure that the main ink-jet head air valve located near the air pump is OFF.

5. Connect a length of hose from each three-way valve purge port to a wastewater bottle.

6. Position the three-way valve in the PURGE position with the handle over the black dot.

7. Turn the copier power ON and allow all lines to purge for 1.5 to 2.0 minutes. Wiggle the entire length of the ink lines during purging to help free air bubbles that may be in the lines.

8. Turn the copier power OFF.

9. Turn the AIR PUMP ONLY switch to the NORMAL position.

9. Turn the main ink-jet head air valve ON.

10. Turn all four three-way valves to the OPERATE position. The handle on the valve should be over the BLUE dot.

11. Turn the copier power ON and perform an operational check. Purging the heads may be necessary after this procedure. See the procedure in Section 8.

7.11 INK-JET HEAD CARRIAGE ASSEMBLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.11.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover. See Section 7.1.4.
3. Remove the carriage drive cable. See Section 7.7.1.
4. Close the valve on each of the heads. See Figure 7-13.
5. Remove the eight screws that hold the ink lines to the underside of the chain hose bracket. See Figure 7-12.
6. Remove the two screws that secure the chain hose bracket and set the bracket aside.

CAUTION

Care must be taken in the following step to ensure that the head does NOT come in contact with the drum or any other surface.

Do NOT stretch the hoses while removing the head carriage assembly.

7. Remove the two hex screws located at each end of the lower head carriage shaft. See Figure 7-13.
8. Slowly lift the ink-jet head carriage assembly off the top shaft and lay the assembly aside, but do not stretch the hoses.

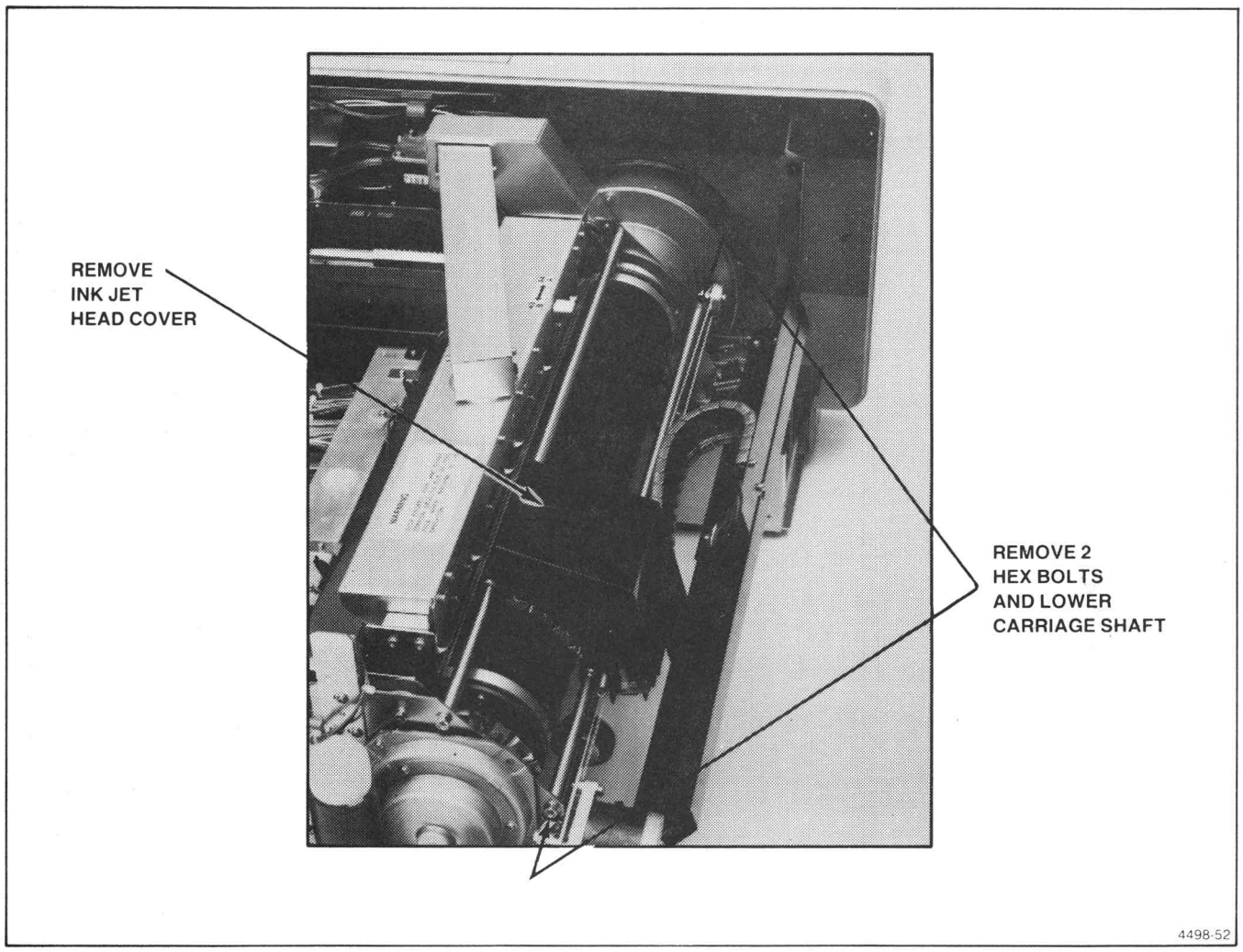


Figure 7-13. Ink-jet Head Carriage Removal.

7.11.2 REPLACEMENT

1. Reverse the removal procedure to replace the head carriage assembly.

2. Check the freedom of movement of the head carriage assembly by sliding the head carriage assembly from end to end. The head carriage assembly should move smoothly without binding or sticking.

3. Perform the alignment procedure titled "Drum-to-Carriage Shaft Adjustment" in Section 5.

4. Install the chain hose assembly. See Section 7.10.2.

7.12 FRONT PAPER STRIPPER ROLLER

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.12.1 REMOVAL

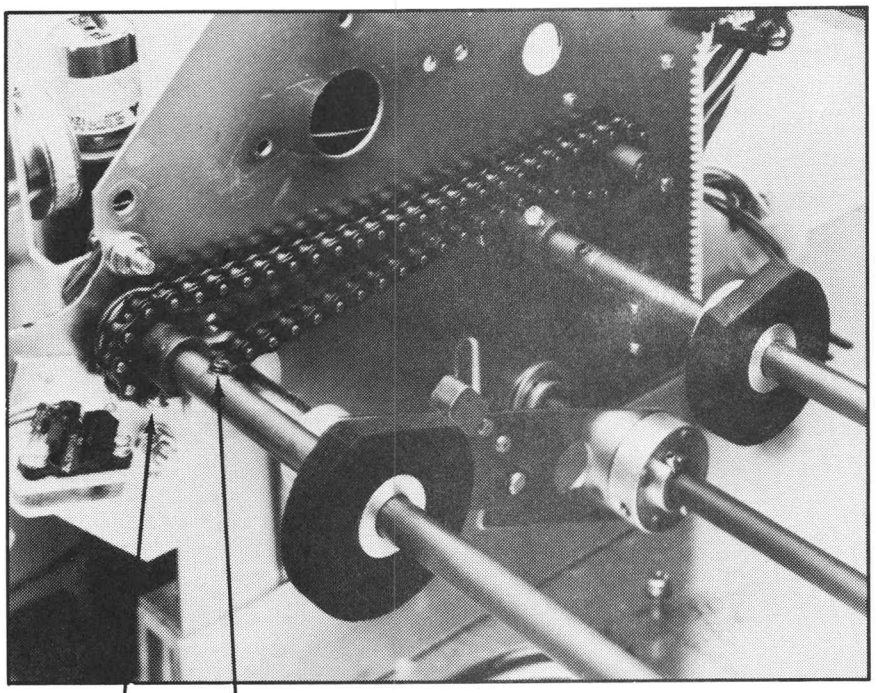
1. Remove the top cover. See Section 7.1.2.
2. Remove the chain hose bracket. See Figure 7-12.
   a. Remove the eight screws that hold the ink lines to the bottom of the chain hose bracket.
   b. Remove the two screws that hold the chain hose bracket to the frame and set the bracket aside.
3. Loosen but do NOT remove the Phillips head screw in the end of the stripper roller shaft. See Figure 7-14a.
4. Manually rotate the stripper roller until you can gain access to the set screw that attaches the roller shaft and the chain drive gear. The stripper shaft will be hard to turn, because you will be turning the drive motor and drive chain.
5. Loosen but do not remove the set screw.
6. Loosen the set screw in the paper stripper interruptor wheel on the right end of the roller shaft. See Figure 7-14b.
7. Remove the "E" clip that secures the shaft bushing in the vacuum fan end.

CAUTION

Care must be taken when sliding the shaft to ensure that no damage is done to the optical interruptor wheel.

8. Carefully slide the shaft toward the bushing end. The loose bushing will provide the necessary clearance to allow the shaft to be removed from the chain gear.
9. Carefully slide the shaft out of the bushing and clear of the copier.

A. STRIPPER ROLLERS (LEFT END).



"E" CLIP

SET SCREW

PHILLIP'S HEAD SCREW

SET SCREW

B. STRIPPER ROLLERS (RIGHT END).

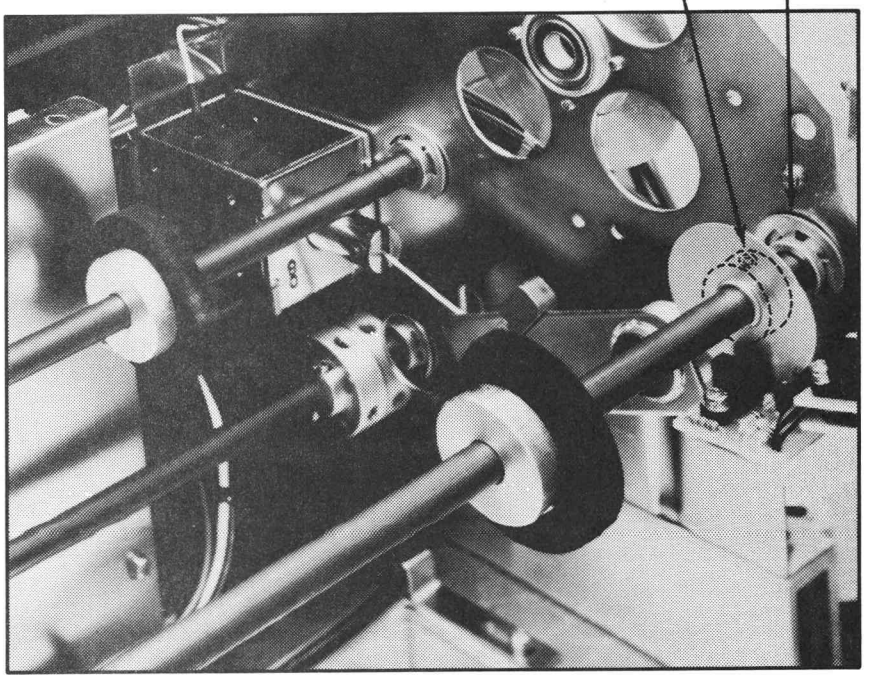


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Figure 7-14. Front Paper Stripper Roller Removal.

7.12.2 REPLACEMENT

1. Perform in reverse steps 4 through 9 of the removal procedure.

NOTE

Ensure that the rear stripper roller is tangent to the drum.

2. Turn the stripper shaft until the flat side of the stripper rollers are tangent to the drum and tighten the set screw in the stripper shaft.

3. When the stripper roller has been installed, the alignment of the optical interruptor for the paper stripper sensor must be checked. If adjustment is necessary, see the alignment procedure titled "Stripper Roller Optical Sensor Adjustment" in Section 5.

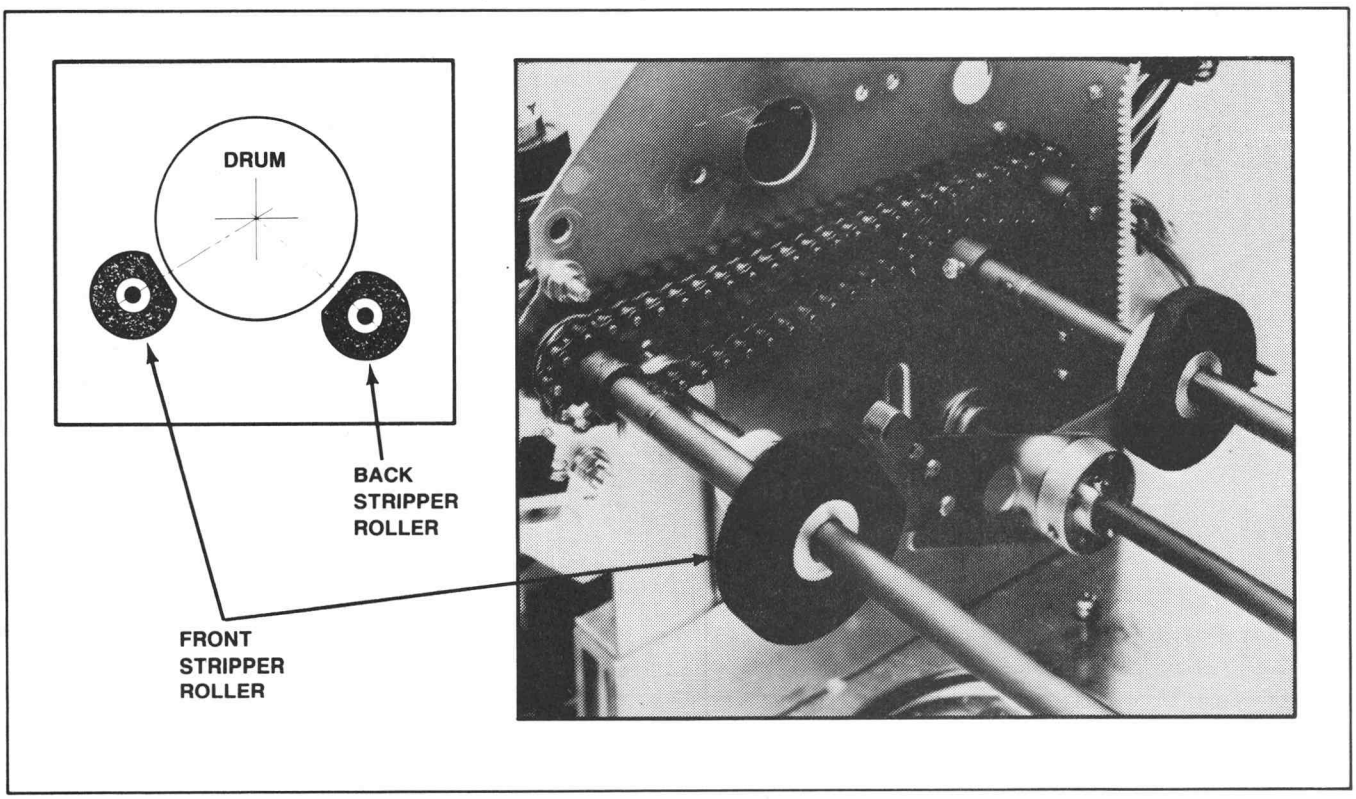


Figure 7-14c. Stripper Roller Alignment.

7.13 REAR PAPER STRIPPER ROLLER

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.13.1 REMOVAL

1. Remove top cover. See Section 7.1.2.
2. Disconnect J46 from the head washing pump assembly motor. See Figure 7-20 for the location of J46.
3. Disconnect the ground strap of the head washing pump motor. This ground strap is attached to the back of the head drive motor bracket with a hex nut.
4. Remove the head wash pump water bottle and drain the reservoir.
5. Remove the head washing pump assembly. See Section 7.18.1.
6. Remove the "E" clip on the outside of the frame at the gear end of the rear paper stripper shaft and remove the fiber washer. See Figure 7-15b.
7. Remove the Phillips screw that secures the shaft drive gear to the short drive shaft.
8. Rotate the roller shaft until you gain access to the shaft allen screw.
9. Remove the allen screw that secures the short drive shaft to the stripper shaft.
10. Slide the main part of the shaft to the right to clear the gear.
11. Remove the gear shaft from the gear by holding the gear in place and sliding the shaft out away from the frame.
12. Remove the shaft. Clearance can be gained by using the bearing hole left by the gear shaft removal.

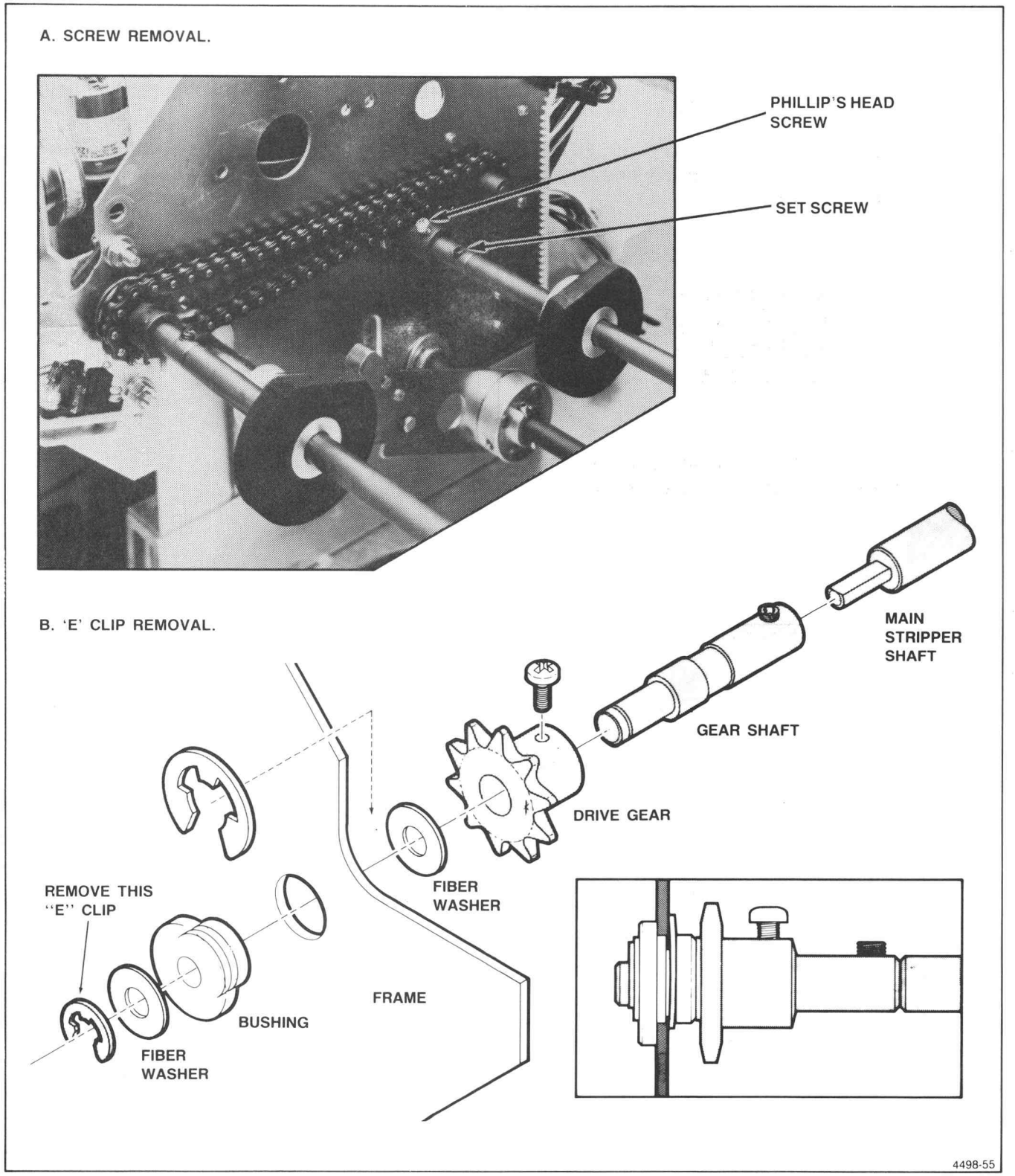


Figure 7-15. Rear Paper Stripper Roller Removal.

7.13.2 REPLACEMENT

1. Perform in reverse the disassembly procedure stopping after step six is completed.

2. Turn the stripper shaft until the flat side of the stripper rollers is tangent to the drum, and tighten the Phillips head screw.

NOTE

When finished all the flat sides of the foam roller should be tangent to the drum. Check to ensure that both the front and rear stripper rollers are tangent to the drum.

3. Refill the water bottle with distilled water ONLY, and replace it in the wash station.

7.14 PAPER STRIPPER MOTOR

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.14.1 REMOVAL

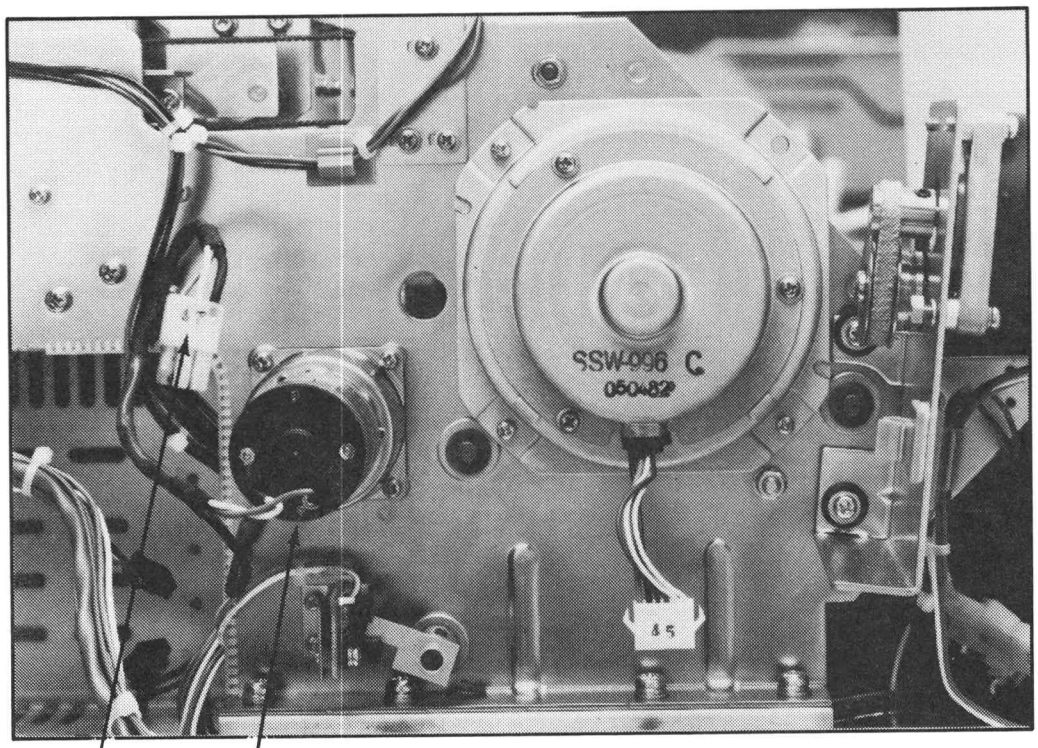
1. Remove the top cover. See Section 7.1.2.
2. Remove the head washing pump assembly. See Section 7.18.1.
3. Disconnect J47 from the stripper motor. See Figure 7-16.
4. Rotate the paper stripper roller until the motor gear set screw becomes visible and access can be gained from the top.
5. Loosen the motor drive gear set screw.

NOTE

Note the location of the ground wire attached to the lower left mounting screw of the head drive motor.

Locate and retain the spacers that must be placed between the motor and the frame when the motor is replaced.

6. Remove the four screws that mount the stripper motor, and remove the motor.



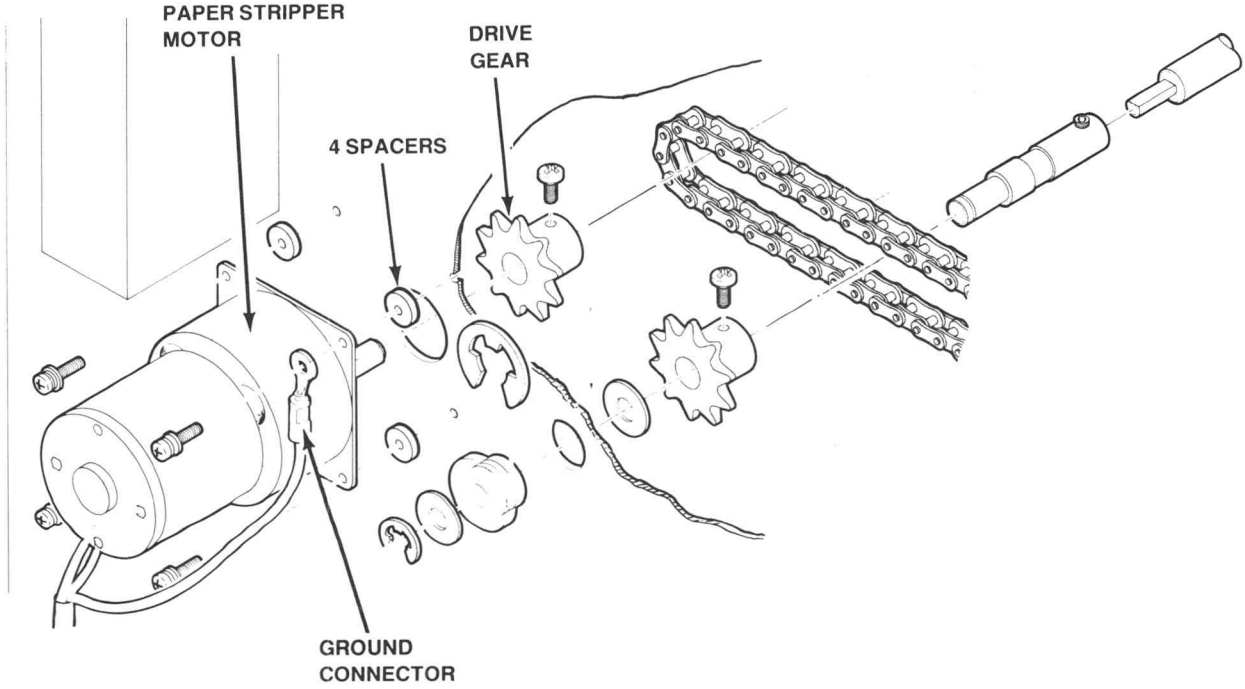


Figure 7-16. Paper Stripper Motor Removal.

7.14.2 REPLACEMENT

1. Reverse the removal procedure to replace the paper stripper motor.

NOTE

Ensure that the gear is correctly aligned into the shaft before tightening.

7.15 DRUM LOCK SOLENOID

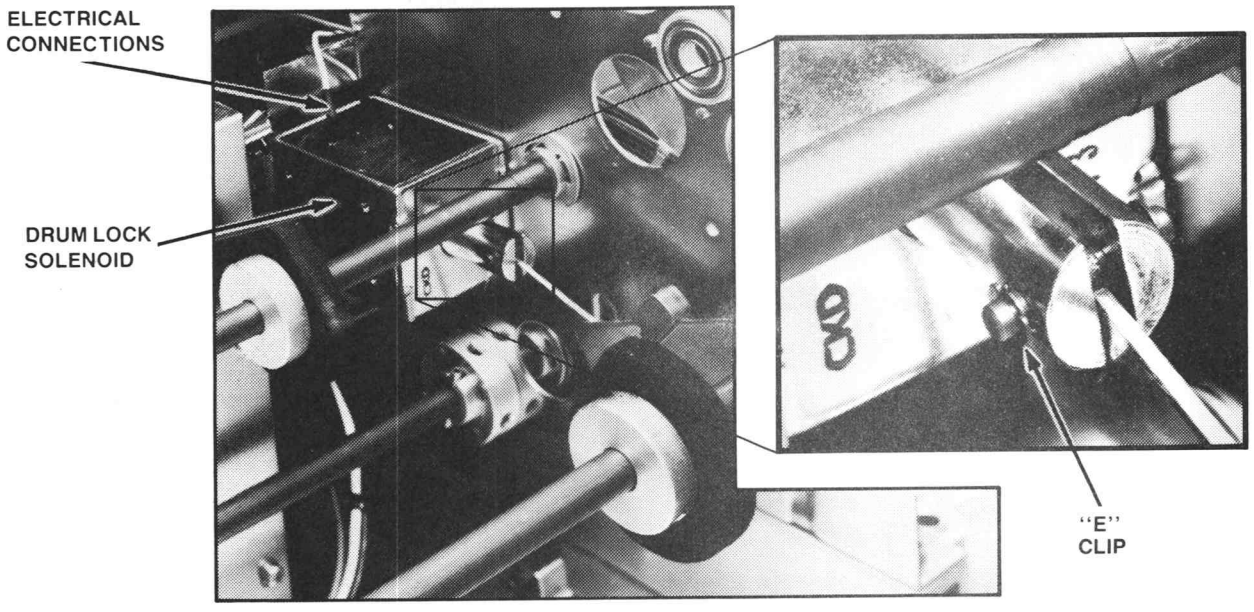
IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.15.1 REMOVAL

The drum lock mechanism is located in the center of the copier below the chrome paper guide. The following steps will allow you to remove and replace the drum lock solenoid.

1. Remove the top cover. See Section 7.1.2.
2. Remove the vacuum fan housing. See Section 7.2.1.
3. Manually move the paper carrier to the rear.
4. Remove the chrome paper guide located between the paper tray and the drum. See Figure 7-25 for the location of the chrome paper guide.
5. Disconnect the solenoid electrical connector (J50).
6. Remove the "E" clip and pin that attaches the solenoid plunger to the drum lock linkage.
7. Locate the four screws that attach the solenoid to the front frame of the copier. See Figure 7-17b.
8. While holding the solenoid with one hand, remove these four screws and lift the solenoid up and out of the printer.

A. SOLENOID LOCATION



B. SOLENOID MOUNTING SCREWS

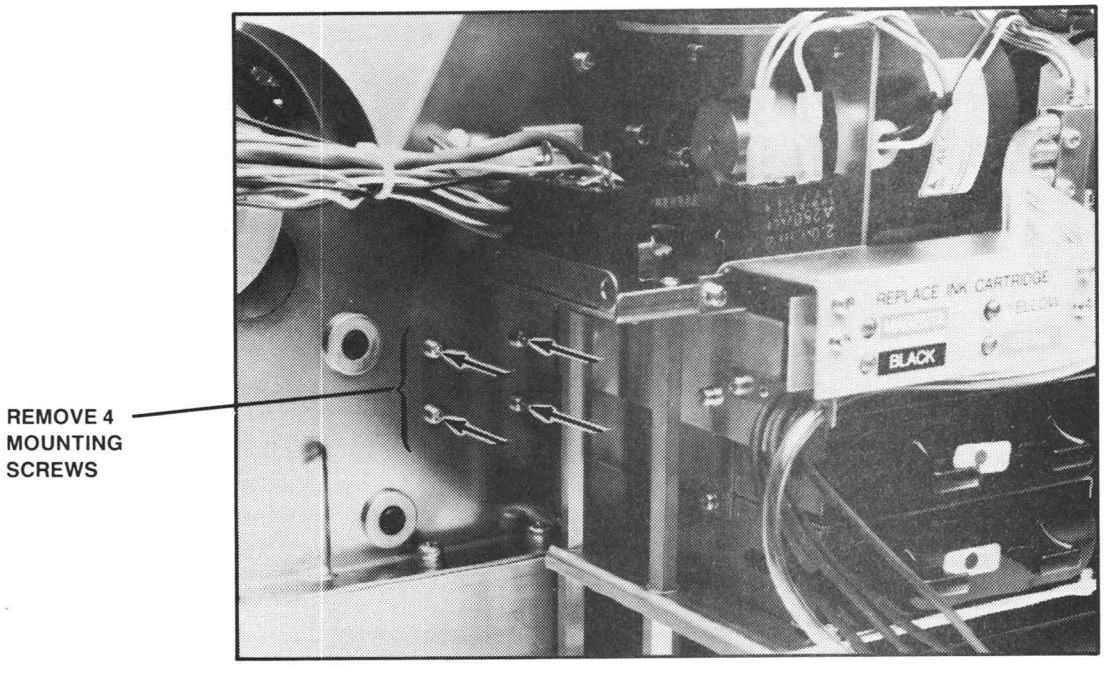


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Figure 7-17. Drum Lock Solenoid Removal.

7.15.2 REPLACEMENT

1. Reverse this procedure to replace the solenoid.

2. After the drum lock solenoid has been replaced it will be necessary to check the alignment of the optical interruptor for the drum lock sensor.

7.16 DRUM MOTOR AND HEAD WASHING STATION

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.16.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the head washing pump assembly. See Section 7.18.1.
3. Disconnect J45 from the drum motor.
4. Loosen the two set screws that attach the drum motor shaft to the drum shaft. See Figure 7-18.
5. Remove the three drum motor screws and the spacers between the motor and the copier frame.

CAUTION

The ink-jet heads are very fragile. Use care not to touch the face of the heads with anything when working around the head assembly.

6. Grasp the drum and carefully remove the motor. Allow the end of the drum shaft to rest on the frame.
7. Use the following steps to remove the ink-jet head washing station and the wash station hose manifold together as a unit.
    a. Remove the two screws that attach the head washing station to the frame.
    b. Remove the two screws that attach the wash station manifold to the frame.
    c. Pull the hoses from the pump assembly through the frame and remove the head washing station and manifold together.

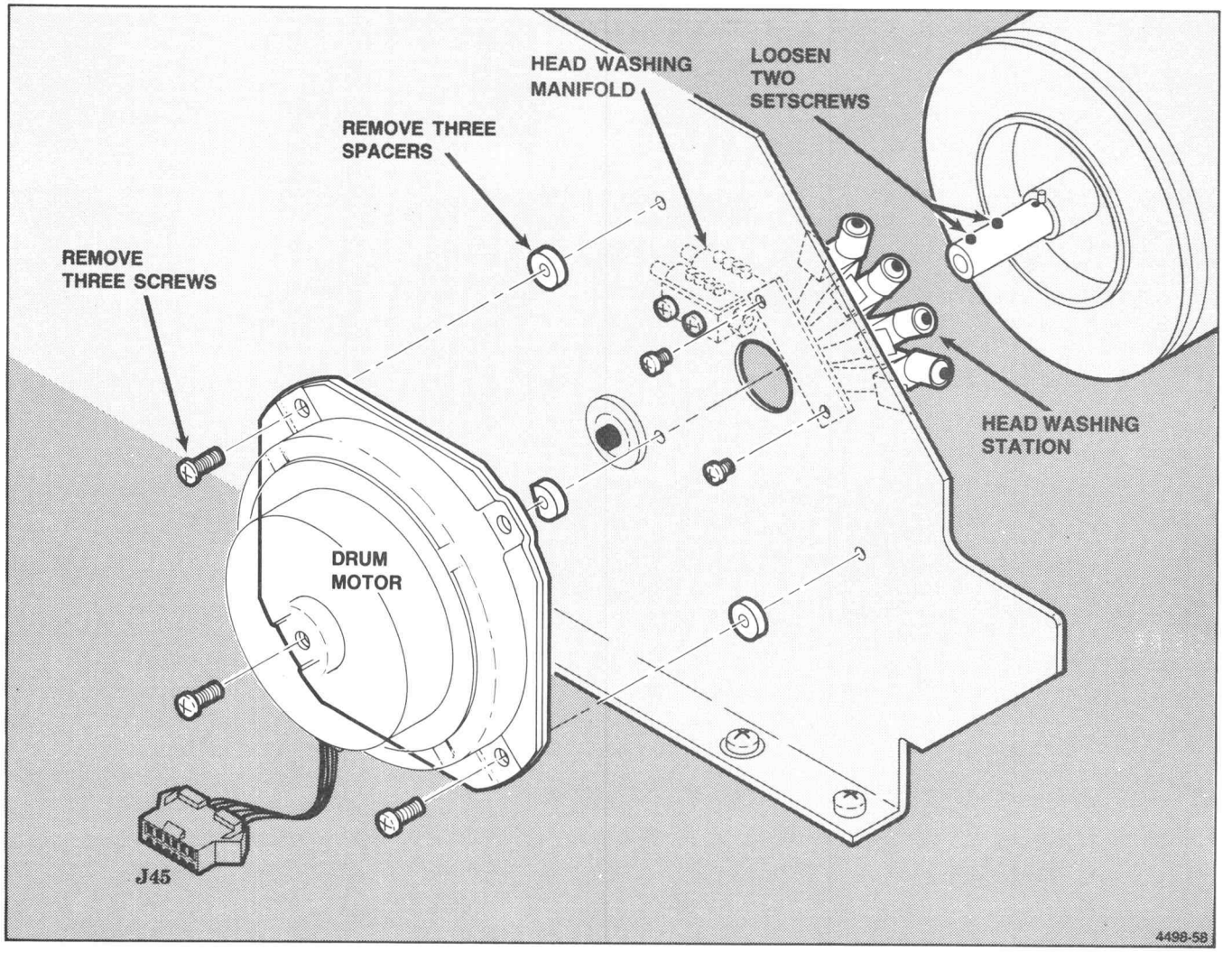


Figure 7-18. Drum Motor and Head Washing Station Removal.

7.16.2 REPLACEMENT

1. Reverse the removal procedure to replace the head washing station, and manifold.

2. Perform the alignment procedure titled "Head Washing Station Adjustment" in Section 5 prior to installing the drum motor.

3. Replace the drum motor and spacers.

7.17 DRUM ASSEMBLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.17.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the front cover. See Section 7.1.4.
3. Remove the vacuum fan assembly. See Section 7.2.1.
4. Remove the ink-jet head carriage assembly. See Section 7.11.1.
5. Remove the head washing pump assembly. See Section 7.18.1.
6. Remove the drum motor. See Section 7.16.1.
7. Remove the head washing station. See Section 7.16.1.
8. Manually rotate the rear paper carrier shaft to position the paper carrier at the paper loading position. This position is the farthest from the drum.

NOTE

Note the position of the bearing on the bar. Wide side from the bearing groove goes to the left.

9. Remove the two bolts from the ends of the top head carriage shaft and remove the shaft.
10. Position the printer to gain access to the inside of the vacuum motor inner housing.
11. Disconnect connectors J34 and J36 from the encoder discs, and remove the two screws that attach the encoder plate to the vacuum fan housing. See Figure 7-19.
12. Remove the four screws that attach the vacuum fan housing to the printer frame.

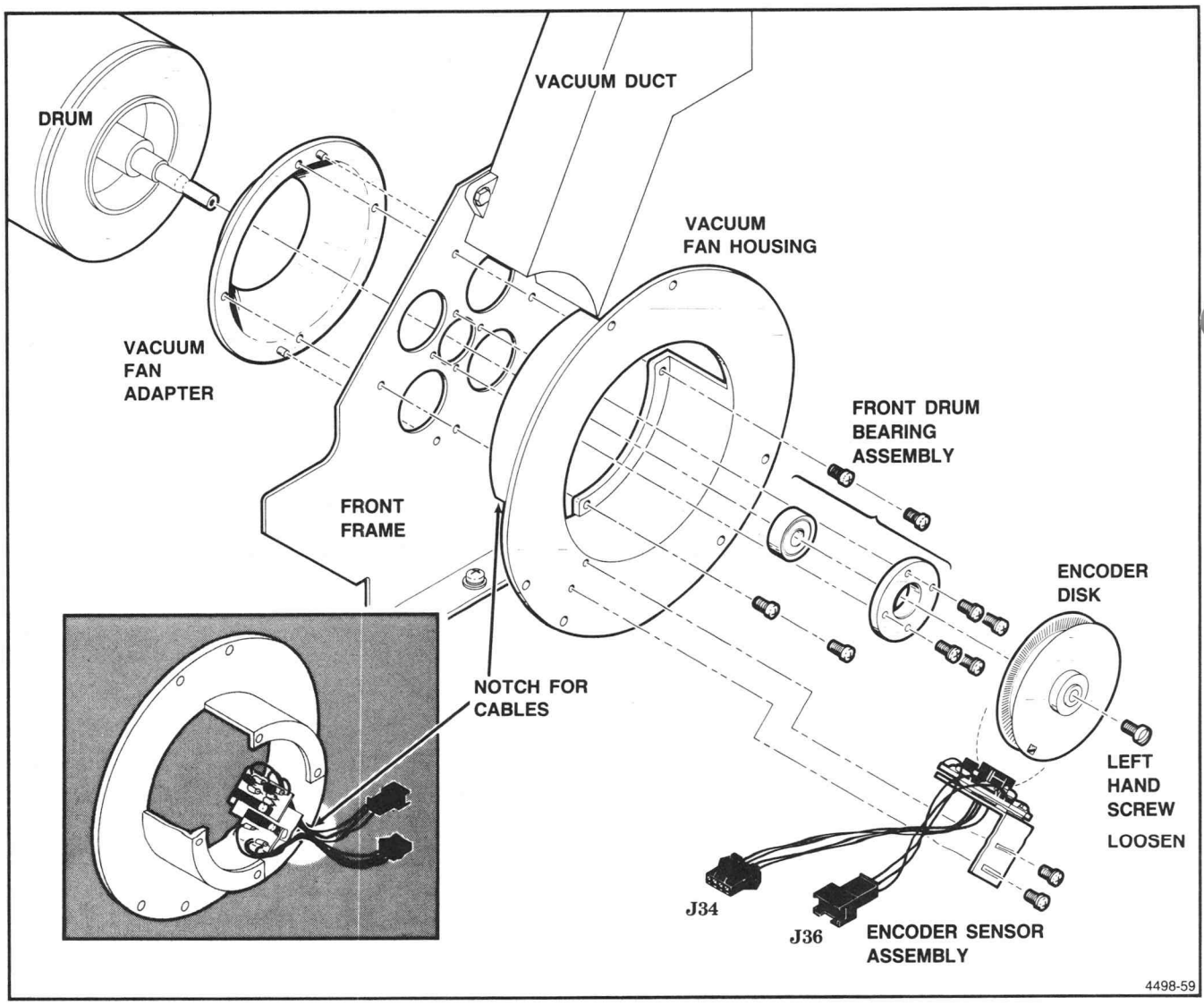


Figure 7-19. Drum Assembly Removal.

13. Loosen the left-hand threaded screw in the front end of the drum shaft securing the encoder wheel.

14. Carefully grasp the encoder disc housing with a pair of pliers and pull the discs off the end of the drum shaft.

NOTE

The vacuum fan adaptor flange can fall off the front end of the drum when the drum is removed.

15. Carefully slide the drum toward the drum motor end of the copier and remove the drum from the copier.

7.17.2 REPLACEMENT

NOTE

When replacing the motor, the motor must be installed with leads down and the flat-sided spacer to the right.

Use locktite or similar adhesive to mount the spacers over the holes. Make sure that they are aligned.

1. Place the vacuum flange on the front end of the drum shaft. See Figure 7-19 for the proper placement of this flange.

2. Prepare to lower the drum into place. The drum shaft with the two set screws should be facing to the rear of the copier.

3. Insert the front drum shaft through the proper frame hole. Figure 7-19 shows this location.

4. Lower the rear of the drum until the rear drum shaft can be placed into the rear frame hole.

5. Install the drum motor. See Section 7.16.2.

6. Ensure that the drum rotates freely with no binding or scraping.

7. Install the encoder wheel but do not tighten the screw.

8. Install the vacuum fan housing on the end of the drum.

9. Adjust the encoder alignment and the drum stop mechanism as described in the procedure titled "Drum Encoder Alignment" in Section 5.

7.18 HEAD WASHING PUMP ASSEMBLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.18.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.

CAUTION

Do NOT tip the head washing pump reservoir or a large ink spill will occur. It is suggested that the ink reservoir be secured to the table (with tape or a clamp) after removal to prevent spillage.

2. Remove the head washing pump reservoir bottle by pressing down and turning counter-clockwise.
3. Place a container (8 ounces) under the wastewater drain valve located under the ink cartridge assembly on the front right corner of the copier. Open the valve and drain the hose.
4. With the valve open, thread the drain hose to the head washing pump assembly out of the chassis.
5. Disconnect J46 to the head washing pump assembly. See Figure 7-20.
6. Disconnect the head washing pump assembly ground lead.
7. Loosen but do not remove the two rear screws that secure the head washing pump assembly to the base plate.
8. Remove the front screw from the base of the pump assembly.
9. Carefully slide the head washing pump assembly out to gain access to the two top hoses.
10. Clamp each hose near the pump assembly reservoir and disconnect them from the reservoir.
11. Carefully remove the pump assembly from the printer and place it in a safe area to avoid spillage.

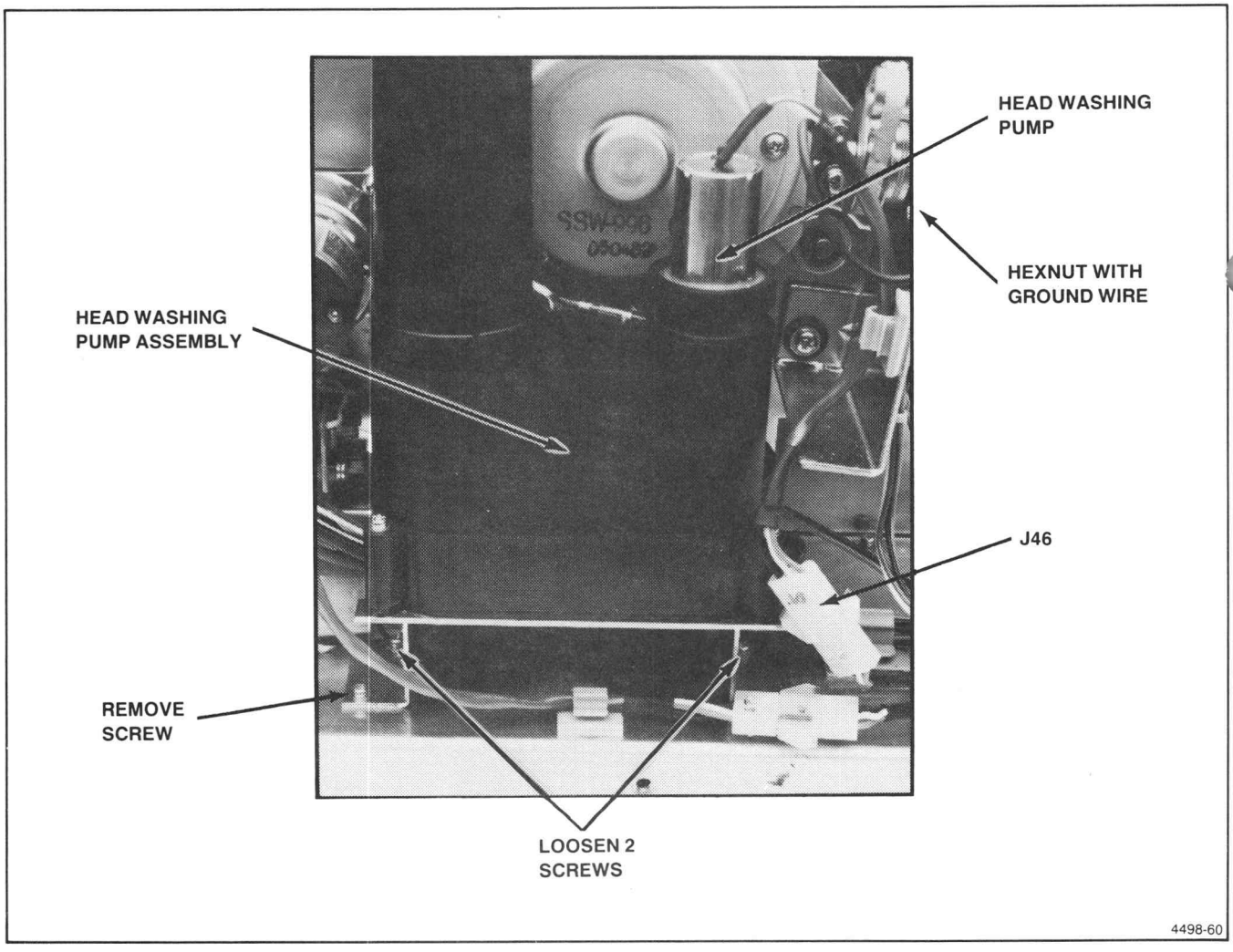


Figure 7-20. Head Washing Pump Assembly Removal.

7.18.2 REPLACEMENT

1. Reverse the removal procedure to replace the head washing pump assembly.

2. Refill the wash pump reservior with DISTILLED water ONLY!

7.19 HEAD WASHING PUMP FILTER

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.19.1 REMOVAL

An exploded view of the pump motor is shown in Figure 7-21.

1. Remove the wash station bottle by pressing down and turning counter-clockwise.

2. Drain and refill the bottle using DISTILLED water only.

3. Use a container (at least 8 ounces) and drain the head washing reservoir line at the waste drain valve which is located in the front right corner of the copier.

4. Disconnect J46 to the wash station pump motor.

5. Disconnect the motor ground lead at the head carriage drive motor bracket.

6. Remove the motor by twisting and pulling it out of the washing station.

7. Unscrew the retaining ring on the bottom of the filter and remove the filter.

7.19.2 REPLACEMENT

1. Install the new filter and perform, in reverse steps four through seven in the removal procedure to reassemble the motor and filter.

2. Install the wash bottle that has been filled with DISTILLED water and check for proper operation.

NOTE

A wash cycle is performed each time power is applied to the copier.

3. Align the holes in the motor housing so that they are rotated 90 degrees from the output port. This relation is illustrated in Figure 7-21.

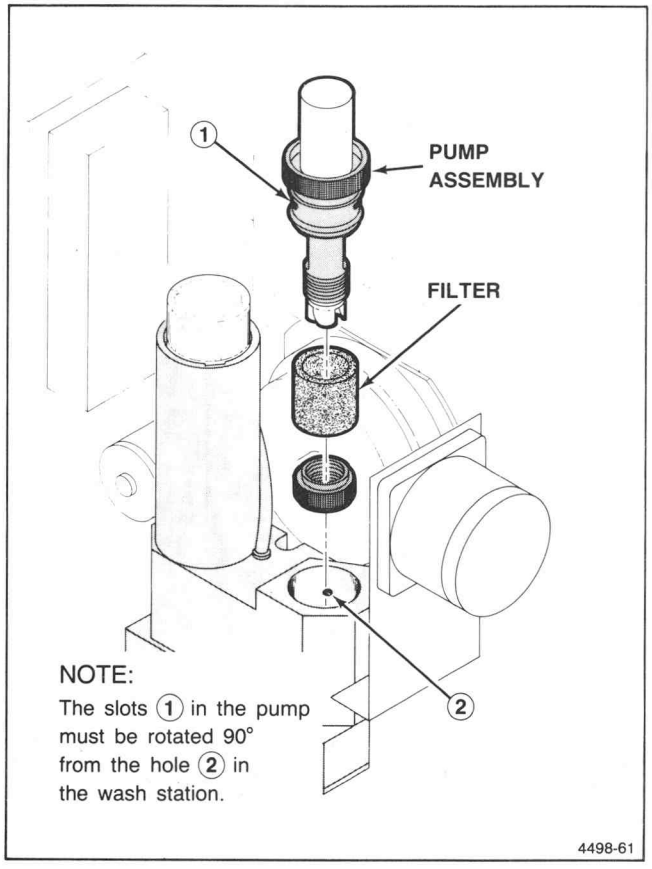


Figure 7-21. Head Washing Pump Filter Replacement.

7.20 POWER SUPPLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.20.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the cowling. See Figure 7-22a.
3. Disconnect J26, J58, and J61 from the power supply.
4. Remove the two screws that secure the power supply to the copier frame. These screws are located between the power supply and the head washing pump assembly. See Figure 7-22b.
5. Remove the two screws on the outside base of the power supply.
6. Slide the power supply out just enough to gain access to the remaining connectors.
7. Disconnect J27, J43, and J55 from the back of the power supply.

WARNING

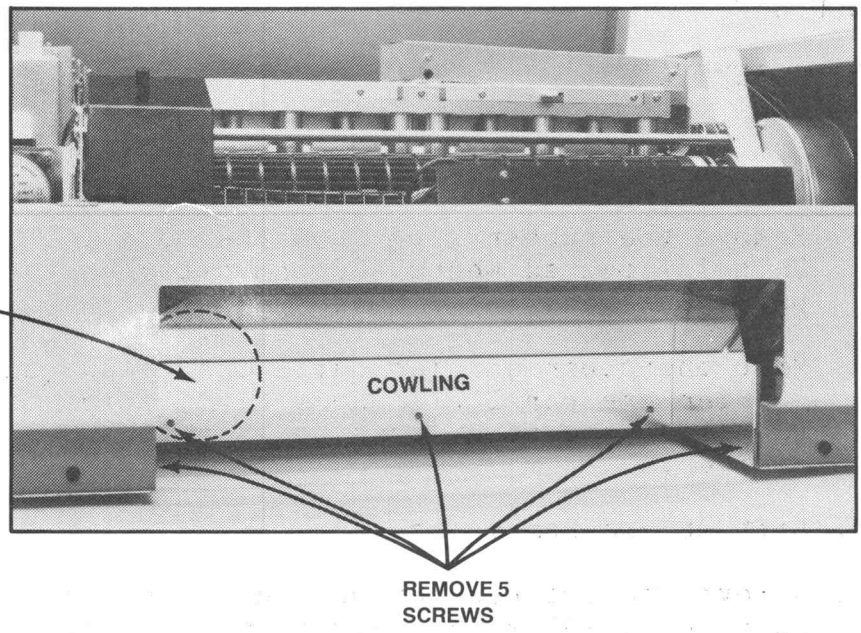
The power supply is heavy. Use care when removing it from the printer base.

8. Remove the power supply from the printer.

7.20.2 REPLACEMENT

1. Reverse the removal procedure to replace the power supply assembly.

A. COWLING REMOVAL



B. POWER SUPPLY REMOVAL

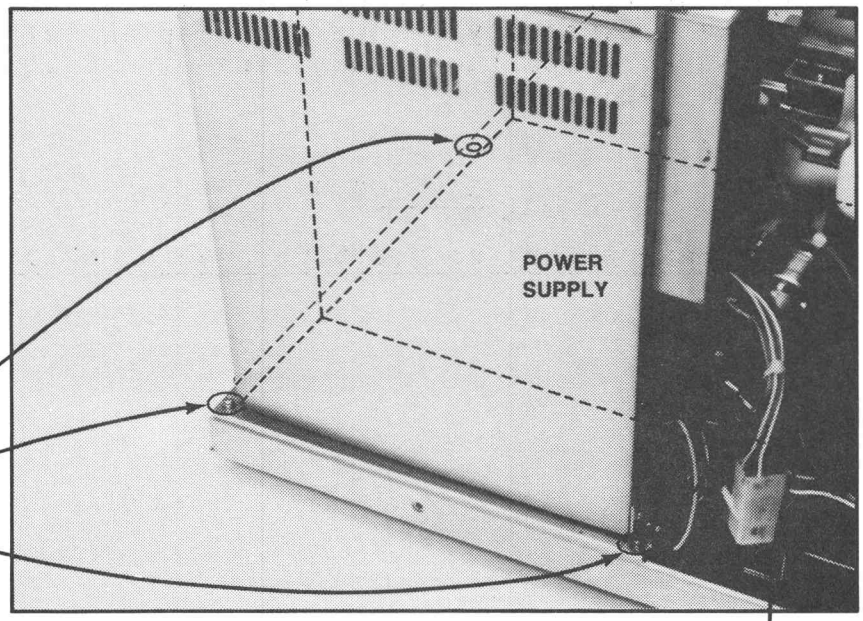


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Figure 7-22. Power Supply Removal.

7.21 PAPER CARRIER ASSEMBLY

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.21.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Remove the rubber plug from the hole in the vacuum arm. This is located where the arm attaches to the top of the paper carrier. See Figure 7-23a.
3. Move the paper carrier until the vacuum arm and the paper carrier are parallel. Use a #1 Phillips tip (not Posidrive) to remove the screw that holds the vacuum arm to the paper carrier.
4. Lift up and remove the arm.
5. Remove the two hex screws from each side of the paper carrier assembly and remove the assembly.
6. The paper carrier may be disassembled for cleaning by removing the three screws that secure the vacuum cap bracket. Carefully remove each cap and clean with mild soap and water. Wipe the vacuum caps with a lint-free cloth. See Figure 7-23b.

CAUTION

Ensure that no moisture remains prior to reassembly.

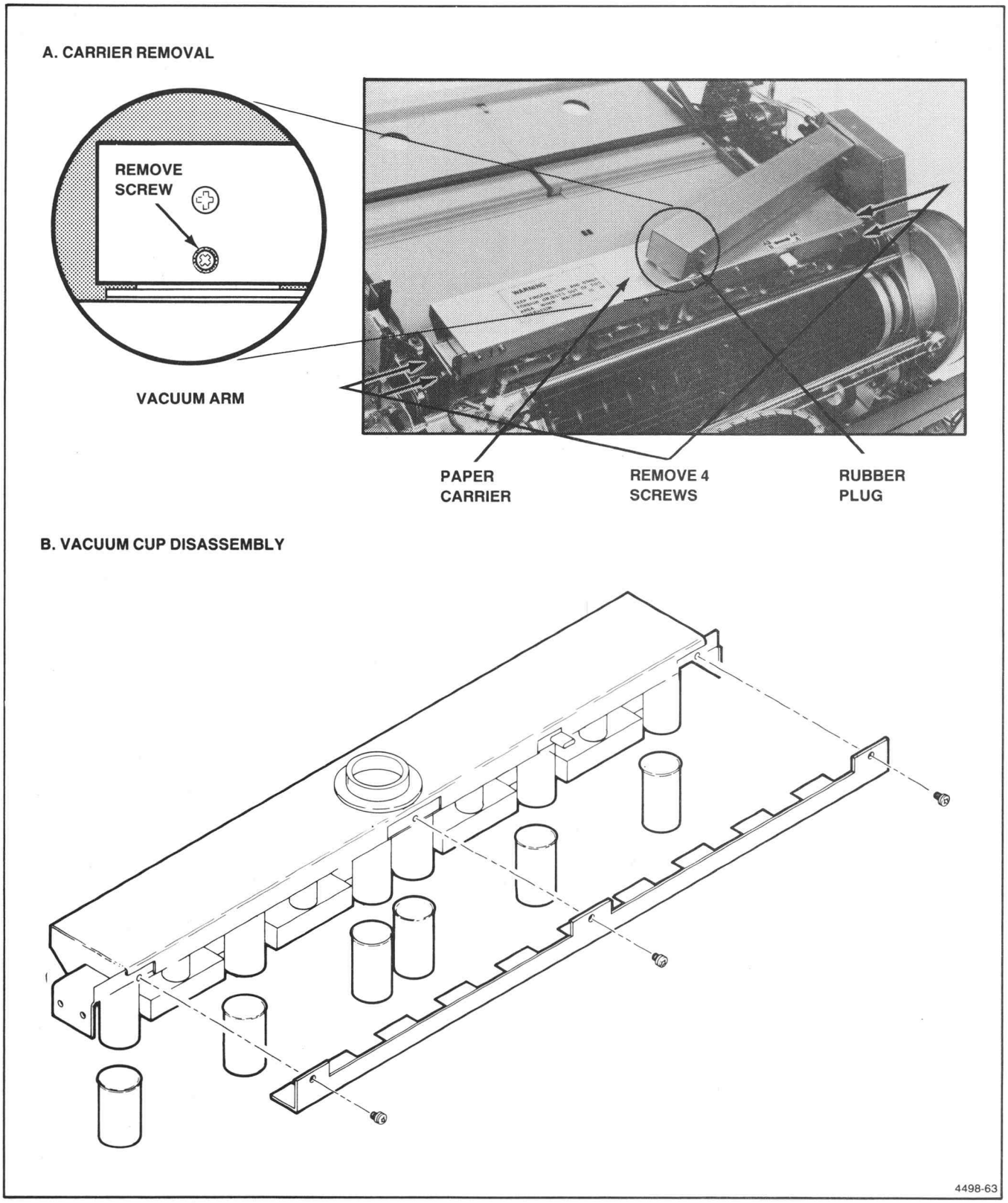


Figure 7-23. Paper Carrier Removal.

7.21.2 REPLACEMENT

1. Reassemble the vacuum cap assembly. See Figure 7-23b.
2. Place the paper carrier back into the copier.
3. Install, but do NOT tighten the four screws that hold the paper carrier in place.
4. Replace the vacuum arm, and install the small screw through the hole in the arm.
5. Replace the rubber plug in the hole in the vacuum arm. See Figure 7-23a.
6. See the alignment procedure titled "Paper Carrier Height Adjustment" in Section 5.

7.22 PAPER CARRIER DRIVE MOTOR

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.22.1 REMOVAL

1. Loosen the two belt clamp screws on each side about eight turns each. See Figure 7-24.
2. Carefully free the belt and push each carrier mounting assembly toward the drum and out of the way.
3. Loosen the two set screws on the gear next to the motor and slide the gear on the shaft about 1/2" to gain access to the motor set screw.
4. Turn the shaft to gain access to the motor set screw and loosen the screw.
5. Disconnect J51 to the carrier motor.
6. Remove the four screws the hold the motor. Observe the location of the spacers and of the ground connection.
7. Carefully remove the motor.

7.22.2 REPLACEMENT

1. Reverse the removal procedure to install the new motor.

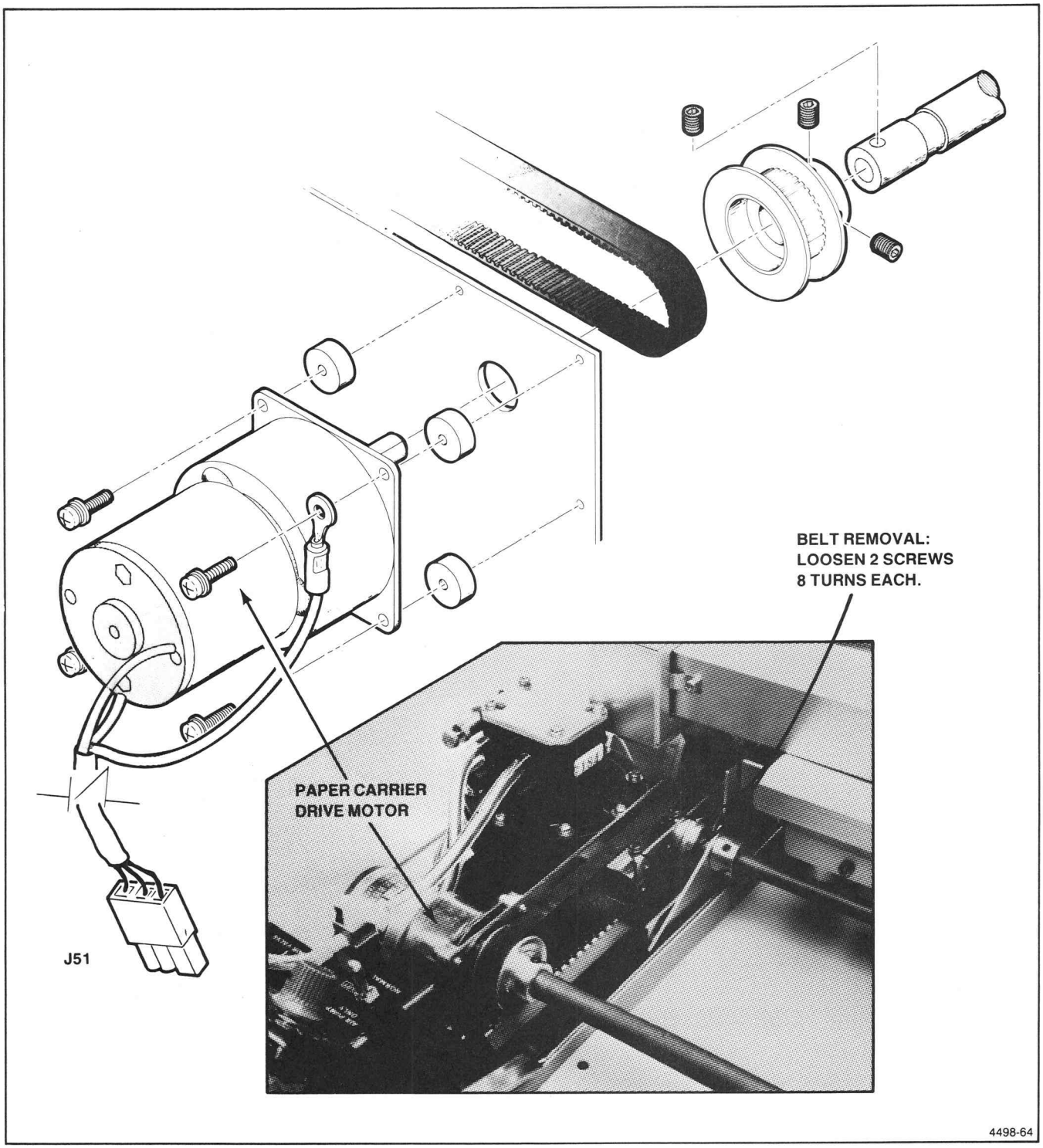


Figure 7-24. Paper Carrier Drive Motor and Belt Removal.

7.23 PAPER CARRIER DRIVE BELT

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.23.1 REMOVAL

1. Remove the paper carrier drive motor. See Section 7.22.1.
2. The belt on the motor side can be removed by slipping it over the end of the shaft and out of the clamp.
3. Remove the belt on the power supply side using the following procedure:
    a. Remove the belt on the motor side from the drive shaft only.
    b. Remove the loosened motor attaching set screw on the end of the drive shaft.
    c. Slide the drive shaft through the motor shaft hole in the frame.
    d. Remove the belt from the power supply end of the shaft and out of the clamp.

7.23.2 REPLACEMENT

1. Install the new belt in the reverse order of step 3 above. Do NOT tighten the clamps.
2. Install the paper carrier drive motor. See Section 7.22.2.
3. Slide the carrier mechanism on the motor side along the belt until the slide rail is even with the outer frame edge.
4. Using a flat ruler, ensure that the rail is even with the frame and tighten the two belt clamp screws.
5. Perform steps 3 and 4 for the power supply side carrier mechanism. See Section 7.22.1
6. Install the paper carrier.
7. Perform the procedure titled "Carrier Height Adjustment" in Section 5.
8. Check the belt tension.
9. Check for smoothness of operation.

7.24 CARD CAGE

IT IS NECESSARY THAT THE PROCEDURE TITLED "PREPARE THE COPIER FOR MOVE" IN SECTION 11 BE COMPLETED PRIOR TO BEGINNING THIS PROCEDURE.

7.24.1 REMOVAL

1. Remove the top cover. See Section 7.1.2.
2. Manually move the paper carrier to the rear position.
3. Remove the four screws from the chrome paper guide. See Figure 7-25a.
4. Carefully lift the chrome paper guide and disconnect J40. Lay the paper guide aside.
5. Remove the power supply. See Section 7.20.1.
6. Disconnect J12, J13, J14, J15, J16, J17 and J18 to the card cage.
7. Remove the four screws that secure the cage card to the base plate.

NOTE

As the card cage is removed from the printer, ensure that the cables clear the edges of the card cage.

7.24.2 REPLACEMENT

1. Reverse the removal procedure to replace the card cage.

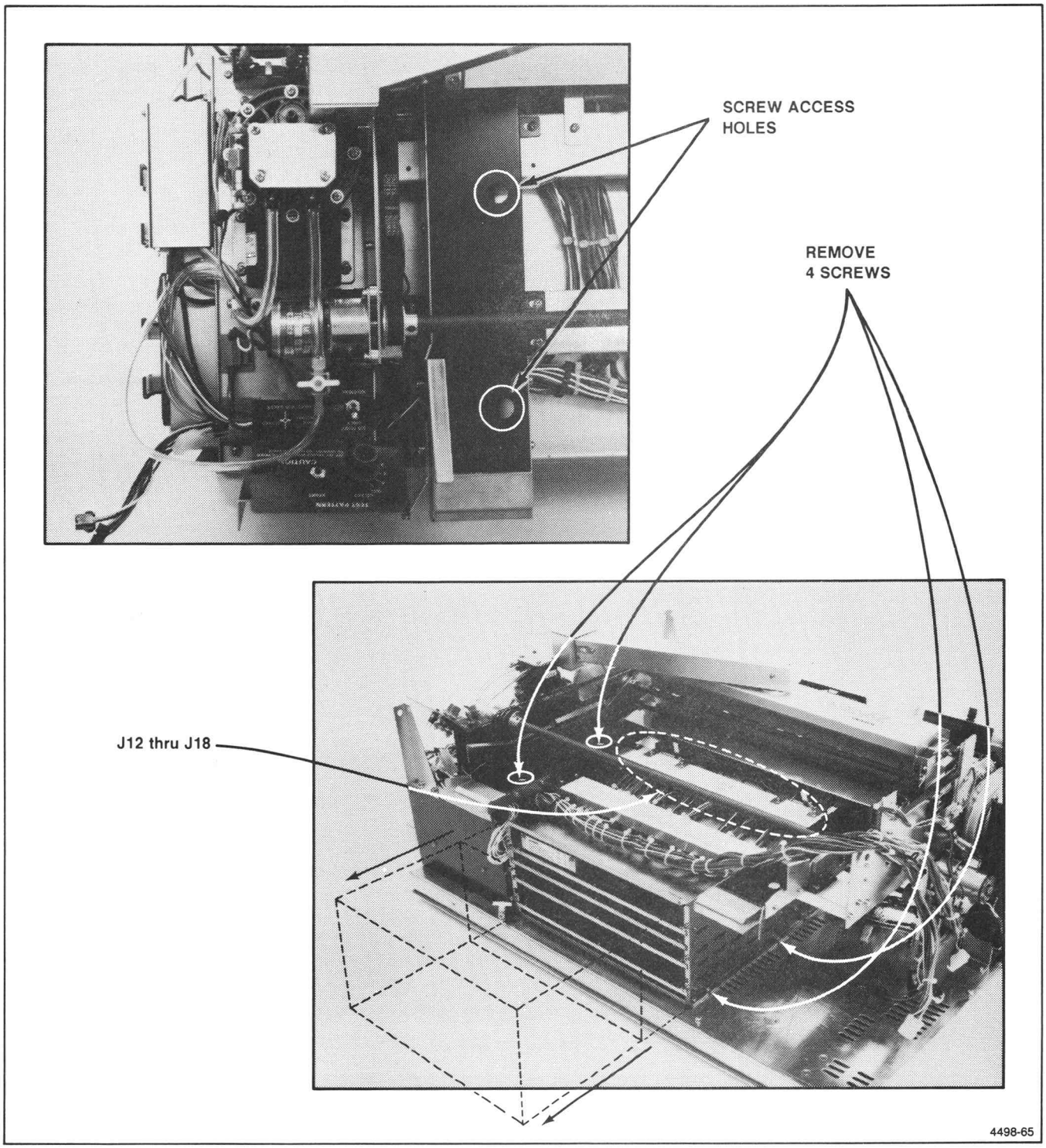


Figure 7-25. Card Cage Removal.

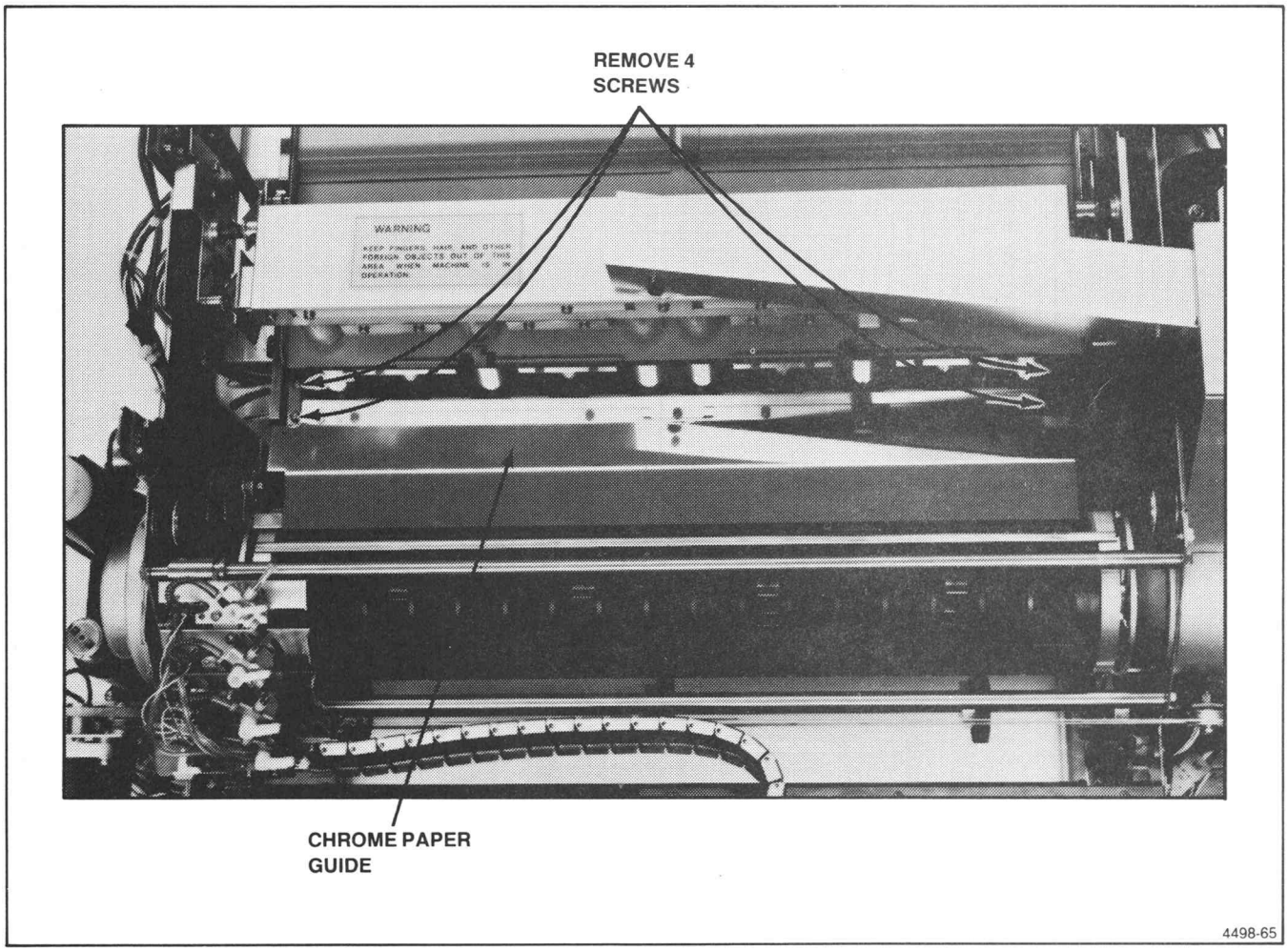


Figure 7-26. Chrome Paper Guide Removal.

Section 8

INK JET HEAD MAINTENANCE

ABOUT THIS SECTION

This section contains the following information or procedures:

- How ink jet heads work
- Ink jet head access procedure
- Ink jet head purging procedure
- Ink jet head replacement procedure
- Ink jet head convergence procedure
- Threshold voltage (TV) test procedure

INTRODUCTION

The fundamental printing principle of the 4691 Color Graphics Copier is shown in Figure 8-1. The air pump produces air for two purposes. The first purpose is to force ink from the four ink cartridges (one is shown in Figure 8-1 for clarity) to the ink jet head. The ink cartridge has two chambers, with the ink being inside a "bladder." The air pressure then squeezes the bladder and forces ink out of the cartridge to the ink jet head. The second purpose is to provide a steady air flow from the nozzle of the ink jet head. The air flow from the nozzle increases the velocity and accuracy of the ink drops by providing a constant air flow. This air flow helps carry the ink drops to the paper.

After the electrical circuitry of the copier processes a print command from the host, the copier stimulates a piezoelectric crystal in the ink jet head with a 20 kHz signal of approximately 200 volts. When stimulated, the crystal deflects one of the walls in the ink chamber (Room 1 in Figure 8-1). The deflection and consequent change in the volume of Room 1 produces a sharp rise of fluid pressure in the ink chamber. The high pressure forces a droplet out of the head toward the printing media. This means that the ink jet head is a miniature positive displacement pump that produces a discrete drop of ink for each electrical pulse applied to it. Therefore, one could refer to the ink jet head design in the copier as an "on demand" type.

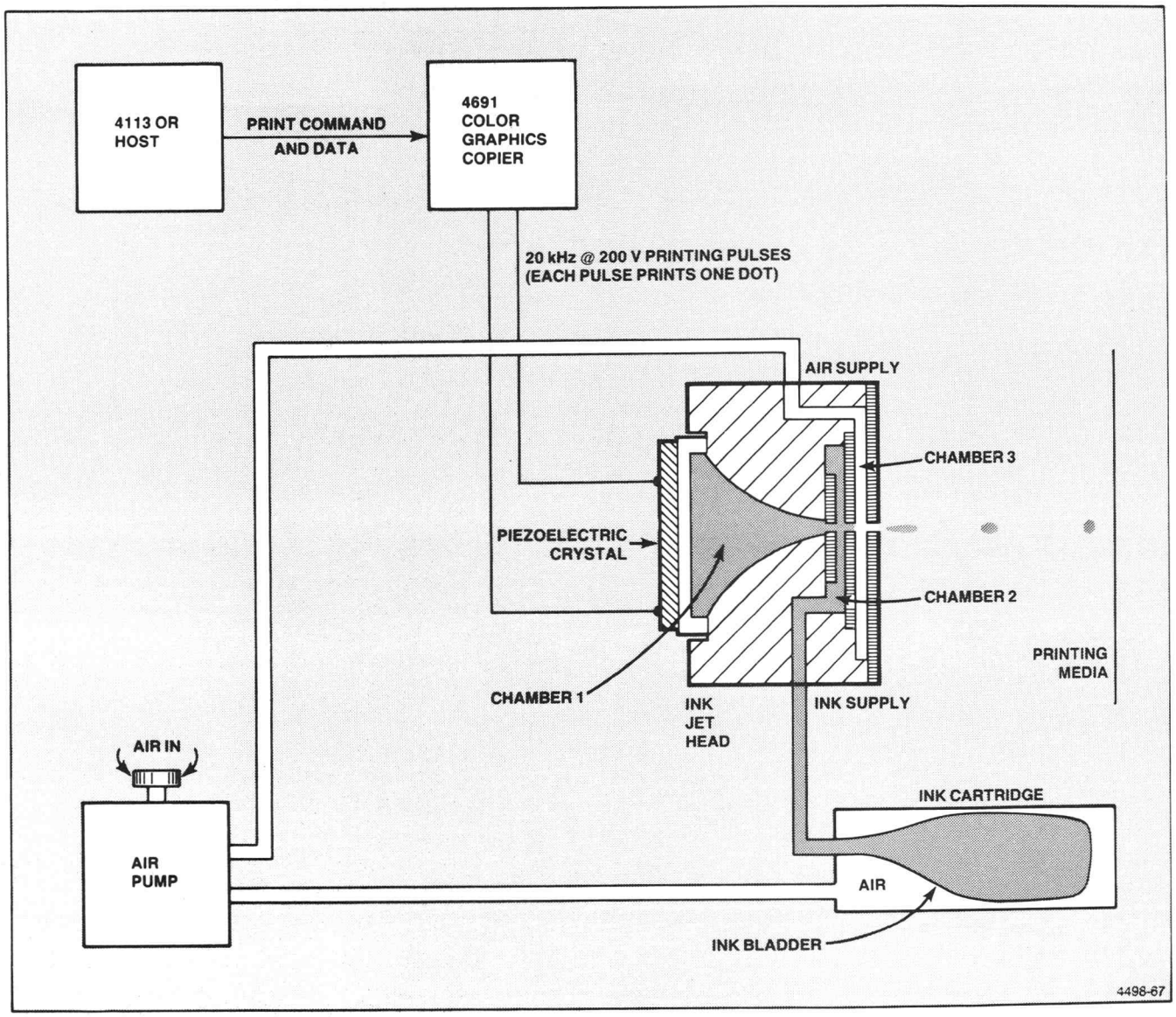


Figure 8-1. Diagram of Ink Jet Head (General).

Because of its delicate construction, the ink jet head will not perform properly if it is carelessly handled, or if contaminates are allowed to enter inside. Air bubbles in the ink jet head or the ink supply line are especially troublesome. Air bubbles may plug the tiny nozzle or absorb the high pressure pulses because of the compressable nature of air. Air can enter the ink jet head if:

1. The copier is subjected to shock or vibration.
2. The ink line has a loose connection.
3. The copier is operated with an empty ink cartridge.

INK JET HEAD MAINTENANCE

Symptoms of Ink Jet Head Problems

If one or more colors are printing normally, but one or more colors are not (assuming all ink cartridges contain ink), the following problems should be considered:

- Air bubble or other contamination in ink jet head(s).
- Dried ink in ink jet head nozzle.
- Loose electrical connection.
- Ink line to ink jet head is plugged.
- Ink jet head is defective.

Ink Jet Head Access

To access the ink jet heads:

1. Open the top cover of the copier.
2. Loosen (but not remove) the screw holding the lower left corner of the carriage cover (see Figure 8-2).
3. Loosen the thumbscrew holding the carriage cover (see Figure 8-2).
4. Lift the carriage cover off the carriage.

The ink jet heads are accessable for maintenance.

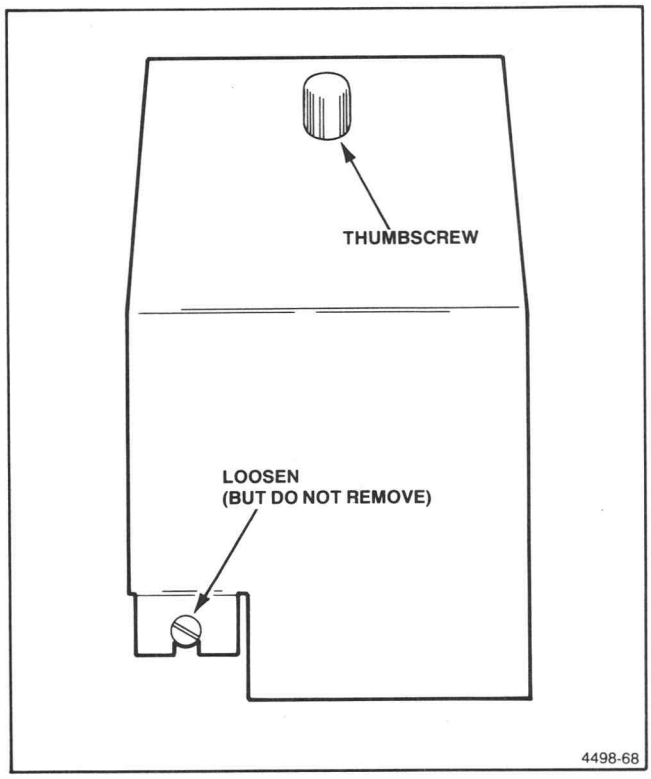


Figure 8-2. Carriage Cover Screw Locations.

Ink Jet Head Purging Procedure

The ink jet head purging procedure is effective in removing air bubbles or other contamination from inside an ink jet head. In this procedure, air bubbles and other contamination are flushed (purged) from the ink jet head.

Before resorting to the purging procedure, it is sometimes possible to remove air bubbles and contaminates from an ink jet head by pinching the air line leading (see Figure 8-3) to the defective head for a few seconds while the copier is printing the self-test pattern. This should be tried before purging any ink jet head.

Purging Procedure:

1. Tape a piece of plastic approximately 9.5 X9.5 inches (241 X 241 mm) to the front of the copier. This piece of plastic will act as an apron to protect the outside finish of the copier (see Figure 8-4).

2. Turn on the copier's POWER if it is not already on.

3. Open the copier's top cover (the copier will automatically turn off).

NOTE

The switch used in the next step is a locking type. The switch's handle must be pulled straight up before it can be moved to the opposite position.

4. Set the copier's air pump switch to the AIR PUMP ONLY position. The air pump switch in located near the right front corner of the copier (see Figure 8-5). This does not in itself turn the air pump on. The air pump will turn on when the copier is powered-up later.

5. Turn off the air valve located near the air pump switch. When the valve's handle is turned 90 degrees to the tubing the valve is in the "off" position.

6. Close the copier's top cover (the copier's power will automatically turn back on).

7. Wait 20 seconds for the copier to initialize and the air pressure to equalize (wait until front panel WAIT light stops flashing).

8. Turn the copier's POWER switch OFF.

9. Open the copier's top cover again.

10. Remove the carriage cover (see "Ink Jet Head Access" earlier in this section).

11. Turn off all four ink line valves on the ink jet heads. Each valve is off when the valve handle is turned clockwise against the screwpost. It is best to close the yellow ink or top valve first, then the magenta, then cyan, and finally black last.

12. Insert a small rod approximately 1/4" (6 mm) into the safety interlock switch to activate it.

13. Remove the two screws that hold the ink jet head that is being purged. These screws are located to the left of the ink line valve closed in Step 11. Do not remove any airlines, inklines, or electrical wires to the ink jet head. See Section 7 for instructions on removing the black-ink jet head.

14. Position the ink jet head over several sheets of folded lintfree absorbant material.

15. Open the ink valve of the removed head to the open (blue) position (valve handle is perpendicular to the ink line).

16. Turn the copier's POWER switch ON. The ink jet head will start leaking ink at this time.

17. Throughly rinse the ink jet head with a stream of distilled water. Make a special effort to clean around all tap screws in the ink jet head.

18. Remove tap screw 2 from the ink jet head (see Figure 8-6). Tap screw 2 is the screw on the side of the ink jet head that has two tap screws.

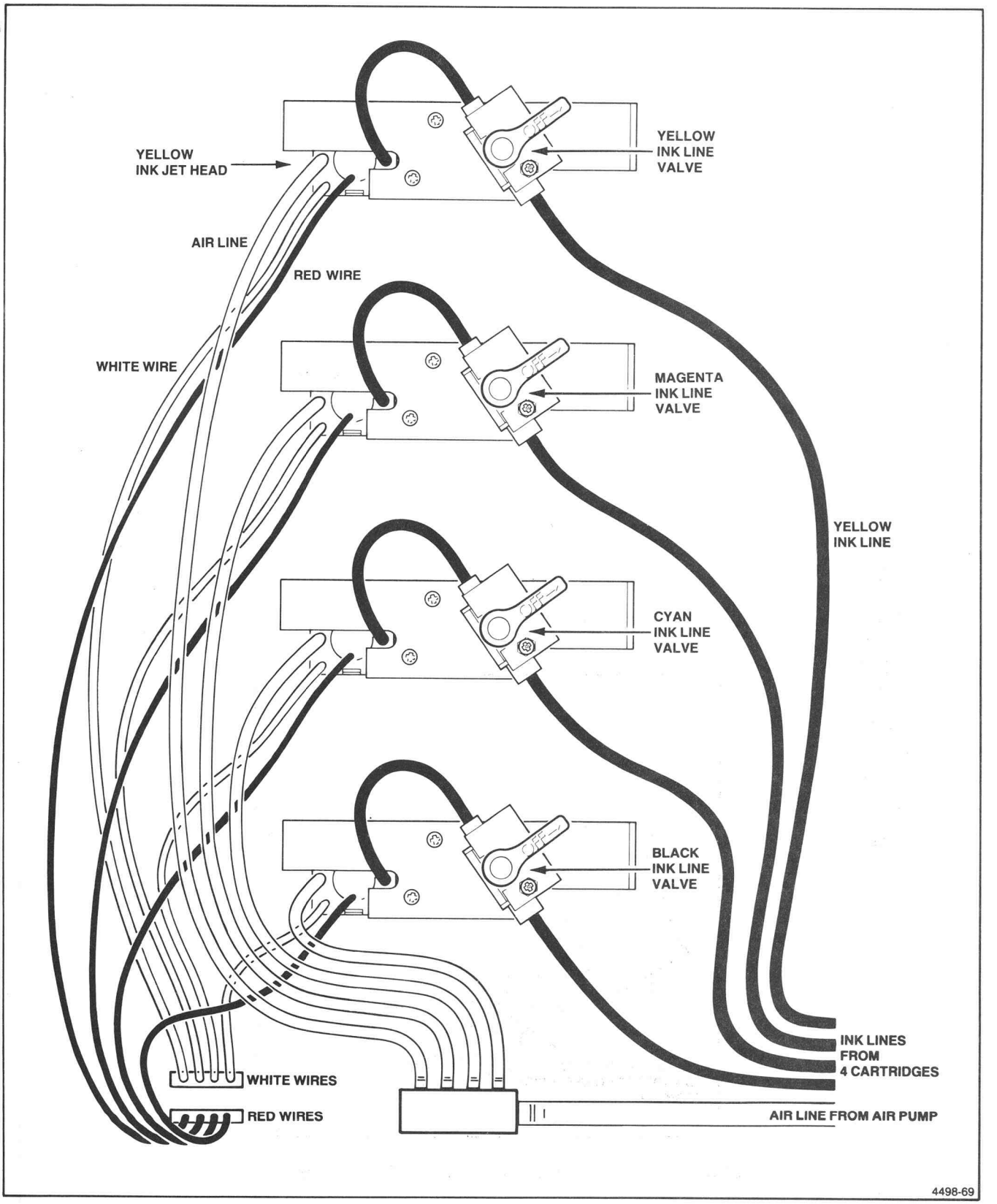


Figure 8-3. Ink Jet Head Assembly Locations.

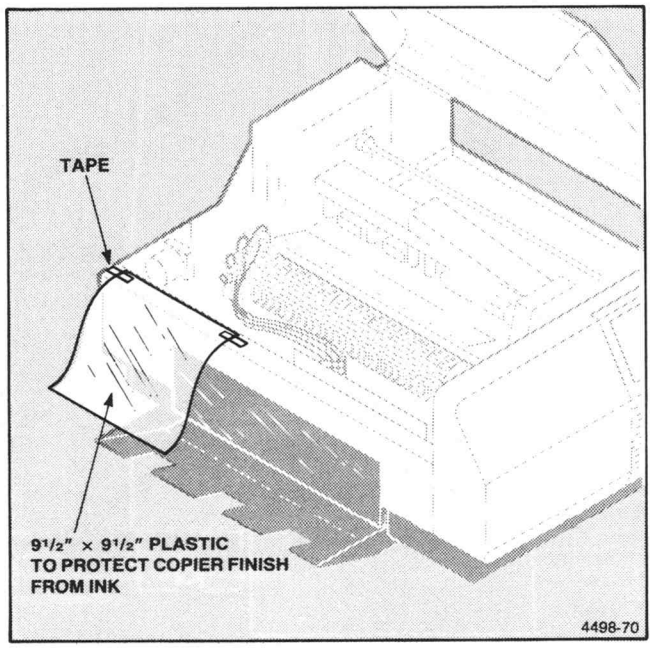


Figure 8-4. Plastic Protective Apron.

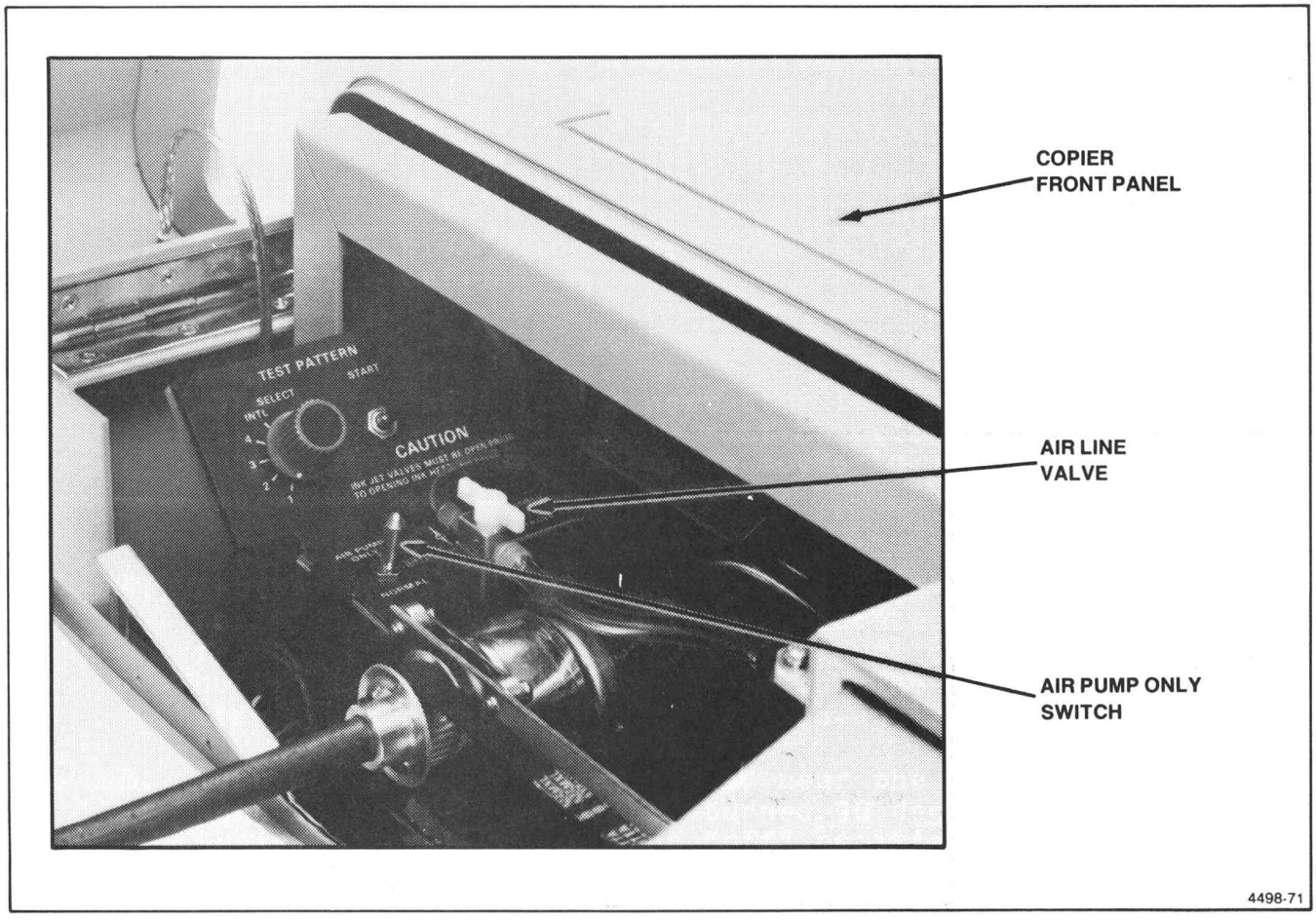


Figure 8-5. Air Pump Switch Location.

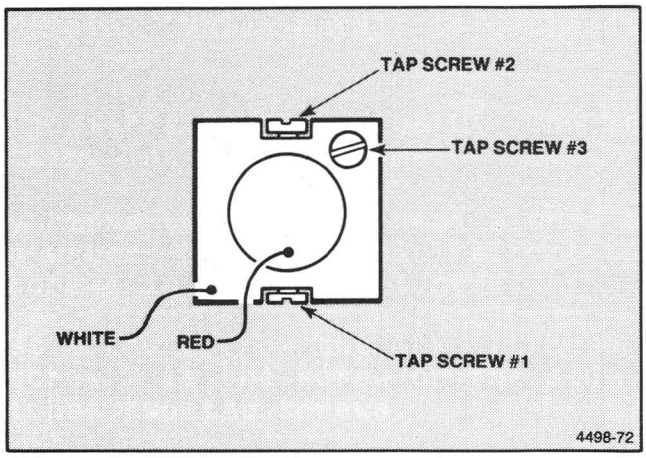


Figure 8-6. Ink Jet Head Tap Screw Locations.

19. Hold the ink jet head bracket tightly in your hand with the open tap facing up. Tap the bracket sharply with a screwdriver shank several times. **Do not strike the ink jet head itself.** During his process, ink should be flowing freely from the tap. A typical flow rate for the yellow, magenta, or cyan ink is about 3 drops per second. Black will flow at about 2 drops per second.

20. Hold the removed tap screw 2 with tweezers and rinse with clean, distilled water and replace the screw back into the ink jet head.

21. Remove tap screw 1 (see Figure 8-6). Tap screw 1 is located on the opposite side of the ink jet head from tap screw 2. It is the only tap screw on this side of the ink jet head.

22. Repeat Step 19. Notice that the ink flow is much less this time.

23. Rinse the tap screw 1 with clean, distilled water and replace the screw back into the ink jet head.

24. Remove tap screw 2 again.

25. Repeat Step 19.

26. Rinse the tap screw 2 with clean, distilled water and replace the screw back into the ink jet head.

27. Observe that ink continues to flow from the ink jet head nozzle.

28. Close the ink valve for that ink jet head by rotating the handle clockwise to the screwpost stop.

29. Turn the copier's POWER switch OFF.

30. Wait approximately 10 to 15 seconds for the air pressure to bleed off.

31. Rinse the head and dry gently. Do not wipe across the face of the ink jet head. Lightly blot the ink jet head dry. Soak up all liquid from the back of the ink jet head. Make sure that the electrical connections are dry.

32. Install the ink jet head on the carriage.

33. Without jarring the ink lines or the copier, open first the black ink or bottom valve, then the cyan, then magenta, and finally the yellow ink valve (top). These valves are mounted on the carriage and are open when the valve handle is perpendicular to the ink line (over the blue mark).

34. Turn the AIR PUMP ONLY switch to the NORMAL position.

35. Open the air valve located near the air pump switch.

36. Turn the copier's POWER switch ON.

37. Turn the 5-position rotary TEST PATTERN SELECT switch to the INTL position and set the switches on the Parallel Interface circuit board to select the solid pattern for the color of ink whose head was purged (see Table 4-2 in Section 4 - Circuit Descriptions).

38. Run 2 or 3 solid fill test patterns.

39. Run a Threshold Voltage test (see procedure later in this section).

40. If Threshold Voltage test is satisfactory (see Appendix H), run the convergence adjustment (procedure is later in this section), and then replace the carriage cover.

41. If the Threshold Voltage test is not satisfactory, repeat the purge procedure. If still unsatisfactory, purge again.

42. If the Threshold test is not satisfactory after the third purge, replace the ink jet head.

43. Set the 5-position rotary TEST PATTERN SELECT switch to the Position 1.

44. Set the dip switches on the Parallel Interface to the OPEN position.

45. Remove the rod in the safety interlock switch.

This completes the ink jet head purge procedure.

INK JET HEAD REPLACEMENT

If it should be necessary to replace any of the ink jet heads in the copier, the following procedure should be used:

The following tools are required:

- Phillips screwdriver (medium tip)
- Curved tip tweezers
- Clamps (four)
- Kim wipes
- Waste ink bleed bottle

The following spare parts are desirable:

- Tube interconnects
- Tubing (air and ink)

Procedure

Refer to Section 7.9.2 for replacement of the black-ink jet head.

1. Turn on the copier's POWER if it is not already on.

2. Open the copier's top cover (the copier will automatically turn off).

NOTE

The switch used in the next step is a locking type. The switch's handle must be pulled straight up before it can be moved to the opposite position.

3. Set the copier's air pump switch to the AIR PUMP ONLY position. The air pump switch in located near the right front corner of the copier. This does not in itself turn the air pump on. The air pump will turn on when the copier is powered-up later.

4. Turn off the air valve located near the air pump switch. When the valve's handle is turned 90 degrees to the tubing the valve is in the "off" position.

5. Close the copier's top cover (the copier's power will automatically turn back on).

6. Wait 10 to 20 seconds for the copier to initialize and the air pressure to equalize (wait until front panel WAIT light stops flashing).

7. Open the copier's top cover again (power turns off again).

8. Remove the carriage cover. It is held with one thumbscrew.

9. Turn off all four ink line valves on the ink jet heads for the location of these valves). The valve is off when the valve handle is turned clockwise against the screwpost. It is best to close the yellow ink or top valve first, then the magenta, then cyan, and finally black last.

10. Disconnect the air line (disconnect it at the coupler approximately 3/4" or 19mm from the ink jet head), and both electrical leads to the defective ink jet head.

11. Clamp the ink line on the right side of the ink head valve. This clamp should be about 0.5" (13mm) from the ink head valve.

12. Disconnect the ink line from the ink jet head.

13. Remove the defective ink jet head. The head is held in place with two screws that are located just to the left of the ink line valve.

14. Carefully remove the cap over the nozzle of new (replacement ink jet head).

15. Install the new ink jet head on the carriage with two screws.

16. Remove the short black tube from the new ink jet head and connect the copier's ink line to the new jet head.

17. Remove the short coiled tube from the new ink jet head.

18. Connect the copier's air line to the ink jet head.

19. Connect the two electrical leads to the copier.

20. After removing the cap on the ink jet head's bleed valve, connect the hose to the waste ink bottle to the bleed valve. The ink jet head's bleed valve is oriented perpendicular to the ink line direction (i.e. to the right).

21. Open the ink jet head's valve to the bleed position. In this position, the valve handle should be parallel to the ink line and pointing toward the ink jet head (i.e. over the black mark).

22. Insert a small rod (1/4" or 6mm in diameter) into the safety interlock switch to activate it.

23. Turn the copier's POWER switch on. Wait approximately 30 seconds. During this time ink and air will be purged from the ink line into the waste ink bottle.

24. Remove the clamp from the ink line. Massage the ink line gently to regain its original round form.

25. After the 30 seconds in Step 23, turn the ink jet head's valve to the operate position (that is the valve handle should point to the right perpendicular to the line line direction.

26. Turn the copier's POWER switch OFF.

27. Remove the waste ink bottle and tube.

28. Replace the cap over the bleed valve connection on the ink jet head (removed in Step 20).

29. Starting with the bottom ink jet head (black), open all of the other ink jet head valves to the operate position (i.e. valve handles should be perpendicular to the ink line direction).

30. Turn the AIR PUMP ONLY switch to the NORMAL position.

31. Open the air line valve located near the air pump and the AIR PUMP ONLY switch.

32. Turn the copier's POWER switch ON.

33. Turn the 5-position rotary TEST PATTERN SELECT switch to the INTL position and set the switches on the Parallel Interface circuit board to select the solid pattern for the color of ink whose head was changed (see Table 4-2 in Section 4 - Circuit Descriptions).

34. Run 2 or 3 solid color test patterns.

35. Run a Threshold Voltage test (see procedure later in this section).

36. If Threshold Voltage test is satisfactory, run the convergence adjustment (procedure is later in this section), and then replace the carriage cover.

37. If the Threshold Voltage test is not satisfactory, purge the ink jet head (procedure earlier in this section).

38. Turn the copier's POWER switch OFF.

39. Set the 5-position rotary TEST PATTERN SELECT switch to Position 1.

40. Set the dip switches on the Parallel Interface to the OPEN position.

41. Remove the 1/4" rod from the safety interlock switch to deactivate it.

This completes the Ink Jet Head Replacement procedure.

INK JET HEAD CONVERGENCE ADJUSTMENT

This procedure will converge all four ink jet heads in both the X and Y axes. Convergence along the X-axis ensures that ink drops from each head are aligned perpendicular to the X-axis (i.e. one vertical line). On the other hand, convergence along the X-axis ensures that ink drops from each head are parallel to the X-axis (i.e. one horizontal line).

The X-axis convergence must be performed first.

X-Axis Convergence (referenced to the black ink jet head):

1. Turn the copier's POWER switch off (if not already).

NOTE

The ink jet heads are identified as follows:
Yellow is the top ink jet head.
Magenta is second from top.
Cyan is third from top.
Black is the bottom ink jet head.

2. Slightly loosen (but do not remove) the two screws holding the ink jet head bracket to the carriage for the cyan, magenta, and yellow ink jet heads. These two screws are located to the left of the respective ink valve. Do not touch the bottom ink jet head.

3. Remove the Interface circuit board (118-2473-00) and replace with the Extender circuit board. Then install the 4691 Test Fixture into the Extender circuit board.

4. Turn the 5-position rotary TEST PATTERN SELECT switch to the 2 position and ensure that the switches on the Parallel Interface circuit board are OPEN. This selects the convergence pattern (see Table 4-2 in Section 4 - Circuit Descriptions).

5. Insert a 1/4" rod into the safety interlock switch (to activate it) and turn the copier's POWER switch on.

NOTE

Once the convergence pattern is started, it may be stopped and examined by pressing the TEST PATTERN START button. Then, press the TEST PATTERN START button again to resume the pattern. To end the convergence test (to exit), press the front panel STOP COPY button while printing or wait for the convergence pattern to complete.

6. Press the TEST PATTERN START button to start the convergence pattern.

7. Let the copier print approximately 1" (25 mm) of the pattern and then press the TEST PATTERN START button to stop the printing of the convergence pattern.

8. Check the alignments of the cyan and black colors.

WARNING

Do not attempt to move the ink jet heads while the copier is printing and the drum is rotating. There is high voltage on the ink jet heads and it is possible to rub the delicate ink jet head's nozzle on the rotating paper.

9. If the cyan color is not aligned with the black, gently move the cyan ink jet head in the direction of the error. Then repeat Steps 6, 7, and 8 until the black-cyan boundaries are aligned.

10. Tighten the two screws holding the cyan ink jet head.

11. Repeat Steps 6, 7, 8, and 9 and check for the alignments of the magenta to black and yellow to black.

12. Tighten the two screws holding each ink jet head.

13. Repeat Steps 6, 7, 8, and 9 to verify that adjustment is complete. Adjust if necessary.

Y-Axis Convergence (referenced to the yellow ink jet head):

1. Ensure that the three 16-position rotary switches on the 4691 Test Fixture circuit board are set to 8.

2. Press the TEST PATTERN START button to start the convergence pattern.

3. After the copier has printed approximately 1" (25 mm), press the TEST PATTERN START button to stop the convergence pattern.

4. Examine the magenta-yellow boundary. If the boundary contains a red line, increase the delay of the magenta ink jet head. On the other hand, if the magenta-yellow boundary contains a white line (no color), decrease the delay on the magenta head. To increase the delay, simply turn the 4691 Test Fixture's 16-position magenta delay rotary switch clockwise. We suggest that the delay switch be changed only one or two positions at a time. To decrease the delay, turn the 4691 Test Fixture's 16-position magenta delay rotary switch counterclockwise.

   White color (no printing) means turn delay switch CCW. Any color (printing) means turn delay switch CW.

5. Repeat Steps 2, 3, and 4 until there is neither a red or white line at the boundary.

6. Repeat Steps 2, 3, and 4 for the cyan ink jet head so that there is neither a purple (to clear, increase the delay) or a white line at the cyan-magenta boundary.

7. Repeat Steps 2, 3, and 4 for the black ink jet head so that there is neither a heavy black line (to clear, decrease the delay) or a white line at the black-cyan boundary.

8. Pick up the Interface circuit board (removed in Step 2 of the X-convergence adjustment) and hold it beside and oriented the the same as the 4691 Test Fixture.

9. Set the Interface's dip switches to correspond to the LEDs on the 4691 Test Fixture (i.e. a lit LED means CLOSE that dip switch). For example, if the five LEDs are lit as follows: on-off-on-on-off, set the dip switches as follows: closed, open, closed, closed, open.

10. Turn the copier's POWER switch OFF.

11. Remove the 4691 Test Fixture and Extender circuit board.

12. Replace the Interface circuit board.

13. Turn the copier's POWER switch back ON.

14. Press the TEST PATTERN START button to print the convergence pattern. Examine the pattern to verify that the copier is properly converged. Repeat this procedure, if the pattern is unsatisfactory.

15. Turn the copier's POWER switch OFF.

16. Set the 5-position rotary TEST PATTERN SELECT switch to Position 1.

17. Set the dip switches on the Parallel Interface to the OPEN position.

This completes the convergence procedure.

THRESHOLD VOLTAGE TEST

Introduction

The Threshold Voltage Test is designed to diagnose the cause of ink jet head problems.

The Threshold Voltage Test performs a "spectrum analysis" of the copier's ink system. The fundamental principle of the Threshold Voltage Test is that it requires a higher ink jet head voltage to cause printing when the resonance frequency of the particle or bubble in the ink system is reached. The ink jet heads are designed so that for each printing signal frequency, a certain minimum drive voltage is required to cause the ink jet head to squirt a drop of ink. This minimum drive voltage is the "threshold voltage." Normally, there is a linear, but gradually increasing, relationship between the threshold voltage and the printing signal frequency. So, if we graph the printing voltage amplitude on the vertical axis and the frequency of the printing signal on the horizontal axis, a relatively smooth, linear printing pattern should result as shown by the lower portion of the printing pattern shown in Figure 8-7. However, if a foreign particle or air bubble is in the ink system, the particle or bubble will absorb energy from the ink jet head drive voltage. The maximum energy absorption occurs at the resonance frequency of the particle or bubble. Studies have shown that nearly all air bubbles and foreign particles resonate between 5 KHz and 40 KHz. Figure 8-8 shows an example of an air bubble in the ink system. Notice the "notch" at approximately 13.75 KHz. This air bubble has absorbed enough energy from the drive voltage so that printing does not occur until the ink jet head drive voltage reaches nearly 130 volts when the printing signal is around 13.75 KHz. Without the air bubble, that particular ink jet head would have required only 60 or 70 volts to print at that frequency. Remember, that each ink jet head requires a slightly different threshold voltage for each frequency (different signature), but the principle is still the same. Also, each air bubble will resonate at a different frequency, so do not attempt to categorize problems on the basis of frequency and/or voltage measurements.

Figure 8-7 shows the other parameters of the Threshold Voltage Test pattern. The printing signal is swept in 40 Hz steps, starting at 5 KHz and for each 40 Hz step, the ink jet head drive voltage is swept (increased) from 0 (at the bottom of the pattern, shown by the horizontal line) to a pre-determined upper limit. For example, at 20 KHz, the upper ink jet head drive voltage is 180 volts. Printing, however, started at about 90 to 100 volts when the print signal was 20 KHz. When the printing frequency reaches 6.25 KHz, the upper limit voltage is increased slightly, causing a "stair-step" affect shown in Figure 8-7. Each stair-step indicates a 1.25 KHz range. Finally, upper limit voltages are set low at the lower frequencies to prevent damage to the ink jet heads.

It must be realized that an infinite number of test pattern variations might occur depending upon the size and location of a foreign particle or air bubble. Therefore, some interpretation of the test pattern might be necessary in some cases. However, generally you are looking for a straight threshold voltage pattern (lower portion of printing pattern in Figure 8-7).

Refer to Appendix H for interpretation of the Threshold Voltage Test Patterns.

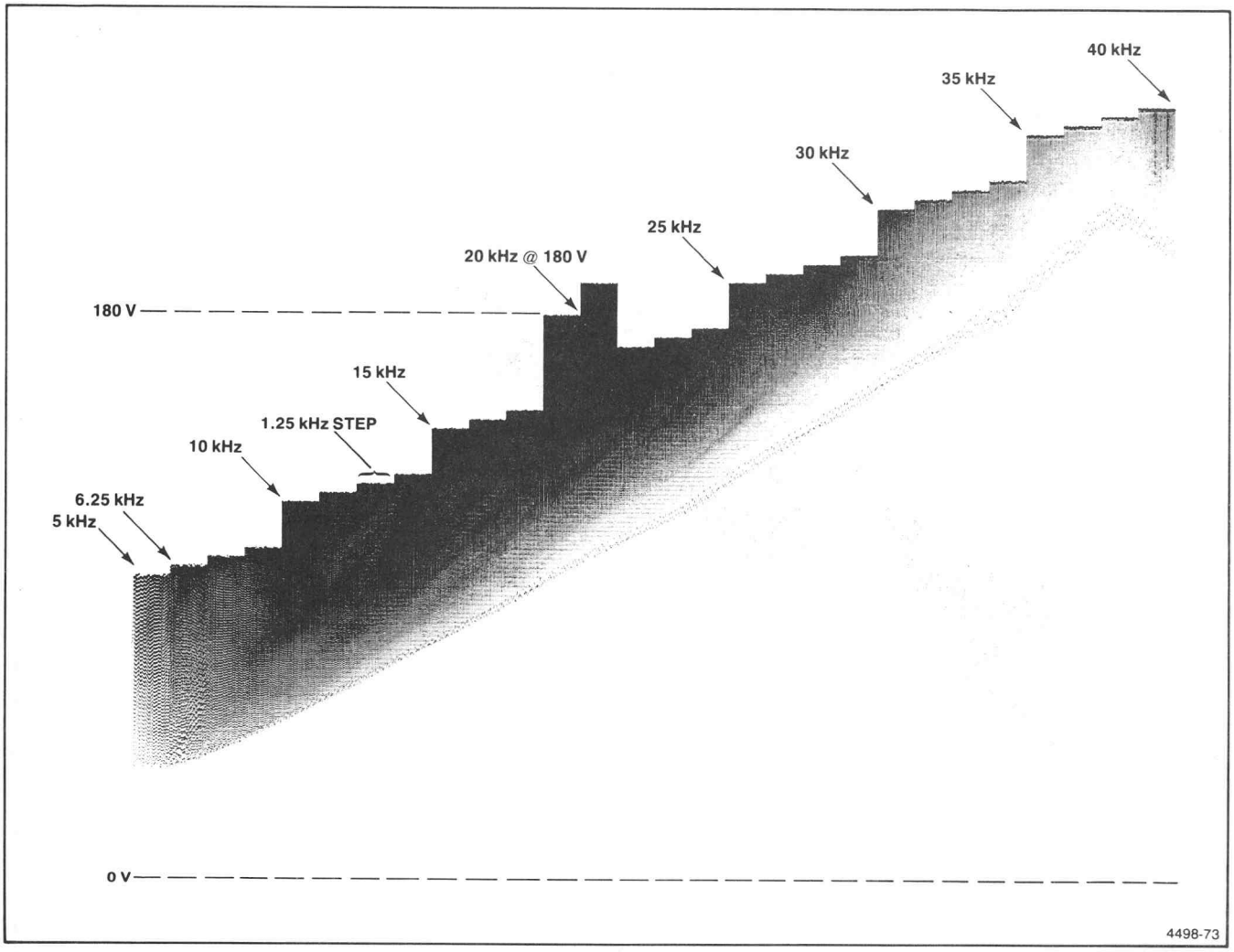


Figure 8-7. Threshold Voltage Test Pattern with a "Good Working Head."

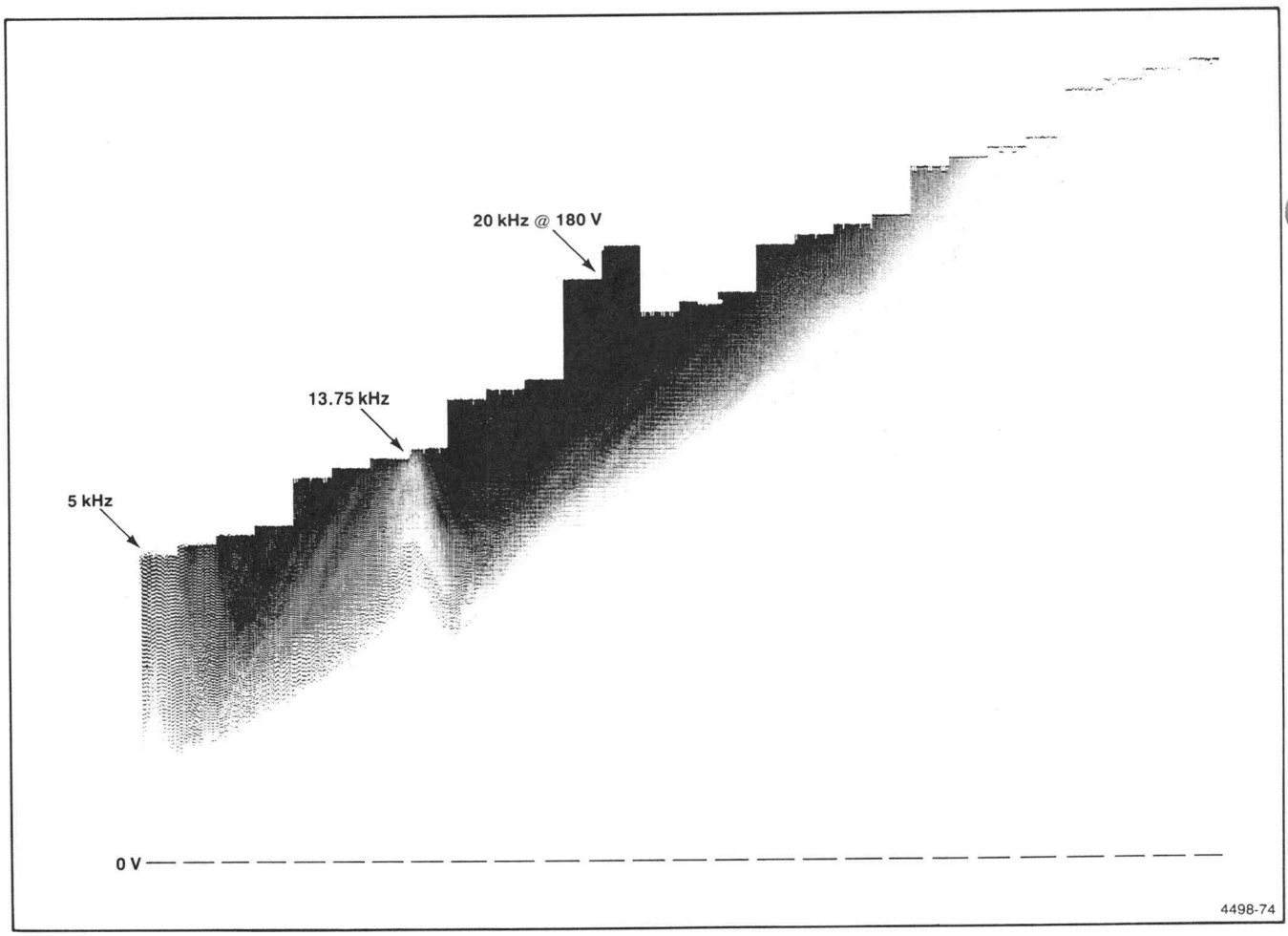


Figure 8-8. Threshold Voltage Test Pattern for an Ink Jet Head Containing an Air Bubble.

Threshold Voltage Test Procedure

1. Ensure that the copier's POWER switch is OFF.

2. Remove the Interface circuit board from the copier's card cage (see Section 7 for instructions on removing this circuit board).

3. Install the Extender circuit board in the slot formerly occupied by the Interface circuit board.

4. Install the 4691 Test Fixture into the Extender circuit board.

5. Ensure that the Test Fixture's ON/OFF switch is in the OFF (out) position (see Figure 8-9) and the MAG, CYAN, and BLK DELAY switches are set to zero.

6. Turn the copier's POWER switch ON. The test fixture will now perform a RAM and ROM test. If the INDICATOR LED fails to light and the BLACK DELAY LEDs indicate the number 1, RAM fail has occurred. If the BLACK DELAY LEDs indicate a number 2, a ROM failure has occurred.

7. Check that the INDICATOR LED is flashing at a once per second rate. This indicates that the test fixture is in an idle mode scanning the test fixture switches. The MAG, CYAN, and BLK DELAY LEDs indicate the print delay for each color (see Convergence Procedure in this section).

8. Turn the MAG, CYAN, and BLK DELAY rotary switches and notice that the MAG, CYAN, and BLK DELAY LEDs follow the switches.

NOTE

Steps 9 through 16 calibrate the 4691 Test Fixture and therefore are not required each time this test is performed. You may want to perform this calibration periodically on the 4691 Test Fixture to ensure accuracy.

9. Push in the CALIBRATION switch and the ON switch. The test fixture is now in the CAL Mode and the INDICATOR LED should flash at a four times per second rate.

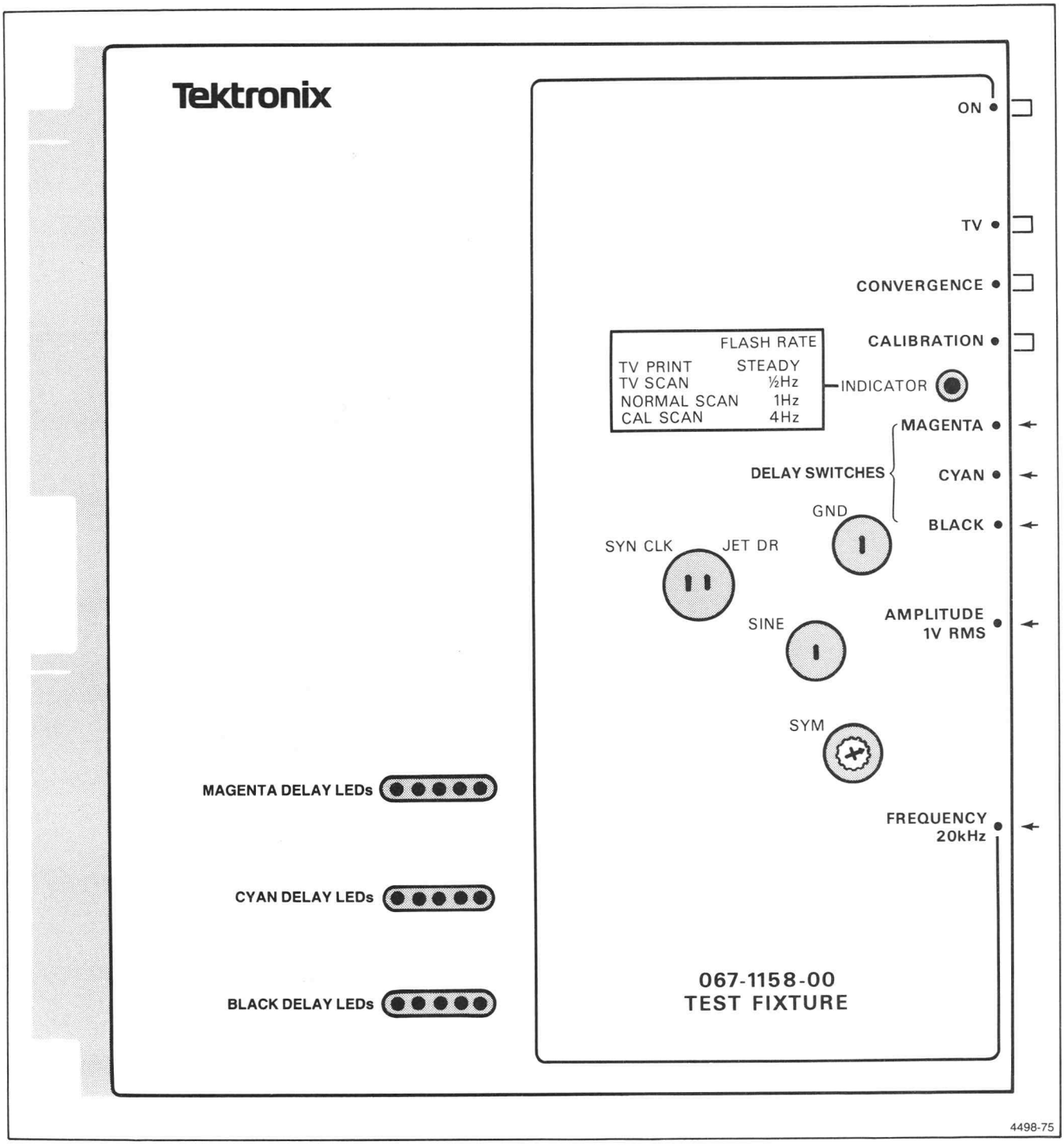


Figure 8-9. 4691 Test Fixture Locations.

10. Connect an oscilloscope (1V/Div, 10 uS/Div) between SYNCLK (TP553) and ground (TP655 see Figure 8-9).

11. Adjust R731 (SYM, or Symmetry) to obtain a square-wave at TP553 (SYNCLK).

12. Adjust R828 (FREQ, or Frequency) to obtain a period of 50 uS $\pm$ 1 uS.

13. Move the signal lead of the oscilloscope to TP745 (SINE) and notice that the sine-wave has little distortion.

14. Move the oscilloscope's signal lead to TP651 (JETDRV).

15. Adjust R851 (AMPLITUDE) for a p-p voltage of 3.30 volts (1.0 volt rms).

16. Push the ON/OFF switch to release it to the out (OFF) position.

17. Push in the TV switch and then the ON switch. Observe that the INDICATOR LED flashes at a once per two second rate. This indicates that the test fixture is waiting for the start of a Threshold Voltage test pattern.

18. Set the rotary five-position TEST PATTERN SELECT switch to three and press the TEST START switch. The INDICATOR LED will turn on steady when the copier starts printing the Threshold Voltage pattern. The printing takes about two minutes on A size paper or about four minutes on B size paper. If the INDICATOR LED fails to light, the wrong test pattern has been selected.

NOTE

Once the Threshold Voltage test pattern has started, the test fixture switches are deactivated. To abort the test, press the copier's front panel STOP COPY switch.

19. Refer to Appendix H for interpretation of the Threshold Voltage test pattern.

This completes the Threshold Voltage Test.

Section 9

COPIER OPTIONS

There are seven options available with the copier.

4691 Option 01

This option modifies the copier for metric (A3 and A4) paper sizes. It is the same as the standard copier, but provides the A3/A4 input paper tray and a 500 sheet package of A3-size paper.

4691 Option 02

This option will permit up to four terminals and/or device drivers to access the copier.

4691 Option A1

This Universal European 220 volt option provides a 3A line fuse and a power cord for operation from 220 volt, 50 or 60 Hz lines.

4691 Option A2

This United Kingdom 240 volt option provides a 3A line fuse and a power cord for operation from 240 volt, 50 or 60 Hz lines.

4691 Option A3

This Australian 240 volt option provides a 3A line fuse and a power cord for operation from 240 volt, 50 or 60 Hz lines.

4691 Option A4

This North American 240 volt option provides a 3A line fuse and a power cord for operation from 240 volt, 50 or 60 Hz lines.

4691 Option A5

This Swiss 230 volt option provides a 3A line fuse and a power cord for operation from 230 volt, 50 or 60 Hz lines.

Section 10

INSTALLATION

INTRODUCTION

This section describes how to install and connect the 4691 Color Graphic Copier into a system.

UNPACKING PROCEDURES

Refer to Appendix G.

PLACEMENT OF COPIER

Area Required

The copier can be placed on any flat and level surface, such as a table or desk, that is at least 24X33 inches (610X838mm). However, the paper tray is inserted into the right side (when facing front of copier) and finished copies are removed from the left side. This means that an additional 12 inches (305mm) should be allowed on each side for paper access and loading, making the total minimum area of 48X33 inches (1219X838mm).

The copier contains a level bubble, which is located near the center of the copier, above the circuit board card cage, and under the paper tray (not installed yet).

The copier may not operate properly unless it is level (bubble located totally within the circle). Adjust the surface on which the copier sits to level the copier.

Environment Required

The area should be as near normal and comfortable a room temperature (20 degrees C or 68 degrees F) and humidity as possible to reduce mechanical, electrical, and ink related problems.

It is very important that the copier not be subjected to any vibration or shock after initial installation. Vibration or shock may introduce air bubbles into the ink-jet heads and cause poor printing quality. If the copier is to be moved after initial installation, refer to Section 11 for instructions on moving the copier.

Power Requirements

Before plugging the copier's line cord into a line voltage source, (see "Setting Up Copier"), verify that the copier's POWER switch is OFF and that the voltage selection switch is set to accept your available line voltage.

The copier can be set for the following AC line voltage (see Line Voltage Selection):

100 volts 990-110 volts)
117 volts (105-129 volts)
200 volts (180-220 volts)
235 volts (231-258 volts)

CAUTION

The copier must be operated on a single phase power source that has one of its current-carrying conductors (grounding) connected to Safety Earth (ground potential). Operation from power sources that have both current-carrying conductors live with respect to ground is not recommended since only the line conductor has over-current (fuse) protection within the instrument. Power sources that are not recommended include phase-to-phase on a multi-phase system or across the legs of a 117-234 volt, single-phase, three-wire system.

The copier is designed to operate on a 100, 117, 200, or 235 volt nominal line voltage source with a frequency of 48 to 62 Hz. The AC power connector is a three-wire polarized plug with one lead connected directly to the instrument frame to provide electric shock protection. Connect this plug only to a three-wire outlet which has a safety ground. If the unit is conncted to any other power source, the copier frame must be connected to a safety ground system. The connector configuration and color coding are shown in Figure 10-1. If necessary, replace the power cord only with another of the same polarity.

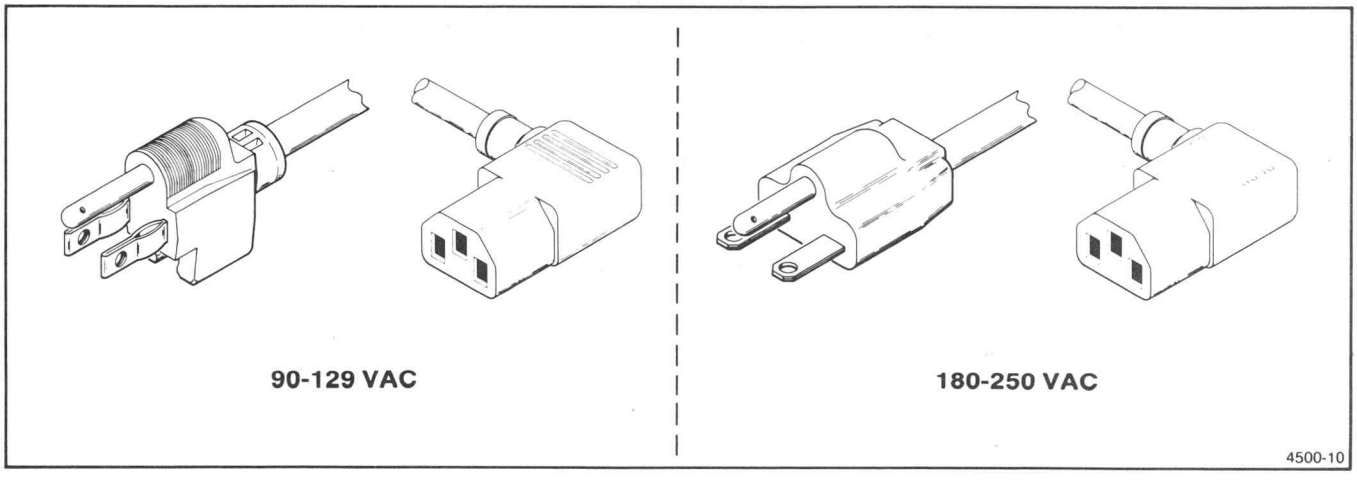


Figure 10-1. USA Standard Power Cord Sets.

SETTING UP COPIER

Line Voltage Selection

CAUTION

Be sure that the copier's POWER switch is OFF and the copier's line cord is disconnected from the line voltage source.

A round dial/switch on the rear panel selects and indicates the voltage for which the copier is internally wired. If this voltage is different from the available line voltage, proceed with these instructions. Otherwise, skip ahead to "Preparing Ink Lines."

The line voltage selection switch is located behind the copier's right side access door (when viewing front of copier).

1. Measure the AC line voltage to which the copier will be connected.
2. Push gently on the left side of the copier's right side access door and allow it to swing down.
3. Use a screwdriver to rotate this switch until the desired AC line voltage is located next to the switch's index (see Figure 10-2).
4. Change the line fuse as follows: 90-129 volt range, use a 6.25 A Fast-Blo fuse; 180-258 volt range, use a 3.0 A Fast-Blo fuse. See Figure 10-2 for the location of the line fuse holder.
5. Close the copier's right side access door. It will close easily if you press on the left side of the door until the door latches.

This completes the line voltage selection procedure.

Preparing Ink Lines

This procedure is the same as that used to restore th copier to operation after moving. Refer to Section 11 and follow the procedure "Restore Copier to Operation After Moving."

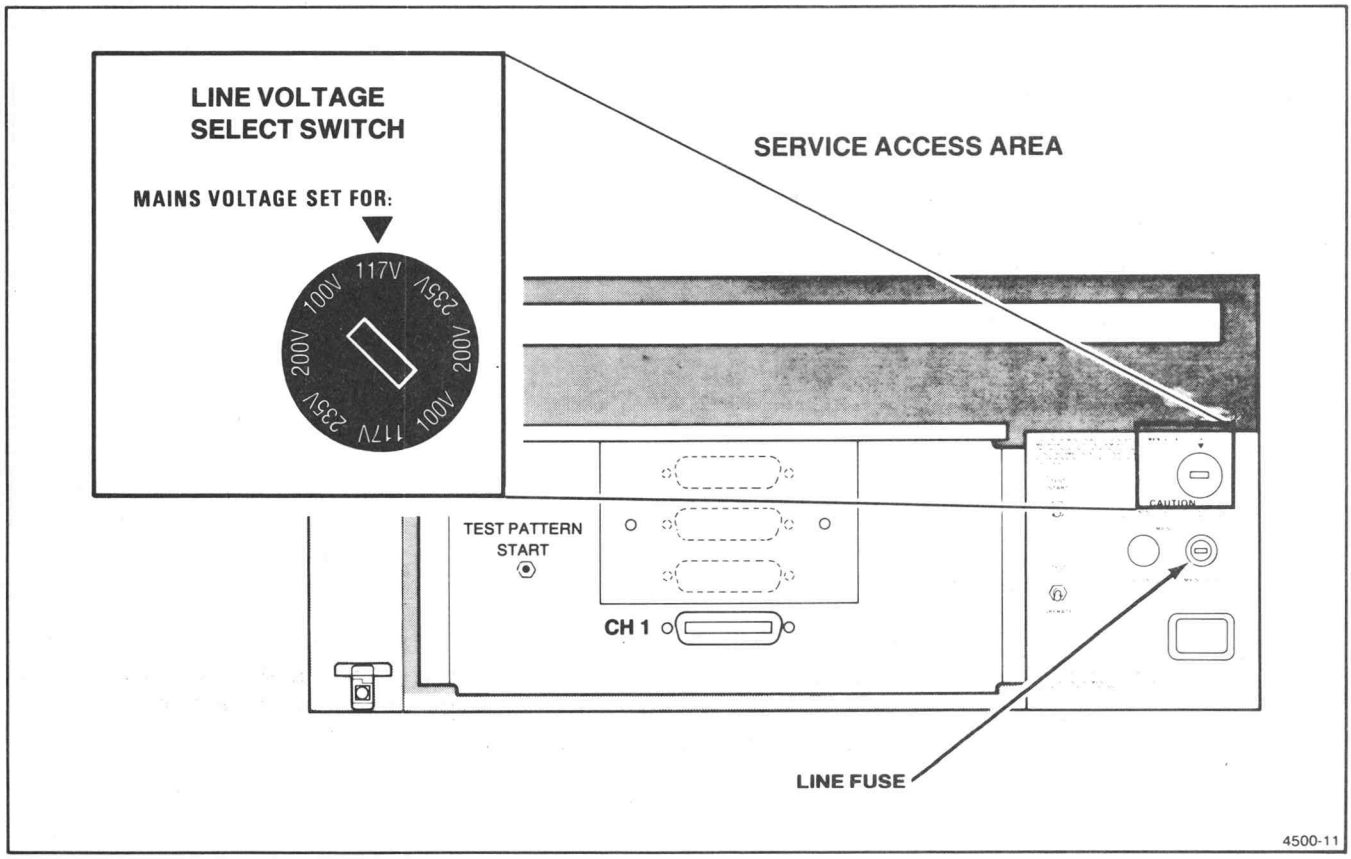


Figure 10-2. Line Voltage Selection Switch.

Replacing Ink Cartridges

To replace any of the four ink cartridges on the 4691 copier, use the following procedure:

1. Refer to Section 11 and do the first ten steps of the procedure "Prepare the Copier For Move."
2. It is now okay to remove/exchange any or all of the four ink cartridges. To remove an ink cartridge, first lift up on its handle, and then pull the cartridge straight out.
3. Be sure that the replacement cartridge has the same color ink that old cartridge contained.
4. Refer to Section 11 and do Steps 4 through 15 of the procedure "Restore Copier to Operation After Moving."

Residue Wash Bottle

Refer to 4691 Operator's Manual.

Selecting Paper Size

Refer to 4691 Operator's Manual.

Loading Paper

Refer to 4691 Operator's Manual.

Self-Test Procedures

The copier contains several self-test patterns, which are used in several procedures throughout this manual. For the general self-test procedure, use Steps 12 and 13 of the procedure "Restore Copier to Operation After Moving" in Section 11.

Installing Copier into a Host-System

Refer to 4691 Operator's Manual.

PACKING COPIER FOR SHIPMENT

Refer to Appendix G.

Section 11

MOVING THE COPIER

MOVING THE COPIER

CAUTION

Air bubbles may be introduced into the ink-jet heads if the copier is subjected to shock or vibration while being moved unless the following procedure is used. This procedure should be followed each time the copier is moved or relocated. This applies even if the copier is moved only short distances - for example, from one end of a table to the other, or even simply respositioning the copier on the same table.

Prepare the Copier for Move

1. Turn on the copier's POWER if it is not already on. Allow the copier to initialize (the front panel WAIT light goes out.

2. Open the copier's top cover (the copier will automatically turn off).

NOTE

The switch used in the next step is a locking type. The switch's handle must be pulled straight up before it can be moved to the opposite position.

3. Set the copier's air pump switch to the AIR PUMP ONLY position. The air pump switch in located near the right front corner of the copier (see Figure 11-1). This does not in itself turn the air pump on. The air pump will turn on when the copier is powered-up later.

4. Turn off the air valve located near the air pump switch. When the valve's handle is turned 90 degrees to the tubing the valve is in the "off" position (see Figure 11-1).

5. Close the copier's top cover (the copier's power will automatically turn back on).

6. Wait 10 to 20 seconds for the copier to initialize and the air pressure to equalize (wait until front panel WAIT light stops flashing).

7. Press the copier's POWER switch to OFF.

8. Open the copier's top cover again.

9. Remove the black carriage cover (loosen the large thumbscrew and a securing screw near the lower-left corner of the carriage cover). Do not disturb the ink lines during the carriage cover removal.

10. Close all four ink-line valves on the ink jet heads (see Figure 11-2 for the location of these valves). The valve is off when the valve handle is turned clockwise against the stop-screw. It is best to close the upper valve first and work toward the lower valve.

11. Reinstall the black carriage cover over the ink jet heads (slide the cover's lower flap under the securing screw and tighten the large thumbscrew finger tight.

12. Ensure that the ink jet head carriage is positioned at the extreme left end of its travel. If it is not, gently push it to the left.

13. Unplug copier's power cord and any interface cables.

14. Close the copier's top cover.

15. Move copier. Use two people (one on each side of the copier) to lift or position the copier during its move. Do not tip the copier. Movable carts are recommended for longer moves. To protect the ink jet heads during the move, do not severly jar or vibrate the copier.

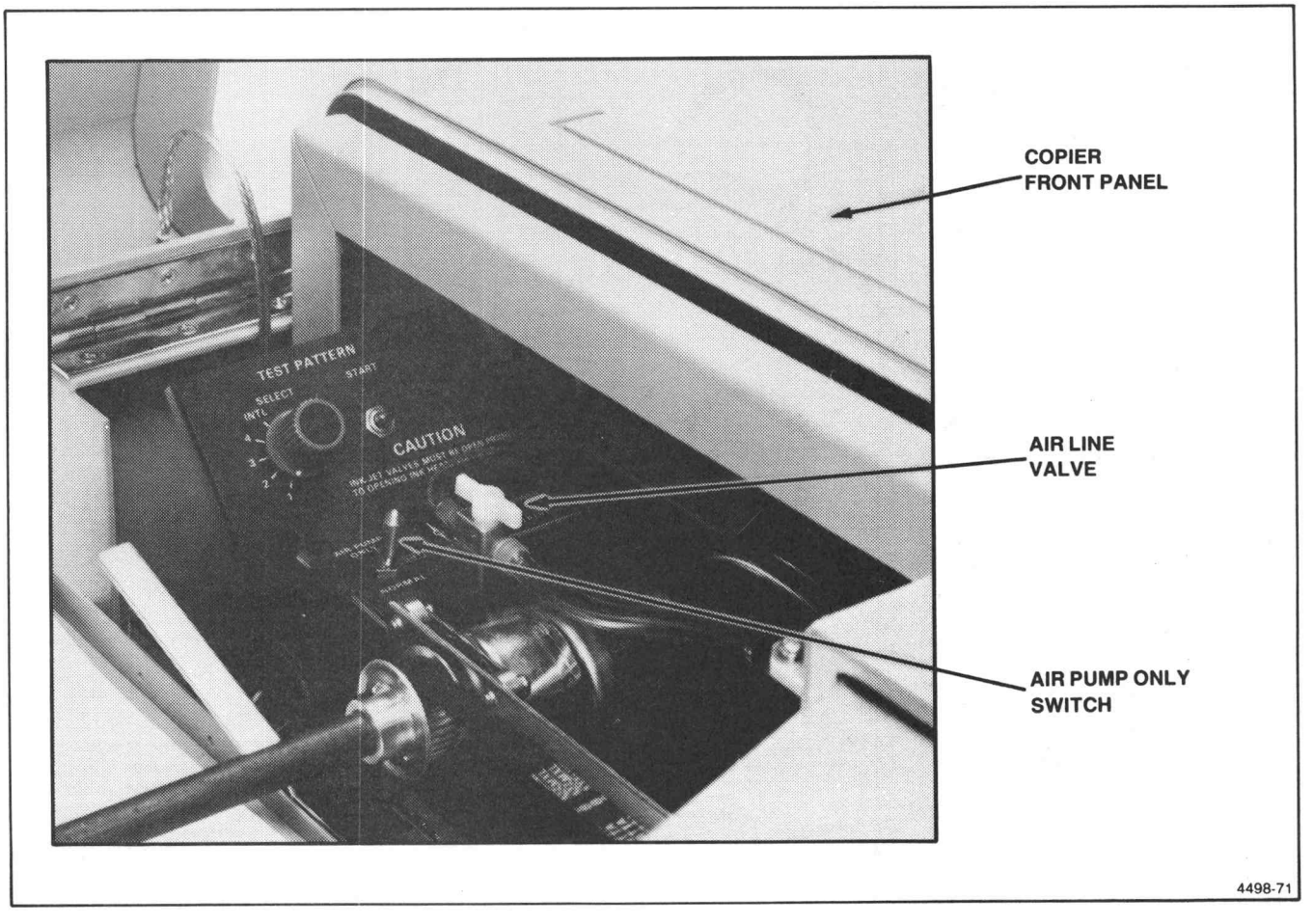


Figure 11-1. Air Pump Switch and Air Line Valve Location.

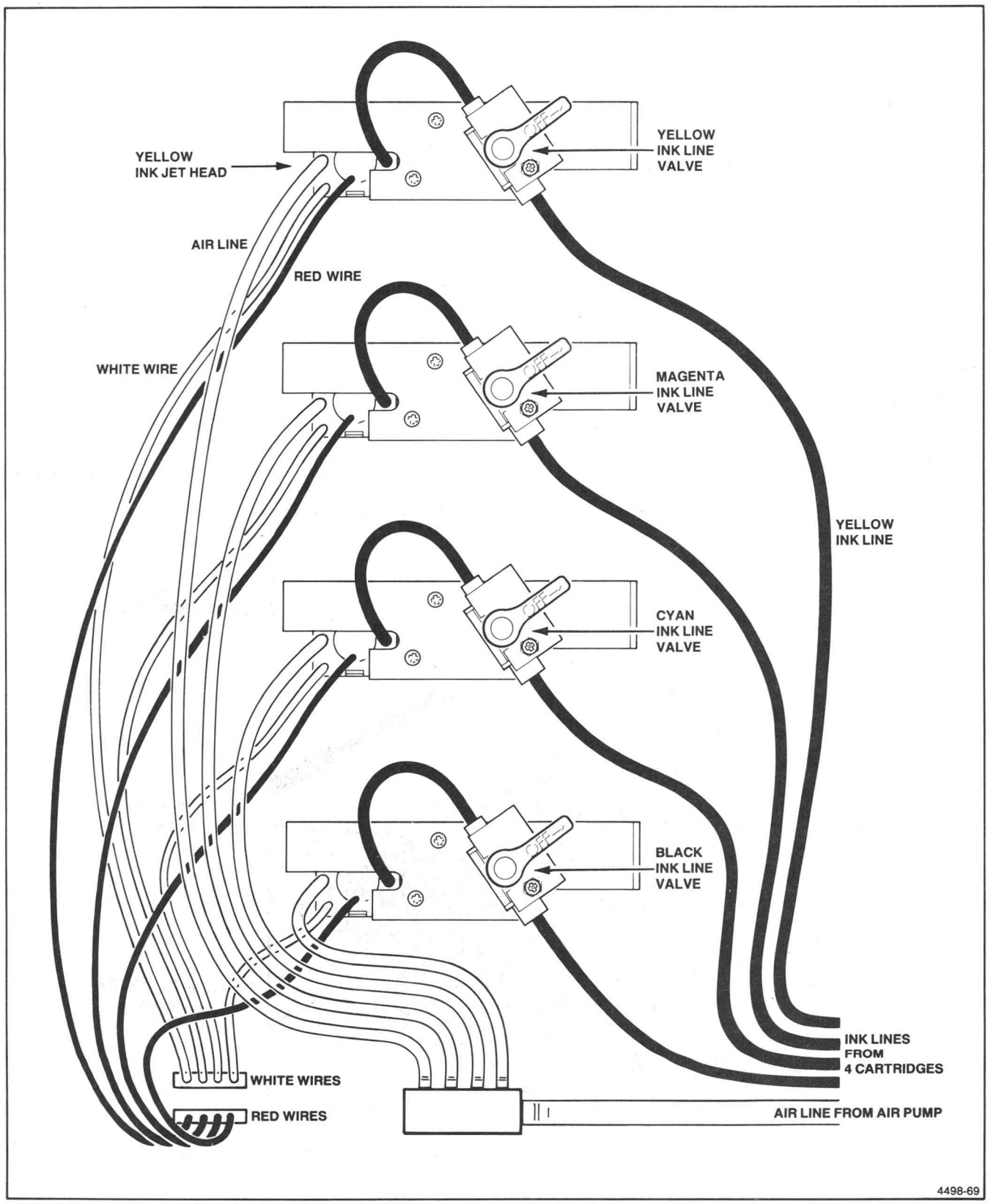


Figure 11-2. Ink Line Valve Location.

Restore Copier to Operation After Moving

NOTE

Refer to Section 10 (Installation) for comments on Area Required, Environment, and Power Requirements before operating copier.

1. Open the copier's top cover.

2. Check the bubble balance under the input paper tray to verify that the copier is level. The bubble must be located within or touching the inner circle. Make appropriate corrections to the surface on which the copier rests to level the copier.

3. Open the service access door and attach the copier's power and interface cables. **DO NOT POWER UP THE COPIER YET.**

4. Ensure that the copier's AIR PUMP ONLY switch is in the AIR PUMP ONLY position. This switch is located near the right-front corner of the copier (see Figure 11-1).

5. Remove the black carriage cover from the ink jet head carriage (loosen the large thumbscrew and securing screw on the lower left corner). Do not disturb the ink lines during removal.

6. Without jarring the ink lines or the copier, open first the black ink or bottom valve, then the cyan, then magenta, and finally the yellow ink valve (top). These valves are mounted on the carriage and are open when the valve handle is perpendicular to the ink line (over the blue mark).

7. Replace the carriage cover. It is held with one thumbscrew and securing screw. Tighten both screws.

8. Open the air valve located near the air pump switch (see Figure 11-1).

9. Set the copier's air pump switch to the NORMAL position (see the NOTE prior to Step 3 of "Prepare the Copier for Move").

10. Plug in the copier's power cord and required interface cables.

11. Close the copier's top cover.

12. Press the copier's POWER switch to the ON position.

CAUTION

Be sure that the four ink line valves are open (refer to Step 6) before starting a self-test pattern or print from a host. Failure to do this will cause air bubbles to be introduced into the ink jet heads, which will then require that all four ink ink jet heads be purged.

13. Momentarily press the TEST PATTERN START button to cause the copier to print the self-test pattern. This switch is located under the copier's right side access door (when viewing the front of the copier) and is **left** of the interface connector.

14. Discard this copy of the self-test pattern.

15. Repeat Step 13 and examine the self-test pattern for acceptable quality. It may be necessary to print the self-test pattern several times to achieve proper quality.

The copier is ready for normal operation.

Section 12
REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

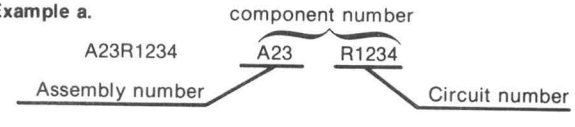
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

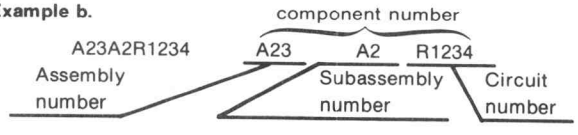
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000FO	UNITED CHEMI-CONN INC.	11282 LEXINGTON AVE.	ROCHESTER N.Y. 14604
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MYRTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05397	UNION CARBIDE CORPORATION, MATERIALS SYSTEMS DIVISION	11901 MADISON AVENUE	CLEVELAND, OH 44101
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
14552	MICRO SEMICONDUCTOR CORP.	2830 E FAIRVIEW ST.	SANTA ANA, CA 92704
26769	NCI INC.	5900 AUSTRALIAN AVENUE	WEST PALM BEACH, FL 33407
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
34335	ADVANCED MICRO DEVICES	901 THOMPSON PL.	SUNNYVALE, CA 94086
34630	TYCO FILTERS DIV., INC.	3940 W. MONTECITO	PHOENIX, AZ 85019
34649	INTEL CORP.	3065 BOWERS AVE.	SANTA CLARA, CA 95051
50522	MONSANTO CO., ELECTRONIC SPECIAL PRODUCTS	3400 HILLVIEW AVENUE	PALO ALTO, CA 94304
51984	NEC AMERICA INC. RADIO AND TRANSMISSION DIV.	2990 TELESTAR CT. SUITE 212	FALLS CHURCH, VA 22042
54473	MATSUSHITA ELECTRIC, CORP. OF AMERICA	1 PANASONIC WAY	SECAUCUS, NJ 07094
55680	NICHICON/AMERICA/CORP.	6435 N PROESEL AVENUE	CHICAGO, IL 60645
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
59660	TUSONIX INC.	2155 N FORBES BLVD	TUCSON, AZ 85705
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
81073	GRAYHILL, INC.	561 HILLGROVE AVE., PO BOX 373	LA GRANGE, IL 60525
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206
91418	RADIO MATERIALS COMPANY, DIV. OF P.R. MALLORY AND COMPANY, INC.	4242 W BRYN MAWR	CHICAGO, IL 60646
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
99392	MEMPCO/ELECTRA INC., ROXBORO DIV.	P O BOX 1223	ROXBORO, NC 27573

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	118-2470-00			CKT BOARD ASSY:MOTHER	54473	EMJ-E82129
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A2	670-7928-00			CKT BOARD ASSY:PARALLEL INTERFACE	80009	670-7928-00
A3	670-8121-00			CKT BOARD ASSY:INTERFACE	80009	670-8121-00
A4	118-2878-00			CKT BOARD ASSY:HEAD DRIVER EXCHANGE ASSY	54473	EMJ-MM8210806
A4A1	118-2492-00			HEAD DRVR ASSY:STEEL W/CKT BOARD	54473	EMJ-E82132
A5	118-2472-00			CKT BOARD ASSY:CPU	54473	EMJ-E82123
A6	118-2471-00			CKT BOARD ASSY:DRIVER	54473	EMJ-E82124
A7	118-2508-00			CKT BOARD ASSY:SENSOR,STPS	54473	EMJ-MA8210802
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A8	118-2509-00			CKT BOARD ASSY:SENSOR,FSW,BSW	54473	EMJ-MA8210801
A8A1	----- -----			CKT BOARD ASSY:FRONT SWITCH SENSOR BOARD		
	----- -----			(REPLACEABLE WITH A8)		
A8A2	----- -----			CKT BOARD ASSY:BACK SWITCH SENSOR BOARD		
	----- -----			(REPLACEABLE WITH A8)		
A9	118-2507-00			CKT BOARD ASSY:DRUM LOCK SENSOR BOARD	54473	EMJ-MA8210803
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A10	118-2504-00			CKT BOARD ASSY:JAM CHECK SENSOR BOARD	54473	EMJ-MA8210806
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A11	118-2555-00			CKT BOARD ASSY:NO PAPER	54473	EMJ-MA8210209
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A12	118-2506-00			CKT BOARD ASSY:SENSOR ROPS SSLMT	54473	EMJ-MA8210804
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A12A1	----- -----			CKT BOARD ASSY:SCANNER LIMIT,SENSOR BOARD		
	----- -----			(REPLACEABLE WITH A12)		
A12A2	----- -----			CKT BOARD ASSY:BOILER POSITION		
	----- -----			(REPLACEABLE WITH A12)		
A13	118-2930-00			CKT BOARD ASSY:PAPER SIZE,SENSOR BOARD	54473	EMJ-MA8210212
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A14	118-2505-00			CKT BOARD ASSY:SENSOR,DLPT/EN	54473	EMJ-MA8210805
	----- -----			(NO REPLACEABLE ELECTRICAL PARTS)		
A15	118-2475-00			CKT BOARD ASSY:FRONT PANEL INDICATOR	54473	EMJ-E82127
A16	----- -----			(REPLACEABLE WITH 118-2586-00,FIG 3-54)		
A17	118-2874-00			POWER SUPPLY:	54473	EMJ-MM8210809
A17A1	118-2474-00			CKT BOARD ASSY:LOW VOLTAGE REGULATOR	54473	EMJ-E82121
A17A2	118-2490-00			SWITCH ASSY:AC POWER,W/CKT BOARD	54473	EMJ-E82130
A2	670-7928-00			CKT BOARD ASSY:PARALLEL INTERFACE	80009	670-7928-00
A2C110	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C120	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C130	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C137	290-0876-00			CAP.,FXD,ELCTLT:15UF,20%,25V	26769	PNS156Y025M1
A2C150	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C155	283-0154-00			CAP.,FXD,CER DI:22PF,5%,50V	72982	8111B061C0G220J
A2C165	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C170	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C180	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C190	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C195	290-0876-00			CAP.,FXD,ELCTLT:15UF,20%,25V	26769	PNS156Y025M1
A2C220	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C225	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C235	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C240	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C250	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C290	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A2C315	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C320	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C325	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C330	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C335	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C340	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C350	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C360	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C365	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C370	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C372	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C375	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C390	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C420	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C425	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C430	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C435	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C440	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C460	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C465	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C470	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C475	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C480	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C515	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C525	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C540	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C560	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C615	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C625	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C635	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C640	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C650	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2C660	283-0421-00			CAP.,FXD,CER DI:0.1UF,+80-20%,50V	04222	DG015E104Z
A2CR364	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
A2DS770	150-1001-02			LT EMITTING DIO:RED,660NM,50MA MAX	07263	FLV160/CL1P
A2DS775	150-1022-00			LAMP,LED,RDOUT:7 SEG NUMERIC,LH DEC ORANGE	50522	MAN72A
A2R113	307-0597-00			RES NTWK,FXD,FI:7,6.8K OHM,2%,1.0W	01121	208A682
A2R115	307-0741-00			RES NTWK,FXD FI:7,3.3K OHM,2%,0.19W EA	01121	208A332
A2R175	307-0741-00			RES NTWK,FXD FI:7,3.3K OHM,2%,0.19W EA	01121	208A332
A2R177	307-0597-00			RES NTWK,FXD,FI:7,6.8K OHM,2%,1.0W	01121	208A682
A2R213	307-0597-00			RES NTWK,FXD,FI:7,6.8K OHM,2%,1.0W	01121	208A682
A2R215	307-0741-00			RES NTWK,FXD FI:7,3.3K OHM,2%,0.19W EA	01121	208A332
A2R220	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R221	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A2R225	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R226	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A2R230	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R231	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A2R255	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A2R260	307-0445-00			RES NTWK,FXD,FI:4.7K OHM,20%,(9) RES	91637	MSP10A01-472M
A2R275	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R276	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A2R277	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R280	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A2R290	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A2R365	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A2R366	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A2R370	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
A2R371	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A2R375	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R376	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A2R377	307-0597-00			RES NTWK,FXD,FI:7,6.8K OHM,2%,1.0W	01121	208A682
A2R554	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A2R555	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A2R556	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A2R655	307-0486-00			RES,NTWK,THK FI:100 OHM,20%,1.125W	91637	MSP10A01-101J
A2R675	307-0636-00			RES NTWK,FXD,FI:8,330 OHM,2%,0.125W	01121	316B331
A2R707	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A2R710	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A2R762	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A2R763	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
A2R770	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A2S780	260-1965-00			SWITCH,ROCKER:(4)SPST,125MA,30VDC	81073	76SB04
A2U110	156-1570-01			MICROCIRUIT,DI:PROM PRPHL INTFC,SCRND	34335	AM8255A-5RDCB
A2U120	156-0469-02			MICROCIRCUIT,DI:3/8 LINE DCDR	01295	SN74LS138NP3
A2U125	156-0469-02			MICROCIRCUIT,DI:3/8 LINE DCDR	01295	SN74LS138NP3
A2U130	156-0469-02			MICROCIRCUIT,DI:3/8 LINE DCDR	01295	SN74LS138NP3
A2U135	156-0469-02			MICROCIRCUIT,DI:3/8 LINE DCDR	01295	SN74LS138NP3
A2U140	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A2U150	156-0479-02			MICROCIRCUIT,DI:QUAD 2-INP ORGATE	01295	SN74LS32NP3
A2U165	156-1088-00			MICROCIRCUIT,DI:8 BIT MICROPROCESSOR	80009	156-1088-00
A2U170	156-1730-00			MICROCIRCUIT,DI:256 X 8 RAM WITH 1/O AND TI	34335	AM8155JB
A2U180	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U190	156-0914-03			MICROCIRCUIT,DI:OCT SR BBR W/3 ST OUT	27014	N74LS240N
A2U220	160-1837-00			MICROCIRCUIT,DI:2048 X 8 EPROM,PRGM	80009	160-1837-00
A2U225	160-1838-00			MICROCIRCUIT,DI:16 X 48 X 8,PRGM	80009	160-1838-00
A2U240	156-1065-01			MICROCIRCUIT,DI:OCTAL D TYPE TRANS LATCHES	34335	AM74LS373
A2U250	156-1036-01			MICROCIRCUIT,DI:PRGM INTERVALTIMER	34649	QD8253
A2U275	156-0914-03			MICROCIRCUIT,DI:OCT SR BBR W/3 ST OUT	27014	N74LS240N
A2U280	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A2U290	156-0383-02			MICROCIRCUIT,DI:QUAD 2-INP NOR GATE	01295	SN74LS02
A2U315	156-1065-01			MICROCIRCUIT,DI:OCTAL D TYPE TRANS LATCHES	34335	AM74LS373
A2U320	156-0865-02			MICROCIRCUIT,DI:OCTAL D-TYPE FF W/CLEAR	01295	SN74LS273NP3
A2U325	156-0865-02			MICROCIRCUIT,DI:OCTAL D-TYPE FF W/CLEAR	01295	SN74LS273NP3
A2U330	156-0865-02			MICROCIRCUIT,DI:OCTAL D-TYPE FF W/CLEAR	01295	SN74LS273NP3
A2U335	156-0865-02			MICROCIRCUIT,DI:OCTAL D-TYPE FF W/CLEAR	01295	SN74LS273NP3
A2U340	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U350	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U360	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U365	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U370	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U375	156-0467-02			MICROCIRCUIT,DI:QUAD 2-INP NAND BFR,SCRN	01295	SN74LS38
A2U390	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A2U415	156-0382-02			MICROCIRCUIT,DI:QUAD 2-INP NAND GATE	01295	SN74LS00
A2U420	160-1840-00			MICROCIRCUIT,DI:2048 X 8 EPROM,PRGM	80009	160-1840-00
A2U425	156-0530-02			MICROCIRCUIT,DI:QUAD 2-INP MUX,SCRN	01295	SN74LS157P3
A2U430	156-1127-00			MICROCIRCUIT,DI:1024 X 4 STATIC RAM	34649	D2114AL-4/S7049
A2U435	156-1127-00			MICROCIRCUIT,DI:1024 X 4 STATIC RAM	34649	D2114AL-4/S7049
A2U440	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U450	156-0530-02			MICROCIRCUIT,DI:QUAD 2-INP MUX,SCRN	01295	SN74LS157P3
A2U460	156-1127-00			MICROCIRCUIT,DI:1024 X 4 STATIC RAM	34649	D2114AL-4/S7049
A2U465	156-1127-00			MICROCIRCUIT,DI:1024 X 4 STATIC RAM	34649	D2114AL-4/S7049
A2U470	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U475	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A2U480	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U515	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A2U520	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A2U525	156-0480-02			MICROCIRCUIT,DI:QUAD 2 INP & GATE	01295	SN74LS08NP3
A2U530	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A2U535	156-1172-01			MICROCIRCUIT,DI:DUAL 4 BIT CNTR,BURN IN	01295	SN74LS393
A2U540	156-0530-02			MICROCIRCUIT,DI:QUAD 2-INP MUX,SCRN	01295	SN74LS157P3
A2U550	156-1172-01			MICROCIRCUIT,DI:DUAL 4 BIT CNTR,BURN IN	01295	SN74LS393
A2U560	156-1172-01			MICROCIRCUIT,DI:DUAL 4 BIT CNTR,BURN IN	01295	SN74LS393
A2U565	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A2U570	156-0479-02			MICROCIRCUIT,DI:QUAD 2-INP ORGATE	01295	SN74LS32NP3
A2U615	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A2U620	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A2U625	156-0479-02			MICROCIRCUIT,DI:QUAD 2-INP ORGATE	01295	SN74LS32NP3
A2U630	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A2U635	156-1065-00			MICROCIRCUIT,DI:OCTAL D TYPE TRANS LATCHES	01295	SN74LS373N OR J
A2U640	156-1065-00			MICROCIRCUIT,DI:OCTAL D TYPE TRANS LATCHES	01295	SN74LS373N OR J
A2U650	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A2U660	156-1740-00			MICROCIRCUIT,DI:OCTAL DYNAMIC MEMORY DRVR	34335	AM2966DCB
A2U665	156-0957-01			MICROCIRCUIT,DI:SYN 4 BIT UP/DOWN BINARY	27014	DM74LS169
A2U670	156-0383-02			MICROCIRCUIT,DI:QUAD 2-INP NOR GATE	01295	SN74LS02
A2Y155	158-0056-00			XTAL UNIT,QTZ:4MHZ,0.003%,SEERIES	34630	150-6070

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A3	670-8121-00			CKT BOARD ASSY:INTERFACE	80009	670-8121-00
A3C01	290-0973-00			CAP.,FXD,ELCTLT:100UF,20%,25VDC	000F0	SM25VB100M
A3C02	290-0287-00			CAP.,FXD,ELCTLT:47UF,20%,25V	56289	150D475X0035B2
A3C03	290-0287-00			CAP.,FXD,ELCTLT:47UF,20%,25V	56289	150D475X0035B2
A3C04	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C05	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C06	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C07	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C08	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C09	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C10	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C11	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C12	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C13	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C14	290-0956-00			CAP.,FXD,ELCTLT:4.7UF,10%,35V	05397	T362B475K035AS
A3C15	290-0956-00			CAP.,FXD,ELCTLT:4.7UF,10%,35V	05397	T362B475K035AS
A3C16	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3C17	118-2601-00			CAP.,FXD,PLASTIC:100UF,5%,125V	54473	ECQ51101JZ
A3C18	118-2601-00			CAP.,FXD,PLASTIC:100UF,5%,125V	54473	ECQ51101JZ
A3C19	118-2601-00			CAP.,FXD,PLASTIC:100UF,5%,125V	54473	ECQ51101JZ
A3C20	118-2601-00			CAP.,FXD,PLASTIC:100UF,5%,125V	54473	ECQ51101JZ
A3C21	118-2640-00			CAP.,FXD,PLASTIC:4700PF,5%,125V	54473	ECQS1472JZ
A3C22	285-1189-00			CAP.,FXD,MTLZD:0.1UF,5%,100V	99392	C280MAH/J100K
A3C23	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A3D01	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	14552	TD3810980
A3D02	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A3D03	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A3IC01	156-1570-01			MICROCIRCUIT,DI:PROM PRPHL INTFC,SCRND	34335	AM8255A-5P/DCB
A3IC02	156-0469-02			MICROCIRCUIT,DI:3/8 LINE DCDR	01295	SN74LS138NP3
A3IC03	156-0529-02			MICROCIRCUIT,DI:DATA SELECTOR,SCRN	01295	SN74LS257
A3IC04	156-0645-02			MICROCIRCUIT,DI:HEX INV ST NAND GATES,SCRN	01295	SN74LS14
A3IC05	118-2635-00			MICROCIRCUIT,DI:CMOS	54473	MC14562BCP
A3IC06	118-2635-00			MICROCIRCUIT,DI:CMOS	54473	MC14562BCP
A3IC07	118-2635-00			MICROCIRCUIT,DI:CMOS	54473	MC14562BCP
A3IC08	118-2635-00			MICROCIRCUIT,DI:CMOS	54473	MC14562BCP
A3IC09	118-2635-00			MICROCIRCUIT,DI:CMOS	54473	MC14562BCP
A3IC10	156-1879-00			MICROCIRCUIT,DI:1-TO-64-BIT VAR LENGTH SHF		
A3IC11	156-1879-00			MICROCIRCUIT,DI:1-TO-64-BIT VAR LENGTH SHF		
A3IC12	156-1879-00			MICROCIRCUIT,DI:1-TO-64-BIT VAR LENGTH SHF		
A3IC13	118-2637-00			MICROCIRCUIT,DI:CMOS	54473	MC141758CP
A3IC14	156-0515-00			MICROCIRCUIT,DI:TRIPLE 3-CHAN MUX	80009	156-0515-00
A3IC15	156-0515-00			MICROCIRCUIT,DI:TRIPLE 3-CHAN MUX	80009	156-0515-00
A3IC16	156-0366-02			MICROCIRCUIT,DI:DUAL D FLIP-FLOP,CHK	80009	156-0366-02
A3IC17	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A3IC18	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A3IC19	156-1126-00			MICROCIRCUIT,LI:VOLTAGE COMPARATOR	51984	UPC311C
A3IC20	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A3L01	118-2847-00			COI,RF:FIXED,125UH,2A	54473	SN-8D-500
A3L02	118-2847-00			COI,RF:FIXED,125UH,2A	54473	SN-8D-500
A3L03	118-2847-00			COI,RF:FIXED,125UH,2A	54473	SN-8D-500
A3L04	118-2848-00			COIL,RF:VARIABLE,12.3MH,5%	54473	ELM7Q7168
A3Q01	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A3Q02	151-1736-00			TRANSISTOR:NPN,SILICON	54473	2SC945
A3R01	301-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.50W	01121	EB3915
A3R02	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R03	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A3R04	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A3R05	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A3R06	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A3R07	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R08	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R09	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R10	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R11	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R12	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R13	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R14	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R15	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A3R16	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A3R17	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A3R18	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
A3R19	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A3R20	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A3R21	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A3R22	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A3R23	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A3R24	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
A3R25	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A3R26	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A3R27	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A3R28	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A3R29	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R30	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A3R31	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A3R32	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A3RB01	118-2633-00			RES NTWK,FXD,FI:3.3K OHM,5%,10 RES	54473	EXBP810332J
A3RB02	118-2634-00			RES NTWK,FXD,FI:6.8K OHM,5%,10 RES	54473	EXBP810682J
A3RB03	118-2639-00			RES NTWK,FXD,FI:3.3K OHM,5%,8 RES	54473	EXBP88332J
A3RB04	118-2638-00			RES NTWK,FXD,FI:6.8K OHM,5%,8 RES	54473	EXBP88682J
A3RB05	118-2629-00			RES NTWK,FXD,FI:3.3K OHM,5%,4 RES	54473	EXBP84322J
A3RB06	118-2630-00			RES NTWK,FXD,FI:6.8K OHM,5%,4 RES	54473	EXBP84682J
A3RB07	118-2631-00			RES NTWK,FXD,FI:10K OHM,5%,6 RES	54473	EXBP86103J
A3RB08	118-2632-00			RES NTWK,FXD,FI:10K OHM,5%,8 RES	54473	EXBP88103J
A3RB09	118-2632-00			RES NTWK,FXD,FI:10K OHM,5%,8 RES	54473	EXBP88103J
A3RB10	307-0542-00			RES,NTWK,FXD,FI:10K OHM,5%,0.125W	01121	106A103
A3RB11	307-0542-00			RES,NTWK,FXD,FI:10K OHM,5%,0.125W	01121	106A103
A3RB12	307-0542-00			RES,NTWK,FXD,FI:10K OHM,5%,0.125W	01121	106A103
A3VR01	311-1279-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	32997	3329W-L58-501
A3VR02	311-1279-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	32997	3329W-L58-501
A3VR03	311-1279-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	32997	3329W-L58-501

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A4A1	118-2492-00			HEAD DRVR ASSY:STEEL W/CKT BOARD	54473	EMJ-E82132
A4A1C01	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C02	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C03	118-2643-00			CAP.,FXD,CER DI:10PF,10%,500V	54473	ECCD2H100F
A4A1C04	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C05	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C06	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C07	118-2643-00			CAP.,FXD,CER DI:10PF,10%,500V	54473	ECCD2H100F
A4A1C08	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C09	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C10	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C11	118-2643-00			CAP.,FXD,CER DI:10PF,10%,500V	54473	ECCD2H100F
A4A1C12	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C13	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C14	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C15	118-2643-00			CAP.,FXD,CER DI:10PF,10%,500V	54473	ECCD2H100F
A4A1C16	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C17	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A4A1C18	118-2644-00			CAP.,FXD,ELCTLT:2.2UF,+30-10%,250V	54473	ECEA2ES2R2
A4A1C19	118-2644-00			CAP.,FXD,ELCTLT:2.2UF,+30-10%,250V	54473	ECEA2ES2R2
A4A1D01	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D02	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D03	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D04	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D05	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D06	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D07	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D08	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D09	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D10	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D11	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1D12	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A4A1Q01	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A4A1Q02	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q03	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q04	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q05	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q06	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A4A1Q07	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q08	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q09	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q10	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q11	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A4A1Q12	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q13	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q14	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q15	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q16	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A4A1Q17	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q18	118-2645-00			TRANSISTOR:PNP,SI	54473	2SA879
A4A1Q19	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1Q20	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A4A1R01	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A4A1R02	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R03	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R04	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R05	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A4A1R06	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A4A1R07	301-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.50W	01121	EB1545
A4A1R08	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A4A1R09	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A4A1R10	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A4A1R11	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A4A1R12	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R13	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R14	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R15	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R16	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A4A1R17	301-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.50W	01121	EB1545
A4A1R18	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A4A1R19	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A4A1R20	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A4A1R21	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A4A1R22	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R23	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R24	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R25	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R26	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A4A1R27	301-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.50W	01121	EB1545
A4A1R28	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A4A1R29	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A4A1R30	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A4A1R31	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A4A1R32	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R33	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
A4A1R34	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R35	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A4A1R36	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A4A1R37	301-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.50W	01121	EB1545
A4A1R38	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A4A1R39	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A4A1R40	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A4A1R41	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A4A1R42	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A4A1R43	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A4A1R44	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A5	118-2472-00			CKT BOARD ASSY:CPU	54473	EMJ-E82123
A5C01	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A5C02	283-0204-00			CAP.,FXD,CER DI:0.01UF,20%,50V	72982	8121N061Z5U0103M
A5C03	283-0154-00			CAP.,FXD,CER DI:22PF,5%,50V	72982	8111B061C0G220J
A5C04	283-0154-00			CAP.,FXD,CER DI:22PF,5%,50V	72982	8111B061C0G220J
A5C05	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A5C06	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A5C07	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A5C08	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A5C09	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
A5C10	290-0973-00			CAP.,FXD,ELCTLT:100UF,20%,25VDC	000FO	SM25VB100M
A5C11	290-0943-00			CAP.,FXD,ELCTLT:47UF,+50-10%,25V	55680	25ULB47V0T
A5C12	290-0943-00			CAP.,FXD,ELCTLT:47UF,+50-10%,25V	55680	25ULB47V0T
A5C13	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C14	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C15	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C16	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C17	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C18	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C19	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C20	285-0901-00			CAP.,FXD,PLSTC:0.047UF,5%,50V	56289	LP66A1AA73J
A5C21	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C22	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5C23	285-0901-00			CAP.,FXD,PLSTC:0.047UF,5%,50V	56289	LP66A1AA73J
A5C24	285-0901-00			CAP.,FXD,PLSTC:0.047UF,5%,50V	56289	LP66A1AA73J
A5C25	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A5DI01	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI02	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI03	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI04	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI05	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI06	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI07	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI08	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5DI09	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A5IC01	156-1088-01			MICROCIRCUIT,DI:8 BIT MICROPROCESSOR	34649	Q 8085A/S4447
A5IC02	118-2900-00			MICROCIRCUIT,DI:PROGRAMMED	54473	PD2732D-XXX
A5IC03	156-1028-01			MICROCIRCUIT,DI:1024 X 4 STATIC RAM W/3 ST	80009	156-1028-01
A5IC04	156-1028-01			MICROCIRCUIT,DI:1024 X 4 STATIC RAM W/3 ST	80009	156-1028-01
A5IC05	156-1570-01			MICROCIRCUIT,DI:PROM PRPHL INTFC,SCRND	34335	AM8255A-5P/DCB
A5IC06	156-1570-01			MICROCIRCUIT,DI:PROM PRPHL INTFC,SCRND	34335	AM8255A-5P/DCB
A5IC07	156-1570-01			MICROCIRCUIT,DI:PROM PRPHL INTFC,SCRND	34335	AM8255A-5P/DCB
A5IC08	156-1250-00			MICROCIRCUIT,DI:OCTAL D-TYPE TRANS LATCHES	01295	SN74S373N
A5IC09	156-0469-02			MICROCIRCUIT,DI:3/8 LINE DCDR	01295	SN74LS138NP3
A5IC10	156-0721-02			MICROCIRCUIT,DI:QUAD 2-IN NAND SCHMITT TR	04713	SN74LS132NDS
A5IC11	156-0645-02			MICROCIRCUIT,DI:HEX INV ST NAND GATES,SCRN	01295	SN74LS14
A5IC12	156-0910-02			MICROCIRCUIT,DI:DUAL DECADE COUNTER	01295	SN74LS390
A5IC13	156-1111-02			MICROCIRCUIT,DI:OCTAL BUS TRANSCEIVERS	01295	SN74LS245JP3
A5IC14	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC15	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC16	118-2913-00			MICROCIRCUIT,DI:CLOCK GEN,8 DIP	54473	1CM72091PA
A5IC17	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A5IC18	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A5IC19	118-2635-00			MICROCIRCUIT,DI:CMOS	54473	MC14562BCP
A5IC20	156-1879-00			MICROCIRCUIT,DI:1-TO-64-BIT VAR LENGTH SHF		
A5IC21	156-0910-02			MICROCIRCUIT,DI:DUAL DECADE COUNTER	01295	SN74LS390
A5IC22	156-1172-01			MICROCIRCUIT,DI:DUAL 4 BIT CNTR,BURN IN	01295	SN74LS393

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A5IC23	156-0875-02			MICROCIRCUIT,DI:DUAL 2-W/2 1NP AOI GATES	01295	SN74LS51
A5IC24	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A5IC25	156-0383-02			MICROCIRCUIT,DI:QUAD 2-INP NOR GATE	01295	SN74LS02
A5IC26	156-0466-02			MICROCIRCUIT,DI:QUAD 2-INP NAND BFR	01295	SN74LS37
A5IC27	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A5IC28	156-0386-02			MICROCIRCUIT,DI:TRIPLE 3-INPUT NAND GATE	01295	SN74LS10
A5IC29	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC30	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC31	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC32	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC33	156-0385-02			MICROCIRCUIT,DI:HEX INVERTER	01295	SN74LS04
A5IC34	156-0094-02			MICROCIRCUIT,DI:DUAL 2-INP NAND DRVR	01295	SN75451
A5IC35	156-0094-02			MICROCIRCUIT,DI:DUAL 2-INP NAND DRVR	01295	SN75451
A5IC36	156-0302-00			MICROCIRCUIT,DI:DUAL 2-INP NAND PRPHL DRVR	01295	SN75452BP
A5IC37	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC38	118-2912-00			MICROCIRCUIT,DI:TTL WN74LS13N,14 DIP	54473	SN741S13N
A5IC39	156-0956-02			MICROCIRCUIT,DI:OCTAL BFR W/3STATE OUT	01295	SN74LS244NP3
A5IC40	156-0411-02			MICROCIRCUIT,LI:QUAD COMPARATOR,SEL	04713	LM339JDS
A5IC41	156-0645-02			MICROCIRCUIT,DI:HEX INV ST NAND GATES,SCRN	01295	SN74LS14
A5IC42	156-0392-03			MICROCIRCUIT,DI:QUAD LATCH W/CLEAR	01295	SN74S175NP3
A5IC43	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A5L01	118-2847-00			COIL,RF:FIXED,125UH,2A	54473	SN-BD-500
A5L02	118-2847-00			COIL,RF:FIXED,125UH,2A	54473	SN-BD-500
A5L03	118-2847-00			COIL,RF:FIXED,125UH,2A	54473	SN-BD-500
A5LED01	118-2648-00			LT EMITTING DIO:	54473	LN235RP
A5LED02	118-2648-00			LT EMITTING DIO:	54473	LN235RP
A5LED03	118-2648-00			LT EMITTING DIO:	54473	LN235RP
A5LED04	118-2648-00			LT EMITTING DIO:	54473	LN235RP
A5LED05	118-2648-00			LT EMITTING DIO:	54473	LN235RP
A5Q01	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A5Q02	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A5Q03	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A5Q04	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A5Q05	118-2647-00			TRANSISTOR:SI 2SA564	54473	2SA564
A5R01	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R02	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
A5R03	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R04	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
A5R05	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A5R06	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R07	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R08	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R09	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R10	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R11	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A5R12	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A5R13	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A5R14	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R15	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R16	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R17	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A5R18	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A5R19	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A5R20	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R21	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R22	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R23	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A5R24	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A5R25	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A5R26	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R27	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R28	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R29	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
A5R30	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A5R31	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A5R32	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R33	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A5R34	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
A5R35	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
A5R36	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
A5R37	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
A5R38	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
A5R39	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A5R40	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A5R41	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
A5R42	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A5R43	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A5R44	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A5R45	301-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.50W	01121	EB1015
A5R46	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A5R47	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A5R48	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A5R49	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A5RB01	118-2639-00			RES NTWK,FXD,FI:3.3K OHM,5%,8 RES	54473	EXBP88332J
A5RB02	118-2638-00			RES NTWK,FXD,FI:6.8K OHM,5%,8 RES	54473	EXBP88682J
A5RB03	307-0651-00			RES NTWK,FXD FI:5,3.3K OHM,5%,0.15W	01121	206A332
A5RB04	118-2606-00			RESISTOR PACK:(9)6.8K OHM,FXD	54473	EXBP85682J
A5RB05	118-2629-00			RES NTWK,FXD,FI:3.3K OHM,5%,4 RES	54473	EXBP84332J
A5RB06	118-2630-00			RES NTWK,FXD,FI:6.8K OHM,5%,4 RES	54473	EXBP84682J
A5RB07	118-2639-00			RES NTWK,FXD,FI:3.3K OHM,5%,8 RES	54473	EXBP88332J
A5RB08	118-2638-00			RES NTWK,FXD,FI:6.8K OHM,5%,8 RES	54473	EXBP88682J
A5RB09	118-2639-00			RES NTWK,FXD,FI:3.3K OHM,5%,8 RES	54473	EXBP88332J
A5RB10	118-2638-00			RES NTWK,FXD,FI:6.8K OHM,5%,8 RES	54473	EXBP88682J
A5RB11	307-0651-00			RES NTWK,FXD FI:5,3.3K OHM,5%,0.15W	01121	206A332
A5RB12	118-2606-00			RESISTOR PACK:(9)6.8K OHM,FXD	54473	EXBP85682J
A5RB13	118-2653-00			RES NTWK,FXD,FI:(6)4.7K OHM,5% EACH	54473	EXBP86472J
A5RB14	118-2654-00			RES NTWK,FXD,FI:(5)330 OHM,5% EA	54473	EXBP85331J
A5RB15	118-2639-00			RES NTWK,FXD,FI:3.3K OHM,5%,8 RES	54473	EXBP88332J
A5RB16	118-2638-00			RES NTWK,FXD,FI:6.8K OHM,5%,8 RES	54473	EXBP88682J
A5T01	118-2650-00			TRANSFORMER:1:1 4691	54473	FP101-103
A5VR01	311-0609-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	73138	82-26-1
A5VR02	311-0609-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	73138	82-26-1
A5VR03	311-0609-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	73138	82-26-1
A5VR04	311-0609-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	73138	82-26-1
A5XTAL	158-0104-00			XTAL UNIT,QTZ:4.433619 MHZ,+/-0.0035%,PRL	80009	158-0104-00
A5ZD1	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	14552	TD3810980

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A6	118-2471-00			CKT BOARD ASSY:DRIVER	54473	EMJ-E82124
A6C01	290-0956-00			CAP.,FXD,ELCTLT:4.7UF,10%,35V	05397	T362B475K035AS
A6C02	290-0956-00			CAP.,FXD,ELCTLT:4.7UF,10%,35V	05397	T362B475K035AS
A6C03	118-2604-00			CAP.,FXD,CER DI:6800UF,10%,50V	54473	ECKF1H682KB
A6C04	283-0144-00			CAP.,FXD,CER DI:33PF,1%,500V	72982	801-547P2G330G
A6C05	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591-Y5E0102
A6C06	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591-Y5E0102
A6C07	285-1189-00			CAP.,FXD,MTLZD:0.1UF,5%,100V	99392	C280MAH/J100K
A6C08	118-2602-00			CAP.,FXD,PLASTIC:1UF,5%,100V	54473	ECQE1105JN
A6C09	118-2601-00			CAP.,FXD,PLASTIC:100UF,5%,125V	54473	ECQ51101JZ
A6C10	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591-Y5E0102
A6C11	283-0119-00			CAP.,FXD,CER DI:2200PF,5%,200V	59660	855-536Y5E0222J
A6C12	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591-Y5E0102
A6C13	283-0119-00			CAP.,FXD,CER DI:2200PF,5%,200V	59660	855-536Y5E0222J
A6C14	118-2600-00			CAP.,FXD,ELCTLT:220UF,20%,50V	54473	ECEA1HS5221
A6C15	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	91418	DM1040ZCAA65
A6C16	283-0081-00			CAP.,FXD,CER DI:0.1UF,+80-20%,25V	91418	DM1040ZCAA65
A6C17	118-2599-00			CAP.,FXD,PLASTIC:1000UF,5%125V	54473	ECQS1102JZ
A6C18	118-2598-00			CAP.,FXD,PLASTIC:0.01UF,5%,125V	54473	ECQS1103JZ
A6C19	118-2601-00			CAP.,FXD,PLASTIC:100UF,5%,125V	54473	ECQS1101JZ
A6C20	118-2597-00			CAP.,FXD,PLASTIC:220PF,5%,125V	54473	ECQS1221JZ
A6C21	118-2603-00			CAP.,FXD,ELCTLT:22UF,20%,100V	54473	ECEA2AS220
A6C22	118-2603-00			CAP.,FXD,ELCTLT:22UF,20%,100V	54473	ECEA2AS220
A6C23	118-2595-00			CAP.,FXD,PLASTIC-0.015UF,5%,50V	54473	ECQM1H154JV
A6C24	290-0755-00			CAP.,FXD,ELCTLT:100UF,+50-10%,10V	56289	502D223
A6C25	118-2595-00			CAP.,FXD,PLASTIC-0.015UF,5%,50V	54473	ECQM1H154JV
A6C26	290-0943-00			CAP.,FXD,ELCTLT:47UF,+50-10%,25V	55680	25ULB47V0T
A6C27	118-2595-00			CAP.,FXD,PLASTIC-0.015UF,5%,50V	54473	ECQM1H154JV
A6C28	290-0943-00			CAP.,FXD,ELCTLT:47UF,+50-10%,25V	55680	25ULB47V0T
A6C29	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A6C30	290-0974-00			CAP.,FXD,ELCTLT:10UF,20%,50VDC	55680	ULB1H100M
A6C31	283-0119-00			CAP.,FXD,CER DI:2200PF,5%,200V	59660	855-536Y5E0222J
A6C32	283-0119-00			CAP.,FXD,CER DI:2200PF,5%,200V	59660	855-536Y5E0222J
A6C33	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A6C34	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A6C35	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A6C36	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A6C37	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A6C38	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C39	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C40	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C41	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C42	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C43	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C44	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C45	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C46	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C47	118-2594-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A6C48	118-2595-00			CAP.,FXD,PLASTIC:0.015UF,5%,50V	54473	ECQM1H154JV
A6D01	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D02	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D03	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D04	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D05	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D06	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D07	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D08	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A6D09	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D10	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D11	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D12	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D13	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D14	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D15	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D16	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D17	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D18	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A6D19	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D20	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D21	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D22	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D23	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D24	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D25	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6D26	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	IS2762
A6D27	152-0398-00			SEMICOND DEVICE:SILICON,200V,1A	04713	SR3609RL
A6F01	118-2905-00			FUSE,CARTRIDGE:3A,125V,FAST BLOW	54473	ULCS-61ML-3
A6F02	118-2906-00			FUSE,CARTRIDGE:4A,125V,FAST BLOW	54473	ULCS-61ML-4
A6F03	118-2907-00			FUSE,CARTRIDGE:2A,125V,FAST BLOW	54473	ULCS-61ML-2
A6IC01	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A6IC02	156-0388-03			MICROCIRCUIT,DI:DUAL D FLIP-FLOP	07263	74LS74A
A6IC03	156-1172-01			MICROCIRCUIT,DI:DUAL 4 BIT CNTR,BURN IN	01295	SN74LS393
A6IC04	156-0982-03			MICROCIRCUIT,DI:OCTAL-D-EDGE FF,SCRN	07263	74LS374
A6IC05	118-2844-00			MICROCIRCUIT,DI:8-BIT DIA CONVERTER	54473	MC3408L
A6IC06	118-2845-00			MICROCIRCUIT,DI:PROM	54473	N82S123N-A
A6IC07	156-0645-02			MICROCIRCUIT,DI:HEX INV ST NAND GATES,SCRN	01295	SN74LS14
A6IC08	156-0382-02			MICROCIRCUIT,DI:QUAD 2-INP NAND GATE	01295	SN74LS00
A6IC09	156-0465-02			MICROCIRCUIT,DI:8 INP NAND GATE	01295	SN74LS30NP3
A6IC10	156-0645-02			MICROCIRCUIT,DI:HEX INV ST NAND GATES,SCRN	01295	SN74LS14
A6IC11	156-0875-02			MICROCIRCUIT,DI:DUAL 2-W/2 INP AOI GATES	01295	SN74LS51
A6IC12	156-1172-00			MICROCIRCUIT,DI:DUAL 4 BIT BIN CNTR	80009	156-1172-00
A6IC13	156-0982-03			MICROCIRCUIT,DI:OCTAL-D-EDGE FF,SCRN	07263	74LS374
A6IC14	118-2844-00			MICROCIRCUIT,DI:8-BIT DIA CONVERTER	54473	MC3408L
A6IC15	156-0481-02			MICROCIRCUIT,DI:TRIPLE 3 INP & GATE	27014	DM74LS11NA+
A6IC16	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A6IC17	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A6IC18	118-2626-00			MICROCIRCUIT,DI:CMOS	54473	MC14052BCP
A6IC19	118-2627-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	54473	MC4558CP1
A6IC20	156-0914-02			MICROCIRCUIT,DI:OCT ST BFR W/3 STATE OUT	01295	SN74LS240
A6IC21	156-1080-00			MICROCIRCUIT,DI:HEX BUFFERS W/OC HV OUT	01295	SN7407N OR J
A6IC22	118-2625-00			MICROCIRCUIT,LI:TIMER	54473	MC1455P1
A6IC23	156-0422-02			MICROCIRCUIT,DI:UP/DOWN SYN BINARY CNTR	01295	SN74LS191
A6IC24	118-2845-00			MICROCIRIT,DI:PROM	54473	N825123N-B
A6IC25	156-0724-02			MICROCIRCUIT,DI:HEX INV W/OC OUT,BURN-IN	01295	SN74LS05
A6IC26	118-2628-00			MICROCIRCUIT,LI:STEPPING MOTOR CONTROLLER	54473	MC5221
A6IC27	118-2624-00			MICROCIRCUIT,LI:STEPPING MOTOR DRIVER	54473	S1-7200G
A6L1	118-2847-00			COIL,RF:FIXED,125UH,2A	54473	SN-8D-500
A6L2	118-2847-00			COIL,RF:FIXED,125UH,2A	54473	SN-8D-500
A6L3	118-2847-00			COIL,RF:FIXED,125UH,2A	54473	SN-8D-500
A6Q01	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q02	118-2623-00			TRANSISTOR:NPN,SILICON	54473	2SD571
A6Q03	118-2623-00			TRANSISTOR:NPN,SILICON	54473	2SD571
A6Q04	118-2622-00			TRANSISTOR:PNP,SILICON	54473	2SB605
A6Q05	118-2621-00			TRANSISTOR:NPN,SILICON	54473	2SD588

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A6Q06	118-2620-00			TRANSISTOR:PNP,SILICON	54473	2SB618
A6Q07	118-2621-00			TRANSISTOR:NPN,SILICON	54473	2SD588
A6Q08	118-2620-00			TRANSISTOR:PNP,SILICON	54473	2SB618
A6Q09	118-2623-00			TRANSISTOR:NPN,SILICON	54473	2SD571
A6Q10	118-2622-00			TRANSISTOR:PNP,SILICON	54473	2SB605
A6Q11	118-2623-00			TRANSISTOR:NPN,SILICON	54473	2SD571
A6Q12	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q13	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A6Q14	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q15	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A6Q16	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A6Q17	151-0405-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
A6Q18	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q19	151-0405-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
A6Q20	151-0429-00			TRANSISTOR:SILICON,PNP	04713	SJE957
A6Q21	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q22	151-0405-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
A6Q23	151-0429-00			TRANSISTOR:SILICON,PNP	04713	SJE957
A6Q24	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q25	151-0405-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE800	04713	SJE943
A6Q26	151-0429-00			TRANSISTOR:SILICON,PNP	04713	SJE957
A6Q27	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6Q28	118-2618-00			TRANSISTOR:PNP,SILICON	54473	TIP127
A6Q29	118-2617-00			TRANSISTOR:NPN,SILICON	54473	TIP122
A6Q30	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A6R01	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A6R02	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
A6R03	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A6R04	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A6R05	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A6R06	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
A6R07	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
A6R08	321-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.125W	91637	MFF1816G24900F
A6R09	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R10	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
A6R11	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R12	321-0325-00			RES.,FXD,FILM:23.7K OHM,1%,0.125W	91637	MFF1816G23701F
A6R13	321-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.125W	91637	MFF1816G24900F
A6R14	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R15	321-0271-00			RES.,FXD,FILM:6.49K OHM,1%,0.125W	91637	MFF1816G64900F
A6R16	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A6R17	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A6R18	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A6R19	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
A6R20	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
A6R21	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A6R22	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
A6R23	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R24	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
A6R25	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A6R26	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R27	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R28	321-0323-00			RES.,FXD,FILM:22.6K OHM,1%,0.125W	91637	MFF1816G22601F
A6R29	305-0681-00			RES.,FXD,CMPSN:680 OHM,5%,2W	01121	HB6815
A6R30	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
A6R31	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A6R32	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A6R33	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A6R34	118-2616-00			RESISTOR:0.27 OHM,10%,3W	54473	ERF3SKR27
A6R35	118-2616-00			RESISTOR:0.27 OHM,10%,3W	54473	ERF3SKR27
A6R36	118-2616-00			RESISTOR:0.27 OHM,10%,3W	54473	ERF3SKR27
A6R37	118-2616-00			RESISTOR:0.27 OHM,10%,3W	54473	ERF3SKR27
A6R38	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A6R39	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A6R40	305-0681-00			RES.,FXD,CMPSN:680 OHM,5%,2W	01121	HB6815
A6R41	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
A6R42	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A6R43	118-2615-00			RESISTOR:5.11K OHM,0.1%,0.25W	54473	ERNSBSB5111
A6R44	321-0193-07			RES.,FXD,FILM:1K OHM,0.1%,0.125W	91637	MFF1816C10000B
A6R45	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R46	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R47	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R48	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R49	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R50	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A6R51	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
A6R52	118-2615-00			RESISTOR:5.11K OHM,0.1%,0.25W	54473	ERNSBSB5111
A6R53	321-0193-07			RES.,FXD,FILM:1K OHM,0.1%,0.125W	91637	MFF1816C10000B
A6R54	118-2614-00			RES.,FXD,WW:0.47 OHM,10%,5W	54473	ERF5SKR47
A6R55	321-0168-00			RES.,FXD,FILM:549 OHM,1%,0.125W	91637	MFF1816G549R0F
A6R56	118-2615-00			RESISTOR:5.11K OHM,0.1%,0.25W	54473	ERO25CKF5111
A6R57	321-0164-00			RES.,FXD,FILM:499 OHM,1%,0.125W	91637	MFF1816G499R0F
A6R58	118-2613-00			RES.,FXD,FILM:27.4K OHM,1%,0.25W	54473	ERNSBSB2742
A6R59	118-2613-00			RES.,FXD,FILM:27.4K OHM,1%,0.25W	54473	ERNSBSB2742
A6R60	118-2613-00			RES.,FXD,FILM:27.4K OHM,1%,0.25W	54473	ERNSBSB2742
A6R61	118-2613-00			RES.,FXD,FILM:27.4K OHM,1%,0.25W	54473	ERNSBSB2742
A6R62	118-2612-00			RES.,FXD,FILM:221K OHM,1%,0.25W	54473	ERNSBSB2213
A6R63	118-2612-00			RES.,FXD,FILM:221K OHM,1%,0.25W	54473	ERNSBSB2213
A6R64	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R65	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A6R66	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
A6R67	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R68	118-2611-00			RES.,FXD,FILM:4.7 OHM,5%,1W	54473	ERQ1CJ4R7
A6R69	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A6R70	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R71	118-2610-00			RES.,VAR,FILM:1.2K OHM,5%,1W	54473	ERD1ANJ122
A6R72	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A6R73	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R74	118-2610-00			RES.,VAR,FILM:1.2K OHM,5%,1W	54473	ERD1ANJ122
A6R75	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A6R76	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R77	118-2610-00			RES.,VAR,FILM:1.2K OHM,5%,1W	54473	ERD1ANJ122
A6R78	118-2609-00			RES.,FXD,FILM:8.2 OHM,5%,1W	54473	ERQ1CJ8R2
A6R79	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
A6R80	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R81	118-2610-00			RES.,VAR,FILM:1.2K OHM,5%,1W	54473	ERD1ANJ122
A6R82	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A6R83	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R84	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A6R85	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
A6R86	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
A6R87	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
A6R88	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
A6R89	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A6R90	118-2608-00			RES.,FXD,WW:1.5 OHM,5%,2W	54473	ERX2ANJ1R5
A6R91	118-2608-00			RES.,FXD,WW:1.5 OHM,5%,2W	54473	ERX2ANJ1R5
A6R92	303-0221-00			RES.,FXD,CMPSN:220 OHM,5%,1W	01121	GB2215
A6R93	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A6R94	118-2609-00			RES.,FXD,FILM:8.2 OHM,5%,1W	54473	ERQ1CJ8R2
A6RB01	118-2639-00			RES NTWK,FXD,FI:3.3K OHM,5%,8 RES	54473	EXBP88332J
A6RB02	118-2638-00			RES NTWK,FXD,FI:6.8K OHM,5%,8 RES	54473	EXBP88682J
A6RB03	307-0651-00			RES NTWK,FXD FI:5,3.3K OHM,5%,0.15W	01121	206A332
A6RB04	118-2606-00			RESISTOR PACK:(9)6.8K OHM,FXD	54473	EXBP85682J
A6ZD01	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	14552	TD3810980
A6ZD02	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	14552	TD3810980
A6ZD03	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	14552	TD3810980

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A15	118-2475-00			CKT BOARD ASSY:FRONT PANEL INDICATOR	54473	EMJ-E82127
A15C01	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A15C02	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
A15C03	118-2656-00			CAP.,FXD,PLASTIC:	54473	ECQEM1H223KZ
A15C04	118-2602-00			CAP.,FXD,ELCTLT:1UF,5%,100V	54473	ECQE1105JN
A15IC1	118-2652-00			TRANSISTOR:ARRAY	54473	PA2003C
A15IC2	156-0383-02			MICROCIRCUIT,DI:QUAD 2-INP NOR GATE	01295	SN74LS02
A15IC3	156-0383-02			MICROCIRCUIT,DI:QUAD 2-INP NOR GATE	01295	SN74LS02
A15IC4	118-2655-00			MICROCIRCUIT,DI:TIMER,UPC 1555C	54473	PC1555C
A15LED01	118-2651-00			LT EMITTING DIO:	54473	LN81RCPHL
A15LED02	118-2651-00			LT EMITTING DIO:	54473	LN81RCPHL
A15LED03	118-2651-00			LT EMITTING DIO:	54473	LN81RCPHL
A15LED04	118-2651-00			LT EMITTING DIO:	54473	LN81RCPHL
A15LED05	118-2651-00			LT EMITTING DIO:	54473	LN81RCPHL
A15R01	307-0651-00			RES NTWK,FXD FI:5,3.3K OHM,5%,0.15W	01121	206A332
A15R02	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A15R03	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A15R04	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A15R05	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A15R06	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A15R07	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A15R08	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A16	----- -----			(REPLACEABLE WITH 118-2586-00,FIG 3-54)		
A16IC1	156-1373-01			MICROCIRCUIT,DI:QUAD BUS BFR GATES W/3	01295	SN74LS125N3
A16LED01	118-2649-00			LT EMITTING DIO:	54473	BR5504S
A16LED02	118-2649-00			LT EMITTING DIO:	54473	BR5504S
A16LED03	118-2649-00			LT EMITTING DIO:	54473	BR5504S
A16LED04	118-2649-00			LT EMITTING DIO:	54473	BR5504S
A16R01	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A16R02	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A16R03	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A16R04	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A16R05	307-0651-00			RES NTWK,FXD FI:5,3.3K OHM,5%,0.15W	01121	206A332

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A17	118-2874-00			POWER SUPPLY:	54473	EMJ-MM8210809
A17A1	118-2474-00			CKT BOARD ASSY:LOW VOLTAGE REGULATOR	54473	EMJ-E82121
A17A1C01	118-2670-00			CAP.,FXD,ELCTLT:22000UF,+30-10%,25V	54473	ECET25R223L
A17A1C02	118-2670-00			CAP.,FXD,ELCTLT:22000UF,+30-10%,25V	54473	ECET25R223L
A17A1C03	118-2670-00			CAP.,FXD,ELCTLT:22000UF,+30-10%,25V	54473	ECET25R223L
A17A1C04	118-2672-00			CAP.,FXD,ELCTLT:6800UF,+30-10%,35V	54473	ECET35R682SW
A17A1C05	118-2672-00			CAP.,FXD,ELCTLT:6800UF,+30-10%,35V	54473	ECET35R682SW
A17A1C06	118-2671-00			CAP.,FXD,ELCTLT:10000UF,+30-10%,25V	54473	ECET25R103SW
A17A1C07	118-2673-00			CAP.,FXD,ELCTLT:22000UF,+30-10%,50V	54473	ECET50R223L
A17A1C08	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
A17A1C09	118-2674-00			CAP.,FXD,PLASTIC:0.1UF,5%,50V	54473	ECQM1H104JZ
A17A1C10	118-2675-00			CAP.,FXD,CER DI:47PF,5%,50V	54473	ECCF1H470J
A17A1C11	118-2846-00			CAP.,FXD,ELCTLT:1000UF,20%,16V	54473	ECEB1CS102
A17A1C12	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
A17A1C13	118-2674-00			CAP.,FXD,PLASTIC:0.1UF,5%,50V	54473	ECQM1H104JZ
A17A1C14	118-2675-00			CAP.,FXD,CER DI:47PF,5%,50V	54473	ECCF1H470J
A17A1C15	118-2676-00			CAP.,FXD,ELCTLT:330UF,20%,25V	54473	ECEB1ES331
A17A1C16	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
A17A1C17	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	59660	0835-591-Y5E0102
A17A1C18	118-2676-00			CAP.,FXD,ELCTLT:330UF,20%,25V	54473	ECEB1ES331
A17A1C19	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
A17A1C20	118-2674-00			CAP.,FXD,PLASTIC:0.1UF,5%,50V	54473	ECQM1H104JZ
A17A1C21	118-2675-00			CAP.,FXD,CER DI:47PF,5%,50V	54473	ECCF1H470J
A17A1C22	118-2677-00			CAP.,FXD,ELCTLT:470UF,20%,10V	54473	ECEB1CS471
A17A1C23	118-2678-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A17A1C24	118-2678-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A17A1C25	118-2678-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A17A1C26	118-2678-00			CAP.,FXD,PLASTIC:0.022UF,5%,50V	54473	ECQM1H223JZ
A17A1C27	118-2679-00			CAP.,FXD,ELCTLT:220UF,20%,35V	54473	ECEB1VS221
A17A1C28	283-0119-00			CAP.,FXD,CER DI:2200PF,5%,200V	59660	855-536Y5E0222J
A17A1D01	118-2680-00			SEMICOND,DVC DI:BRIDGE,200V,10A	54473	S10VB20
A17A1D02	118-2680-00			SEMICOND,DVC DI:BRIDGE,200V,10A	54473	S10VB20
A17A1D03	118-2680-00			SEMICOND,DVC DI:BRIDGE,200V,10A	54473	S10VB20
A17A1D04	118-2680-00			SEMICOND,DVC DI:BRIDGE,200V,10A	54473	S10VB20
A17A1D05	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D06	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D07	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D08	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D09	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D10	118-2682-00			SEMICOND DVC,DI:ZENER,0.5W	54473	RD5-6EB3
A17A1D11	118-2683-00			SEMICOND DVC,DI:ZENER,0.5W	54473	RD15EB1
A17A1D12	118-2683-00			SEMICOND DVC,DI:ZENER,0.5W	54473	RD15EB1
A17A1D13	118-2684-00			SEMICOND DVC,DI:ZENER,0.5W	54473	RD91EB1
A17A1D14	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D15	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D16	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D17	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D18	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1D20	118-2681-00			SEMICOND DVC,DI:POWER,SI,200V,3A	54473	1S2762
A17A1F02	118-2916-00			FUSE,CARTRIDGE:10A,125V,FAST BLOW	54473	GGL-10
A17A1F03	118-2905-00			FUSE,CARTRIDGE:3A,125V,FAST BLOW	54473	ULCS-61ML-3
A17A1F04	118-2905-00			FUSE,CARTRIDGE:3A,125V,FAST BLOW	54473	ULCS-61ML-3
A17A1F05	118-2905-00			FUSE,CARTRIDGE:3A,125V,FAST BLOW	54473	ULCS-61ML-3
A17A1F06	118-2916-00			FUSE,CARTRIDGE:10A,125V,FAST BLOW	54473	GGL-10
A17A1F07	159-0016-00			FUSE,CARTRIDGE:3AG,1.5A,250V,FAST-BLOW	71400	AGC 1 1/2
A17A1F08	159-0083-00			FUSE,CARTRIDGE:0.15A,250V,FAST-BLOW	71400	AGC 15/100
A17A1IC01	118-2668-00			RGLTR,VOLTAGE:	54473	UPC141C

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A17A1IC02	118-2668-00			RGLTR,VOLTAGE:	54473	UPC141C
A17A1IC03	118-2669-00			RGLTR,VOLTAGE:	54473	UPC142A
A17A1IC04	118-2668-00			RGLTR,VOLTAGE:	54473	UPC141C
A17A1IC05	118-2685-00			RGLTR,VOTAGE:24V,1A,AN7824	54473	AN7824
A17A1Q01	118-2666-00			THYRISTOR:PNP,SILICON	54473	2SB621
A17A1Q02	118-2664-00			TRANSISTOR:NPN,SILICON	54473	2SD857
A17A1Q03	118-2705-00			TRANSISTOR:NPN,SI	54473	2SC2486
A17A1Q04	118-2705-00			TRANSISTOR:NPN,SI	54473	2SC2486
A17A1Q05	118-2705-00			TRANSISTOR:NPN,SI	54473	2SC2486
A17A1Q06	118-2704-00			TRANSISTOR:PNP,SI	54473	2SB762
A17A1Q07	118-2705-00			TRANSISTOR:NPN,SI	54473	2SC2486
A17A1Q08	118-2704-00			TRANSISTOR:PNP,SI	54473	2SB762
A17A1Q09	118-2705-00			TRANSISTOR:NPN,SI	54473	2SC2486
A17A1Q10	118-2666-00			THYRISTOR:PNP,SILICON	54473	2SB621
A17A1Q11	118-2704-00			TRANSISTOR:PNP,SI	54473	2SB762
A17A1Q12	118-2705-00			TRANSISTOR:NPN,SI	54473	2SC2486
A17A1Q13	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A17A1Q14	118-2665-00			THYRISTOR:8A,200V	54473	8P2M
A17A1Q15	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A17A1Q16	118-2665-00			THYRISTOR:8A,200V	54473	8P2M
A17A1Q17	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A17A1Q18	118-2665-00			THYRISTOR:8A,200V	54473	8P2M
A17A1Q19	118-2619-00			TRANSISTOR:PNP,SILICON	54473	2SA733
A17A1Q20	118-2665-00			THYRISTOR:8A,200V	54473	8P2M
A17A1R01	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A1R02	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R03	118-2703-00			RES.,FXD,FILM:0.47 OHM,10%,5W	54473	ERF5SKR47
A17A1R04	118-2703-00			RES.,FXD,FILM:0.47 OHM,10%,5W	54473	ERF5SKR47
A17A1R05	118-2703-00			RES.,FXD,FILM:0.47 OHM,10%,5W	54473	ERF5SKR47
A17A1R06	118-2686-00			RES.,FXD,FILM:34.8 OHM,2%,0.25W	54473	ERD25TG34R8
A17A1R07	118-2697-00			RES.,FXD,FILM:215 OHM,2%,0.25W	54473	ERD25TG2150
A17A1R08	322-0257-00			RES.,FXD,FILM:4.64K OHM,1%,0.25W	75042	CEBT0-4641F
A17A1R09	118-2698-00			RES.,FXD,FILM:2.15K OHM,2%,0.25W	54473	ERD25TG2151
A17A1R10	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R11	118-2699-00			RES.,FXD,FILM:42.2 OHM,2%,0.25W	54473	ERD25TG42R2
A17A1R12	118-2700-00			RES.,FXD,FILM:562 OHM,2%,0.25W	54473	ERD50TG5620
A17A1R13	118-2702-00			RES.,FXD,FILM:0.82 OHM,10%,3W	54473	ERF3AKR82
A17A1R14	118-2689-00			RES.,FXD,FILM:13.3K OHM,2%,0.25W	54473	ERD25TG1332
A17A1R15	118-2696-00			RES.,FXD,FILM:1.87K OHM,2%,0.25W	54473	ERD25TG1871
A17A1R16	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R17	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
A17A1R18	118-2695-00			RES.,FXD,FILM:2.37K OHM,2%,0.25W	54473	ERD25TG2371
A17A1R19	118-2694-00			RES.,FXD,FILM:5.11K OHM,2%,0.25W	54473	ERD25TG5111
A17A1R20	118-2693-00			RES.,FXD,FILM:27.4 OHM,2%,0.25W	54473	ERD25TG27R4
A17A1R21	118-2692-00			RES.,FXD,FILM:430 OHM,5%,0.5W	54473	ERD50TJ431
A17A1R22	118-2702-00			RES.,FXD,WW:0.82 OHM,10%,3W	54473	ERF3AKR82
A17A1R23	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R24	118-2691-00			RES.,FXD,FILM:22.6 OHM,2%,0.25W	54473	ERD25TG22R6
A17A1R25	118-2690-00			RES.,FXD,FILM:332 OHM,2%,0.25W	54473	ERD25TG3320
A17A1R26	118-2701-00			RES.,FXD,WW:0.56 OHM,10%,3W	54473	ERF3AKR56
A17A1R27	118-2688-00			RES.,FXD,FILM:7.87K OHM,2%,0.25W	54473	ERD25TG7871
A17A1R28	118-2698-00			RES.,FXD,FILM:2.15K OHM,2%,0.25W	54473	ERD25TG2151
A17A1R29	118-2687-00			RES.,FXD,FILM:680 OHM,5%,3W	54473	ERG3CJ681
A17A1R30	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R31	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R32	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R33	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A17A1R34	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R35	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R36	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
A17A1R37	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A1R38	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R39	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R40	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
A17A1R41	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A1R42	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R43	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A1R44	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
A17A1R45	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A1RL	118-2667-00			RELAY,ARMATURE:6VDC,COIL,2T	54473	AP5420
A17A1VR01	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.5%,0.5W	73138	82P-6-2-102K
A17A1VR02	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.5%,0.5W	73138	82P-6-2-102K
A17A1VR03	311-0609-00			RES.,VAR,NONWIR:2K OHM,10%,0.50W	73138	82-26-1
A17A1VR04	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.5%,0.5W	73138	82P-6-2-102K

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A17A2	118-2490-00			SWITCH ASSY:AC POWER,W/CKT BOARD	54473	EMJ-E82130
A17A2C01	290-0943-00			CAP.,FXD,ELCTLT:47UF,+50-10%,25V	55680	25ULB47V0T
A17A2C02	118-2657-00			CAP.,FXD,ELCTLT:22UF,+30-10%,500V	54473	ECEB2HS220
A17A2C03	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	59660	871-533E103P
A17A2C04	118-2658-00			CAP.,FXD,ELCTLT:10UF,+30-10%,250V	54473	ECEA2ES100
A17A2C05	118-2658-00			CAP.,FXD,ELCTLT:10UF,+30-10%,250V	54473	ECEA2ES100
A17A2C06	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	59660	871-533E103P
A17A2C07	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	59660	871-533E103P
A17A2CN23	118-2917-00			TERM SET,PIN:2 PIN,MALE	54473	RTB-1.5-2
A17A2CN24	118-2918-00			TERM SET,PIN:5 PIN,MALE	54473	RTB-1.5-5
A17A2CN25	118-2919-00			TERM SET,PIN:4 PIN,MALE	54473	RTB-1.5-4
A17A2CN28	118-2921-00			TERM SET,PIN:3 PIN,MALE	54473	RTB-1.5-3
A17A2CN29	118-2920-00			TERM SET,PIN:4 PIN,MALE,WHITE PLASTIC	54473	B4P-SHF-1AA
A17A2CN30	118-2918-00			TERM SET,PIN:5 PIN,MALE	54473	RTB-1.5-5
A17A2CR01	118-2663-00			SPARK,GAP:SPARK QUENCHING CONDENSER	54473	ECQJ0186A
A17A2CR02	118-2663-00			SPARK,GAP:SPARK QUENCHING CONDENSER	54473	ECQJ0186A
A17A2CR03	118-2663-00			SPARK,GAP:SPARK QUENCHING CONDENSER	54473	ECQJ0186A
A17A2D01	118-2659-00			SEMICOND DVC,DI:800V,1A	54473	F14H
A17A2D02	118-2659-00			SEMICOND DVC,DI:800V,1A	54473	F14H
A17A2D03	118-2659-00			SEMICOND DVC,DI:800V,1A	54473	F14H
A17A2D04	118-2659-00			SEMICOND DVC,DI:800V,1A	54473	F14H
A17A2D05	118-2659-00			SEMICOND DVC,DI:800V,1A	54473	F14H
A17A2D06	118-2659-00			SEMICOND DVC,DI:800V,1A	54473	F14H
A17A2D07	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A17A2D08	118-2660-00			SEMICOND DVC,DI:ZENER,24V,5%,0.5W	54473	RD24EB
A17A2D09	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A17A2D10	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A17A2D11	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A17A2D12	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D13	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D14	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D15	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D16	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A17A2D17	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D18	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D19	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D20	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D21	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	07263	FDH-6012
A17A2D22	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D23	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D24	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D25	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D26	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2D27	118-2662-00			SEMICOND DVC,DI:200V,1A	54473	F14B
A17A2PC01	118-2661-00			OPT ISOLATOR:	54473	PS1001
A17A2PC02	118-2661-00			OPT ISOLATOR:	54473	PS1001
A17A2PC03	118-2661-00			OPT ISOLATOR:	54473	PS1001
A17A2Q01	118-2566-00			TRANSISTOR:NPN,SI	54473	2SD458
A17A2Q02	118-2646-00			TRANSISTOR:NPN,SI	54473	2SC1501
A17A2Q03	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A17A2Q04	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A17A2Q05	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A17A2Q06	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A17A2Q07	118-2641-00			THYRISTOR:SCR,300MA,200V	54473	03P2M
A17A2Q08	118-2642-00			THYRISTOR:TRIAC,3A,200V	54473	AC03BGM-L
A17A2Q09	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A17A2Q10	118-2641-00			THYRISTOR:SCR,300MA,200V	54473	03P2M

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A17A2Q11	118-2642-00			THYRISTOR:TRIAC,3A,200V	54473	AC03BGM-L
A17A2Q12	151-0736-00			TRANSISTOR:SILICON,NPN	04713	SPS8317
A17A2Q13	118-2641-00			THYRISTOR:SCR,300MA,200V	54473	03P2M
A17A2Q14	118-2642-00			THYRISTOR:TRIAC,3A,200V	54473	AC03BGM-L
A17A2R01	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A2R02	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A17A2R03	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A17A2R04	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
A17A2R05	301-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.50W	01121	EB2205
A17A2R06	301-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.50W	01121	EB1835
A17A2R07	301-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.50W	01121	EB2245
A17A2R08	301-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.50W	01121	EB2245
A17A2R09	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
A17A2R10	315-0394-00			RES.,FXD,CMPSN:390K OHM,5%,0.25W	01121	CB3945
A17A2R11	303-0270-00			RES.,FXD,CMPSN:27 OHM,5%,1W	01121	GB2705
A17A2R12	303-0390-00			RES.,FXD,CMPSN:39 OHM,5%,1W	01121	GB3905
A17A2R13	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A2R14	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
A17A2R15	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A17A2R16	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
A17A2R17	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A17A2R18	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A2R19	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A2R20	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
A17A2R21	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A17A2R22	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
A17A2R23	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A17A2R24	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A2R25	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A17A2R26	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
A17A2R27	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A17A2R28	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
A17A2R29	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
A17A2R30	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A17A2VR01	311-0644-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W	73138	82-34-1

Component No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				CHASSIS PARTS		
B1001	118-2561-00			FAN:COOLING	54473	FB12A24A
B1003	118-2453-00			MOTOR:MAIN	54473	SSQ-996C
B1005	118-2584-00			AIR PUMP:CAP	54473	EMJ-017905PU
B1007	118-2469-00			FAN:SUCTION	54473	2RCB-20A
B1009	118-2546-00			MOTOR,DC:0.1 HP,24V	54473	EMJ-ZTG8N
B1011	118-2452-00			MOTOR:PAPER STRIP	54473	EMJ-MA8210702
B1013	118-2477-00			PUMP:HEAD CLEANING	54473	EMJ-MA8210602
B1015	118-2454-00			MOTOR:STEPPING	54473	EMJ-Z2SH04A46
L1001	118-2877-00			SOLENOID ASSY:WITH HARDWARE	54473	EMJ-MM8210409
S1000	118-2489-00			SWITCH:PUMP,SERVICE W/HARDWARE	54473	EMJ-MA8210807
S5001	118-2428-00			SWITCH,POWER:AC,YELLOW	54473	ESB-70272T
S5003	118-2424-00			SWITCH:STOP	54473	EB-2011-98G

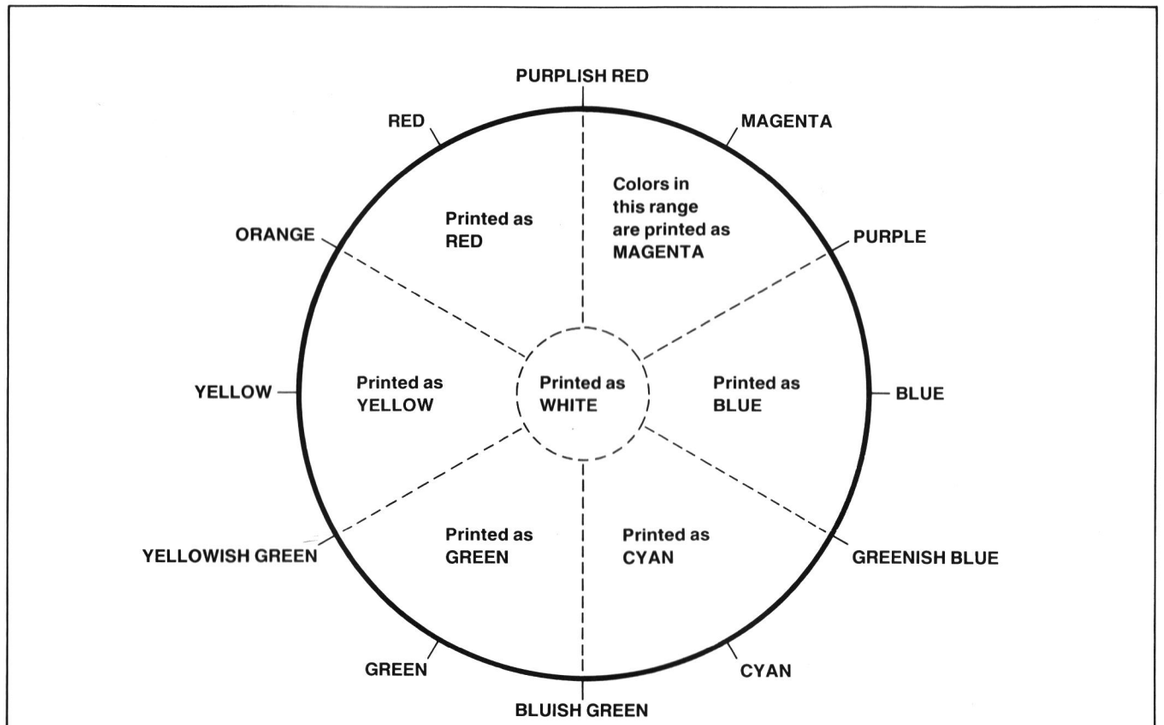


Figure 13-11. Tektronix Color Wheel.

SCHEMATICS

Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

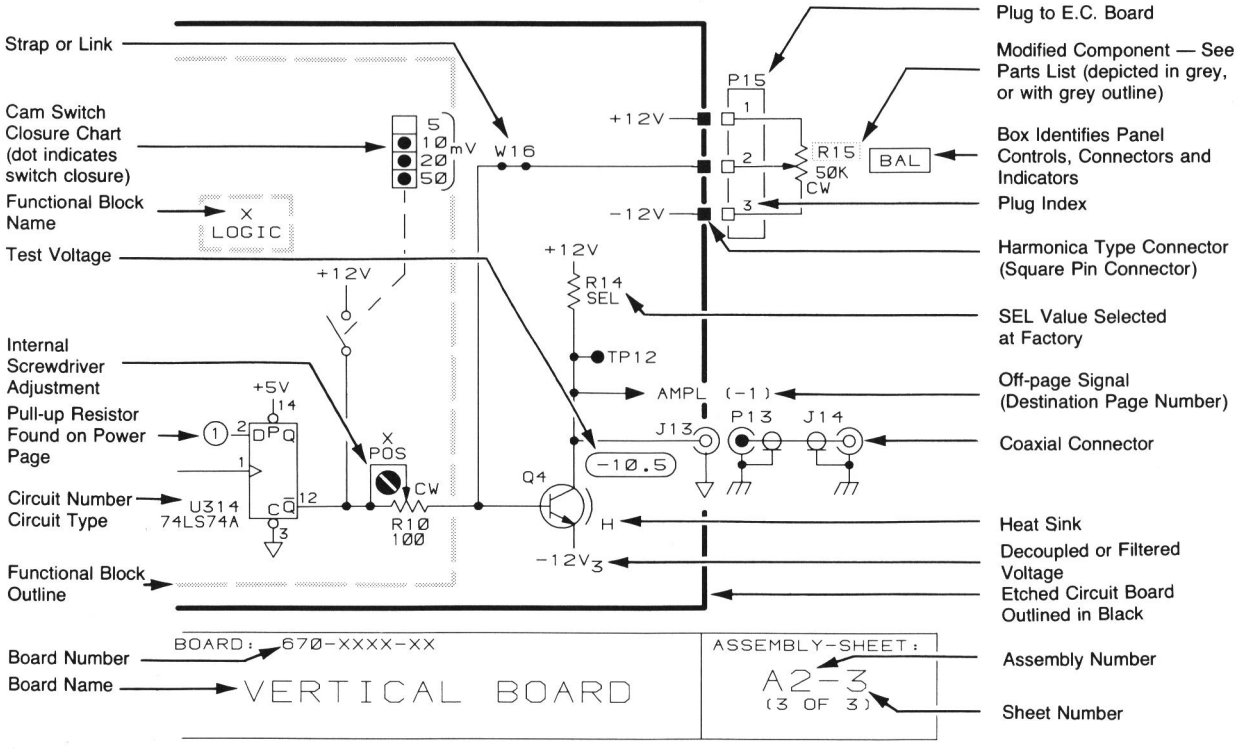
Abbreviations are based on ANSI Y1.1-1972. Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc., are:

Y14.15, 1966	Drafting Practices.
Y14.2, 1973	Line Conventions and Lettering.
Y10.5, 1968	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)	H	Heat dissipating device (heat sink, heat radiator, etc.)	S	Switch or contactor
AT	Attenuator, fixed or variable	HR	Heater	T	Transformer
B	Motor	HY	Hybrid circuit	TC	Thermocouple
BT	Battery	J	Connector, stationary portion	TP	Test point
C	Capacitor, fixed or variable	K	Relay	U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
CB	Circuit breaker	L	Inductor, fixed or variable	V	Electron tube
CR	Diode, signal or rectifier	M	Meter	VR	Voltage regulator (zener diode, etc.)
DL	Delay line	P	Connector, movable portion	W	Wirestrap or cable
DS	Indicating device (lamp)	Q	Transistor or silicon-controlled rectifier	Y	Crystal
E	Spark Gap, Ferrite bead	R	Resistor, fixed or variable	Z	Phase shifter
F	Fuse	RT	Thermistor		
FL	Filter				

The following special symbols may appear on the diagrams:



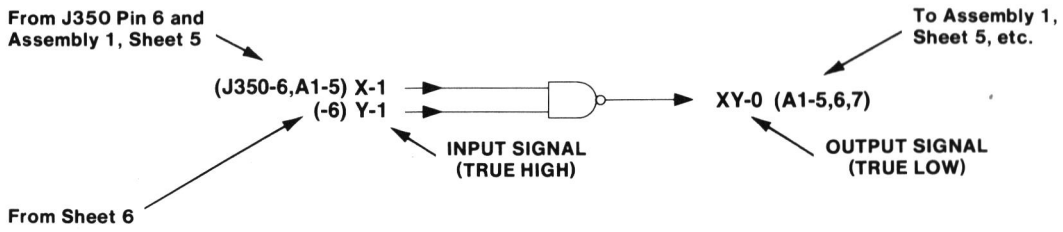
1. True High and True Low Signals

Signal names on the schematics are followed by -1 or a -0. A TRUE HIGH signal is indicated by -1, and a TRUE LOW signal is indicated by -0.

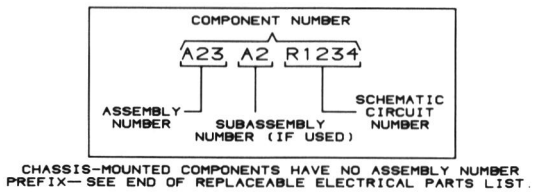
SIGNAL -1 = TRUE HIGH
SIGNAL -0 = TRUE LOW

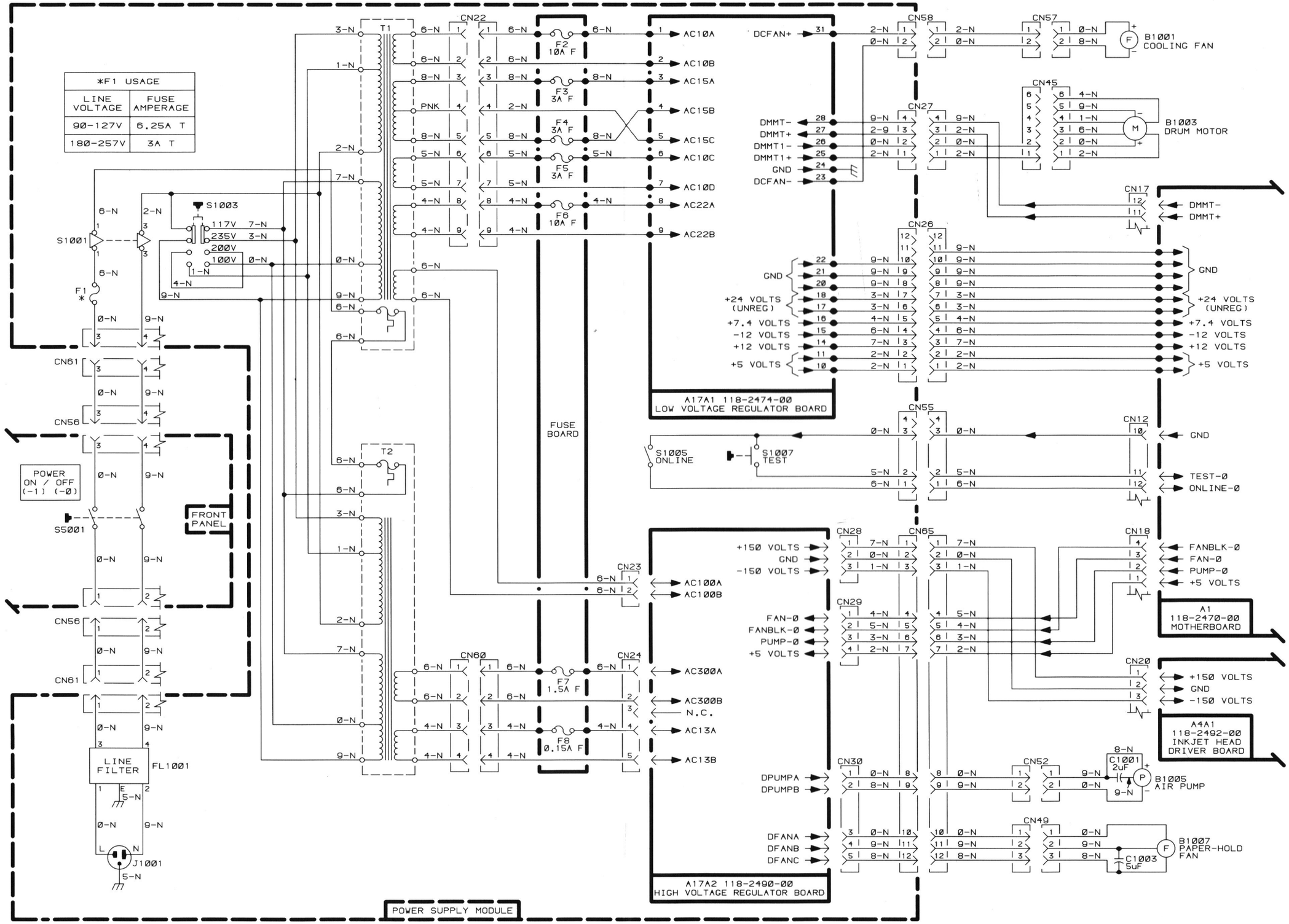
2. Cross-References

Schematic cross-references (from/to information) are included on the schematics. The "from" reference only indicates the signal "source," and the "to" reference lists all loads where the signal is used. All from/to information will be enclosed in parentheses.

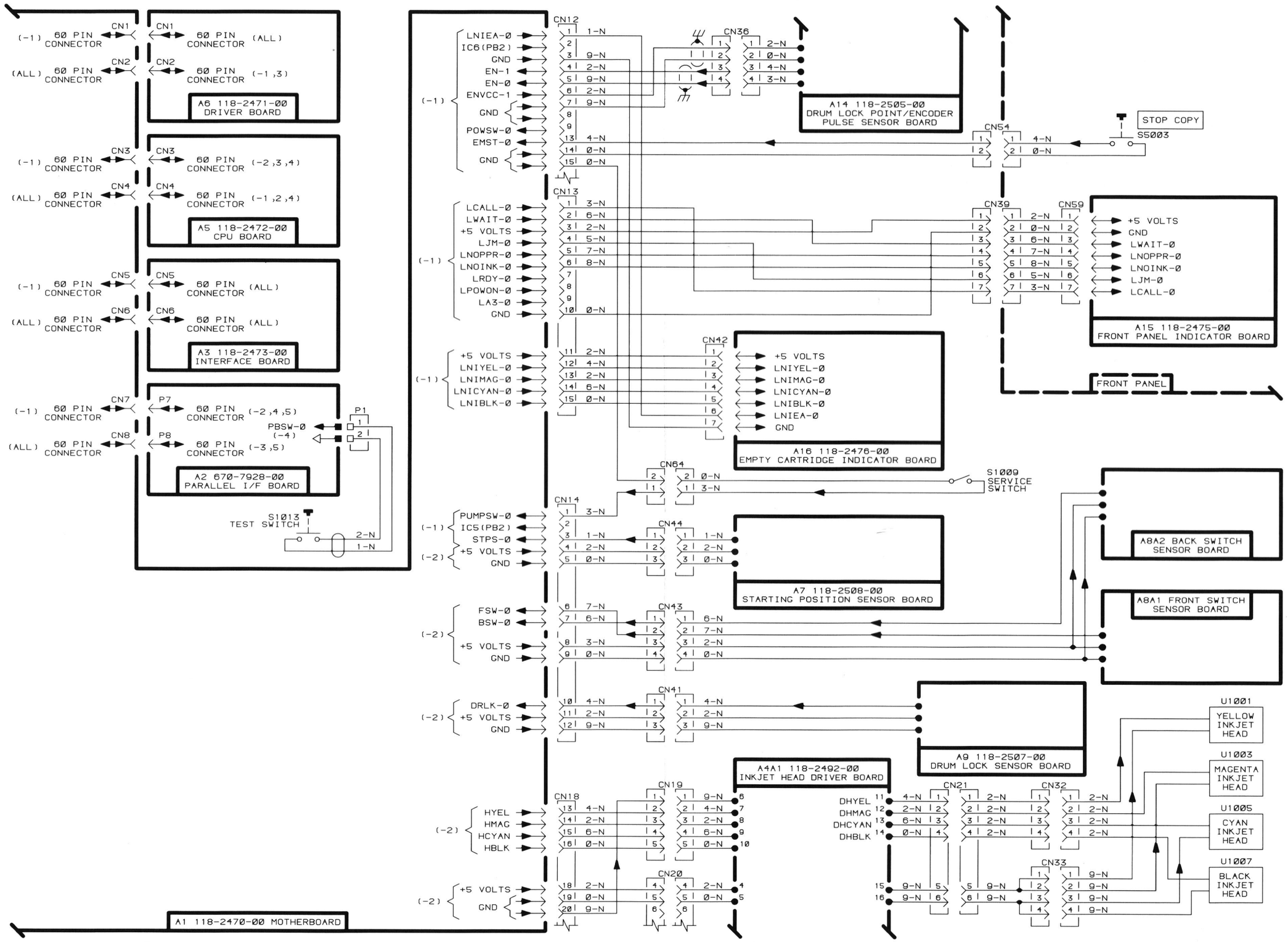


3. Component Number Example

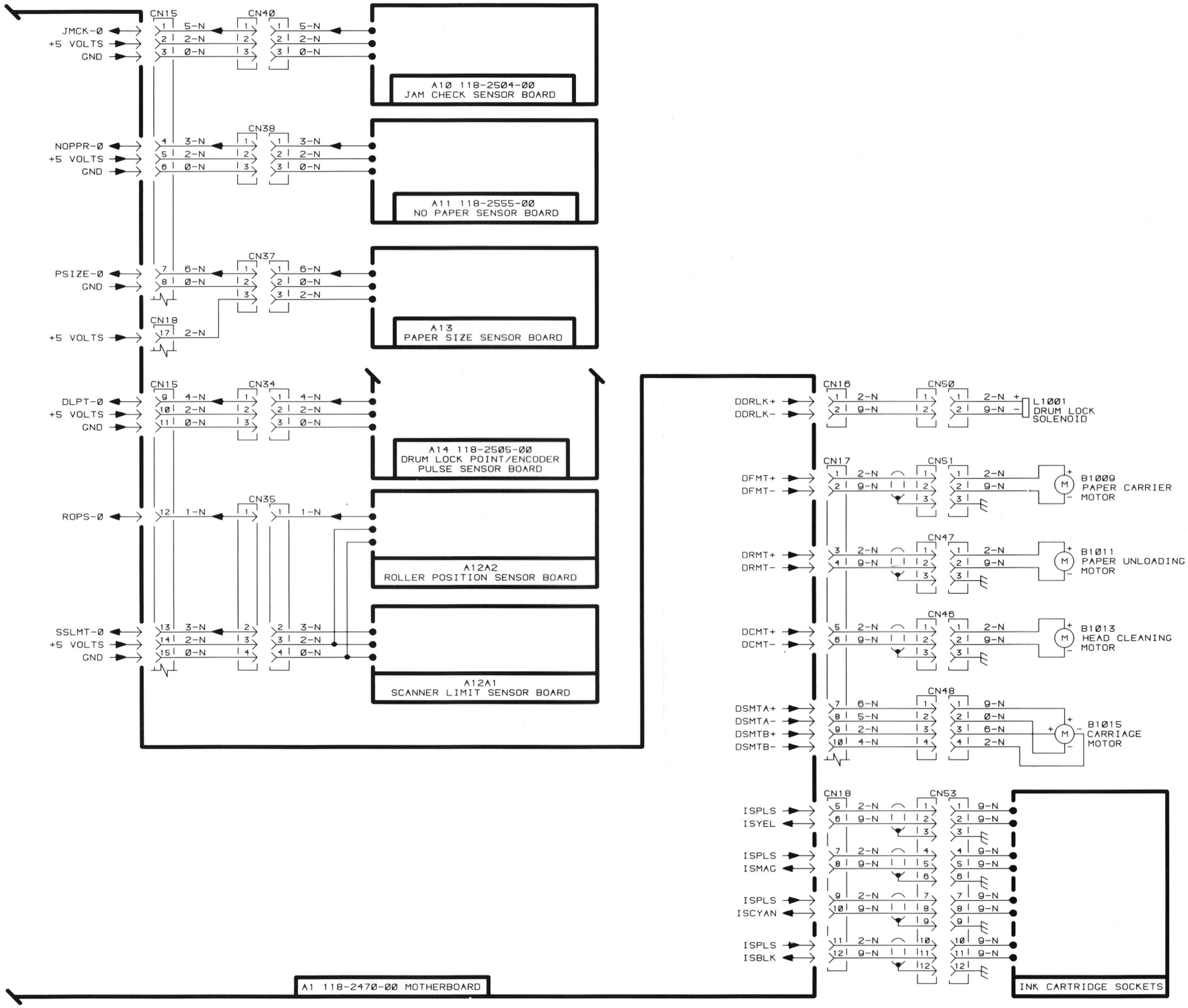




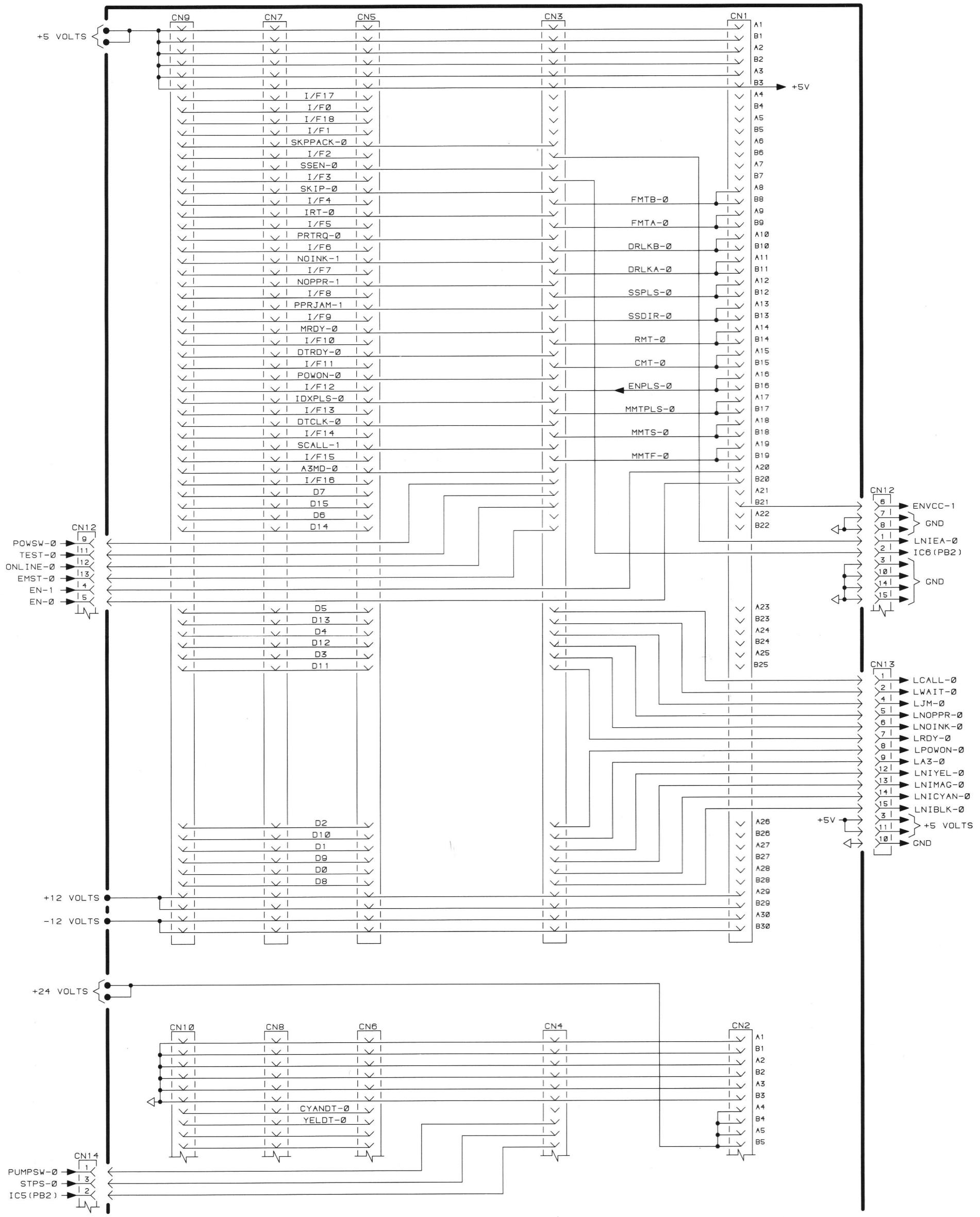
INSTRUMENT:	NOTES:	DIAGRAM:	SHEET:
4691	4498-I1	SYSTEM INTERCONNECT	1 OF 3



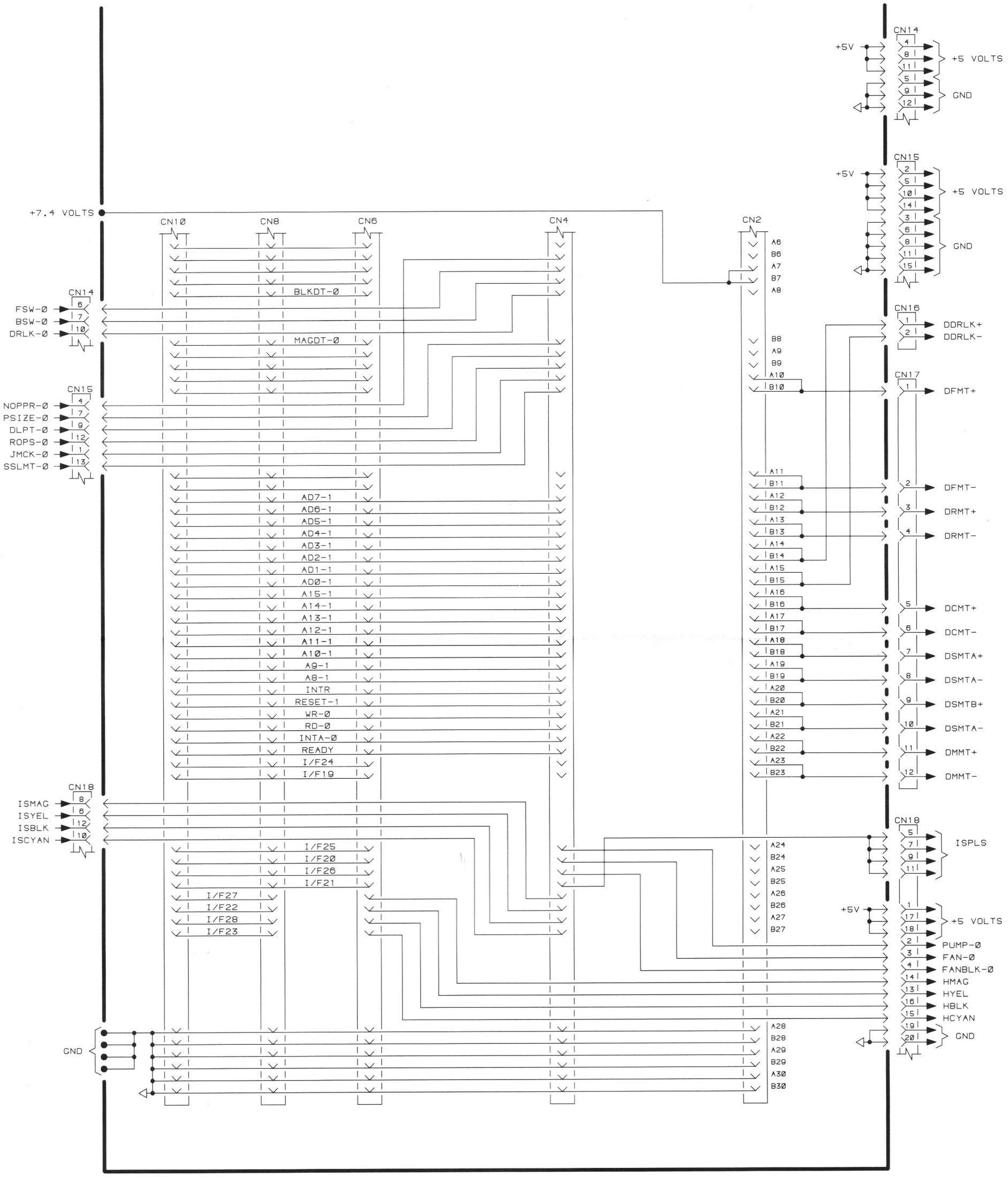
INSTRUMENT:	NOTES:	DIAGRAM:	SHEET:
4691	4498-I2	SYSTEM INTERCONNECT	2 OF 3



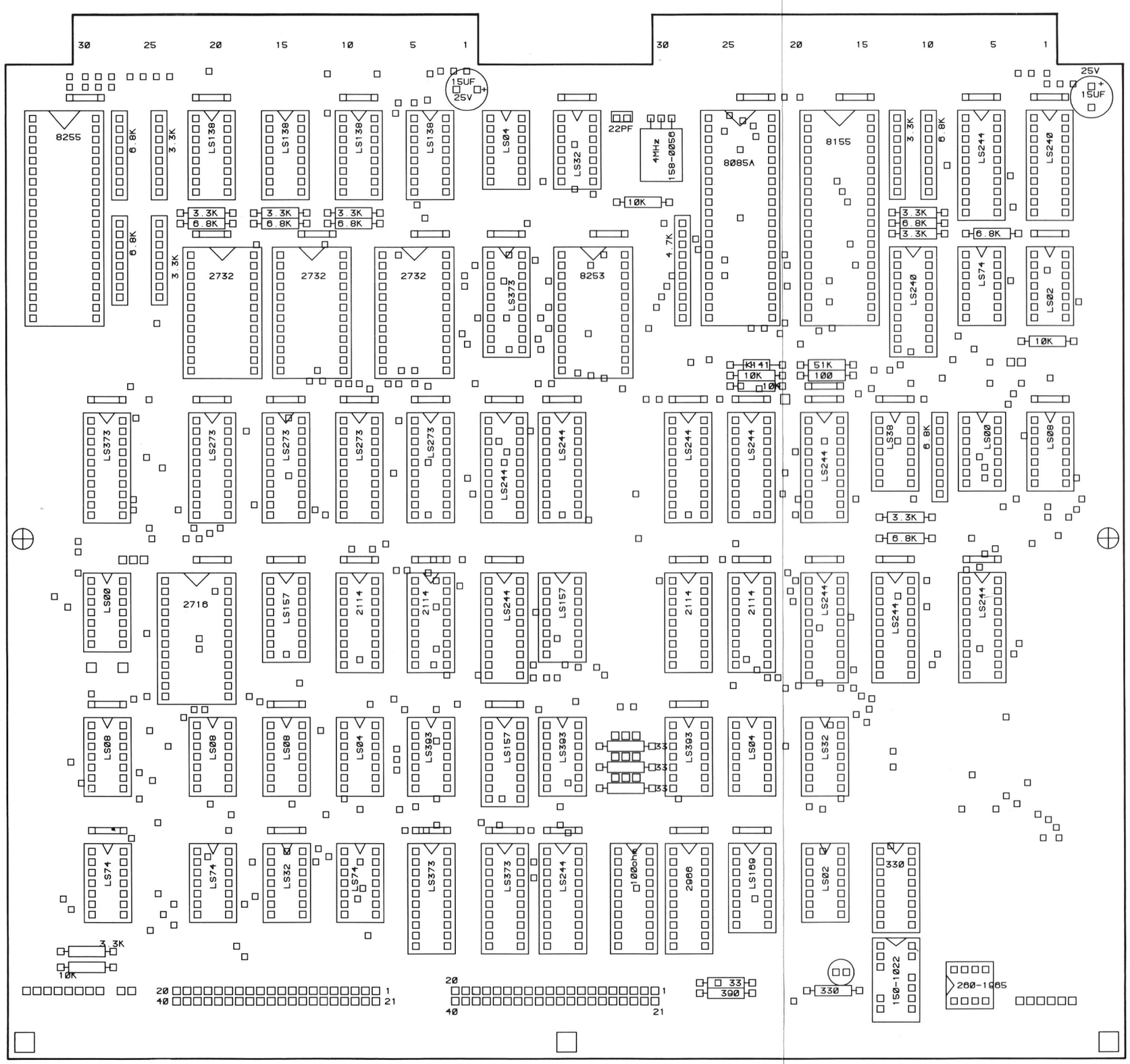
INSTRUMENT:	NOTES:	DIAGRAM:	SHEET:
4691	4498-I3	SYSTEM INTERCONNECT	3 OF 3



INSTRUMENT:	NOTES:	BOARD: **118-2470-00**	ASSEMBLY-SHEET:
4691	4498-S1	MOTHERBOARD	A1-1 (1 OF 2)



INSTRUMENT:	NOTES:	BOARD: 118-2470-00	ASSEMBLY-SHEET:
4691	4498-S2	MOTHERBOARD	A1-2 (2 OF 2)



Parallel Interface (670-7928-00) Component Locations.

PROCESSOR

PROGRAM MEMORY

ADDRESS DEMUX

PROGRAMMABLE COUNTERS

WORKSPACE RAM, TIMER & I/O PORTS

U165 8085A

U135 74LS138

U240 74LS373

U220 2732

U225 2732

U235 NOT USED

U250 8253

U170 8155

U140E 74LS04

U140F 74LS04

U290A 74LS02

U375A 74LS38

U375B 74LS38

U390A 74LS08

U280A 74LS74A

U280B 74LS74A

U150A 74LS32

U150B 74LS32

U150C 74LS32

U660A 2966

U660B 2966

Y155 4.0MHz

C155 22

C372 0.1uF

R255 10K

R260 4.7K

R290 10K

R370 51K

R371 100

R375 3.3K

R376 6.8K

R762 33

R555 33

CR364

J385 CPU TEST

J555 SHORT LONG

GND

+5V

TIR/SO

(-3) CMD-1

POWON-0

(-3) ORIDX-1

(-3) ORDC-1

(-3) SYIDX-1

(-3) T/RD7-1 THRU T/RD0-1

(-3) RFLT-0

RACK-0

TFLT-0

TBSY-1

TACK-0

IR/SO

PA13-1 THRU PA11-1 (-2,4)

CS4-0 (-2,4)

2MHz-1

PRD-0 (-4)

2MHz-1 (-3)

PW-0 (-2)

PAD7-1 THRU PAD0-1 (-2,3,4)

TDSTB-0

PCFLT-0

PFLT-0

PACK-1

PDSTB-0 (-3)

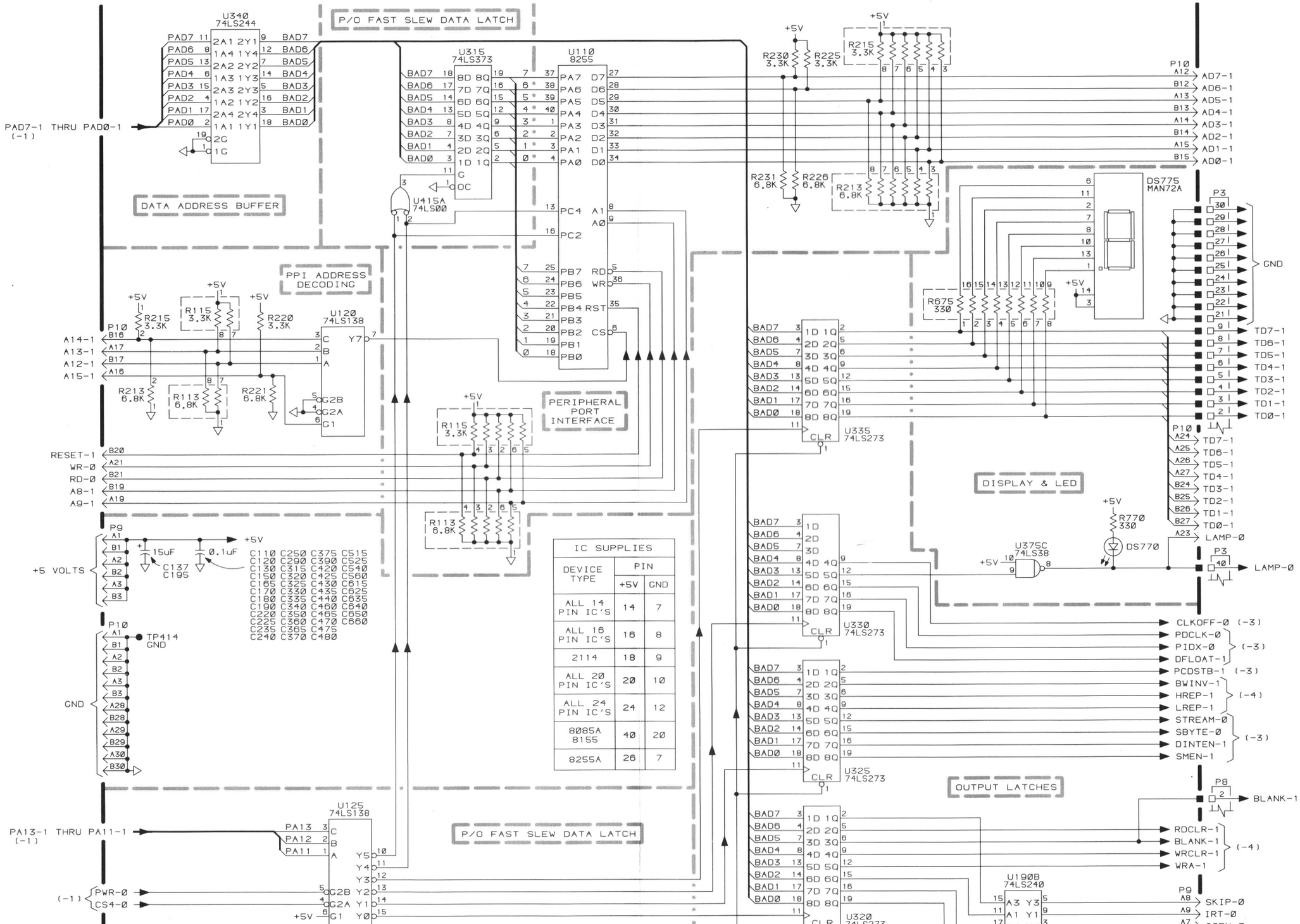
BUSY-1

PRESET-1 (-2)

MAR2-0

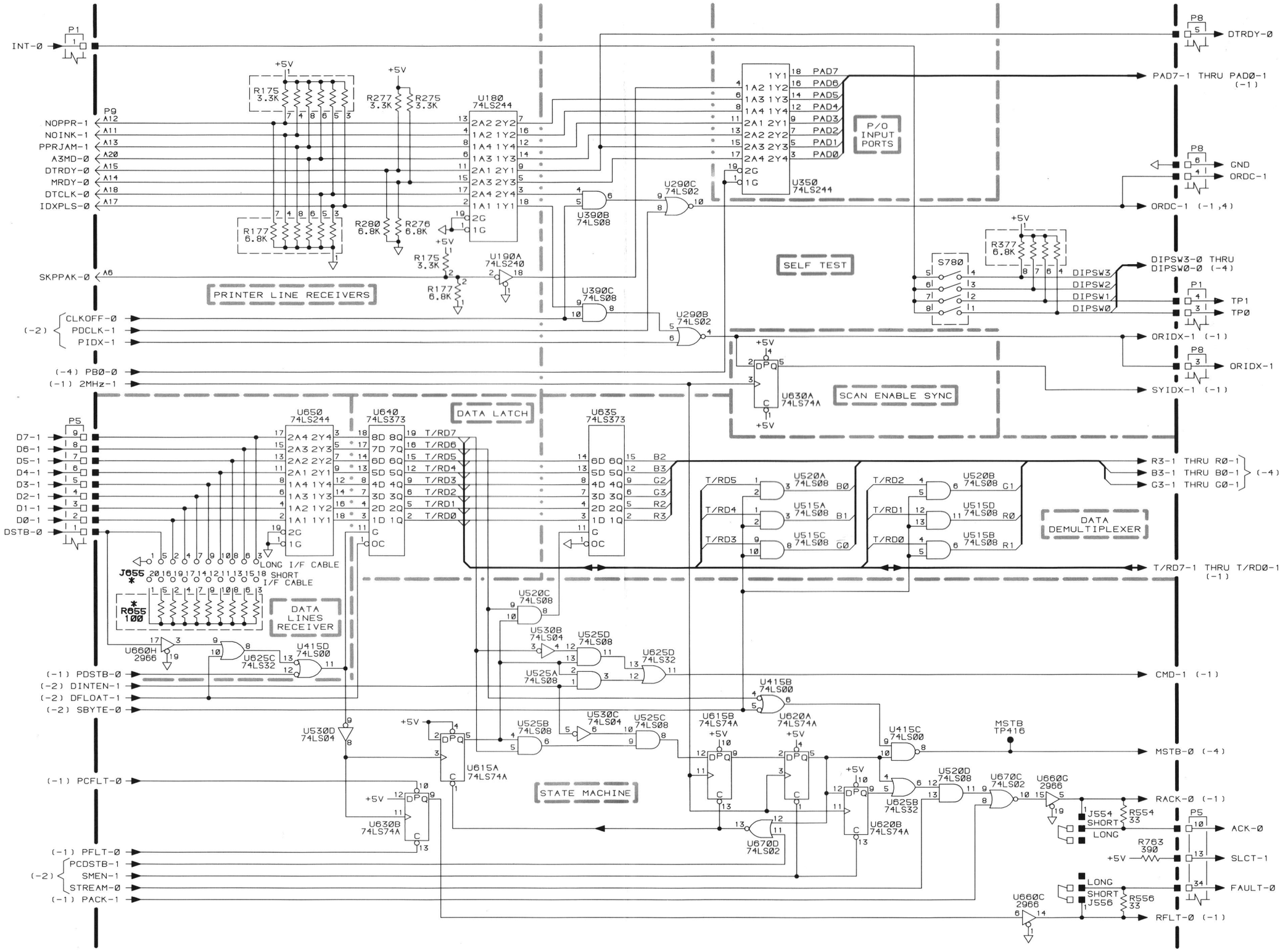
MAR1-0 (-4)

INSTRUMENT:	NOTES:	BOARD: 670-7928-00	ASSEMBLY-SHEET:
4691	4498-S3	PARALLEL I/F BOARD	A2-1 (1 OF 4)

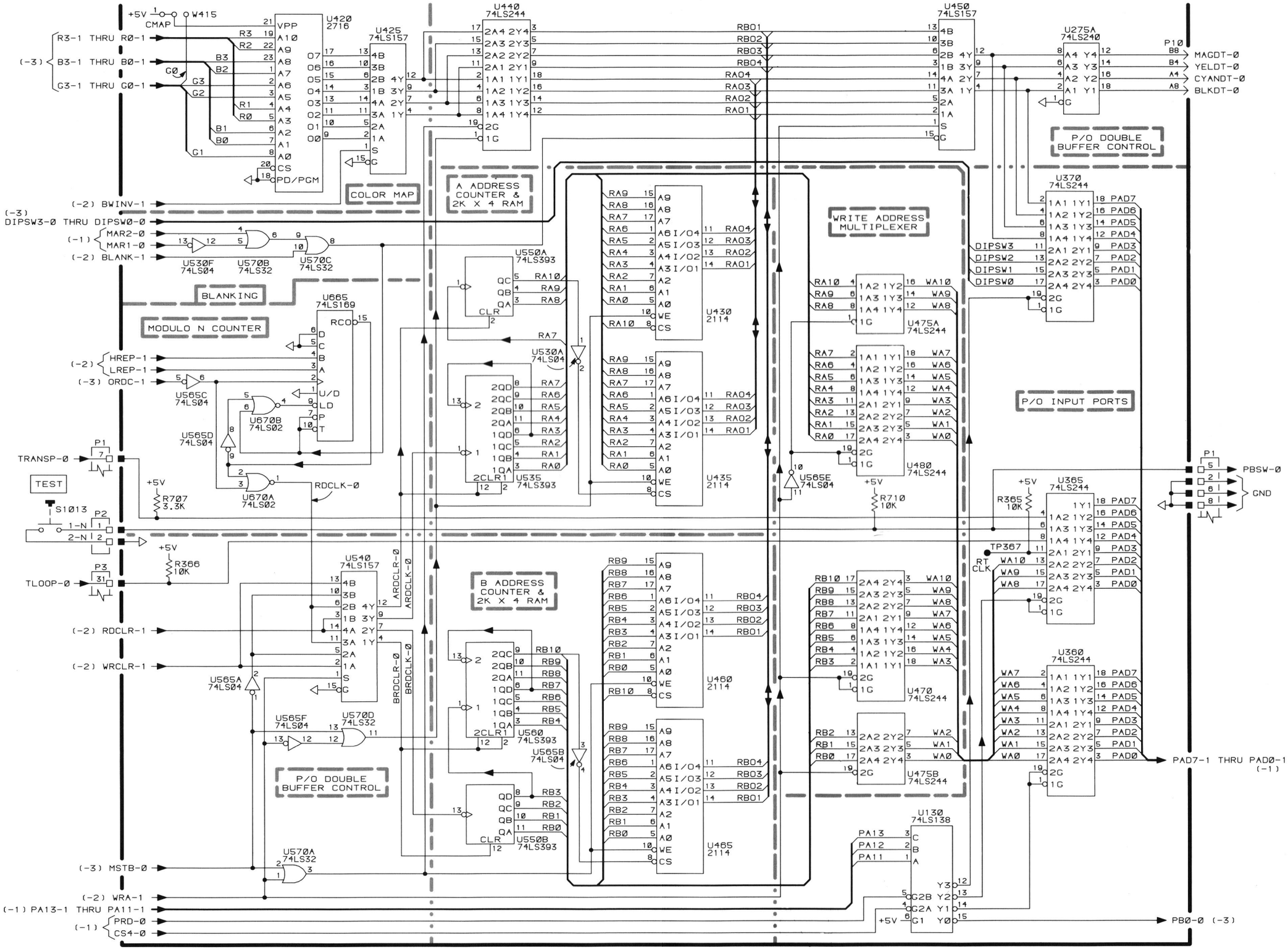


IC SUPPLIES		
DEVICE TYPE	PIN	
	+5V	GND
ALL 14 PIN IC'S	14	7
ALL 16 PIN IC'S	16	8
2114	18	9
ALL 20 PIN IC'S	20	10
ALL 24 PIN IC'S	24	12
8085A 8155	40	20
8255A	26	7

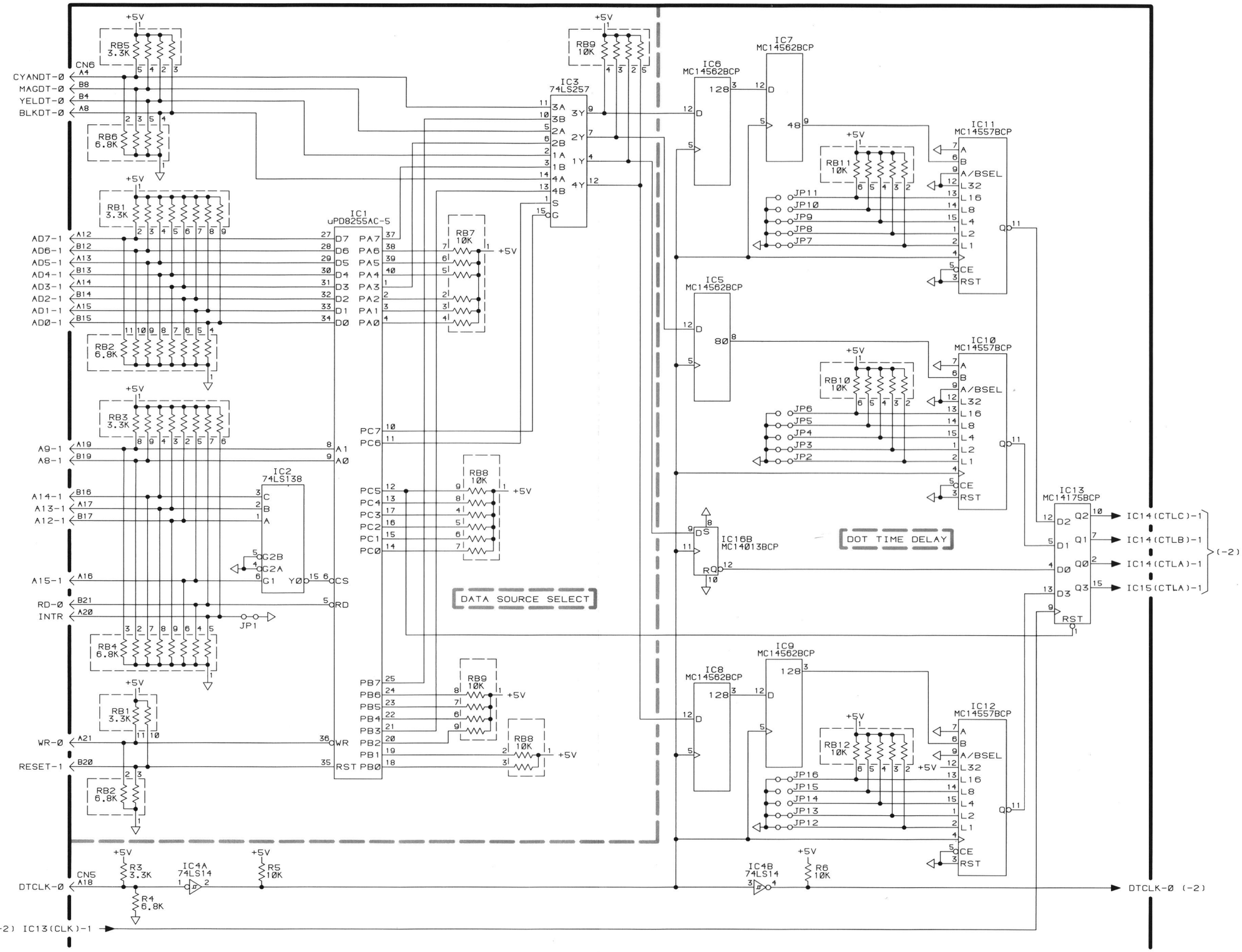
INSTRUMENT:	NOTES:	BOARD: 670-7928-00	ASSEMBLY-SHEET:
4691	4498-S4	PARALLEL I/F BOARD	A2-2 (2 OF 4)



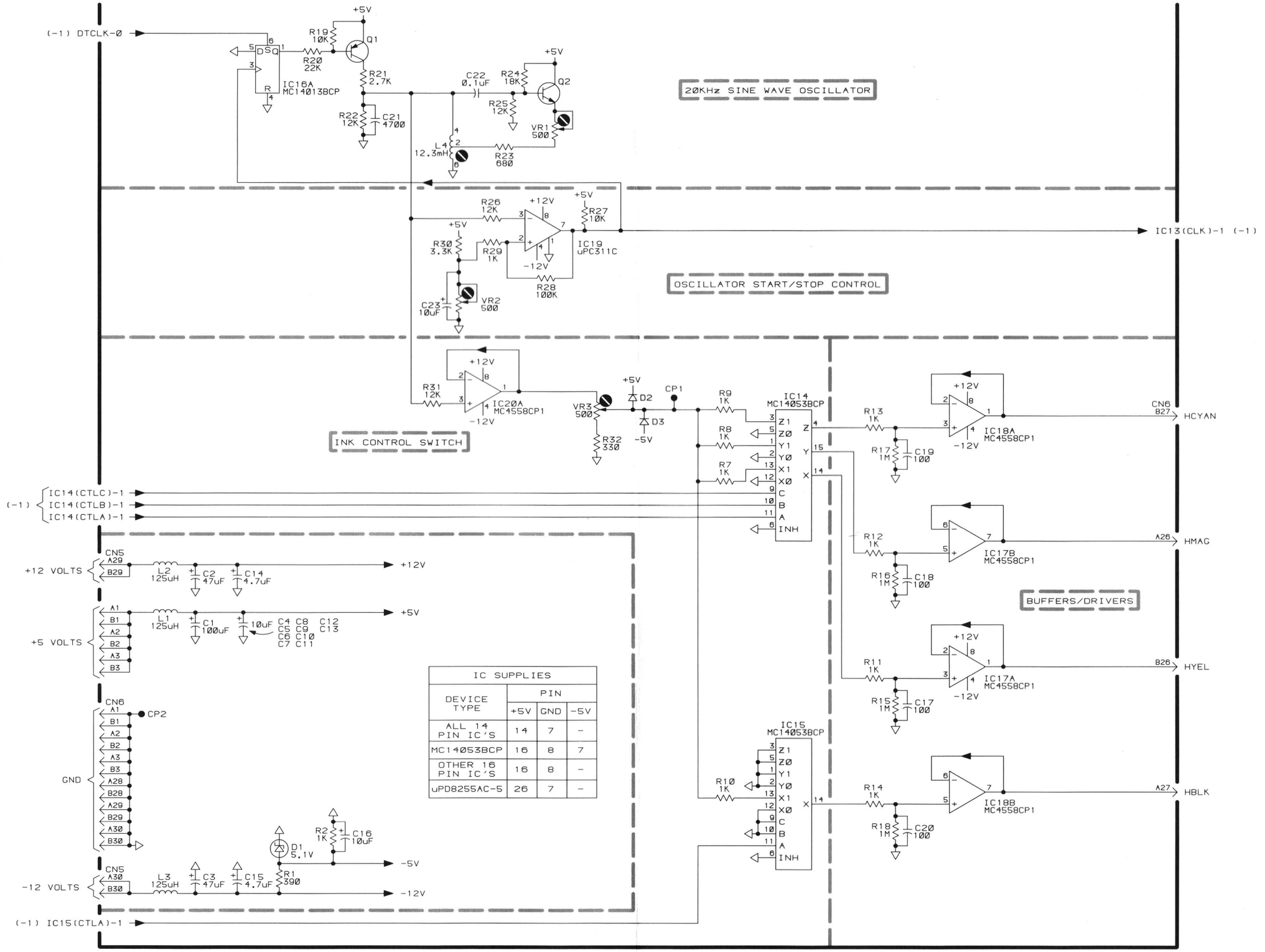
INSTRUMENT:	NOTES: * R655(SIP) PLUGS INTO EITHER THE LONG I/F CABLE OR THE SHORT I/F CABLE POSITION OF J655.	BOARD: 670-7928-00	ASSEMBLY-SHEET:
4691	4498-S5	PARALLEL I/F BOARD	A2-3 (3 OF 4)



INSTRUMENT:	NOTES:	BOARD: 670-7928-00	ASSEMBLY-SHEET:
4691	4498-S6	PARALLEL I/F BOARD	A2-4 (4 OF 4)

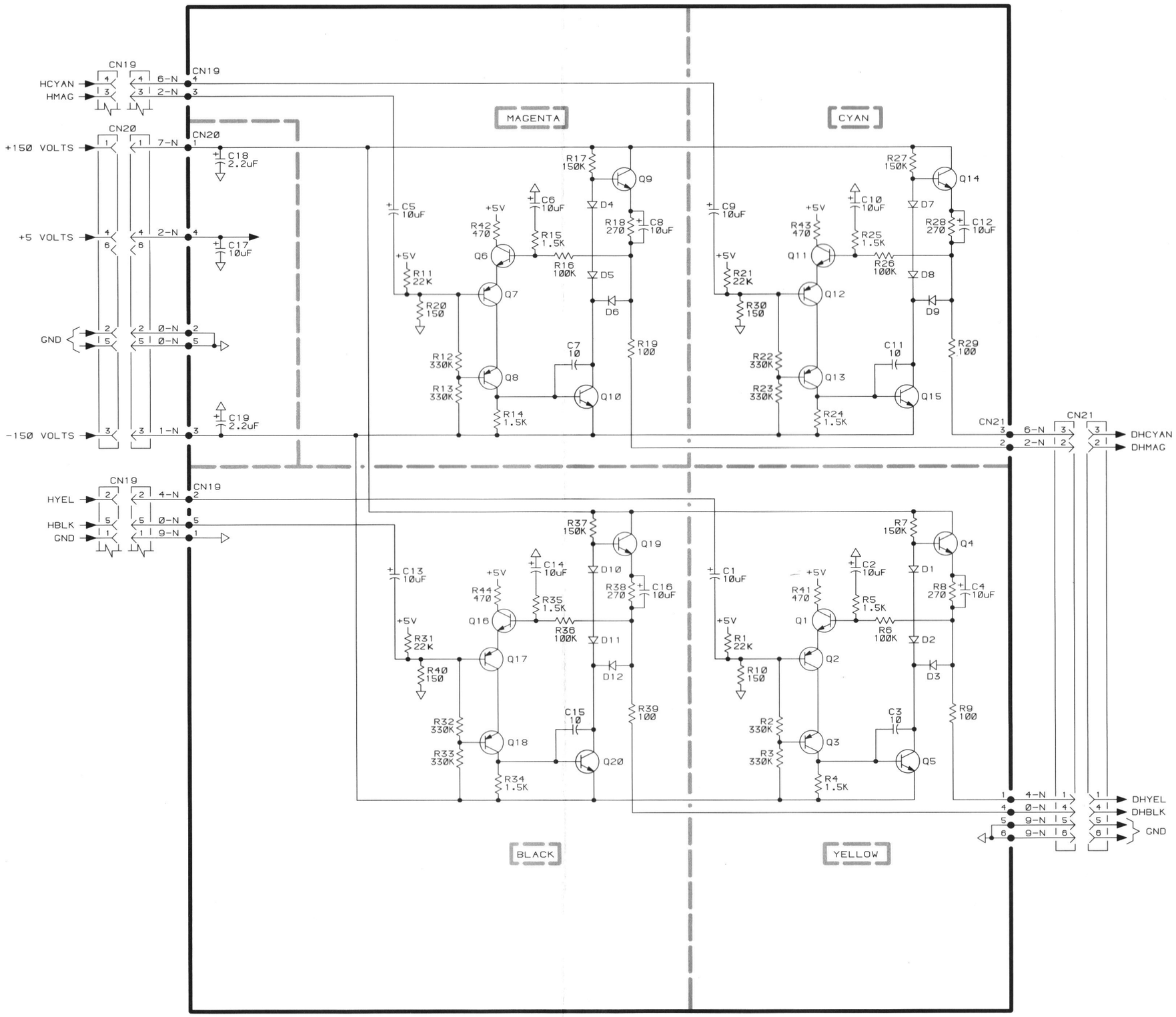


INSTRUMENT:	NOTES:	BOARD: 118-2473-00	ASSEMBLY-SHEET:
4691	4498-S7	INTERFACE BOARD	A3-1 (1 OF 2)

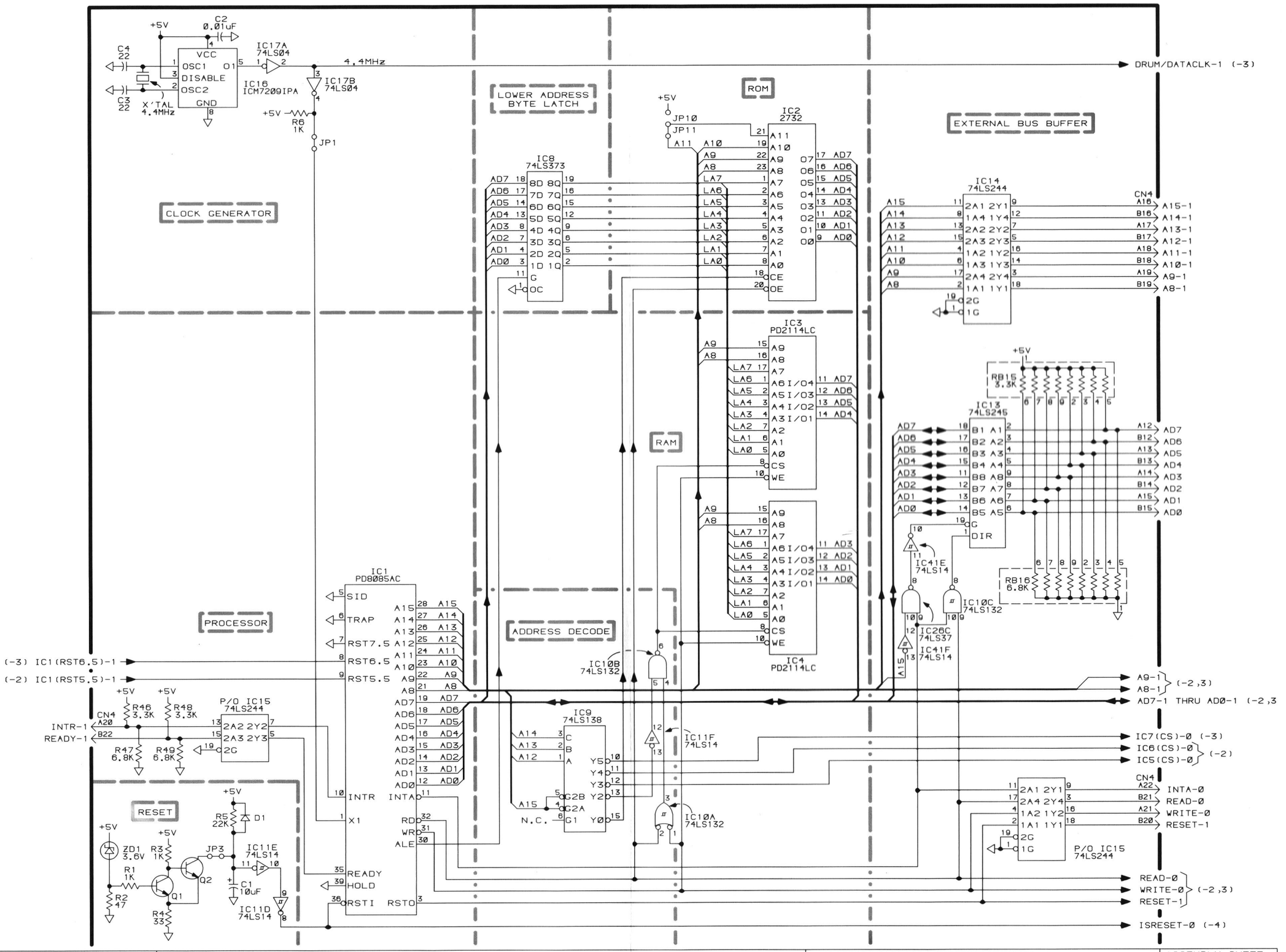


IC SUPPLIES			
DEVICE TYPE	PIN		
	+5V	GND	-5V
ALL 14 PIN IC'S	14	7	-
MC14053BCP	16	8	7
OTHER 16 PIN IC'S	16	8	-
uPD8255AC-5	26	7	-

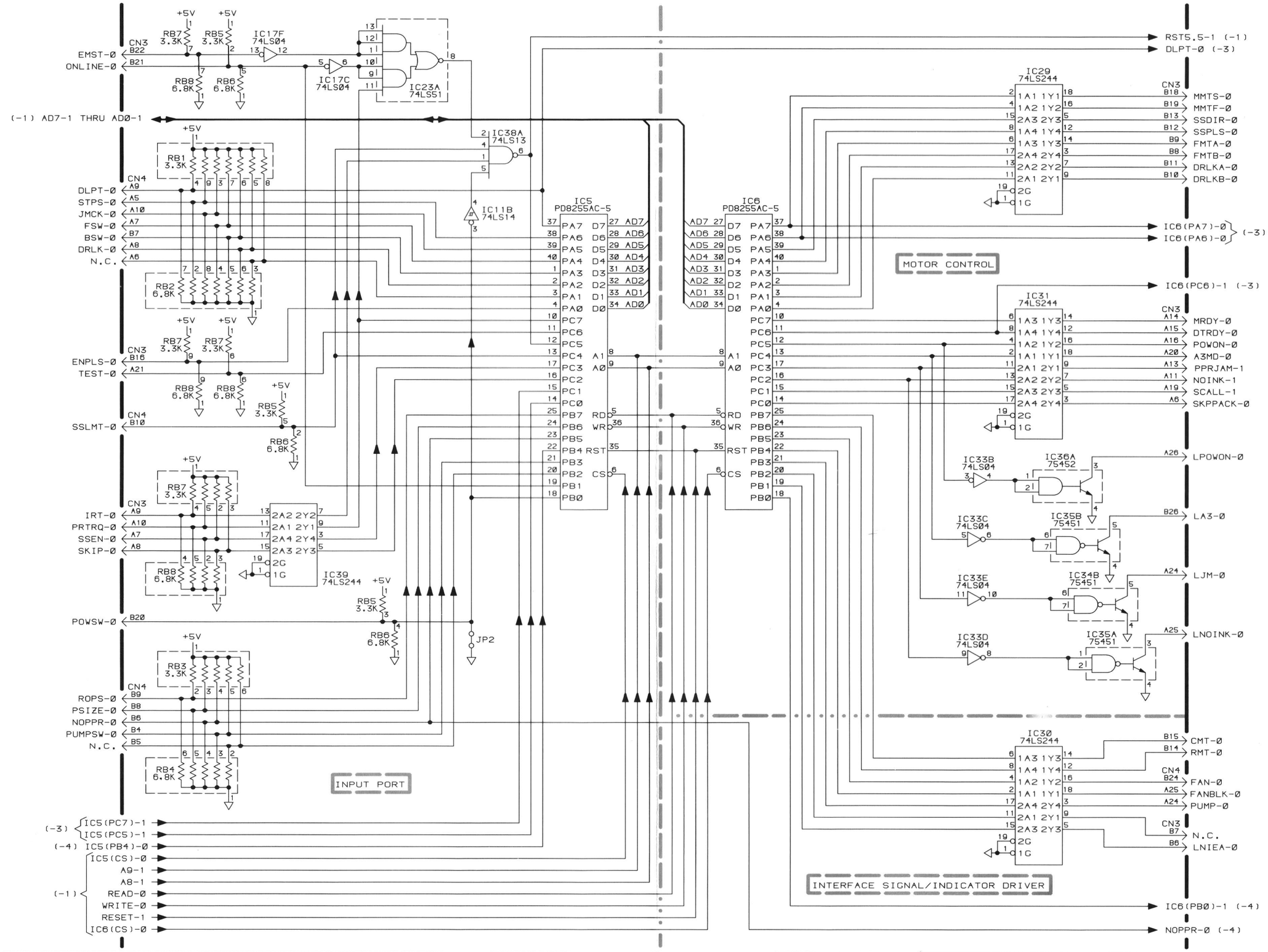
INSTRUMENT:	NOTES:	BOARD: 118-2473-00	ASSEMBLY-SHEET:
4691	4498-S8	INTERFACE BOARD	A3-2 (2 OF 2)



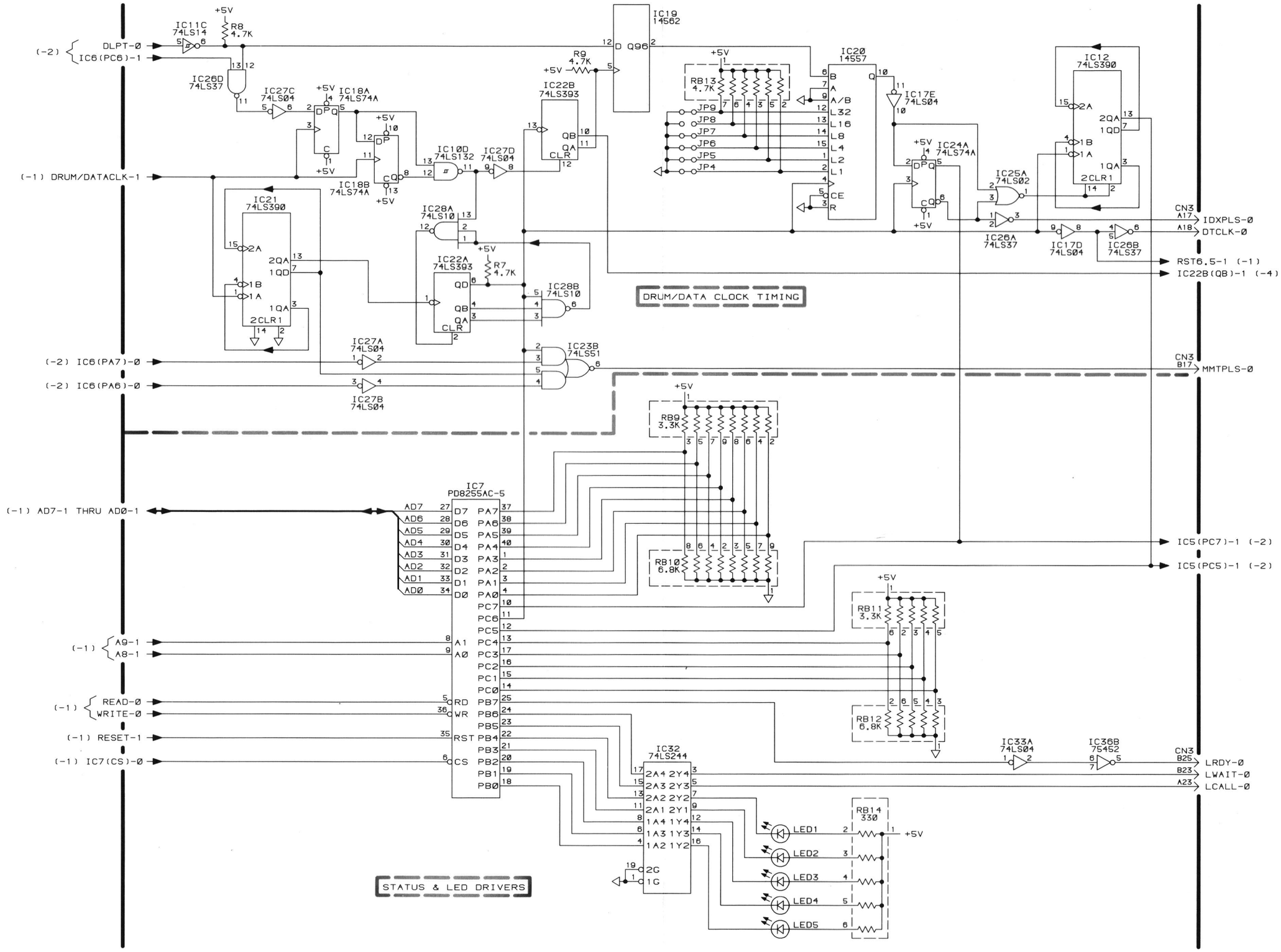
INSTRUMENT:	NOTES:	BOARD: 118-2492-00	ASSEMBLY-SHEET:
4691	4498-S9	INKJET HEAD DRIVER BOARD	A4A1-1 (1 OF 1)



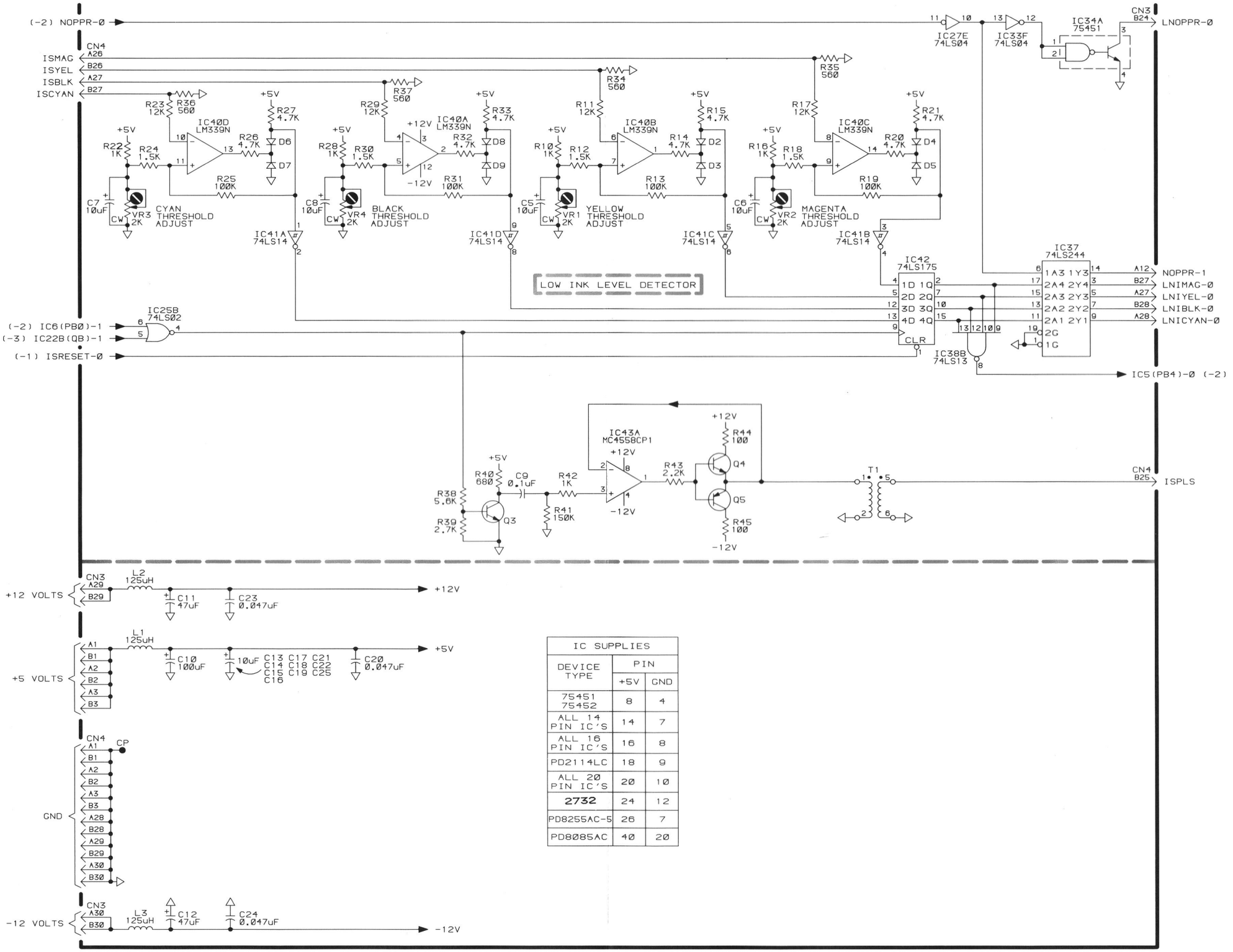
INSTRUMENT:	NOTES:	BOARD: 118-2472-00	ASSEMBLY-SHEET:
4691	4498-S10	CPU BOARD	A5-1 (1 OF 4)



INSTRUMENT:	NOTES:	BOARD: 118-2472-00	ASSEMBLY-SHEET:
4691	4498-S11	CPU BOARD	A5-2 (2 OF 4)

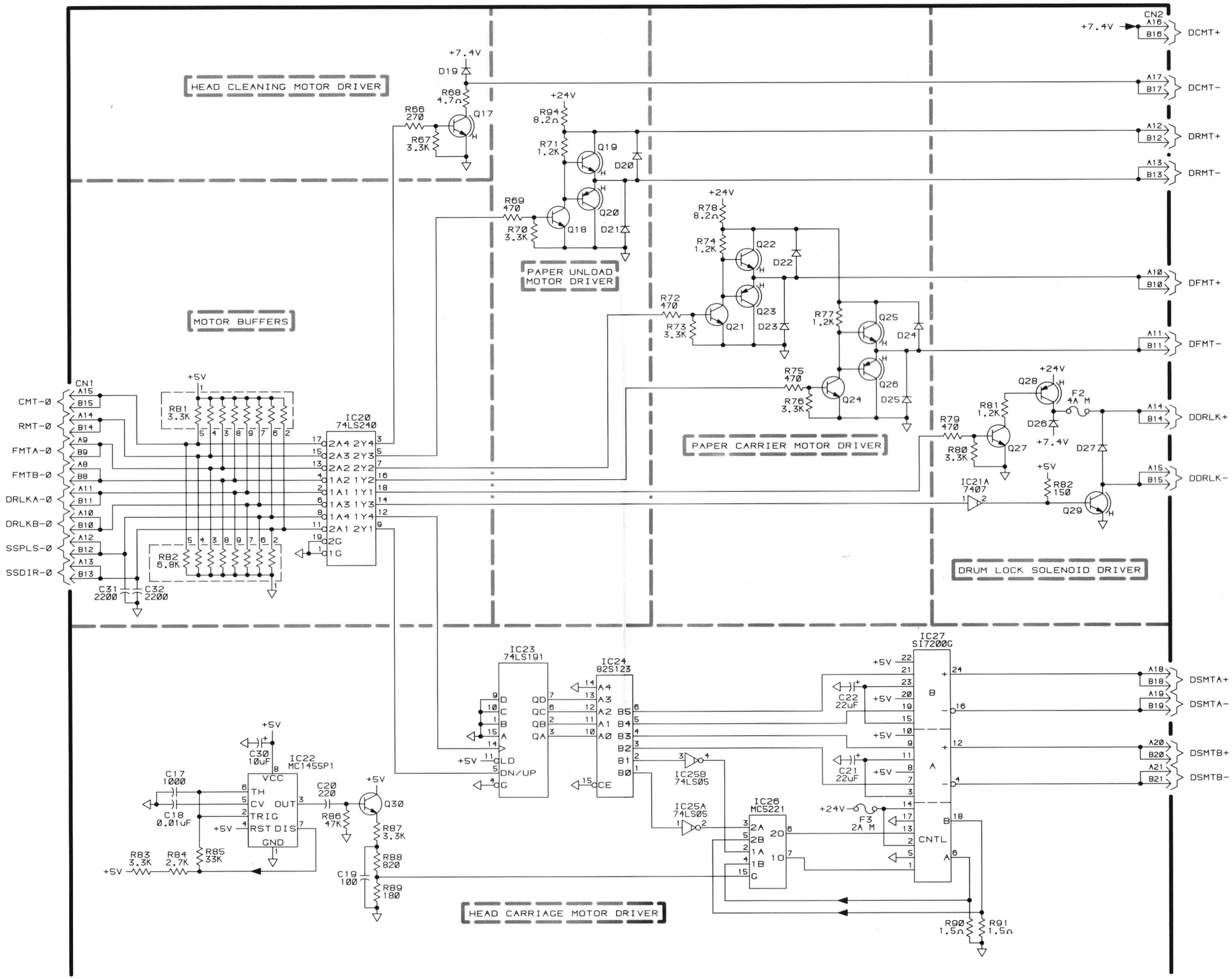


INSTRUMENT:	NOTES:	BOARD: 118-2472-00	ASSEMBLY-SHEET:
4691	4498-S12	CPU BOARD	A5-3 (3 OF 4)

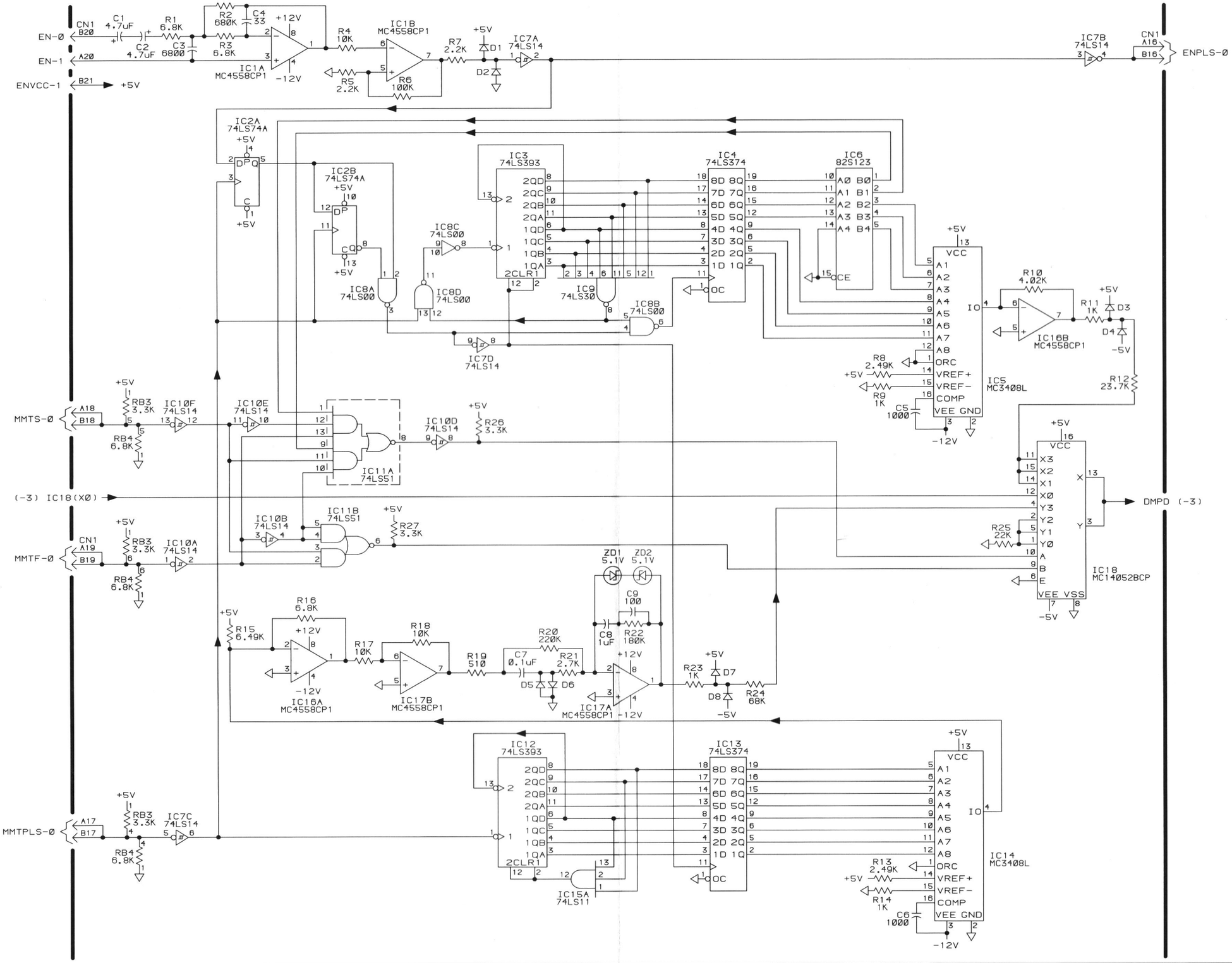


IC SUPPLIES		
DEVICE TYPE	PIN	
	+5V	GND
75451 75452	8	4
ALL 14 PIN IC'S	14	7
ALL 16 PIN IC'S	16	8
PD2114LC	18	9
ALL 20 PIN IC'S	20	10
2732	24	12
PD8255AC-5	26	7
PD8085AC	40	20

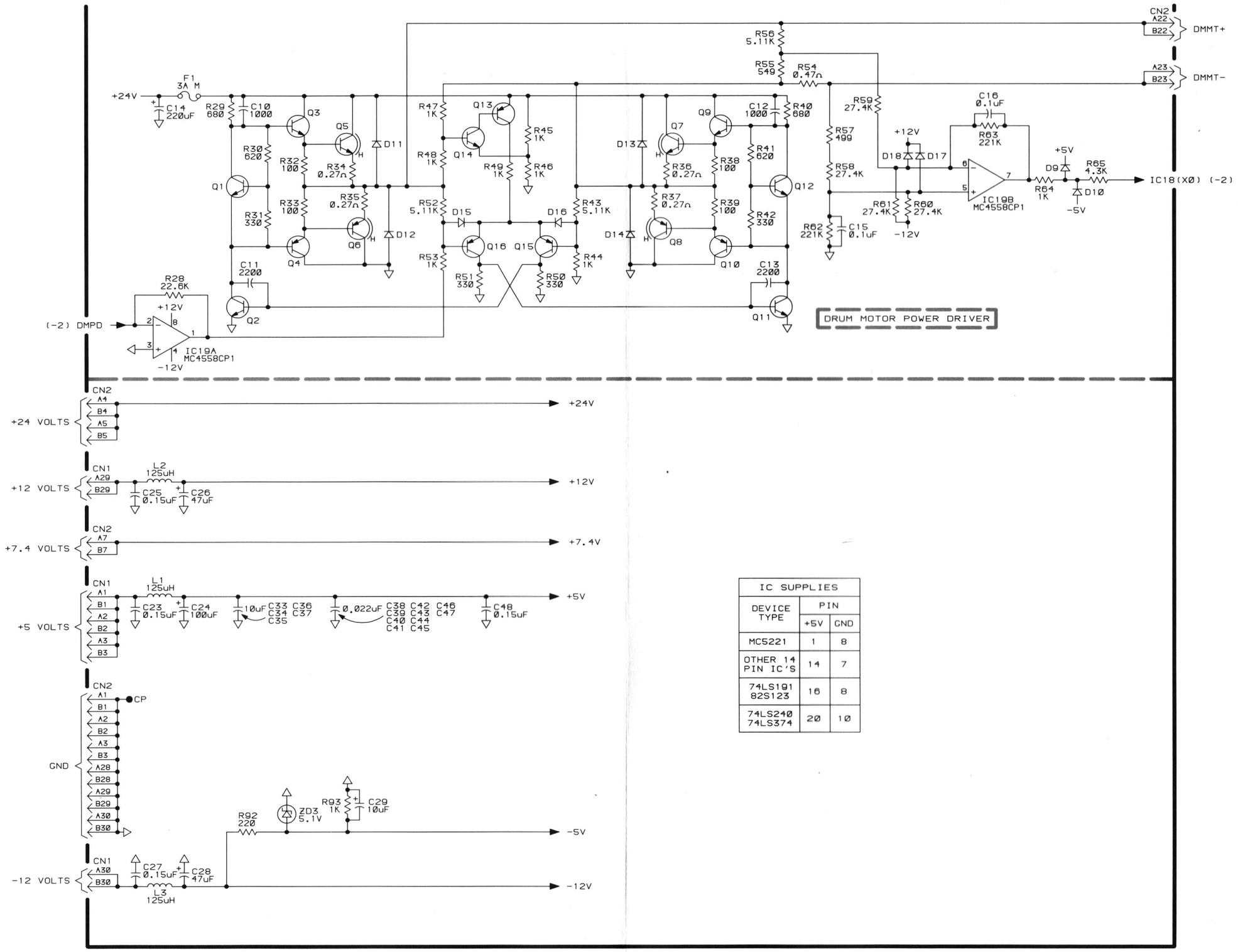
INSTRUMENT:	NOTES:	BOARD: **118-2472-00**	ASSEMBLY-SHEET:
4691	4498-S13	CPU BOARD	A5-4 (4 OF 4)



INSTRUMENT:	NOTES:	BOARD: 118-2471-00	ASSEMBLY-SHEET:
4691	4498-S14	DRIVER BOARD	A6-1 (1 OF 3)

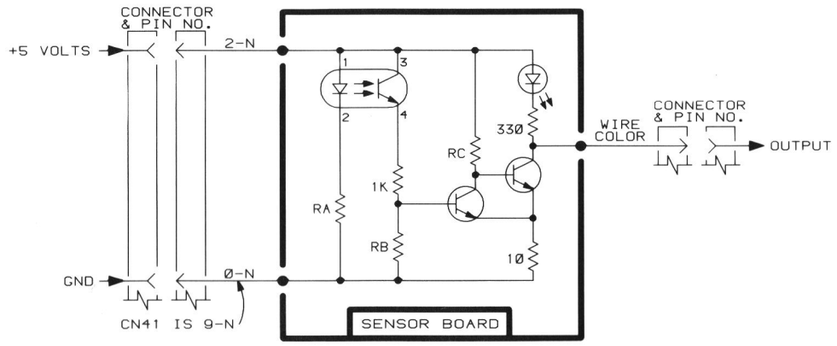


INSTRUMENT:	NOTES:	BOARD: 118-2471-00	ASSEMBLY-SHEET:
4691	4498-S15	DRIVER BOARD PHASE LOCK LOOP	A6-2 (2 OF 3)

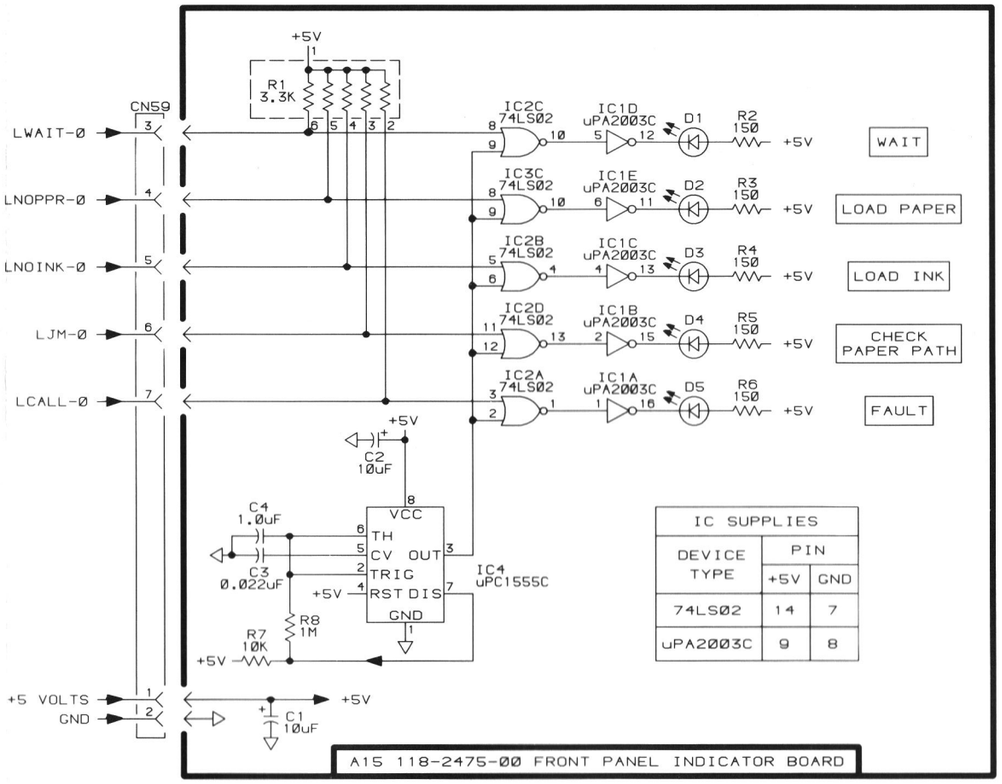


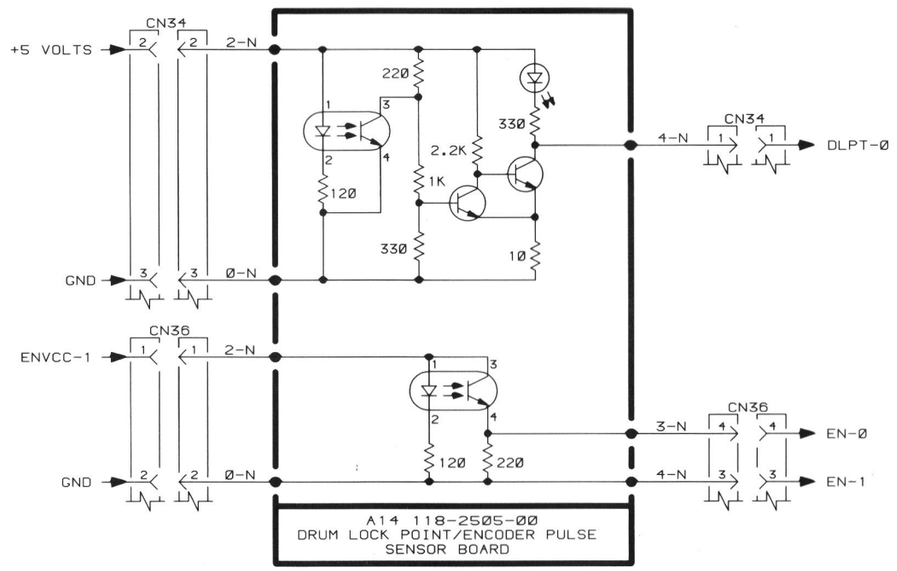
IC SUPPLIES		
DEVICE TYPE	PIN	
	+5V	GND
MC5221	1	8
OTHER 14 PIN IC'S	14	7
74LS191 82S123	16	8
74LS240 74LS374	20	10

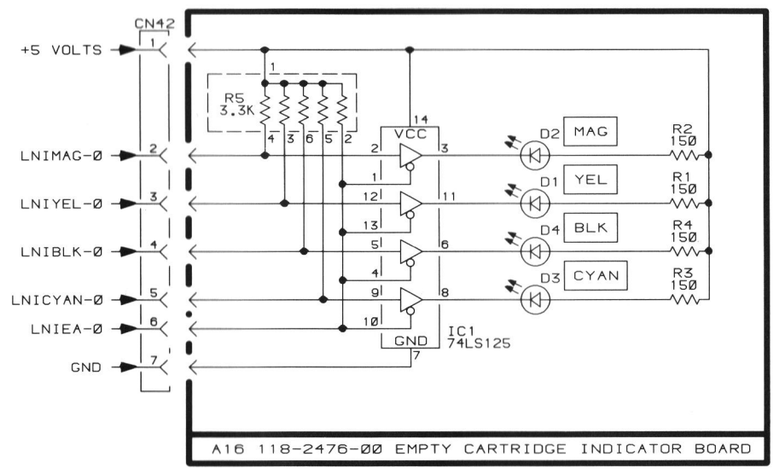
INSTRUMENT:	NOTES:	BOARD: 118-2471-00	ASSEMBLY-SHEET:
4691	4498-S16	DRIVER BOARD	A6-3 (3 OF 3)



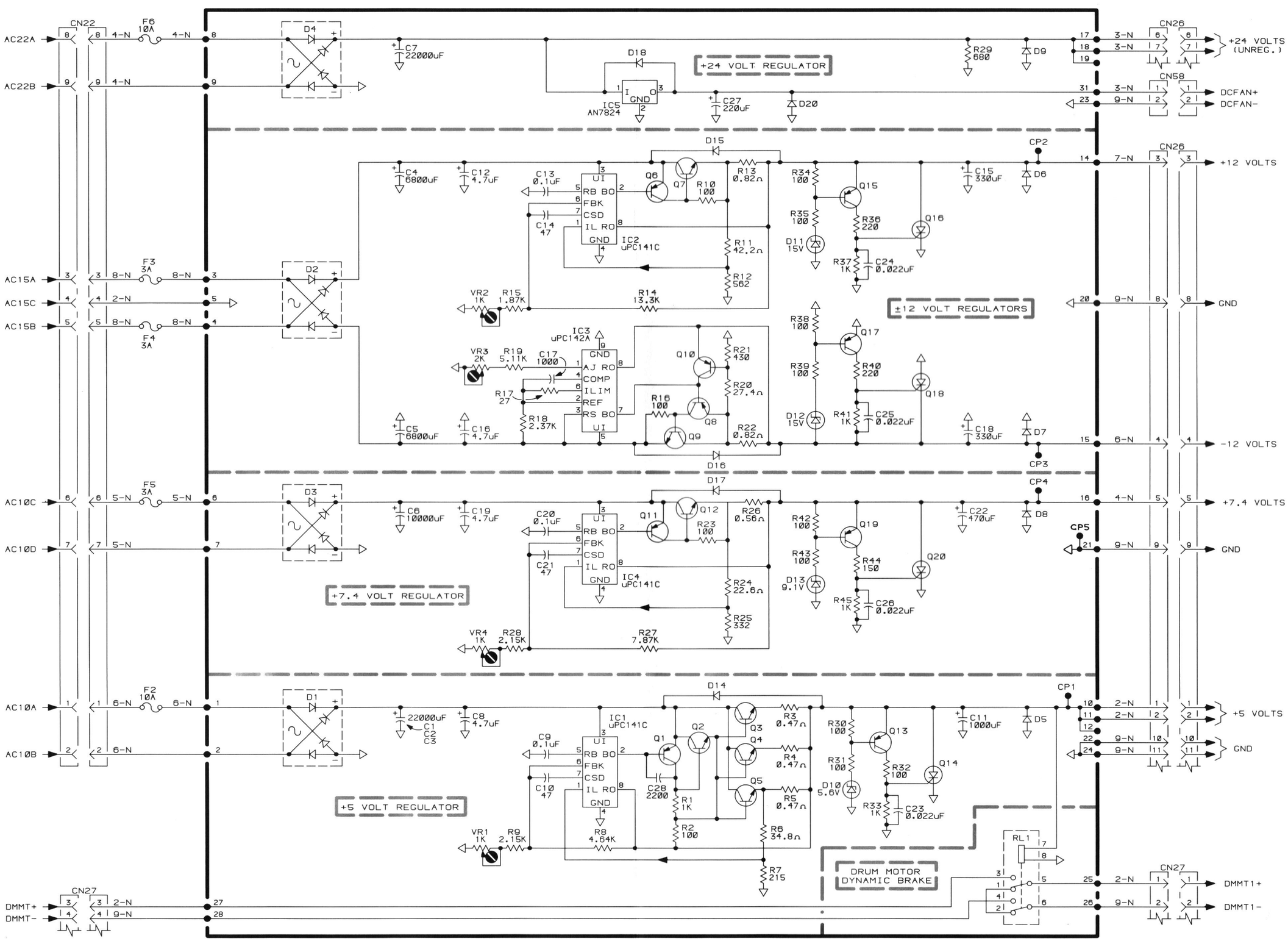
ASSEMBLY	SENSOR BOARD	CONNECTOR & PIN NUMBERS			OUTPUT	OUTPUT		COMPONENT VALUE		
		CONN.	+5V	GND	OUTPUT	WIRE COLOR	SIGNAL NAME	RA	RB	RC
A7	118-2508-00 STARTING POSITION	CN44	2	3	1	1-N	STPS-Ø	120	330	1.8K
A8A1	P/O 118-2509-00 FRONT SWITCH	CN43	3	4	2	7-N	FSW-Ø			
A8A2	P/O 118-2509-00 BACK SWITCH				1	6-N	BSW-Ø			
A9	118-2507-00 DRUM LOCK	CN41	2	3	1	4-N	DRLK-Ø			
A10	118-2504-00 JAM CHECK	CN40				5-N	JMCK-Ø	150	2.2K	2.2K
A11	118-2555-00 NO PAPER	CN38				3-N	NOPPR-Ø	120	330	1.8K
A12A1	P/O 118-2506-00 SCANNER LIMIT	CN35	3	4	2	3-N	SSLMT-Ø			
A12A2	P/O 118-2506-00 ROLLER POSITION				1	1-N	ROPS-Ø			2.2K
A13	PAPER SIZE	CN37	2	3		6-N	PSIZE-Ø			

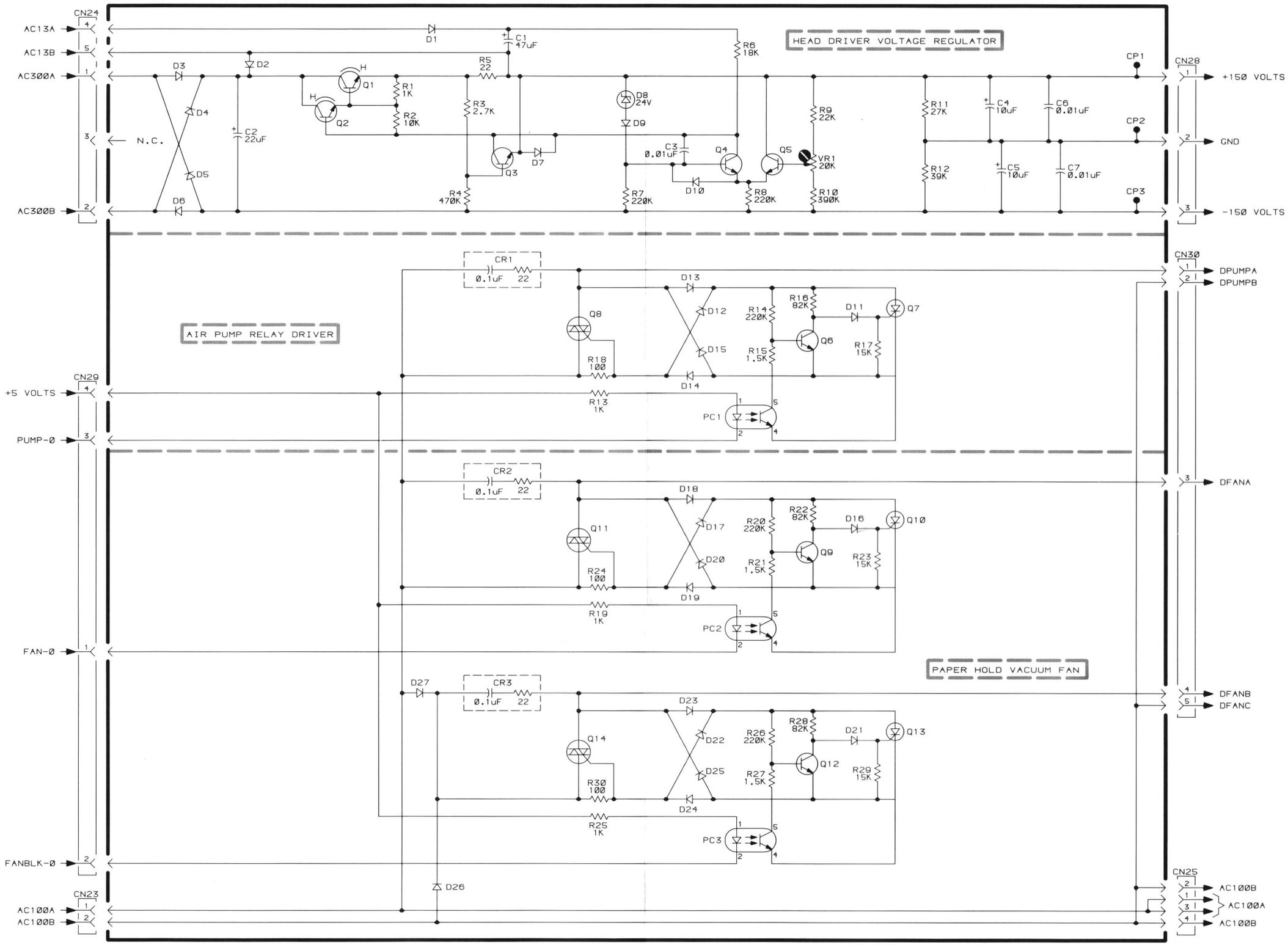






INSTRUMENT:	NOTES:	BOARD:	ASSEMBLY-SHEET:
4691	4498-S17	INDICATOR & SENSOR BOARDS	A7 Thru A16 (1 OF 1)


AC22A
AC22B
AC15A
AC15C
AC15B
AC10C
AC10D
AC10A
AC10B
DMMT+
DMMT-
CN22
CN26
CN58
CN27
F6 10A
F3 3A
F4 3A
F5 3A
F2 10A
D4
D2
D3
D1
D18
D15
D16
D17
D14
D9
D20
D6
D7
D8
D5
CP1
CP2
CP3
CP4
CP5
RL1
IC5 AN7824
IC2 uPC141C
IC3 uPC142A
IC4 uPC141C
IC1 uPC141C
+24 VOLT REGULATOR
±12 VOLT REGULATORS
+7.4 VOLT REGULATOR
+5 VOLT REGULATOR
DRUM MOTOR DYNAMIC BRAKE
+24 VOLTS (UNREG.)
DCFAN+
DCFAN-
+12 VOLTS
GND
-12 VOLTS
+7.4 VOLTS
+5 VOLTS
DMMT1+
DMMT1-
C7 22000uF
C4 6800uF
C12 4.7uF
C5 6800uF
C16 4.7uF
C6 10000uF
C19 4.7uF
C8 4.7uF
C1 C2 C3 22000uF
C27 220uF
C15 330uF
C18 330uF
C22 470uF
C11 1000uF
C13 0.1uF
C14 47
C17 1000
C20 0.1uF
C21 47
C9 0.1uF
C10 47
C28 2200
R29 680
R13 0.82Ω
R11 42.2Ω
R12 562
R14 13.3K
R22 0.82Ω
R21 430
R20 27.4Ω
R18 2.37K
R26 0.56Ω
R24 22.6Ω
R25 332
R27 7.87K
R3 0.47Ω
R4 0.47Ω
R5 0.47Ω
R6 34.8Ω
R7 215
R8 4.64K
R1 1K
R2 100
R10 100
R16 100
R23 100
R34 100
R35 100
R36 220
R37 1K
R38 100
R39 100
R40 220
R41 1K
R42 100
R43 100
R44 150
R45 1K
R30 100
R31 100
R32 100
R33 1K
VR2 1K
R15 1.87K
VR3 2K
R19 5.11K
R17 27
VR4 1K
R28 2.15K
VR1 1K
R9 2.15K
Q6
Q7
Q10
Q8
Q9
Q11
Q12
Q15
Q16
Q17
Q18
Q19
Q20
Q1
Q2
Q3
Q4
Q5
Q13
Q14
D11 15V
D12 15V
D13 9.1V
D10 5.6V
C24 0.022uF
C25 0.022uF
C26 0.022uF
C23 0.022uF
INSTRUMENT:
4691
NOTES:
4498-S18
BOARD: 118-2474-00
LOW VOLTAGE REGULATOR BOARD
ASSEMBLY-SHEET:
A17A1-1
(1 OF 1)
LOW VOLTAGE REGULATOR A17A1-1
118-2474-00



INSTRUMENT:	NOTES:	BOARD: 118-2490-00	ASSEMBLY-SHEET:
4691	4498-S19	HIGH VOLTAGE REGULATOR BOARD	A17A2-1 (1 OF 1)

Section 14
REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 *Name & Description*

Assembly and/or Component
Attaching parts for Assembly and/or Component
\- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
\- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
\- - - * - - -

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
S3109	FELLER ASA ADOLF AG., C/O PANEL COMPONENTS CORP.	355 TESCONI CIRCLE	SANTA ROSA, CA 95401
S3629	PANEL COMPONENTS CORP.	2015 SECOND ST.	BERKELEY, CA 94170
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OR 97005
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
54473	MATSUSHITA ELECTRIC, CORP. OF AMERICA	1 PANASONIC WAY	SECAUCUS, NJ 07094
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80126	PACIFIC ELECTRICORD CO.	747 W. REDONDO BEACH,P O BOX 10	GARDENA, CA 90247
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86221	GROMAN CORP.	54530 COUNTRY RD. NO 17	ELKHART, IN 46514

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	118-2433-00			1		CABINET,TOP:	54473	EMJ-MA8211001
-2	118-2415-00			1		PLATE,WINDOW:TOP PLASTIC	54473	EMJ-ME8211001
-3	118-2416-00			2		HOLDER,WINDOW:STEEL	54473	EMJ-MP8211001
						(ATTACHING PARTS)		
-4	----- -----			8		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-5	----- -----			2		BRACKET,HINGE:		
						(ATTACHING PARTS)		
-6	----- -----			6		SCREW,MACHINE:		
-7	----- -----			6		NUT:		
						- - - * - - -		
-8	----- -----			2		CABLE:		
						(ATTACHING PARTS)		
-9	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
-10	----- -----			2		BOTTOM HINGE:		
						(ATTACHING PARTS)		
-11	----- -----			8		SCREW,MACHINE:		
						- - - * - - -		
-12	118-2417-00			1		ARM,SAFETY SW:ALUMINUM	54473	EMJ-MP8211002
						(ATTACHING PARTS)		
-13	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STEEL		
-14	118-2418-00			1		SPRING,GAS:050S	54473	EMJ-MZ50S05
						(ATTACHING PARTS)		
-15	----- -----			2		SCREW,MACHNE:M 5 X 10,STEEL		
-16	----- -----			2		WASHER,PLAIN:M 5,STEEL		
-17	118-2420-00			1		ARM PLUNGER:STEEL SPRING	54473	EMJ-ME8211004
-18	----- -----			2		NUT:M 5,STEEL		
						- - - * - - -		
-19	118-2432-00			1		CABINET,BOTTOM:	54473	EMJ-MA8211002
						(ATTACHING PARTS)		
-20	----- -----			8		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STEEL		
						- - - * - - -		

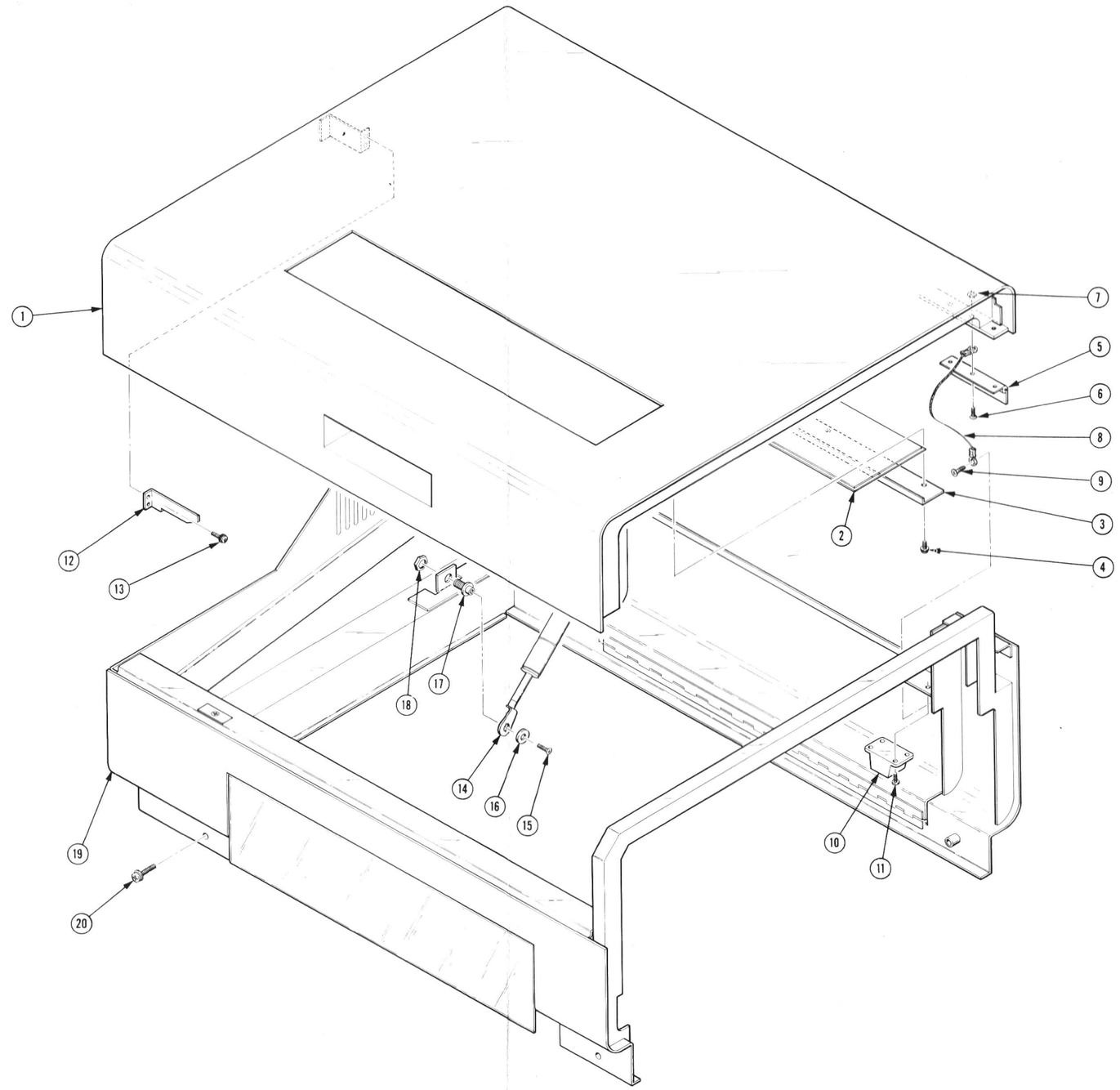

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FIG. 2 FRONT PANEL

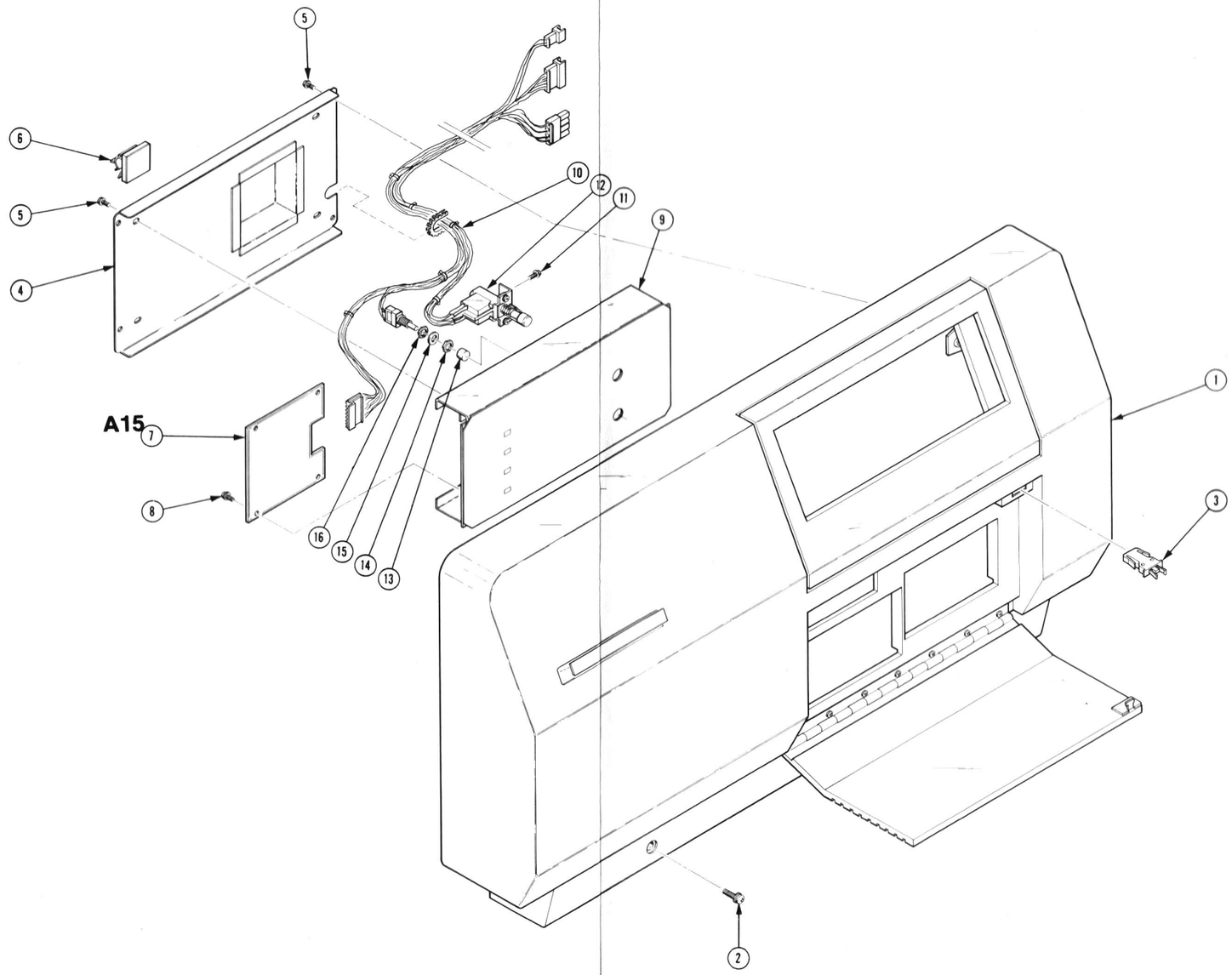


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-1	118-2431-00			1		CABINET,FRONT:	54473	EMJ-MA8211003
						(ATTACHING PARTS)		
-2	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 5 X 20,STEEL		
						- - - * - - -		
-3	118-2983-00			1		LATCH,DOOR:		
-4	118-2429-00			1		COVER,FRONT PNL:	54473	EMJ-MP8211004
						(ATTACHING PARTS)		
-5	----- -----			8		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STEEL		
						- - - * - - -		
-6	----- -----			1		CABLE CLAMP:		
-7	----- -----			1		CKT BOARD ASSY:(SEE A15 REPL)		
						(ATTACHING PARTS)		
-8	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STEEL		
						- - - * - - -		
-9	118-2422-00			1		CHASSIS,FR PNL:ALUMINUM	54473	EMJ-MA8211004
-10	----- -----			1		CABLE:		
						(ATTACHING PARTS)		
-11	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STEEL		
						- - - * - - -		
-12	----- -----			1		SWITCH,POWER:AC(SEE S5001 REPL)	54473	ESB-70272T
	118-2430-00			1		BRACKET,SWITCH:AC,STEEL	54473	EMJ-MP821103
	----- -----			1		SWITCH:STOP(SEE S5003 REPL)		
-13	118-2427-00			1		BUTTON:RED	54473	AT443-08R
-14	----- -----			1		NUT:		
-15	----- -----			1		WASHER:		
-16	----- -----			1		NUT:		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-1	----- -----			1		MOTOR:STEPPING(SEE B1015 REPL)		
						(ATTACHING PARTS)		
-2	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 4 X 14,STL		
-3	----- -----			4		SPACER,STEEL:		
-4	118-2456-00			1		PULLEY:FLAT BELT,STEEL	54473	EMJ-MA8210503
-5	----- -----			1		SETSCREW:M 4 X 5,STL		
						- - - * - - -		
-6	118-2440-00			1		BRACKET:MOTOR STEEL	54473	EMJ-MP8210502
						(ATTACHING PARTS)		
-7	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 4 X 10,STL		
-8	----- -----			2		WASHER,PLAIN:M 4,STEEL		
-9	----- -----			2		WASHER,RUBBER:		
-10	----- -----			2		RUBBER,SPACER:		
-11	----- -----			2		WASHER:M 4,STEEL		
-12	----- -----			2		NUT:4M,STEEL		
						- - - * - - -		
-13	118-2455-00			1		PULLEY:FLAT BELT,WIRE	54473	EMJ-MA8210504
						(ATTACHING PARTS)		
-14	----- -----			1		SCREW,MACHINE:M 5 X 20,STL		
-15	----- -----			1		WASHER,PLAIN:M 5,STEEL		
						- - - * - - -		
-16	----- -----			1		NUT:		
-17	----- -----			1		WASHER,LOCK:		
-18	118-2464-00			1		BELT:FLAT	54473	EMJ-ME8210503
-19	118-2483-00			1		CARRIAGE ASSY:WIRE/SPRING	54473	EMJ-ME8210504
-20	----- -----			1		SPRING:		
-21	----- -----			1		PUMP:HEAD CLEANING(SEE B1013 REPL)		
-22	118-1677-00			1		CAP:NPU PLASTIC	54473	EMJ-ME8210601
						- - - * - - -		
-23	118-2478-00			1		FILTER:	54473	EMJ-ME8210602
-24	118-2479-00			1		HOUSING:HEAD CLEANING	54473	EMJ-MA8210603
						(ATTACHING PARTS)		
-25	----- -----			3		SCREW,MACHINE:M 3 X 30,STL		
						- - - * - - -		
-26	118-2437-00			1		BRACKET:HEAD CLEANING,STEEL	54473	EMJ-MP8210601
						(ATTACHING PARTS)		
-27	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
						- - - * - - -		
-28	118-2565-00			1		BRACKET,LEFT:CHAIN,STEEL	54473	EMJ-MP8210105
						(ATTACHING PARTS)		
-29	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-30	----- -----			1		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-31	118-2564-00			1		BRACKET,RIGHT:CHAIN,STEEL	54473	EMJ-MP8210106
						(ATTACHING PARTS)		
-32	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-33	----- -----			1		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-34	118-2590-00			1		CHAIN ASSY:	54473	EMJ-MA8210902
						(ATTACHING PARTS)		
-35	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
-36	118-2589-00			1		PLATE,NUT:	54473	EMJ-MP8210901
-37	----- -----			6		SCREW,MACHINE:M 3 X 3.2		
						- - - * - - -		
-38	118-2567-00			1		BRACKET:CHAIN,HOSE,STEEL	54473	EMJ-MA8210102
-39	118-2881-00			1		HOSE:INK		
	118-2982-00			1		CONNECTOR:INK LINE		
-40	118-2426-00			1		BRACKET,CABINET:LEFT FRONT,STEEL	54473	EMJ-MP8211005
						(ATTACHING PARTS)		
-41	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-42	118-2500-00			1		COVER:HEAD DRIVER,STEEL	54473	EMJ-MP8210809
						(ATTACHING PARTS)		
-43	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-44	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-45	----- -----			1		CKT BOARD ASSY:HEAD DRIVER(SEE A4A1 REPL)		
						(ATTACHING PARTS)		
-46	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 12,STL		
						- - - * - - -		
-47	----- -----			4		SPACER:		
-48	118-2493-00			1		BASE:HEAD DRIVER	54473	EMJ-MP8210808
						(ATTACHING PARTS)		
-49	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
	118-2971-00			1		HT SINK,HD DR:INK JET,STEEL	54473	EMJ-E8213201
	342-0209-00			1		INSULATOR,PLATE:TRANSISTOR,MICA	04713	OBD
-50	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-51	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
-52	----- -----			1		BRACKET,HOSE:BASE,STEEL		
						(ATTACHING PARTS)		
-53	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
						- - - * - - -		
-54	118-2586-00			1		INDICATOR,CRTG:W/ECB	54473	EMJ-MA8210905
	----- -----			1		. CKT BOARD ASSY:INDICATOR EMPTY CARTRIDGE		
	----- -----			-		. (A16 REPLACEABLE WITH 118-2586-00 ONLY)		
						(ATTACHING PARTS)		
-55	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-56	----- -----			2		SCREW,MACHINE:		
-57	----- -----			2		SPACER:		
-58	----- -----			2		WASHER:		
-59	----- -----			1		NUT:		
						- - - * - - -		
-60	118-2585-00			1		BRKT,INDICATOR:STEEL	54473	EMJ-MP8210903
						(ATTACHING PARTS)		
-61	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-62	----- -----			1		AIR PUMP:CAP		
						(ATTACHING PARTS)		
-63	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
-64	----- -----			1		VACUME PUMP:CAP		
						(ATTACHING PARTS)		
-65	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
-66	----- -----			1		AIR PUMP:CAP(SEE B1005 REPL)		
						(ATTACHING PARTS)		
-67	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-68	118-2582-00			1		MANIFOLD:AIR PUMP	54473	EMJ-MA8210906
						(ATTACHING PARTS)		
-69	----- -----			2		SCEW,MACHINE:WASHER ASSY,M 3 X 12,STL		
						- - - * - - -		
-70	118-2583-00			1		BRACKET:MANIFOLD,PUMP	54473	EMJ-MP8210904
						(ATTACHING PARTS)		
-71	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-72	255-0869-00			AR		TUBING,NM:CLEAR PLASTIC		
-73	366-1039-00			1		KNOB:GRAY	80009	366-1039-00
-74	213-0153-00			1		. SETSCREW:5-40 X 0.125,STL BK OXD,HEX SKT	000CY	OBD
-75	175-8615-00			1		CA ASSY,SP,ELEC:8,26 AWG,21.0 L,RIBBON	80009	175-8615-00
						(ATTACHING PARTS)		
-76	210-0583-00			1		NUT,PLAIN,HEX:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-77	210-0905-00			1		WASHER,FLAT:0.256 ID X 0.05 THK,BRS	83385	OBD
						- - - * - - -		
-78	----- -----			1		SWITCH:PUMP(SEE S1000 REPL)		
-79	386-2149-00			1		PLATE,CMPNT MTG:SWITCH,AL	80009	386-2149-00
-80	118-2488-00			1		BRACKET,SWITCH:STEEL	54473	EMJ-MP8210810
						(ATTACHING PARTS)		
-81	----- -----			2		SCREW,MACHIE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-82	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-83	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
-84	----- -----			1		VALVE:		
-85	255-0869-00			AR		TUBING,NM:CLEAR PLASTIC		
-86	118-2425-00			1		BRACKET,CABINET:RIGHT FRONT,STEEL	54473	EMJ-MP821106
						(ATTACHING PARTS)		
-87	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-88	118-2559-00			1		BASE,AIR PUMP:STEEL	54473	EMJ-MP8210104
						(ATTACHING PARTS)		
-89	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-90	118-2569-00			2		POST:PUMP,LONG,STEEL	54473	EMJ-ME8210105
-91	118-2568-00			2		POST:PUMP,SHORT,STEEL	54473	EMJ-ME8210106
-92	----- -----			1		HOSE BRACKET:		
						(ATTACHING PARTS)		
-93	----- -----			1		SCREW,MACHINE:		
-94	----- -----			1		NUT:		
						- - - * - - -		
-94	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-95	----- -----			2		SCREW,MACHINE:		
						- - - * - - -		
-96	----- -----			4		BRACKET:		
						(ATTACHING PARTS)		
-97	----- -----			8		SCREW,MACHINE:		
						- - - * - - -		
-98	118-2588-00			4		COUPLER ASSY:	54473	EMJ-MA8210903
-99	118-2587-00			2		HOLDER COUPLER:	54473	EMJ-MA8210904
						(ATTACHING PARTS)		
-100	----- -----			8		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-101	118-2558-00			1		BASE,COUPLER:STEEL	54473	EMJ-MP8210103
-102	118-2571-00			1		POST,COUPLER:LONG,STEEL	54473	EMJ-ME8210103
-103	118-2570-00			2		POST,COUPLER:SHORT,STEEL	54473	EMJ-ME8210104
-104	118-2572-00			1		POST,COUPLER:LONG,STEEL	54473	EMJ-ME8210102
-105	118-2560-00			1		HOLDER,FAN:COOLING SYSTEM	54473	EMJ-MP8210109
						(ATTACHING PARTS)		
-106	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
						- - - * - - -		
-107	118-2561-00			1		FAN:COOLING(SEE B1001 REPL)		
						(ATTACHING PARTS)		
-108	----- -----			2		SCREW,MACHINE:M 3 X 35,STL		
-109	----- -----			2		WASHER,PLAIN:M 3,STEEL		
-110	----- -----			2		WASHER,SPRING:M 3,STL		
						- - - * - - -		
-111	118-2562-00			1		BRACKET,FRONT:FAN,STEEL	54473	EMJ-MP8210108
-112	----- -----			2		SCREW,MACHINE:FLUSH HEAD,M 3 X 5,STL		
						- - - * - - -		
-113	118-2563-00			1		BRACKET,BASE:FAN	54473	EMJ-MP8210107
						(ATTACHING PARTS)		
-114	----- -----			2		SCREW,MACHINE:FLUSH HEAD,M 3 X 5,STL		
						- - - * - - -		
-115	118-2578-00			1		SPACER:ALUMINUM	54473	EMJ-MB8210101
						(ATTACHING PARTS)		
-116	----- -----			4		SCREW,MACHINE:M 5 X 50,STL		
-117	----- -----			4		WASHER,PLAIN:M 5,STEEL		
-118	----- -----			4		WASHER,SPRING:M 5,STL		
						- - - * - - -		
-119	----- -----			1		CLAMP:		
						(ATTACHING PARTS)		
-120	----- -----			1		SCREW,MACHINE:		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-121	118-2576-00			1		SPACER:ALUMINUM	54473	EMJ-MB8210102
						(ATTACHING PARTS)		
-122	----- -----			4		SCREW,MACHINE:M 5 X 50,STL		
-123	----- -----			4		WASHER,PLAIN:M 5,STEEL		
-124	----- -----			4		WASHER,SPRING:M 5,STEEL		
						- - - * - - -		
-125	118-2575-00			1		MEMBER,REINF:FRONT	54473	EMJ-MB8210103
						(ATTACHING PARTS)		
-126	----- -----			6		SCREW,MACHINE:WASHER ASSY,M 4 X 10,STL		
						- - - * - - -		
-127	118-2574-00			1		MEMBER,REINF:REAR	54473	EMJ-MB820104
						(ATTACHING PARTS)		
-128	----- -----			6		SCREW,MACHINE:WASHER ASSY,M 4 X 10,STL		
						- - - * - - -		
-129	118-2457-00			1		PULLEY:TENSION,	54473	EMJ-MA8210505
						(ATTACHING PARTS)		
-130	----- -----			1		SCREW,MAHCINE:M 5 X 20,STL		
-131	----- -----			1		WASHER,SPRING:M 5,STEEL		
-132	----- -----			2		WASHER,PLAIN:M 5,STEEL		
-133	----- -----			1		SPACER,STEEL:		
-134	----- -----			1		NUT:5 M,STEEL		
						- - - * - - -		
-135	118-2438-00			1		BRACKET:TENSION,STEEL	54473	EMJ-MP8210503
						(ATTACHING PARTS)		
-136	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 4 X 8,STL		
						- - - * - - -		
-137	118-2577-00			1		FRAME,PLATE:RIGHT,STEEL	54473	EMJ-MP8210102
	118-2579-00			1		FRAME,PLATE:LEFT,STEEL	54473	EMJ-MP8210101
-138	118-2421-00			1		FRAME DOOR:PAPER OUTPUT	54473	EMJ-MP8211007
						(ATTACHING PARTS)		
-139	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
-140	----- -----			2		SCREW,MACHINE:FLUSH HEAD,M 3 X 5,STL		
						- - - * - - -		
-141	118-2573-00			4		FOOT:PLASTIC	54473	EMJ-ME8210101
						(ATTACHING PARTS)		
-142	----- -----			8		SCREW,MACHINE:WASHER ASSY,M 4 X 14,STL		
						- - - * - - -		
-143	----- -----			1		CABLE,CLAMP:		
-144	118-2580-00			1		BASE ASSEMBLY:ALUMINUM	54473	EMJ-MA8210101

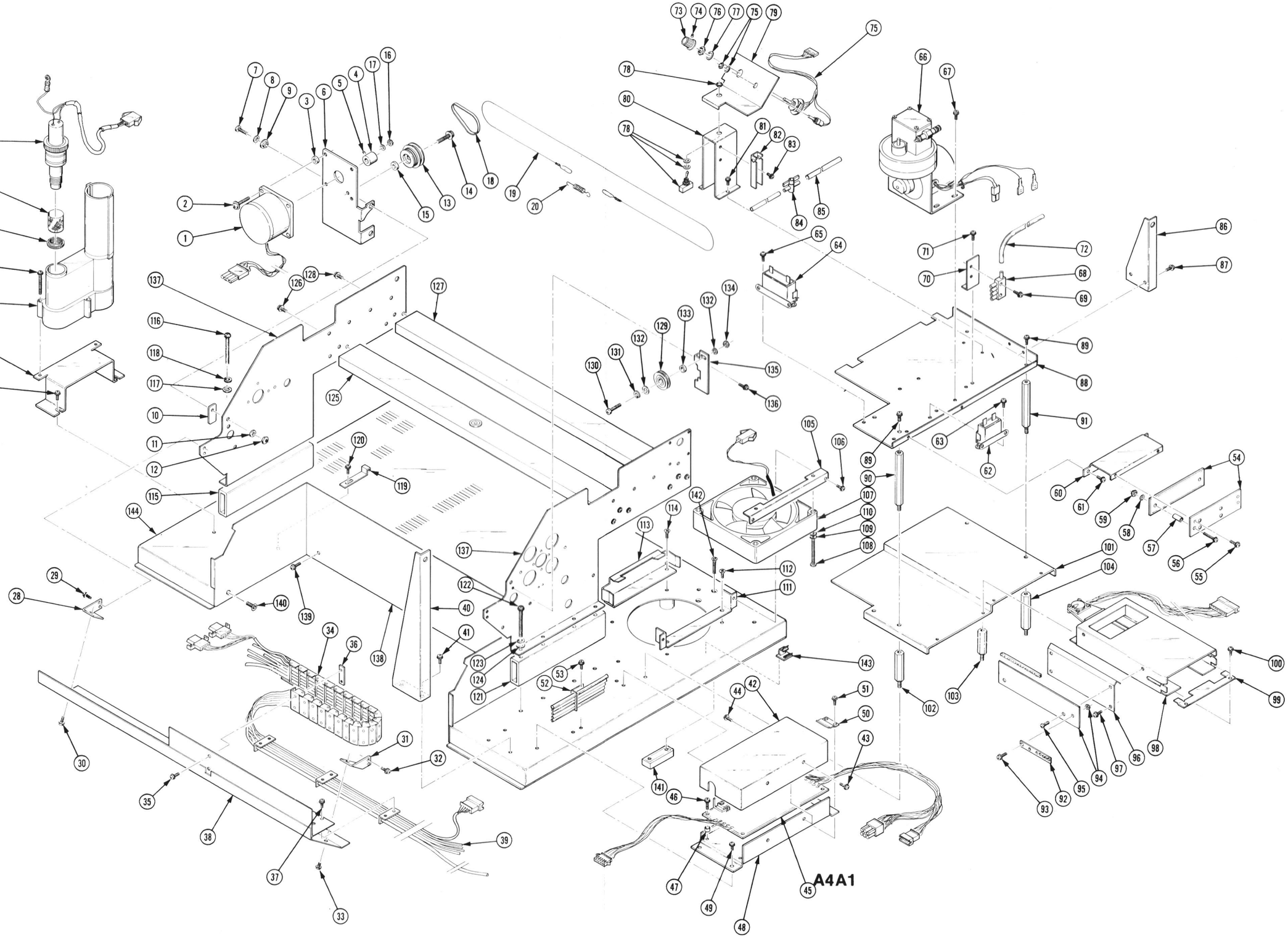


FIG. 3 CARD CAGE

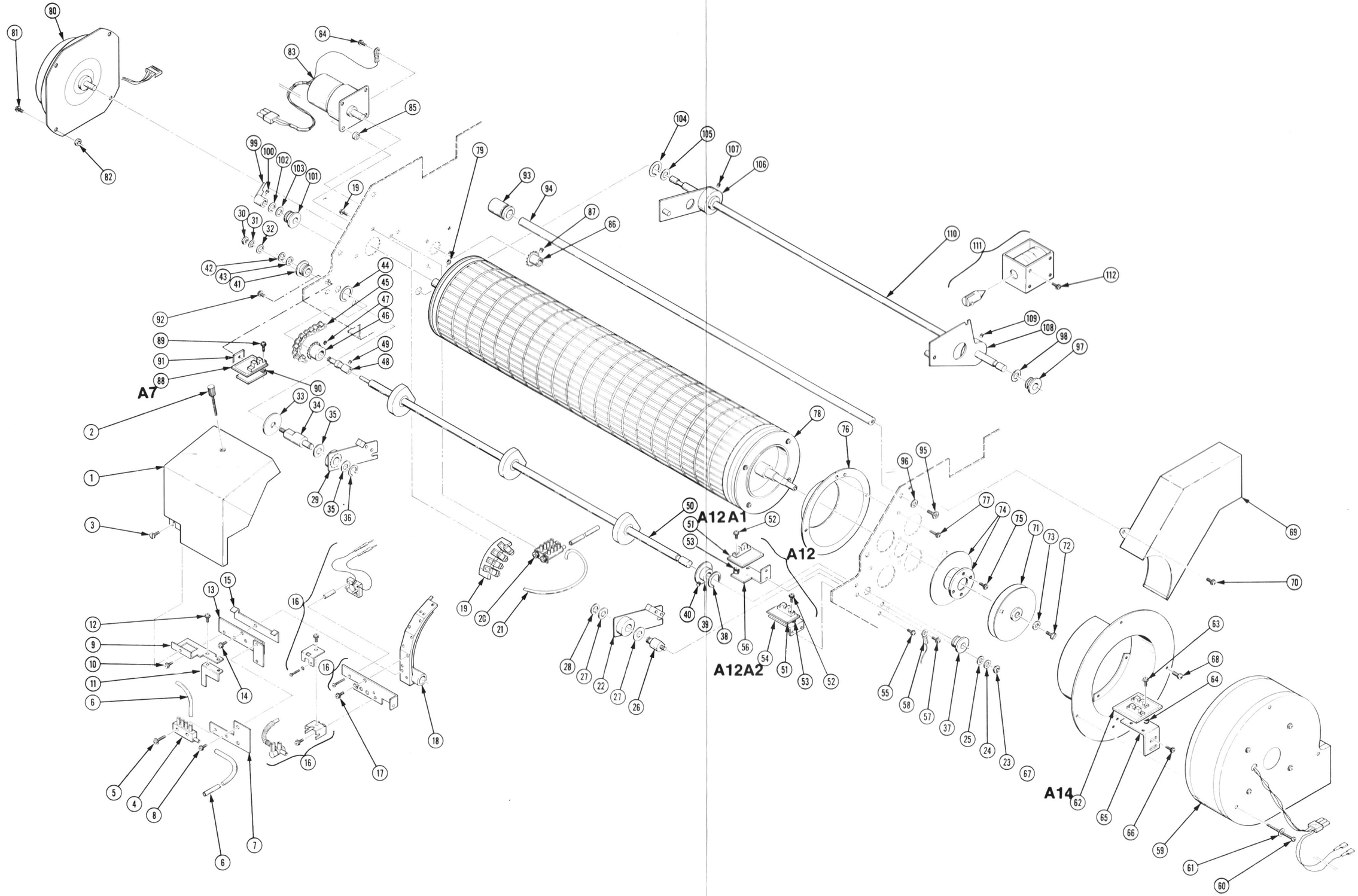


FIG. 4 DRUM & INK JETS

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-1	118-0165-00			1		COVER,CARRIAGE:ALUMINUM	54473	EMJ-MP8210507
						(ATTACHING PARTS)		
-2	----- -----			1		SCREW:THUMB		
-3	----- -----			1		SCREW:		
						- - - * - - -		
-4	118-2591-00			1		MANIFOLD:AIR HEAD	54473	EMJ-MA8210901
						(ATTACHING PARTS)		
-5	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 12,STL		
						- - - * - - -		
-6	255-0869-00			AR		TUBING,NM:CLEAR PLASTIC		
-7	118-2884-00			1		BRKT,MANIFOLD:STEEL	54473	EMJ-MP8210508
						(ATTACHING PARTS)		
-8	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-9	118-2886-00			1		BRACKET,CONNAGE:STEEL	54473	EMJ-MP8210504
						(ATTACHING PARTS)		
-10	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-11	118-2885-00			1		INTRPT,CARRIAGE:STEEL	54473	EMJ-MP8210505
						(ATTACHING PARTS)		
-12	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-13	118-2883-00			1		BRKT,CARRIAGE:STEEL	54473	EMJ-MA8210506
						(ATTACHING PARTS)		
-14	----- -----			1		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-15	118-2887-00			1		PLATE,CARRIAGE:STEEL	54473	EMJ-MP8210501
-16	118-2898-01			1		INK JET ASSY:		
	118-2933-00			1		. COCK,INK:3 WAY	54473	EMJ-MC0010
	118-2880-00			1		. HOSE:SPIRAL	54473	EMJ-MHE006
	118-2903-00			1		. PLUG:FOR INK TUBE	54473	EMJ-MC0009
	----- -----			2		. SCRW:M1.4		
	----- -----			2		. O-RING:1.25 NBR		
	----- -----			1		. SCREW,MACHINE:M 2.0		
	----- -----			1		. O-RING:1.85 NBR		
	118-2873-00			4		CAP:HEAD PROTECTION	54473	EMJ-MHE008
	118-2899-00			1		. PULLY ASSY:W/HARDWARE	54473	EMJ-MA8220504
	----- -----			1		. SPRING:		
	118-2901-00			1		. DAMPER:RUBBER A	54473	EMJ-ME8210507
	118-2902-00			1		. DAMPER:RUBBER B	54473	EMJ-ME8210508
						(ATTACHING PARTS)		
-17	----- -----			1		SCREW:		
-18	----- -----			1		CARRIAGE:ZINC		
-19	118-1284-00			1		CAP:HEAD		
-20	----- -----			1		BEARING ASSY:DRUM	54473	EMJ-MA8210601
-21	255-0868-00			AR		TUBING,NM:CLEAR PLASTIC		
-22	118-2446-00			1		LEVER:RIGHT,DRUM LOCK,STEEL	54473	EMJ-MA8210402
						(ATTACHING PARTS)		
-23	----- -----			1		NUT:M 5,STEEL		
-24	----- -----			1		WASHER:SPRING,M 5,STL		
-25	----- -----			1		WASHER:PLAIN,M 5,STL		
-26	118-2448-00			1		ARM:RIGHT,DRUM LOCK,STEEL	54473	EMJ-ME8210403
-27	----- -----			2		WASHER:THRUST BEARING,8		
-28	----- -----			1		E-RING:7,STEEL		
						- - - * - - -		
-29	118-2445-00			1		LEVER:LEFT,DRUM LOCK,STEEL	54473	EMJ-MA8210401
						(ATTACHING PARTS)		
-30	----- -----			1		NUT:M 5,STEEL		
-31	----- -----			1		WASHER:SPRING,M 5,STEEL		
-32	----- -----			1		WASHER:PLAIN,M 5,STEEL		
-33	118-2460-00			1		WASHER:3 X 2 X 25	54473	EMJ-ME8210402
-34	118-2447-00			1		ARM:LEFT,DRUM LOCK,STEEL	54473	EMJ-ME8210401
-35	118-2459-00			2		WASHER:TRUST BEARING,STEEL	54473	EMJ-ZTW0815
-36	----- -----			1		E-RING:7,STEEL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-37	118-2435-00			2		BEARING:RIGHT PAPER STRIP ROLLER	54473	EMJ-ME8210703
						(ATTACHING PARTS)		
-38	----- -----			2		E-RING:WAVE,10,STEEL		
						- - - * - - -		
-39	118-2482-00			1		INTERRUPTER:PAPER STRIP	54473	EMJ-ME8210704
-40	----- -----			1		SCREW,SET:		
-41	118-2434-00			2		BEARING:LEFT,PAPER STRIP ROLLER	54473	EMJ-ME8210702
						(ATTACHING PARTS)		
-42	----- -----			1		E-RING:		
-43	----- -----			1		WASHER:		
-44	----- -----			2		E-RING:WAVE,10,STEEL		
						- - - * - - -		
-45	118-2458-00			1		CHAIN:54 X RS25	54473	EMJ-MZRS25X54
-46	118-2467-00			1		WHEEL CHAIN:N10XRS25	54473	EMJ-ME8210701
-47	----- -----			1		SCREW,MACHINE:M 3 X 5,STL		
-48	118-2481-00			2		SHAFT:PAPER STRIP ROLLER,STEEL	54473	EMJ-MS8210701
-49	----- -----			2		SCREW,SET:M 4 X 5,STEEL		
-50	118-2480-00			2		ROLLER:PAPER STRIP	54473	EMJ-MA8210701
-51	----- -----			1		SENSOR:ROPS,SSLMT(SEE A12 REPL)		
						(ATTACHING PARTS)		
-52	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-53	----- -----			1		SPACER:PLASTIC		
						- - - * - - -		
-54	118-2515-00			1		BRACKET,SENSOR:PAPER STRIP	54473	EMJ-MP8210805
						(ATTACHING PARTS)		
-55	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-56	118-2517-00			1		BRACKET,SENSOR:CARRIAGE	54473	EMJ-MP8210806
						(ATTACHING PARTS)		
-57	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-58	----- -----			1		GROUND,STRAP:		
						- - - * - - -		
-59	----- -----			1		FAN:SUCTION(SEE B1007 REPL)		
						(ATTACHING PARTS)		
-60	----- -----			3		SCREW,MACHINE:M 3 X 60,STL		
-61	----- -----			3		WASHER:PLANE,M 3,STL		
						- - - * - - -		
-62	----- -----			1		SENSOR:DLPT/EN(SEE A14 REPL)		
						(ATTACHING PARTS)		
-63	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-64	----- -----			4		SPACER:PLASTIC		
						- - - * - - -		
-65	118-2516-00			1		BRACKET,SENSOR:STEEL	54473	EMJ-MP8210807
						(ATTACHING PARTS)		
-66	----- -----			2		SCREW,MACHINE:CUP,HEAD,M 3 X 5,STL		
						- - - * - - -		
-67	118-2449-00			1		BRACKET,FAN:SUCTION,ALUMINUM	54473	EMJ-MB8210302
						(ATTACHING PARTS)		
-68	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
						- - - * - - -		
-69	118-2468-00			1		DUCT:SUCTION ALUMINUM	54473	EMJ-MA8210306
						(ATTACHING PARTS)		
-70	----- -----			2		SCREW,MACHINE:HEXAGON HEAD,W/CROSS-RECESSED		
						- - - * - - -		
-71	118-2487-00			1		DISC,ENCODER:LOCK POINT	54473	EMJ-MA8210305
						(ATTACHING PARTS)		
-72	118-2451-00			1		SCREW,MACHINE:LEFT,HANDED,STEEL	54473	EMJ-XSN4+8L
-73	118-2450-00			1		WASHER,SPRING:CONICAL,M 4,STEEL	54473	EMJ-ME8210302
						- - - * - - -		
-74	118-2463-00			1		BEARING ASSY:DRUM	54473	EMJ-MA8210304
						(ATTACHING PARTS)		
-75	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
						- - - * - - -		
-76	118-2465-00			1		FLANGE,SUCTION:	54473	EMJ-MB8210301
						(ATTACHING PARTS)		
-77	----- -----			4		SCREW,MACHINE:M 4 X 18,STL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-78	118-2875-00			1		DRUM ASSY:W/LOCK ASSY & W/HDW	54473	EMJ-MA8210301
-79								
-80	----- -----			1		MOTOR:MAIN(SEE B1003 REPL)		
						(ATTACHING PARTS)		
-81	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-82	----- -----			3		SPACER:STEEL		
						- - - * - - -		
-83	----- -----			1		MOTOR:PAPER STRIP(SEE B1011 REPL)		
						(ATTACHING PARTS)		
-84	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
-85	----- -----			4		SPACER:STEEL		
-86	118-2466-00			1		WHEEL CHAIN:N9XRS25,	54473	EMJ-ME8210705
-87	----- -----			1		. SCREW,SET:M 3 X 3,STEEL		
						- - - * - - -		
-88	----- -----			1		CKT BOARD ASSY:SENSOR,STPS(SEE A7 REPL)		
						(ATTACHING PARTS)		
-89	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-90	----- -----			2		SPACER:PLASTIC		
						- - - * - - -		
-91	118-2512-00			1		BRACKET,SENSOR:CARRIAGE	54473	EMJ-MP8210803
						(ATTACHING PARTS)		
-92	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-93	118-2888-00			1		BRG,CARRIAGE:STEEL	54473	EMJ-MA8210502
-94	118-2462-00			2		SHAFT,SLIDE:STEEL	54473	EMJ-MS8210501
						(ATTACHING PARTS)		
-95	----- -----			4		SCREW,MACHINE:HEX HD,W/CROSS-RECESSED,M5X10,STL		
-96	----- -----			4		WASHER:PLAIN,M 5,STEEL		
						- - - * - - -		
-97	118-2444-00			1		BEARING:RIGHT,DRUM LOCK SHAFT	54473	EMJ-ME8210405
						(ATTACHING PARTS)		
-98	----- -----			1		E-RING:WAVE,10,STEEL		
						- - - * - - -		
-99	118-2486-00			1		INTERRUPTER:DRUM LOCK,ALUMINUM	54473	EMJ-ME8210406
-100	----- -----			1		. SCREW,SET:M 4 X 5,STEEL		
-101	118-2443-00			1		BEARING:LEFT,DRUM LOCK SHAFT	54473	EMJ-ME8210404
						(ATTACHING PARTS)		
-102	----- -----			1		E-RING:5,STEEL		
-103	118-2461-00			1		WASHER:TRUST BEARING	54473	EMJ-ZTW0612
-104	----- -----			1		E-RING:WAVE,10,STEEL		
-105	118-2461-00			1		WASHER:TRUST BEARING	54473	EMJ-ZTW0612
						- - - * - - -		
-106	118-2441-00			1		LEVER:LEFT,ROCKER,STEEL	54473	EMJ-MA8210403
-107	----- -----			2		. SCREW,SET:M 5 X 8,STL		
-108	118-2442-00			1		LEVER:RIGHT,ROCKER,STEEL	54473	EMJ-MA8210404
-109	----- -----			2		. SCREW,SET:M 5 X 8,STL		
-110	118-2876-00			1		SHAFT ASSY:WITH HARDWARE	54473	EMJ-MM8210408
-111	118-2877-00			1		SOLENOID ASSY:WITH HARDWARE	54473	EMJ-MM8210409
						(ATTACHING PARTS)		
-112	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
5-1	118-2520-00			2		SLIDE,DWR,EXT:STEEL	54473	EMJ-MA8210201
						(ATTACHING PARTS)		
-2	----- -----			8		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-3	118-2521-00			1		PLATE,MOUNTING:LEFT STEEL	54473	EMJ-MP8210201
						(ATTACHING PARTS)		
-4	----- -----			3		SCREW,MACHINE:CUP HEAD,M 3 X 5,STL		
						- - - * - - -		
-5	118-2522-00			2		BRACKET,BELT:STEEL	54473	EMJ-MP8210202
-6	118-2523-00			2		CLIP,BELT:STEEL	54473	EMJ-MP8210203
						(ATTACHING PARTS)		
-7	----- -----			4		SCREW,MACHINE:M 3 X 6,STEEL		
-8	----- -----			4		NUT:		
-9	----- -----			4		SCREW,MACHINE:CUP HEAD,M 3 X 4,STL		
						- - - * - - -		
-10	118-2524-00			1		PLATE,MOUNTING:RIGHT STEEL	54473	EMJ-MP8210204
						(ATTACHING PARTS)		
-11	----- -----			3		SCREW,MACHINE:CUP HEAD,M 3 X 5,STL		
						- - - * - - -		
-12	118-2525-00			1		INTERRUPTER:STEEL	54473	EMJ-MP8210205
						(ATTACHING PARTS)		
-13	----- -----			2		SCREW,MACHINE:CUP HEAD,M 3 X 4,STL		
-14	118-2526-00			1		SPRING,HLEXT:	54473	EMJ-ME8210201
						- - - * - - -		
-15	118-2527-00			1		BRKT,PAPER CARR:LEFT STEEL	54473	EMJ-MP8210206
-16	118-2528-00			1		STRIP,MOUNTING:LEFT STEEL	54473	EMJ-MP8210207
						(ATTACHING PARTS)		
-17	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-18	----- -----			2		E-RING:04,STL		
						- - - * - - -		
-19	118-2529-00			1		BRKT,PAPER CARR:RIGHT STEEL	54473	EMJ-MP8210208
-20	118-2530-00			1		STRIP,MOUNTING:RIGHT STEEL	54473	EMJ-MP8210209
						(ATTACHING PARTS)		
-21	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
-22	----- -----			2		E-RING:05,STL		
						- - - * - - -		
-23	118-2531-00			1		ARM,SUPPORT:STEEL	54473	EMJ-ME8210202
						(ATTACHING PARTS)		
-24	118-2532-00			1		SCREW,MACHINE:STEEL	54473	EMJ-ME8210204
-25	118-2533-00			1		BEARING,BALL:	54473	EMJ-Z632ZZ
-26	----- -----			1		SPACER:STL		
-27	----- -----			1		E-RING:05,STL		
						- - - * - - -		
-28	118-2534-00			1		LVR,PPR,CARRIER:LEFT STEEL	54473	EMJ-MA8210202
-29	----- -----			2		. SCREW,SET:M 4 X 5,STL		
-30	118-2535-00			1		LVR,PPR,CARRIER:LEFT STEEL	54473	EMJ-MA8210203
-31	----- -----			2		. SCREW,SET:M 4 X 5,STL		
						(ATTACHING PARTS)		
-32	----- -----			1		E-RING:05,STL		
						- - - * - - -		
-33	118-2536-00			1		SHAFT,STRAIGHT:RIGHT STEEL	54473	EMJ-MS8210201
-34	118-2537-00			1		EXTENSION SHAFT:LEFT STEEL	54473	EMJ-MS8210202
						(ATTACHING PARTS)		
-35	118-2538-00			2		HOUSING BEARING:AL	54473	EMJ-MB8210201
-36	118-2539-00			2		BEARING BALL:	54473	EMJ-Z605ZZ
						- - - * - - -		
-37	118-2540-00			1		PAPER CAPR ASSY:	54473	EMJ-MA8210204
-38	----- -----			1		LABEL:WARNING		
-39	118-2541-00			1		KNOB:ABS	54473	EMJ-ME8210205
-40	118-2542-00			1		ARM SUCTION:	54473	EMJ-MA8210206
-41	----- -----			1		PLUG:		
-42	118-2543-00			1		BEARING SLEEVE:DRIVE SHAFT	54473	EMJ-ME8210210
						(ATTACHING PARTS)		
-43	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
5-44	118-2544-00			1		SHAFT,STRAIGHT:DRIVE STEEL	54473	EMJ-MS8210203
-45	----- -----			1		. SCREW,SET:M 4 X 5,STL		
-46	118-2545-00			2		SPROCKET,WHEEL:TIMING BELT,AL	54473	EMJ-ME8210211
-47	----- -----			4		. SCREW,SET:M 4 X 5,STL		
-48	----- -----			1		MOTOR,DC:0.1 HP,24V(SEE B1009 REPL)		
						(ATTACHING PARTS)		
-49	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-50	----- -----			4		SPACER:STEEL		
						- - - * - - -		
-51	118-2547-00			2		BELT,POS DRIVE:TIMING	54473	EMJ-ZB265MXL7
-52	118-2548-00			2		SPROCKET,WHEEL:TENSION,AL	54473	EMJ-ME8210213
						(ATTACHING PARTS)		
-53	118-2549-00			2		SCREW,SHOULDER:STEEL	54473	EMJ-ME8210214
-54	----- -----			3		WASHER:M 4,STEEL		
-55	----- -----			1		WASHER,SPRING:M 4,STL		
-56	----- -----			1		NUT:M 4,STEEL		
-57	118-2550-00			1		NUT PLATE:STEEL	54473	EMJ-ME8210215
						- - - * - - -		
-58	----- -----			1		SENSOR:FSE,BSW(SEE A8 REPL)		
						(ATTACHING PARTS)		
-59	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-60	----- -----			4		SPACER,PLASTIC:		
						- - - * - - -		
-61	----- -----			1		SENSOR:DRLK(SEE A9 REPL)		
						(ATTACHING PARTS)		
-62	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
-63	----- -----			2		SPACER,PLASTIC:		
						- - - * - - -		
	118-2514-00			1		BRACKET SENSOR:DRUM LOCK	54473	EMJ-MP8210804
						(ATTACHING PARTS)		
	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 10,STL		
						- - - * - - -		
-64	118-2552-00			1		GUIDE ASSEMBLY:LEFT TRAY	54473	EMJ-MA8210207
						(ATTACHING PARTS)		
-65	----- -----			6		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-66	118-2553-00			1		GUIDE ASSEMBLY:RIGHT TRAY	54473	EMJ-MA8210208
						(ATTACHING PARTS)		
-67	----- -----			6		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-68	118-2554-00			1		GUIDE PAPER:STEEL	54473	EMJ-MP8210214
						(ATTACHING PARTS)		
-69	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-70	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-71	----- -----			2		SCREW:		
						- - - * - - -		
-72	----- -----			2		SENSOR ASSEMBLY:(SEE A11 REPL)		
						(ATTACHING PARTS)		
-73	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		

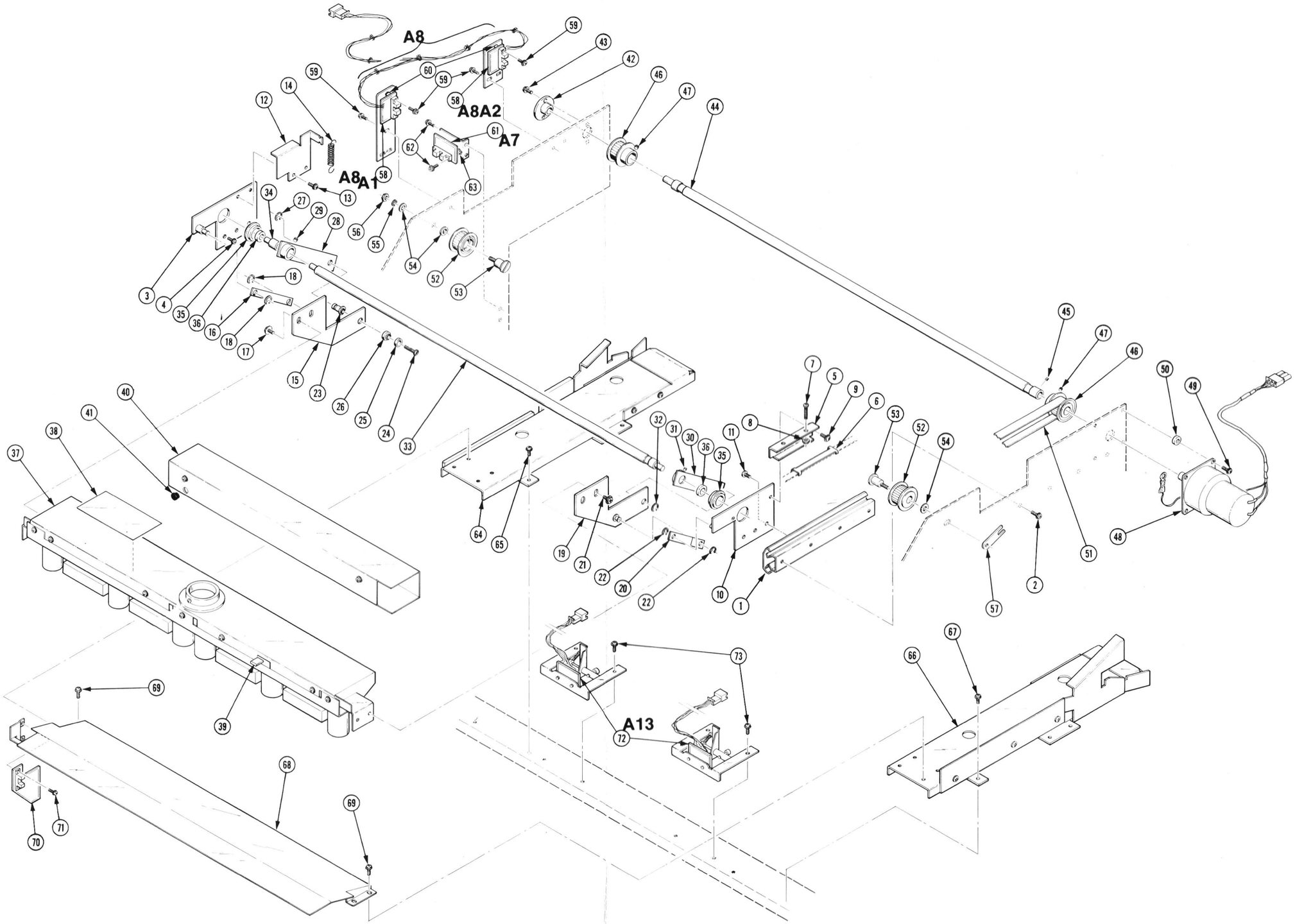


FIG. 5 PAPER ASSEMBLY

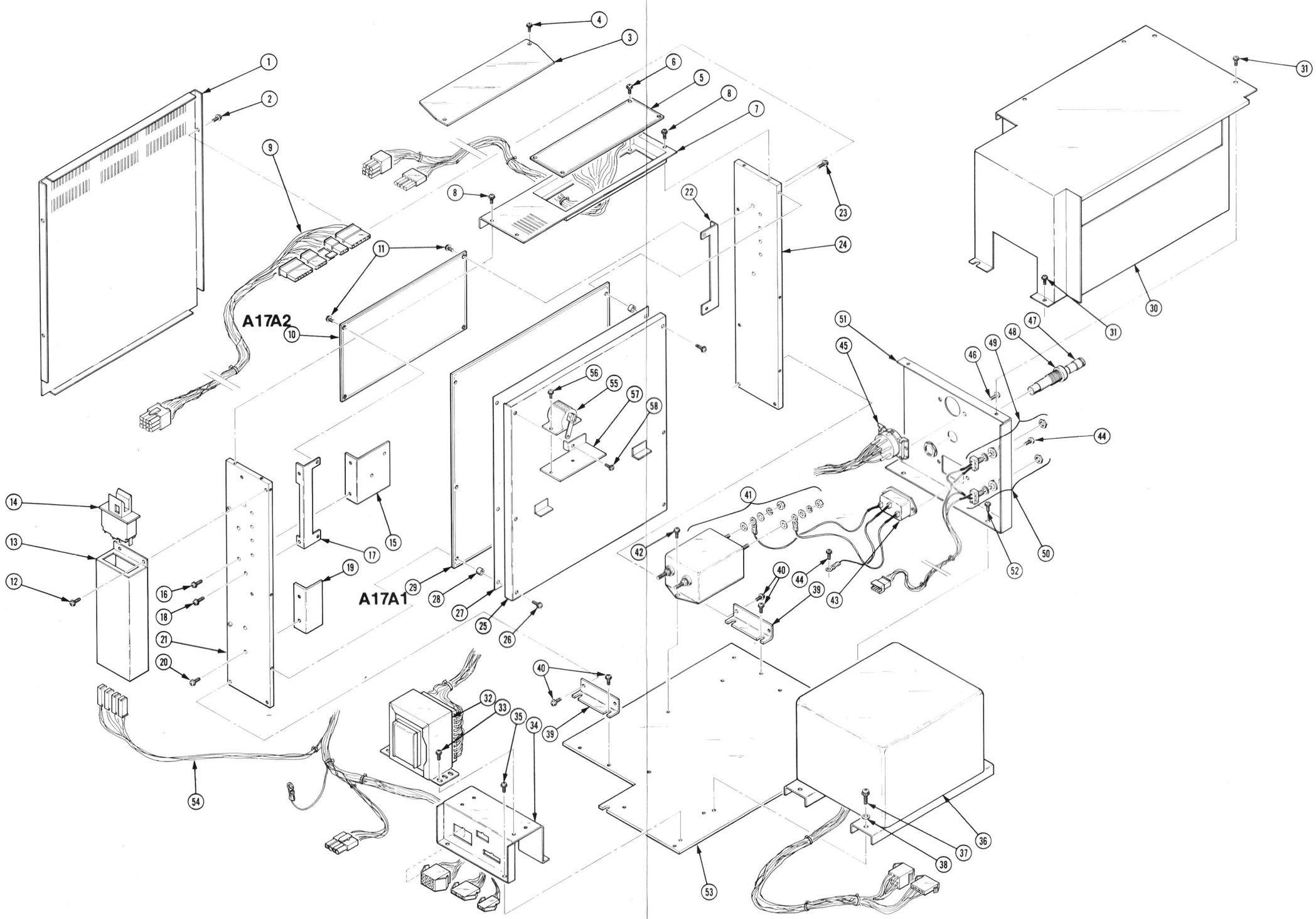
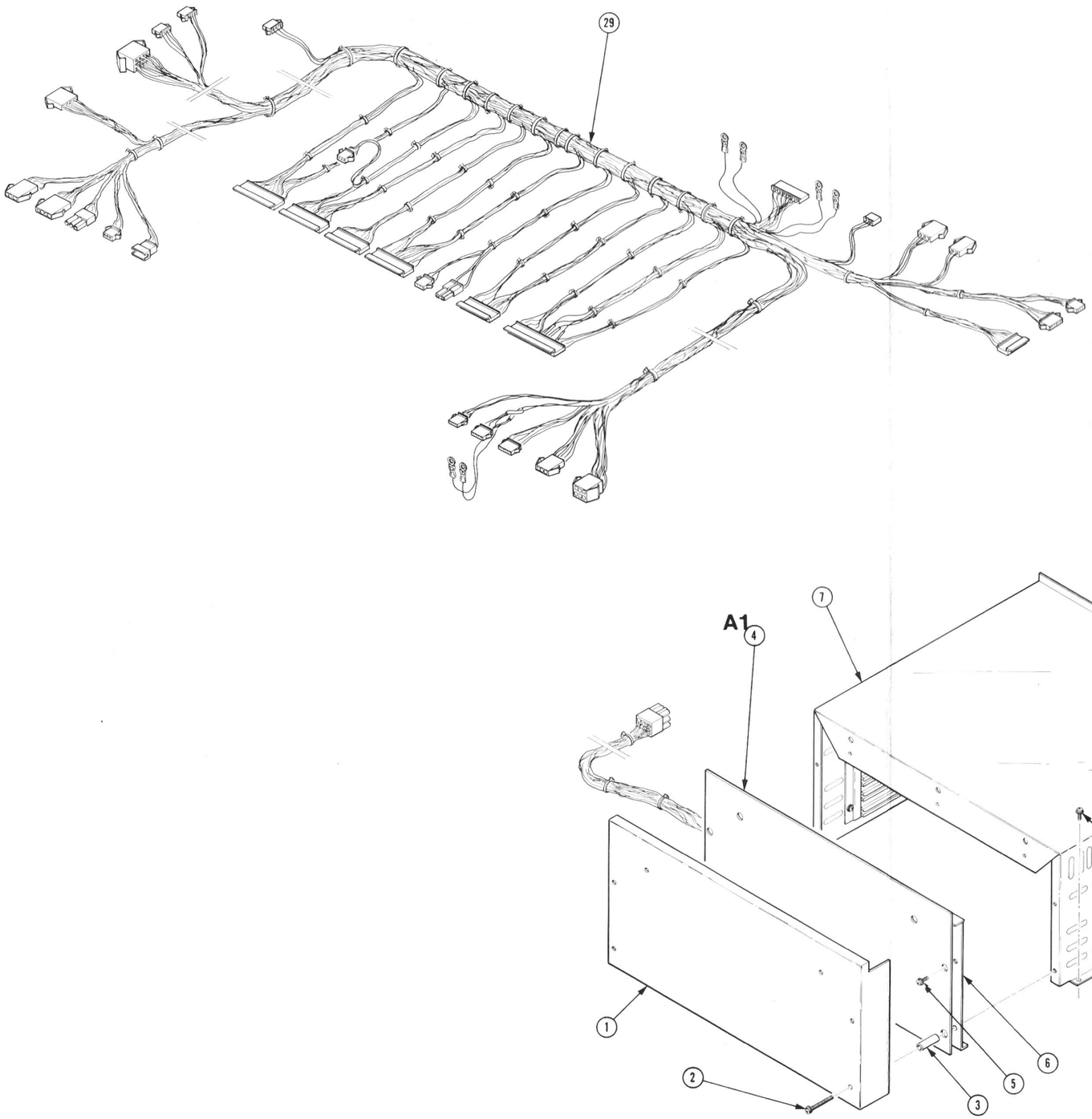


FIG. 6 POWER SUPPLY

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
6-	118-2874-00			1		POWER SUPPLY:	54473	EMJ-MM8210809
-1	118-2495-00			1		COVER,REGULATOR,STEEL	54473	EMJ-MP8210820
						(ATTACHING PARTS)		
-2	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-3	118-2496-00			1		COVER,FUSE HLDR:PLASTIC	54473	EMJ-MP8210819
						(ATTACHING PARTS)		
-4	----- -----			2		SCREW,MACHINE:WASHER ASSY,M 3 X 8,STL		
						- - - * - - -		
-5	118-2915-00			1		BRKT,MOUNRNG:ECB W/CABLE	54473	EMJ-E8212117
	----- -----			-		(SEE A17A1 FOR FUSES F2-F8)		
						(ATTACHING PARTS)		
-6	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-7	118-2882-00			1		BRACKET:FUSE HOLDER	54473	EMJ-E8212112
						(ATTACHING PARTS)		
-8	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-9	----- -----			1		CABLE:		
-10	----- -----			1		CKT BOARD ASSY:(SEE A17A2 REPL)		
						(ATTACHING PARTS)		
-11	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
	----- -----			-		CKT BOARD ASSY INCLUDES:		
	386-0978-00			1		. INSULATOR PLATE:	80009	386-0978-00
	342-0209-00			1		. INSULATOR PLATE:	80009	342-0209-00
-12	118-2494-00			1		COVER,SWITCH:STEEL	54473	EMJ-MP8210821
						(ATTACHING PARTS)		
-13	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-14	118-2927-00			1		SWITCH,SAFETY:INTERLOCK	54473	F81A-811
-15	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-16	----- -----			2		SCREW:		
						- - - * - - -		
-17	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-18	----- -----			2		SCREW:		
						- - - * - - -		
-19	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-20	----- -----			2		SCREW:		
						- - - * - - -		
-21	118-2502-00			1		HEAT SINK:REGULATOR,ALUMINUM	54473	EMJ-MP8210816
-22	----- -----			1		BRACKET:		
						(ATTACHING PARTS)		
-23	----- -----			2		SCREW:		
						- - - * - - -		
-24	118-2503-00			1		HEAT SINK:REGULATOR,ALUMINUM	54473	EMJ-MP8210815
-25	118-2497-00			1		COVER,PUB,STEEL:	54473	EMJ-MP8210818
						(ATTACHING PARTS)		
-26	----- -----			6		SCREW,MACHINE:WASHER ASSY,M 3 X 12,STL		
						- - - * - - -		
-27	118-2501-00			1		INSULATOR,PLATE:	54473	EMJ-MP8210817
-28	----- -----			6		SPACER,PLASTIC:		
-29	----- -----			1		CKT BOARD ASSY:LOW VOLTAGE REGULATOR		
	----- -----			-		(SEE A7A1 REPL)		
	342-0630-00			6		. INSULATOR,PLATE:TRAN,SIIICONE RBR		
	342-0563-00			5		. INSULATOR,PLATE:TRAN,FIBERGLASS		
	118-2914-00			11		. INSULATOR,BSHG:	54473	EMJ-E8212106
-30	118-2498-00			1		COVER,CKT BD:PRIMARY STEEL	54473	EMJ-MP8210813
						(ATTACHING PARTS)		
-31	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
6-32	----- -----			1		TRANSFORMER:(SEE T2 REPL)		
						(ATTACHING PARTS)		
-33	----- -----			4		SCREW:		
						- - - * - - -		
-34	118-2889-00			1		BRACKET:STEEL	54473	EMJ-E8212203
						(ATTACHING PARTS)		
-35	----- -----			4		SCREW:		
						- - - * - - -		
-36	----- -----			1		TRANSFORMER:(SEE T1 REPL)		
						(ATTACHING PARTS)		
-37	----- -----			4		SCREW:		
-38	----- -----			4		WASHER:		
						- - - * - - -		
-39	118-2518-00			2		BRACKET,CKT BD:REGULATOR,	54473	EMJ-MP8210814
						(ATTACHING PARTS)		
-40	----- -----			8		SCREW:		
						- - - * - - -		
-41	118-2925-00			2		FILTER,NOISE:	54473	GT-210U
						(ATTACHING PARTS)		
-42	----- -----			2		SCREW:		
						- - - * - - -		
-43	118-2926-00			1		RECEPTACLE:	54473	CM3(C-170)
						(ATTACHING PARTS)		
-44	----- -----			3		SCREW:		
						- - - * - - -		
-45	118-2893-00			1		SWITCH:VOLTAGE SELECTOR	54473	ESE37237
						(ATTACHING PARTS)		
-46	----- -----			2		SCREW:		
						- - - * - - -		
-47	200-2265-00			1		CAP,FUSEHOLDER:5 X 20MM FUSES	S3629	FEK 031.1663
-48	204-0832-00			1		BODY,FUSEHOLDER:3AG,5 X 20MM FUSES	S3629	031.1673(MDLFEU)
-49	118-2895-00			1		SWITCH:MOMENTARILY	54473	M-2015G
-50	118-2894-00			1		SWITCH,TOGGLE:	54473	M-2012G
-51	----- -----			1		PANEL,STEEL:		
						(ATTACHING PARTS)		
-52	----- -----			2		SCREW:		
						- - - * - - -		
-53	118-2896-00			1		PLATE,BASE:ALUMINUM	54473	EMJ-E8212201
-54	----- -----			1		CABLE:		
-55	118-2892-00			1		BRACKET,SENSOR:	54473	EMJ-MP8210802
						(ATTACHING PARTS)		
-56	----- -----			3		SCREW,MACHINE:CUP HEAD,M 3 X 4,STL		
						- - - * - - -		
-57	118-2513-00			1		BRACKET,SENSOR:POWER SUPPLY,STEEL	54473	EMJ-MP8210801
						(ATTACHING PARTS)		
-58	----- -----			2		SCREW,MACHINE:CUP HEAD,M 3 X 4,STL		
						- - - * - - -		

Fig: & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
7-1	118-2499-00			1		COVER,CKT BD:MOTHER STEEL	54473	EMJ-MP8210812
						(ATTACHING PARTS)		
-2	----- -----			7		SCREW,MACHINE:WASHER ASSY,M 3 X 30,STL		
-3	----- -----			7		SPACER:BRASS		
						- - - * - - -		
-4	----- -----			1		CKT BOARD ASSY:MOTHER(SEE A1 REPL)		
						(ATTACHING PARTS)		
-5	----- -----			20		SCREW,MACHINE:WASHER ASSY,M 3 X 12,STL		
						- - - * - - -		
-6	118-2510-00			1		BRACKET,CKT BD:STEEL	54473	EMJ-MP8210811
-7	118-2491-00			1		CARD CAGE:	54473	EMJ-MA8210808
						(ATTACHING PARTS)		
-8	----- -----			4		SCREW,MACHINE:WASHER ASSY,M 3 X 12,STL		
-9	012-0517-00			1		CABLE,INTCON:	54473	EMJ-E8122Z05
						(ATTACHING PARTS)		
-10	----- -----			2		SCREW:		
-11	----- -----			2		NUT:		
						- - - * - - -		
-12	198-5132-00			1		WIRE SET,ELEC:	80009	198-5132-00
						(ATTACHING PARTS)		
-13	----- -----			1		NUT:		
						- - - * - - -		
-14	386-2731-00			1		PLATE,COVER:CONN,ALUMINUM	80009	386-2731-00
						(ATTACHING PARTS)		
-15	----- -----			4		SCREW:		
						- - - * - - -		
-16	348-0102-00			1		PAD,CUSHIONING:13.76 INCH LONG(CUT TO FIT)	80009	348-0102-00
-17	----- -----			1		CKT BOARD ASSY:DRIVER(SEE A6 REPL)		
-18	386-4986-00			1		STIF,CKT BOARD:11.26 L,STEEL	80009	386-4986-00
						(ATTACHING PARTS)		
-19	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 6 STL		
						- - - * - - -		
	----- -----			-		CKT BOARD ASSY INCLUDES:		
	118-2908-00			6		. HOLDER,FUSE:	54473	F204
	118-2904-00			2		. CONN,RCPT,ELEC:ECB MOUNT,12 PIN	54473	1CC04020350G
	386-4986-00			1		. STIF,CKT BOARD:11.261,STEEL		
	342-0224-00			7		. INSULATOR,PLATE:TRANSISTOR,MICA	80009	342-0224-00
	342-0563-00			2		. INSULATOR,PLATE:TRAN FIBERGLASS		
	118-2909-00			2		. INSULATOR,BSHG:	54473	EMJ-E8212406
	118-2910-00			4		. INSULATOR,PLATE:	54473	EMJ-E8212408
	118-2911-00			8		. INSULATOR,BSHG:W/SHOULDER	54473	EMJ-E8212409
-20	----- -----			1		CKT BOARD ASSY:CPU(SEE A5 REPL)		
-21	386-4986-00			1		STIF,CKT BOARD:11.26 L,STEEL	80009	386-4986-00
						(ATTACHING PARTS)		
-22	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-23	----- -----			1		CKT BOARD ASSY:INTERFACE(SEE A3 REPL)		
-24	386-4986-00			1		STIF,CKT BOARD:11.26 L,STEEL	80009	386-4986-00
						(ATTACHING PARTS)		
-25	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-26	----- -----			1		CKT BOARD ASSY:PARALLEL INTERFACE(SEE A2 REPL)		
-27	386-4986-00			1		STIF,CKT BOARD:11.26 L,STEEL	80009	386-4986-00
						(ATTACHING PARTS)		
-28	----- -----			3		SCREW,MACHINE:WASHER ASSY,M 3 X 6,STL		
						- - - * - - -		
-29	118-2511-00			1		WIRING HARNESS:	54473	EMJ-E82125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A6
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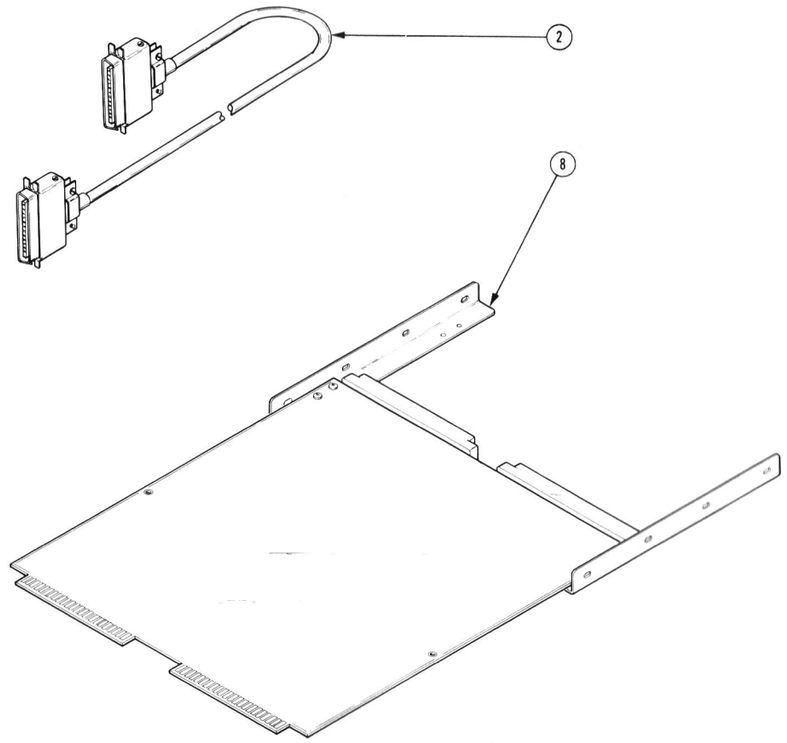
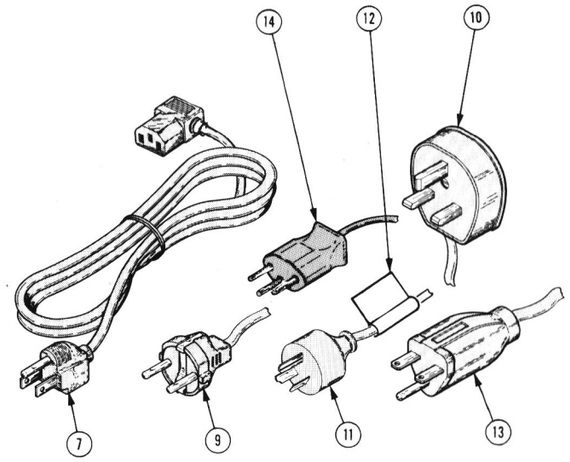
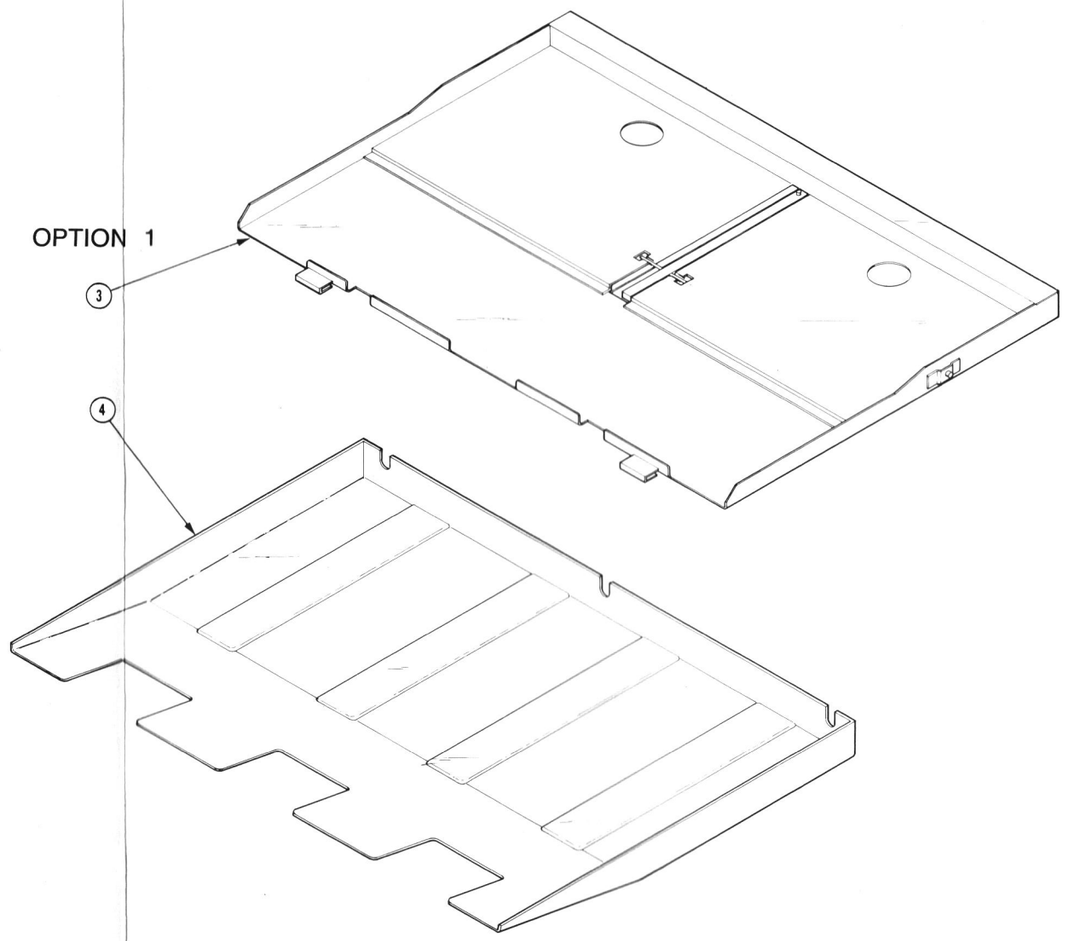




OPTION 1



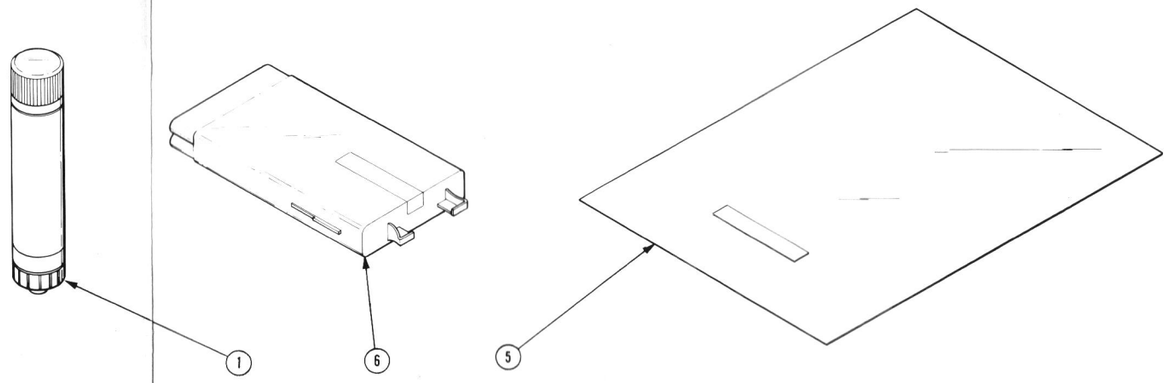


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
						STANDARD ACCESSORIES		
8-1	118-2436-00			1		BOTTLE,WATER:	54473	EMJ-MA8210604
-2	012-0518-00			1		CABLE,INTCON:120.0 L	54473	
-3	118-2556-00			1		TRAY ASSEMBLY:FOR PAPER A3 & A4,INTL USAGE	54473	EMJ-MA8210210
	----- -----			-		(OPTION 01 ONLY)		
	118-2557-00			1		TRAY ASSEMBLY:FOR PAPER A & B,U.S. USAGE	54473	EMJ-MA8210211
-4	----- -----			1		PAPER OUTPUT TRAY		
-5	118-2593-00			1		MASK,DRUM:		
	016-0710-00			1		PAPER,PRINTER:297MM X 420MM,BLANK WHITE	80009	016-0710-00
	----- -----			-		("A3" SIZE)		
	016-0711-00			1		PAPER,PRINTER:279MM X 423MM,BLANK,WHITE	80009	016-0711-00
	----- -----			-		("B" SIZE)		
-6	016-0713-00			1		CARTRIDGE,INK:CYAN		
	016-0714-00			1		CARTRIDGE,INK:BLACK		
	016-0715-00			1		CARTRIDGE,INK:YELLOW		
	016-0716-00			1		CARTRIDGE,INK:MAGENTA		
-7	161-0104-00			1		CABLE ASSY,PWR,:3 WIRE,98.0" LONG		
	070-4500-00			1		MANUAL,TECH:OPERATORS,4691 COLOR		
	070-4498-00			1		MANUAL,TECH:SERVICE,4691 COLOR GRAPHIC		
						OPTIONAL ACCESSORIES		
-8	067-1148-00			1		FIXTURE,CAL:4691 COLOR COPIER EXTENDER		
	003-1352-00			1		FIXTURE,SUPPORT:DRUM		
	003-1353-00			1		FIXTURE,SUPPORT:PAPER FEED		
	003-1354-00			1		FIXTURE,ALIGN:WASH STATION		
	005-0742-00			1		BLANKS,REAMER:0,HIGH SPEED,HDN & GND		
	067-1158-00			1		FIXTURE,CAL:TV PATTERN GENERATOR		
	118-2872-00			1		CLAMP:STEEL,NICKLE PLATED		
	175-8690-00			1		CA ASSY,SP,ELEC:40,28 AWG,16.0 L,RIBBON		
	253-0315-00			AR		TAPE,GUMMED:TEFLON,5MM X 0.75		
	016-0712-00			1		PAPER,PRINTER:216MM X 279MM,BLANK,WHITE	80009	016-0712-00
	----- -----			-		("A" SIZE)		
	016-0709-00			1		PAPER,PRINTER:210MM X 197MM,BLANK,WHITE	80009	016-0709-00
	----- -----			-		("A4" SIZE)		
						POWER CORD OPTIONS		
-9	161-0104-06			1		CABLE ASSY,PWR:3 X 0.75MM SQ,220V,98.0L	80126	OBD
	----- -----			-		(OPTION A1-EUROPEAN ONLY)		
-10	161-0104-07			1		CABLE ASSY,PWR:3 X 0.75MM SQ,240V,98.0 L	80126	OBD
	----- -----			-		(OPTION A2-UNITED KINGDOM ONLY)		
-11	161-0104-05			1		CABLE ASSY,PWR:3,18 AWG,240V,98.0 L	86221	OBD
	----- -----			-		(OPTION A3-AUSTRALIAN ONLY)		
-12	334-3995-00			1		MARKER,IDENT:MARKED CAUTION	80009	334-3995-00
	----- -----			-		(OPTION A3-AUSTRALIAN ONLY)		
-13	161-0104-08			1		CABLE ASSY,PWR:3,18 AWG,240V,98.0 L	80126	OBD
	----- -----			-		(OPTION A4-NORTH AMERICAN ONLY)		
-14	161-0167-00			1		CABLE ASSY,PWR:3.0 X 0.75,6A,240V,2.5M	S3109	OBD
	----- -----			-		(OPTION A5-SWISS ONLY)		

OPTIONS

OPT	ORDER NO.	DESCRIPTION
01	----- -----	A SIZE OUTPUT
02	----- -----	FOUR CHAN MUX
A1	----- -----	220V EUROPEAN POWER OPTION
A2	----- -----	240V UNITED KINGDOM POWER OPTION
A3	----- -----	240V AUSTRALIAN POWER OPTION
A4	----- -----	240V NORTH AMERICAN POWER OPTION
A5	----- -----	240V ŚWISS POWER OPTION

Section 13

DIAGRAMS AND SCHEMATICS

This section contains most of the diagrams for the copier. The diagrams in this section include:

- Interconnecting Cables and Cable Connector Diagram
- Plumbing Diagram (Ink and Air Lines)
- Several Examples of Poor Quality Printing (referenced in some of the tables in Section 6 *Troubleshooting*)
- Several Examples of Test Patterns
- Tektronix Color Wheel
- Schematics

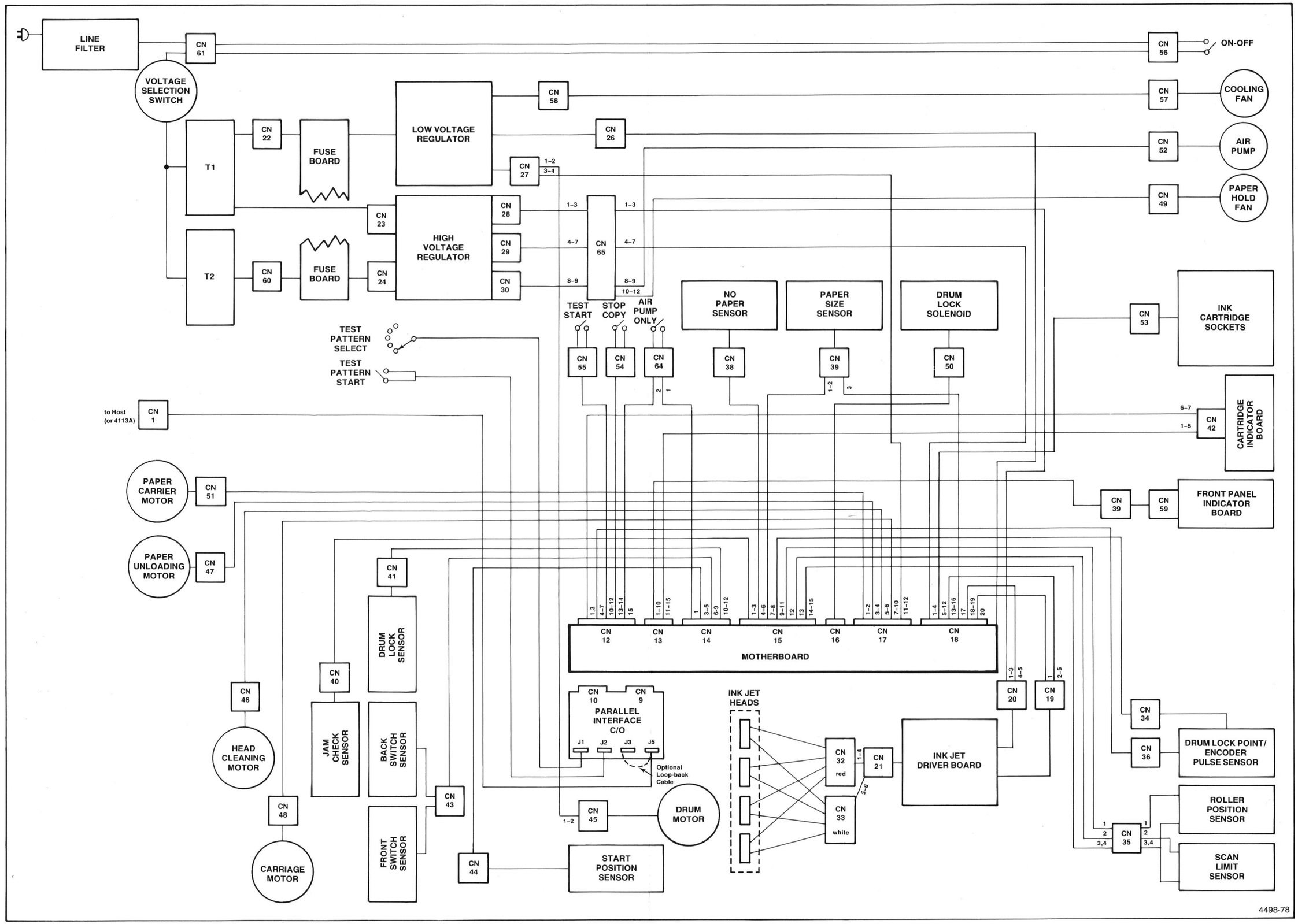


Figure 13-1. Interconnecting Cables and Connector Diagram.

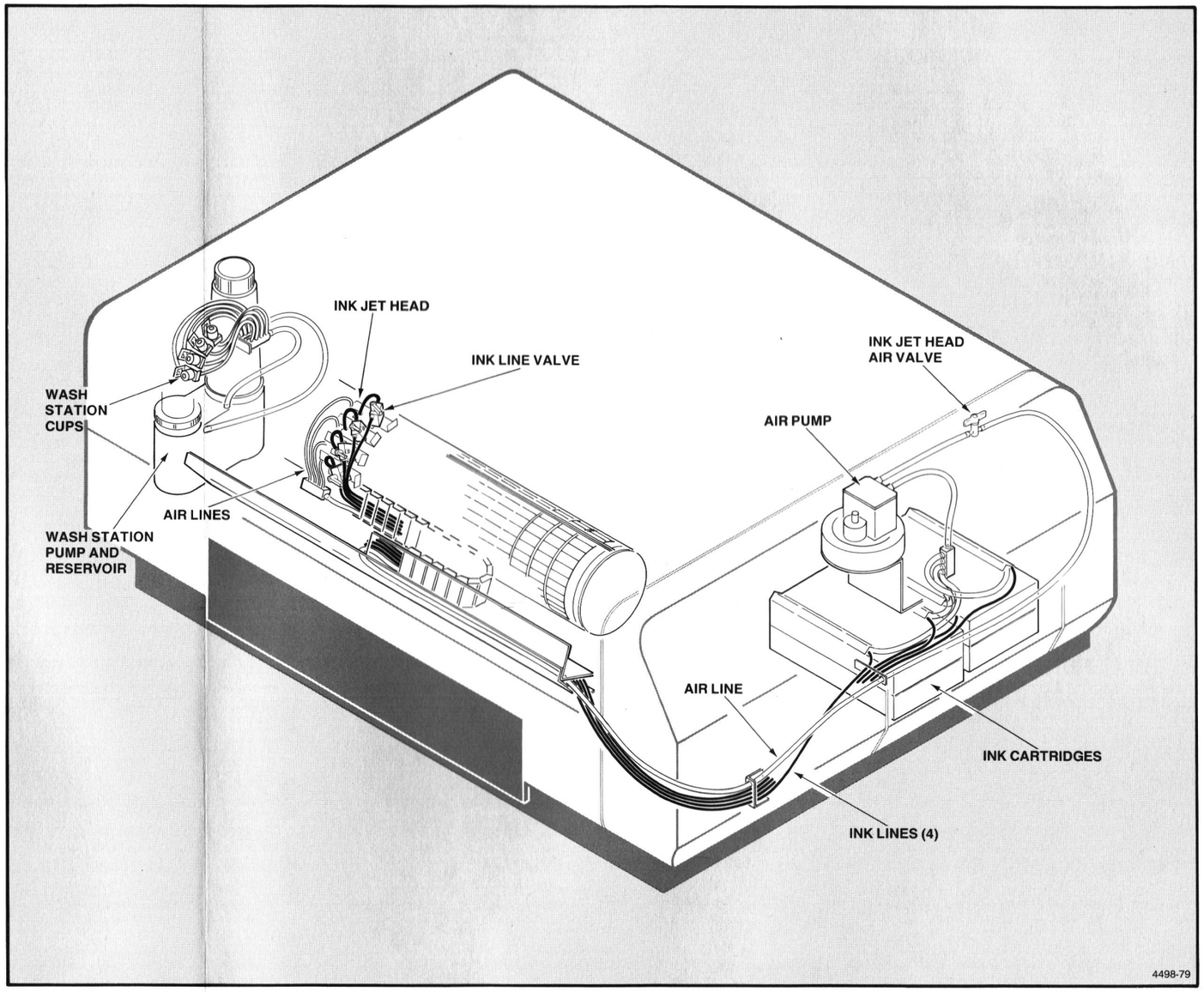
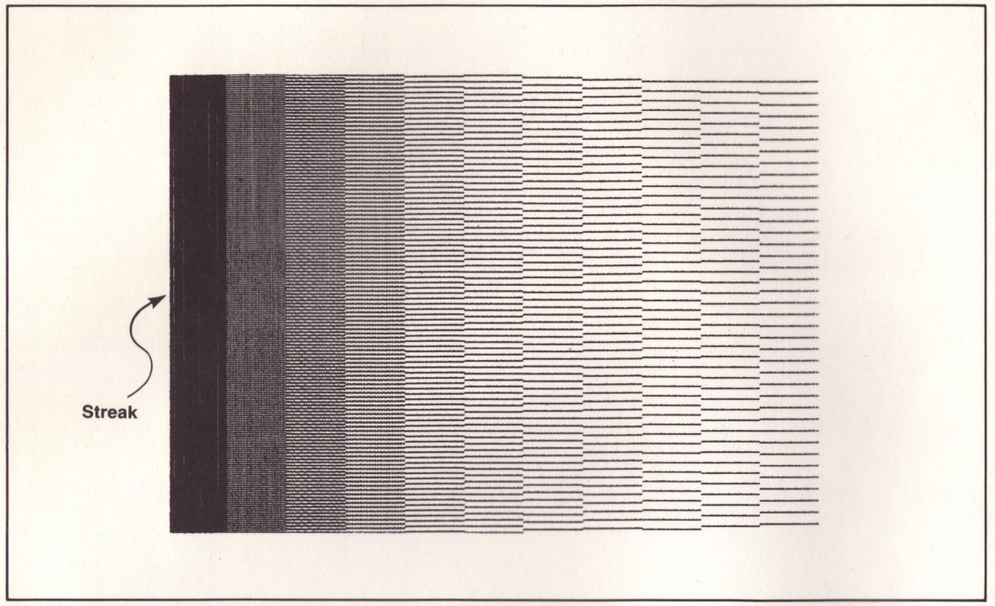


Figure 13-2. Plumbing Diagram (Ink and Air Lines).

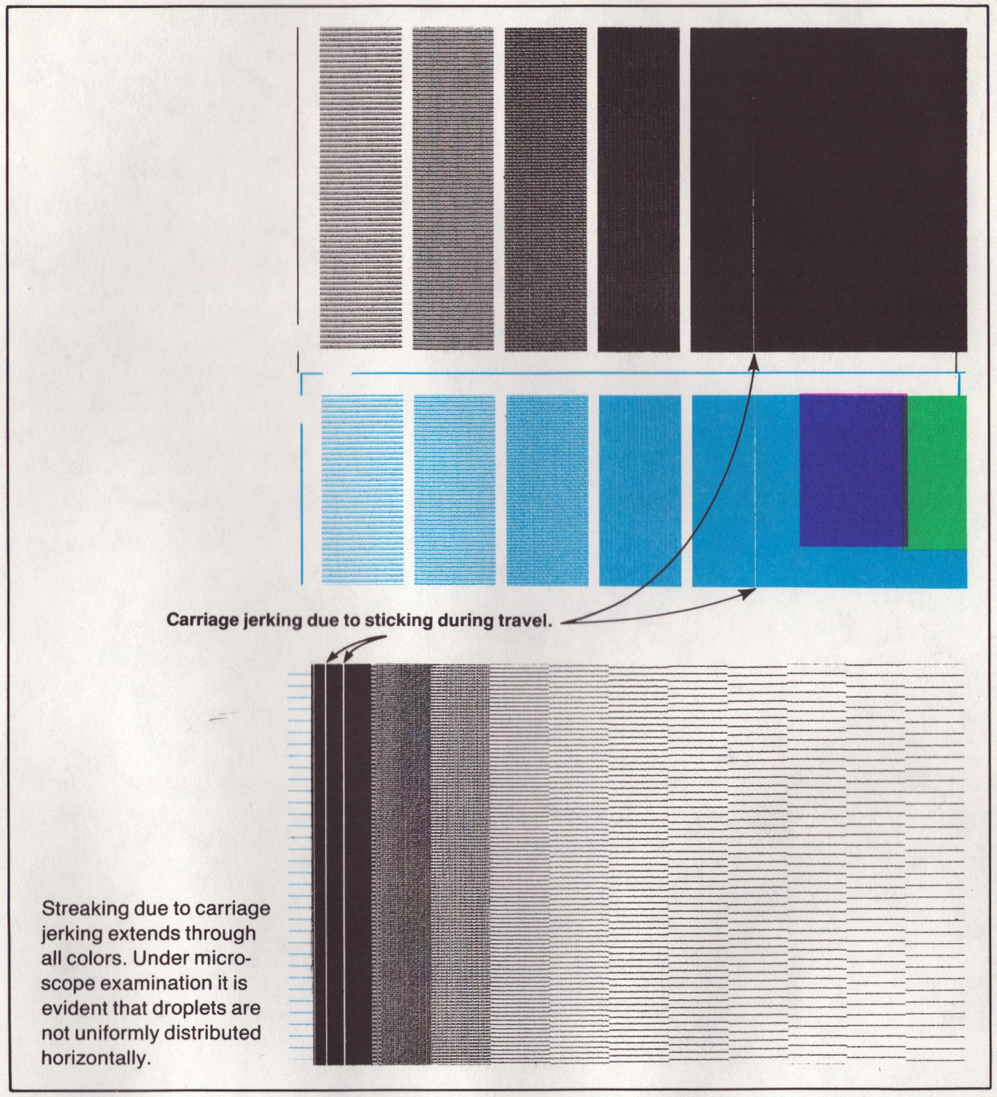


POSSIBLE CAUSES:

- Partially clogged orifice — either N2 or N3.
- Partially clogged ink filter.

4498-101

Figure 13-3. Example of Copier Streaking.



POSSIBLE CAUSE:

- Sticky/dirty carriage rails.
- Carriage or flexible-hose conduit catching on hardware during travel.

4498-102

Figure 13-4. Example of Copier Printing with Carriage Binding.

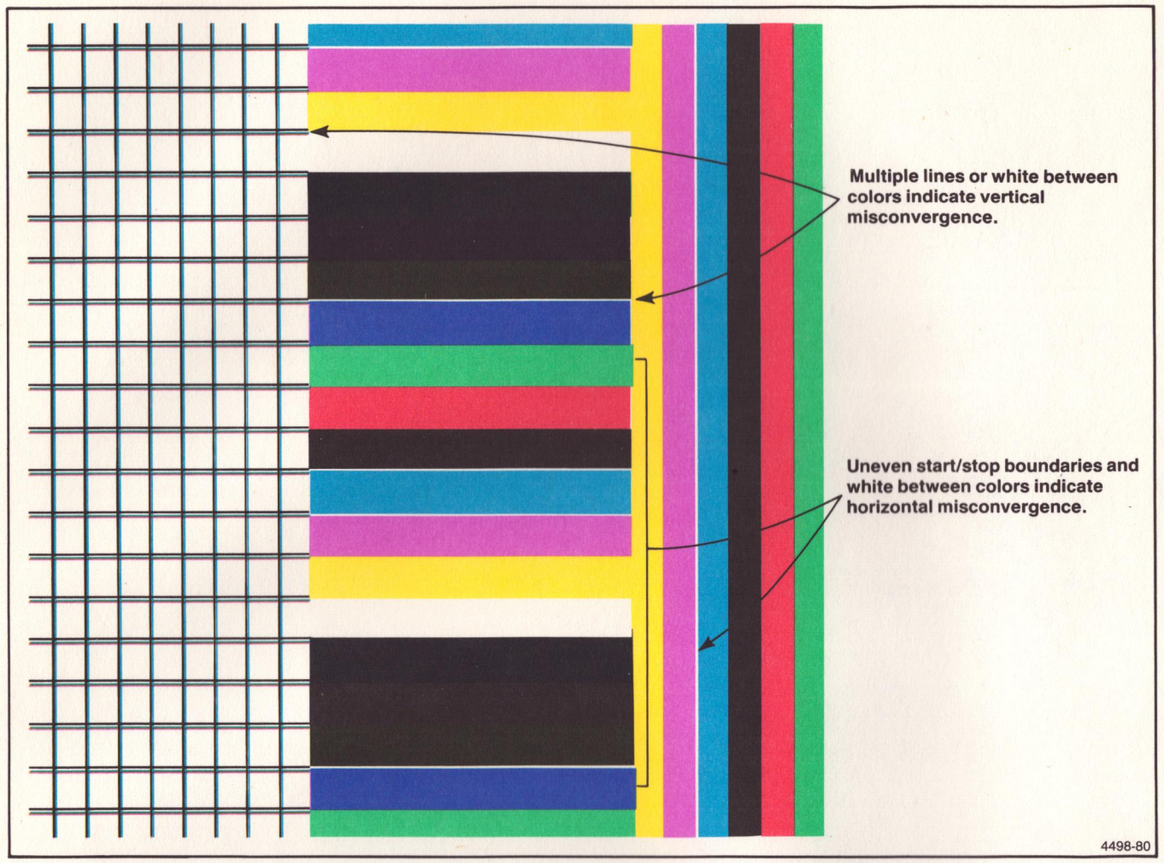


Figure 13-5. Example of Ink Jet Head Misconvergence (both axes).

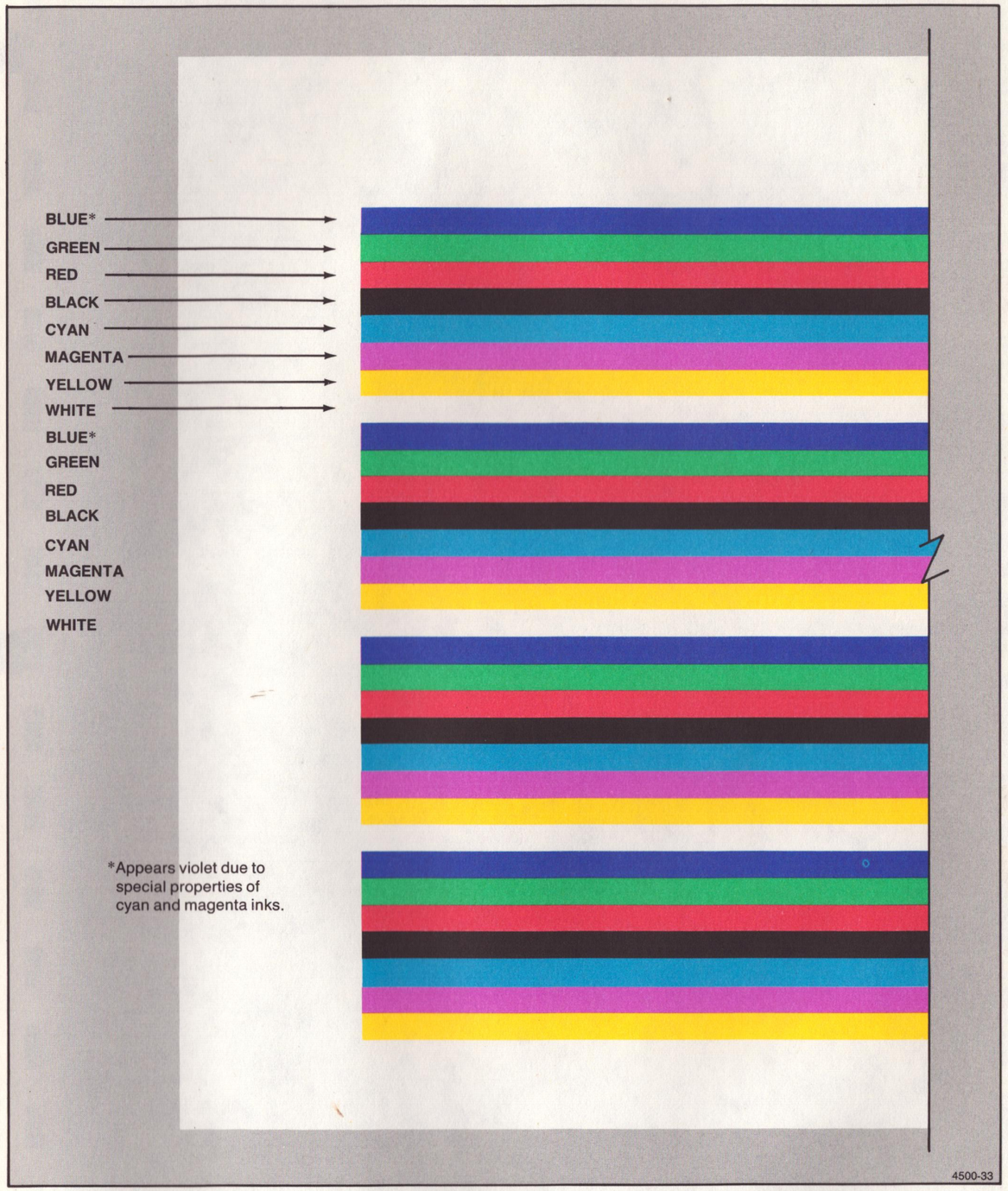


Figure 13-6. Horizontal Bars Test Pattern (TEST PATTERN SELECT #1).

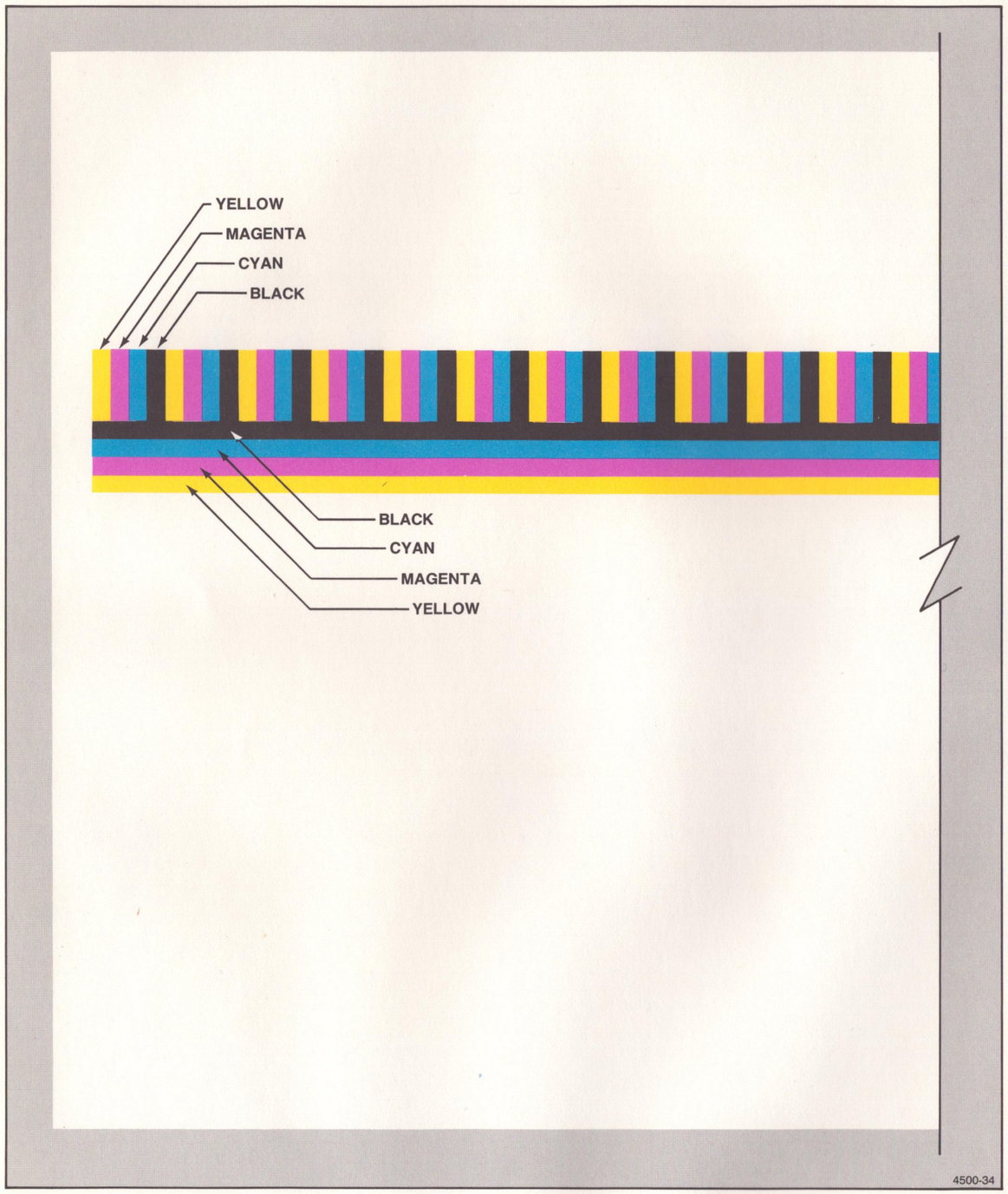


Figure 13-7. Convergence Test Pattern (TEST PATTERN SELECT #2).

Figure 13-8. 4-Solid/TV Test Pattern (TEST PATTERN SELECT #3).

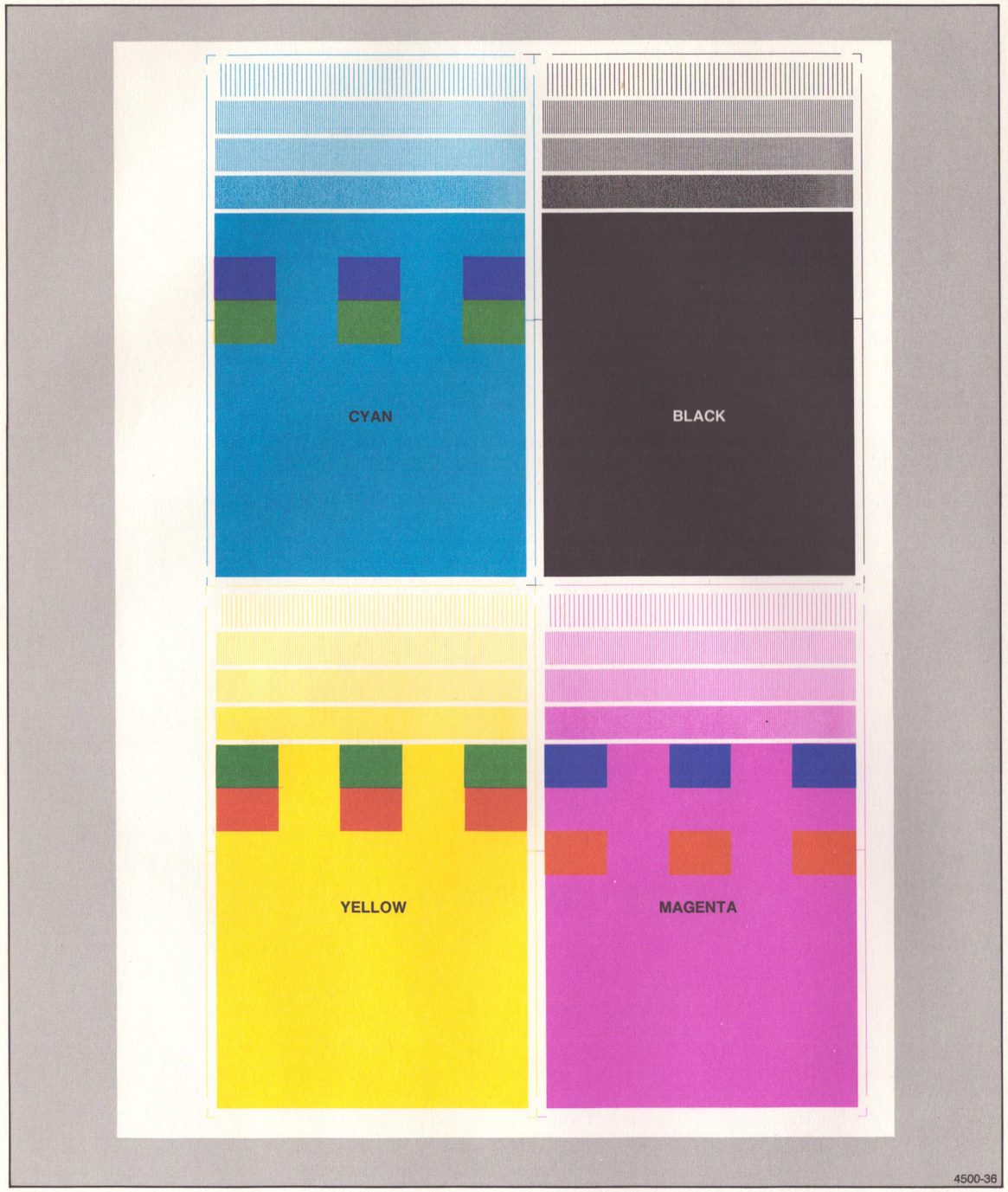


Figure 13-9. General Purpose Test Pattern (TEST PATTERN SELECT #4).

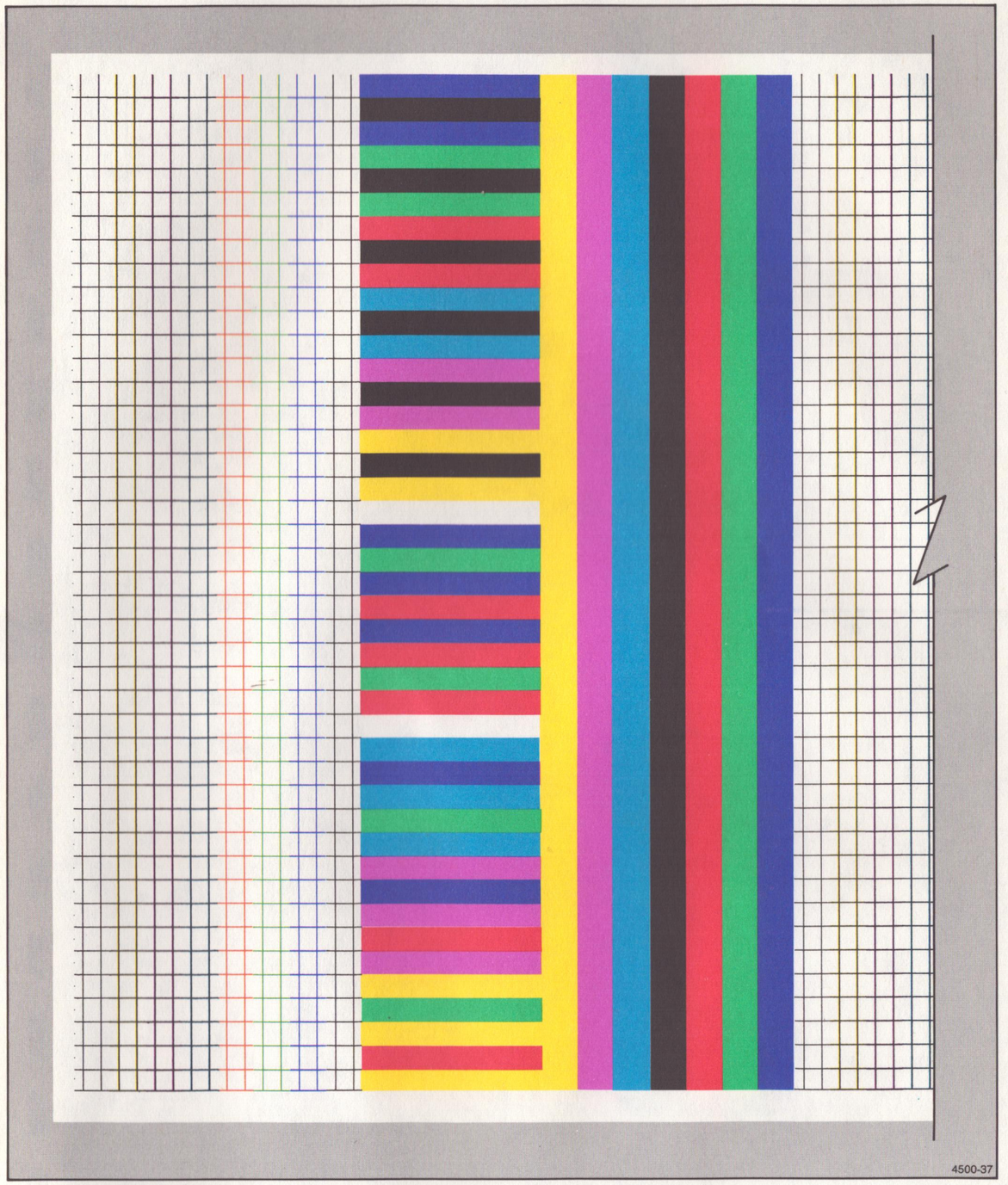


Figure 13-10. Test Pattern Using the TEST START Switch (TEST/OPERATE Switch is in Test Position).

FIGURE 13-9 GENERAL PURPOSE
FIGURE 13-10 TEST START PATTERN

Appendix A

ACCESSORIES AND SUPPLIES

INTRODUCTION

The following lists the standard accessories, optional accessories, and supplies needed to operate and maintain the copier.

STANDARD ACCESSORIES

4691 Color Graphics Copier Operator's Manual 070-4500-00

Interconnecting Cable, 9.8 ft (3 m) 012-0518-00

Power Line Cord, 120 Volt 161-0104-00

Ink Jet Copy Paper, one package (500 sheets); B-size is standard (you receive A3-size paper when Option 01 is ordered). For part numbers, see "Supplies."

Ink Cartridges (one 200 ml cartridge for each color -- Yellow, Magenta, Cyan, and Black). For part numbers, see "Supplies."

Drum Adapter Mask (for changing paper size from B- to A-size, or from A3- to A4-size if Option 01 is ordered. Three masks are sent with each copier. 118-2593-00

Input Paper Tray, A- and B-size paper tray is standard (A3- and A4-size paper tray if Option 01 is ordered). For part numbers, see "Optional Accessories."

OPTIONAL ACCESSORIES

4691 Color Graphics Copier Service Manual	070-4498-00
Device Driver Development Guide for 4690 Series Color Copiers	070-4547-00
Interconnecting Cable, 29.5 ft (9 m)	012-0527-00
Input Paper Tray for A3- and A4-size paper	118-2556-00
Input Paper Tray for A- and B-size paper	118-2557-00
Drum Adapter Masks (three each)	118-2593-00
Extender Circuit Board	067-1148-00
4691 Test Fixture	067-1158-00

Several other fixtures and tools are listed under "Equipment Required" located in Section 5

SUPPLIES

Copy Paper, each package contains 500 sheets.

A-Size 8.5x11.0 in (216x279 mm)	016-0712-00
B-Size 11.0x17.0 in (279x432 mm)	016-0711-00
A4-Size 8.3x11.7 in (210x297 mm)	016-0709-00
A3-Size 11.7x16.5 in (297x420 mm)	016-0710-00

Replacement Ink Jet Cartridges (200 ml).
The four colors are:

Yellow	016-0715-00
Magenta	016-0716-00
Cyan	016-0713-00
Black	016-0714-00

Appendix B

FUSES

There are ten fuses in the 4691 Color Graphics Copier:

A. One line fuse on the rear panel:
   Use 6.25A Slo-Blo for 90-129 volt operation
   Use 3A Slo-Blo for 180-258 volt operation

B. Seven fuses in the Power Supply (see Figure B-1):
   F2 +5 volt circuit - Use 10A Fast-Blo (rated at 125 V)
   F3 +12 volt circuit - Use 3A Fast-Blo (rated at 125 V)
   F4 -12 volt circuit - Use 3A Fast-Blo (rated at 125 V)
   F5 +7.4 volt circuit - Use 3A Fast-Blo (rated at 125 V)
   F6 +24 volt circuit - Use 10A Fast-Blo (rated at 125 V)
   F7 +300 volt circuit - Use 1.5A Fast-Blo (rated at 250 V)
   F8 Reference voltage for 300 V Supply - Use 0.15A Fast-BloV
   (250 V rating)

C. Three fuses on the Driver Circuit Board (see Figure B-2):
   F1 Drum Motor Circuit - Use 3A Fast-Blo (rated at 125 V)
   F2 Drum Lock Solenoid - Use 4A Fast-Blo (rated at 125 V)
   F3 Head Carriage Motor - Use 2A Fast-Blo (rated at 125 V)

APPENDIX B
FUSES

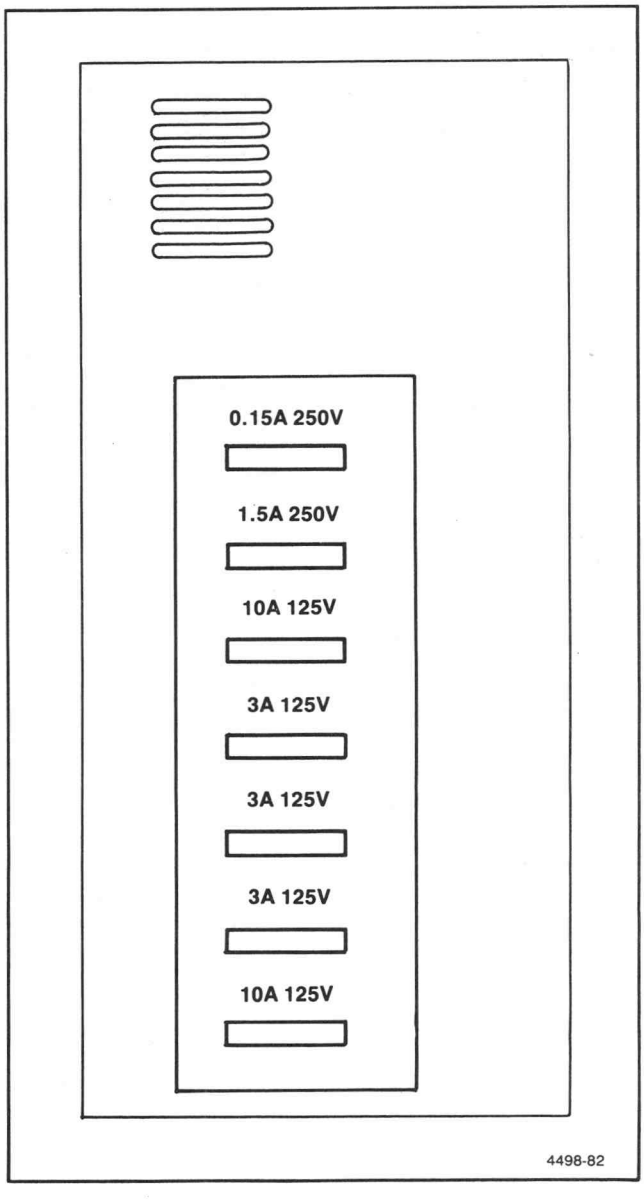


Figure B-1. Power Supply Fuses.

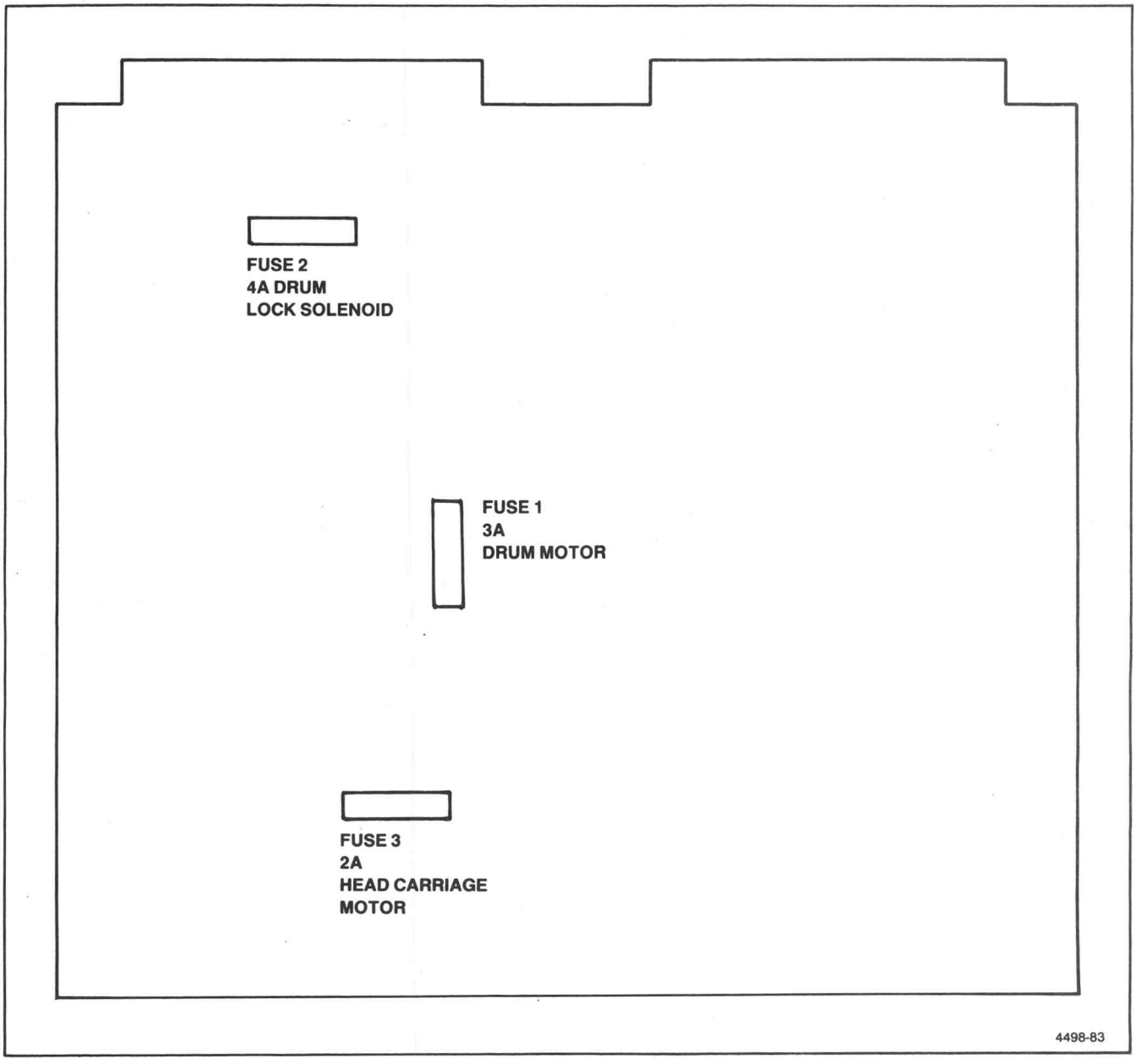


Figure B-2. Driver Circuit Board Fuses.

Appendix C

FIRMWARE LOCATIONS

The 4691 Color Graphics Copier contains four EPROM/ROMs:

A. Parallel Interface Circuit Board (see Figure C-1):

U220 Contains Processor instructions for interface/printer communications and double buffer management.

U225 Contains power-up self-test and self-test pattern generating algorithms.

U420 Contains the color map look-up table.

B. CPU Circuit Board (see Figure C-2):

IC2 Contains CPU Processor instructions for copier mechanism management (color data routing, control of ink jet heads, sensor and front panel monitors, etc.)

APPENDIX C
FIRMWARE LOCATIONS

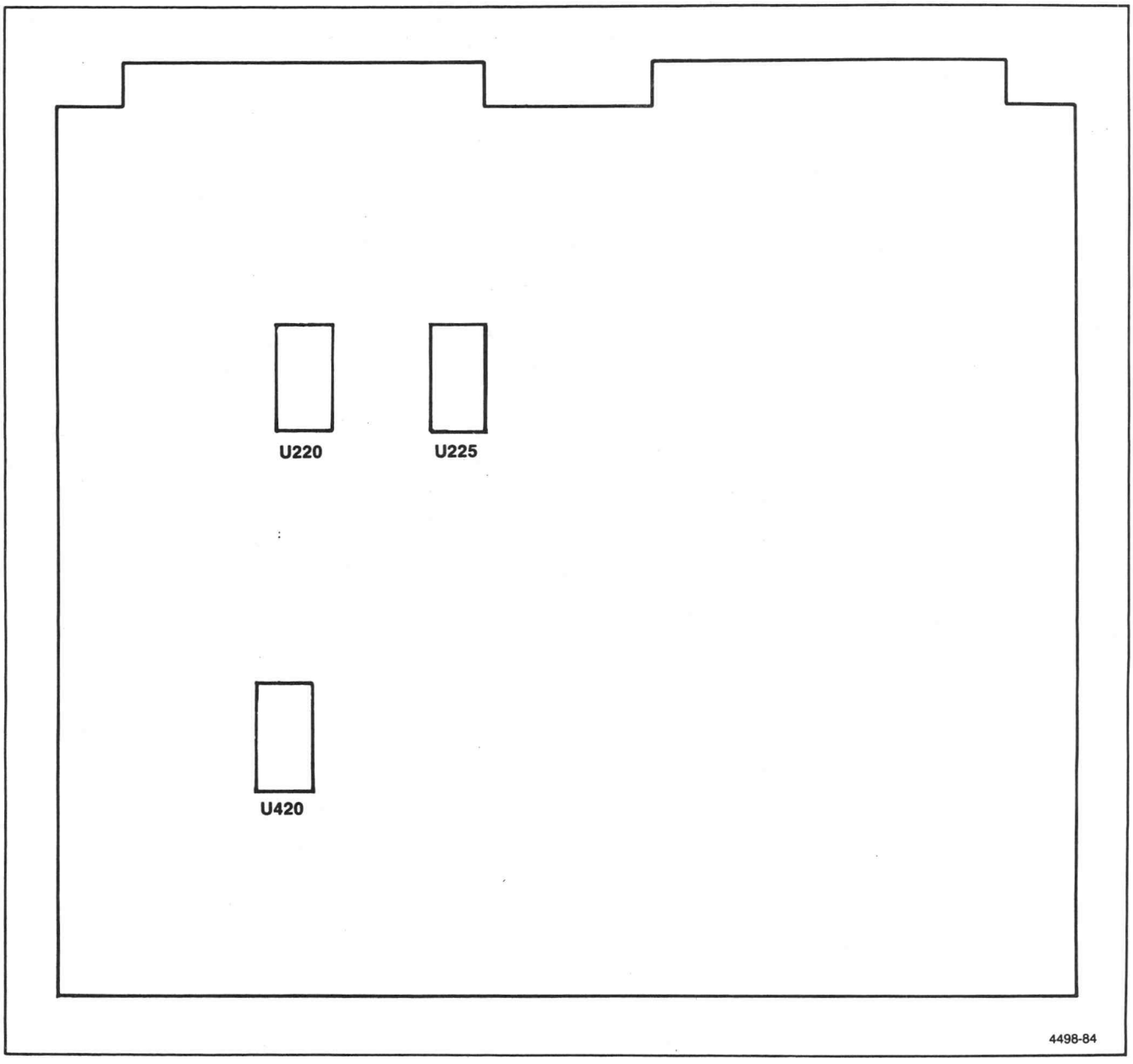


Figure C-1. Parallel Interface Firmware Locations.

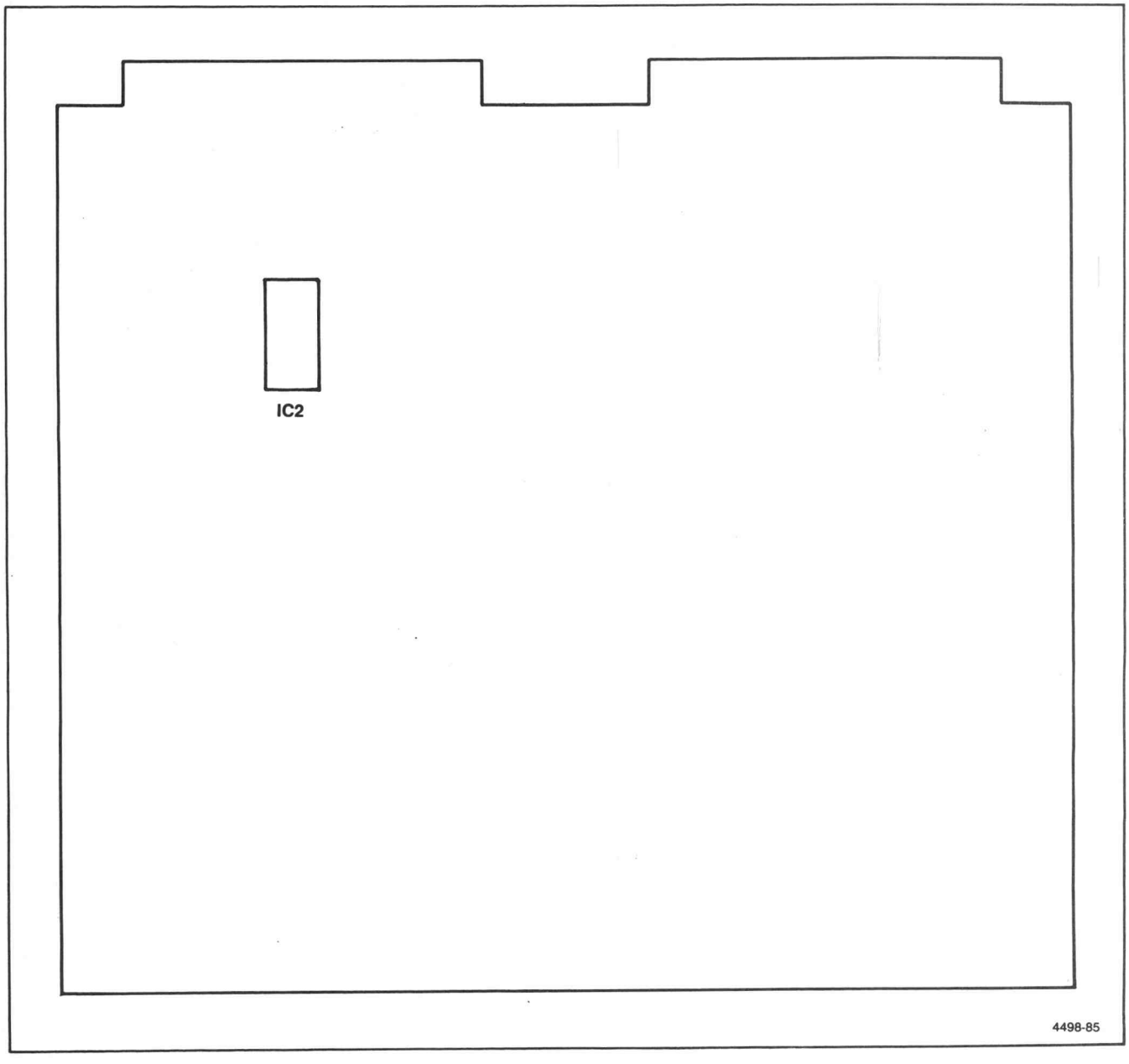


Figure C-2. CPU Circuit Board Firmware Locations.

Appendix D

STRAPS AND JUMPERS

There are a number of wire jumpers (straps) or DIP switches (posing as straps) on three of the copier's circuit boards:

A. Parallel Interface Circuit Board (see Figure D-1):

The Parallel Interface has:

- 3 Straps (used to select length of host-interface cable)
- One 10-Pin resistor-pack (used to select the length of the host-interface cable)
- One four-switch (16-combination) DIP switch to select Parallel Interface test patterns.

Straps

The three straps (J554, J555, and J556) are used to internally select (or match) the impedance of the host-interface cable. Since the length of a cable determines its impedance, these straps allow the Parallel Interface to match the impedance of short (less than 10 foot or 3 meter) or long (greater than 10 foot) cables. The three jumpers select the impedance for the ACK-0 (J554), BUSY-0 (J555), and FAULT-0 (J556). Select SHORT for host-interface cables that are less than 10 feet (3 meters) or select LONG for host-interface cables that are longer than 10 feet. Factory setting is SHORT.

Resistor-Pack

A ten-pin resistor-pack is used to internally select (or match) the impedance of the host-interface cable. Since the length of a cable determines its impedance, these straps allow the Parallel Interface to match the impedances of short (less tan 10 foot or 3 meter) or long (greater than 10 foot) cables. The resistor pack selects the impedance of the eight data lines and DSTB-0. Select SHORT for host-interface cables that are less than 10 feet long (3 meters) or select LONG for host-interface cables that are longer than 10 feet. Notice the dot on the resistor-pack. It must go in Pin 1 of J655 for the LONG case or to Pin 20 of U655 for the SHORT case. The factory setting of J655 is SHORT.

DIP Switch

The Parallel Interface circuit board has a four-switch (16-combination) DIP switch for selecting Parallel Interface self-test patterns. Table D-1 shows the test patterns selected by the DIP switch (5-position rotary TEST PATTERN SELECT switch must be in the INTL position).

The four switches on the DIP switch are weighted as follows:

Switch #1=1
Switch #2=2
Switch #3=4
Switch #4=8

Where a switch set in the OPEN position is a 1 (CLOSED is a 0).

For example, if Switches #1 and #3 are set OPEN, the DIP switch setting is five (5).

DIP switches should always be returned to the OPEN (factory set position) position after servicing the copier. If the DIP switches are not returned to the OPEN position, the 5-position rotary TEST PATTERN SELECT switch will not select test patterns according to Table D-1.

Table D-1

PARALLEL INTERFACE TEST PATTERNS

Dip-Switch Setting	Test Pattern
0	Resonance Test
1	Solid Yellow Test
2	Solid Magenta Test
3	Solid Cyan Test
4	Solid Black Test
5	Horizontal Bars
6	Horizontal Bars
7	Horizontal Bars
8	Horizontal Bars
9	Horizontal Bars
10	Horizontal Bars
11	Horizontal Bars
12	Horizontal Bars
13	Convergence Test
14	4 Solid/TV Test
15	General Purpose Test

NOTE

The five-position rotary TEST PATTERN SELECT switch must be in the INTL position.

NOTE

The TEST/OPERATE switch must be in the OPERATE position before any of the Parallel Interface circuit board test patterns can be printed.

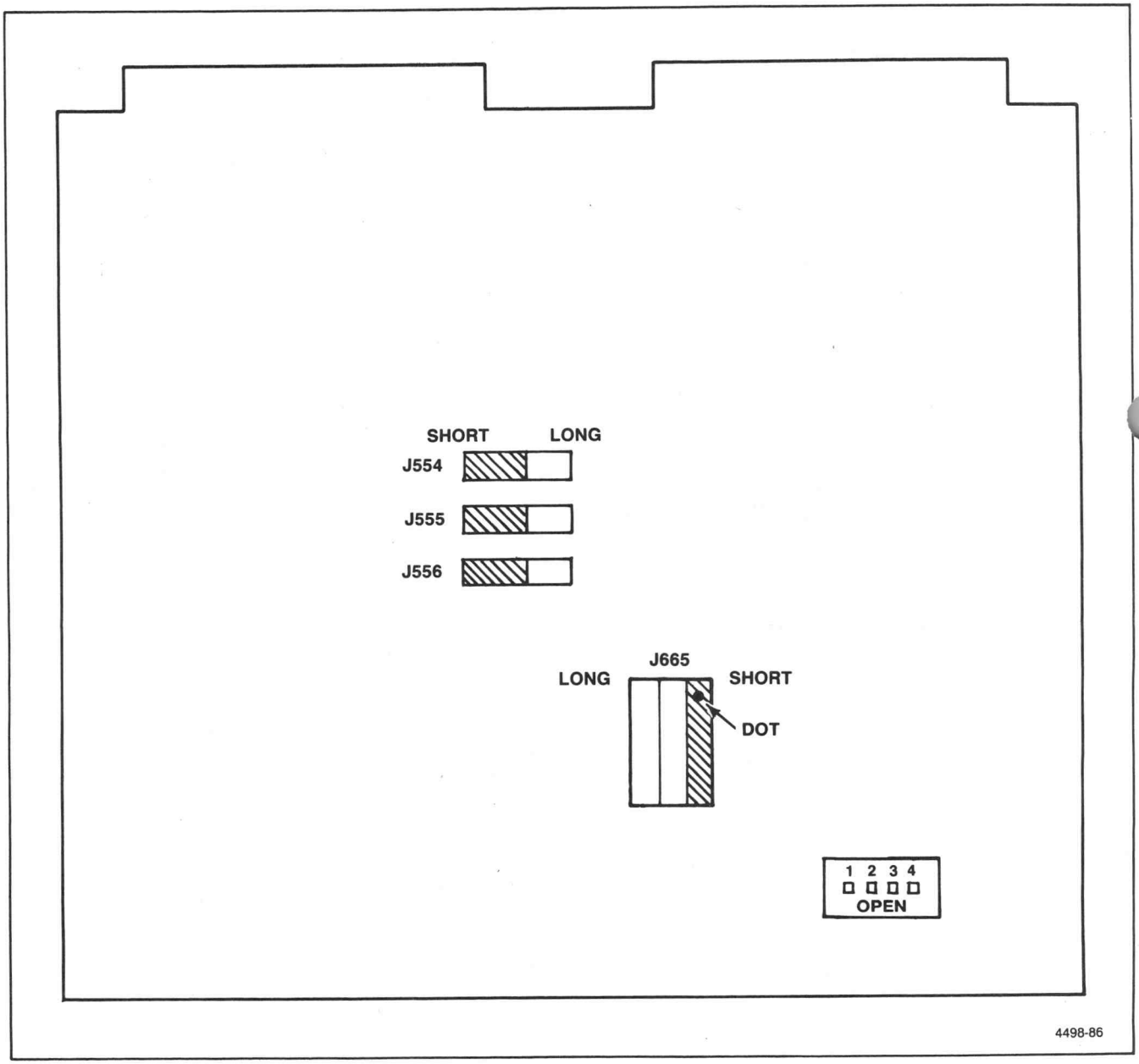


Figure D-1. Parallel Interface Straps and Switches Locations.

B. Interface Circuit Board (see Figure D-2):

The Interface circuit board contains one wire strap and three five-switch DIP switches:

JP1	Is installed at the factory and is required for normal operation of the copier.
JP2 to JP6	Is a five-switch DIP device to select a portion of the magenta dot time delay. The switches may be changed during convergence adjustments to compensate for slight changes in component tolerances during aging. Normal factory setting of this switch is 1, 2, and 4 CLOSED*.
JP7 to JP11	Selects a portion of the cyan dot time delay. Normal factory setting of this switch is 1, 2, and 3 CLOSED*.
JP12 to J16	Selects a portion of the black dot time delay. Normal factory setting of this switch is 1, 2, and 5 CLOSED*.
JP17 to JP22	Are not used.

*Switches may have other settings due to tolerance differences in components.

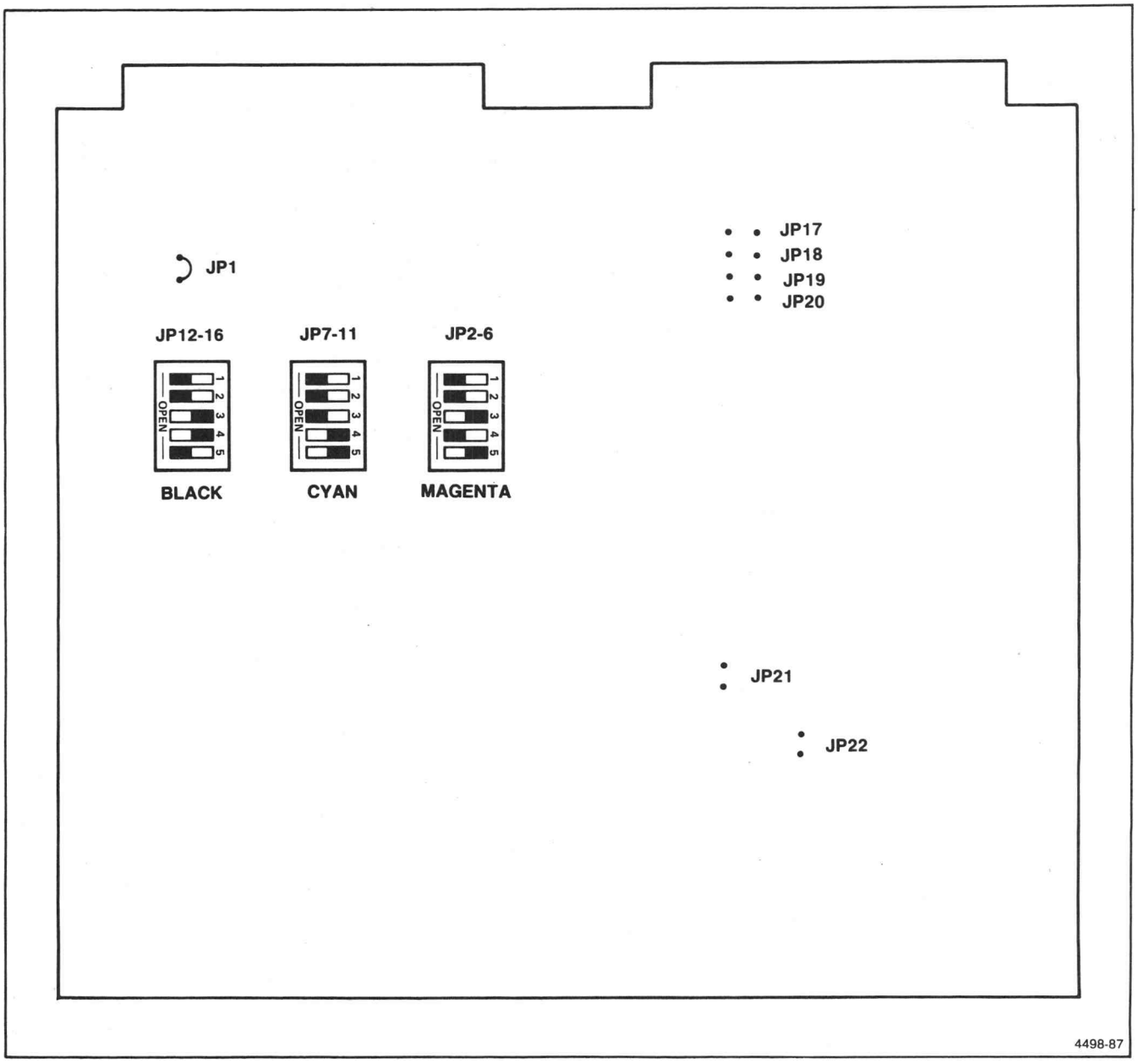


Figure D-2. Interface Straps and Switches Locations.

C. CPU Circuit Board (see Figure D-3):

Eleven wire strap selections are used on the CPU circuit board.

JP1	Allows the Clock Generator to be disconnected from the CPU Processor. Normally this strap is wired "in."
JP2	Allows the signal POWSW-0 to be used. Normally, this strap is wired "in" and grounds the signal POWSW-0.
JP3	Allows the Reset circuit to detect power-line "gliches" after power-up and reset the CPU Processor. Normally, this strap is wired "in."
JP4 to JP9	Sets a variable shift register (IC20). The shift register delays the DLPT-0 signal, which is generated by the Drum Lock Point Sensor once each drum revolution. The delay prevents printing of ink on the blank (unprinted) leading paper margin. Normally, Straps JP4, 5, 6, 7, and 9 are wired "in."
JP10 and JP11	Allow for different pin configurations of IC2. Since IC2 is a 2732 EPROM device, this strap is wired in the JP11 position.

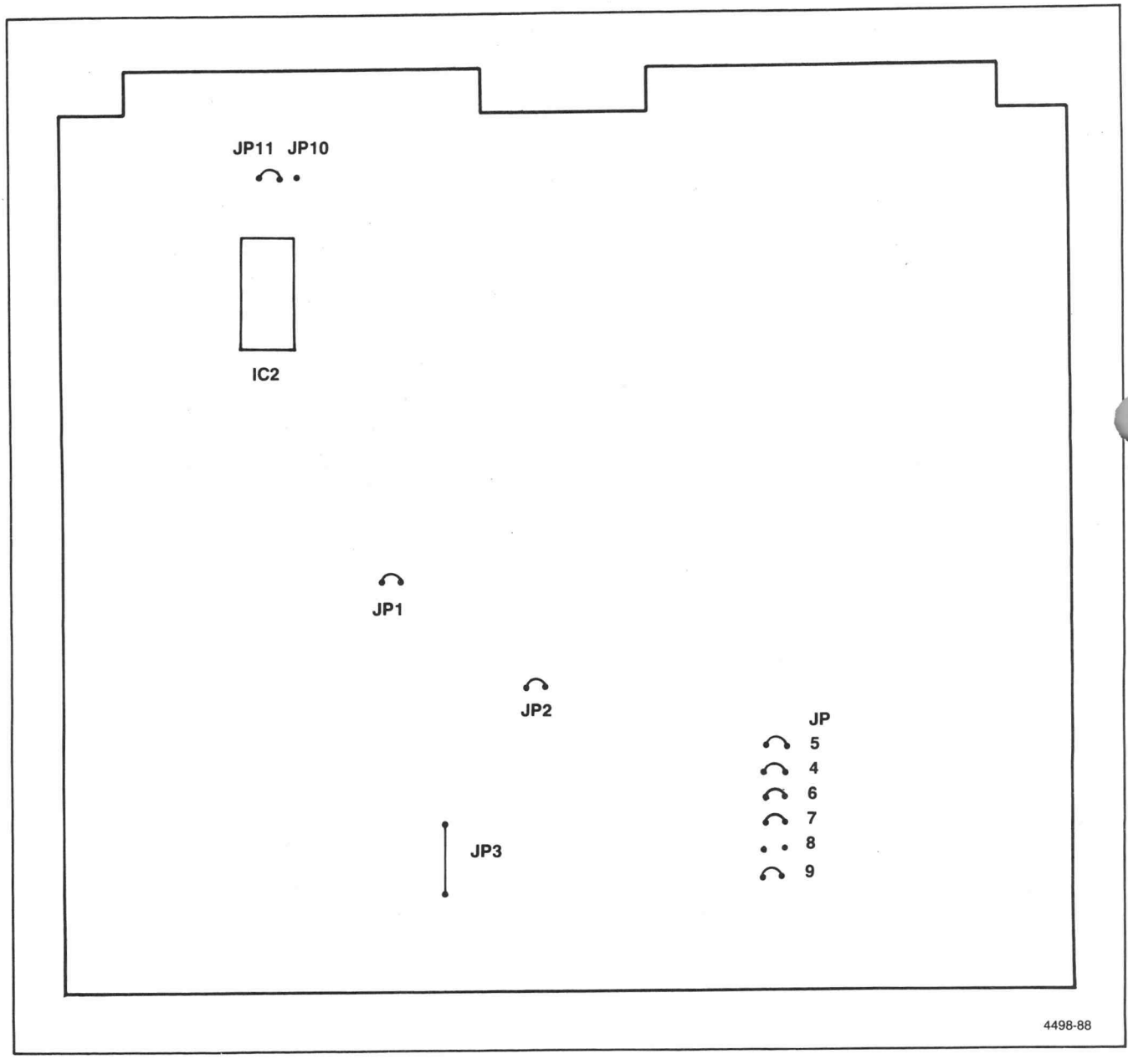


Figure D-3. CPU Straps and Switches Locations.

Appendix E

INTERFACE CONNECTOR DIAGRAM

Figure E-1 shows the rear panel interface connector and Table E-1 shows the signal/pin assignments.

Table E-1

INTERFACE CONNECTOR SIGNAL/PIN ASSIGNMENTS

Pin Number	Signal	Pin Number	Signal
1	DSTB-0	19	GND
2	DATA 0	20	GND
3	DATA 1	21	GND
4	DATA 2	22	GND
5	DATA 3	23	GND
6	DATA 4	24	GND
7	DATA 5	25	GND
8	DATA 6	26	GND
9	DATA 7	27	GND
10	ACK-0	28	GND
11	BUSY-1	29	GND
12	IR/SO	30	NC
13	SLCT-1	31	NC
14	NC	32	FAULT-0
15	NC	33	NC
16	NC	34	NC
17	NC	35	NC
18	NC	36	NC

APPENDIX E
INTERFACE CONNECTOR DIAGRAM

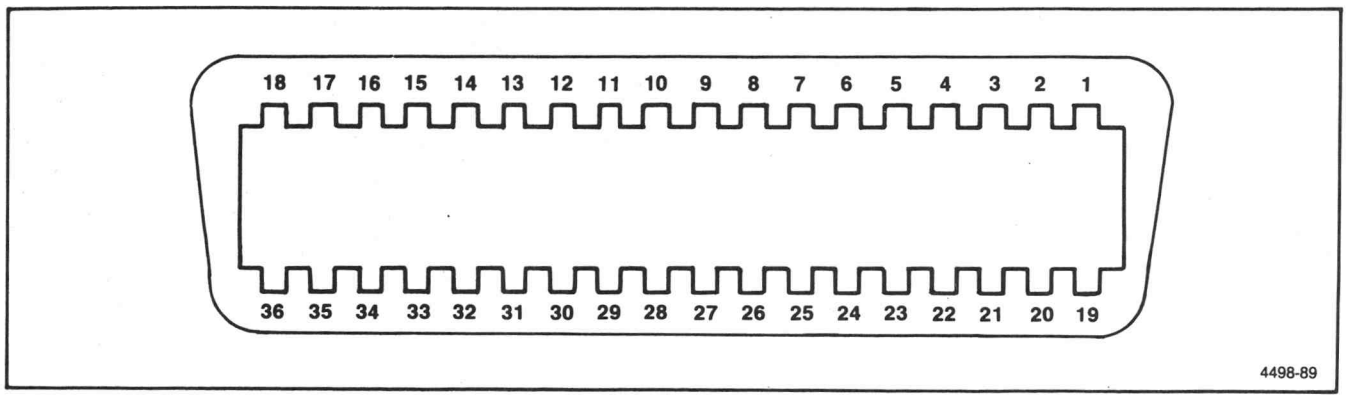


Figure E-1. Interface Connector Diagram.

Appendix F

INTERCONNECTING WIRING

INTRODUCTION

This appendix consists of circuit board connector diagrams and tables of every cable connector in the copier. This appendix is designed to be used with the Figure 13-1 Interconnecting Wiring Diagram and the System Interconnect Diagrams (first three pages of the Schematics) to trace every wire in the cable harness.

Figure 13-1 (located in Section 13 - Diagrams) shows a diagram of all the interconnecting cables within the copier and the associated cable connector numbers. Jack (or Plug) numbers for multiple-pin connectors appear on the circuit board next to the connector (or on the connector itself). In most cases, the connector is a formed connector and can only be connected one way. The System Interconnect Diagrams in the Schematics give the wire color code for each signal/pin.

Tables F-1 through F-9 list the signals on the pins of these connectors and Table F-10 describes each of the "inline" cable connectors in the copier's wiring harness.

MOTHERBOARD

The connector locations on the Motherboard are shown in Figure F-1. Tables F-1 through F-7 show the signals on each pin of the Motherboard's connectors.

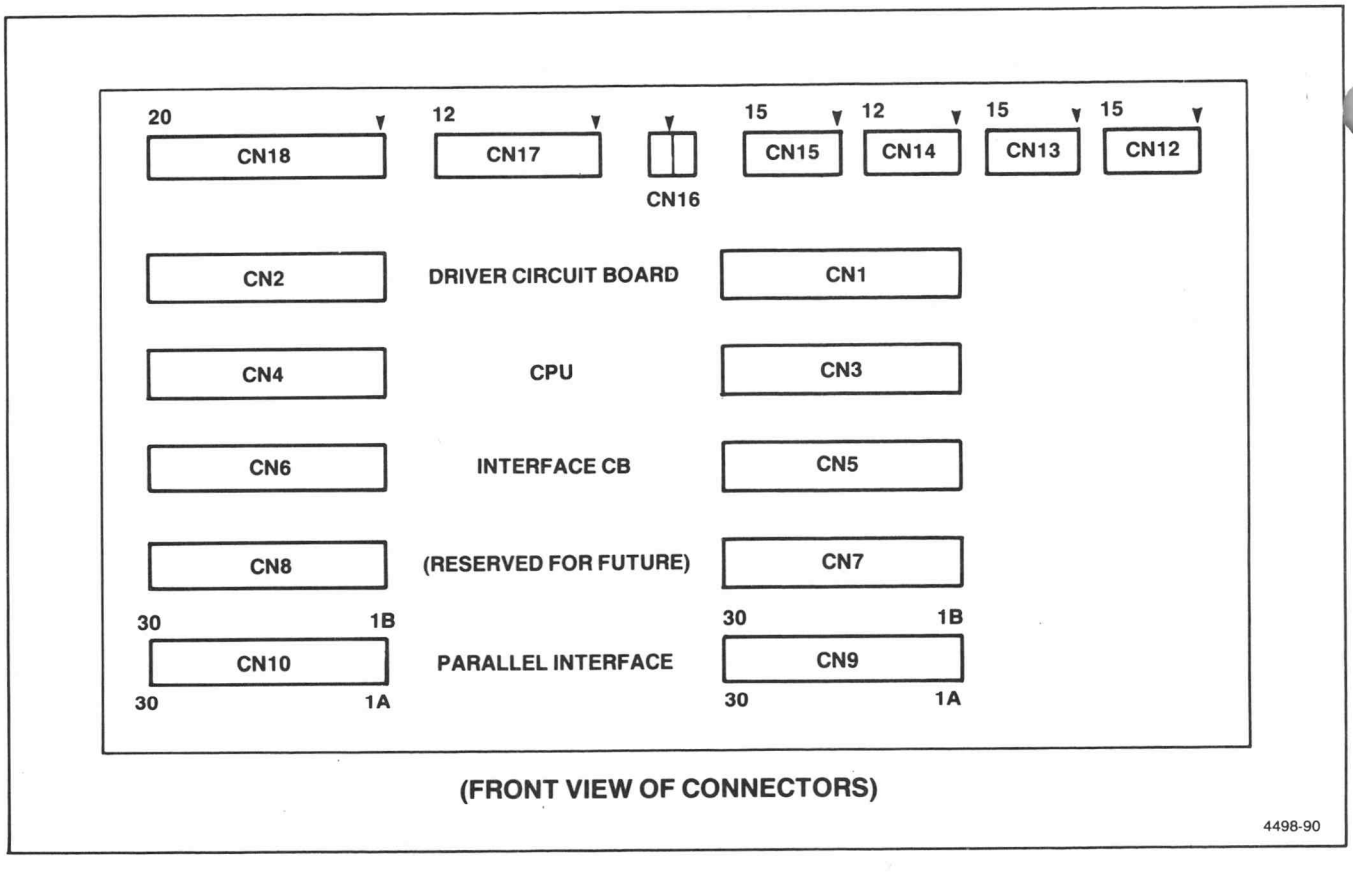


Figure F-1. Motherboard Connectors.

Table F-1

MOTHERBOARD CONNECTOR CN1 (DRIVER CIRCUIT BOARD)

Pin	Signal	Pin	Signal
A1	+5V	B1	+5V
A2	+5V	B2	+5V
A3	+5V	B3	+5V
A4	NC	B4	NC
A5	NC	B5	NC
A6	NC	B6	NC
A7	NC	B7	NC
A8	FMTB-0	B8	FMTB-0
A9	FMTA-0	B9	FMTA-0
A10	DRLKB-0	B10	DRLKB-0
A11	DRLKA-0	B11	DRLKA-0
A12	SSPLS-0	B12	SSPLS-0
A13	SSDIR-0	B13	SSDIR-0
A14	RMT-0	B14	RMT-0
A15	CMT-0	B15	CMT-0
A16	ENPLS-0	B16	ENPLS-0
A17	MMTPLS-0	B17	MMTPLS-0
A18	MMTS-0	B18	MMTS-0
A19	MMTF-0	B19	MMTF-0
A20	EN-1	B20	EN-0
A21	NC	B21	ENVCC-1
A22	NC	B22	NC
A23	NC	B23	NC
A24	NC	B24	NC
A25	NC	B25	NC
A26	NC	B26	NC
A27	NC	B27	NC
A28	NC	B28	NC
A29	+12V	B29	+12V
A30	-12V	B30	-12V

Table F-2

MOTHERBOARD CONNECTOR CN2 (DRIVER CIRCUIT BOARD)

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	GND	B2	GND
A3	GND	B3	GND
A4	+24V	B4	+24V
A5	+24V	B5	+24V
A6	NC	B6	NC
A7	+7.4V	B7	+7.4V
A8	NC	B8	NC
A9	NC	B9	NC
A10	DFMT+	B10	DFMT+
A11	DFMT-	B11	DFMT-
A12	DRMT+	B12	DRMT+
A13	DRMT-	B13	DRMT-
A14	DDRLK+	B14	DDRLK+
A15	DDRLK-	B15	DDRLK-
A16	DCMT+	B16	DCMT+
A17	DCMT-	B17	DCMT-
A18	DSMTA+	B18	DSMTA+
A19	DSMTA-	B19	DSMTA-
A20	DSMTB+	B20	DSMTB+
A21	DSMTB-	B21	DSMTB-
A22	DMMT+	B22	DMMT+
A23	DMMT-	B23	DMMT-
A24	NC	B24	NC
A25	NC	B25	NC
A26	NC	B26	NC
A27	NC	B27	NC
A28	GND	B28	GND
A29	GND	B29	GND
A30	GND	B30	GND

Table F-3

MOTHERBOARD CONNECTOR CN3 (CPU CIRCUIT BOARD)

Pin	Signal	Pin	Signal
A1	+5V	B1	+5V
A2	+5V	B2	+5V
A3	+5V	B3	+5V
A4		B4	NC
A5		B5	NC
A6	SKPPACK-0	B6	LNIEA-0
A7	SSEN-0	B7	IC6 (PB2)
A8	SKIP-0	B8	FMTB-0
A9	IRT-0	B9	FMTA-0
A10	PRTRQ-0	B10	DRLKB-0
A11	NOINK-1	B11	DRLKA-0
A12	NOPPR-1	B12	SSPLS-0
A13	PPRJAM-1	B13	SSDIR-0
A14	MRDY-0	B14	RMT-0
A15	DTRDY-0	B15	CMT-0
A16	POWON-0	B16	ENPLS-0
A17	IDXPLS-0	B17	MMTPLS-0
A18	DTCLK-0	B18	MMTS-0
A19	SCALL-1	B19	MMTF-0
A20	A3MD-0	B20	EN-0
A21	D7	B21	ONLINE-0
A22	D6	B22	EMST-0
A23	D5	B23	LWAIT-0
A24	D4	B24	LNOPPR-0
A25	D3	B25	LRDY-0
A26	D2	B26	LA3-0
A27	D1	B27	LNIMAG-0
A28	D0	B28	LNIBLK-0
A29	+12V	B29	+12V
A30	-12V	B30	-12V

Table F-4

MOTHERBOARD CONNECTOR CN4 (CPU CIRCUIT BOARD)

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	GND	B2	GND
A3	GND	B3	GND
A4	+24V	B4	+24V
A5	+24V	B5	+24V
A6	NC	B6	NOPPR-0
A7	+7.4V	B7	+7.4V
A8	DRLK-0	B8	PSIZE-0
A9	DLPT-0	B9	ROPS-0
A10	JMCK-0	B10	SSLMT-0
A11	NC	B11	NC
A12	AD7-1	B12	AD6-1
A13	AD5-1	B13	AD4-1
A14	AD3-1	B14	AD2-1
A15	AD1-1	B15	AD0-1
A16	A15-1	B16	A14-1
A17	A13-1	B17	A12-1
A18	A11-1	B18	A10-1
A19	A9-1	B19	A8-1
A20	INTR	B20	RESET-1
A21	WR-0	B21	RD-0
A22	INTA-0	B22	READY
A23	NC	B23	NC
A24	PUMP-0	B24	FAN-0
A25	FANBLK-0	B25	ISPLS
A26	ISMAG	B26	ISYEL
A27	ISBLK	B27	ISCYAN
A28	GND	B28	GND
A29	GND	B29	GND
A30	GND	B30	GND

Table F-5

MOTHERBOARD CONNECTORS CN5, CN7, CN9

Pin	Signal	Pin	Signal
A1	+5V	B1	+5V
A2	+5V	B2	+5V
A3	+5V	B3	+5V
A4	I/F17	B4	I/F0
A5	I/F18	B5	I/F1
A6	SKPPACK-0	B6	I/F2
A7	SSEN-0	B7	I/F3
A8	SKIP-0	B8	I/F4
A9	IRT-0	B9	I/F5
A10	PRTRQ-0	B10	I/F6
A11	NOINK-0	B11	I/F7
A12	NOPPR-1	B12	I/F8
A13	PPRJAM-1	B13	I/F9
A14	MRDY-0	B14	I/F10
A15	DTRDY-0	B15	I/F11
A16	POWON-0	B16	I/F12
A17	IDXPLS-0	B17	I/F13
A18	DTCLK-0	B18	I/F14
A19	SCALL-1	B19	I/F15
A20	A3MD-0	B20	I/F16
A21	D7	B21	D15
A22	D6	B22	D14
A23	D5	B23	D13
A24	D4	B24	D12
A25	D3	B25	D11
A26	D2	B26	D10
A27	D1	B27	D9
A28	D0	B28	D8
A29	+12V	B29	+12V
A30	-12V	B30	-12V

NOTE: Interface circuit board uses CN5 and Parallel Interface circuit board uses CN9. CN7 is reserved for future use.

Table F-6

MOTHERBOARD CONNECTORS CN6, CN8, CN10

	Pin	Signal	Pin	Signal
	A1	GND	B1	GND
	A2	GND	B2	GND
	A3	GND	B3	GND
	A4	+24V	B4	+24V
	A5	+24V	B5	+24V
	A6	NC	B6	NC
	A7	NC	B7	NC
	A8	BLKDT-0	B8	MAGDT-0
	A9	NC	B9	NC
	A10	NC	B10	NC
	A11	NC	B11	NC
	A12	AD7-1	B12	AD6-1
	A13	AD5-1	B13	AD4-1
	A14	AD3-1	B14	AD2-1
	A15	AD1-1	B15	AD0-1
	A16	A15-1	B16	A14-1
	A17	A13-1	B17	A12-1
	A18	A11-1	B18	A10-1
	A19	A9-1	B19	A8-1
	A20	INTR	B20	RESET-1
	A21	WR-0	B21	RD-0
	A22	INTA-0	B22	READY
	A23	I/F24	B23	I/F19
	A24	I/F25	B24	I/F20
	A25	I/F26	B25	I/F21
CN6 only	A26	HMAG	B26	HYEL
CN8,CN10	A26	I/F27	B26	I/F22
CN6 only	A27	HBLK	B27	HCYAN
CN8,CN10	A27	I/F28	B27	I/F23
	A28	GND	B28	GND
	A29	GND	B29	GND
	A30	GND	B30	GND

NOTE: Interface circuit board uses CN6 and Parallel Interface circuit board uses CN10. CN8 is reserved for future use.

Table F-7

MOTHERBOARD CONNECTORS CN12,CN13,CN14,CN15,CN16,CN17,CN18,CN26

Connector	Pin	Signal	Source or Destination
CN12	1	LNIEA-0	Cartridge Indicator board (Pin 6 of CN42)
	2	IC6 (PB2)	NC
	3	GND	Cartridge Indicator board (Pin 7 of CN42)
	4	EN-1	Drum Lock Point/Encoder Pulse Sensor (Pin 3 of CN36)
	5	EN-0	Drum Lock Point/Encoder Pulse Sensor (Pin 4 of CN36)
	6	ENVCC-1	Drum Lock Point/Encoder Pulse Sensor (Pin 1 of CN36)
	7	GND	Drum Lock Point/Encoder Pulse Sensor (Pin 2 of CN36)
	8	GND	NC
	9	POWSW-0	NC
	10	GND	TEST START and ONLINE Switch (Pin 3 of CN55)
	11	TEST-0	TEST START switch (Pin 2 of CN55)
	12	ONLINE-0	ONLINE Switch (Pin 1 of CN55)
	13	EMST-0	STOP COPY switch (Pin 1 of CN54)
	14	GND	STOP COPY switch (Pin 2 of CN54)
	15	GND	AIR PUMP ONLY switch (Pin 2 of CN64)
CN13	1	LCALL-0	Front Panel Indicator board (Pin 7 of CN59) via Pin 7 of CN39
	2	LWAIT-0	Front Panel Indicator board (Pin 3 of CN59) via Pin 3 of CN39
	3	+5V	Front Panel Indicator board (Pin 1 of CN59) via Pin 1 of CN39
	4	LJM-0	Front Panel Indicator board (Pin 6 of CN59) via Pin 6 of CN39
	5	LNOPPR-0	Front Panel Indicator board (Pin 4 of CN59) via Pin 4 of CN39
	6	LNOINK-0	Front Panel Indicator board (Pin 5 of CN59) via Pin 5 of CN39
	7	LRDY-0	NC
	8	LPOWON-0	NC
	9	LA3-0	NC
	10	GND	Front Panel Indicator board (Pin 2 of CN59) via Pin 2 of CN39
	11	+5V	Cartridge Indicator bd (Pin 1 of CN42)
	12	LNIYEL	Cartridge Indicator bd (Pin 2 of CN42)
	13	LNIMAG-0	Cartridge Indicator bd (Pin 3 of CN42)
	14	LNICYAN-0	Cartridge Indicator bd (Pin 4 of CN42)
	15	LNIBLK-0	Cartridge Indicator bd (Pin 5 of CN42)

Table F-7 (cont)

Connector	Pin	Signal	Source or Destination
CN14	1	PUMPSW-0	AIR PUMP ONLY switch (Pin 1 of CN64)
	2	IC5 (PB2)	NC
	3	STPS-0	Start Position Sensor (Pin 1 of CN44)
	4	+5V	Start Position Sensor (Pin 2 of CN44)
	5	GND	Start Position Sensor (Pin 3 of CN44)
	6	FSW-0	Front Switch Sensor (Pin 2 of CN43)
	7	BSW-0	Back Switch Sensor (Pin 1 of CN43)
	8	+5V	Both Front and Back Switch Sensors (Pin 3 of CN43)
	9	GND	Both Front and Back Switch Sensors (Pin 4 of CN43)
	10	DRLK-0	Drum Lock Sensor board (Pin 1 of CN41)
	11	+5V	Drum Lock Sensor board (Pin 2 of CN41)
	12	GND	Drum Lock Sensor board (Pin 3 of CN41)
CN15	1	JMCK-0	Jam Check Sensor board (Pin 1 of CN40)
	2	+5V	Jam Check Sensor board (Pin 2 of CN40)
	3	GND	Jam Check Sensor board (Pin 3 of CN40)
	4	NOPPR-0	No Paper Sensor board (Pin 1 of CN38)
	5	+5V	No Paper Sensor board (Pin 2 of CN38)
	6	GND	No Paper Sensor board (Pin 3 of CN38)
	7	PSIZE-0	Paper Size Sensor board (Pin 1 of CN37)
	8	GND	Paper Size Sensor board (Pin 2 of CN37)
	9	DLPT-0	Drum Lock Point/Encoder Pulse Sensor board (Pin 1 of CN34)
	10	+5V	Drum Lock Point/Encoder Pulse Sensor board (Pin 2 of CN34)
	11	GND	Drum Lock Point/Encoder Pulse Sensor board (Pin 3 of CN34)
	12	ROPS-0	Roller Position Sensor board (Pin 1 of CN35)
	13	SSLMT-0	Scan Limit Sensor board (Pin 2 of CN35)
	14	+5V	Both Roller Position and Scan Limit Sensor boards (Pin 3 of CN35)
	15	GND	Both Roller Position and Scan Limit Sensor boards (Pin 4 of CN35)
CN16	1	DDRLK+	Drum Lock Solenoid (Pin 1 of CN50)
	2	DDRLK-	Drum Lock Solenoid (Pin 2 of CN50)

Table F-7 (cont)

Connector	Pin	Signal	Source or Destination
CN17	1	DFMT+	Paper Carrier Motor (Pin 1 of CN51)
	2	DFMT-	Paper Carrier Motor (Pin 2 of CN51)
	3	DRMT+	Paper Unloading Motor (Pin 1 of CN47)
	4	DRMT-	Paper Unloading Motor (Pin 2 of CN47)
	5	DCMT+	Head Cleaning Motor (Pin 1 of CN46)
	6	DCMT-	Head Cleaning Motor (Pin 2 of CN46)
	7	DSMTA+	Carriage Motor (Pin 1 of CN48)
	8	DSMTA-	Carriage Motor (Pin 2 of CN48)
	9	DSMTB+	Carriage Motor (Pin 3 of CN48)
	10	DSMTB-	Carriage Motor (Pin 4 of CN48)
	11	DMMT+	Low Voltage Regulator (Pin 3 of CN27)
	12	DMMT-	Low Voltage Regulator (Pin 4 of CN27)
CN18	1	+5V	High Voltage Regulator (Pin 4 of CN29) via Pin 7 of CN65
	2	PUMP-0	High Voltage Regulator (Pin 3 of CN29) via Pin 6 of CN65
	3	FAN-0	High Voltage Regulator (Pin 1 of CN29) via Pin 4 of CN65
	4	FANBLK-0	High Voltage Regulator (Pin 2 of CN29) via Pin 5 of CN65
	5	ISPLS	Ink Cartridge Sockets (Pin 1 of CN53)
	6	ISYEL	Ink Cartridge Sockets (Pin 2 of CN53)
	7	ISPLS	Ink Cartridge Sockets (Pin 4 of CN53)
	8	ISMAG	Ink Cartridge Sockets (Pin 5 of CN53)
	9	ISPLS	Ink Cartridge Sockets (Pin 7 of CN53)
	10	ISCYAN	Ink Cartridge Sockets (Pin 8 of CN53)
	11	ISPLS	Ink Cartridge Sockets (Pin 10 of CN53)
	12	ISBLK	Ink Cartridge Sockets (Pin 11 of CN53)
	13	HYEL	Ink Jet Head Driver board (Pin 2 of CN19)
	14	HMAG	Ink Jet Head Driver board (Pin 3 of CN19)
	15	HCYAN	Ink Jet Head Driver board (Pin 4 of CN19)
	16	HBLK	Ink Jet Head Driver board (Pin 5 of CN19)
	17	+5V	Paper Size Sensor board (Pin 3 of CN37)
	18	+5V	Ink Jet Head Driver board (Pin 4 of CN20)
	19	GND	Ink Jet Head Driver board (Pin 5 of CN20)
	20	GND	Ink Jet Head Driver board (Pin 1 of CN19)

Table F-7 (cont)

Connector	Pin	Signal	Source or Destination
CN26	1	+5V	Low Voltage Regulator circuit board
	2	+5V	Low Voltage Regulator circuit board
	3	+12V	Low Voltage Regulator circuit board
	4	-12V	Low Voltage Regulator circuit board
	5	+7.4V	Low Voltage Regulator circuit board
	6	+24V	Low Voltage Regulator circuit board
	7	+24V	Low Voltage Regulator circuit board
	8	GND	Low Voltage Regulator circuit board
	9	GND	Low Voltage Regulator circuit board
	10	GND	Low Voltage Regulator circuit board
	11	NC	
	12	NC	

DRIVER CIRCUIT BOARD CONNECTORS

Refer to Tables F-1 and F-2 (CN1 and CN2) for pin/signal assignments for the Driver circuit board.

CPU CIRCUIT BOARD CONNECTORS

Refer to Tables F-3 and F-4 (CN3 and CN4) for pin/signal assignments for the CPU circuit board.

INTERFACE CIRCUIT BOARD CONNECTORS

Refer to Tables F-5 and F-6 (CN5 and CN6) for pin/signal assignments for the Interface circuit board.

PARALLEL INTERFACE CIRCUIT BOARD CONNECTORS

The connector locations on the Parallel Interface circuit board are shown in Figure F-2. Table F-8 shows the signals on each pin of the Parallel Interface circuit board's cable connectors.

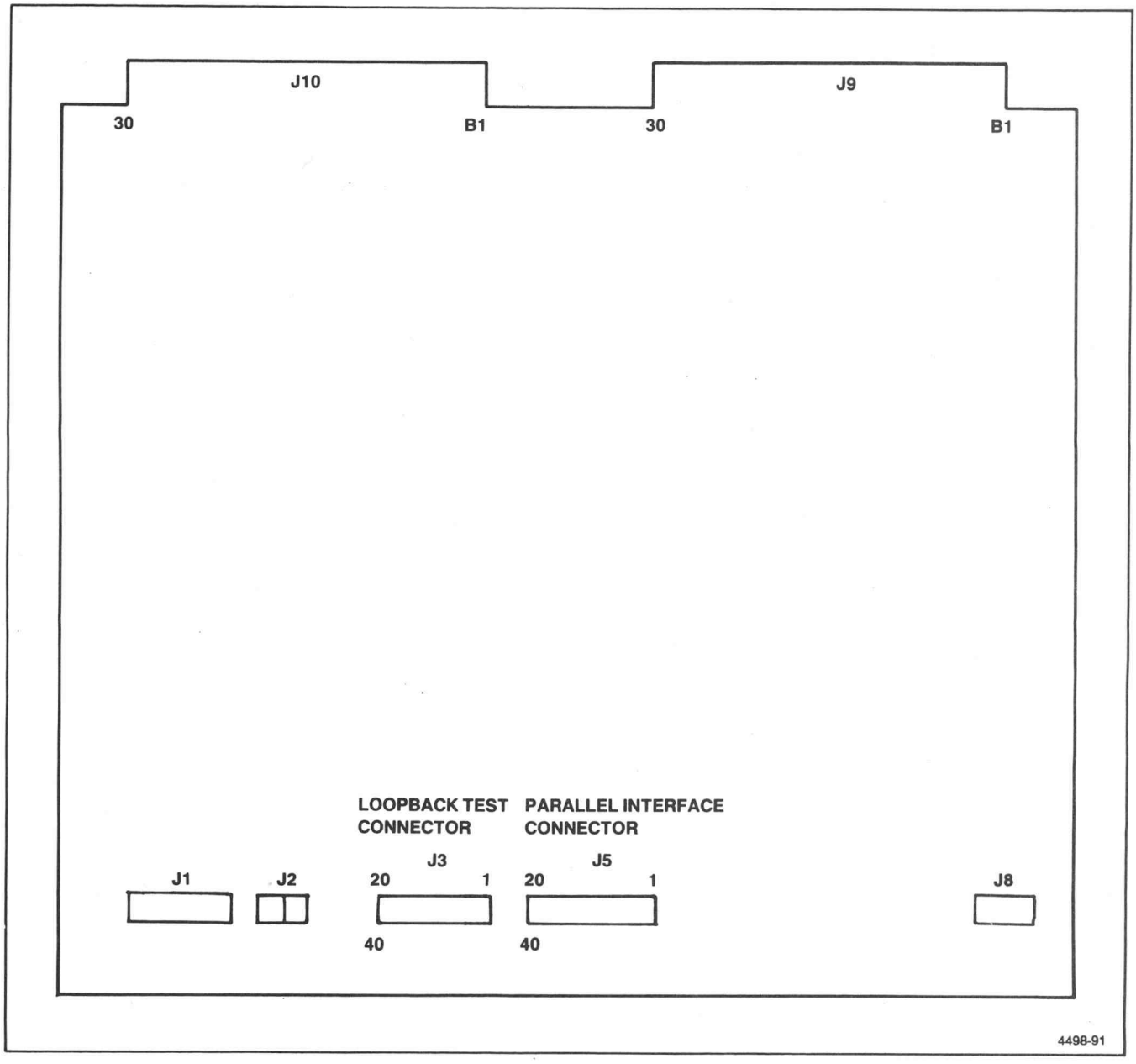


Figure F-2. Parallel Interface Circuit Board Connectors.

Table F-8

PARALLEL INTERFACE CIRCUIT BOARD CONNECTORS

Connector	Pin	Signal	Source or Destination
J1	1	INT-0	5-Position Rotary TEST PATTERN SELECT Switch
	2	GND	
	3	TP0	
	4	TP1	
	5	PBSW	
	6	GND	
	7	TRANSP-0	
	8	GND	
J2	1	+5V	TEST START Switch S1013
	2	GND	TEST START Switch
J3	1	TDSTB-0	LOOPBACK TEST CONNECTOR
	2	TD0-1	
	3	TD1-1	
	4	TD2-1	
	5	TD3-1	
	6	TD4-1	
	7	TD5-1	
	8	TD6-1	
	9	TD7-1	
	10	TACK-0	
	11	TBSY-0	
	12	TIR/SO	
	13-20	NC	
	21	GND	
	22	GND	
	23	GND	
	24	GND	
	25	GND	
	26	GND	
	27	GND	
	28	GND	
	29	GND	
	30	GND	
	31	TLOOP-0	
	32-33	NC	
	34	TFLT-0	
	35-39	NC	
	40	LAMP-0	

Table F-8 (cont)

Connector	Pin	Signal	Source or Destination
J5	1	DSTB-0	HOST OR 4113A TERMINAL
	2	D0-1	
	3	D1-1	
	4	D2-1	
	5	D3-1	
	6	D4-1	
	7	D5-1	
	8	D6-1	
	9	D7-1	
	10	ACK-0	
	11	BUSY-1	
	12	IR/SO	
	13	SLCT-1	
	14	NC	
	15	NC	
	16	NC	
	17	NC	
	18	NC	
	19	NC	
	20	NC	
	21	NC	
	22-32	GND	
	33	NC	
	34	FAULT-0	
	35-40	NC	
J8	1	2MHz	Not Used
	2	BLANK-1	
	3	ORIDX-1	
	4	ORDC-1	
	5	DTRDY-0	
	6	GND	
J9	See Table F-5 (CN9)		
J10	See Table F-6 (CN10)		

INK JET HEAD DRIVER CIRCUIT BOARD CONNECTORS

Table F-9 shows the signals on each pin of the Ink Jet Head Driver circuit board's connectors.

Table F-9

INK JET HEAD DRIVER CIRCUIT BOARD CONNECTORS

Connector	Pin	Signal	Source or Destination
CN19	1	GND	CN18 on the Motherboard
	2	HYEL	
	3	HMAG	
	4	HCYAN	
	5	HBLK	
CN20	1	+150V	High Voltage Regulator CB (CN28)
	2	GND	
	3	-150V	
	4	+5V	CN18 on the Motherboard
	5	GND	
	6	NC	
CN21	1	DHYEL	Ink Jet Head via CN32
	2	DHMAG	
	3	DHCYAN	
	4	DHBLK	
	5	GND	
	6	GND	

CABLE CONNECTORS

Each connector in the copier has a unique number, which is printed on both halves of the connector. Table F-10 lists all of the cable connectors in the copier, except those on the Motherboard (which are shown in Tables F-1 through F-7). Table F-10 also shows what two components are joined by that connector and also on which page of the SYSTEM INTERCONNECT drawings (in Section 13 - Diagrams) that the schematic of that connector is shown. You will want to refer to the SYSTEM INTERCONNECT drawing to identify the different pins in the connector using the wire color codes shown on the SYSTEM INTERCONNECT drawing. Also refer to Figure 13-2 for an overall cable interconnect diagram.

Table F-10

CABLE CONNECTORS

Connector	Page in SYSTEM INTER-CONNECT Drawing	Connects What Components Together
19	2	CN18 (Motherboard) to Ink Jet Head Driver board
20	2	CN18 (Motherboard) to Ink Jet Head Driver board and
	1	Ink Jet Head Driver board to High Voltage Regulator board (CN28) via CN65
21	2	Ink Jet Head Driver board to Ink Jet Heads via CN32 and CN33
22	1	Transformer T1 to Fuse Board
23	1	Transformer T1 to High Voltage Regulator board
24	1	Transformer T2 to High Voltage Regulator board via CN60 and Fuse board

Table F-10 (cont)

Connector	Page in SYSTEM INTER CONNECT Drawing	Connects What Components Together
25		Not Used
26	1	Low Voltage Regulator board to Motherboard
27	1	Low Voltage Regulator board to Drum Motor (via CN45) and Motherboard (CN17)
28	1	High Voltage Regulator board to Ink Jet Head Driver (CN20) via CN65
29	1	High Voltage Regulator board to Motherboard (CN18) via CN65
30	1	High Voltage Regulator board to Air Pump (via CN52) and Paper-Hold Fan (via CN49)
31		Not Used
32	2	Ink Jet Head Driver board (CN21) to Ink Jet Heads
33	2	Ink Jet Head Driver board (CN21) to Ink Jet Heads
34	3	Motherboard (CN15) to Drum Lock Point/Encoder Pulse Sensor board
35	3	Motherboard (CN15) to Roller Position and Scan Limit Sensor board
36	2	Motherboard (CN12) to Drum Lock Point/Encoder Pulse Sensor board
37	3	Motherboard (CN15) to Paper Size Sensor board
38	3	Motherboard (CN15) to No Paper Sensor
39	2	Motherboard (CN13) to Front Panel Indicator board (CN59)

Table F-10 (cont)

Connector	Page in SYSTEM INTER-CONNECT Drawing	Connects What Components Together
40	3	Motherboard (CN15) to Jam Check Sensor board
41	2	Motherboard (CN14) to Drum Lock Sensor board
42	2	Motherboard (CN12 and CN13) to Cartridge Indicator board
43	2	Motherboard (CN14) to Front and Back Switch Sensor board
44	2	Motherboard (CN14) to Starting Point Sensor
45	1	Low Voltage Regulator (CN27) to Drum Motor
46	3	Motherboard (CN17) to Head Cleaning Motor
47	3	Motherboard (CN17) to Paper Unloading Motor
48	3	Motherboard (CN17) to Carriage Motor
49	1	High Voltage Regulator board (CN30) to Paper-Hold Fan via CN65
50	3	Motherboard (CN16) to Drum Lock Solenoid
51	3	Motherboard (CN17) to Paper Carrier Motor
52	1	High Voltage Regulator board (CN30) to Air Pump via CN65
53	3	Motherboard (CN18) to Ink Cartridge Sockets
54	2	Motherboard (CN12) to STOP COPY switch (S5003)
55	1	Motherboard (CN12) to TEST START and ONLINE switches

Table F-10 (cont)

Connector	Page in SYSTEM INTER-CONNECT Drawing	Connects What Components Together
56	1	Front Panel POWER Switch to Power Supply Module (CN61)
57	1	Low Voltage Regulator board (CN58) to cooling fan
58	1	Low Voltage Regulator board to cooling fan via CN57
59	2	Front Panel Indicator board to Motherboard (CN13) via CN39
60	1	Transformer T2 to High Voltage Regulator board (CN24) via Fuse board
61	1	Power Supply Module to Front Panel POWER switch
62		Not Used
63		Not Used
64	2	Motherboard (CN14 and CN12) to AIR PUMP ONLY switch
65	1	High Voltage Regulator board (CN28,29, and 30) to Motherboard (CN18), Ink Jet Head Driver (CN20), Air Pump (CN52), and Paper-Hold Fan (CN49)

Appendix G

UNPACKING/PACKING PROCEDURES

ABOUT THIS APPENDIX

This appendix provides information needed when a copier first arrives from the factory. Procedures for unpacking, preparing the copier, and repackaging are provided. Refer to Section 11 for copier handling precautions, site considerations, line voltage settings, and copier moving.

UNPACKING PROCEDURE

This procedure instructs you on how to open the copier's shipping container. The copier's shipping container is designed to provide full protection under normal transit conditions. All standard accessories are shipped in the accessory box (located inside the copier's shipping container). Immediately upon arrival, inspect the container for possible damage incurred during shipping. Report any obvious container damage to the carrier company and to the Tektronix Sales representative.

The copier's shipping weight is approximately 225 lbs (102 kg). A lift truck may be used to move the crated instrument to the installation site.

Removing The Copier From The Carton

Figure G-1 shows an exploded view of the shipping container and its parts. All shipping containers and internal packing material may be saved and re-used as required. Each shipping container is mounted on a wooden pallet.

The following procedure details the steps for removing the exterior shipping carton parts. The step numbers in this procedure correspond to the numbers called out in Figure G-1.

1. Remove the six plastic clips that hold the outer carton in place.
2. Lift the outer carton straight up and off of the copier.
3. Remove the flat top spacer and the four square cardboard spacers around the top of the copier.
4. Remove the accessory box from the top of the copier. Set this package aside to be unpacked later (refer to 4691 Operator's Manual for unpacking accessory box).
5. Remove the two foam parts from the top of the copier.
6. Remove the plastic cover and the outside cardboard container.
7. The copier can now be removed from the shipping carton. The copier should be placed in its permanent location before removing the packaging material from inside the copier.

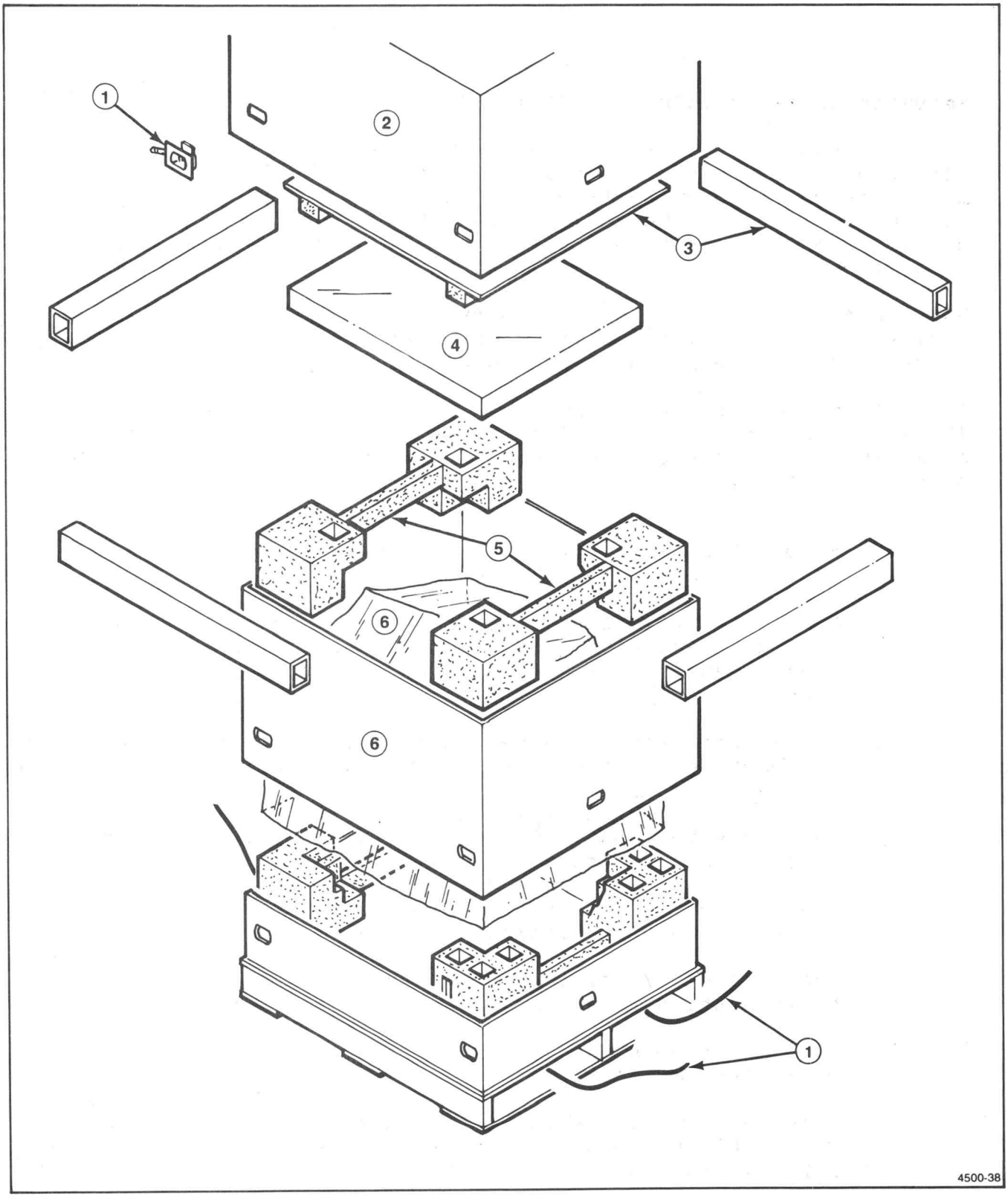


Figure G-1. Exploded View of the Shipping Container.

Removing Copier's Internal Packing Material

When the copier is shipped from the manufacturer, there are foam blocks and cable ties inside the copier to prevent any of the major assemblies from shifting during shipment. Figure G-2 shows the location of all the internal packaging material. These packing components should be saved in case the copier must be repackaged.

Use the following procedure to remove packing material from inside the copier. The numbers of each step in this procedure corresponds to the numbers in Figure G-2.

The information at the end of some of the steps refer to the illustrations in Figure G-3 (ie. Block B). If the copier must be repacked, it is necessary to install this packing material in the proper locations.

1. Remove the two plastic stoppers between the ends of the drum and the frame. (Stopper).

2. Clip and remove the three cable ties that secure the drum and remove the two long plastic spacers that are placed between the drum and the head carriage shafts. (Drum holder).

3. Remove the plastic spacer that is between the bottom of the paper carrier and the chrome paper guide. (Block C).

4. Remove the masking tape that holds the six vacuum tubes up. Check to ensure that all six tubes drop into their proper operating position.

5. Remove the foam block from between the rear of the vacuum arm and the frame. (Block A).

6. Remove the foam block that is taped to the vacuum arm between the arm and the frame below it. (Block E).

7. Clip and remove the cable tie around the center of the paper carrier assembly.

8. Clip and remove the two cable ties that hold the two spacer blocks between the paper carrier assembly and the paper carrier drive shaft. (Block B).

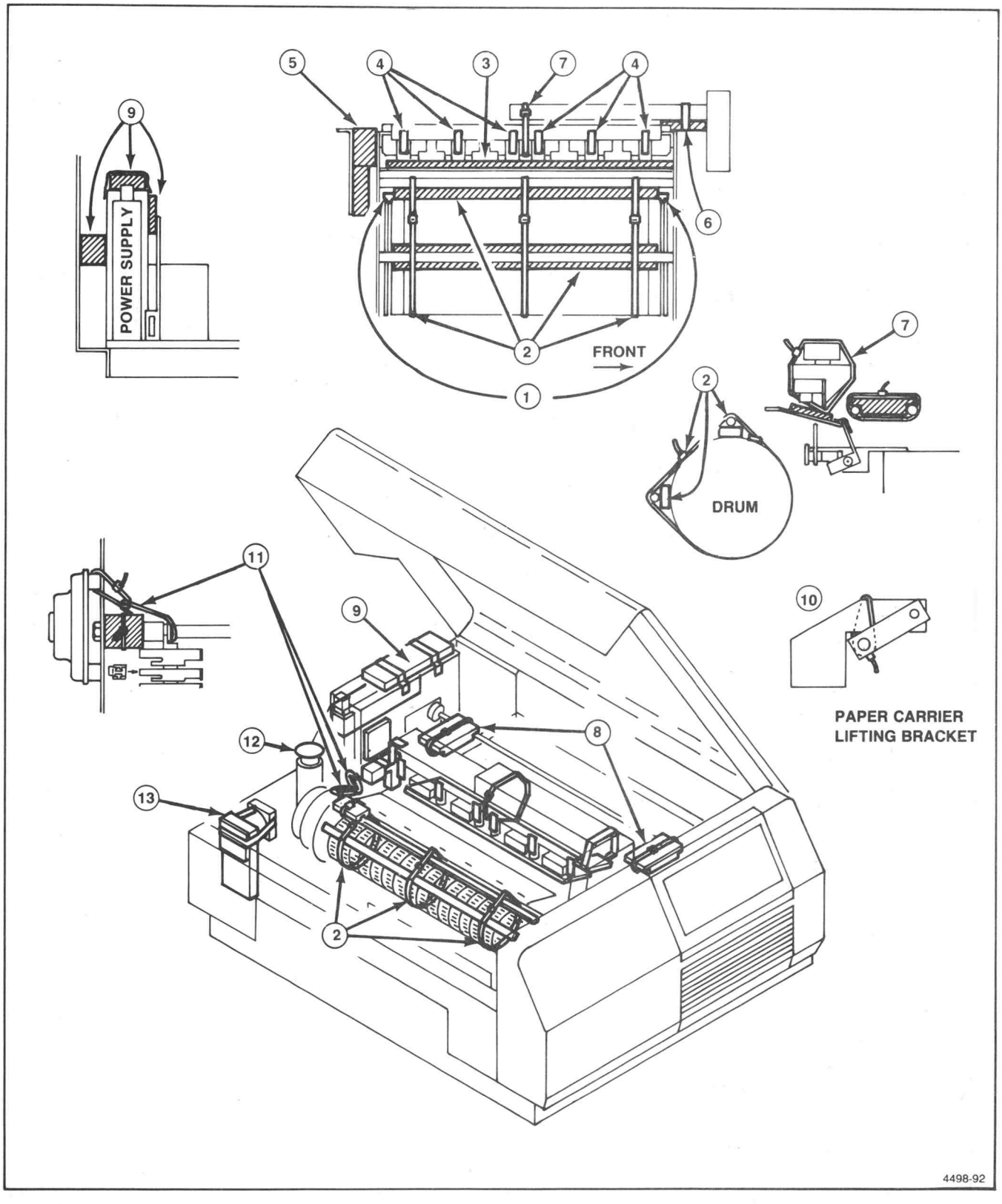


Figure G-2. Copier's Internal Packing.

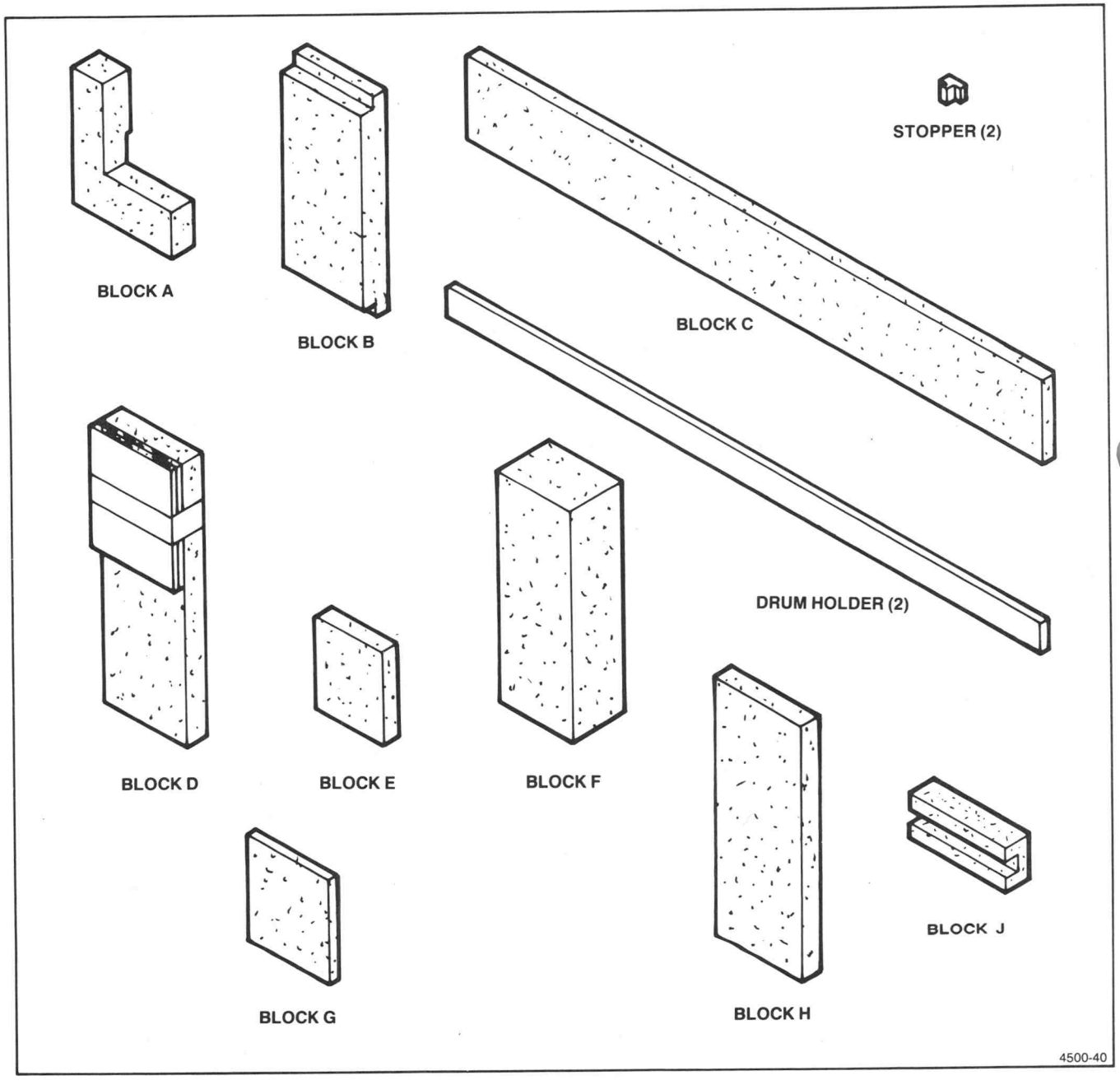


Figure G-3. Internal Copier Packing Materials.

9. Remove the tape and three foam blocks that are located on the top, right side and left side of the power supply assembly. (Blocks H,G,F).

10. Clip and remove the cable ties around the paper carrier lifting brackets at the front and rear of the paper carrier assembly.

11. Clip and remove the two cable ties that secure the head carriage assembly to the drum motor. Clip and remove the cable tie that holds the spacer block between the head carriage and the frame.

12. Remove the round cover on the head washing pump assembly. The wash bottle that is included in the accessory carton can be filled with DISTILLED water ONLY and installed in the head washing pump assembly. Install the washing bottle, push down and turn counter-clockwise to lock the bottle in place.

13. Remove the tape, cardboard and foam spacers from around the head carriage drive motor.

14. Remove the tape from the "Paper Size" and the "Paper Out" sensors. These sensors are located behind the chrome paper guide.

15. Remove all tape that is placed around the access doors of the copier.

16. Check to ensure that all tape and packing material has been removed from inside the copier.

17. See the procedure in Section 11 for Installation. Then, refer refer to the 4691 Operator's Manual for Copier Checkout procedure.

PACKING PROCEDURE

Refer to the 4691 Operator's Manual for instructions on how to repack the copier for shipment.

Appendix H

DIAGNOSTICS GUIDE

ABOUT THIS APPENDIX

The purpose of this appendix is to provide a guide to troubleshoot ink jet heads in the copier. Included are several characteristic test pattern aberrations and their probable causes.

In some cases, more than one malfunction may cause the same test pattern aberration. In these instances, several possible causes are listed in order of easiest to check. The most difficult item to check is listed last. The service person should check for the problem item by item as they are listed in the guide.

INTRODUCTION

The Threshold Voltage (TV) Test Pattern is the most useful tool that can be used to troubleshoot the copier's ink jet heads. Section 8 describes the theory and operation of the Threshold Voltage Test. Proper interpretation of the TV pattern is essential to accurately determine the ink jet head fault and correct it.

Three or four TV patterns should be generated. Often, the first couple of patterns are substantially different from the last few. Then, after the internal condition of the ink jet head has stabilized, subsequent patterns should not vary. These later patterns should be used to determine the copier's ink jet head fault.

Compare the TV pattern to the examples shown in this appendix. While the patterns shown in this appendix may not be identical to your pattern, general shapes, trends, and relative magnitudes may make it fit closer to one example or another. Exact values and magnitudes of your TV pattern's aberrations in volts or hertz is of little value.

Generally, if a fairly straight lower edge is produced on the TV pattern, the ink jet head is operating correctly. Also, small aberrations in the TV pattern are acceptable. Figures H-1 through H-11 show the common ink jet head faults and causes.

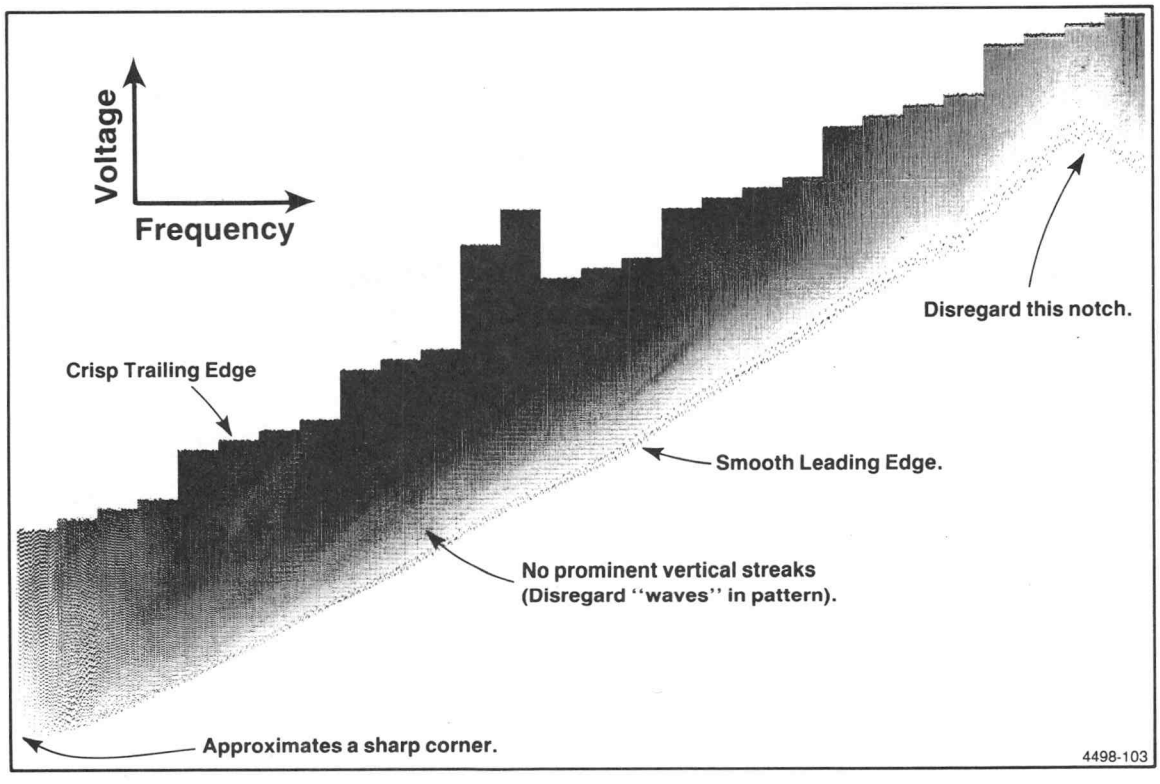


Figure H-1. TV Pattern Produced by a Good Ink Jet Head.

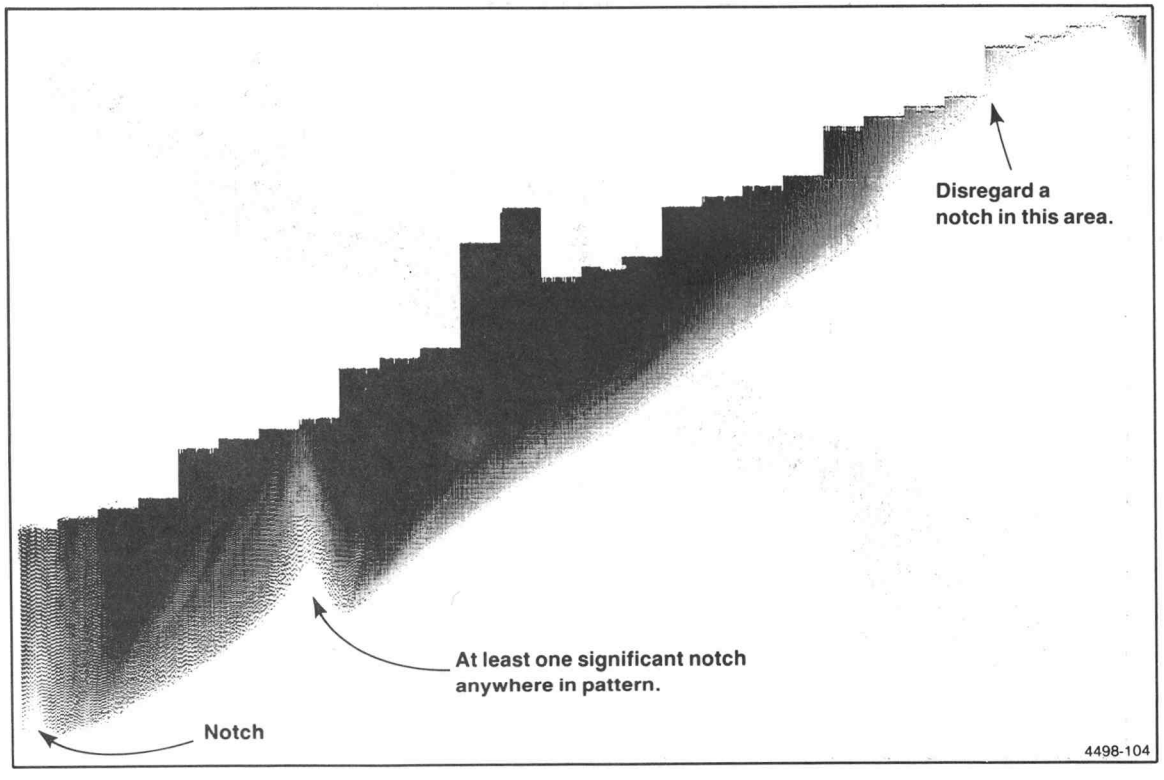


Figure H-2. TV Pattern Produced by an Ink Jet Head with an Air Bubble.

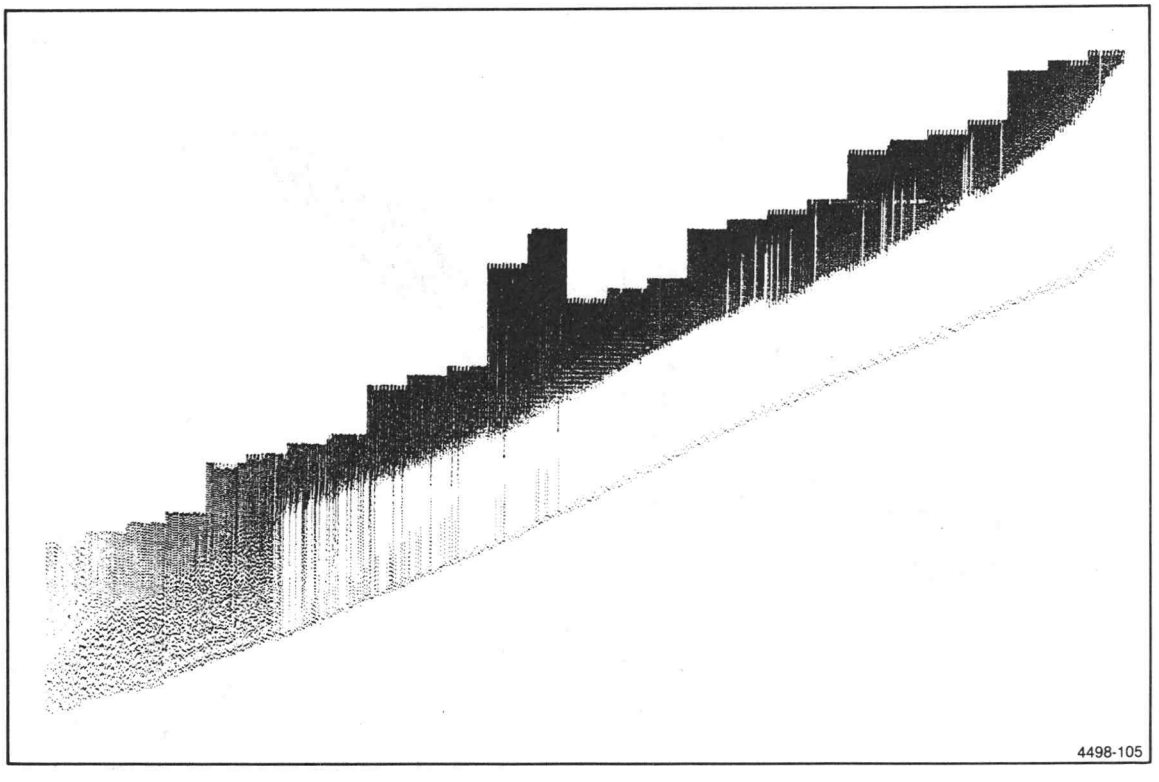


Figure H-3. TV Pattern Produced by an Ink System with Low Air/Ink Pressure.

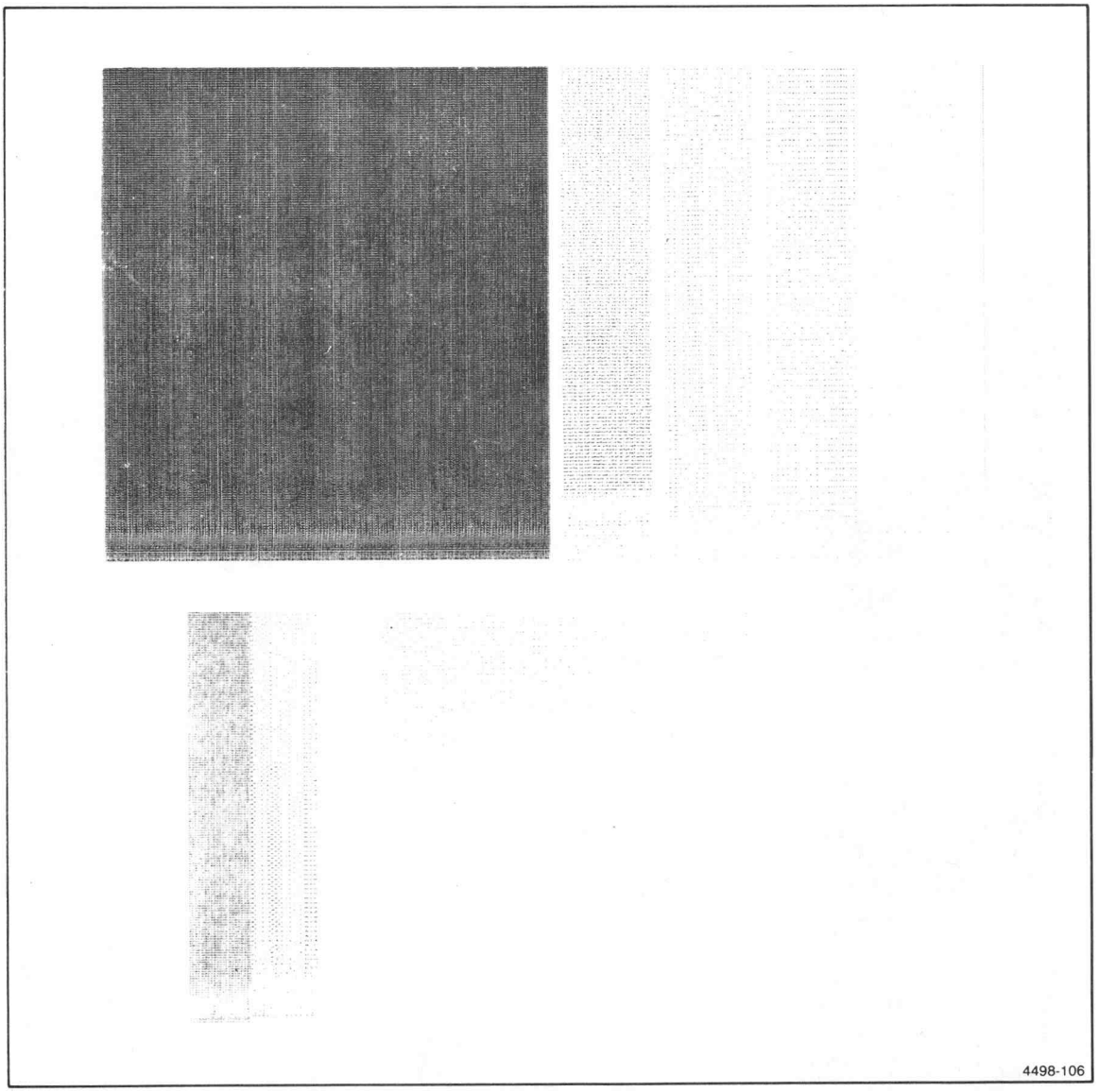


Figure H-4. Low Color Density of a Solid Fill Area.

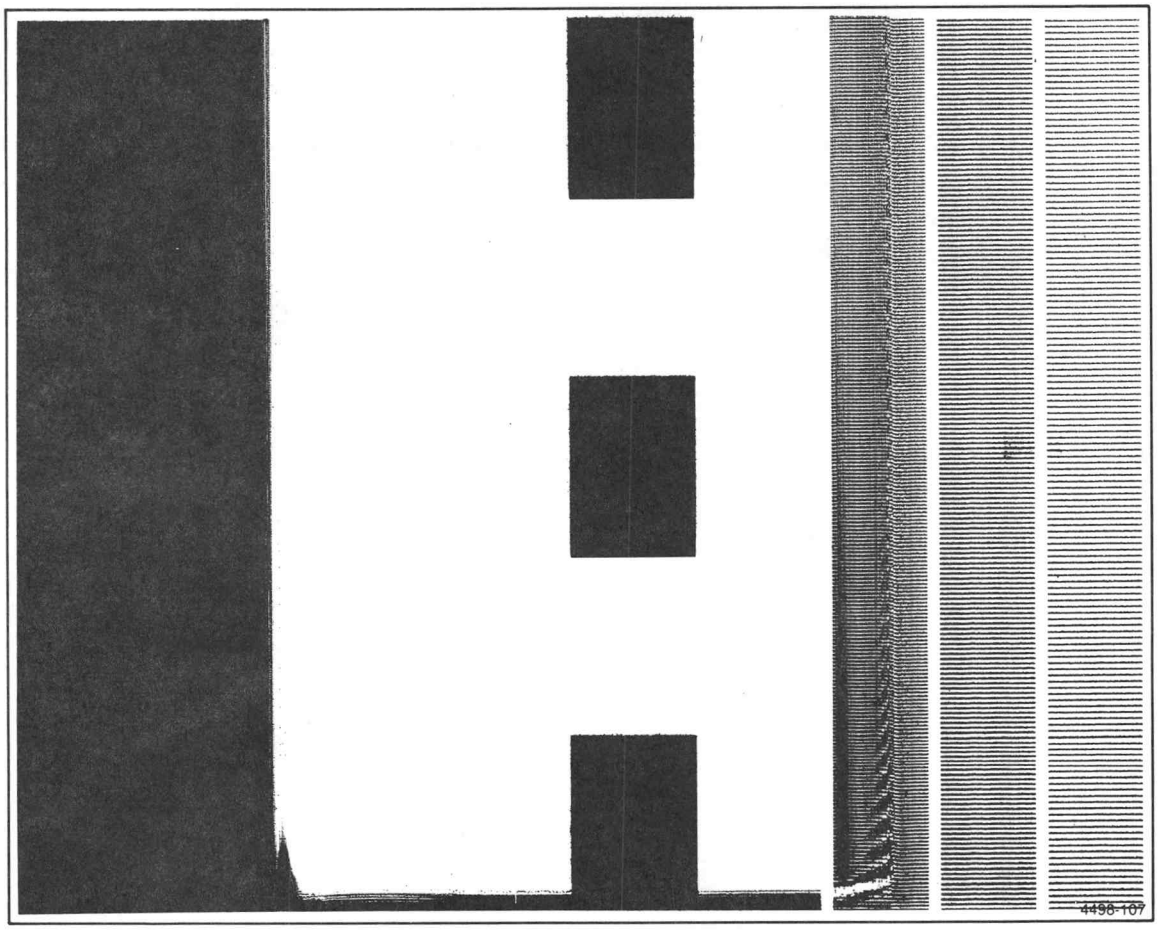


Figure H-5. Solid Fill Area Produced by an Ink Jet Head with Inadequate Ink Flow.

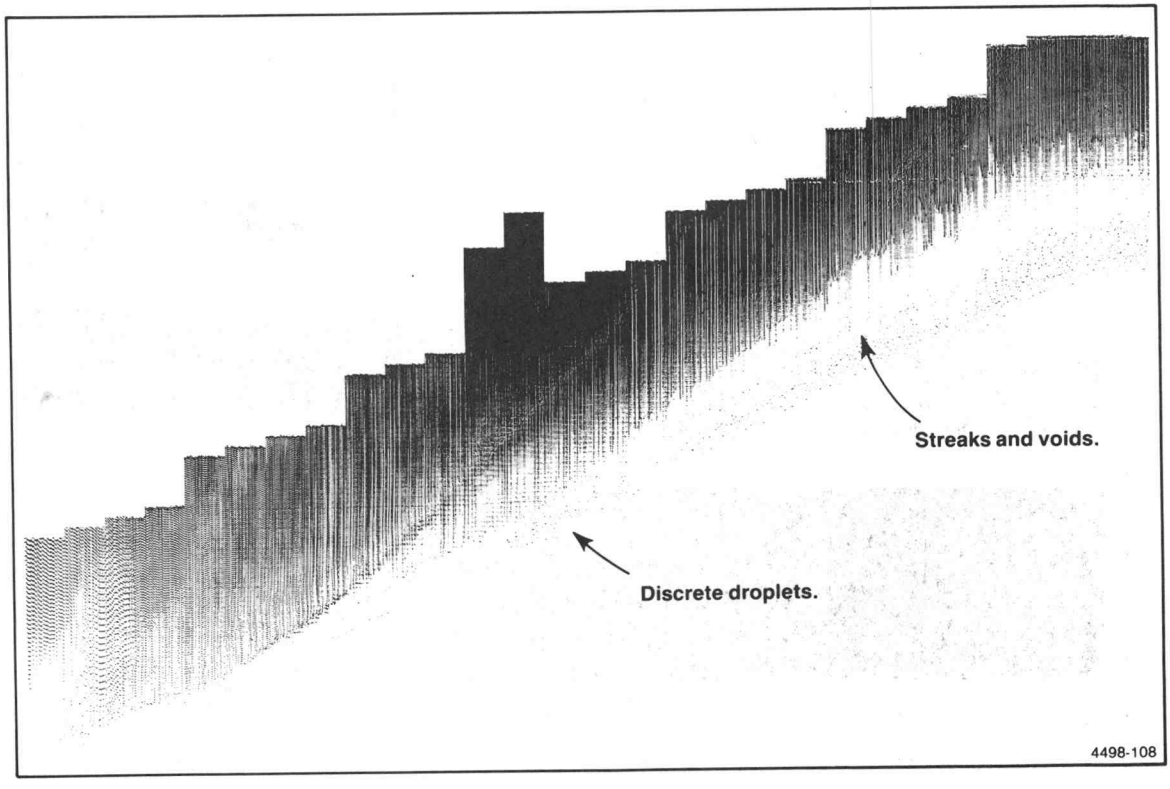


Figure H-6. TV Pattern Produced by an Ink Jet Head with a Partially Clogged Orifice.

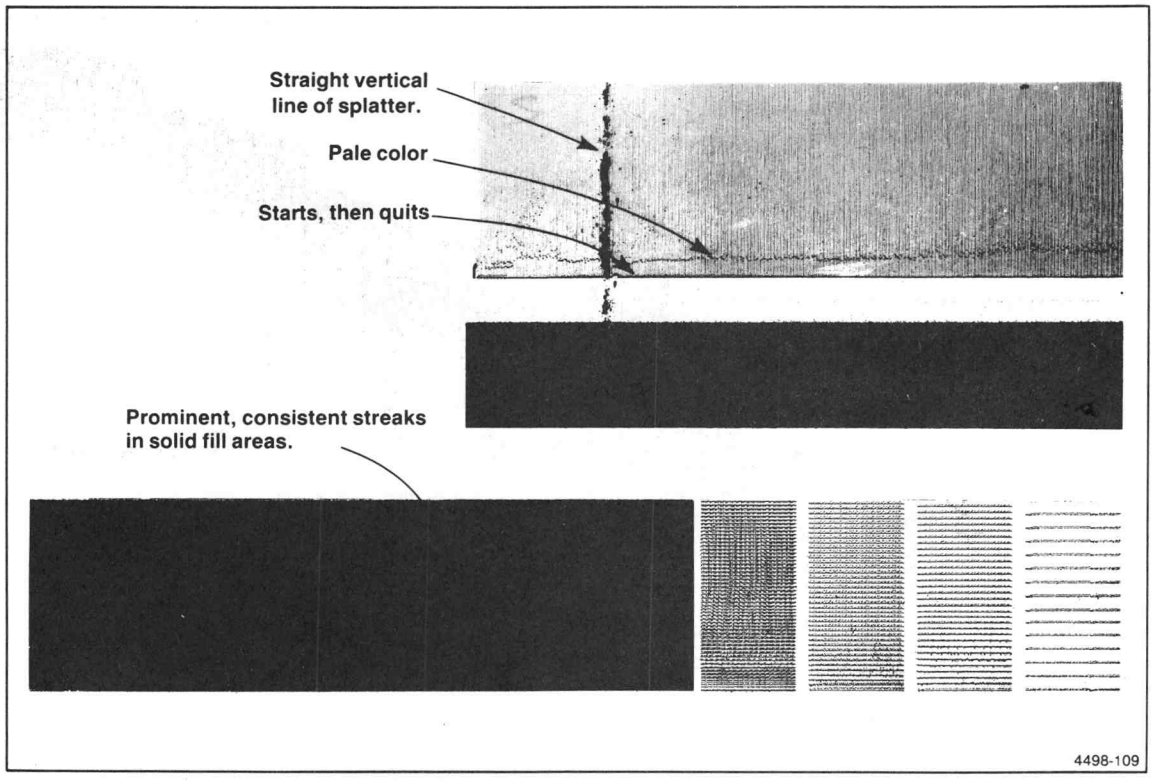


Figure H-7. Copies Produced by an Ink Jet Head with a Partially Clogged Orifice.

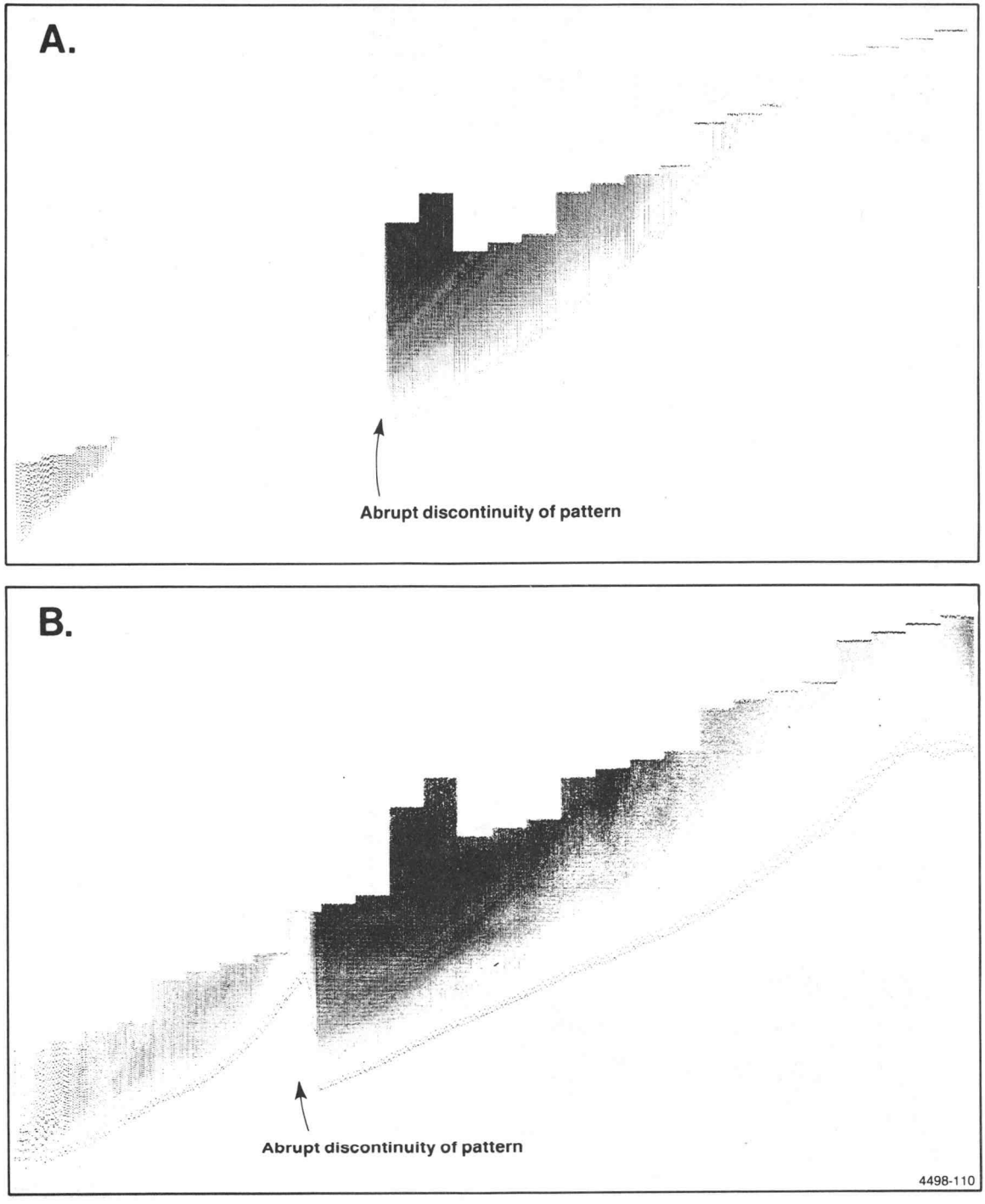


Figure H-8. TV Pattern Produced by an Ink Jet Head with Inadequate Ink Flow.

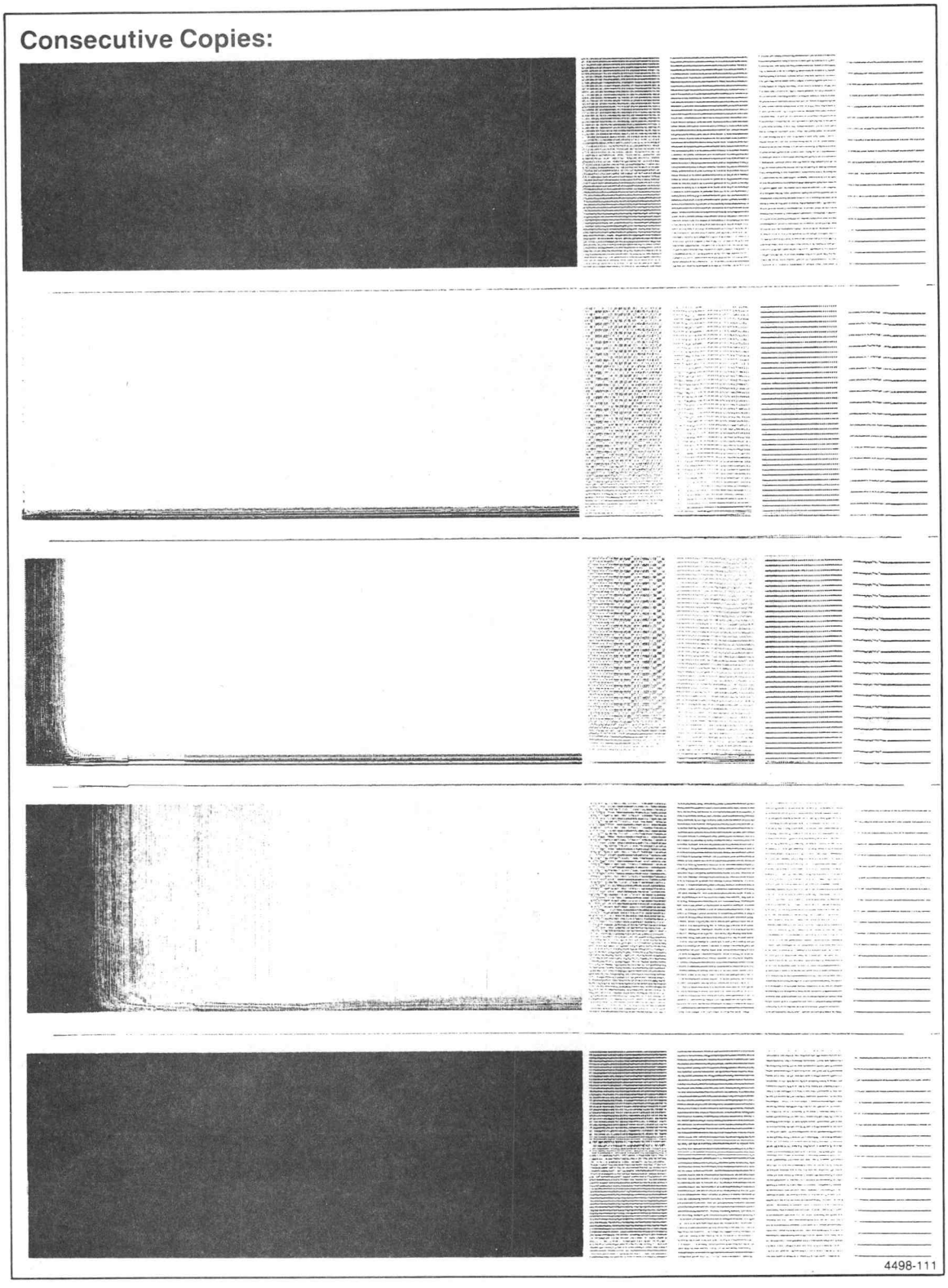
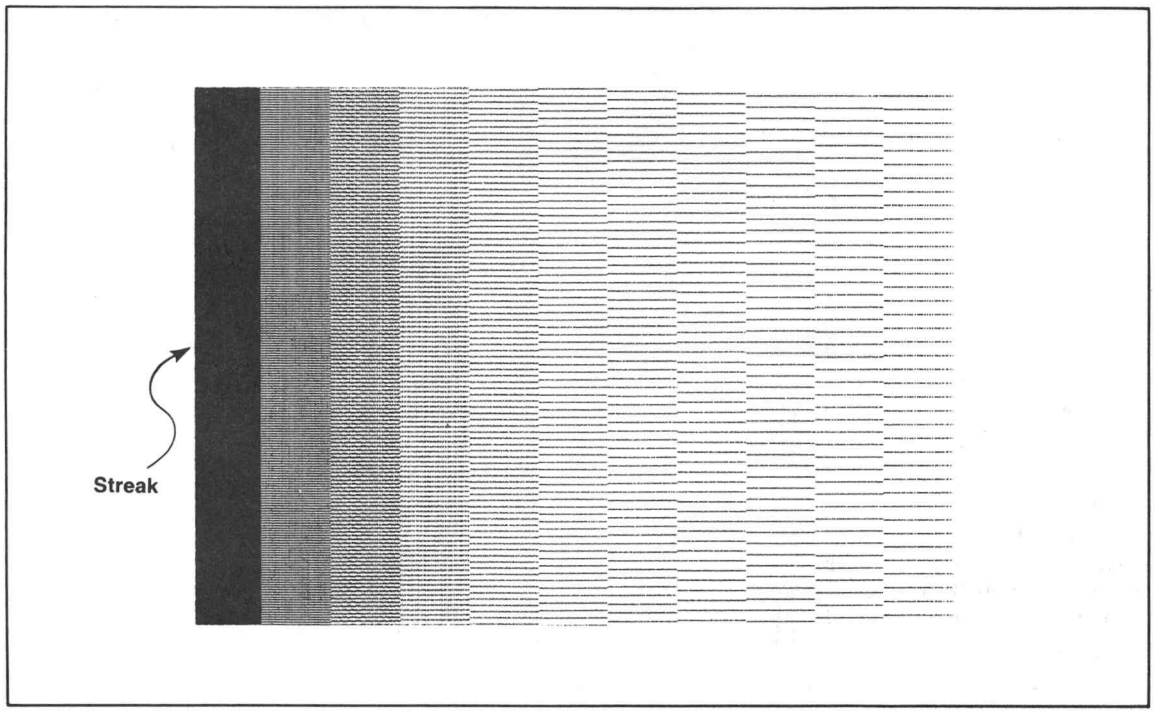


Figure H-9. Solid Fill Area Produced by an Ink Jet Head with a Partially Clogged Orifice.

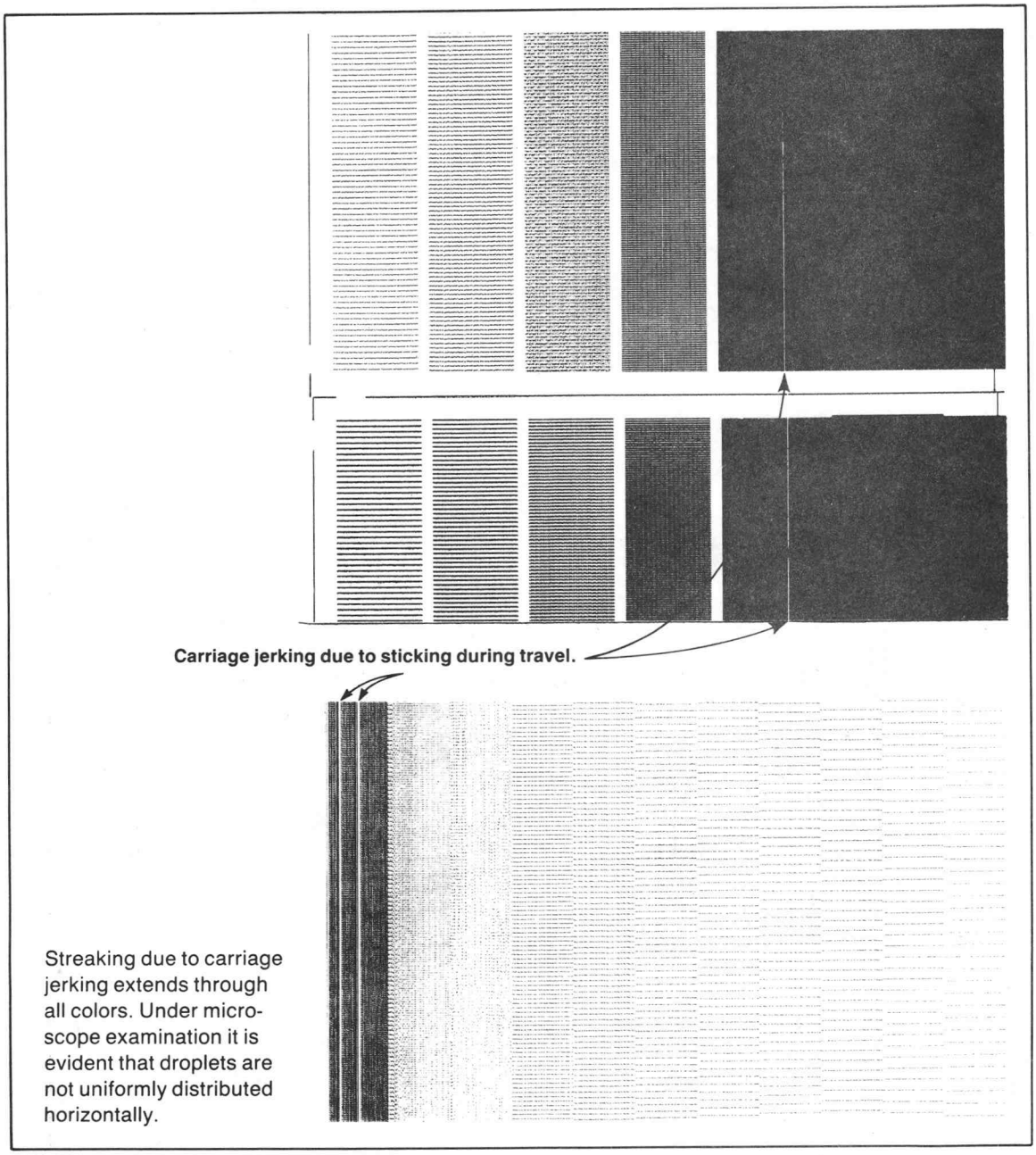


POSSIBLE CAUSES:

- Partially clogged orifice — either N2 or N3.
- Partially clogged ink filter.

4498-101

Figure H-10. Streaked Copy Produced by an Ink Jet Head with a Partially Clogged Orifice.



POSSIBLE CAUSE:

- Sticky/dirty carriage rails.
- Carriage or flexible-hose conduit catching on hardware during travel.

4498-102

Figure H-11. Streaked Copy Produced by Carriage Jerk.

Tektronix®
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

PRODUCT 4691 COLOR GRAPHICS COPIER SERVICE MANUAL
CHANGE REFERENCE C1/283
MANUAL PART NO. 070-4498-00
DATE 2-24-83

EFFECTIVE ALL SERIAL NUMBERS

SCHEMATIC CHANGES

MAKE THE FOLLOWING SCHEMATIC CHANGES:

SYSTEM INTERCONNECT Sheet 2 of 3

Change CN7 and P7 to read CN9 and P9.
Change CN8 and P8 to read CN10 and P10.

SYSTEM INTERCONNECT Sheet 3 of 3

CN18 should be shown broken (CN18 is also shown on P1, P2, and left side of P3).

A1-2 MOTHERBOARD 118-2470-00

Change CN17 Pin 10 DSMTA- to read DSMTB-.

A17A1-1 LOW VOLTAGE REGULATOR 118-2474-00

Change VR1 to read VR3 (in the -12 volt circuit).